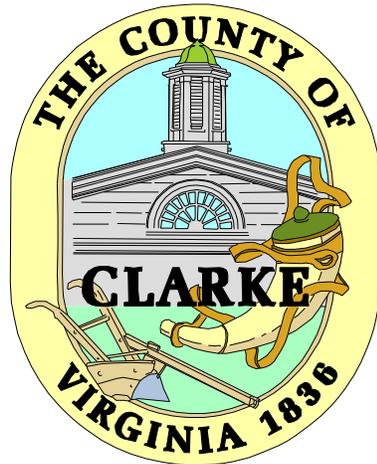


Agricultural Land Plan

Clarke County Comprehensive Plan

Implementing Component Plan



**Adopted by the
Clarke County Board of Supervisors on
February 21, 2017**

ACKNOWLEDGEMENTS

CLARKE COUNTY PLANNING COMMISSION

George L. Ohrstrom, II, Chair (Russell Election District)
Anne Caldwell, Vice Chair (Millwood Election District)
Frank Lee (Berryville Election District)
Gwendolyn Malone (Berryville Election District)
Scott Kreider (Buckmarsh Election District)
Douglas Kruhm (Buckmarsh Election District)
Jon Turkel (Millwood Election District)
Cliff Nelson (Russell Election District)
Randy Buckley (White Post Election District)
Robina Bouffault (White Post Election District)
Mary L.C. Daniel (Board of Supervisors representative)

AGRICULTURAL LAND PLAN SUBCOMMITTEE

Robina Bouffault (White Post Election District)
Randy Buckley (White Post Election District)
Jon Turkel (Millwood Election District)
Corey Childs (Agricultural & Forestal District Advisory Committee)
Emily Day (Agricultural & Forestal District Advisory Committee)

CLARKE COUNTY BOARD OF SUPERVISORS

David Weiss, Chair (Buckmarsh Election District)
Beverly B. McKay, Vice-Chair (White Post Election District)
Terri T. Catlett (Millwood Election District)
Barbara Byrd (Russell Election District)
Mary L.C. Daniel (Berryville Election District)

CLARKE COUNTY PLANNING DEPARTMENT

Brandon Stidham, Planning Director
Ryan Fincham, Senior Planner/Zoning Administrator
Alison Teetor, Natural Resource Planner
Debbie Bean, Administrative Assistant

Clarke County Planning Department
101 Chalmers Court, Suite B
Berryville, VA 22611
540-955-5132

DATE OF PLANNING COMMISSION PUBLIC HEARING AND ADOPTION:

January 6, 2017

DATE OF BOARD OF SUPERVISORS PUBLIC HEARING AND ADOPTION:

February 21, 2017

2016 AGRICULTURAL LAND PLAN

TABLE OF CONTENTS

Statement of Purpose and Plan Application		ii-iii
Chapter I – Plan Goals, Objectives, and Strategies		I-1 – I-5
Chapter II – Background Information		II-1 – II-27
A.	Agriculture in Clarke County	II-1 – II-6
B.	Land Preservation Tools	II-7 – II-10
C.	Agricultural Impacts and Stewardship Efforts	II-10 – II-12
D.	Original Plan Strategies and Action Items	II-12 – II-15
E.	Guidance from the 2013 Comprehensive Plan and Related Component Plans	II-15 – II-27
Chapter III -- Conclusion		III-1 – III-2
Appendix – Additional Maps		A-1 – A-3

MAPS

Map 1 – Important Soils for Agricultural Production	II-5
Map 2 – Properties in the Land Use Taxation Program	A-1
Map 3 – Properties in the County Agricultural & Forestal District	A-2
Map 4 – Conservation Easement Properties	A-3

TABLES

Table 1 – Selected Statistics from the 2012 Census of Agriculture	II-2 – II-3
Table 2 – Important Farmland Value of Soils	II-4
Table 3 – Sliding-Scale Zoning/Dwelling Unit Right Distribution	II-7

2016 AGRICULTURAL LAND PLAN

STATEMENT OF PURPOSE AND PLAN APPLICATION

Statement of Purpose

The Agricultural Land Plan is an implementing component of the Clarke County Comprehensive Plan. The Plan was developed not only to provide tools and approaches for conserving farmland, but to establish and maintain policies and programs for the long-term prosperity of the County's agricultural industries. The Plan was originally developed by the consulting firm Coughlin, Keene, & Associates as a revision to a previous agricultural plan that was adopted in 1987. The Plan was adopted by the Board of Supervisors on September 16, 1997.

The purpose of the Plan is to outline the County's symbiotic relationship with its agricultural industry including approaches to supporting and promoting agriculture as well as guidance for land use planning and development of regulatory tools to preserve farmland. As stated in the 1997 Plan:

In recent years, communities like Clarke County have become more sophisticated in their understanding of the issues involved in agricultural and environmental conservation. They have come to realize that it is not enough to put together a set of individual techniques for conserving farmland. It is necessary to pursue serious programs for comprehensive growth management to limit the amount of non-farm development that takes place in prime farming areas. It is also necessary to take appropriate steps to help farmers increase the profitability of farming. This certainly includes reviewing county regulations to assure that they are as "farmer friendly" as possible. It also involves treating agriculture as part of the economic base of the county and a proper concern for county economic development programs.

The revised 2016 Agricultural Land Plan continues to advance these concepts of preserving farmland, promoting agriculture, and viewing the industry as a key part of the County's economic development program. Development of the revised Plan began in March 2016 with the formation of the Planning Commission's Agricultural Land Plan Subcommittee consisting of three Commissioners (Robina Bouffault, Randy Buckley, and Jon Turkel) and two members of the County's Agricultural & Forestal District (AFD) Advisory Committee (Corey Childs and Emily Day). The Subcommittee's efforts to update the Plan consisted of identifying areas of the 1997 Plan that were out of date as well as addressing new issues impacting agriculture in 2016. The Subcommittee also developed new policies for the revised Plan and organized them in a Goals, Objectives, and Strategies format. A process for reviewing the Plan on a regular five-year schedule was also recommended by the Subcommittee.

The Subcommittee met five times between May and November 2016, and presented an Initial Draft for the Planning Commission's consideration on November 29, 2016.

2016 AGRICULTURAL LAND PLAN

Plan Application

The Plan should be used by property owners, elected and appointed officials, and other interested stakeholders to understand the County's approach to protecting and promoting agriculture. The Plan should also be applied in tandem with the recommendations found in the County's Comprehensive Plan, Economic Development Strategic Plan, Transportation Plan, and other relevant component plans. Examples of some of the ways that this Plan can be used include:

- Determining how the County should provide support to the agricultural industry including dedication of financial and staffing resources.
- Balancing preservation of prime farmland and open space with the need to accommodate current and future growth and economic development.
- Evaluating land development applications and proposed changes to the Zoning and Subdivision Ordinances.
- Reviewing and updating the County's Comprehensive Plan and component plans.

Chapter I contains the Plan's revised list of Goals, Objectives, and Strategies – collectively these items describe the County's program for preserving and promoting the agricultural industry.

Chapter II should be used as a resource for background information on the County's agricultural industry, the Plan's original recommended policies and how these policies have been implemented over time, and recommendations from the 2013 Comprehensive Plan and pertinent component plans that were used to guide the revision of the Plan.

Chapter III describes the process for reviewing and updating the Plan on a regular basis.

2016 AGRICULTURAL LAND PLAN

(this page is intentionally blank)

CHAPTER I

PLAN GOALS, OBJECTIVES, AND STRATEGIES

2016 AGRICULTURAL LAND PLAN

(this page is left intentionally blank)

2016 AGRICULTURAL LAND PLAN

CHAPTER I -- PLAN GOALS, OBJECTIVES, AND STRATEGIES

This Chapter contains the Agricultural Land Plan's Goals, Objectives, and Strategies. The Goals Statement depicts the purpose and long-term expectations of the Plan in general terms. The Objectives describe the specific topics to be addressed in furtherance of the Goals Statement. Strategies are detailed action items to be followed to implement the Plan's Goals and Objectives.

A. Goals Statement

The Goals of the 2016 Agricultural Land Plan are as follows:

- 1. Actively support the practice of agriculture and the preservation of agricultural land.**
- 2. Promote agricultural industry and business.**
- 3. Establish land use and regulatory policies to support the agricultural sector and preserve agricultural land.**

Section B below lists the Objectives associated with each of the three Goals and the recommended implementation Strategies for each Objective.

B. Plan Objectives and Strategies

GOAL 1: Actively support the practice of agriculture and the preservation of agricultural land.

Objective 1. Support a vigorous agricultural development program as recommended by the County Comprehensive Plan and Economic Development Strategic Plan.

Strategy (a). Appoint a County advisory committee to serve as a forum for cooperative discussion of issues affecting the agricultural community and to provide recommendations to the Board of Supervisors on policy issues affecting agriculture. As an alternative, consider assigning this role to an existing County committee such as the Agricultural and Forestal District (AFD) Advisory Committee.

Strategy (b). Evaluate the creation of a formal agricultural development program that includes assignment of County staffing and financial resources. Consider establishing the program, at its onset, as part of the County's Economic Development Department work program with support from the Department of Planning.

Strategy (c). Partner with the Virginia Cooperative Extension, local Farm Bureau, and other pertinent agencies and organizations to conduct periodic surveys of the

2016 AGRICULTURAL LAND PLAN

agricultural community to evaluate current and future needs that the County may help to address.

Strategy (d). Utilize the internet, websites, and social media to promote agriculture and Clarke County products.

Strategy (e). Develop a database of County agricultural operations and support businesses in order to effectively communicate programs and other opportunities to the community and interested stakeholders.

Objective 2. Continue to support and promote Land Use Taxation, Agricultural & Forestal District (AFD), and Conservation Easement programs.

Strategy (a). Develop outreach and social media tools to inform the public of the benefits of these programs and explain their value to the community as a whole.

Strategy (b). Continue to support efforts to place prime farmland and large agricultural parcels into permanent conservation easement including leveraging grants with local funds to purchase dwelling unit rights as a means of permanently preserving lands for agriculture.

Objective 3. Facilitate the availability of broadband internet for the agricultural industry, its business activities, and farm residents.

Strategy (a). Solicit feedback from the agricultural community on ways that they use broadband internet access to streamline and enhance day-to-day operations. Use the feedback in conjunction with efforts to expand broadband availability throughout the County.

Objective 4. Take a proactive role to ensure that the potential environmental impacts of agriculture are mitigated and that the interests of future development do not collide with the interests of the agricultural community.

Strategy (a). Continue to support programs that help mitigate adverse impacts on the County's streams and waterways, e.g., stream fencing and streambank restoration projects. Continue partnering with agencies such as the Lord Fairfax Soil & Water Conservation District and the Natural Resources Conservation Service, and pursue grant opportunities in support of these programs.

Strategy (b). Maintain existing and work to create new land development regulations that ensure the separation of agricultural uses from residential and commercial uses. Examples include perimeter buffering of agricultural parcels, setback distances from property lines, and subdivision plat notes regarding existing agricultural operations on AOC-zoned properties.

2016 AGRICULTURAL LAND PLAN

Strategy (c). Allow intensive livestock facilities as required by State law, ensuring that site development regulations mitigate potential adverse environmental impacts on surrounding properties and waterways.

GOAL 2: Promote agricultural industry and business.

Objective 1. Encourage agricultural ventures of all sizes whether very large, mid-range, or small farms. Support non-traditional agricultural enterprises including but not limited to equine, specialty growers, local food/pick-your-own, farm-to-table, and agri-tourism.

Strategy (a). Ensure that marketing/outreach initiatives and County agricultural projects and programs consider the diverse needs and involve all facets of the agricultural industry equally.

Objective 2. Ensure that the County's economic development program includes projects that promote the County's agricultural industry.

Strategy (a). Develop partnerships and resources to link existing farmers and agricultural-related business owners with emerging farmers, agricultural entrepreneurs, landowners, and the general public.

Strategy (b). Participate in regional agricultural economic development programs and activities. Establish partnerships that are consistent with the County's agricultural goals and policies.

Objective 3. Encourage the development of businesses that provide products and services to support the agricultural community.

Strategy (a). Explore the feasibility of establishing or attracting agricultural support facilities for production and sales of agricultural products such as farm markets, co-ops, canneries, and farm equipment sales/service businesses.

GOAL 3: Establish land use and regulatory policies to support the agricultural sector and preserve agricultural land.

Objective 1. Ensure that the County's land use policies and regulations are consistent with the current and future needs of the agricultural community.

Strategy (a). Conduct periodic reviews of zoning regulations to balance the needs of the agricultural community with ensuring that potential impacts such as traffic safety, agricultural waste/runoff, and other environmental concerns are effectively addressed.

2016 AGRICULTURAL LAND PLAN

Strategy (b). Consider developing regulations for landowners to create farmland of various sizes for purchase or lease. Establish design criteria to ensure that the regulations are not used to create large residential lots that are not farmed.

Strategy (c). Consider increasing housing opportunities for farm families and farm workers. Evaluate current zoning and subdivision regulations regarding dwelling unit right usage, lot size requirements, tenant houses, and accessory dwellings (less than 600 square feet).

Strategy (d). Support agricultural-related uses as a means of preserving the character and historic value of large homesteads and their associated lands.

Strategy (e). Ensure that future updates of the County Comprehensive Plan and relevant component plans are coordinated with the current goals, objectives and strategies of the Agricultural Land Plan.

Objective 2. Ensure that future residential and commercial development does not conflict with existing agricultural operations or consume prime farmland.

Strategy (a). Continue to support the sliding-scale zoning system and the County's approach to land use decision-making.

Strategy (b). Prevent the expansion of the Rural Residential (RR) zoning district beyond the boundaries of the County's unincorporated villages and existing residential communities. Prevent the expansion of commercial zoning districts beyond the boundaries of designated business intersections unless supported by the applicable business intersection area plan.

Strategy (c) Support efforts to permanently preserve lands that are located adjacent to the corporate boundaries of Berryville and Boyce that contain significant natural, historical or cultural resources; have unique scenic beauty; or possess prime farmland characteristics. Consider providing flexibility for these properties to be used as passive recreational parks, educational resources, scenic greenways, or similar uses as an amenity for nearby residents.

Objective 3. Ensure that non-traditional agricultural activities do not significantly expand beyond the scope of agriculture and the intent of the Right to Farm Act. Maintain dividing lines by designating special uses or prohibiting uses that exceed the scope of agriculture.

Strategy (a). Solicit input from the agricultural community on Zoning Ordinance text amendments that propose commercial or public assembly activities in conjunction with agricultural operations.

2016 AGRICULTURAL LAND PLAN

Strategy (b). Continue to use the County's special event permitting process to allow periodic public assembly activities in agricultural areas as an alternative to permanent public event centers.

2016 AGRICULTURAL LAND PLAN

(this page is intentionally blank)

CHAPTER II

BACKGROUND INFORMATION

2016 AGRICULTURAL LAND PLAN

(this page is left intentionally blank)

2016 AGRICULTURAL LAND PLAN

CHAPTER II – BACKGROUND INFORMATION

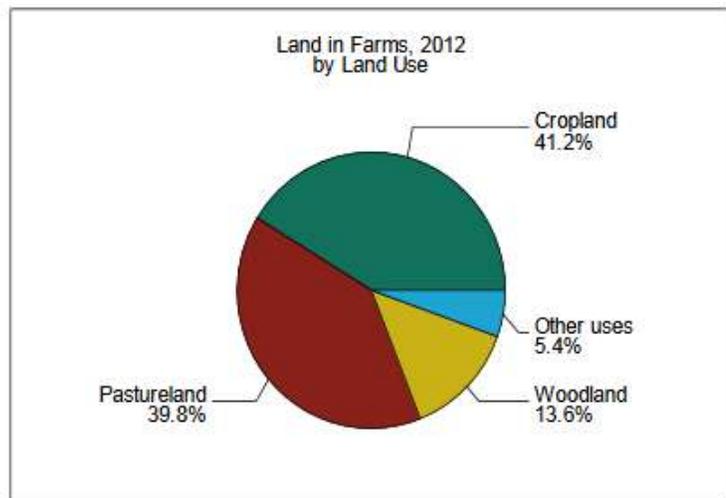
A. Agriculture in Clarke County

1. Farming Sectors

a. Traditional Farming/USDA Census of Agriculture

The U.S. Department of Agriculture conducts a Census of Agriculture on a five-year basis and is the most comprehensive source of statistical information on agriculture. The current census was conducted in 2012 and the results were released to the public in May 2014. As with the United States Census held every ten years to determine population demographics, the accuracy of results for the Census of Agriculture is heavily dependent upon participation by the agricultural producers.

Below in Table 1 is a list of selected statistics for Clarke County from the 2012 Agricultural Census. In general terms, approximately 80% of County farms are in either cropland or pastureland. The remaining 20% is in woodland/forestry use or “other uses.” A total of 477 farms responded to the census covering 66,946 acres (approximately 60% of the total County land area) with an average farm size of 140 acres. Of these farms, approximately 80% were reported as being between 1 and 179 acres in size. A total of 17 farms were reported as being 1000 acres or larger.



Source -- 2012 Agricultural Census

The total market value of products sold was reported at \$25,917,000 which ranks Clarke County 42nd out of 98 total Virginia counties. Of this number, \$8,573,000 is crop value and \$17,344,000 is the value of livestock, poultry, and their products. The average market value per farm is \$54,333.

Regarding value of sales by commodity group, the category “horses, ponies, mules, burros, and donkeys” leads the list at \$8,398,000 and ranks the County as 1st in the state for this category. The categories “Cattle and calves” and “grains, oilseeds, dry beans, dry peas” follow on the list at \$5,704,000 and \$4,388,000 respectively. The top crop item category for the County is “forage land used for hay, haylage, grass silage and greenchop” at 16,235 acres. The top livestock inventory item category is “cattle and calves” at 13,163. Also of note is the County’s top ranking in the category “colonies of bees” at 969.

2016 AGRICULTURAL LAND PLAN

TABLE 1 -- Selected Statistics from 2012 Census of Agriculture

Number of Farms	477
Land in Farms	66,946 acres
Average Size of Farm	140 acres
Farms by Size	
1-9 acres	42
10-49 acres	183
50-179 acres	155
180-499 acres	75
500-999 acres	5
1000+ acres	17
Land in Farms, By Land Use	
Cropland	41.2%
Pastureland	39.8%
Woodland	13.6%
Other uses	5.4%
Total Market Value of Products Sold	\$25,917,000 (State Rank ¹ – 42 nd)
Value of crops (including nursery and greenhouse)	\$8,573,000 (State Rank – 46 th)
Value of livestock, poultry, and their products	\$17,344,000 (State Rank – 29 th)
Average Per Farm	\$54,333
Value of Sales by Commodity Group	
Horses, ponies, mules, burros, and donkeys	\$8,398,000 (State Rank – 1 st)
Cattle and calves ²	\$5,704,000 (State Rank – 36 th)
Grains, oilseeds, dry beans, dry peas	\$4,388,000 (State Rank – 44 th)
Nursery, greenhouse, floriculture, sod	\$1,601,000 (State Rank – 29 th)
Other crops and hay	\$1,494,000 (State Rank – 36 th)
Other animals and other animal products	\$802,000 (State Rank – 2 nd)
Fruits, tree nuts, and berries	\$772,000 (State Rank – 15 th)
Vegetables, melons, potatoes, sweet potatoes	\$232,000 (State Rank – 41 st)
Cut Christmas trees and short rotation woody crops	\$88,000 (State Rank – 15 th)
Poultry and eggs	\$49,000 (State Rank – 45 th)
Hogs and pigs	\$49,000 (State Rank – 34 th)
Top Crop Items (acres)	
Forage land used for hay, haylage, grass silage, and greenchop	16,285 acres (State Rank – 35 th)
Corn for grain	2,922 acres (State Rank – 34 th)
Soybeans for beans	2,253 acres (State Rank – 51 st)
Corn for silage	727 acres (State Rank – 36 th)
Barley for grain	232 acres (State Rank – 32 nd)

¹ State ranking is based on a total of 98 Virginia counties.

² Data on milk production as well as production of sheep, goats, wool, and mohair is withheld to avoid disclosing data for individual operations.

2016 AGRICULTURAL LAND PLAN

Top Livestock Inventory Items (total number)	
Cattle and calves	13,163 (State Rank – 41 st)
Layers	3,483 (State Rank – 25 th)
Horses and ponies	2,583 (State Rank – 6 th)
Sheep and lambs	2,057 (State Rank – 14 th)
Colonies of bees	969 (State Rank – 1 st)

b. Non-traditional farming/agritourism

The concepts of non-traditional farming activities and “agritourism” were not directly addressed in the 1997 Agricultural Land Plan but have become important components of the County’s agricultural industry and economic development strategy over the past two decades. With the County’s proximity to the Washington, DC metropolitan area, the County is ideally positioned to share its agricultural resources with weekend visitors to the County and with urban markets and restaurants to the east.

The County is currently the home to farm wineries, Christmas tree farms, pick-your-own farms providing fruits and vegetables, farm markets, and seasonal agricultural events. Efforts to assist and promote agribusiness and agritourism activities has been incorporated into the County’s economic development work program and features prominently in the County’s Economic Development Strategic Plan. The County has also incorporated new State regulations regarding farm breweries and farm distilleries to allow those uses as new permitted activities in the AOC and FOC Districts.

2. Farmland Quality and Soil Type/LESA system

About 40% of the land in Clarke County is suitable for some type of cultivated farm crop. Best suited for agriculture are Soil Group 5, which forms a strip through the center of the County, and Soil Group 8, which includes the floodplain of the Shenandoah River (see Table 2 below). In addition to the general soil classifications, the U.S. Department of Agriculture (USDA) characterizes soil types in terms of important farmland. This classification recognizes areas important to agricultural production, with responsibility given to governing bodies, in cooperation with the USDA, for classifying farmlands within their jurisdictions.

- a. Prime farmland is land that has the best combination of physical characteristics for the production of food, fiber, forage, oilseed, and other agricultural crops, with minimum inputs of fuel, fertilizer, pesticides, and labor and without intolerable soil erosion. Prime farmland includes land that also possesses the above characteristics but is currently being used to produce livestock and timber. It does not include land already in or committed to urban development or water storage.
- b. Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops. It has the special combination of soil quality,

2016 AGRICULTURAL LAND PLAN

location, growing season, and moisture supply needed to produce sustained high quality or high yields of specific crops economically, when treated and managed according to acceptable farming methods.

Examples of such crops include citrus, tree nuts, olives, cranberries, fruit, including grapes, apples, and vegetables.

- c. Farmland of statewide importance is land other than prime or unique farmland that is of statewide importance for the production of food, feed, fiber, forage, or oilseed crops.
- d. Farmland of local importance is land that is neither prime nor unique but is of local importance for the production of food, feed, fiber, forage, or oilseed crops.
- e. Other is land that is usually of little or no importance to agriculture and includes all map units not assigned to a higher class.

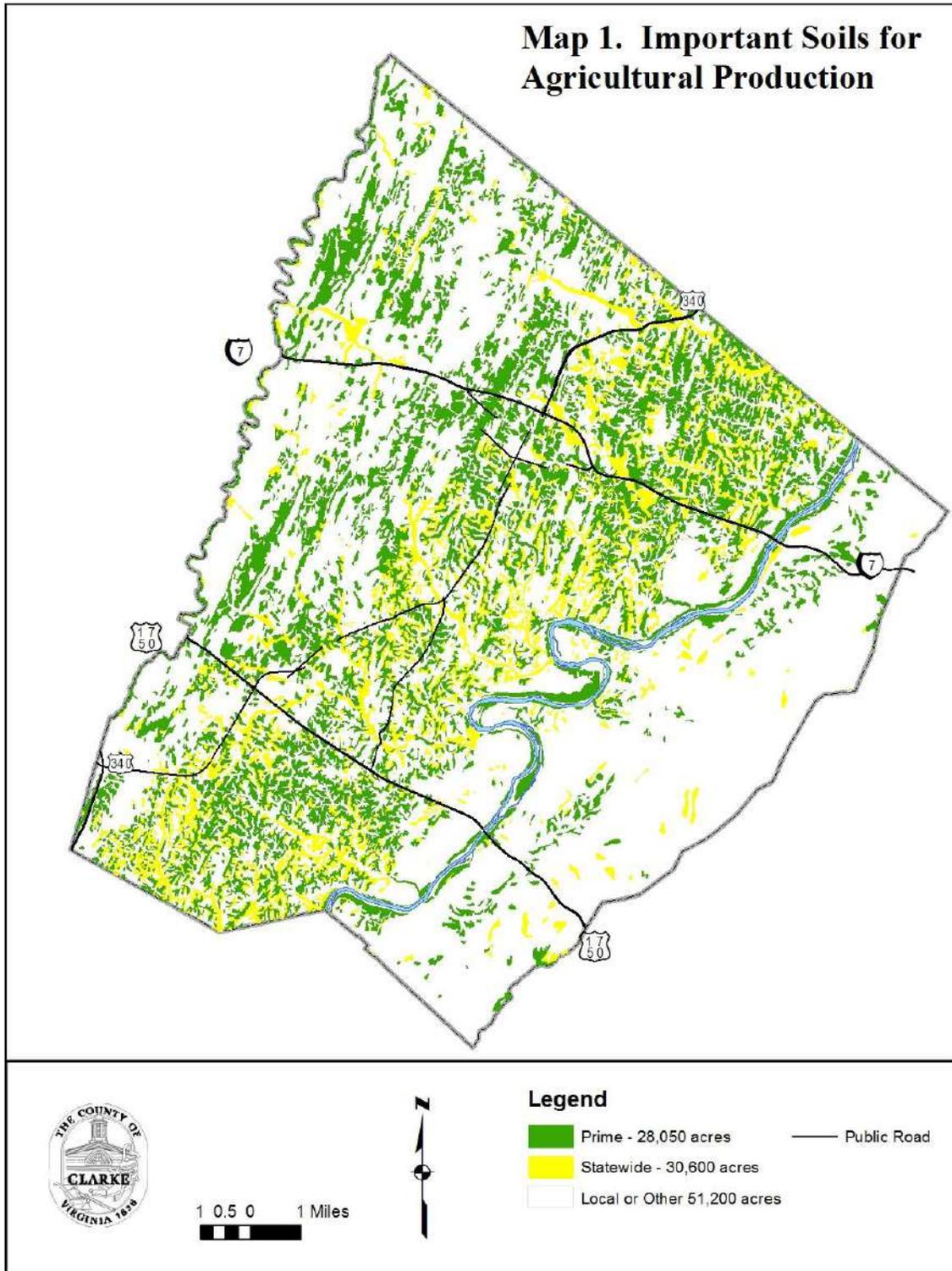
Clarke County further classified farmland types into categories described in Table 2 and shown on Map 1 below. These categories are used with the Land Evaluation and Site Assessment (LESA) system. The LESA system is a technique developed by the USDA's Natural Resources Conservation Service (NRCS) to evaluate the productivity of agricultural land and its suitability or non-suitability for conversion to nonagricultural use. The NRCS, previously referred to as the Soil Conservation Service (SCS), assisted the County in developing the categories and implementing the system in 1982.

TABLE 2 – Important Farmland Values of Soils

Group #	Acreage	% of Total Land Area
1 (prime, nonrocky)	9,395	8.7%
2 (prime)	12,107	11.0%
3 (prime, rocky)	6,552	5.9%
4 (Statewide)	16,189	14.8%
5 (Statewide)	14,418	13.1%
6 (Local)	4,687	4.3%
7 (Local)	17,052	15.5%
8 (Local)	6,431	5.9%
9 (Local)	18,199	16.6%
10 (Other)	4,643	4.2%

* Soil Survey of Clarke County, 1982.

2016 AGRICULTURAL LAND PLAN



2016 AGRICULTURAL LAND PLAN

The LESA System has two components:

1. Land evaluation, which is based on soil survey information and indicates the agricultural suitability of soil types in a given area, and
2. Site assessment, which identifies factors other than soils that contribute to the suitability of an area for retention in agriculture.

The LESA system is used by the County in the following decision-making circumstances:

Rezoning

When a landowner requests that his or her land be rezoned from agricultural/open space/conservation to a more intense use, the county considers the LESA rating of the land along with many other factors. The LESA rating, therefore, does not determine the final rezoning decision. Rezoning cases are often complicated, and the resulting decisions are highly discretionary.

Agricultural and Forestal District (AFD)

Applications to have a property included in the County's Agricultural & Forestal District (AFD) are evaluated through a more systematic use of LESA ratings. Each farm proposed for inclusion receives a LESA rating, which determines whether a farm is eligible for inclusion in the district. Farms rated at 70 or more are eligible to join the district. Farms rated between 60 and 70 are eligible if they are not located near existing towns. Farms rated below 60 are generally not eligible.

Although the LESA rating is the dominant factor used in determining eligibility, other factors are also used. Eligible farms must be zoned AOC or FOC and be located outside town limits. In addition, certain lands adjacent to qualifying farms can be admitted to the districts. Furthermore, the LESA may be discounted when compelling information indicates that a farm is more deserving of membership on the district than the LESA rating indicates.

Lot Size

The County Zoning Ordinance includes a maximum lot size requirement of four acres for parcels that are zoned Agricultural-Open Space-Conservation (AOC). An exception to the maximum lot size requirement can be granted through the subdivision review process if the applicable area of the parent tract is not considered to be "important farmland" through a LESA evaluation. Resources for conducting a detailed LESA evaluation are retained on file in the County's Department of Planning.

2016 AGRICULTURAL LAND PLAN

B. Land Preservation Tools

1. Sliding-scale zoning

Sliding-scale zoning was implemented by the County in 1980 to preserve agricultural land and the rural character of the County. The sliding-scale zoning system allocates dwelling unit rights (DURs) for parcels of land and specifies a maximum number of dwelling units that may be built in the Agricultural-Open Space-Conservation (AOC) Zoning District and Forestal-Open Space-Conservation (FOC) Zoning District. There are two key components to the system:

The “sliding-scale” and parcel size

The term, “sliding-scale,” reflects the fact that the overall density of dwelling units per acre decreases on a “sliding-scale” based on the increasing acreage of the parcel of record. In other words, the larger the parcel, the lower the overall residential density will be. This approach, paired with maximum lot size requirements, helps to ensure that parcels of record are kept in large sizes to facilitate farming and open space preservation.

Table 3 below was adopted with sliding-scale zoning in 1980 along with the corresponding DUR assignments to parcels in the County at the time. The sliding-scale chart has remained unchanged since its adoption.

TABLE 3 – Sliding Scale Zoning/Dwelling Unit Right Distribution

Size of Tract Permitted	Dwelling Unit Rights Assigned	Average Resultant Density
0-14.99 acres	1	1 unit/7.495 acre
15-39.99 acres	2	1 unit/13.748 acres
40-79.99 acres	3	1 unit/19.998 acres
80-129.99 acres	4	1 unit/26.249 acres
130-179.99 acres	5	1 unit/30.999 acres
180-229.99 acres	6	1 unit/34.166 acres
230-279.99 acres	7	1 unit/36.428 acres
280-329.99 acres	8	1 unit/38.124 acres
330-399.99 acres	9	1 unit/40.555 acres
400-499.99 acres	10	1 unit/44.999 acres
500-599.99 acres	11	1 unit/49.999 acres
600-729.99 acres	12	1 unit/55.416 acres
730-859.99 acres	13	1 unit/61.153 acres
860-1029.99 acres	14	1 unit/67.499 acres
1030 acres or more	15	1 unit/68.666 acres (max)

Fixed allocation

DURs were assigned for each parcel as depicted on the County tax maps on October 17, 1980. The DUR allocation is a fixed number that cannot be increased absent approval of a rezoning to a higher density residential zoning district by the Board of Supervisors. The DUR allocation

2016 AGRICULTURAL LAND PLAN

records are managed by the Department of Planning and the number of available DURs is reduced as landowners build houses or “retire” DURs by placing their property under permanent conservation easement. Having a fixed number of DURs enables an accurate projection of the maximum residential “build-out” potential for the County’s rural areas.

2. Designated growth areas

Hand in hand with the sliding-scale zoning system is the County’s designation of specific areas where residential and commercial growth may occur. These areas include the incorporated towns of Berryville and Boyce and the business intersections at Waterloo (U.S. 340 and U.S. 50/17) and Double Tollgate (U.S. 340, U.S. 522, and Va. 255). The areas are designated for potential growth at a suburban scale due to their proximity to existing or future public infrastructure – e.g., public water, public sewer, schools, and the primary highway transportation network. Outside of these growth areas, the County projects only rural-scale residential and business uses.

These growth areas are outlined in the Comprehensive Plan and are not planned for expansion absent detailed study and determination of the need for additional suburban-scale land. Adhering to the designated growth areas helps to preserve farmland from development and curb suburban sprawl that can increase demand for public infrastructure improvements.

3. Maximum lot size requirement – AOC District

Another important tool to preserve farmland is the maximum lot size requirement of four acres in the Agricultural-Open Space-Conservation District (AOC). While many jurisdictions have minimum lot size requirements to manage density and ensure adequate area for private wells and septic system, Clarke County has added a maximum lot size in the AOC District to produce small, rural-scale residential lots with large residual parcels that are conducive to agriculture. As an example, a 100 acre parcel with 4 assigned DURs would not be permitted to be divided into four 25-acre tracts. The maximum lot size requirement would instead produce a subdivision of three 3-acre lots and one residual 91 acre lot each with one assigned DUR each. This regulation helps to minimize the amount of land used for residential purposes and maximize the amount of remaining land for potential agricultural and open space uses.

4. Conservation easements

The Clarke County Conservation Easement Authority (CEA) was created by the Clarke County Board of Supervisors on June 18, 2002 to administer the Clarke County Easement Purchase Program (CEP Program). The general purpose of the CEP program is to protect and preserve land with significant agricultural, natural, scenic, and historic resources. In furtherance of the general purpose, the specific duties of the CEA and the CEP Program include, but are not limited to:

- Developing selection criteria for easement properties
- Promoting the easement program among County landowners
- Identifying and pursuing potentially valuable easements in areas of prime farmland or unique scenic beauty

2016 AGRICULTURAL LAND PLAN

- Soliciting and receiving voluntary applications from property owners
- Ranking applications in accordance with the Selection Criteria
- Selecting proposed easements to be appraised and commissioning appraisals for them
- Determining the Purchase Price for selected parcels using the appraised value of the proposed easement and the Income Criteria
- Applying for and pursuing grants and other funding sources
- Monitoring properties to determine compliance with the terms of easements purchased, and taking action to enforce compliance if necessary
- Conducting periodic reviews of the CEP Program to determine if its purposes are being met

The program is housed within the Clarke County Planning Department and managed by the Natural Resource Planner who works under the direction of the seven-member Conservation Easement Authority to promote and oversee the program. The Easement Purchase Program is funded by the Board of Supervisors in the county budget or by special appropriation. Since the program's inception, these local funds have successfully been used to leverage grants and other funding sources to purchase easements. As of October 2016, the CEA holds 6,594 acres or 5.8% of the total land area of the County. A total of 24,717 or 21.7% of the total land area in the County is in permanent conservation easement held by the CEA and other organizations.

5. Use Value Assessment

Clarke County maintains a use value assessment program (also referred to commonly as "land use taxation") through the office of the Commissioner of the Revenue that allows properties in active agricultural or horticultural production to be assessed at a lower rate resulting in a lower annual real estate tax payment. The program, authorized by the Code of Virginia, provides a valuable incentive for landowners to maintain their properties in active agricultural production. The use value assessment method produces a savings to property owners because it assumes the resale value of the property if kept exclusively in agricultural production. This differs from a fair market value assessment in which the "highest and best" use of the property is assumed in determining the value of the property.

The use value assessment program requires an initial application and provision of information annually to verify compliance with program requirements. Properties in agricultural or horticultural production must be a minimum of five acres and properties in forestal production must be a minimum of twenty acres in order to qualify for use value assessment.

6. Agricultural & Forestal District

Related to the use value assessment program, the Clarke County Agricultural & Forestal District (AFD) is another tool to encourage the preservation of farmland and active agricultural production. The benefits of the AFD are as follows:

- Land in the District, which otherwise meets the criteria for land use value taxation, automatically qualifies for the Land Use Assessment program (administered by the Commissioner of the Revenue) for the duration of the District term even if the County

2016 AGRICULTURAL LAND PLAN

rescinds the Land Use Assessment program. The Land Use Assessment program provides tax benefits to property owners that meet eligibility requirements for agricultural, forestal, horticultural, or open space uses.

- The District safeguards the rural character of the community by preserving agricultural, forestal, and open space land and providing safeguards against the adoption of local ordinances that unreasonably restrict farm structures, farming, or forestry practices unless the restrictions are directly related to health, safety, and welfare.
- The District also offers some protections against eminent domain. Acquisition of land for power lines, roadways, and other infrastructure within a District is subject to a special public review process. Also, the expenditure of public funds for non-farm related purposes in a District is subject to a special review process.

Clarke County first established a district in 1980 with a 6-year district renewal period (the State allows renewal periods of a minimum of 4 years and a maximum of 10 years). The district was renewed in 1986, 1992, 1998, 2004, 2010, and 2016. Approximately 35,000 acres are in the AFD program.

C. Agricultural Impacts and Stewardship Efforts

1. Water quality programs

In addition to the goals of preserving farmland and promoting the agricultural industry, the County has an equally important goal of protecting the quality of its surface and ground water resources. Due to the nature of some agricultural activities, these interests can sometimes become competing ones.

The Virginia Right to Farm Act provides protections to agricultural operations by limiting the extent to which they may be regulated by local zoning. Any zoning ordinance provisions that are adopted to regulate agriculture cannot “unreasonable restrict or regulate” farming activities and structures unless they bear a direct relationship “to the health, safety, and general welfare” of the County’s citizens.

In an effort to balance these potentially competing interests, the County has chosen to work cooperatively with the agriculture community to obtain voluntary use of best management practices to protect surface water resources. These efforts include encouraging farmers to avoid highly erodible lands and to maintain minimal levels of fertilizer and pesticide application, voluntary fencing to protect streams from livestock impacts, streambank restoration projects, and off-site watering programs. In many cases, the County has pursued grant funding and in-kind assistance from partnering organizations to promote and implement these programs. These programs have been widely utilized by producers to improve the quality of the County’s waterways.

2016 AGRICULTURAL LAND PLAN

2. Biosolids

On July 15, 1997 the Board of Supervisors approved the adoption of a text amendment establishing standards for the land application of biosolids. Beginning in 1998, two companies (Bio Gro and Recyc Systems) began applying biosolids in the County. Currently Synagro (formally Bio-Gro) and Wright Trucking spread biosolids on area farms. The following table summarizes the acreages applied each year.

Biosolids Applications

Year	Acres	# Farms
1998	180	2
1999	625	3
2000	0	0
2001	1830	11
2002	1145	11
2003	350	3
2004	150	4
2005	263	3
2006	950	9
2007	1,063	10
2008	1,307	13
2009	1,287	13
2010	1,989	21
2011	1,800	18
2012	1,539	18
2013	838	8
2014	1,784	23
2015	665	13
17 Year Total	17,100	

In 2004, State law repealed counties' ability to regulate biosolids application beyond testing and monitoring. The change permitted Counties to request reimbursement for expenses relating to monitoring and testing but eliminated increased setback standards that Clarke County had adopted to protect ground and surface water resources in sensitive Karst areas. The County has maintained the services of a biosolids monitoring consultant since 1998 under this State reimbursement program.

Beginning January 1, 2008 the Virginia Department of Environmental Quality (DEQ) assumed regulatory oversight of all land application of treated sewage sludge, commonly referred to as biosolids. This action, which moves oversight of the Biosolids Use Regulations from the Virginia Department of Health to DEQ, was at the direction of the 2007 General Assembly, which voted to consolidate the regulatory programs so that all persons land applying biosolids would be subject to uniform requirements, and to take advantage of the existing compliance and enforcement structure at DEQ.

DEQ has established an Office of Land Application Programs within the Water Quality Division to manage the biosolids program, as well as land application of industrial sludge, septage, livestock and poultry waste, and water reclamation and reuse. The

Virginia Department of Health will continue to consult with DEQ and advise the public on health issues related to biosolids applications.

All applications have been closely monitored by County and State representatives and have been in compliance with all requirements. In accordance with State Regulations, counties may be reimbursed for the testing and monitoring expenses; in 2015 the County was reimbursed \$5,453.87.

A total of 11,125 acres area permitted for biosolids application in the County -- proportionately more than many other counties in the area -- and averaging 18,000 wet tons per year. Biosolids contain about 5-8 pounds of nitrogen per ton. There is interest and concern about the effect of biosolids application on the quality of ground water in Clarke County. In order to address this concern, the County applied for and received two grants in 2013, totaling \$16,000 to monitor 10

2016 AGRICULTURAL LAND PLAN

springs in northern Shenandoah Valley for discharge, TN, TP, ammonia, ortho phosphate, nitrate-nitrite, E. coli, flow, and general water chemistry. Springs are located in Karst areas. The purpose is to identify contribution of contamination from springs to surface waters to assist in 1) determining appropriate BMP's on agricultural lands and 2) impact of biosolids applications on water quality as compared to other fertilizer sources. A report detailing the study is available from the Planning Department.

3. Intensive Livestock Facilities

As previously noted above, the Virginia Right to Farm Act limits local regulation of agricultural activities in zoning districts where agriculture is allowed by right, and any zoning ordinance regulations that are adopted must bear a relationship to protecting the health, safety, and welfare of County residents.

Intensive facilities for livestock, dairy, and poultry – due to their size and large concentration of animals – can often produce adverse impacts on a much greater scale in terms of odor and potential for agricultural runoff. For this category of agriculture, the County adopted special zoning regulations in 1995 and 2000 to ensure that these potential adverse impacts are mitigated. All agricultural operations that meet the criteria to be considered an intensive livestock facility are required to have a nutrient management plan that has been approved by the Virginia Department of Conservation and Recreation, a Virginia Pollution Discharge Elimination System (VPDES) permit issued by the Virginia Department of Environmental Quality, and a Development Plan showing compliance with all required setbacks. Intensive livestock facilities are defined as livestock or dairy operations which have at least 300 animal units or a poultry operation with at least 200 animal units where such animals are confined for at least 45 days or more in a 12 month period.

Intensive livestock regulations also include more stringent setback requirements from residential zoning districts and incorporated town boundaries, property lines and public rights of way, streams, springs, wells, and sinkholes.

D. Original Plan Strategies and Action Items

This section lists the original nine policies that were recommended in the 1997 Agricultural Land Plan and describes the degree to which each policy has been implemented to date.

- Policy 1. Encourage and Expand the Activities of Agricultural Committees:*
- * *The Agriculture Committee of the County Planning Commission*
 - * *The Economic Development Committee of the County Farm Bureau*

Implementation Status. The Planning Commission Agriculture Committee was formed to serve as an advocate for agricultural interests and to advise the full Commission on matters affecting County agriculture. The Farm Bureau's Economic Development Committee evaluated several elements of the agricultural industry and helped to promote programs and efforts to expand agriculture from an economic development perspective. As of 2016, the Planning Commission

2016 AGRICULTURAL LAND PLAN

no longer maintains an Agriculture Committee as one of the standing committees, and the County is not an active participant in the Farm Bureau's Economic Development Committee.

Policy 2. Include the promotion of Agriculture and Related Businesses in the responsibilities of the County Economic Development Coordinator

Implementation Status. Support and promotion of the agricultural industry is a prominent issue addressed in the County's Economic Development Strategic Plan that was adopted by the Board of Supervisors in 2014. The Strategic Plan contains specific recommendations for promotional activities to be coordinated by the County's economic development director. This key staff position was incorporated into the duties of other County staff members for several years until the hiring of a part-time Director of Economic Development and Tourism in the spring of 2015. Supporting agriculture, agribusiness, and agritourism has been formally incorporated into the duties of this position and is an important part of the County's economic development program.

Policy 3. Keep Land Use Taxation

Implementation Status. The County continues to maintain and support the Land Use Assessment Program through the office of the Commissioner of the Revenue. Parcels of at least five acres in agricultural production or at least twenty acres of forestry production can qualify for assessment at the land use rate. The County also continues to maintain the Agricultural & Forestal District (AFD) program in accordance with Code of Virginia §15.2-4300 through 4314, and recently added a process for allowing parcels to apply for District inclusion prior to the expiration of the six-year District term. The AFD program allows properties to qualify immediately for the Land Use Assessment Program as a landowner benefit, and also allows properties to continue land use assessment even if the locality chooses to end their land use assessment program.

Policy 4. Consider Proposing Changes to State Agricultural District Regulations

Implementation Status. To date, the County has not proposed any changes to the State's agricultural district regulations. The General Assembly has made changes to the program in recent years to simplify the review process and public hearing requirements as well as to allow more opportunity to add land to a district. These changes helped to address concerns that County staff has had as program administrators.

Policy 5. Encourage the Creation of a Clarke County Agricultural and Forestal Land Trust

Policy 6. Consider the Purchase of Agricultural Conservation Easements by the County

Implementation Status. The Clarke County Conservation Easement Authority was created by the Board of Supervisors in 2002 to manage the County's easement purchase program. In addition to purchasing dwelling unit rights for permanent land preservation, the Authority also evaluates and accepts donation of lands for conservation easements. A more detailed description of the Authority is included in Section C above.

2016 AGRICULTURAL LAND PLAN

Policy 7. Require an Agricultural Disclaimer in Agreements of Sale for Land in the AOC Zoning District

Implementation Status. The Code of Virginia does not authorize localities to require agricultural disclaimers to be included in land sale agreements. However, the County has adopted requirements for the following agricultural disclaimer to be included in all subdivision record plats for properties in the AOC District:

AGRICULTURAL OPERATIONS NOTICE

This property is in the Agricultural-Open Space-Conservation (AOC) Zoning District. Agriculture is the primary economic activity of this zoning district. Owners, residents, and other users of property in the AOC District may be subjected to inconvenience, discomfort, and the possibility of injury to property and health arising from agricultural operations even though conducted in accordance with best management practices and/or in accordance with existing laws and regulations of the Commonwealth and the County. Such agricultural operations may generate noise, odors, and dust, may involve the operation of machinery, including aircraft, the storage and disposal of manure, and the application of fertilizer, soil amendments, and pesticides. Owners, occupants, and users of land in the AOC district should be prepared to accept such inconveniences or discomfort as a normal and necessary aspect of living in a zoning district in a county with a strong rural character and an active agricultural sector.

While this requirement does not extend to all plats, it does apply to all record plats for minor and major subdivisions and ensures that this information appears in the chain of title for all newly created parcels.

Policy 8. Adopt Site Design Guidelines for Subdivisions in the AOC and FOC Districts

Implementation Status. Since 1997, a number of regulations have been added to the Zoning and Subdivision Ordinance that were aimed at minimizing the impact on sensitive environmental and agricultural resources. Some of the more prominent changes include:

- Design criteria for AOC and FOC District subdivisions to minimize impact on topographic, scenic, and environmentally-sensitive features.
- Vegetated property buffer requirements for new and recently-created parcels.
- Allowing maximum lot size exceptions when land is placed in permanent conservation easement or preventing the creation of a parcel with low quality land characteristics.
- Modifications to building setbacks based on acreage.
- Establishment of a Stream Protection Overlay to provide additional buffers and safeguards for perennial and intermittent streams from development.
- Special design requirements for FOC District subdivisions including additional pre- and post-construction meeting and site inspection requirements, buffering and vegetative preservation requirements for slopes and property lines, and certification regulations for agricultural and forestal clearing.

2016 AGRICULTURAL LAND PLAN

The Planning Commission and Department of Planning Staff also evaluate proposed subdivisions and encourage the voluntary provision of building sites that are located to maximize the use of large parcels for agricultural activities.

Policy 9. Promote agriculture-related businesses in AOC, such as pick-your-own operations, farm stands, and other ways of increasing farmers' agricultural income.

Implementation Status. The 2014 Economic Development Strategic Plan includes specific recommendations to promote these agriculture-related businesses. The Planning Commission and Board of Supervisors also regularly evaluate the Zoning and Subdivision Ordinances to ensure that they do not create unnecessary regulatory impediments to these types of businesses.

E. Guidance from the 2013 Comprehensive Plan and Related Component Plans

This section is a compilation of language and recommendations from the Comprehensive Plan and related component plans that support the revised Goals, Objectives, and Strategies of the Agricultural Land Plan. This section organizes the relevant language and recommendations into four categories: General Guidance from the Comprehensive Plan, Preserve Farmland and Open Space, Support the County's Agricultural Economy, and Protect the County's Scenic and Environmental Resources. The latter three categories correspond to the three recommended Goals that are discussed in Chapter II.

While this is not intended to be a complete listing of all plan references pertinent to the Agricultural Land Plan, it is a compilation of references that bear direct relationship to the Plan's revised Goals, Objectives, and Strategies in the most concise manner. Quoted text is noted in italics.

General Guidance from the Comprehensive Plan

- COMPREHENSIVE PLAN, Summary Statement of Purpose (p. ii):

The County's conservation easement program, land use taxation, and various planning and zoning tools shall continue to be used to protect rural areas, to aid in the vitality of our agricultural industries, and to preserve our natural and historic resources.

Land use decision-making shall emphasize directed, controlled growth on a rural, small-town scale in designated areas where public infrastructure can be efficiently provided. These areas include the Towns of Berryville and Boyce as well as other villages and business intersections described in this Plan and its Implementing Component Plans.

The County will focus its resources on infrastructure and economic development projects to serve the designated growth areas. Residents and businesses in rural areas should continue to expect rural levels of service.

2016 AGRICULTURAL LAND PLAN

The County shall strive to support concepts, programs, projects, and regulations that ensure environmental sustainability. Clarke County's fundamental goal is to protect our natural resources so that we may pass them on to future generations. We seek to accomplish this through efforts that manage surface water and groundwater, protect and restore stream and river corridors, and preserve the integrity of our natural environment.

The County shall also strive to support concepts, programs, projects, and regulations that ensure economic sustainability. Public and private sector investments in business, housing, and infrastructure should be economically viable, environmentally sound, and socially responsible to the community's objectives as set forth in this Plan. Achieving this goal requires participation from all sectors of the community, both to determine community needs and to identify and implement innovative and appropriate solutions.

- **COMPREHENSIVE PLAN, Chapter III – Agricultural Land Plan (pp. III-3-5):**

The Board of Supervisors adopted the Agricultural Land Plan in September 1997. The Federal Agricultural Census occurred in 2012 with data available in early 2014. An update of the Agricultural Land Plan should be planned for Spring 2014 based on this most recent information.

1. Summary

Clarke County, using powers delegated to it by the Virginia General Assembly, has developed a sophisticated and comprehensive set of policies and associated methods of implementation for protecting its highly-valued farmland. In addition, the County has either completed or retained consultants to assemble the background studies needed to undergird its strategies.

The major components of this state/county farmland protection program are listed below.

1. *Land Use Taxation.*
2. *Virginia Estate Tax.*
3. *State right-to-farm protection against private nuisance lawsuits.*
4. *Agricultural and Forestal districts authorized by state law.*
5. *Conservation Easement Purchase Program managed by the Clarke County Conservation Easement Authority.*
6. *Other easement programs operated by the Department of Historic Resources, Virginia Outdoors Foundation, and private organizations such as the Piedmont Environmental Council and Potomac Appalachian Trail Conference.*
7. *Sliding-scale zoning system to aid in the preservation of large tracts of land.*
8. *The three committees that participate in various ways in efforts to maintain a strong agricultural economy:*
 - a. *The Agricultural and Forestal District Committee that advises the Board of Supervisors on matters affecting the Clarke County Agricultural and Forestal District created through the Code of Virginia;*

2016 AGRICULTURAL LAND PLAN

- b. *County's Economic Development Advisory Committee (EDAC) that provides guidance on economic development matters including agribusiness and agritourism.*
 - c. *The Clarke County Farm Bureau's Economic Development Committee.*
9. *Provision in the Comprehensive Plan for protecting agricultural and mountain lands, on the one hand, and coordinating the control of urban development and the provision of infrastructure, on the other. The intent of such policies is to concentrate new growth in the Towns of Berryville and Boyce and at primary highway intersections. Few jurisdictions in the country can match these accomplishments.*

2. Priorities for the Next Few Years

The 1997 Agricultural Land Plan concentrates on two major themes: (1) the necessity of taking steps to strengthen Clarke County's agricultural sector to ensure that farmers can continue to operate profitably, and (2) developments in the law that affect the capacity of the County to protect its farmland resource. In conjunction with the scheduled update of the Plan, these major themes will be evaluated for relevance and expanded or modified as needed. Current trends in agriculture such as alternative farming techniques, agribusiness, and agritourism will be considered for inclusion in the Plan.

As a general matter, the protection of the County's farmland resources requires that new development be channeled away from prime farm areas and into those parts of the County that are more suitable for urban development and are well served by necessary infrastructure. In short, it is necessary to manage urban growth thoughtfully and effectively to protect natural and agricultural resources. The County should continue to articulate forcefully its policies for concentrating development in the Towns and designated growth areas.

Over the years, the County has adopted several regulations pertaining to subdivision design, especially in the AOC and FOC districts, so that they are well laid out and their impact on the natural environment is minimized. The County should continue to periodically review its zoning and subdivision regulations and procedures to ensure that they contain policies and criteria that produce better-designed developments, while minimizing their negative impacts on surrounding areas.

Preserve Farmland and Open Space

- COMPREHENSIVE PLAN, Objective 1 – Agriculture (pp. II-2-4):

Policy 4. Make land use decisions and plans that are consistent with LESA ratings. Approve conversion of important farmland to nonfarm use only if an overriding public need exists to change the land use and the existing development areas cannot accommodate the new use.

2016 AGRICULTURAL LAND PLAN

- Policy 6. Provide limited, low-density residential opportunities in unincorporated areas in a manner compatible with agricultural activities in the area of the county west of the Shenandoah River. Such residential development should include the following characteristics.*
- a. Should not be located on Important Farmland, as determined by the County's Land Evaluation and Site Assessment (LESA) rating system.*
 - b. Should be on a minimum area sufficient to provide proper placement of a dwelling, related accessory structures, well, and septic system.*
 - c. Should be located in or substantially bounded by natural or cultural features, such as wooded areas, railroads, or public roads that would buffer them from agricultural lands.*
 - d. Should be located away from natural and cultural resources such as the Shenandoah River and the Blandy Experimental Farm and State Arboretum.*
 - e. Should be compatible with the environmental features of that land and should not diminish natural and scenic values.*
 - f. Should respect environmental limitations and protect natural features during and after the development process.*
 - g. Should be consistent with the County's sliding-scale zoning philosophy and should not involve rezoning to a higher residential density to produce additional lots above the parcel's dwelling unit right allocation.*
- Policy 7. Strongly discourage the rezoning of agricultural zoned properties to the Rural Residential District (RR) in areas outside of designated growth areas and villages to avoid loss of farmland, sprawl development, and consumption of potential conservation lands and open space.*
- Policy 8. To the maximum extent possible, separate nonagricultural land uses from agricultural lands and operations. Where nonagricultural operations are adjacent to agricultural operations, the nonagricultural operations should provide buffering in the form of fencing, landscaping, and open space, and by inclusion of the right-to-farm warning notice within the deed of dedication.*
- Policy 9. With the exception of telecommunication and high-speed internet facilities, discourage extension of public utilities and other growth-inducing public facilities into agricultural areas and land under permanent conservation easement.*
- Policy 10. Encourage all government agencies to consider the impacts that their programs and projects may have on maintaining the availability and use of agricultural land. Encourage them to eliminate or minimize adverse impacts.*
- Policy 11. Promote and support the renewal and expansion of the Clarke County Agricultural and Forestal District program by providing information on its*

2016 AGRICULTURAL LAND PLAN

benefits and incentives to associated farmland owners, timberland owners, and farm organizations.

Policy 12. Use the Land Evaluation and Site Assessment (LESA) System for the objective and consistent evaluation of applications for additions to the Clarke County Agricultural District.

Policy 14. Evaluate and consider implementing innovative land-conserving techniques as authorized by State law.

- COMPREHENSIVE PLAN, Objective 3 – Natural Resources (pp. II-7-8):

Protect natural resources, including soil, water, air, scenery, night sky, wildlife habitats, and fragile ecosystems through the following policies, the Water Resources Plan, and other adopted policies.

Policy 7. Identify and inventory environmentally significant land suitable for the preservation and conservation of natural resources. Encourage landowners to apply for preservation programs such as the Agricultural and Forestal District program (AFD) as well as applicable use-value taxation for such lands as "real estate devoted to open space use" Code of Virginia, Section 58.1-3230). Such real estate includes parcels adjacent to designated scenic rivers, wetlands, designated scenic highways, registered historic structures. Such real estate also includes lands adjacent to or under permanent open space easement or lying within the 100-year floodplain.

- COMPREHENSIVE PLAN, Objective 5 – Conservation Easements (II-10-11):

Ensure the continued success of the Conservation Easement program by encouraging landowners to place County lands in voluntary permanent easement. Provide support and funding of the County's Conservation Easement program and collaboration with other easement programs managed by State, Federal, and private entities.

Policy 1. Encourage and facilitate the donation of open-space and conservation easements on land that meets the criteria of the U.S. Internal Revenue Service for easement donation and that is identified as having important scenic, historic, open-space, conservation, agricultural, or wildlife-habitat qualities. Such easements should also be consistent with the Comprehensive Plan and implementing component plans.

Policy 3. Encourage and support the goals of the Conservation Easement Program to protect and preserve:

2016 AGRICULTURAL LAND PLAN

- a. *Land essential to agriculture including land with soils classified as “Important Farmland” by the Natural Resource Conservation Service for the continued production of crops and livestock.*
- b. *Forested areas for their value as natural habitat and recreation, ability to enhance air and water quality, prevent soil erosion, and as a source of renewable wood products.*
- c. *Historic resources, to maintain community character and identity, and encourage the tourism industry.*
- d. *All water resources with particular emphasis on land adjacent to the Shenandoah River and other perennial streams and the limestone ridge/groundwater recharge area to protect water quantity and quality (reference Map 3, Groundwater Recharge Area).*
- e. *Land adjacent to the Appalachian Trail and other public lands.*
- f. *Land with environmentally sensitive areas important to air and water quality, plant life, and wildlife.*
- g. *Lands that provide viewsheds for the County’s gateways, main roads, and scenic byways.*
- h. *Lands that are not located in designated growth areas with the exception of those lands with scenic value, historic value, or environmental sensitivity.*

Support the County’s Agricultural Economy

- COMPREHENSIVE PLAN, Objective 1 – Agriculture (pp. II-2-4):

Encourage agricultural operations and productivity to ensure the preservation and availability of land for the continued production of crops and livestock through the following policies and the Agricultural Land Plan.

Policy 1. Promote and protect agriculture as the primary use of land in rural areas and inform the public of benefits of this policy.

Policy 2. Support a vigorous agricultural development program in the County that emphasizes promotion of Clarke County agricultural products, encourages cooperation with individual agricultural interests within the County and with advocacy agencies, and liaisons with counties in the area that have similar development programs.

Policy 3. Utilize the Agricultural Land Evaluation and Site Assessment (LESA) System to assess accurately the suitability of land for continued agricultural use. The LESA system provides an objective evaluation tool that scores the soils and physical conditions of a parcel for agricultural use.

2016 AGRICULTURAL LAND PLAN

Policy 13. Support use-value taxation and other fiscal programs that help to alleviate economic burdens on owners of land used for agricultural, horticultural, forest, or open-space purposes (Code of Virginia, Section 58.1-3230, as amended). Continue to implement strategies to protect agricultural land from escalating assessments as a result of development pressures.

Policy 15. Refine and strengthen the Agricultural Land Plan to include specific strategies pertaining to agribusiness and agritourism concepts.

- **COMPREHENSIVE PLAN, Objective 10 – Economic Development (p. II-15-17):**

Encourage economic growth that is compatible with the County's environmental quality, rural character, and residential neighborhoods, and that provides a healthy balance between revenues from residential and agricultural uses, and those from commercial and industrial uses.

Policy 5. Promote types of economic development that are consistent with the County's existing uses and character, including but not limited to the following.

- a. Tourism and the land uses that would benefit from it.*
- b. Agricultural businesses.*
- c. Agriculturally related businesses.*
- d. Equine businesses and related services.*
- e. Compatible light industrial uses in designated locations.*

Policy 6. Protect and enhance the environmental resources of the County, recognizing that they can serve as an attraction to business and industry.

Policy 7. Encourage the attraction of business activities that complement or that work in conjunction with existing industrial and commercial activities in the County, particularly active farming and forestry operations.

Policy 10. Support a vigorous agricultural development program in the County that emphasizes promotion of Clarke County agricultural products, encourages cooperation with individual agricultural interests within the County and advocacy agencies, and establishes liaisons with counties in the area that have similar development programs.

- **ECONOMIC DEVELOPMENT STRATEGIC PLAN**

Goal C, Strategy 1 (p. 11):

Goal C. Increase the Vitality of Agriculture and Tourism

Strategy 1: Foster Growth and Vitality of the Agricultural Industry [coordinate with Agricultural Land Plan]

2016 AGRICULTURAL LAND PLAN

Action C.1. Promote information and understanding of local agriculture

Action C.2. Promote activities that support local agriculture

Agriculture Economic Sector Description (p. 18):

Agriculture – Despite the ongoing challenges from changing markets and technologies, this sector has good potential for sustainability through new market opportunities within the region, and greater linkage to tourism activities. The County’s land use policies have created a generally stable land base for agriculture, and the growing regional population and changing food markets also create opportunities for niche products, including equine-related businesses, higher-intensity crops, etc.

Strategic Action Framework – Agriculture & Tourism Infrastructure and Activities (p. 19):

Agriculture and Tourism Infrastructure and Activities

- *Coordinate efforts of tourist-related activities and resources, including cross-promotion*
- *Promote key resources – trail, river, historic sites, etc.*
- *Expand the number of economically productive special events – birding, hiking, competitions, festivals, etc.*
- *Foster development of rural tourist business enterprises with suitable regulations*
- *Promote high value-added agri-business, equine industry, and related activities*

Action B.8. – Promote Rural Economic Innovation (pp. 38-40):

Action B.8. Promote Rural Economic Innovation (including compatible home-based businesses) (Longer Term Priority)

Given its resources and location, the County has excellent potential to expand its rural economy in the long-term. An important method for such expansion is through innovation, which includes a wide range of topics such as new markets for goods and services, new kinds of goods and services, new kinds of business operations and procedures, new locational opportunities for businesses, and new marketing techniques. Home-based and farm-based locations offer special opportunities for Clarke County due to the quality of life in its rural area. Aspects of these have been included in some of the preceding strategies for specific economic sectors.

Over the course of time, a variety of new businesses and economic sectors will likely emerge within Clarke County, as demographic, technological, and economic change continues in and around the region. Examples of potential prospects could include:

- *“E-commerce” and telework offer multiple business opportunities, from enabling professionals to work from a rural home to creating new e-commerce businesses that can link to global markets. High quality broadband infrastructure is critical. Thus, the County should monitor changes in local broadband service to determine the existing and future need, and if there are policies, actions, or investments the County could take to meet that need.*

2016 AGRICULTURAL LAND PLAN

- *“Ecosystem services” such as habitat and watershed protection, in part through collaboration with environmental groups and agricultural and recreational businesses that see the value of working landscapes as a way to conserve and enhance the natural environmental resources.*
- *Regional food systems where larger stores are buying local products. The growing interest in local fresh food supports this strategy, as well as the County’s proximity to a large and relatively high-income metropolitan population.*
- *Sustainable agricultural systems based on substituting internal inputs, including labor and management, for externally purchased ones.*
- *Alternative energy through wind farms, solar farms, and other alternative energy generators (subject to mitigation or avoidance of any environmental issues that would conflict with tourism and other planning goals).*

A broad, long-term approach to innovation depends on seven key strategies:

1. *Provide critical information needed by businesses. Information on economic and demographic trends are especially valuable for the County to promulgate, as well as information on connections and linkages, as described in #3 below.*
2. *Maintain and continually improve the high quality of life, and a local culture that embraces creativity, growth and change in the local business sectors. This includes promoting “place-based” development that capitalizes on the County’s and Town’s special characteristics, including the traditional, historic downtown, other historic buildings and sites, scenic rural landscapes, and the “small-town” rural social and cultural environment of the County. This can be done through appropriate planning, zoning, and urban design policies and regulations as cited herein, as well as through prudent investments in utilities and communications infrastructure, information, and marketing.*
3. *Enhance connections between businesses and the people and organizations that can help them prosper through sharing information with business associations, universities, service providers, etc.*
4. *Cultivate talent and creativity by fostering an environment that supports individuals and firms who use art or design in their products and services, as well as fostering a community spirit and culture that values innovation and creativity within the business community and local economy.*
5. *Use local resources as the basis for innovation and growth. Local products and processes, local talent, and the local quality of life can all provide the identity and “brand” that will further distinguish Clarke County from other areas.*
6. *Promote the enhancement of broadband access. High speed internet service is widespread in Berryville (including some public Wi-Fi), and a fiber line runs along Rt. 7,*

2016 AGRICULTURAL LAND PLAN

but most of the rural areas rely on wireless service; identify how the County might be able to promote the enhancement of broadband access and quality countywide (study similar to hotel and equine). Constantly changing technologies and business models presents a challenge for the County to address this issue. However, good broadband service will be increasingly important in all sectors of the future economy.

- 7. Foster the further development of home-based and farm-based businesses by evaluating and modifying the zoning regulations as needed to ensure a proper balance between land use compatibility and efficient review and approval processing. For example, by expanding the number of defined types of home-based businesses, the standards and permit processes can be properly tailored to the level of intensity of the business, thereby creating the most efficient and effective level of regulation.*

Schedule: FY 2017+

Responsibility: Economic Development Director; Planning Director

Estimated Cost: TBD

Goal C – Increase Vitality of Agriculture & Tourism (pp. 40-45):

Goal C. Increase the Vitality of Agriculture and Tourism

[Note: Draft Berryville Clarke County Tourism Plan Objective 7 – “Foster growth and development of new tourism sectors including agribusiness, tourism, promotion of local artists and musicians” is embedded in this Goal C, which includes these other sectors.]

Strategy 1. Foster Growth and Vitality of the Agricultural Industry

The County currently provides some assistance and information to the local farm community as well as relying on state organizations such as the Virginia Cooperative Extension, the Virginia Department of Agriculture and Consumer Services, and the Virginia Farm Bureau. While the County could enhance its involvement and support for local agricultural businesses through the establishment of a County office of Agricultural Development, as some other neighboring counties have done, such a separate local government office is probably premature for Clarke County at this time in terms of assigning a full-time staff member. Yet some of the work done by these offices could be included in the work plan for an enhanced County Economic Development program. Any such efforts should be done in coordination with future updates to the Agricultural Land Plan. Each of the strategies below is something that the County staff is currently doing but with very limited capacity. If professional capacity is expanded, these activities could be part of that.

Action C.1. Promote information and understanding of the local agricultural industry.

In conjunction with enhancement of the County’s website for all economic development components. As the County expands and broadens its programmatic support for the local farm industry, the website can reflect and reinforce those efforts by providing data and information, links to other resources, and other networking tools, etc. Specific content will depend on how the website emerges in relation to expansion of agricultural development efforts.

2016 AGRICULTURAL LAND PLAN

Schedule: FY 2015 and ongoing.

Responsibility: Economic Development Director.

Estimated Cost: (Subsumed in future Economic Development Budget)

Action C.2. Promote activities that support local agriculture, including farm tours, “buy local” initiatives, “pick-your-own” enterprises, Farmers Markets, Community Supported Agriculture (CSAs), etc., in conjunction with enhancement of the County’s website for all economic development components. The website is an ideal tool for informing and promoting the full range of activities, both within the County, as well as among its regional and state partners.

Schedule: FY 2015 and ongoing.

Responsibility: Economic Development Director.

Estimated Cost: (Subsumed in future Economic Development Budget)

Strategy 3. Promote Equine Development (Longer Term Priority)

Action C.6 Conduct a detailed study of the equine industry

This would include identifying the barriers and opportunities for expanding, and steps to pursue (similar to the Town’s recent hotel market study). The purpose is to identify the short and long term potential for the industry and the most practical steps and priorities for achieving the potential.

Action Steps:

(1) Identify the scope of the study and funding resources.

(2) Issue an RFP for the work.

(3) Retain the firm to conduct the study.

(4) Assess, promulgate, and implement the findings.

Schedule: FY 2017+

Responsibility: Economic Development Director

Estimated Cost: TBD

Action C.7 Strengthen businesses in the local equestrian industry

Develop a county or regional website devoted to the industry, offering up to date information on hay pricing, horse shows, and other business trends. (This could be in conjunction with the overall effort to upgrade the County’s website for economic development marketing and tourism). Any such efforts should build on the success of the existing Equine Alliance and be an outgrowth or enhancement of that group. Businesses in the industry include stables and breeders, but also support businesses such as farriers, saddle-makers/marketers, and specialty construction companies.

Schedule: FY 2017+

Responsibility: Economic Development Director

Estimated Cost: TBD

2016 AGRICULTURAL LAND PLAN

Protect the County's Scenic and Environmental Resources

- COMPREHENSIVE PLAN, Objective 1 – Agriculture (pp. II-2-4):

Policy 5. Encourage the use of best management practices as outlined in the Chesapeake Bay Regulations and as determined by the Federal Total Maximum Daily Load (TMDL) program to improve water quality by the following methods.

- a. Making technical assistance available.*
- b. Promoting public awareness on the benefits of, and necessity for, best management practices, erosion and sedimentation controls, storm water management and Chesapeake Bay Preservation Regulations.*
- c. Assisting in the establishment of conservation plans for all farms adjacent to perennial streams.*
- d. Encouraging the participation of all landowners engaged in agricultural activities to use the assistance of the Virginia Cooperative Extension Service, the Natural Resource Conservation Service, the Lord Fairfax Soil and Water Conservation District, and other public agencies.*

- GROUNDWATER RESOURCES PLAN

Nonpoint Pollution (p. 21):

D. Nonpoint pollution: Cooperate with and encourage use of the programs administered by the Agricultural Extension Office and other agencies involved in developing Best Management Practices (BMPs).

Nonpoint pollution is the single largest contributor to groundwater pollution in Clarke County. In Clarke County, it is characterized as pollution from agricultural and residential development practices that cause soil erosion as well as improper fertilizer and pesticide application.

Control measures for agricultural land use are currently supervised by the Natural Resource Conservation Service (NRCS), the Agricultural Stabilization and Conservation Service (ASCS), and the Agricultural Extension Office. These agencies work with farmers to develop Nutrient Resources Plans and implement Best Resources Practices (BMPs), which encourage farmers to avoid highly erodible lands when cropping and maintain minimal levels of fertilizer and pesticide applications. Residential landowners should be educated as to their responsibility for proper fertilizer and pesticide application on lawns and proper septic system maintenance.

2016 AGRICULTURAL LAND PLAN

- SURFACE WATER RESOURCES PLAN

Implementation Steps (p. 3):

5. *Encourage installation of Best Management Practices (BMPs) to reduce access of livestock to riparian buffer zones.*

2016 AGRICULTURAL LAND PLAN

(this page is intentionally blank)

CHAPTER III



CONCLUSION

2016 AGRICULTURAL LAND PLAN

(this page is left intentionally blank)

2016 AGRICULTURAL LAND PLAN

CHAPTER III -- CONCLUSION

A land use plan is only as good as the degree in which it is implemented so it is critical to work towards researching, evaluating, and pursuing the recommendations set forth in this Plan. Likewise, a land use plan is only effective if it is kept up to date and reflects the community's current conditions, needs, and impacts.

It is recommended that the Plan be reviewed on a five-year review schedule according to the following process:

1. On a five-year schedule from the adoption date of the current Agricultural Land Plan, the Planning Commission shall adopt a resolution addressing the status of the Plan, whether it should be updated, and to what degree it should be updated. This resolution may come in one of the following forms:

- A finding that the current Plan recommendations are sufficient and that no amendment is necessary.
- A finding that changes in the community warrants a comprehensive review and update of the Plan. An example would be the release of decennial Census data and growth projections.
- A finding that the Plan does not address, or inadequately addresses, a specific topic area or areas warranting a focused update of the Plan. While the update may have a specific purpose, the review should remain comprehensive to ensure that all impacts are carefully evaluated.

2. It is recommended that at the beginning of year four in the five-year schedule, the Commission should begin work evaluating the Plan status. This can be accomplished as a committee of the whole or by designating a special subcommittee. If the Board of Supervisors has established an agricultural advisory committee, the Planning Commission should include this committee's input on the Plan evaluation either by joint meetings with the committee or including representatives from its membership on a special subcommittee with Commission members.

Plan status should be evaluated by considering factors including, but not limited to:

- Recent release of updated demographics including the Agricultural Census.
- Recent updates to the County Comprehensive Plan or related component plans.
- Changes to State law impacting the agricultural industry.
- Any other subject not addressed or inadequately addressed by the current Plan.

2016 AGRICULTURAL LAND PLAN

While not recommended, a proposal may be considered to amend the Plan outside of the scope of the Plan's five-year review cycle. Frequent, piecemeal changes to the Plan can result in the document becoming fragmented and inconsistent. It can also devalue the importance of the document as a long-range planning guideline. For these reasons, interim amendments are strongly discouraged.

APPENDIX – ADDITIONAL MAPS

- **MAP 2 – Properties in the Land Use Taxation Program**
 - See discussion of Use Value Assessment on Page II-9

- **MAP 3 -- Properties in the Clarke County Agricultural & Forestal District (AFD)**
 - See discussion of the AFD Program on Pages II-9 – II-10

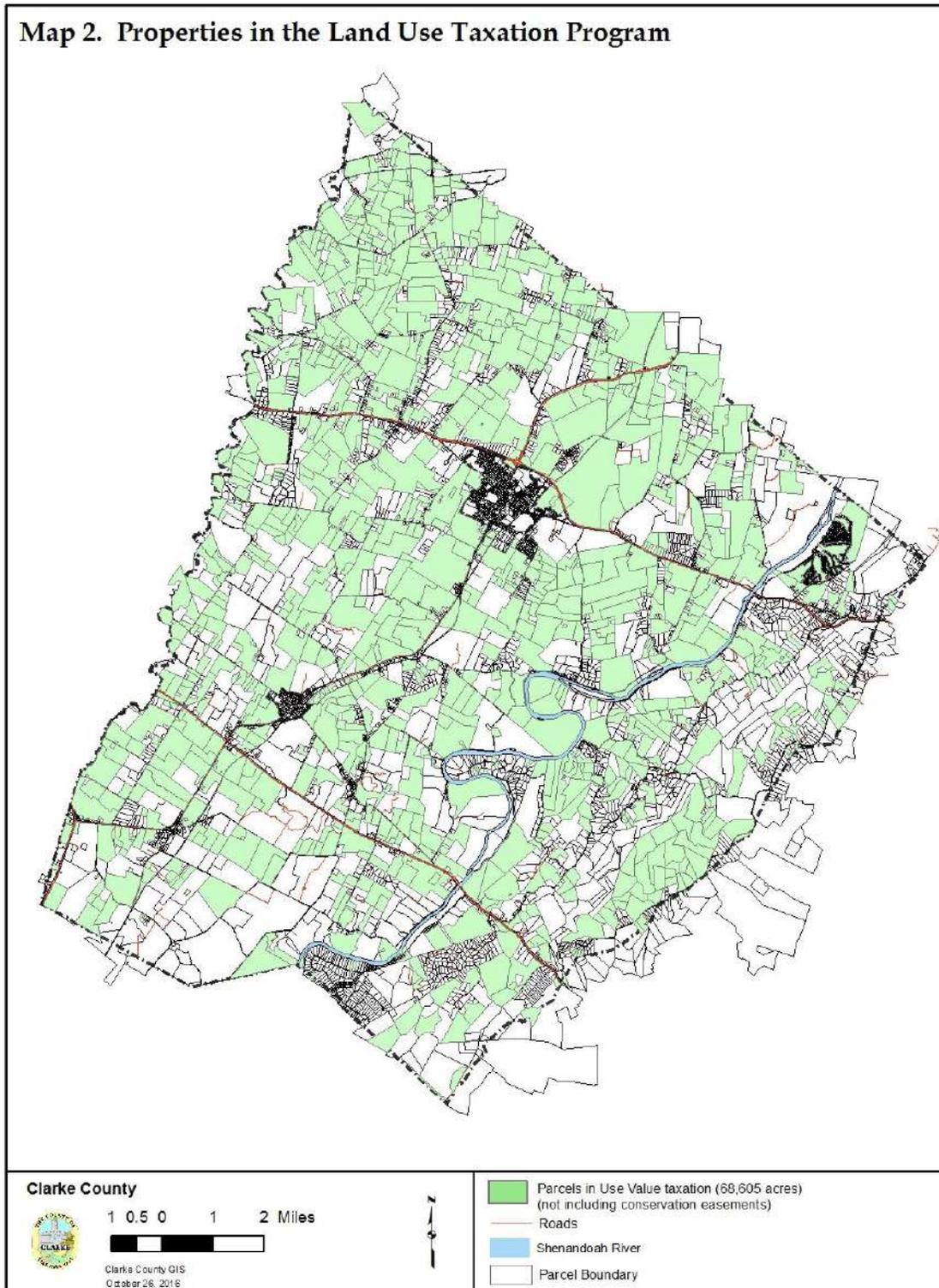
- **MAP 4 – Conservation Easements in Clarke County**
 - See discussion of the Clarke County Conservation Easement Authority (CEA) and Easement Purchase Program (CEP) on Pages II-8 – II-9

2016 AGRICULTURAL LAND PLAN

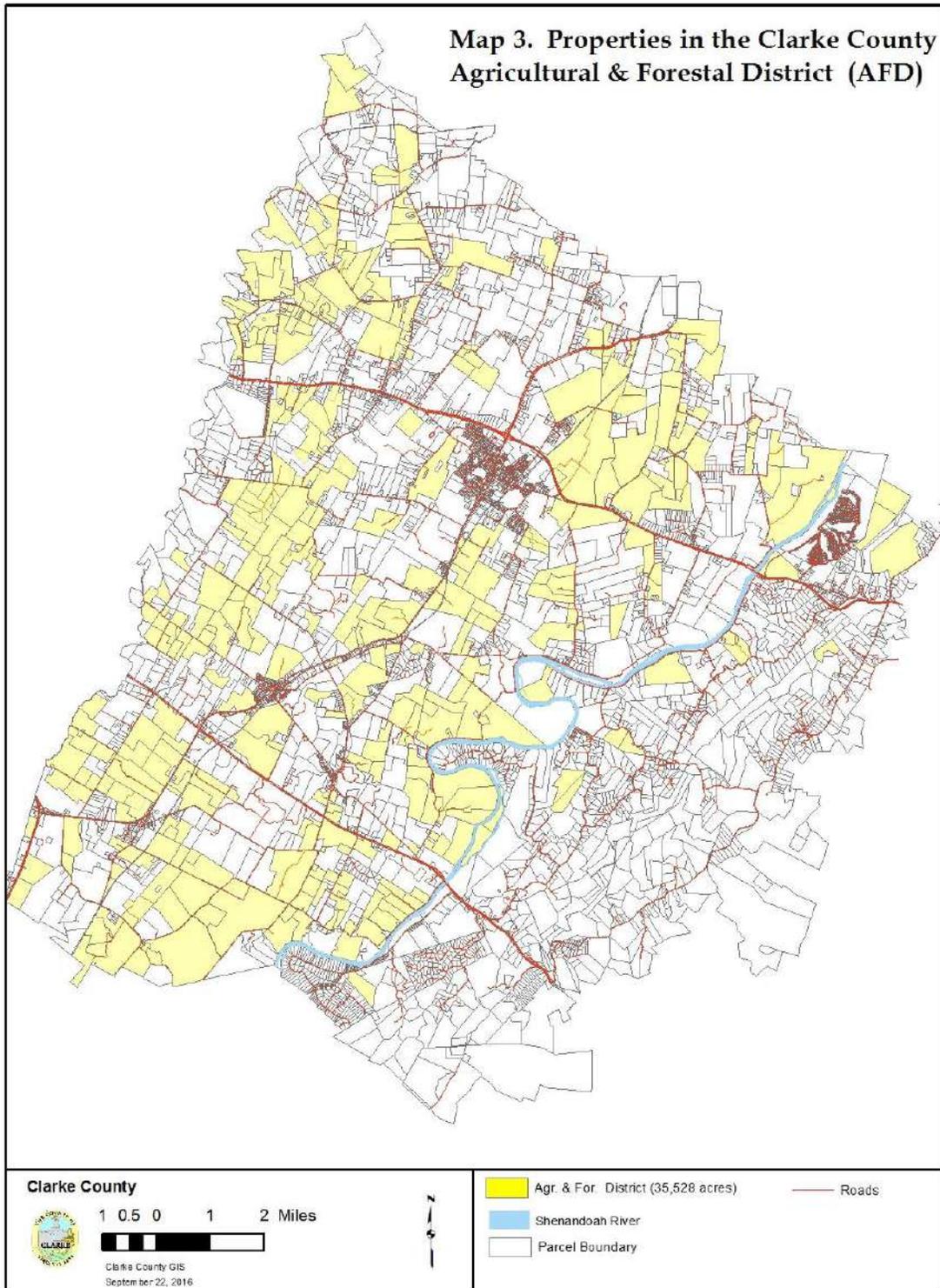
(this page is left intentionally blank)

2016 AGRICULTURAL LAND PLAN

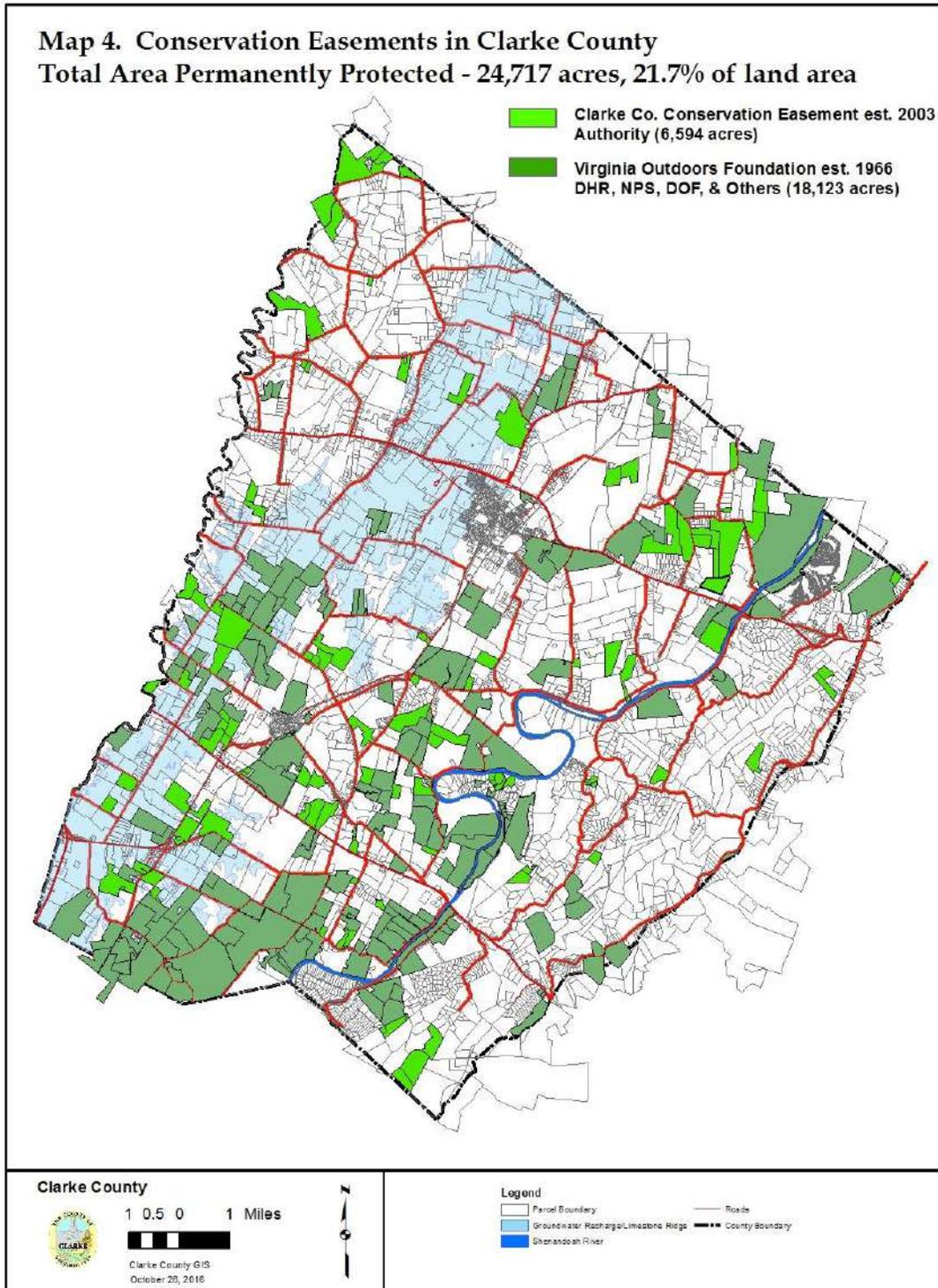
Map 2. Properties in the Land Use Taxation Program



2016 AGRICULTURAL LAND PLAN

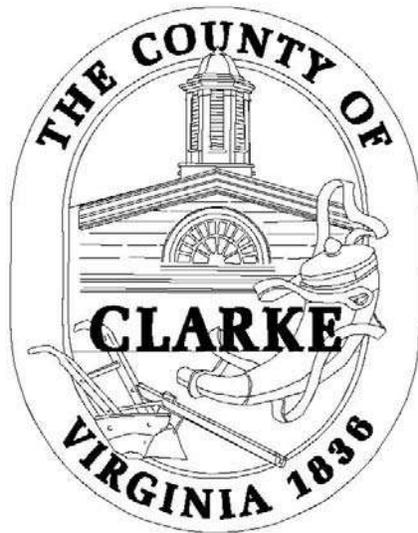


2016 AGRICULTURAL LAND PLAN



MOUNTAIN LAND PLAN

Adopted
August 16, 1994
Revised
June 21, 2005



Clarke County
Comprehensive Plan
Implementing Component
Article 2

Mountain Land Plan

Table of Contents

	Page	
Purpose	3	
Implementing Actions	4	
Physical Character		9
Development Trends	26	
Appendix		
Zoning Ordinance	33	
Subdivision Ordinance	39	
County Code		47

BOARD OF SUPERVISORS

John Staelin, Chair
Michael Hobert, Vice-Chair
Barbara Byrd A. R. Dunning, Jr. David Weiss

PLANNING COMMISSION

Beverly McKay, Chair
Pat McKelvy, Vice-Chair
A. R. Dunning Jr., BOS Representative
Jay Arnold Barbara Batterton Anne Caldwell Cliff Nelson
Mary Daniel George Ohrstrom Kathy Smart Robert Wade

MOUNTAIN LAND PLAN COMMITTEE

Robert Wade, Chair
Anne Caldwell Jon Erickson David Jelinek Frank Journey
Betsy Lesley Pat McKelvy Sigrid Pollari Erika Shriner Sid Stern

PLANNING DEPARTMENT

Charles Johnston, Planning Administrator
Alison Teetor, Natural Resource Planner
Jesse Russell, Zoning Administrator

Plan Consultant

Historic and Architectural Overview
Maral Kalbian, Boyce, VA

**Special appreciation is expressed
to the Blue Ridge and Shenandoah Farms Volunteer Fire Companies
for hosting the many public meetings
that were held in the preparation of this Plan.**

I. PURPOSE OF MOUNTAIN LAND PLAN

The Shenandoah River and the Blue Ridge Mountains are outstanding natural and scenic resources. Their beauty is attracting ever-increasing development. Inappropriate and insensitive new development will damage the natural and scenic resources that draw development in the first place. Logging operations are a key element to the local economy and to the management of the health and viability of the forest. Timber harvesting should be conducted in such a manner that the forests as well as the overall natural environment are protected for both short- and long-term horizons.

In 1980, 2213 dwelling unit rights (in addition to existing dwellings) were allocated to the Mountain Land Area zoned Forestal-Open Space-Conservation (FOC). At the end of 2004, 1,266 or 57% remained unused. In the ten years from 1990-2000, 160 new houses were constructed. Seventy-five new houses were built from 2001 to 2003. The number of lots increased by an additional 39 from 2001 to 2004, with 10 more lots proposed in 2005. Development trends over the past 24 years show proportionately more construction activity in the Mountain Land Area of the County, where 57% of the dwelling unit rights remain unused when compared to the agricultural portion of the Valley, west of the Shenandoah River, where 68% of the dwelling unit rights remain unused.

The following objectives were developed to guide public land use policy in the Mountain Land Area based on the above development pressures and on the unique, irreplaceable, and environmentally sensitive character of the Mountain Land Area:

1. Protect the forest resources of the area;
2. Protect surface water quality of the area;
3. Protect availability and quality of groundwater in the area;
4. Protect wildlife habitats and ecosystems (including natural heritage areas);
5. Protect the scenic values and scenic byways of the area;
6. Protect cultural resources (such as the Appalachian National Trail / historic structures/sites);
7. Ensure safe public and private roads;
8. Protect private property rights;
9. Provide for well-sited development compatible with the first eight objectives.

All of these objectives are important, but no single one is pre-eminent. The first five are mutually reinforcing objectives. A development pattern that serves any one of these objectives is likely to serve the others. Nevertheless, achieving each objective required individual consideration. The particular characteristics of the Mountain Land Area in regard to each must be identified and policies that serve each must be developed and enacted.

The Clarke County Comprehensive Planning process strives to identify current needs with regard to land uses and to develop long-range goals and policies to meet those needs. Future decisions on land use, natural resource protection, public facilities, capital improvements, and economic growth are based on the Clarke County Comprehensive Plan. The laws of the Commonwealth of Virginia require all counties to adopt comprehensive plans and to update those plans at 5-year intervals, Title 15.2, Chapter 22, Article 3 (§15.2-2223, et seq), Code of Virginia. Clarke County adopted its initial Comprehensive Plan June 15, 1974. The plan was updated in August 1974, September 1980, March 1988, May 1994, and March 2001.

Specific topical issues within the County require specific study. Plans for such areas and topics are treated as implementing components of the Comprehensive Plan's Goals, Objectives, and Policies. These implementing components are composed of: Agricultural Land Plan, Mountain Land Plan, Berryville Area Plan, Water Resources Plan, Historic Resources Plan, and Public Facilities Plan. Effective implementation of the Comprehensive Plan rests on these components.

The need for a Mountain Land Plan became apparent as people in the community recognized the importance of the mountain to Clarke County as a natural resource, a timber resource, and an environmentally important resource with regard to increases in residential development. The first Mountain Land Plan was adopted in August 1994. The need for an updated Mountain Land Plan has become apparent. Most flat and easily accessible land has been developed. Development is now occurring in mountain areas with increasingly difficult access and terrain challenges that are not adequately addressed in the current Mountain Land Plan.

As an implementing component of the Clarke County Comprehensive Plan, the Mountain Land Plan seeks to describe the mountain environment, to identify the elements that are important to the people of the County with regard to the mountain character, and to outline a plan for future development patterns.

In summary, the updated Mountain Land Plan recommends increasing the minimum lot size, requiring large residual tracts (to encourage the grouping of new lots in a manner that protects the mountain's character), and providing for continued forestry. The standards for private roads are adjusted to improve their safety and limit their impact on the natural terrain. The Plan proposes improved protection of surface and ground water resources. Clearing standards are addressed with regard to slope, property lines, and view shed. Recommendations are made to protect extreme slopes and areas of slippage soils from development, to the maximum extent possible. Forestry issues are addressed as well as cultural and historic resource issues.

II. IMPLEMENTING ACTIONS

Based on the physical character of the Mountain Land Area, the development trends and services, and the County Comprehensive Plan Policies, the following actions are recommended:

Land Use Issues

The current limitations on the number of dwelling unit rights on parcels effectively limits the number of houses that can be built, but additional standards should be established to preserve the character of the community and minimize disturbance to the natural character of the area to preserve property values while allowing compatible development.

The following recommended ordinance amendments would apply only in the Mountain Land Area.

1. Lot Size (Zoning Ordinance Amendment – FOC Zoning District)
Increase minimum lot size from 2 acres to 3 acres. This increase in minimum lot area also helps ensure that house sites, well and drainfield locations, and vegetative buffers could reasonably be accommodated on new parcels.
2. Required Open Space (Zoning Ordinance Amendment – FOC Zoning District)
In order to ensure quality development, preservation of open space, and compliance with the Comprehensive Plan, a defined percentage of the total area of the subdivisions of 40 acres or more should be left in one parcel with only one dwelling unit right or only an existing house. This limits the sprawling of lots in a subdivision, the length of the road accessing the proposed lots, and the impact of development on the environment.

The following suggested ordinance text amendments were developed as a part of the Mountain Land study as being advisable for applicability in the Mountain Land Area, but also are deemed to be advisable for all areas of the County and are recommended for county-wide applicability:

1. Administrative Review of 100 acre lot subdivisions (Subdivision Ordinance Amendment)
Currently subdivisions involving parcels of 100 acres or more are exempt from review. This amendment would provide for review of such subdivisions by the Zoning Administrator to ensure that the parcel size, parcel location, and access easements comply with County ordinances.
2. Boundary Line Adjustments (Zoning and Subdivision Ordinance Amendment)
To not unduly shift the density of rural dwellings, reallocation of dwelling unit rights should be limited in a boundary line adjustment to comply with the allocation of dwelling unit rights in section 3-D-2 of the Zoning Ordinance; dwelling unit right allocations should be limited to one per boundary line adjustment.
3. Environmental Impact Statement (Subdivision Ordinance Amendment)
Current Environmental Impact Statement requirements inadequately identify environmental impacts associated with development. Recently issues relating to Appalachian Trail access, endangered species habitat, and sensitive soils have not been satisfactorily addressed in statements provided by applicants. Revised EIS requirements would require applicants to obtain written comments from state and federal agencies to identify current conditions and what steps would be taken to minimize potential impacts on natural and historic resources.
4. Utilities (Subdivision Ordinance Amendment)
Transmission utility lines should be required to be placed underground and within private access/utility easements.
5. Disclaimer Notices (Subdivision Ordinance Amendment)
Additional notices should be included in Consumer Disclosure Statements requirements and should be shown on Subdivision Plats. The first notice advises land purchasers that adequate response for emergency services will not be immediate and may be difficult to accomplish under the weather conditions that are known to occur in this region. The second notice advises land purchasers that commercial forestry is a permitted and common activity in this area of the County and adjacent residential property owners need to be aware that while such activity can be considered unpleasant to some, it is an inherent part of living in a rural mountainous area.
6. Propane Tanks (Zoning Ordinance Amendment – County-wide)
In order to protect the health and safety of County residents through the promotion of fire safety and pursuant to Clarke County policies and ordinances providing for clustering of single-family homes, propane tanks 500 gallons or larger shall be placed underground.

Road Issues

The adequacy and safety of public and private roads are concerns shared by all property owners and residents of the Mountain Land Area. Funding for public improvement of roads comes through the Virginia Department of Transportation. Through an annual planning process, VDOT and the Clarke County Board of Supervisors jointly decide on the allocation of these funds. By this process, VDOT and the Board of Supervisors address safety problems, as identified by area residents. Public road issues must be addressed through this annual planning process. However, the basic thrust of the Mountain Land Plan is preservation of the area's character; therefore, Rural Rustic Road Standards (that minimize impacts on the environment) should be used wherever possible for necessary safety improvements. Current subdivision regulations require the Planning Commission to determine whether existing roads are adequate to accommodate new development.

It is well within the purview of this Plan to call for access easement standards for private roads that minimize the impact of these private roads on the land while providing safe access, particularly for emergency services. It was concluded there were too many variations between parcels to establish a specific standard for a maximum length for private-road access easements. It was also concluded that a maximum private access easement length

could result in long individual driveways, which are usually built to a lower standard than access easements. However, changes to easement design standards are recommended to improve emergency access while minimizing environmental impacts. In addition, application of travel way standards to new driveways (longer than 150 feet) is also recommended, again for safety reasons.

The following suggested ordinance text amendments were developed as a part of the Mountain Land study as being advisable for applicability in the Mountain Land Area, but also are deemed to be advisable for all areas of the County and are recommended for county-wide applicability:

Private road access standards (Subdivision Ordinance Amendment – County-wide)

1. Private driveways longer than 150 feet (in parcels created after the adoption of the text amendment) shall comply with all Private Access Easement travel way standards.
2. Current minimum 30-ft easement width is to be retained, but a maximum easement width of 40 ft is added (with 50 ft allowed for short distances to meet site-specific conditions) to reduce the amount of tree clearing
3. Current minimum 14-ft travel way shall be retained, but a maximum 18-ft travel way is recommended to limit road impacts.
4. No obstruction (such as posts, pillars, walls, or fences) should be erected within 10 feet of the centerline of a travel way or within a public right of way.
5. All easements should have pull-off areas every 900 ft (fire hoses range from 1,000 to 1,500 ft in length; a 900 ft requirement will allow for some degree of flexibility or for most appropriate location).
6. A turn around area (either circular or ‘T’ shaped) is recommended at the end of a travel way.
7. Travel ways, pull-off areas, and cul-de-sacs are to be constructed to VDOT gravel-road standards.
8. Current road standards set 8% as the maximum grade with up to 16% allowed for short distances. The maximum grade for short distances is to be reduced to 12% to better accommodate large fire trucks.
9. Roads should not be constructed on slopes of 25% or greater where there is a slope width of more than 100 ft (to limit adverse effects on steep slopes subject to erosion).
10. Travel-way side slope is to be reduced from a 4:1 (horizontal: vertical) slope to a 3:1 slope (to provide for drainage while lessening the area needed for clearing and grading). The Planning Commission may approve a slope of 2:1 if there are unique site-specific circumstances.
11. Before a building permit is issued for a residence, the grading and base should be completed for that portion of a private road accessing such a residence. This is recommended to ensure emergency access for a structure under construction. Before a certificate of occupancy is issued for a residence, all construction is to be completed for that portion of a private road accessing such a residence. This is recommended to ensure access to an occupied structure.
12. Private Road length should be minimized (particularly in areas of steep slopes) so as not to make emergency access more difficult and to limit the impact of road construction on the environment.

Environmental Issues

The main priorities of this Plan include protecting the forest and associated natural resources, maintaining the forested character of the mountain, and reducing the impact of forestry activities on residential properties. Therefore, the following limitations should be established on forestry activities, on clearing for residential purposes, and on requirements for vegetative buffers on residential parcels.

The following recommended ordinance amendments would apply only in the Mountain Land Area.

1. Vegetative Buffers and Clearing Limits (Zoning Ord. Amendment - FOC Zoning District) - for purposes other than forestry (timber harvesting)

Maximum area allowed for clearing (for each house [dwelling unit right] constructed after the Plan is adopted, accessory buildings, and drain field, not including driveways):

Slopes less than 7%

No Limit

Slopes of 7 up to 15% under 800 feet elevation
Slopes of 7 up to 15% over 800 feet elevation
Slopes of 15 up to 25%

No Limit
2 acre limit
1 acre limit (may be increased to 1.5 acres
with engineered erosion and sediment
control plan)
No clearing

Slopes of 25% and greater, slippage soils
Slope to be calculated within proposed cleared area.

By previous action, parcels of less than 20 acres recorded after 2 February 2003 must retain their existing woody vegetation within 25 feet of all property lines. Any parcels of four acres or more, created after the date of adoption of this Plan and associated ordinance amendments, must retain existing woody vegetation as follows:

- within 25 feet of all property lines,
- within 50 feet of the edge of public rights of way or 25 feet of private access easements,
- on slopes of 25% or more, and
- on slippage soils.

To allow a limited area to be cleared for views and other esthetic purposes, clearing within 200 feet of the cleared areas described above is permitted as follows:

- no clear-cut openings,
- selective thinning of trees of 2 inches or more in diameter (measured 4.5 feet above ground), is randomly spaced, with removal of not more than 50 % of the crown cover, within any 10 year period,
- pruning of branches is limited to the bottom 1/3 of the tree, and
- such additional clearing associated with new houses shall be done before issuance of final certificate of occupancy.

If clearing limitations are exceeded, revegetation would be required as recommended by a forestry consultant.

2. Clearing for agricultural uses (Zoning Ordinance Amendment – FOC Zoning District)

Inappropriate clearing for pastureland or other agricultural activities has occurred in the Mountain Land Area on steep slopes and erodible soils. Before any such clearing is done, a Conservation Farm Management Plan, approved by either the regional Soil and Water Conservation District or the federal Natural Resources Conservation Service, is to be submitted to the County Zoning Administrator.

3. Slippage Soils (Zoning Ordinance Amendment – FOC Zoning District)

Slippage soils are those soils that could shift dramatically during heavy rains, causing mudslides. Areas of such slippage soils include those soils identified as type 54C in the Clarke County Soil Survey and encompass approximately 2,700 acres on the mountain. Clearing is prohibited on these soils.

The following suggested ordinance text amendments were developed as a part of the Mountain Land study as being advisable for applicability in the Mountain Land Area, but also are deemed to be advisable for all areas of the County and are recommended for county-wide applicability:

1. Erosion and Sediment Control (County Code Amendment – County-wide)

- Pond construction for ponds larger than 10,000 square feet is allowed only with an Erosion and Sediment Control Plan approved by the Soil and Water Conservation District and the County. Because of the right-to-farm laws, this requirement may be waived if the property has an approved Conservation Farm Management Plan and is receiving use-value taxation for agriculture.
- The applicant for new homes shall complete an Erosion and Sediment Control Sketch Plan in addition to the land disturbance permit that is currently required. This sketch would detail the proposed land disturbance and proposed erosion control practices without being as formal as a full Erosion and Sediment Control Plan.

2. Forestry (Zoning Ordinance Amendment – County-wide)

- The cutting or logging of any trees for profit is allowed only with a Pre-Harvest Plan, which includes Virginia Department of Forestry Best Management Practices, that is reviewed by the County Zoning Administrator and a consulting forester for compliance with County ordinances.
- No subdivision application should be accepted for 3 years before or after a timber harvest operation.
- No timber harvest operations beyond the allowable clearing, as outlined below, shall be allowed within 3 years of a subdivision.
- Selective timber harvest shall be allowed within vegetative buffers, as described below.
- Clearcuts for forest regeneration and wildlife habitat should be laid out with an undulating perimeter instead of squares or rectangles. This is to increase the “edge” effect between adjacent forested areas so vital to wildlife, and to help them blend into the surrounding forest.
- Best Management Practices for clearing within buffer areas shall be implemented so as to limit the amount of disturbance within the buffer.

Specific ordinance text amendments to the County Zoning Ordinance, County Subdivision Ordinance, and County Code can be found in Appendix 1.

III. PHYSICAL CHARACTER OF THE MOUNTAIN LAND AREA

A. Introduction

The Mountain Land Area of Clarke County is defined as all land in Clarke County east of the Shenandoah River, as can be seen in Figure 1. This area encompasses approximately 27,630 acres of the western slope of the Blue Ridge Mountains. It measures nearly 14 miles parallel to the Shenandoah River and between two and four miles perpendicular to it.

Elevations range from 360 feet, where the Shenandoah River enters West Virginia, to 1935 feet at Paris Mountain. The majority of the slopes are forested and timber harvesting is the primary land use east of the Shenandoah River. In 2001, Forests covered 15,425 acres of parcels greater than 20 acres, or 58 % of the land. Residential subdivisions (defined as parcels less than 20 acres) accounted for 6,470 acres, or 24 %, and Agriculture accounted for 1,165 acres, or 4 % (Fig. 2). More detail is given in Table 1.

Table 1. Acreage by Land Use - FOC Zoning District

Type of Land Use	Acres	%
Residential		
< 6 acres w/out dwelling	998	4
< 6 acres w/dwelling	1,841	7
6-20 acres w/out dwelling	1,120	4
6-20 acre w/dwelling	2,511	9
> 20 acres w/out dwelling	5,068	19
> 20 acres w/dwelling	11,401	43
Recreational - Appalachian Trail	3,367	13
Commercial	12	<1
Mt. Weather	287	1
Transportation (Rt. 50/7 corridors)	87	<1
Total	26,692	100
Agriculture (Pasture) (parcels > 20 acres)	1,165	
Forest (parcels > 20 acres)	15,425	

* Residential includes property under easement

** Dwelling is improvement value > \$6,000 (Commissioner of Revenue)

Source: Commissioner of Revenue Land Records database (2004)

Aerial Imagery 2002, Commonwealth of Virginia

The mountain is characterized by rugged, forested terrain isolated from the remainder of the county by the Shenandoah River. Two primary highways, Route 50 and Route 7, provide the only access between the valley region of the County and the mountain area. Within the Mountain Land Area there are few roads and, with one exception, these run north-south. On top of the mountain is the most direct road, Route 601. Along the bench on the western side of the mountain and along the river, Routes 604, 606, and 649 provide more circuitous routes. Steeply-sloped Route 605 is the only road between Routes 7 and 50 to connect the ridge and the river.

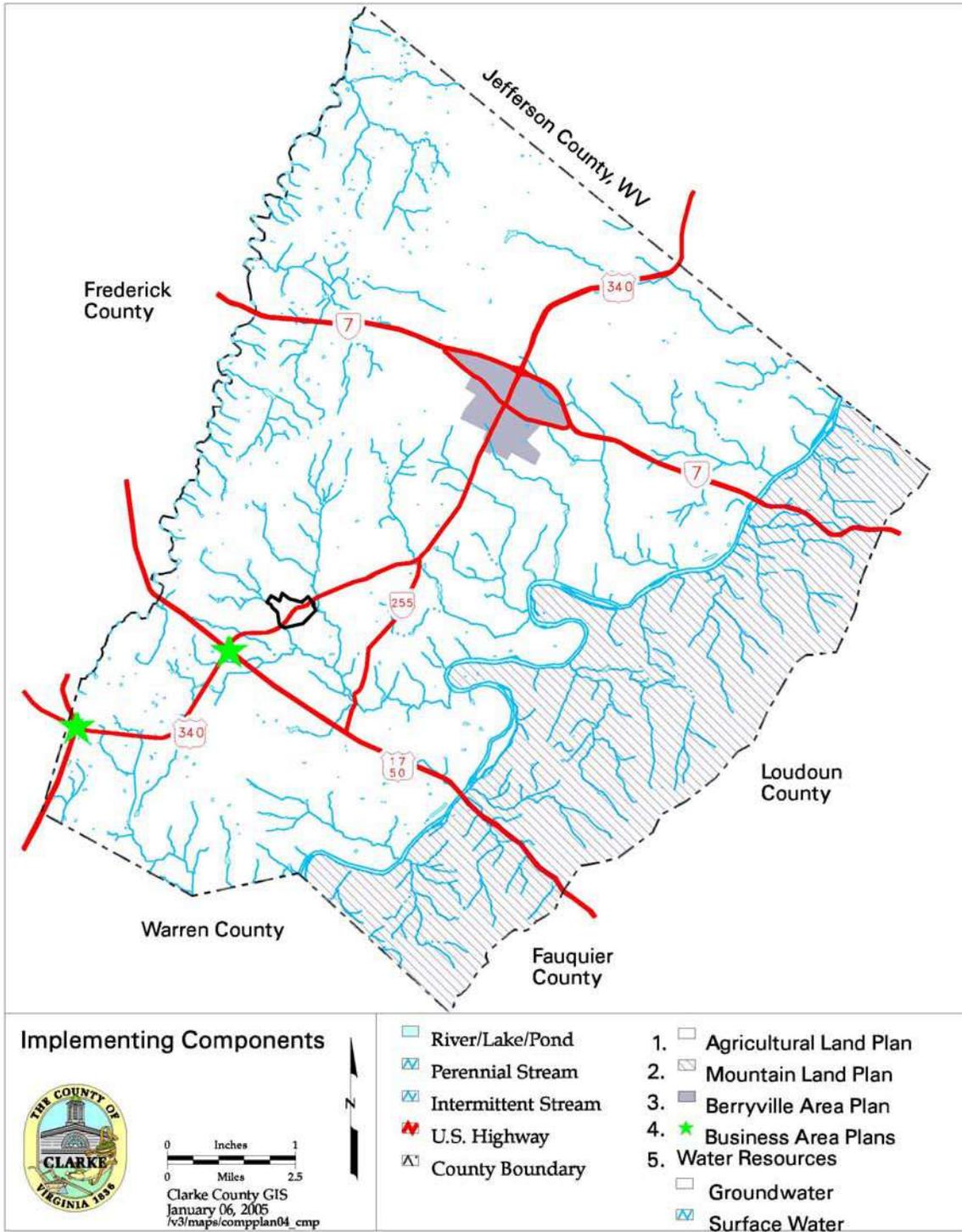


Figure 1

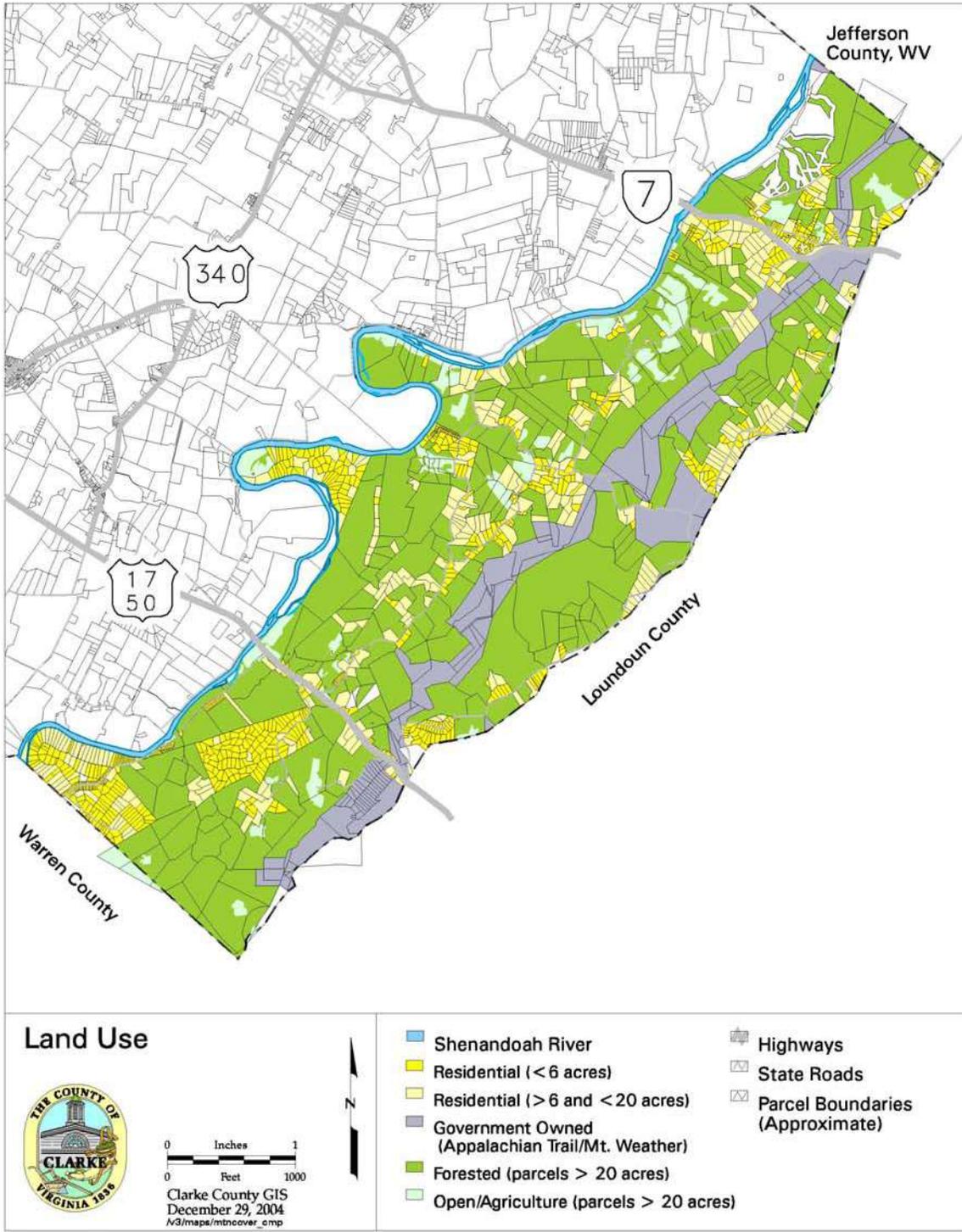


Figure 2

1. Natural Features

A. Slopes

Much, but not all, of the Mountain Land Area is steeply sloped. Figure 3 indicates that slopes between 15% and 25% cover 33% of the area, and slopes of over 25% cover 16%. The relatively flat bench about halfway up the western side of the mountain and two necks on the river are the locations of most of the easily developable land. Steep slopes influence the amount of land area that may be built upon due to problems with access, soil stability, and the ability to locate a septic system. Currently, the Clarke County Septic Ordinance prohibits locating drain fields on slopes in excess of 25%.

B. Geology

The Blue Ridge region of Clarke County is underlain by crystalline rock, quartzite, sandstone and shale; all of which are relatively resistant to chemical weathering. Less resistant shale, dolomite and limestone lie along the foothills and the valley floor. The distribution of the geologic formations east of the Shenandoah River is shown in Figure 4. The specific geologic formation descriptions are as follows:

Catoctin Formation This formation is generally dark green, massive metabasalt. These igneous rocks are poorly exposed in the region, primarily because large angular blocks of epidosite and metabasalt cover extensive areas and mask the bedrock. The 15 to 20 feet of colluvium and saprolite exposed in borrow pits on the south side of State Route 601 approximately 1.3 miles northeast of Ashby Gap may characterize the overburden present on the metabasalts in the more gently sloping areas. In the crystalline rocks of the Piedmont and Blue Ridge Provinces, a two-media system forms the groundwater model. The porous granular saprolite (decomposing bedrock) and the fractured bedrock serve as two distinct aquifers that are hydraulically connected. The saprolite layer serves as a water storage unit for the fractures that transmit groundwater to the well bore.

Weaverton Formation The Weaverton Formation is a combination of conglomerates, quartzites, and cemented sandstones. Pressure-solution activity has modified quartz-grain boundaries and destroyed original permeability. As a result, it is likely that the Weaverton Formation is a poor aquifer. The formation is too resistant and uniform that it likely lacks significant fracturing.

Harpers Formation The Harpers Formation is a largely monotonous sequence of laminated- to thick-bedded graywackes. Well-developed axial plane cleavage typically obscures bedding features. The extensive fracturing and folding of this formation should significantly improve the permeability of this formation, making it a fair aquifer.

Antietam Formation The Antietam Formation is generally a fine-grained feldspathic sandstone. Characteristically, it has thin to medium beds of planar sandstone separated by thin beds of laminar shale. Local concentrations of iron may be present. It is unlikely that this formation is of any hydrogeologic significance since it is generally thin, well-cemented, and not in locations for well sites.

Sandy Formation The Sandy Formation occurs generally in topographic low areas between the ridges of the Antietam and the low hills of the Rome. It is an alternation of

dark gray limestones and light gray dolomite. Hydrogeologically, this formation has

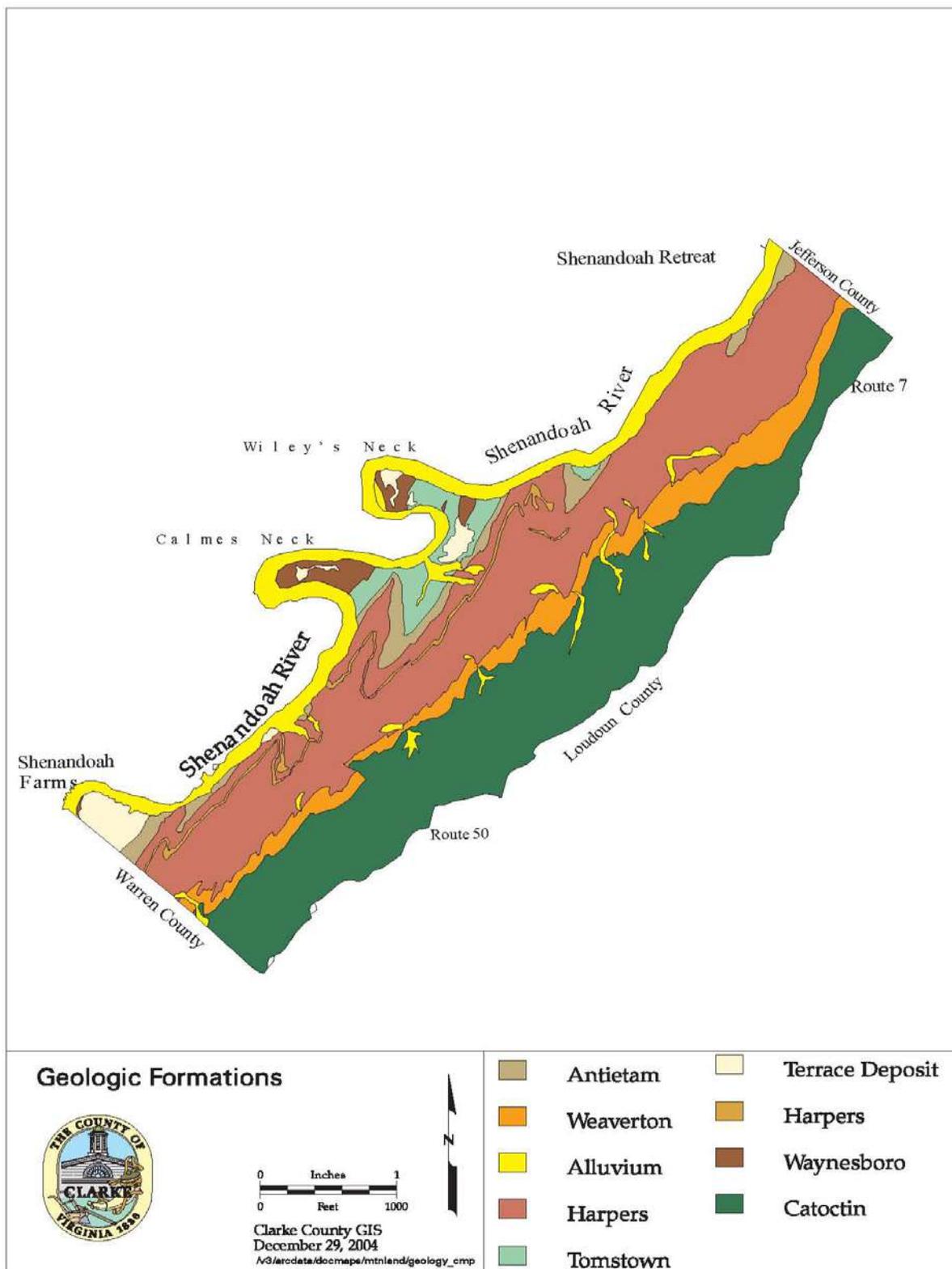


Figure 4

moderate aquifer potential, depending on its extent of fracturing and the development of solution channels in these fractures.

Rome Formation The Rome Formation consists of alternating limestones, dolomites, shales and other fine-grained carbonate rocks. The formation is generally folded and sinuous and could be a good aquifer in folded and fractured areas. Fracture enlargement from dissolution of carbonate rocks may also increase the permeability.

C. Soils

The Blue Ridge Mountain area is described by the Soil Conservation Service (SCS) as some of the roughest and steepest parts of the County. Soils are formed in residuum, or colluvium, from sedimentary and metamorphic rock. Three main general soil types are described for the mountain. These include the Dekalb-Laidig, Cardiff-Cataska-Whiteford, and Catoclin-Myersville-Lew series (Fig. 5).

Dekalb-Laidig These soils make up approximately 34% of the mountain soils. They are deep, well drained soils that have a loamy subsoil and formed in materials weathered from sandstone. These soils are found most frequently on the steep upland side slopes. These soils have many limitations for development including a high content of coarse fragments and slow permeability.

Cardiff-Cataska-Whiteford These are deep to shallow, well-drained or excessively-drained soils that have a loamy subsoil and are formed in materials weathered from phylites and slates on uplands. Approximately 28% of the mountain has these soil types. Slope, depth to bedrock, and high content of slate fragments limit septic field location and dwellings with basements.

Catoclin-Myersville-Lew Moderately deep or deep, well-drained soils that have a loamy subsoil and are formed in materials weathered from residuum, or colluvium, from greenstone. These soil types are found primarily in upland areas. Stones and boulders limit residential development in these soils, which make up 38% of the mountain.

Certain soil types are more susceptible to disturbance by development than others. These include soils associated with erosion and slippage (Fig. 6). Because of the steep slopes, the majority of soils on the mountain are classified as highly erodible by SCS. Any land disturbance on these soils can contribute to sedimentation of streams and roadways. Slippage soils are those that if disturbed may cause landslides. Vegetation, primarily forest cover, can significantly stabilize soils prone to erosion and slippage. Therefore limits on tree clearing are recommended to reduce the impact to these soils.

The Virginia Erosion and Sediment Control Law (Va. Code Sec. 10.1-560) requires every county, city, and town to pass a local ordinance or program to control erosion sediment and storm water run-off from land-disturbing activities. Currently disturbance exceeding 10,000 square feet requires an Erosion and Sediment Control Plan. In many cases single-family home construction does not require a complete plan but may still cause considerable erosion. Therefore, it is recommended that for all single-family home construction an Erosion and Sediment Control Sketch be submitted. These would not be as detailed as a Plan, but require the homeowner or contractor to submit a sketch identifying the proposed disturbance and erosion control measures to be installed.

General Soil Types

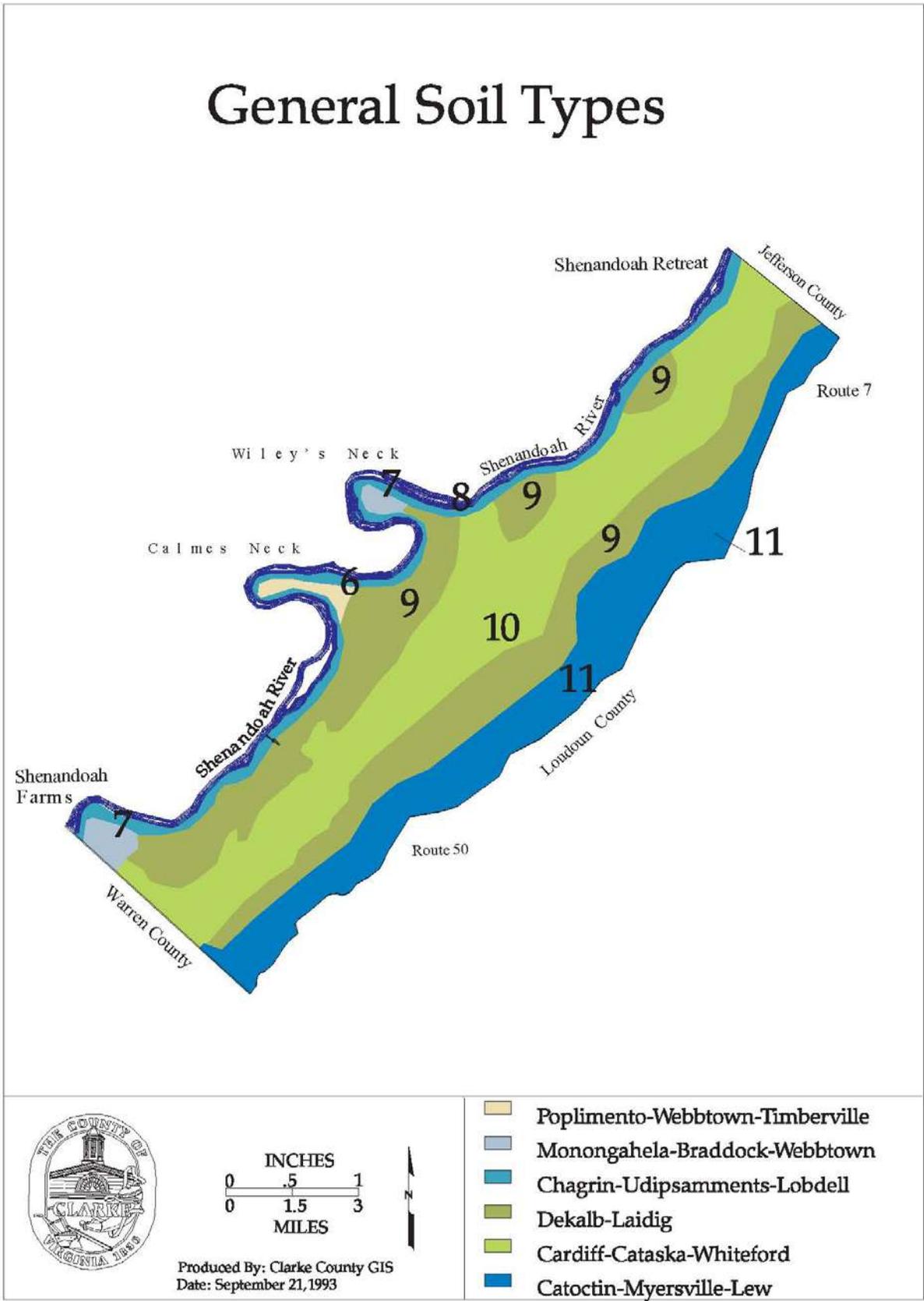


Figure 5

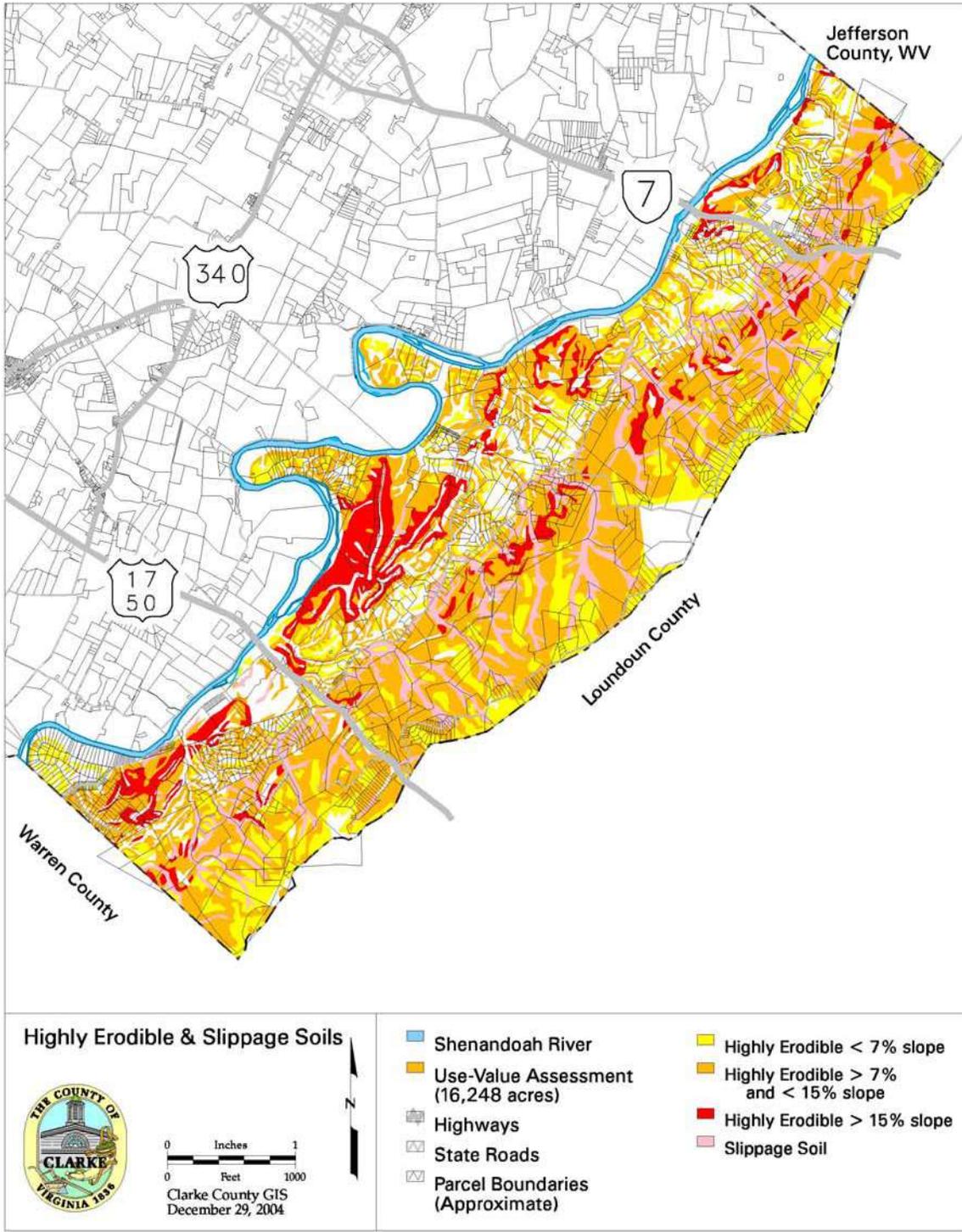


Figure 6

D. Forest Resources

The General Assembly of the Commonwealth has made it clear that forestal lands, as well as agricultural lands, are valuable resources and should be protected. The Agricultural and Forestal Districts Act (Code of Va., Sect. 15.2-4301) states that:

It is the policy of the Commonwealth to conserve and protect and to encourage the development and improvement of the Commonwealth's agricultural and forestal lands for the production of food and other agricultural and forestal products. It is also the policy of the Commonwealth to conserve and protect agricultural and forestal lands as valued natural and ecological resources that provide essential open spaces for clean air sheds, watershed protection, and wildlife habitat, as well as for aesthetic purposes. It is the purpose of this chapter to provide a means for a mutual undertaking by landowners and localities to protect and enhance agricultural and forestal land as a viable segment of the Commonwealth's economy and as an economic and environmental resource of major importance.

Nearly all of the Mountain Land Area is in oak-hickory timber type, which includes yellow poplar. A very large portion of this area is harvestable timberland.

The acreage under forestry use-value assessment (comprising 61.5% of the Mountain Land Area) is in 241 parcels (Table 2). Land in parcels of over 100 acres comprises 19% of all the land under use-value assessment, and parcels between 20 and 100 acres account for another 51%.

In 1994, about 11,295 acres were in tracts generally considered large enough for commercial forestry. In 2004, 16,247 acres were in land-use. This represents a 31% increase in the number of acres under use-value on the mountain since 1994 (Fig. 7). The remaining small parcels, accounting for only 4% of the acreage, would not be eligible for use-value assessment by themselves (Code of Va. Sect. 58.1-3233), but if in combination with other adjacent parcels in the same ownership they constitute areas of over 20 acres of forested land, they are considered eligible under a 1988 amendment, unless the parcels are shown on a recorded subdivision plat.

The exclusion of lots in recorded subdivisions reflects the fact that it would be questionable public policy to allow forestry use-value assessment for land that had been divided into tracts that are so small as to be clearly intended for the development market and by themselves are too small for normal commercial forestry management and harvesting. Allowing use-value assessment for such lots is likely simply to result in a subsidy to owners intending to develop.

Table 2. Land Under Forestry Use-Value Assessment

Tract Size	Parcels		Acres	
	Number	Percent	Number	Percent
0 - 19.9	71	29	586	4
20.0 - 99.9	123	51	5,438	33
100-499.9	46	19	9,425	58
500 acres or more	1	<1	798	5
Total	241	100	16,247	100

Although Forest Management Plans are required in order to receive a tax break through the use of the use-value assessment, neither the Virginia Department of Forestry nor the County Commissioner of Revenue enforces the Plans. The Plans are considered recommendations to the landowner with regard to best forest management practices. The VDF has developed a brochure entitled "Virginia's Forestry Best Management Practices for Water Quality, BMP Field Guide" July 2002 (and as amended). This guidebook outlines minimum Best Management

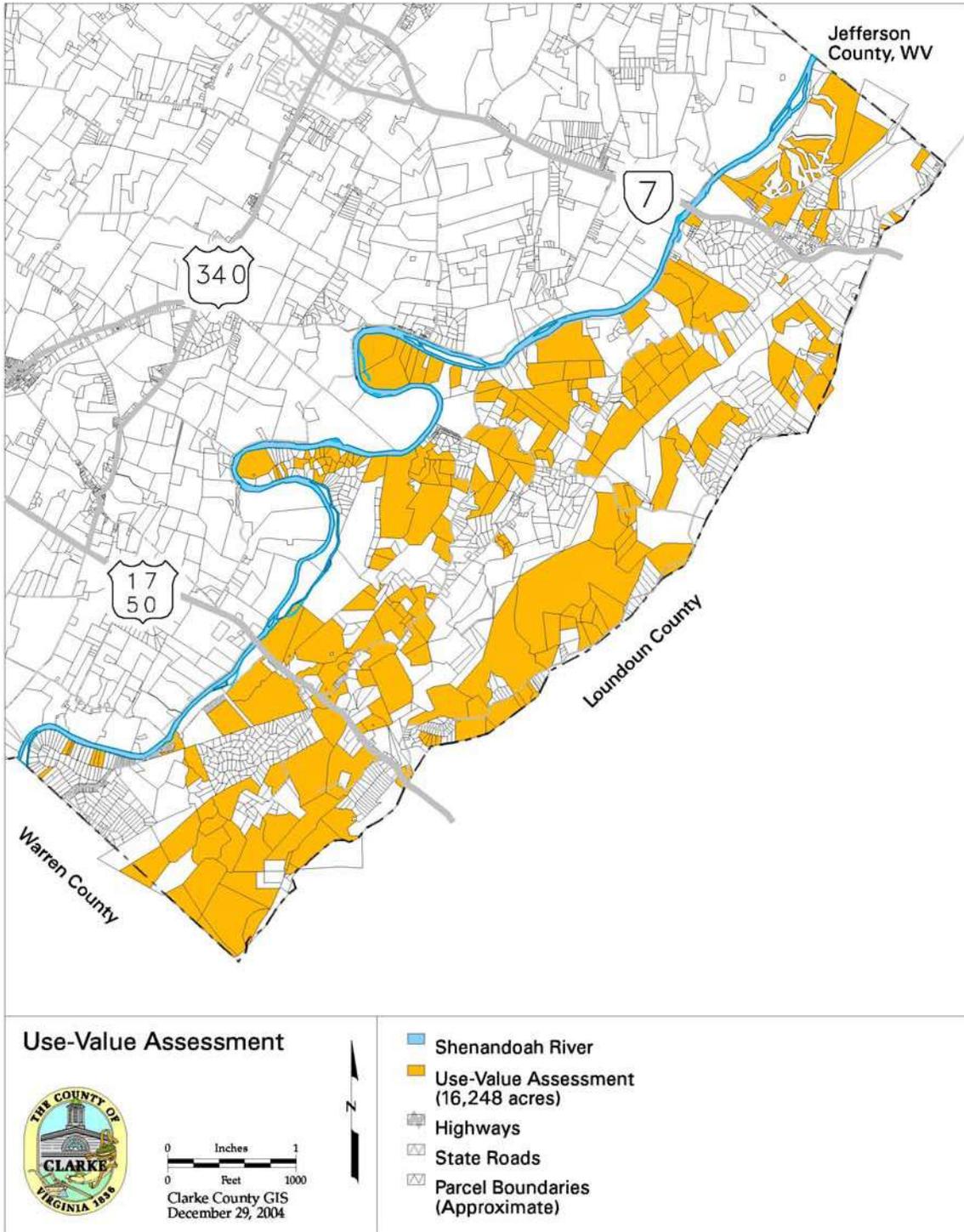


Figure 7

Practices (BMPs) to be followed during a timber harvest operation. A recommendation is for loggers to submit a Pre-Harvest Plan, which details the proposed location and type of BMPs to be installed before a timber harvest.

E. Water Resources

Water resources throughout the County are its most important natural resource. Quantity and quality of both ground and surface waters are important to protect from degradation. Surface waters are more visible and therefore of more immediate concern to citizens. Groundwater is measured primarily by individual wells and cannot be assessed visually. Problems with ground water often go undetected until widespread problems exist. Once widespread problems exist they are often difficult and expensive, if not impossible, to correct. A severe drought throughout the region between 1999 and 2001 increased awareness as to problems with water availability.

1. Surface Water Quality

Perennial (year round) streams and intermittent (wet-weather) streams are common throughout the mountain area. These are specifically identified by the US Geologic Survey (USGS) on topographic maps. Because of their steepness, mountain lands are particularly susceptible to erosion whenever the natural environment is disturbed, as, for example, by construction of roads or buildings. Construction usually results in increased areas of impervious surface, which speeds and concentrates run off, causing even more erosion. Effluent from septic treatment systems in thin mountain soils is likely to seep to the surface and cause contamination of intermittent and perennial streams.

Increased run-off results in higher peak flows in streams, causing channel enlargement. The material removed by the stream in enlarging its channel to accommodate the increased flow is deposited in relatively level reaches downstream. Any considerable enlargement will result in large and unsightly out-washes of rock and silt into the Shenandoah itself. These will substantially diminish the river's scenic value and the silt will be harmful to aquatic life and add to nutrient enrichment of the tributaries, the river, and eventually the Chesapeake Bay.

2. Groundwater

Concerns over groundwater quality and quantity have prompted the County to consider ways to prevent groundwater degradation. Protection strategies for the valley and mountain areas of the County differ significantly. Sinkholes and limestone bedrock are the main factors influencing groundwater quantity and quality in the valley. Geology, steep slopes, and thin porous soils influence groundwater on the mountain. Groundwater quantity can be low, and contamination potential is high due to these factors.

Quality

Several features make the mountain area vulnerable to groundwater contamination. First, much of the groundwater recharge to wells occurs from the upper layers of bedrock where fracturing is most prevalent. Waters in these layers have a more direct relation to septic systems than would groundwater at lower levels. Second, slopes cause more rapid movement of water in the shallow zones of soil and fractured rock than would occur in more level areas. This results in less dilution and greater displacement from a source (such as a septic treatment system). Third, effluent moves through thin porous soils more quickly, so there is less time for biologic breakdown and more rapid movement to the water table than is the case with soils in relatively flat areas (Sandberg, 1987). In a well-testing program completed in 1991 that sampled 49 wells on the mountain for various water contaminants, including coliform, 10 of these (20%) were positive for bacteria.

Clarke County has adopted an ordinance that extends the Virginia Department of Health's requirements for subsurface septic systems in order to minimize the potential for groundwater contamination resulting from improper siting and construction of subsurface systems.

Colluvial soils have been identified by the SCS as those soils most likely to contribute to groundwater recharge as well as having a high potential for contamination primarily due to their high permeability (0.6 to 20 in/hr), soil depth (> 60"), a high infiltration rate (hydrologic groups A&B, SCS Soil Survey), and the lack of a fragipan, or impervious, layer.

Figure 8 indicates that the soils in large portions of the Mountain Land Area are not well suited to accommodate on-site septic systems. In fact, no soils series on the mountain are rated as having slight or no limitations for septic systems. The bench area on the western side of the mountain is the best land in the Mountain Land Area for septic systems, but even it is characterized by moderate limitations. The remainder of the Mountain Land Area has one or more severe limitations. The top of the mountain and large areas close to the river exhibit three severe limitations.

Additional contamination sources that need to be addressed include leaking underground storage tanks, pesticides, fertilizers, road chemicals, and household hazardous wastes. These sources will be addressed County wide in Comprehensive Plan Chapter III, Article 4, Groundwater Resources Plan.

Quantity

Inadequate well yields, however, are likely to be at least as much a hindrance to development in the Mountain Land Area as is septic contamination. Well yields tend to be highest where fractures in the rock occur, and often in such places soils are deepest. Regional fractures often occur as linear elements, such as streams, swales, or mountain gaps. Smaller fractures, which cannot be discerned easily on the ground, often can be delineated from air photographs or satellite imagery. Delineation by remote sensing, however, must be complemented by expensive field work (Source: Water Resources Division, U. S. Geological Survey, Richmond, VA). A study conducted by the League of Women Voters of Clarke County in 1986 indicated that typical (median) well yields in the Mountain Land Area are 7 gpm. Half of the 65 wells measured yielded between 2.5 and 15 gpm, while, at the extremes, six had no flow and one had a yield of 100 gpm. In contrast, 166 wells west of the river had a median yield of 15 gpm. Half of these well yields were between 5.5 and 47.5 gpm, and at the extremes, seven had no flow and one had a flow of 200 gpm.

As authorized by the 1988 General Assembly, Clarke County has adopted a well-water ordinance that prescribes well construction standards and water quantity standards to be met before a building permit is issued. This ordinance will help insure that wells have at least a minimum flow level before lot owners invest construction money and will minimize groundwater contamination resulting from improperly constructed wells.

Virginia has enacted several laws designed to protect its groundwater resources. The centerpiece is the Groundwater Act of 1973 (Va. Code, Secs. 62-144.83 to 62.1-44.106). The Act declares that it is the policy of the Commonwealth that the public has the right to exert reasonable control of all groundwater resources in the Commonwealth and that suitable regulations must be adopted to conserve and protect them. The Department of Environmental Quality (formerly State Water Control Board) is given the authority to declare "groundwater

Soil Suitability for Septic Systems

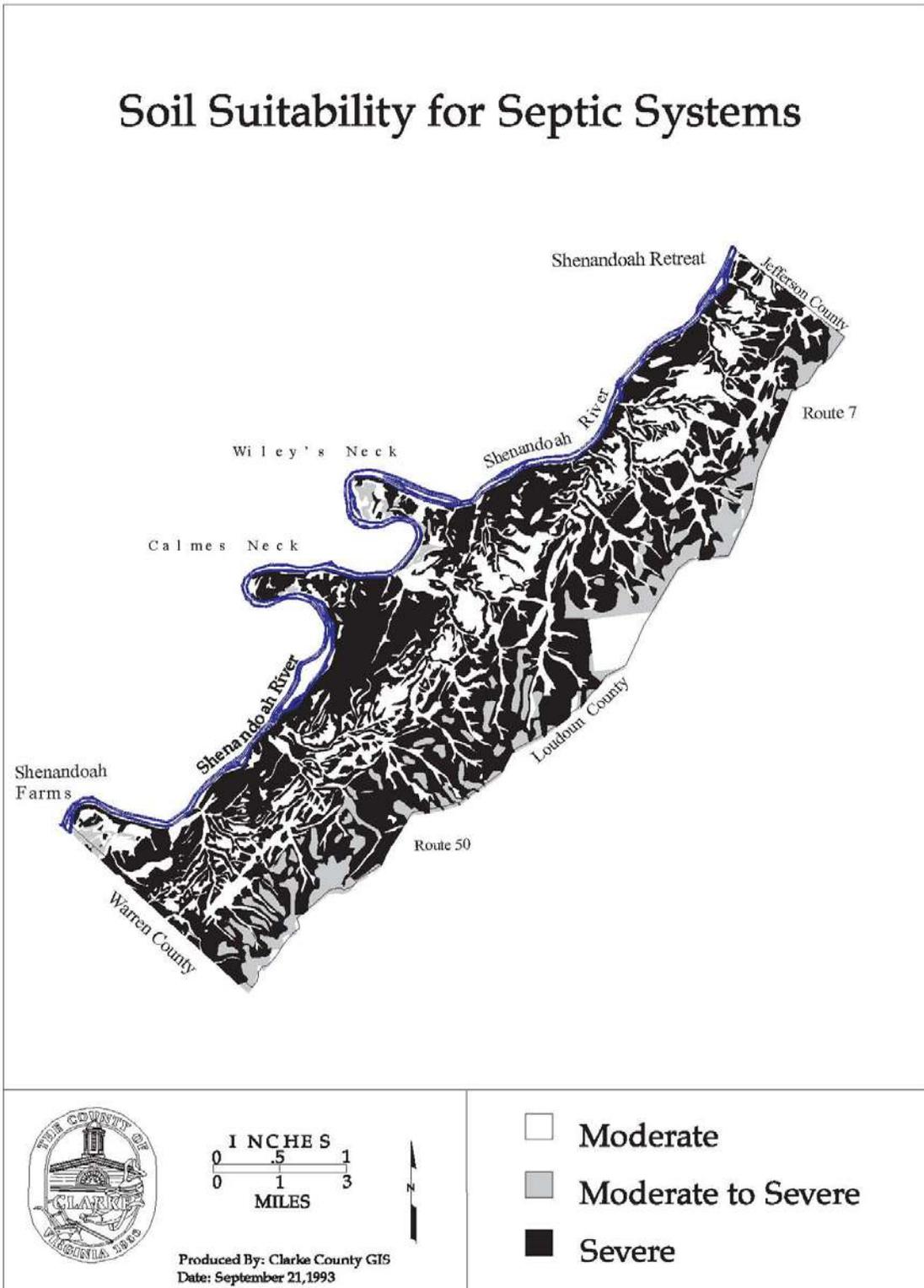


Figure 8

management areas" that require special protective measures. No withdrawals can be made within those areas without a State permit.

F. Wildlife

There is a strong public interest in maintaining a wide diversity of species and in protecting those species of flora and fauna that are endangered. This interest has been recognized at the federal level in the statutes relating to endangered species and in many state legislatures. Broad problems have local manifestations, so it behooves the counties and municipalities as well as the state governments to take appropriate steps to protect species diversity within their jurisdictions. One practice used to increase diversity of wildlife habitat is the proper use of forest management practices, including but not limited to regeneration clearcuts, intermediate thinnings, and commercial timber harvests. Increased habitat diversity in turn enhances the mountain area for all wildlife species.

The primary concern for protecting threatened and endangered species is to avoid degradation of species habitat, thereby providing an opportunity for species survival. Species survival is an important issue as it relates directly to the natural diversity of a locality or region. The more diversity there is in an area the more able that community is to withstand and adapt to change. For example, the more insect species there are the more prey species are available for insect eating predators. If one insect species is wiped out by disease, for example, then other insects 'fill in' as the prey species. Less species availability means less food opportunity that can lead to fewer species higher up the food chain.

There are several different rankings for species or communities considered threatened or endangered. Federally threatened and endangered species are protected by The Federal Endangered Species Act, which prohibits degradation of species or species habitat. Virginia's threatened or endangered species laws protect endangered species. These laws are similar to the federal laws in scope. The Virginia Departments of Game and Inland Fisheries and of Agriculture develop the state species lists. Currently there are no known federal or state threatened or endangered species in Clarke County.

The Division of Natural Heritage, which is a branch of the Virginia Department of Conservation and Recreation, further identifies areas and species considered to be the most environmentally significant in Virginia, including rare plants and animals, geologic landmarks, natural communities, and other natural features. The Division identifies one-minute blocks within the state where *elements of special concern* for Virginia exist.

To protect habitat, landowners need to be informed if species are located on their property; therefore, revisions to the environmental impact statement for major subdivisions will require the developer to contact the Division of Natural Heritage to insure that sensitive areas are not disturbed by development.

G. Scenic Values

The Shenandoah River corridor and the Blue Ridge Mountains are important scenic assets for the County (Fig. 9). The land that is within sight of the river is a major asset that qualified the river for formal Scenic River designation by the State. The Blue Ridge Mountain in its entirety is recognized as a uniquely important scenic resource. South of Front Royal, its importance has been recognized by inclusion in the National Park System (Shenandoah National Park). The Virginia Scenic Rivers Act (Va. Code, Secs. 10.1 400 to 10.1 418.2) states that its purpose is to provide for the identification, preservation, and protection of the

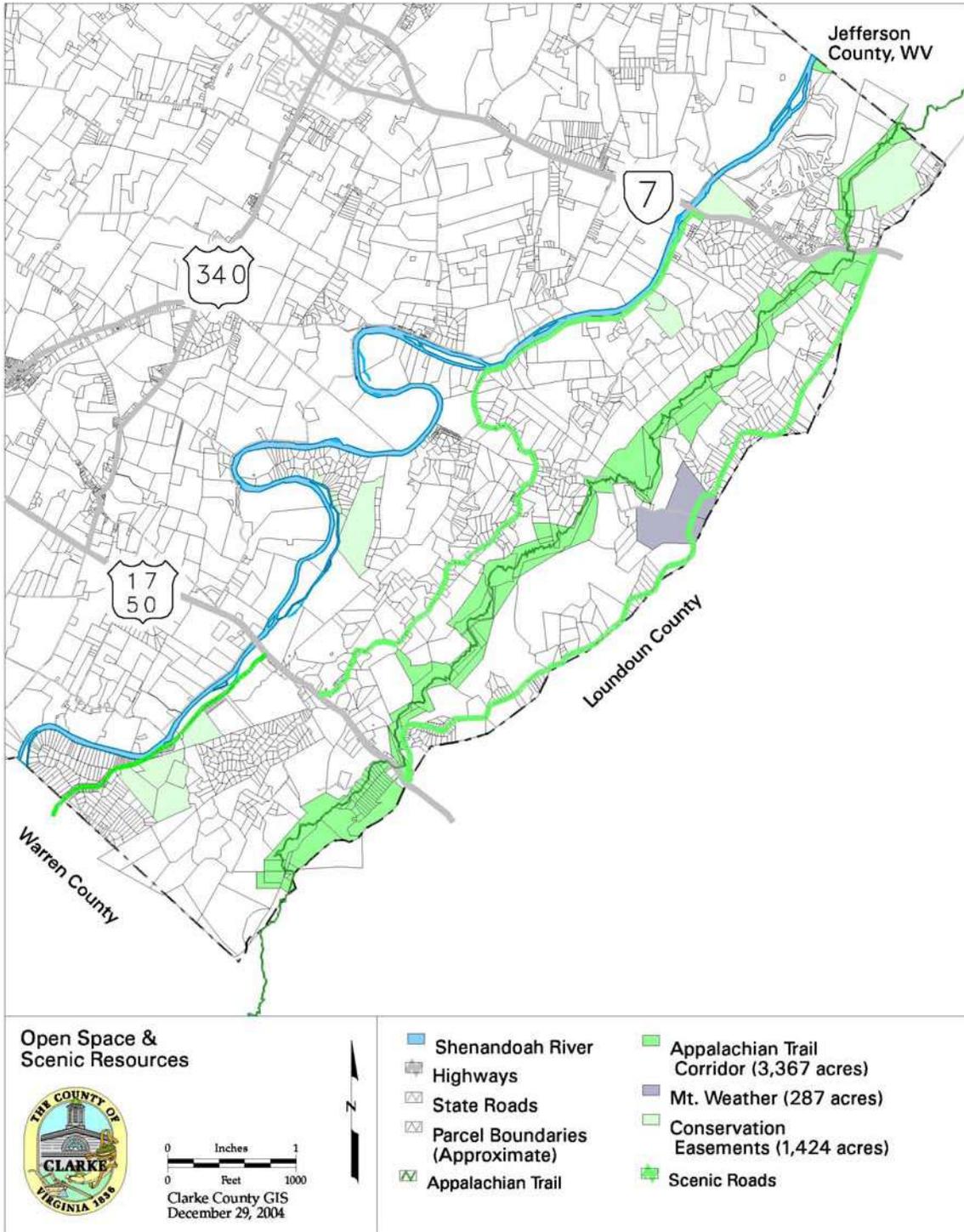


Figure 9

Clarke County section of the Shenandoah River to assure the enjoyment of its scenic, geologic, fish and wildlife, historic, cultural, and other assets and to encourage the continuance of existing agricultural, horticultural, forestry, and open-space land and water uses. While the Scenic River designation by the state does not include direct controls on development, it demonstrates the state's interest in protecting the river's scenic character.

The Appalachian National Scenic Trail is one of two trails created by the National Trails System Act (16 U.S.C.A. Secs. 1241 et seq.), which was passed in 1968. The Act envisioned a system of trails that were near urban areas, within scenic areas, or along historic travel routes.

Currently 1,424 acres on the mountain are in conservation easements held in perpetuity by the Virginia Outdoors Foundation. Encouraging the creation of open-space management districts is another tool that allows property owners to maintain land as open space for a variety of purposes. While engaged in the district the landowner is eligible for a tax break. These districts are established for a period of 7 years. An individual property owner may withdraw from a district at the end of the 7 year period, if so desired, thereby maintaining land use flexibility.

The Virginia Departments of Conservation and Recreation and of Transportation have designated certain roads as scenic byways because they provide a view of the mountain and other scenic landscapes. In July 2004, the Commonwealth Transportation Board designated Route 601 (Blue Ridge Mountain Road) from Route 7 to Route 50 as a Virginia Byway. In 2005, the Commonwealth Transportation Board designated the following routes as Virginia Byways: Route 606 (River Road) from Route 7 to Route 649, Route 649 (Frogtown Road), Route 606 (Mount Carmel Road) from Route 649 to Route 50, and Route 638 (Howellsville Road) from Route 50 to Warren County.

As the majority of the mountain is currently forested, a feeling of isolation and rural character is maintained along public roadways on the mountain. Maintenance of tree buffers along public roads will ensure the continuance of the rural aesthetics in spite of increases in housing development. Additional measures that maintain the visual integrity of the mountain by spreading development out are increasing minimum lot sizes, minimum lot widths, and minimum setbacks.

H. Historic Resources

The Mountain Land Area contains 125 structures constructed before 1943 that have been documented in the County's Rural Historic Resource Surveys (Fig. 10). Nineteenth-century vernacular buildings predominate. Most of them are located along the Shenandoah River, on the roads that cross the mountain (Routes 7 and 50), and along the bench on the west side of the mountain. There are a number of nineteenth-century churches. Up to a dozen of these buildings are potentially eligible for official historic recognition by nomination to the National Register of Historic Places. However, at this time none of these properties have been registered. The summer homes near Bluemont dating from the 1890s to the 1930s are potentially eligible for group nomination as a historic district.

All these examples of the scenic and historic character of the Mountain Land Area should be taken into account by the County government in its exercise of long-range planning for development and land use.

Historic Buildings in the Mountain Land Area

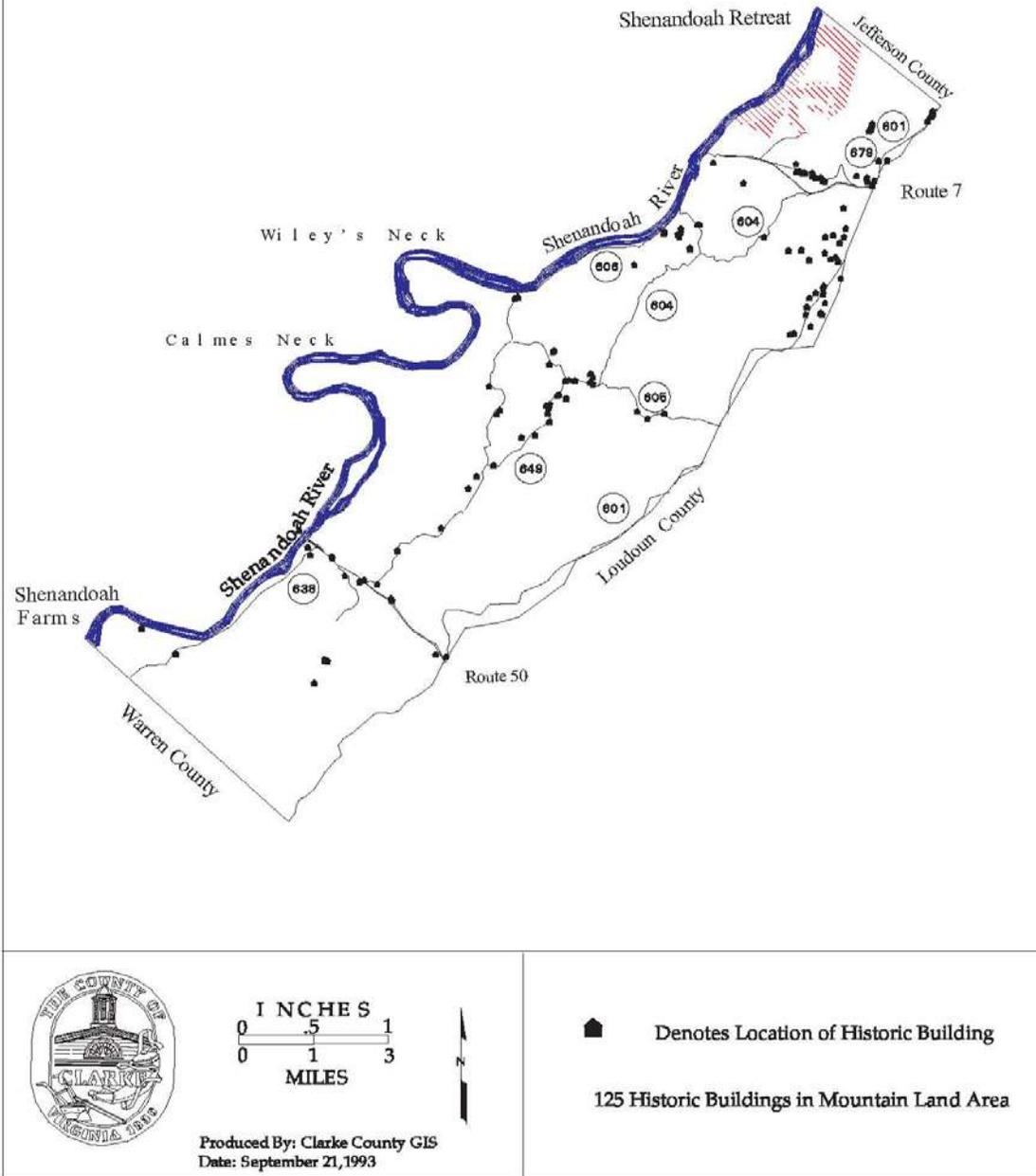


Figure 10

IV. DEVELOPMENT TRENDS

A. Development Pressures

The mountain occupies a strategic position for the development of Clarke County. As part of the Blue Ridge, it separates the county from generally flat, accessible and readily developable land to the east. Washington, D. C., 60 miles eastward, has fueled major suburbanization that has come closer and closer to Clarke County. During the past 10 years, major employment centers have developed in Loudoun County, which abuts the mountain land directly.

Overall housing density is currently controlled in the County by sliding scale zoning, which was adopted in 1980. Before 1980, 5 acre zoning was in place that permitted one dwelling for every 5 acres. The general purposes of sliding scale are to:

- maintain and promote the rural, agricultural, forestal, and open-space character of the land on both sides of the Shenandoah River;
- minimize conflicting land uses detrimental to the historical landscape and to agricultural and forestal operations;
- minimize land disturbance that may result in adverse environmental impacts such as increased erosion and sedimentation, non-point pollution of surface waters, and/or contamination of ground water; and
- limit construction and development of new residential subdivisions requiring unnecessary and costly provision of public facilities and services that would be disruptive to historically significant, scenic, agricultural, forestal, and open-space areas that are remote from existing population centers.

Sliding scale zoning provides for a proportional allocation of development or building rights based on the size of the property. Table 3 describes the original DUR allocation for parcels.

Building Permits

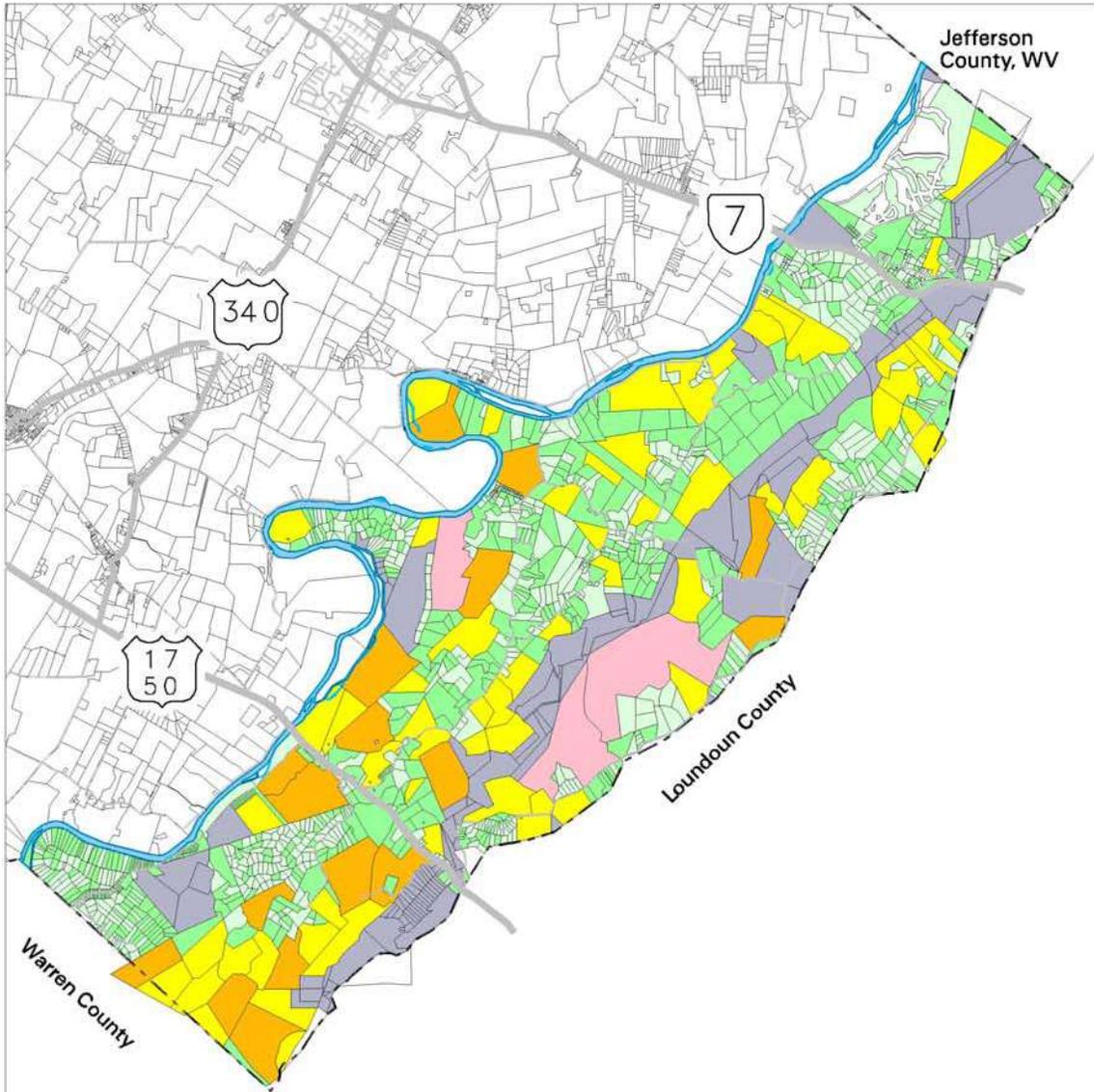
The Mountain Land Area is under increasingly strong pressure for development. It is the closest part of the county to the center of the Washington Metropolitan Area and adjoins rapidly growing Loudoun County. Between January 1980 and December 1993, the County issued 308 building permits for new residences in the Mountain Land Area, or 35% of all permits in 26% of the County. Between January 1994 and December 2004, the County issued 223 building permits in the Forestal-Open Space-Conservation District, or 31% of all rural permits.

Parcel Creation

Time Period	# parcels approved	total area	# parcels in FOC	% of # in FOC	area in FOC	% of area in FOC
1980-1989	350	2639 ac	75	21%	806 ac	30%
1990-1999	307	9956 ac	65	21%	2294 ac	23%
2000-2004	201	3678 ac	40	20%	516 ac	14%
Pending	10	73 ac	10	100%	73 ac	100%

While parcel creation was slower in the Mountain Land Area than in the rest of the County, the 1500 existing parcels east of the Shenandoah River constitute 40% of all parcels in the rural portion of the County (excluding Berryville). Therefore, parcel availability for development is greater.

In 1980 a total of 2,213 dwelling unit rights were allocated on the mountain; by the end of 2004, 947 DURs remained unused (Table 4) (Fig. 11). Approximately 980 houses currently exist on the mountain (Table 5).



Dwelling Unit Rights Remaining



0 1
Inches
0 1000
Feet

Clarke County GIS
December 29, 2004



-  Shenandoah River
-  0 DURs remain
-  1-2 DURs remain
-  3-4 DURs remain
-  5-7 DURs remain
-  > 7 DURs remain
-  Government Owned & Conservation Easement

-  Highways
-  State Roads
-  Parcel Boundaries (Approximate)

Figure 11

Table 3. Dwelling Right Allocation.

Size of Tract	Number of Single- Family Detached Dwelling Units Permitted
0 – 14.99 Acres	1
15 – 39.99 Acres	2
40 – 79.99 Acres	3
80 – 129.99 Acres	4
130 – 179.99 Acres	5
180 – 229.99 Acres	6
230 – 279.99 Acres	7
280 – 329.99 Acres	8
330 – 399.99 Acres	9
400 – 499.99 Acres	10
500 – 599.99 Acres	11
600 – 729.99 Acres	12
730 – 859.99 Acres	13
860 – 1029.99 Acres	14
1030 Acres or More	15

Table 4. Dwelling Unit Rights Remaining.

DURs Remaining	# DURs	# Parcels	# Acres	% Acres
0	0	855	9,545	37
1-2	642	623	6,463	25
3-4	251	64	5,233	21
5-7	24	17	2,808	11
> 7	30	3	1,535	6
Total	947	1,562	25,584	

* Does not include Government owned or Conservation Easements

B. Lands Committed to Development and Restricted from Development

Figure 12 shows the areas that have been fully built to the extent permitted by the current zoning ordinance. It is clear that while large sections of the Mountain Land Area have yet to be developed, substantial areas have reached the ultimate development permitted by the current zoning.

Table 5 shows that there are approximately 1,263 lots in the Mountain Land Area that are less than 10 acres, comprising about 81% of the area. Although about 63% of these lots are not yet built on. Their small size makes them of relatively little use for commercial forestry so they generally must be considered as likely to be developed.

The built-out areas and the areas already subdivided into small lots constitute much of the land that is most readily developable. Any significant conservation of land for forestry, wildlife habitat, scenic or recreational purposes will have to occur in the remaining portions of the Mountain Land Area.

Figure 9 indicates that substantial areas already have protection as permanent open space, either because they are fully owned by the public or because public or semi-public bodies have acquired easements restricting their development. The largest such holding is the Appalachian

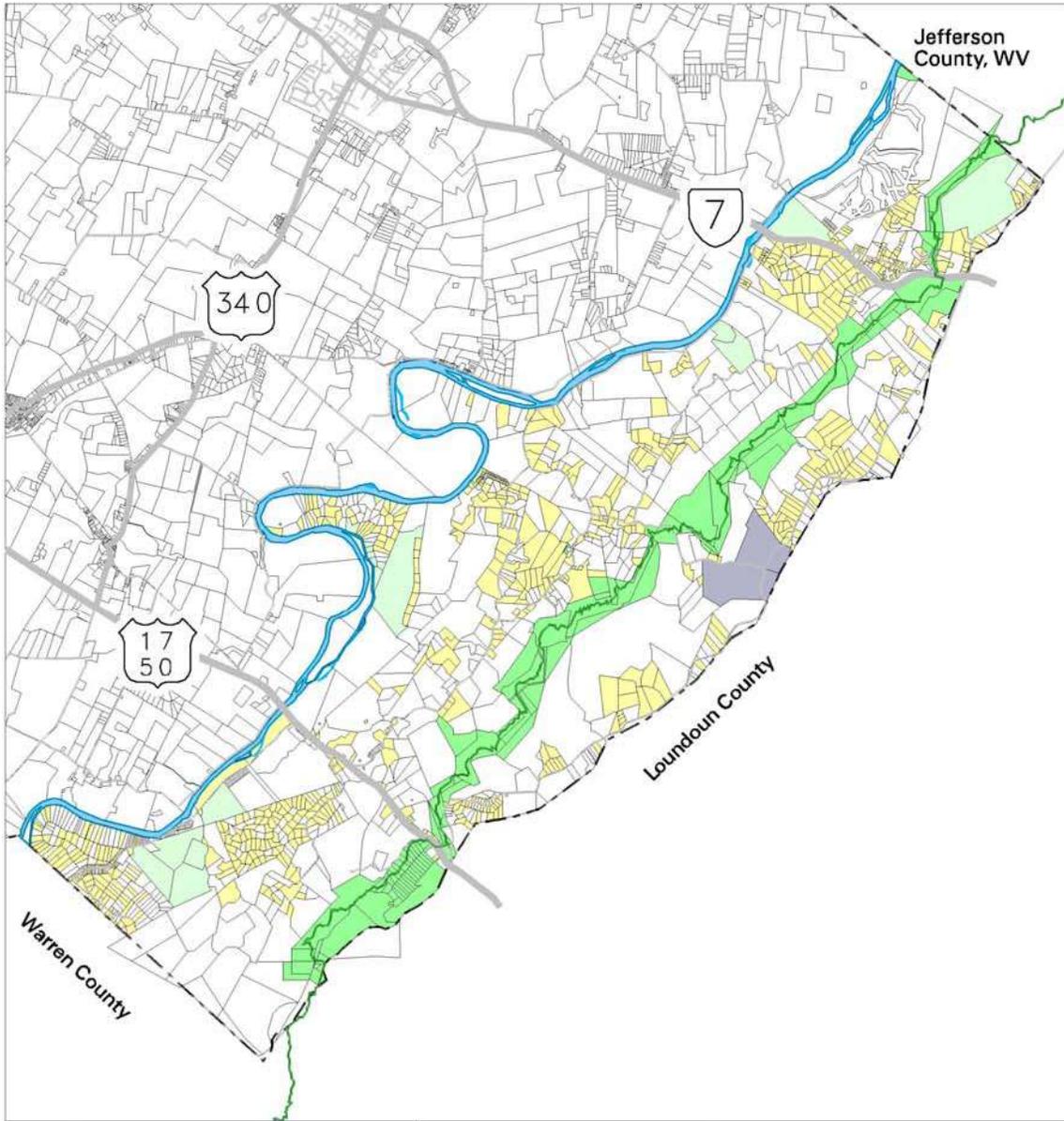


Figure 12

Trail corridor. As of 2004, it consisted of about 3,323 acres lying generally along the west side of the ridge of the mountain.

Table 5: Size Distribution of Tracts in the Mountain Land Area

Size Class (acres)*	# of Tracts	# of Acres	% of Tracts with a bldg.	# of Tracts with a bldg.
Less than 1	313	161	49	154
1-1.9	102	151	71	72
2-4.9	164	514	64	105
5-9.9	545	3,207	66	360
10-14.9	139	1,616	77	107
15-39.9	155	3,668	55	86
40-79.9	74	3,954	46	34
80-129.9	32	3,246	53	17
130-179.9	14	2,106	36	5
180-229.9	3	592	33	1
230-279.9	5	1,268	20	1
280-329.9	1	301	0	0
330-399.9	1	386	100	1
400-499.9	1	456	100	1
500-599.9	0	0	0	0
600-729.9	0	0	0	0
730-859.9	1	798	0	0
860-1029.9	0	0	0	0
Total	1,550	22,424	61	944

* Not including Govt. land (Appalachian Trail, Mt. Weather)

*Includes 280 lots for which size is not given in assessor's records. They are estimated to be 0.5 acres = 140 acres.

**Tracts with improvements assessed at \$6000 or more are assumed to have a building.

Conservation easements have been donated by landowners on several large tracts along the Shenandoah River, south of Calmes Neck. These easements protect the scenic qualities along significant reaches of the river. Several tracts are in easement near the Route 7 corridor, bordering the river and the Appalachian Trail.

Taken together, the already built-out areas and the areas with permanent open-space protection are not likely to change appreciably in the foreseeable future.

V. ROADS AND FIRE SAFETY

A. Transportation

The mountain is characterized by rugged, forested terrain isolated from the remainder of the County by the Shenandoah River. Two primary highways, Rt. 50 and Rt. 7, provide the only access between the valley region of the County and the mountain area. Within the Mountain Land Area there are few roads; with one exception, these run north-south. On top of the mountain is the most direct road, Rt. 601. Along the bench on the western side of the mountain and along the river, Routes 604, 606, and 649 provide more circuitous routes. Steeply-sloped Rt. 605 is the only road between Routes 7 and 50 to connect the ridge and the river.

The main problem with maintaining mountain roads is steep slopes and overall mountainous terrain. Because of the terrain, runoff during storm events erodes the roadbeds quickly as water is traveling at a high velocity off the slopes and onto the roads. Steep terrain, combined with unimproved conditions along some routes, especially Rt. 605, has created difficult driving conditions. Rt. 605 is difficult to maintain, with annual storm events causing significant damage. Every effort should be made by the County Board of Supervisors and the Virginia Department of Transportation to insure that roads in need of safety improvements are placed on the Six-Year Highway Plan so that they are upgraded in a timely manner. Grading should be designed and executed to cause the least possible disruption to natural ground forms and existing vegetation. Specific standards that will cause the “least possible disruption” should be provided.

The majority of new lots are accessed by private-access easements. To ensure safe emergency vehicle access via such easements, modifications to easement construction standards would reduce the maximum grade, provide setbacks for entry way posts or pillars, require pull-off areas for emergency vehicles, provide terminus turn around areas, and the use of VDOT gravel road standards for the road surface and base. To limit the impact construction of such private roads on the natural environment, a maximum right of way width is established, a maximum travel way width is established, and steeper shoulder slopes allowed.

B. Fire Safety

Because of the rugged topography, inaccessibility, lack of access to water, and forest cover, ensuring mountain residents protection from fire is a difficult task. Forest fires are administered by local volunteer fire departments and the Department of Forestry. Reports of the two volunteer fire companies in the mountain area: Blue Ridge on Retreat Road and Shenandoah Farms on Howellsville Road, state that the most common fire event is forest fires.

Homeowners can assist fire fighters by ensuring that fire prevention techniques are used in and around their homes. Many pamphlets are available from the Virginia Department of Forestry that describe appropriate landscaping around homes that can reduce the risk of fire damage.

In addition to reducing fire hazards around the home, property owners need to be concerned with emergency vehicle accessibility. Minimum standards are available from your local fire station. In general, emergency vehicles require a cul-de-sac at the end of roads with a minimum 40-foot radius. Private access easements should be up to 18 feet wide to allow for vehicles to pass. Pillars or gates at road entrances should be set back and far enough apart to allow a smooth turn into a property by fire apparatus. Propane tanks of more than 500 gallons should be placed underground to lessen the danger when forest fires come close to homes and businesses. Finally, dry hydrants connected to adjacent ponds are encouraged to provide potential water sources for fire fighting activities.

APPENDIX 1

**ITEM 1.
PROPOSED ZONING ORDINANCE TEXT AMENDMENTS**

**ITEM 2.
PROPOSED SUBDIVISION ORDINANCE TEXT AMENDMENTS**

**ITEM 3.
PROPOSED COUNTY CODE TEXT AMENDMENT**

**ITEM 4.
RESOLUTION**

**ITEM 5.
PUBLIC HEARING NOTICE**

for a house site, or 1.5 acres if an erosion and sediment control plan is prepared by a professional engineer and approved by the Zoning Administrator for dwellings constructed after [adoption date of ordinance]

- 3-A-2-f-(4)** *Except for those clearing activities listed in section 3-A-2-f-(9), clearing is allowed within 200 feet of the house site area described in the previous section provided: 1) there are no clear-cut openings, 2) the thinning of trees of 2 inches or more in diameter (measured 4.5 feet above ground), is allowed, if randomly spaced with not more than 50% of the crown cover removed within any 10 year period, 3) pruning of branches is limited to the bottom 1/3 of the tree, and 4) this clearing within 200 feet of house site areas shall be done before issuance of final certificate of occupancy.*
- 3-A-2-f-(5)** *Except for those clearing activities listed in section 3-A-2-f-(9), existing woody vegetation shall be retained on all parcels :*
- a. on slopes of 25% or more, and*
 - b. on slippage soils.*
- 3-A-2-f-(6)** *Tree Protection during Construction*
- a. Critical Root Zone*
Tree preservation areas shall be identified on the subdivision plat or construction plans. A “critical root zone” (CRZ) shall be delineated on the plans and clearly marked and protected in the field prior to any land disturbance. The CRZ is the area underneath the Tree Drip Line as defined in Section 9-B-#.
 - b. General Requirements*
 - 1. Before any land disturbance, suitable protective barriers, such as safety fencing, shall be erected outside of the CRZ of any tree or stand of trees to be preserved. Protective barriers shall remain so erected throughout all phases of construction. No grade changes or storage of equipment, materials, debris, or fill shall be allowed within the area protected by the barrier. No construction traffic, parking of vehicles, or disposal of liquids is permitted within the CRZ.*
 - 2. Trees likely to die as a result of site disturbance activities within 25 feet of the safety fence, as identified in the tree conservation plan, shall be removed.*
- 3-A-2-f-(7)** *Revegetation/tree replacement, in consultation with a Forestry Consultant or Certified Arborist and within the guidelines described below, shall be required for all areas where any clearing occurs in excess of the standards for maximum cleared area or in required vegetative buffer.*
- a. Replacement criteria.*
Trees that are removed shall be replaced so that there is, at a minimum, no loss of tree canopy coverage upon maturity of the replacement trees. All trees to be used as replacement trees shall be:
 - 1. a Virginia native tree species as identified in the Virginia Department of Forestry’s Tree Seedling Brochure described by the Virginia Native Plant Society (dcr.Virginia.gov);*
 - 2. be of minimum quality as identified in the American Standard for Nursery Stock (ANSI Z60.1-2004) (as amended);*
 - 3. planted as described in the American Standard for Nursery Stock (ANSI Z60.1-2004) (as amended); by a qualified landscape contractor to insure survival; and*
 - 4. a minimum of 4 feet in height with caliper dependent on species.*
- 3-A-2-f-(8)** *Clearing for agricultural uses shall require a Conservation Farm Management Plan approved by either the regional Soil and Water Conservation District or the federal Natural Resources Conservation Service and submitted to the County Zoning Administrator.*
- 3-A-2-f-(9)** *The following clearing activities shall be allowed in the no-clear areas:*

- ~~3-A-2-f(1)~~
 - ~~3-A-2-f(2)~~
 - ~~3-A-2-f(3)~~
- a. Dead trees and shrubs may be removed.
 - b. Invasive alien species may be removed. Invasive alien species shall be those listed by the Virginia Department of Conservation and Recreation.
 - c. **Forestry activities as described in Section 3-C-2-1.**
 - d. **Clearing for the following activities** ~~types of development~~ may ~~occur~~ ~~be located~~ in the vegetated property buffer, provided no more land, trees, or vegetation shall be disturbed than is necessary for construction, use, and maintenance of:
 - i. driveways and access easements of not more than 30 feet **wide**,
 - ii. electric, gas, and telephone utility easements, on-site water facilities and sewage disposal systems, if the Planning Commission determines that not allowing such facilities or systems in the buffer would prohibit the **feasible construction** ~~practical development~~ of such facilities or systems,
 - iv. public water and sewer lines (including water and sewer lines constructed by private interests for dedication to public agencies), or
 - v. fences.
 - vi. **Forestry activities as described in Section 3-C-2-1.**

3-A-2-g **Private driveway standards**
All private driveways longer than 150 feet shall comply with all Private Access Easement travel way standards as stated in Subdivision Ordinance Section 8-J-2-(c) on parcels created after [adoption date of ordinance].

3-C **SUPPLEMENTARY REGULATIONS (10/17/00) (11/18/03)**

3-C-1 **General**
 The following regulations are supplementary regulations for districts listed in the Schedule of District Regulations, and are in addition to other provisions and requirements of this Ordinance.

3-C-2 **Uses in Various Districts**

3-C-2-1 Forestry Uses and Structures: The cutting or logging of any trees for **profit that exceeds one acre of harvested area**, ~~commercial purposes~~ shall not be conducted without a Pre-Harvest Plan, ~~submitted by the property owner~~ **which shall include Virginia Department of Forestry Best Management Practices, that is reviewed by the County Zoning Administrator and a consulting forester or certified arborist for compliance with County ordinance** ~~and approved by the Virginia Department of Forestry and a Timber Harvest Permit issued by the Zoning Administrator.~~ **The Pre-Harvest Plan shall be submitted to the Zoning Administrator at least 10 business days before the start of a harvest operation.**

3-C-2-1(1) Intent
 The standards for the Pre-Harvest Plan are Best Management Practices (BMPs) specifically established to reduce logging costs, reduce erosion, and prevent water quality problems.

3-C-2-1(2) Pre-Harvest Plan
 The Pre-Harvest Plan shall include a map identifying:

- a) property boundaries,
- b) streams and drainages,
- c) ~~Critical Area~~ **vegetated buffers as described in Section 3-A-2-f,**

- d) road and trail locations,
- e) stream and drainage crossings,
- f) log landings and mill seats,
- g) streamside management zones (SMZs), and
- h) other environmental concerns.

As appropriate, written notes shall address:

- a) road and trail specifications,
- b) harvesting equipment to be used,
- c) timing of harvest,
- d) logging contract specifications,
- e) special planning for wet areas,
- f) obstructions such as rock outcroppings, and
- g) when and where BMPs will be installed.

3-C-2-l-(3)

The guidelines in the “~~Loggers Guide~~”, Virginia Department of Forestry, 1988, “*Virginia’s Forestry Best Management Practices for Water Quality, BMP Field Guide*” July 2002 (and as amended) shall be the minimum standards and criteria for the Pre-Harvest Plan and shall be understood and applied as the minimum requirements for:

- a. haul roads,
- b. skid trails,
- c. haul road and skid trail drainage,
- d. log decks, landings, and mill seats,
- e. stream side management zone (SMZ); however, in no instance shall a SMZ be less than 100 feet for a perennial stream or 50 feet for an intermittent stream as identified *on the 7.5 minute USGS topographic maps* ~~the U.S. Geological Survey,~~
- f. *Buffer areas as described in section 3-C-2-l-(6),*
- g. *Clearcuts for forest regeneration and wildlife habitat should be laid out with an undulating perimeter instead of squares or rectangles. This is to increase the “edge” effect between adjacent forested areas so vital to wildlife, and to help them blend into the surrounding forest, and*
- h. seeding bare soil

3-C-2-l-(4)

No subdivision application accepted for three years before or after a timber harvest operation.

3-C-2-l-(5)

No Pre-Harvest Plan would be accepted for a property within three years of an approved subdivision

3-C-2-l-(6)

A buffer shall be maintained, for commercial forestry activities with a Pre-Harvest Plan, of 25 feet along public rights of way and 25 feet along property lines, allowing for the thinning of trees not to exceed ~~25~~ 50% of the crown cover (~~25~~ 50% crown cover retained at all times).

- a. *no skid trails shall be located within buffer areas,*
- b. *tree removal in buffers shall be with directional felling and winching,*
- c. *within this managed area up to 50% of the basal area or up to 50% of the forest canopy can be harvested,*
- d. *salvage shall be conducted in accord with recommendations outlined in the BMP manual,*
- e. *removal of harvested timber in the buffer shall be done so that the forest floor remains virtually undisturbed. If disturbance does occur, a permanent vegetative cover shall be established on exposed soil within the buffer area;*
- f. *equipment shall not be operated in or adjacent to the buffer area for salvage and sanitation purposes when soils are saturated, and*

3-C-2-l-(7) *g. areas of damage of less than 1 acre may be completely harvested. Revegetation, as described in Section 3-A-2-f-(7), shall be required for all areas where any clearing occurs in excess of the standards for required vegetative buffers.*

3-C-2-* *Propane Tanks: Propane tanks of 500 gallons or larger shall be placed underground.*

3-D ALLOCATION OF SINGLE-FAMILY DETACHED DWELLING UNIT RIGHTS IN THE AGRICULTURAL-OPEN SPACE-CONSERVATION (AOC) AND THE FORESTAL-OPEN SPACE-CONSERVATION (FOC) DISTRICTS AND LOT SIZE IN THE AOC DISTRICT

3-D-8 **Boundary Line Adjustment of Lots or Parcels of Land in the AOC/FOC Districts**
If a boundary line adjustment results in an increase in acreage of a tract by 10% or more, the allocation of dwelling unit rights between the tracts may be adjusted by reallocation of not more than one dwelling unit right from the tract reduced in size to the parcel increased in size, provided:
(a) the resulting dwelling unit rights on the tract increased in size does not exceed the dwelling units rights that would have been allocated to such parcel under Section 3-D-2 if such parcel had been a parcel of record that existed in the Clarke County Real Property Identification Maps on October 17, 1980, and
(b) not more than one boundary line adjustment that includes reallocation of a dwelling unit right may be approved in any two year period.

9 DEFINITIONS

9-B-152 **SLIPPAGE SOILS:** *Soil types identified as 54C Udorthents in the “Soil Survey of Clarke County” (1982).*

(the following terms to be inserted in alphabetical order)

9-B-# **CERTIFIED ARBORIST:** *An individual certified by the International Society of Arboriculture (ISA) who has demonstrated through a professionally developed examination and education program a thorough knowledge of tree biology and tree care practices.*

9-B-# **CONSULTING FORESTER:** *An individual who has at a minimum a 4-year degree in forest management from a college accredited by the Society of American Foresters.*

9-B-# **TREE:** *any living, self-supporting, wood perennial plant that normally grows to an overall height of no less than 10 feet.*

9-B-# **TREE CANOPY:** *the upper portion of the tree consisting of limbs, branches, and leaves.*

9-B-# **TREE CANOPY COVERAGE:** *the areal extent of ground within the drip line of the tree.*

9-B-# **TREE DIAMETER AT BREAST HEIGHT (DBH):** *the diameter of the trunk of a tree measured at breast height (a height of 4.5 feet above the natural grade). The DBH of*

trees with multiple trunks shall be the assumed diameter obtained from the sum of the cross-sectional areas of individual trunks at breast height. Trees with less than 4.5 feet of clear trunk shall be measured at the diameter of the largest vertical branch or leader at breast height.

- 9-B-#** ***TREE DRIP LINE:** the peripheral limits of the horizontal crown of a tree spread vertically to the ground, provided, however, that the same shall not be less than a circle with a 5 foot radius measured from the center of the tree.*
- 9-B-#** ***TREE, LARGE MATURE:** any tree that has a DBH of 18 inches or greater; with the exception of non-native, dead, dying or diseased trees.*
- 9-B-#** ***TREE PROTECTIVE BARRIER:** fences or like structures at least 4 feet in height that are conspicuously colored and prevent or obstruct passage.*
- 9-B-#** ***TREE PRUNING:** to cut away, remove, cut off or cut back parts of a tree for general maintenance purposes.*
- 9-B-#** ***TREE REMOVAL:** to cut down, dig up, destroy, effectively destroy, or the unlicensed relocation of any tree.*
-

AMENDMENT 2.
PROPOSED SUBDIVISION ORDINANCE TEXT AMENDMENTS

Sections to be added shown in *bold Italics*

Section to be deleted shown ~~struck through~~

2 USAGE AND DEFINITIONS

2-B DEFINITIONS

- 2-B-50 SUBDIVIDE: To divide any tract, parcel, or lot of land into
(2/16/01) two or more parts, with the following exceptions:
- 2-B-50-(a) Boundary Line Adjustments (see Special Regulations, Article 10-D).
- ~~2-B-50-(b) The division of land shall not be considered a subdivision if, in the opinion of the Zoning Administrator, it meets all of the following requirements:~~
- ~~2-B-50-(b)-(1) It is not in conflict with the general meaning and purpose of this Ordinance;~~
- ~~2-B-50-(b)-(2) No streets, roads, or rights-of-way not already accepted into the State Highway System are needed to serve any parcel in the subdivision;~~
- ~~2-B-50-(b)-(3) It does not include a dedication of land to public use; and~~
- ~~2-B-50-(b)-(4) No parcel resulting from such division is less than 100 acres; provided that a resulting parcel will be measured with and included in any previously existing separate parcel to which it is merged.~~
- ~~2-B-50-(c) The division of land shall not be considered a~~
(7/20/93) ~~subdivision if, in the opinion of the Zoning Administrator:~~
- ~~2-B-50-(c)-(1) It is not in conflict with the general meaning and purpose of this Ordinance;~~
- ~~2-B-50-(c)-(2) No streets, roads, or rights-of-way not already accepted into the State Highway System are needed to serve any parcel in the subdivision;~~
- ~~2-B-50-(c)-(3) Not more than two parcels would result from the division of land;~~
- 2-B-50-(b e)-(4) **The use of one of the parcels will be public utility uses *and not more than two parcels would result from the division of land.***
- 2-B-50-(c d)
(6/13/89) All persons proposing to divide and/or merge land who contend
(2/20/90) such division is exempted from the provisions of this Ordinance
(7/20/93) under subsections (a) **or** (b), ~~or (c)~~, above, shall submit to the Zoning Administrator a plat of the proposed division, or other documents, plats, or evidence satisfactory to the Zoning Administrator, and if in the opinion of the Zoning Administrator the division is excepted, he shall so certify on said plat or on the deed of conveyance by which the property is to be divided. The Zoning Administrator's certificate shall state that the division is excepted under (a) **or** (b), ~~or (c)~~ above, and shall be signed by the Zoning Administrator. ~~All persons proposing to divide land in an AOC or FOC zoning district pursuant to the provisions of subsections (a), (b), or (c) above, shall submit to the Board of Supervisors of Clarke County, Virginia, a duly sworn affidavit setting forth the allocation of rights for new single family detached dwellings, as provided in Sections 4-G-2, 4-G-3, and 4-G-7 of the Clarke County Zoning Ordinance, to each of the parcels resulting from the division of the tract. Said affidavit shall further state that prior to conveyance or transfer of any such parcels, the grantor shall furnish a copy of the affidavit to the grantee. No person shall record a plat or conveyance for the division of land without complying with the provisions of this Ordinance or without the Zoning Administrator's certificate as aforesaid.~~

2-B-52 SUBDIVISION: The act or process of subdividing as herein defined. ~~All parcels of less than 100 acres resulting from the act of subdividing a tract of land shall be a part of the~~

~~subdivision and the requirements of this Ordinance, including platting requirements, shall apply there to.~~

- 2-B-53 (9/18/90) SUBDIVISION, MAJOR: A subdivision meeting any of the following conditions:
- 2-B-53-(a) Three or more lots are proposed, ***at least three of which are less than 100 acres.***
 - 2-B-53-(b) A lot will be used for commercial or industrial purposes.
 - 2-B-53-(c) A right of way in the subdivision will be proposed for acceptance into the Virginia Department of Transportation's road system.
 - 2-B-53-(d) Public water or public sewerage are proposed to serve any lot.
 - 2-B-53-(e) Homeowners association to be created for this subdivision.
- 2-B-54(9/18/90) SUBDIVISION, MINOR: A subdivision containing ~~less than 3~~ ***one or two*** lots, ***that are each less than 100 acres, and***
2-B-54-a meets none of the conditions set under Section 2-B-53, Subsections (a), (b), (c), (d), and
2-B-54-b (e) for major subdivisions.

3 ADMINISTRATION

3-A ADMINISTRATION BY PLANNING COMMISSION

- 3-A-2 The Commission may act through its Zoning Administrator and/or Planning Staff duly appointed as provided in Section 15.2-2217 of the Code of Virginia, to the extent that the Commission finds appropriate for the administration of this Ordinance; provided, however, that no person may act for the Commission in approving, conditionally approving, or disapproving any Preliminary Plat or Record Plat, ***except the Zoning Administrator shall act for the Commission in approving, conditionally approving, or disapproving any Preliminary Plat or Record Plat in which all lots proposed are 100 acres or greater in area.***

5 ENVIRONMENTAL INVENTORY AND IMPACT STATEMENT

- 5-A Every application for subdivision of land shall include as a part of said application an Environmental Inventory and Impact Statement; provided, however, that this requirement may be waived or modified in whole or in part, in writing by the Zoning Administrator where he does not deem such statement to be material. The Inventory and Impact Statement shall cover the area of proposed subdivision ~~or development~~, and areas within ***500 feet two miles*** of the nearest boundary of the proposed subdivision ~~or development~~. Included in the Inventory and Impact Statement shall be the following:

- 5-A-1 INVENTORY: Existing characteristics and conditions of the ***natural and cultural*** environment ***shall be addressed in the Statement***, including, but not limited to, the ~~following topics listed below~~. ***The applicant shall be responsible for contacting the agencies or resources where listed for each topic and provide written documentation to the Planning Commission of existing (or lack of) these characteristics and conditions.***
- i) ***Endangered Species or Habitats***
Virginia Department of Conservation and Recreation – Division of Natural Heritage: A site map shall be provided to DNH in order that they may compare the location to existing data regarding threatened or endangered species or habitat.
 - ii) ***Appalachian Trail***

Appalachian Trail Conference/Potomac Appalachian Trail Club:

Provide site map for evaluation of access, sensitive features, proximity to trail, and other issues related to the Appalachian Trail (re: property in the FOC Zoning District).

- iii) ***Historic/Archeological Resources***
Virginia Department of Historic Resources: Identification of archeologic/historic resources more than 50 years old, including resources on, or determined eligible for, the Virginia Landmarks Register and/or the National Register of Historic Places.
- iv) ***Conservation Easements***
Virginia Outdoors Foundation/Virginia Department of Historic Resources/ Clarke County Conservation Easement Authority/Lord Fairfax Soil and Water Conservation District: Easements held by the above referenced entities shall be identified.
- v) ***Soils***
Clarke County Soil Survey and National Wetlands Inventory: The following soils shall be identified:
 - Slippage soils*** -soil type 54C;
 - Groundwater Recharge Areas*** -soil types 19D, 20D, 22C, 22D, 49B, 50B;
 - Wetlands*** -hydric soil types 6B, 6C, 7D, 16B, 23, 24, 54C.
- vi) ***Water features***
All features shall be shown including springs, intermittent streams, perennial streams, or ponds;
- vii) ***Sinkholes***
Clarke County Soil Survey and on-site research;
- viii) ***Ridgelines***
Prominent ridgelines (watershed divides or slopes exceeding 15% over 800 feet elevation) shall be identified;
- ix) ***Slopes***
Slopes (in categories of 15% up to 25% and 25% and greater) shall be identified;
- x) ***Pollutions Sources***
Known pollution sources (including without limitation dump sites, drainfields, buried fuel tanks, solid and liquid disposal sites, etc.) shall be identified;
- xi) ***Large Trees***
Trees or clusters of trees greater than 6 inches diameter at breast height (DBH) shall be shown in the areas to be cleared; the areas and acreage to be cleared of such trees for construction activities shall also be shown.

- ~~5 A 1 (a) Earth Mineral Resources, construction material, soils, permeability, land form, geology, unique physical features;~~
- ~~5 A 1 (b) Water Surface, underground, quality, temperature, recharge;~~
- ~~5 A 1 (c) Atmosphere Quality as to gases and particulates;~~
- ~~5 A 1 (d) Processes Floods, erosion, sedimentation, precipitation, solution, absorption, compaction and settling, stability as to slides and slumps, air movements;~~
- ~~5 A 1 (e) Flora Trees, shrubs, grass, crops, microflora, aquatic plants, endangered species, barriers, corridors;~~
- ~~5 A 1 (f) Fauna Birds, land animals including big game, small mammals and reptiles, fish and shellfish, benthic organisms, insects, microfauna, endangered species, barriers, corridors;~~
- ~~5 A 1 (g) Land Use Wilderness and open spaces, wildlife habitat, wetlands, forestry grazing, agriculture, residential, commercial, industrial, mining and quarrying;~~
- ~~5 A 1 (h) Recreation Hunting, fishing, boating, swimming, camping and hiking, picnicking, resorts;~~
- ~~5 A 1 (i) Aesthetics and Human Interest Scenic views and vistas, wilderness qualities, open space qualities, landscape design, unique physical features, parks and reserves, monuments, rare and unique species, historical or archaeological sites and objects;~~

- ~~5-A-1 (j) Cultural Status Cultural patterns and lifestyle, health and safety, employment, population density;~~
- ~~5-A-1 (k) **xii)** Manmade Facilities and Activities - (Structures, transportation network including movement and access, utility networks, waste disposal, barriers, corridors) Any conditions existing in adjacent areas of the County which will or may adversely affect the use and enjoyment of all or any part of the subdivision.~~
- 5-A-2 **IMPACT: Applicant shall show how the proposed subdivision will impact any items identified in Section 5-A-1, and how that impact will be remediated so as to reduce or eliminate the impact.** : Impact upon area by proposed subdivision including, but not limited to, the following:
- ~~5-A-2 (a) Modification of Regime Introduction of exotic flora or fauna, biological controls, modification of wildlife habitat, alteration of ground cover, alteration of ground water hydrology, alteration of drainage, river control and flow modification, canalization, irrigation, weather modification, burning, surface or paving noise, and vibration;~~
- ~~5-A-2 (b) Land Transformation and Construction Urbanization, residential and vacation homes, industrial sites and buildings, airports, highways and bridges, roads and trails, railroads, cables and lifts, transmission lines, pipelines and corridors, barriers including fencing, channel dredging and straightening, channel revetments, canals, dams, impoundments, piers and marinas, offshore structures, blasting and drilling, cut and fill, tunnels and underground structures;~~
- ~~5-A-2 (c) Resource Extraction Blasting and drilling, surface excavation, subsurface excavation, well drilling and fluid removal, dredging, clear cutting and other lumbering, commercial fishing and hunting;~~
- ~~5-A-2 (d) Processing Farming, ranching and grazing, feedlots, dairying, energy generation, mineral processing, metallurgical industry, chemical industry, textile industry, automobile and aircraft, oil refining, food, lumbering, pulp and paper, product storage;~~
- ~~5-A-2 (e) Land Alteration Erosion and control and terracing, mine sealing and waste control, strip mining rehabilitation, landscaping, marsh fill and drainage;~~
- ~~5-A-2 (f) Resource Renewal Reforestation, wildlife stocking and management, ground water recharge, fertilization application, waste recycling;~~
- ~~5-A-2 (g) Changes in Traffic Railway, automobile, trucking, shipping, aircraft, river and canal traffic, pleasure boating, trails, cables and lifts, communication, pipeline;~~
- ~~5-A-2 (h) Waste Emplacement and Treatment Landfill, emplacements of tailings, spoil and overburden, underground storage, junk disposal, deep well emplacement, cooling water discharge, municipal waste discharge including spray irrigation, liquid effluent discharge, stabilization and oxidation ponds, septic tanks, stack and exhaust emission, spent lubricants;~~
- ~~5-A-2 (i) Chemical Treatment Fertilization, chemical de-icing of highways, chemical stabilization of soil, weed control, insect control with pesticides;~~
- ~~5-A-2 (j) Accidents Explosions, spills and leaks, operation failure.~~
- 5-B The Commission may require the subdivider to provide an Environmental Inventory and Impact Statement or to provide additional information or amplification with respect to the Statement, whether or not initially considered material by the Zoning Administrator, where the Commission considers such to be material.

6 CONSUMER DISCLOSURE STATEMENT

6-A-* *the following notices:*

a. *for property located in the Agricultural-Open Space-Conservation (AOC)*

Zoning District:

AGRICULTURAL OPERATIONS NOTICE

This property is in the Agricultural-Open Space-Conservation (AOC) Zoning District. Agriculture is the primary economic activity of this zoning district. Owners, residents, and other users of property in the AOC District may be subjected to inconvenience, discomfort, and the possibility of injury to property and health arising from agricultural operations even though conducted in accordance with best management practices and/or in accordance with existing laws and regulations of the Commonwealth and the County. Such agricultural operations may generate noise, odors, and dust, may involve the operation of machinery, including aircraft, the storage and disposal of manure, and the application of fertilizer, soil amendments, and pesticides. Owners, occupants, and users of land in the AOC district should be prepared to accept such inconveniences or discomfort as a normal and necessary aspect of living in a zoning district in a county with a strong rural character and an active agricultural sector.

b. *for property in the Forestal-Open Space-Conservation (FOC) Zoning*

District:

EMERGENCY SERVICES NOTICE

The rural location and limited access of this property, combined with adverse weather conditions, may delay or totally impede the timely response of emergency service agencies (police, fire, medical) despite their best efforts. The County of Clarke will be held harmless and not be subject to liability claims for damage to property, personal injury, or loss of life under such conditions.

FORESTRY OPERATIONS NOTICE

This property is in the Forestal-Open Space-Conservation (FOC) Zoning District. Forestry is the primary economic activity of this zoning district and is necessary for the health and viability of the forest resource itself. Owners, residents, and other users of property in the FOC District may be subjected to inconvenience, discomfort, and the possibility of injury to property and health arising from forestry operations even though conducted in accordance with best management practices and/or in accordance with existing laws and regulations of the Commonwealth and the County. Such forestry operations may generate noise, odors, and dust, and may involve the operation of machinery, including heavy equipment and chain saws. Debris such as tree-tops and limbs may be left on site at the conclusion of a forestry operation. Owners, occupants, and users of land in the FOC district should be prepared to accept such inconveniences or discomfort as a normal and necessary aspect of living in a zoning district in a county with a strong rural character and an active forestal sector.

c. *for property in any zoning district:*

FERTILIZERS AND PESTICIDES NOTICE

Before fertilizers and pesticides are used for lawn or landscaping purposes, a soil test should be conducted. The application of such chemicals should be limited due to the potential for groundwater contamination and should not exceed that determined necessary by the soil test.

7-C RECORD PLAT

7-C-3-(p) *The following statement shall be shown on the Record Plat of property located in the Forestal-Open Space-Conservation (FOC) Zoning District*

EMERGENCY SERVICES NOTICE

The rural location and limited access of this property, combined with adverse weather conditions, may delay or totally impede the timely response of emergency service agencies (police, fire, medical) despite their best efforts. The County of Clarke will be held harmless and not be subject to liability claims for damage to property, personal injury, or loss of life under such conditions.

FORESTRY OPERATIONS NOTICE

This property is in the Forestal-Open Space-Conservation (FOC) Zoning District. Forestry is the primary economic activity of this zoning district and is necessary for the health and viability of the forest resource itself. Owners, residents, and other users of property in the FOC District may be subjected to inconvenience, discomfort, and the possibility of injury to property and health arising from forestry operations even though conducted in accordance with best management practices and/or in accordance with existing laws and regulations of the Commonwealth and the County. Such forestry operations may generate noise, odors, and dust, and may involve the operation of machinery, including heavy equipment and chain saws. Debris such as tree-tops and limbs may be left on site at the conclusion of a forestry operation. Owners, occupants, and users of land in the FOC district should be prepared to accept such inconveniences or discomfort as a normal and necessary aspect of living in a zoning district in a county with a strong rural character and an active forestal sector.

8 DESIGN REQUIREMENTS

8-A DESIGN PRINCIPLES

8-A-1-(c)
(4/18/00) The arrangement of parcels in the Agricultural Open-Space Conservation and Forestal Open-Space Conservation Zoning Districts should be consistent with the design concepts listed below. These concepts are intended as guidelines to be used to preserve the rural character of these zoning districts. These design concepts are primarily intended to guide the location of parcels less than six acres in area, as the primary use of these parcels is residential, ***but they should also be considered for parcels of any size because of the interrelated nature of parcels and uses.*** Site specific circumstances may not allow application of all concepts, but, to the extent practical, these concepts should be followed when siting proposed parcels:

- 1) Parcels should not be arranged in a row along public roads;
- 2) Parcels should not be located as individual 'islands' in the middle of larger parcels to avoid hindering the use of a field for agricultural purposes;
- 3) Parcels should not be located immediately adjacent to property under permanent open space easement;
- 4) Parcels should not be located so that the most likely house location is on the top of an exposed or prominent ridge or hill;
- 5) Parcels should be located in or adjacent to wooded areas;
- 6) Parcel boundaries should follow natural features, fence lines, or hedgerows; ~~and~~
- 7) Parcels should be clustered,
- 8) ***Parcels should be located to minimize road length and maximize ease of emergency access, particularly in areas of steep slopes, and***
- 9) ***Large residual tracts should contain areas of steeper slopes and other environmentally sensitive features.***

8-G UTILITY EASEMENTS

- 8-G-1 Utilities shall be installed or easements for such utilities shall be provided and delineated on the Record Plat in the location and to the width designated by the Commission after receiving recommendations from the agencies responsible for the installation of same. In no case shall an easement be less than 10 feet wide.
- 8-G-2 ~~Wherever practical, utility and cable television transmission lines shall be placed underground.~~
- 8-G-3 Where ~~practical~~ **determined appropriate by the Planning Commission**, utility easements shall be provided on each side of all rear lot lines and along side lot lines where necessary for utility installation and maintenance.
- 8-G-4 Public utility installations should be so located as to permit multiple installations within the easements.
- 8-G-5 Where it is proposed to place public utilities within the rights-of-way shown for public streets on a Record Plat, such utility installations shall be coordinated with the street construction plans and profiles as approved by the Resident Engineer of the Virginia Department of Transportation, and such installation shall be performed in accordance with all requirements of said Department.

8-J PRIVATE ACCESS EASEMENTS(11/19/91)

8-J-1 General Regulations

- 8-J-1-(a) Except in the Agricultural-Open Space-Conservation (AOC) and Forestal-Open Space-Conservation (FOC) zoning districts, no subdivision shall be approved in which more than three lots are served solely by Private Access Easements.
- 8-J-1-(b) A proposed subdivision which includes a Private Access Easement shall comply with all provisions of this Ordinance.
- 8-J-1-(c) Construction of any Private Access Easement shall comply with all applicable provisions of the Clarke County Soil Erosion and Sedimentation Control Ordinance.
- 8-J-1-(d) No Private Access Easement approved pursuant to the provisions of this Ordinance shall provide thoroughfare to subdivisions of adjoining property, unless such adjoining property is a part of the original tract as it existed on the date of approval of such easement.
- 8-J-1-(*)** *Before a building permit is issued for a residence, the grading and base shall be completed for that portion of a travel way accessing such a residence. Before a certificate of occupancy is issued for a residence, all construction shall be completed for that portion of a travel way accessing such a residence.*
- 8-J-1-(e)** *As stated in Zoning Ordinance Section 3-A-2-I, all private driveways longer than 150 feet shall comply with all Private Access Easement travel way standards in section 8-J-2-c below.*

8-J-2 Design Standards

- 8-J-2-(a) All Private Access Easements shall have a minimum **width of 30 foot** right-of-way, and any additional right of way necessary to include the travel surface and the drainage facilities necessary to carry the 2-year storm event. ***The maximum right of way width shall be 40 feet with 50 feet allowed for short distances when the Planning Commission determines there are unique site-specific circumstances.***
- 8-J-2-(b) No telescoping, stacking, paralleling, or similar design configuration of Private Access Easements shall be permitted.
- 8-J-2-(c) All Private Access Easements serving three or more parcels shall have travel ways with:
- 1) a minimum design speed of 15 miles per hour;
 - 2) a minimum radius of 40 feet, measured along the centerline

- of the travel way;
- 3) the following maximum grades, measured along the centerline of the travel way:
 - a) 4% within 25 feet of a public right of way,
 - b) a vertical curve providing a transition between the above grades in the area between 25 feet and up to 125 feet from a public right of way, and
 - c) 8% for any portion of the travel way more than 125 feet from a public right of way, however up to 12% may be allowed for short distances if specifically approved by the Planning Commission based on site-specific circumstances;
 - #) ***not more than 100 linear feet, measured on the centerline, that crosses pre-development slopes of 25% or greater;***
 - 4) a minimum stopping sight distance of 65 feet (distance is based on a 3.5 foot height of eye and a 0.2 foot height of object);
 - 5) a minimum intersection sight distance of 100 feet (distance is based on a 3.5 foot height of eye and a 4.25 foot height of object);
 - 6) a travel way crown with a maximum of 1/2 inch per foot and a minimum of 1/4 inch per foot;
 - 7) a minimum travel way surface width (graveled or paved) of 14 feet ***and a maximum travel way surface width of 18 feet;***
 - #) ***no obstruction (such as posts, pillars, walls, or fences) erected within 10 feet of the centerline a travel way or within a public right of way.***
 - #) ***a pull-off area(s) not further than 900 feet from a public right of way or other pull-off area to accommodate emergency vehicles;***
 - #) ***a turn around area (either circular or 'T' shaped) at the end of a travel way;***
 - #) ***all travel ways, pull-offs, and turn-arounds constructed to the VDOT vertical construction standards for a gravel road.***
 - 8) drainage facilities to allow a 14-foot wide travel way on the roadway during the 2-year storm event.
 - 9) a minimum travel way side slope of 4:1 ***3:1*** (horizontal: vertical) to the flow line of the ditch or the limit of the easement, ***however a slope of 2:1 may approved by the Planning Commission if there are unique site-specific circumstances;***
 - (6/17/03) 10) storm drain culverts shall meet VDOT standards; and
 - (6/17/03) 11) a minimum 100 foot setback for travel ways and drainage facilities from sinkholes and perennial streams (except for approved stream crossings).
 - (6/17/03)

10-D
10-D-5

BOUNDARY LINE ADJUSTMENTS

See Zoning Ordinance section 3-D-8, which addresses the reallocating of dwelling unit rights with a boundary line adjustment.

AMENDMENT 3.
PROPOSED COUNTY CODE TEXT AMENDMENT

Sections to be added shown in *bold Italics* Section to be deleted shown ~~struck through~~

CHAPTER 148 - Soil Erosion And Sedimentation Control

§ 148-4. Definitions.

EROSION AND SEDIMENT CONTROL SKETCH PLAN - ***A plat or drawing of the property detailing the proposed areas of disturbance, including but not limited to the driveway, house site, and clearing, and identifying the location and type of proposed erosion and sediment control practices to be installed prior to land disturbance.***

Land disturbing activity shall not include the following activities:

- G. Tilling, planting or harvesting of agricultural, horticultural or forest crops, or livestock feedlot operations, including engineering operations as follows: construction of terrace, terrace outlets, check dams, desilting basins, dikes, ~~ponds~~, ditches, strip-cropping, lister furrowing, contour cultivating, contour furrowing, land drainage and land irrigation.

§ 148-6. Approval required for proposed land disturbing activity.

- E. Land disturbing activity adjacent to streams or springs. Any person whose land disturbing activity involves lands that are within 100 feet of a perennial stream, or perennial spring, or 50 feet of an intermittent stream shall have an approved erosion and sediment control plan.
- F. ***Land disturbing activity involving pond construction. Any person whose land disturbing activity involves construction of a pond that exceeds 10,000 square feet shall have an approved erosion and sediment control plan. Ponds specifically related to agricultural activities where the Owner has a Conservation Farm Management Plan approved by the Zoning Administrator and by either the regional Soil and Water Conservation District or the federal Natural Resources Conservation Service and qualifies for use-value taxation for agriculture shall be exempt from this requirement.***
- G. Person engaging in land disturbing activities. A person engaging in land disturbing activities must receive a Land Disturbance Permit from the Program Administrator. A Land Disturbance Activity of more than 10,000 square feet will require an erosion and sediment control plan ***or an Erosion and Sediment Control Sketch Plan (as determined by the Program Administrator)*** before issuance of a Land Disturbance Permit. A Disturbance of 2,500 to 10,000 square feet may require an erosion and sediment control plan ***or an Erosion and Sediment Control Sketch Plan*** before issuance of a Disturbance Permit, as determined by the Program Administrator based on site-specific conditions.
- H. Land Disturbance Permits. All land disturbance permits issued for the construction of a single family residence, which do not require an approved erosion and sedimentation control plan, must also include an ***Erosion and Sediment Control Sketch Plan and an Agreement in Lieu of a Plan*** that is signed by the applicant or his/her agent and is approved by the Program Administrator.

**CLARKE COUNTY
PLANNING COMMISSION**

**RESOLUTION
6 May 2005**

WHEREAS, Goal 1 of the Clarke County Comprehensive Plan states: “Preserve and protect the natural, rural, and open-space character of unincorporated areas;”

WHEREAS, the Clarke County Comprehensive Plan, Objective 2, states: “Preserve the natural beauty and protect the ecology of forested areas to ensure that development in those areas is in conformance with their environmental limitations;”

WHEREAS, policies for Objective 2 of the Clarke County Comprehensive Plan state:

- “1. Promote multiple uses of forested land that are non-intensive and compatible such as outdoor recreation, wildlife habitats, watershed protection, and timber harvesting.
2. Ensure that development on forest land is compatible with the environmental features of that land and does not diminish natural and scenic values. Foster respect for environmental limitations and protection of natural features during and after the development process through incentives and regulations.
3. Ensure that timber harvesting is conducted in accordance with an approved forest management plan and such that sedimentation of streams and other environmental impacts are minimized.”;

WHEREAS, the Clarke County Comprehensive Plan, Objective 3, states: “Protect natural resources, including soil, water, air, scenery, and fragile ecosystems.”;

WHEREAS, policy 2 for Objective 3 of the Clarke County Comprehensive Plan states: “Require that adverse environmental impacts of activities directly or indirectly related to new construction (including removal of vegetation, cutting of trees, altering drainage ways, grading, and filling) are minimized.”;

WHEREAS, the Clarke County Comprehensive Plan states: “To achieve these Goals, Objectives, and Policies, implementation of the Clarke County Comprehensive Plan has been divided into seven components pertaining to specific geographic and policy areas. It is through these implementing components that the aspirations of the citizens are achieved and the elements of the Plan are realized.”

WHEREAS, the Clarke County Comprehensive Plan identifies one of these components as the Mountain Land Plan and states about this Plan: “The mountain lands of Clarke County to the east of the Shenandoah River constitute nearly one-fourth of the County. The steep slopes and predominantly forested areas create special land use concerns that require specific land use planning. The Mountain Land Plan is designed to protect the scenic values, forest resources, surface water and groundwater quality, and wildlife habitats of the area, while allowing well-sited development compatible with these concerns.”

WHEREAS, the last Mountain Land Plan was adopted on 16 August 1994, Clarke County Comprehensive Plan identifies

WHEREAS, Code of Virginia section 15.2-2230 states: “At least once every five years the comprehensive plan shall be reviewed by the local planning commission to determine whether it is advisable to amend the plan.”

WHEREAS, on 5 December 2003, the Clarke County Planning Commission adopted a resolution initiating an update of the 1994 Mountain Land Plan to ensure the implementation of the goals, objectives, and policies of the 2001 Clarke County Comprehensive Plan in the Mountain Land Area of the County.

WHEREAS, on 9 January 2004, the Clarke County Planning Commission Chair appointed the following persons to the Mountain Land Plan Committee to recommend an updated Plan: Robert Wade, Chairman

(Planning Commission Rep), Anne Caldwell (Planning Commission Rep), Pat McKelvy (Planning Commission Rep.), Jon Erickson, David Jelinek, Frank Journey, Betsy Lesley, Sigrid Pollari, Erika Shriner, and Sid Stern.

WHEREAS, the Mountain Land Plan Committee held public hearings on the 18th and 26th of February 2004 and the 8th and 16th of September 2004, met 25 times in open session from 20 January 2004 to 26 January 2005, and held numerous subcommittee meetings to develop a recommended Mountain Land Plan and amendments to the County Code, the County Subdivision Ordinance, and the County Zoning Ordinance.

WHEREAS, the Clarke County Planning Commission has held public hearings on the 15th and 16th of March, 1st of April, 2nd and 6th of May, 2005 on the proposed Mountain Land Plan and amendments to the County Code, the County Subdivision Ordinance, and the County Zoning Ordinance.

NOW THEREFORE BE IT RESOLVED, the Clarke County Planning Commission recommends to the Clarke County Board of Supervisors the updated and revised Mountain Land Plan and does certify a copy of the Plan to the Board of Supervisors.

Attest:

Charles Johnston, Clerk to the Commission

PUBLIC HEARING NOTICE

The Clarke County Board of Supervisors will hold public hearings at the following time and place:
6:30 p.m., Tuesday, 21 June, 2005
at the Clarke County Board of Supervisors Room, 102 N. Church Street, Berryville, VA

on the following matters:

I. AMENDMENTS TO THE MOUNTAIN LAND PLAN COMPONENT OF THE CLARKE COUNTY COMPREHENSIVE PLAN

The Clarke County Planning Commission recommends to the Board of Supervisors amendments to the Mountain Land Plan component of the Clarke County Comprehensive Plan to update and revise the Mountain Land Plan as to statistics, data, and development trends; to set forth general and long-range policies to guide public land use policy in the Mountain Land area; and to recommend specific ordinances and code amendments to implement those policies.

II. AMENDMENTS TO THE ZONING ORDINANCE

The Clarke County Planning Commission recommends to the Board of Supervisors amendments to the following sections of the Clarke County Zoning Ordinance:

1. Amendments to the Forestal-Open Space-Conservation (FOC) Zoning District (FOC District only)
 - A. 3-A-2-b-(1)-(a) (Lot Requirements) - To increase the minimum lot area for single family detached dwellings from 2 acres to 3 acres for each dwelling unit right.
 - B. 3-A-2-(b)-(3) (Required Residual Parcel) - To add a section to establish minimum acreage in a residual parcel upon the subdivision of a parcel of 40 acres or more.
 - C. 3-A-2-f (Vegetated Property Buffer and Clearing Limits) - To establish regulations for required vegetated property buffers along property lines along public rights of way, on parcels with average slopes over 7%, and on slippage soils; for limitations on clearing; for limitations on thinning and pruning of trees; for tree protection during construction; for revegetation and tree replacement; and for clearing for agricultural uses.
 - D. 3-A-2-g (Private Driveway Standards) - To add a section to require all private driveways longer than 150 feet on parcels created after the adoption of this amendment to comply with Private Access Easement standards.
2. Amendments to the Agricultural-Open Space-Conservation (AOC) Zoning District (AOC District only)
 - A. 3-A-1-i (Private Driveway Standards) - To add a section to require all private driveways longer than 100 feet on parcels created after the adoption of this amendment to comply with Private Access Easement standards.
3. Amendments to Zoning Ordinance (applicable to all districts)
 - A. 3-C-2-1 (Supplementary Regulation - Forestry Uses and Structures) - To require the submission of a Pre-Harvest Plan, which includes Virginia Department of Forestry Best Management Practices, for cutting or logging of trees for profit that exceeds one acre of harvested area, to be reviewed by the Zoning Administrator or FORESTRY CONSULTANT ~~certified arborist~~ for compliance with County ordinances; to establish requirements and minimum standards for the Pre-Harvest Plan; to prohibit a Pre-Harvest Plan within three years of an approved subdivision on the property; to establish buffers for commercial forestry activities; to establish requirements in the buffer areas; and to provide for revegetation for cleared areas in excess of standards for required vegetative buffers.
 - B. 3-C-2 (Supplementary Regulations - Propane Tanks) - To require propane tanks of 500 gallons or larger to be placed underground.
 - C. 3-D-8 (Allocation of Dwelling Unit Rights - Boundary Line Adjustments) - To permit the reallocation of dwelling unit rights between parcels in certain boundary line adjustments; to limit the resulting dwelling unit rights on a parcel; and to limit boundary line adjustments that reallocate a dwelling unit right to one in any two year period. (Current section 3-D-8 to be renumbered.)
 - D. 9-B (Definitions) - To add ordinance definitions of the terms Slippage Soils, Certified Arborist, Consulting Forester, Tree, Tree Canopy, Tree Canopy Coverage, Tree Diameter at Breast Height (DBH), Tree Drip Line, ~~Mature~~ Large Tree, Tree Protective Barrier, Tree Pruning, and Tree Removal.

III. AMENDMENTS TO THE SUBDIVISION ORDINANCE

The Clarke County Planning Commission recommends to the Board of Supervisors amendments to the following sections of the Clarke County Subdivision Ordinance:

- A. 2-B-50, 52, 53, and 54 (Definitions - Subdivision) - To amend the ordinance definitions of Subdivide, Subdivision, Major Subdivision, and Minor Subdivision as they relate to parcels of 100 acres or more.
- B. 3-A-2 (Administration) - To provide that the Zoning Administrator shall act for the Planning Commission on preliminary and record plats for subdivisions where all parcels exceed 100 acres.
- C. 5-A (Environmental Inventory and Impact Statement) - To amend the requirements of what to be included in an environmental inventory; to require written documentation from certain agencies as to certain environmental characteristics and resources;

and to require the applicant to show how the items identified in the environmental inventory will be impacted and how the impact will be addressed.

- D. 6-A (Consumer Disclosure Statement) - To require the Consumer Disclosure Statement to include, and to prescribe the form of, an Agricultural Operations Notice (for property in AOC District), Emergency Services Notice (for property in FOC District), Forestry Operations Notice (for property in FOC District), and Fertilizers and Pesticides Notice (for property in all zoning districts).
- E. 7-C-3-(p) (Record Plat) - To require that the Emergency Services Notice and Forestry Operations Notice be included on the Record Plat for subdivisions in the FOC zoning district.
- F. 8-A-1-(c) (Design Principles) - To include design principles for subdivision plats in the AOC and FOC zoning districts to address road length, emergency access, steeper slopes, and environmentally sensitive features.
- G. 8-G-2 and 3 (Utility Easements) - To require utility and cable television transmission lines to be placed underground, and to provide for location of utility easements as determined appropriate by the Planning Commission.
- H. 8-J-1 (Private Access Easements - General Regulations) - To add requirements for completion of a portion of a travel way accessing a residence before issuance of a building permit, and for completion of the travel way before issuance of an occupancy permit.
- I. 8-J-2 (Private Access Easements - Design Standards) - To require additional design standards for private access easements dealing with maximum width, slopes of 25% or greater, obstructions, emergency vehicle accommodations, turn around areas, VDOT vertical construction standards, and side slopes.
- J. 10-D-5 (Boundary Line Adjustments) - To include a reference to '3-D-8 of the zoning ordinance regarding reallocating dwelling unit rights in a boundary line adjustment.

IV. AMENDMENTS TO THE COUNTY CODE

The Clarke County Planning Commission recommends to the Board of Supervisors amendments to the following sections of Chapter 148 (Soil Erosion and Sedimentation Control) of the Clarke County Code:

- A. 148-4 (Definitions) - To add a code definition of Erosion and Sediment Control Sketch Plan.
- B. 148-6 (Approval Required for Land Disturbing Activities) - To add requirements for land disturbing activities involving pond construction; for the alternative of a Erosion and Sediment Control Sketch Plan in certain circumstances; and for an Erosion and Sediment Control Sketch Plan for certain land disturbance permits for single family residence construction.

Copies of the proposed Mountain Land Plan and the proposed ordinances and code amendments are available at the Clarke County Planning Department, 102 North Church Street, Berryville, Virginia; at the Clarke County Library; and on-line at www.co.clarke.va.us. All persons affected may appear and present their views at the public hearings. Clarke County does not discriminate on the basis of handicapped status in admission to its programs and activities. Accommodations will be made for handicapped persons upon prior request. If the meeting is cancelled because of inclement weather or some other reason, the back-up hearing date is one week after the scheduled hearing date.

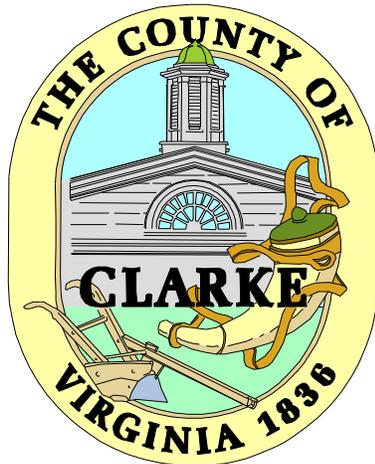
Charles Johnston
Clarke County Planning Administrator

ADVERTISE: Clarke Times-Courier-

June 2, 2005
June 9, 2005

CHARGE: Clarke County Accounts Payable

Water Resources Plan
Clarke County Comprehensive Plan
Implementing Component Plan



Adopted by the
Clarke County Board of Supervisors on
September 18, 2018

ACKNOWLEDGEMENTS

CLARKE COUNTY PLANNING COMMISSION

George L. Ohrstrom, II, Chair (Russell Election District)
Randy Buckley, Vice Chair (White Post Election District)
Anne Caldwell (Millwood Election District)
Frank Lee (Berrville Election District)
Gwendolyn Malone (Berryville Election District)
Scott Kreider (Buckmarsh Election District)
Douglas Kruhm (Buckmarsh Election District)
Bob Glover (Millwood Election District)
Cliff Nelson (Russell Election District)
Robina Bouffault (White Post Election District)
Mary L.C. Daniel (Board of Supervisors representative)

COMPREHENSIVE PLAN SUBCOMMITTEE

Robina Bouffault (White Post Election District)
Douglas Kruhm (Buckmarsh Election District)
Cliff Nelson (Russell Election District)
Bob Glover (Millwood Election District)

CLARKE COUNTY BOARD OF SUPERVISORS

David Weiss, Chair (Buckmarsh Election District)
Beverly B. McKay, Vice-Chair (White Post Election District)
Terri T. Catlett (Millwood Election District)
Barbara Byrd (Russell Election District)
Mary L.C. Daniel (Berryville Election District)

CLARKE COUNTY PLANNING DEPARTMENT

Brandon Stidham, Planning Director
Ryan Fincham, Senior Planner/Zoning Administrator
Alison Teetor, Natural Resource Planner
Debbie Bean, Administrative Assistant

Clarke County Planning Department
101 Chalmers Court, Suite B
Berryville, VA 22611
540-955-5132

DATE OF PLANNING COMMISSION PUBLIC HEARING AND ADOPTION:

July 6, 2018

DATE OF BOARD OF SUPERVISORS PUBLIC HEARING AND ADOPTION:

September 18, 2018

2018 WATER RESOURCES PLAN

Table of Contents

Description of Resources		iv
Statement of Purpose, Scope and Plan Application		ix
Summary of Prior Plan		xvi
Summary of Recent Activities		xvi
Plan Application		xvii
Chapter I – Plan Goals, Objectives, and Strategies		I-1 – I-8
Chapter II – Recommendations		II-1 – II-2
Chapter III – Description of Blue Ridge and Great Valley Regions		III-1 – III-7
Chapter IV – Background Information		IV-1 – IV-29
A.	Interrelationship between Ground and Surface Waters	IV-1
B.	Public Water and Sewer	IV-2
C.	Water Quality	IV-4
D.	Water Quality Impacts – Point and Non-point sources	IV-4
E.	Point Source – Regulated discharge	IV-5
F.	Urban	IV-7
G.	Agriculture	IV-8
H.	Non-point Source	IV-9
I.	Biosolids	IV-13
J.	Improvement Programs- Federal, State, Regional, Local	IV-14
K.	Impaired Waters	IV-17
L.	Water Supply Planning	IV-23
M.	Drought Response Plan	IV-24
N.	Groundwater Availability	IV-28
Chapter V -- Conclusion		V-1 – V-2
References Cited		RC-1 – RC-3
Appendix I – Status of Implementation 1999 Water Resources Plan		AI-1 – AI-4
Appendix II – Programs and Grant Projects		AII-1 – AII-2
Appendix III – Guidance from Comprehensive Plan		AIII-1 – AIII-9

FIGURES

Figure 1 – Physiographic Provinces	v
Figure 2 – Limestone Ridge	vi
Figure 3 – Groundwater Areas	vii
Figure 4 – Surface Water Features	x
Figure 5 – Groundwater Contamination Problems	xiii
Figure 6 – Impaired Streams	xv
Figure 7 – Hydrologic Unit Boundaries	III-7
Figure 8 – Location of Public Water and Sewer Facilities	IV-3
Figure 9 – Location of Intensive Livestock Facilities	IV-10

2018 WATER RESOURCES PLAN

Figure 10 – Monitoring Sites	IV-18
Figure 11 – Spout Run Watershed	IV-21
Figure 12 – EPA Sole Source Aquifer	IV-22
Figure 13 – Locations of Dry Wells reported during 1999-2000 drought	IV-26
Figure 14 – Real-Time Monitoring Network (USGS)	IV-29

TABLES

Table 1 – Contamination threats to water resources	xi
Table 2 – EPA Assessment Categories and Virginia Subcategories	IV-19
Table 3 – Impaired waters	IV-20

2018 WATER RESOURCES PLAN

ACRONYMS

BMP – Best Management Practice

BWWTP – Boyce Waste Water Treatment Plant

CCSA – Clarke County Sanitary Authority

CREP – Conservation Reserve Enhancement Program

CWA – Clean Water Act

DCR- Virginia Department of Conservation and Recreation

DEQ – Virginia Department of Environmental Quality

EPA – Environmental Protection Agency

FOSR – Friends of the Shenandoah River

FWSA – Frederick-Winchester Service Authority

GPS – Global Positioning System

LFSWCD – Lord Fairfax Soil and Water Conservation District

MGD – Million Gallons per Day

NGVD – National Geodetic Vertical Datum

NPS – Non-point Source Pollution

NSVRC – Northern Shenandoah Valley Regional Commission (formally - LFPDC – Lord Fairfax Planning District Commission)

ODW – Virginia Department of Health Office of Drinking Water

PCB – Poly Chlorinated Biphenyls, are industrial products or chemicals

RMP – Resource Management Plan

STP – Sewage Treatment Plant

SWCB – State Water Control Board

SWCD – Soil and Water Conservation District

TMDL – Total Maximum Daily Load

USDA – United States Department of Agriculture

USGS – United States Geological Survey

VDH – Virginia Department of Health

VPDES – Virginia Pollution Discharge Elimination System

VSMP – Virginia Stormwater Management Program

WIP – Watershed Implementation Plan

2018 WATER RESOURCES PLAN

GENERAL INFORMATION

Description of Resources

Clarke County is located in the northern Shenandoah Valley and consists of approximately 114,021 acres. Clarke's location at the junction of two distinct geologic regions - the Valley & Ridge and the Blue Ridge Physiographic Provinces (Figure 1) - creates two different hydro-geologic areas, underlain by characteristic bedrock types. Differences in resistance to weathering are also shown by the extent of bedrock openings where groundwater occurs and moves.

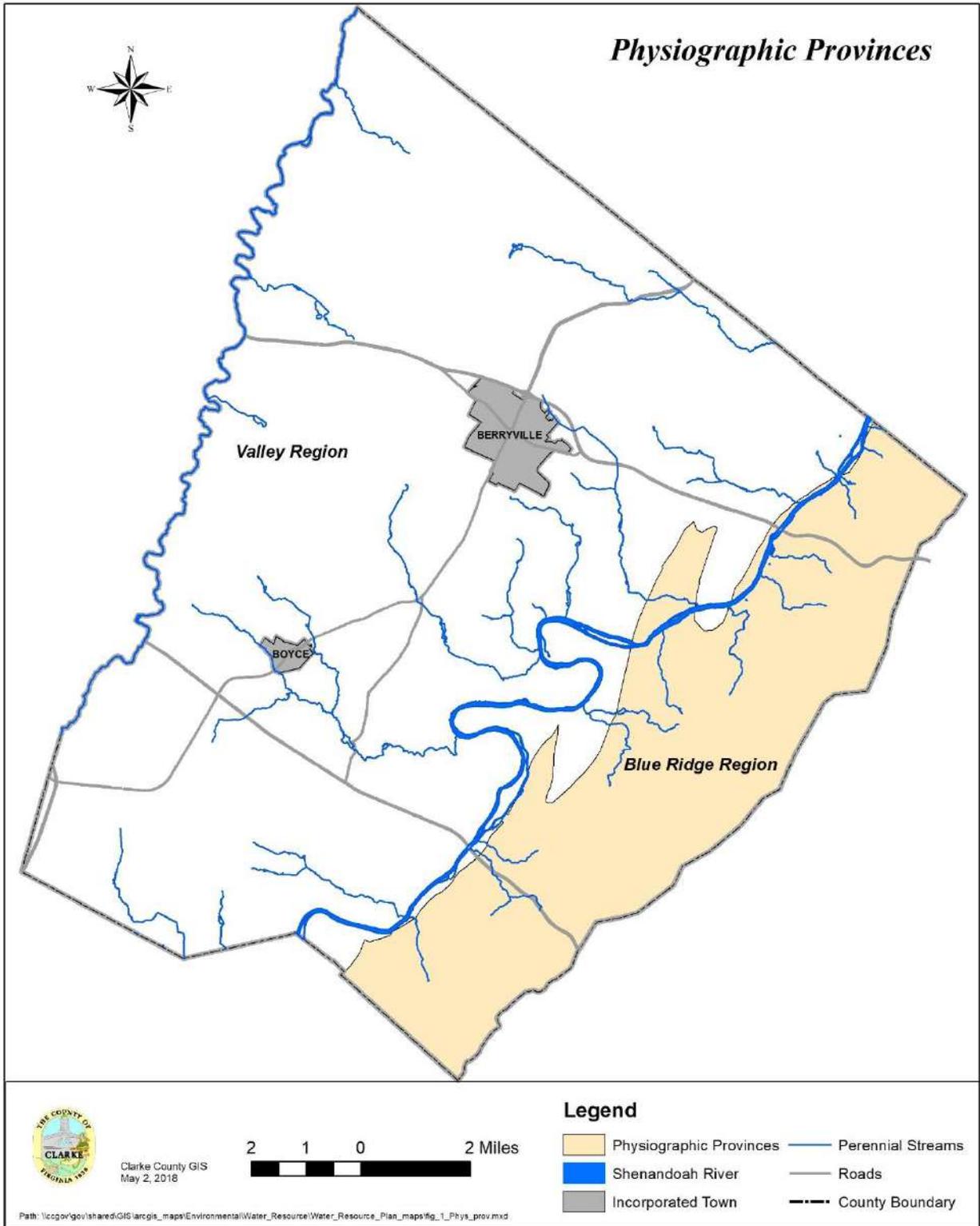
In the Blue Ridge bedrock, water occurs in fractures in the rock, joints, faults, and bedding plane separations.

In the Valley area, the carbonate bedrock is more easily dissolved by water, and many fractures can become enlarged into solution channels. The Valley section of the county encompasses two major basins within the Potomac River Watershed: Opequon Creek to the west and the Shenandoah River on the east. The drainage divide between these two basins is present in an area of the county that is frequently referred to as the Limestone Ridge. Formal definition of this area is necessary because of its importance to the underlying groundwater flow systems.

In North America elevations are given using either Sea Level Datum of 1929, also called the National Geodetic Vertical Datum (NGVD) of 1929. The Limestone Ridge is delineated as the area higher than the contour for 630 ft above NGVD 1929 (Figure 2) (Nelms, et. al., 2010). Clarke County was divided into nine groundwater areas based on surface-water basin boundaries (Figure 3).

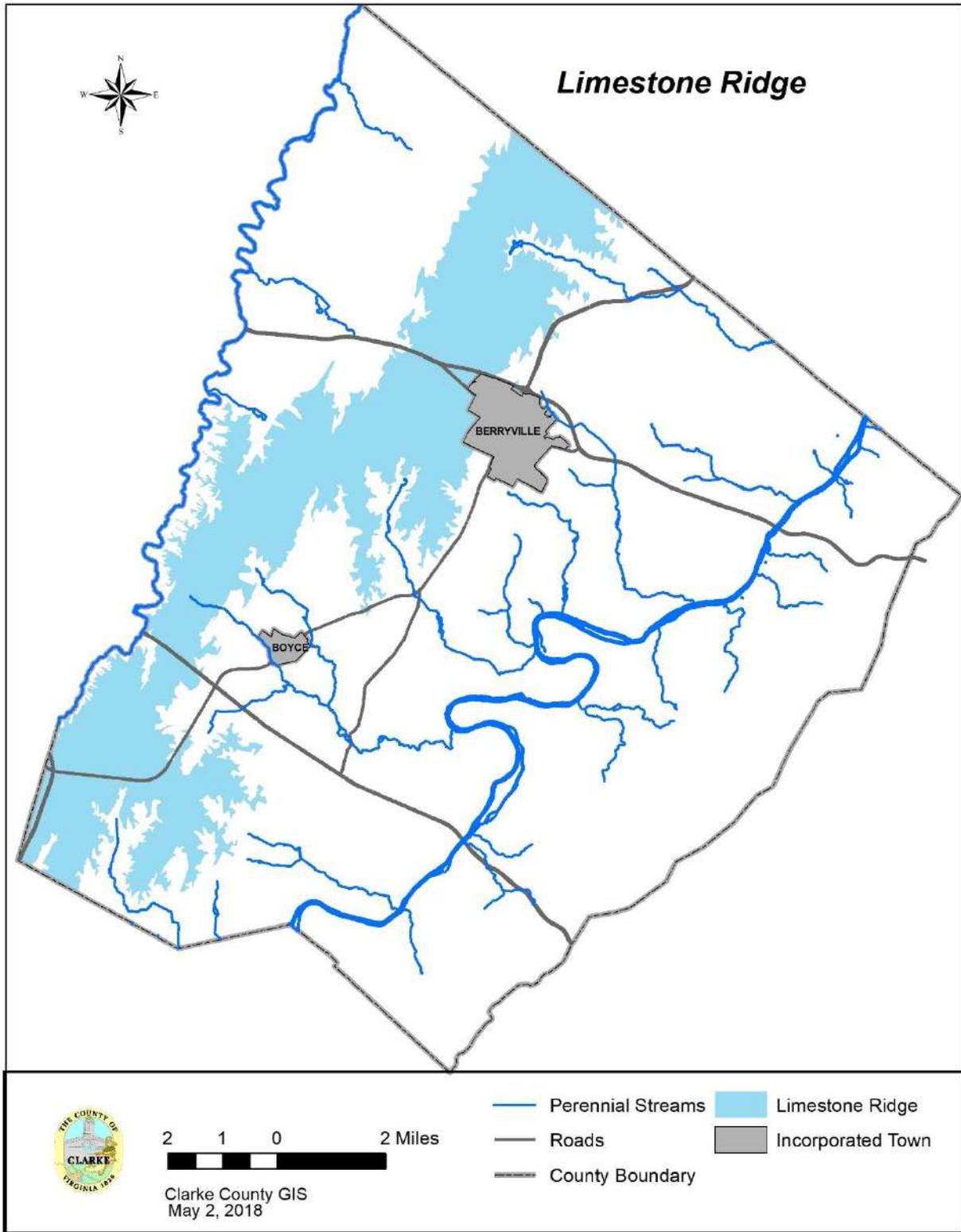
2018 WATER RESOURCES PLAN

Figure 1



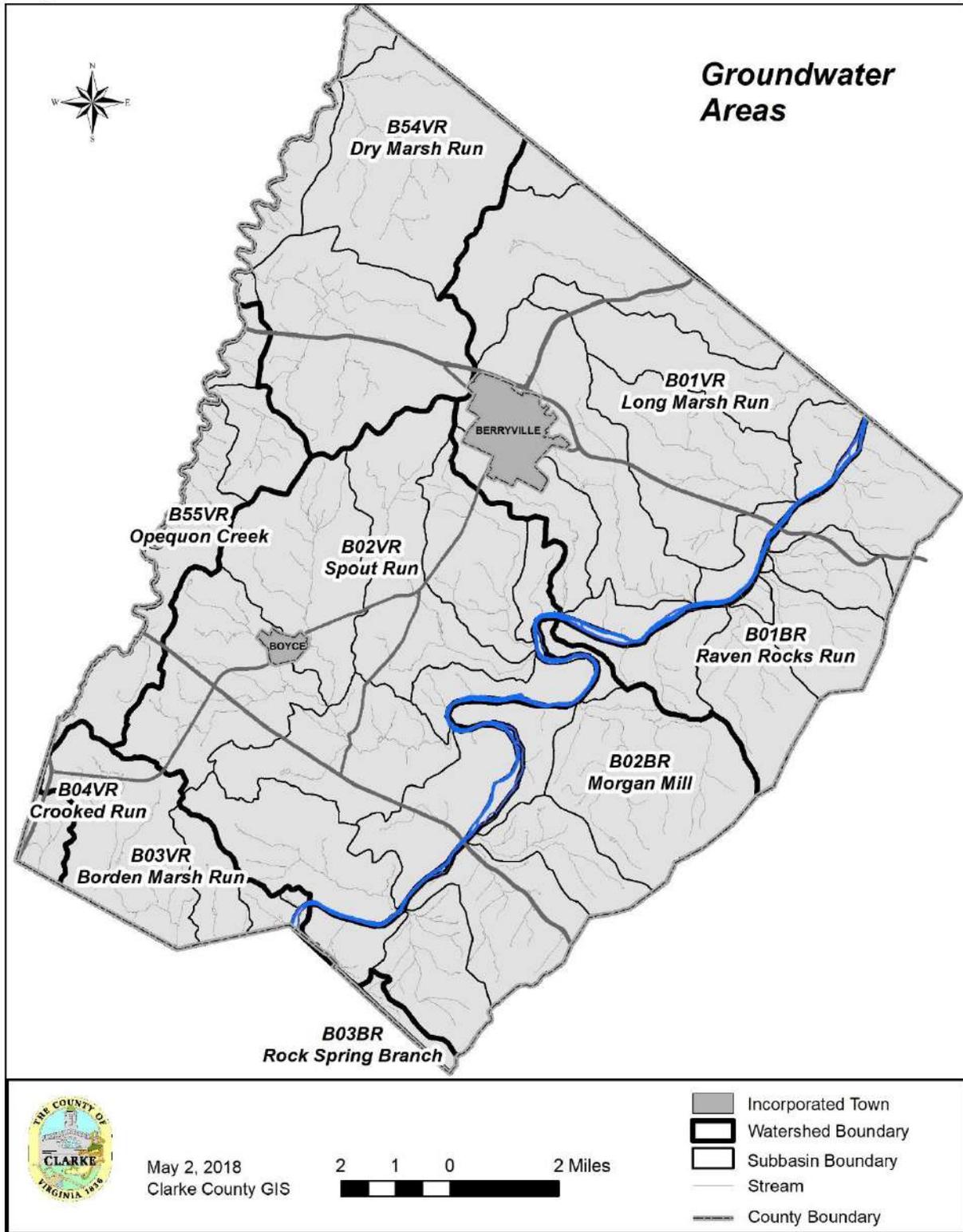
2018 WATER RESOURCES PLAN

Figure 2



2018 WATER RESOURCES PLAN

Figure 3



2018 WATER RESOURCES PLAN

Delineation of these groundwater areas could assist future water- management activities because each area contains similar physical, geologic, and hydrologic characteristics (Nelms, et. al., 2010).

In the Blue Ridge Section of the county, the boundaries of the three groundwater areas may mimic the boundaries of the individual groundwater flow systems because the conceptual model for this part of the county assumes groundwater divides generally are closely related to the surface-water divides.

In the Great Valley Section of the county, the groundwater areas only represent areas with similar characteristics and not necessarily groundwater boundaries because flow beneath surface-water divides has been observed (Jones, 1987).

Details of these two sections are described in Chapter III below. Additional details can also be found in the 2010 USGS report (Nelms, et. al., 2010).

2018 WATER RESOURCES PLAN

STATEMENT OF PURPOSE, SCOPE AND PLAN APPLICATION

Purpose and Scope

The Comprehensive Plan establishes basic land use policy for the County. The critical nature of water resources to public health as well as the overall environment warrants the Water Resources Plan to implement the Goals, Objectives, and Policies of the County Comprehensive Plan, specifically Objective 3 in the Comprehensive Plan, which states: “Protect natural resources, including soil, water, air, scenery, night sky, wildlife habitats, and fragile ecosystems through the following policies, the Water Resources Plan, and other adopted policies.”

Water resources are significant for many reasons. Groundwater provides the primary source of potable water for more than 75% of the County residents and provides 80-90% of the base flow for surface water (Nelms, et.al. 2010). The Shenandoah River is a designated State Scenic River and is a major recreational attraction. The 21 perennial secondary streams provide water for livestock and a few are large enough for swimming and fishing (Figure 4).

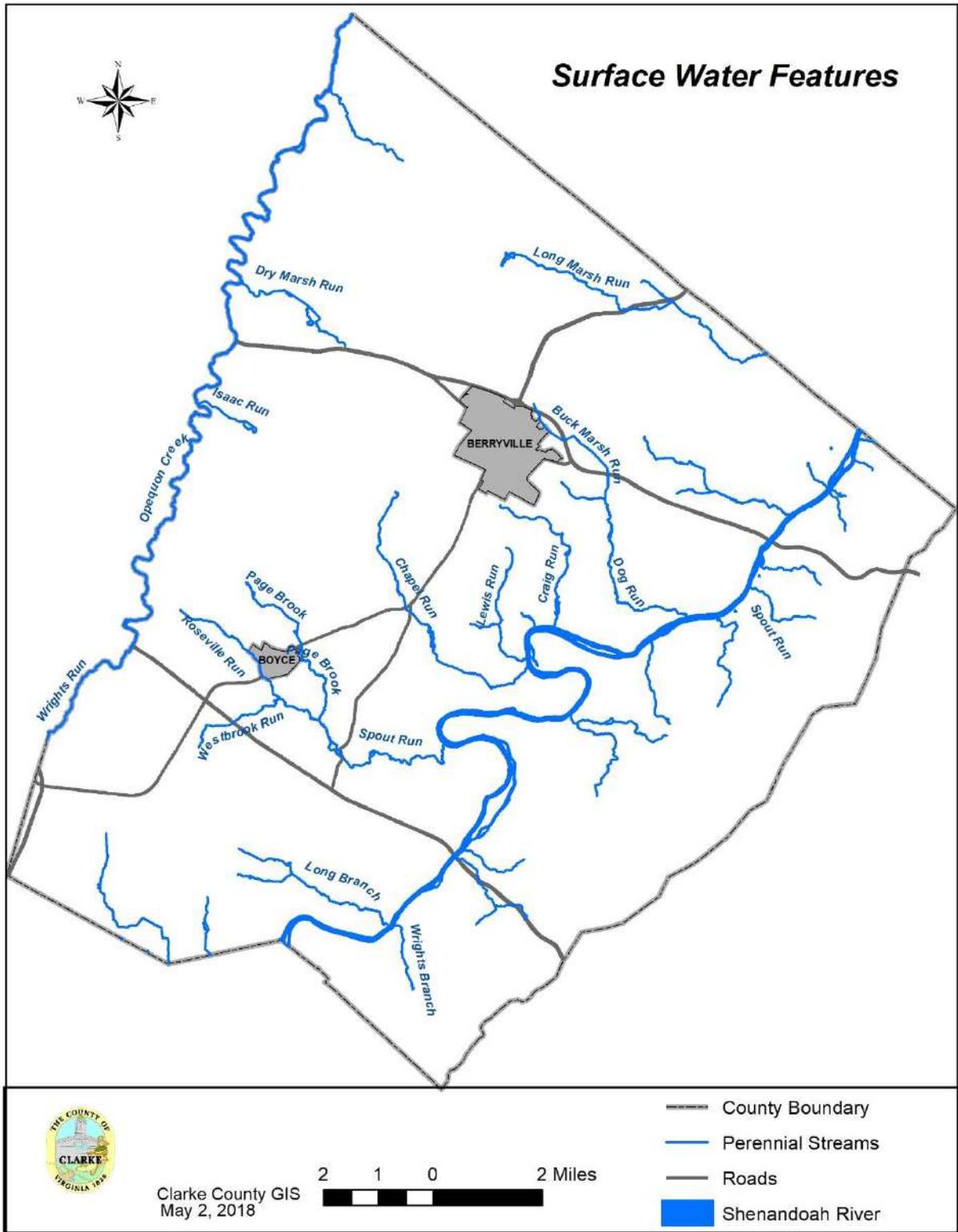
A clean adequate water supply is a reflection of the overall health of the County's natural environment. Therefore, the ability to maintain the availability and enhance the quality of our water resources is integral to our quality of life.

Water resources include both ground and surface waters. These water features are integrally linked together by the hydrologic cycle, where water moves from the atmosphere to the surface as rain. Rain then percolates through the soil to groundwater and is discharged at springs to streams, becomes surface water, and evaporates back to the atmosphere.

Land use practices have an impact on the quality and quantity of these water features. The groundwater resources of Clarke County are particularly susceptible to contamination resulting from human activities because of the sensitive nature of the aquifers, found in carbonate rocks underling the Valley region of the County.

2018 WATER RESOURCES PLAN

Figure 4



2018 WATER RESOURCES PLAN

Groundwater protection and management problems are generally greater in areas that are underlain by carbonate rocks, such as limestone and dolostone, than in areas underlain by most other rock types because of the presence of solution-enlarged sinkholes, conduits, and caves.

These geologic features characterize what is called karst terrane. The generally high permeability of these rocks facilitates the infiltration and transport of contaminants from the land surface to the groundwater reservoir. The primary threats to surface water quality within our County come from point source discharge of sewage treatment facilities, non-point agricultural and urban runoff, and failing septic systems.

Table 1. Contamination threats to water resources associated with principal land uses in Clarke County, Virginia.

LAND USE	LAND USE ACTIVITY	TYPE OF CONTAMINATION
Agriculture	Animal Feed Lots Manure spreading & pits Chemical Application Chemical Storage Areas	Coliform bacteria, pesticides, fungicides, fertilizers - nitrates
Residential	Septic systems Hazardous household products (paints, cleaning products) Lawn chemicals, fertilizers Underground storage tanks	Coliform bacteria, chemicals, nitrates, petroleum
Commercial and Industrial	Auto repair Construction areas Car washes Gas stations Paint shops Road deicing operations Storage tanks Storm Water Runoff	Petroleum, chemicals, detergents, salts
Other uses	Transportation - railroad - trucking	Petroleum, chemicals, variety of contaminants

From: Wellhead Protection Programs: Tools for Local Government, 1989

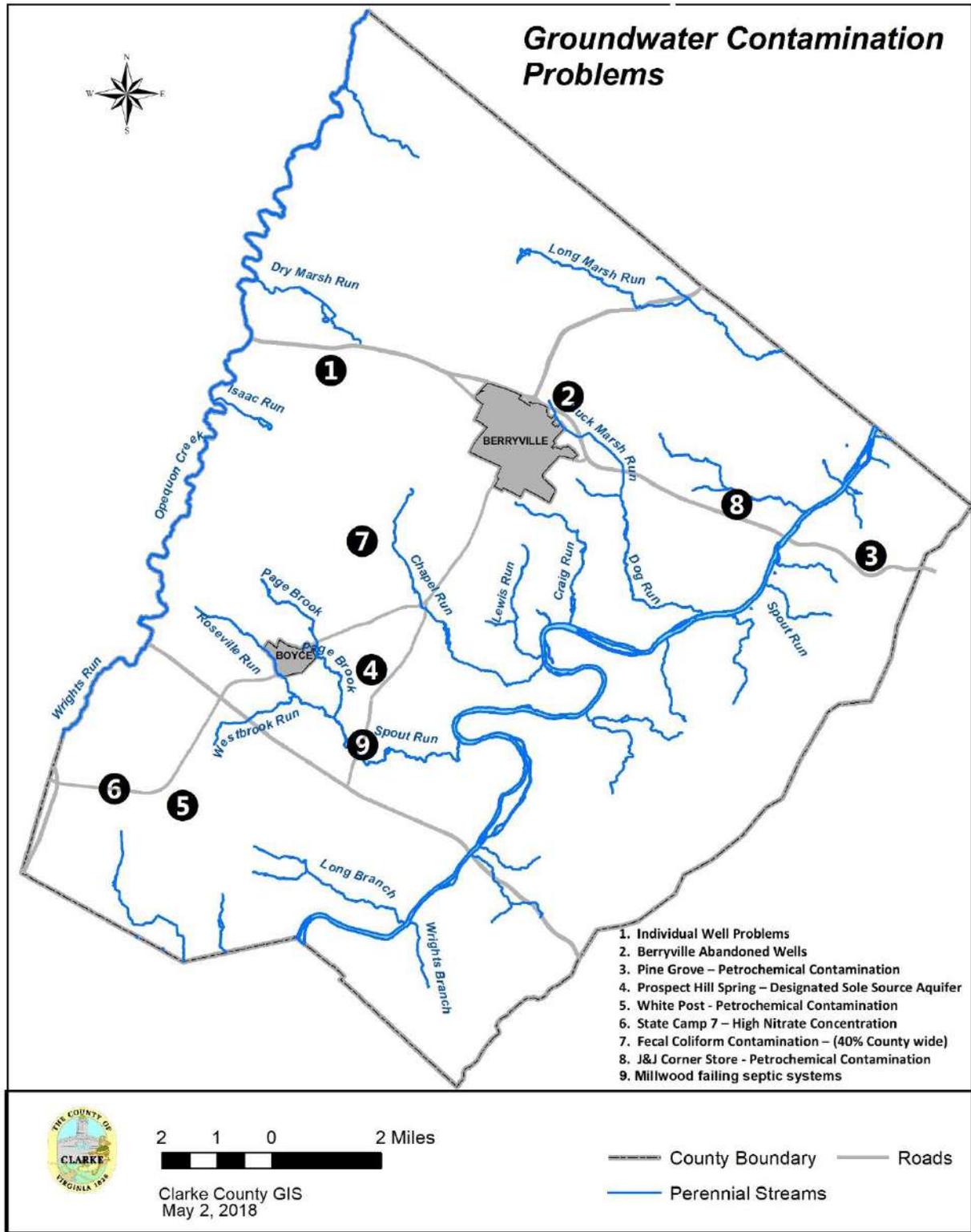
2018 WATER RESOURCES PLAN

Problems with water contamination have occurred throughout the County, and are well documented in the previous Plan. Examples include:

- Groundwater Contamination (Figure 5)
 - In the 1960's, well contamination in the Boyce-Millwood area led to the creation of the Clarke County Sanitary Authority in 1968 (LFPDC 1987). By the mid-1970s, the authority began supplying water to more than 200 residences and businesses from the high-yielding Prospect Hill Spring.
 - Water samples collected by the Clarke County office of the State Health Department from 1980 to 1998 indicated approximately 40% of wells sampled were contaminated by fecal coliform.
 - In 1981, the Berryville public water supply wells became contaminated by a combination of nitrates, phenols, and herbicides, requiring construction of a \$1.3 million water treatment plant using the Shenandoah River as the water source.
 - In 1986, 10 wells in the village of Pine Grove were contaminated by petroleum believed to have leaked from underground storage tanks.
 - In 1987 a survey conducted by the Lord Fairfax Health District identified 46% of the sewage disposal systems in Millwood did not meet the standards of the Health Department causing eventual construction of public sewer to the Village of Millwood in 2002.
 - A groundwater study completed in 1990 by the USGS identified 40% well contamination rates countywide.
 - A 1991 water testing program conducted by the Agricultural Extension Office showed that 40% of sampled wells were contaminated by fecal coliform.
 - In 1992, the groundwater supply for the community of White Post was contaminated by petroleum products necessitating the expenditure of more than \$2 million by the State Water Control Board to bring potable water from Prospect Hill Spring to White Post.

2018 WATER RESOURCES PLAN

Figure 5



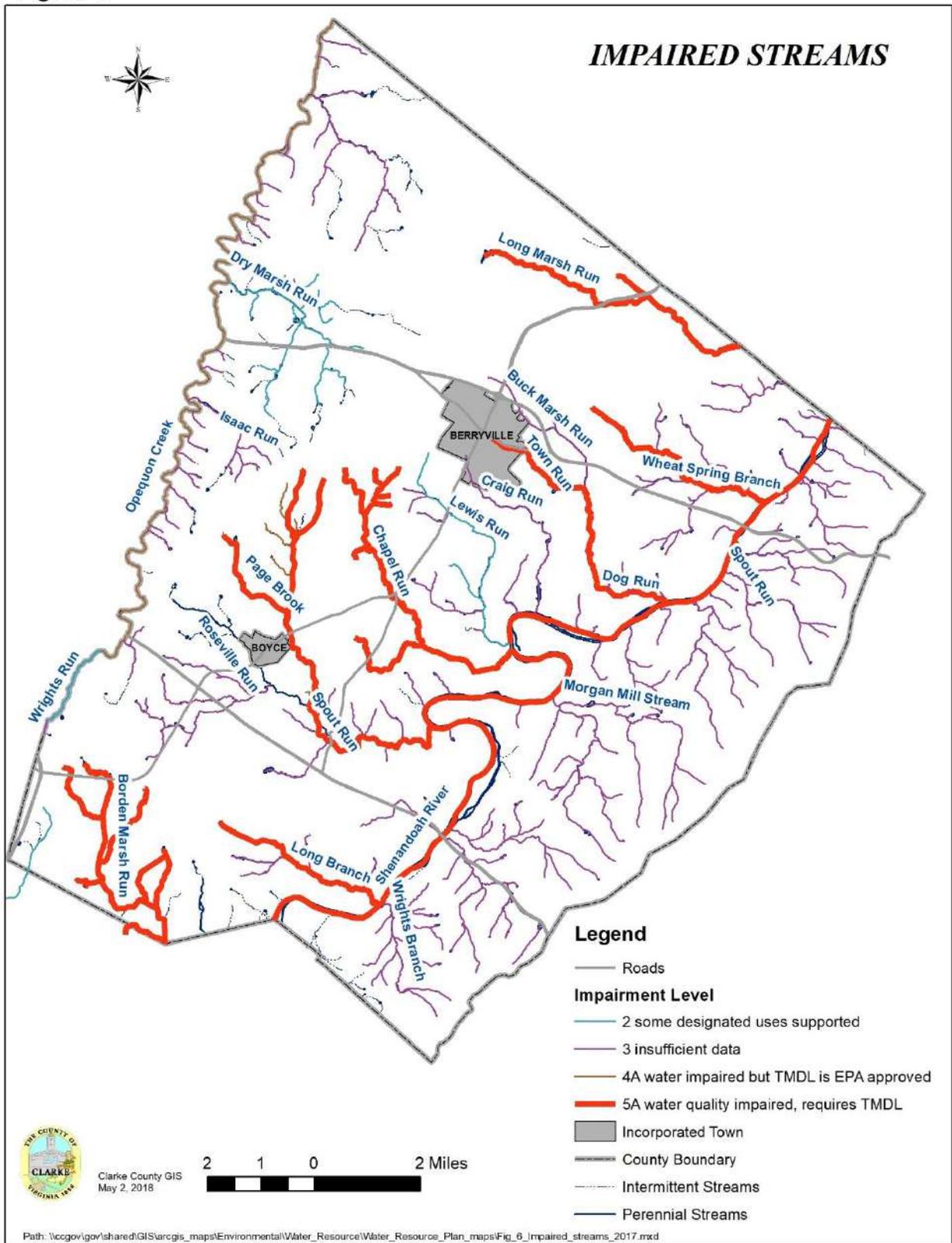
2018 WATER RESOURCES PLAN

- In 1995 the Town of Boyce constructed a sewage treatment plant due to the high number of failing septic systems. Approximately 185 homes and business were connected initially. Currently 278 homes/businesses are connected to sewer in Boyce.
- In 2010, petroleum leaked from an underground storage tank at J&J Corner Store at the intersection of Harry Byrd Highway (Route 7) and Shepherds Mill Road (Route 612) causing well contamination issues for approximately 20 households.
- Surface Water Contamination (Figure 6)
 - Of the 21 perennial secondary streams, 11 are designated as impaired waterways not meeting water quality standards primarily e. coli and sediment.
 - The Shenandoah River is contaminated by mercury and PCB's from industrial sources. Mercury was used by Du Pont Co. in Waynesboro as a catalyst in fiber production between 1929 and 1950. During that time, strict storage and disposal regulations did not exist, and mercury made its way to the South River. A serious contamination problem was discovered in the 1970s. The Health Department advisory extends from Waynesboro to Front Royal. The Clarke County section is contaminated with PCB's from the Avtex Fibers plant in Front Royal.

In summary, these issues prompted the goals, objectives and strategies outlined in this plan. This Plan will describe the resource, the work that was done prior to 1999 to understand and protect the resource, the work that has been completed since the previous plan, and provide strategies to correct current problems and protect and maintain these resources for the future.

2018 WATER RESOURCES PLAN

Figure 6



2018 WATER RESOURCES PLAN

Summary of Prior Plan

The previous Water Resource Plan (1999) laid the groundwork for efforts to protect County water quality. These efforts included:

- Adoption of the Septic Ordinance (County Code Section 143)
- Adoption of the Well Ordinance (County Code Section 180)
- Adoption of the Sinkhole Ordinance (County Code Section 180)
- Completion of a 1990 USGS Report "Ground-Water Hydrology and Quality in the Valley & Ridge and Blue Ridge Physiographic Provinces of Clarke County, Virginia."
- Completion of 3 grant-funded water quality improvement projects for the Spout Run watershed
- Establishment of the EPA sole source aquifer for Prospect Hill Spring
- Adoption of the Spring Conservation Overlay District (Zoning Ordinance Section 3-E-2)
- Adoption of the Stream Overlay Protection District (Zoning Ordinance Section 3-E-5)
- Investigation into Surface Water Management Area designation
- Participation in Tributary Strategy's effort

Summary of Recent Activities

- Continued update and strengthening of Septic Ordinance, well ordinance, and stream overlay protection district regulations
- Completion of a 6-year USGS Report entitled "Hydrogeology and groundwater availability in Clarke County, Virginia"
- Establishment of a real-time monitoring network consisting of 3 wells and 2 stream gages
- Completion of four Minimum Instream Flow Studies for the North Fork, South Fork, and Main Stem of the Shenandoah River
- Completion and adoption of a Drought Response Plan
- Participation in the update of the State Water Supply Plan
- Completion of 2 grant funded water quality improvement projects for the Spout Run watershed
- Participation in Chesapeake Bay TMDL cleanup effort

Details of the above summaries for the 1999 Water Resource Plan and Implementation Status can be found in Appendix I attached.

2018 WATER RESOURCES PLAN

Plan Application

The Plan should be used by property owners, elected and appointed officials, and other interested stakeholders to understand the County's approach to protecting water resources. The Plan should also be applied in tandem with the recommendations found in the County's Comprehensive Plan, Agricultural Land Plan, Mountain Land Plan, and other relevant component plans. Examples of some of the ways that this Plan can be used include:

- Determining how the County should protect water resources both quality and quantity to insure adequate clean supply's for County residents.
- Balancing water quality and availability with the desire to accommodate current and future growth and economic development.
- Evaluating land development applications and proposed changes to the Zoning and Subdivision Ordinances.
- Reviewing and updating the County's Comprehensive Plan and component plans.

Chapter I contains the Plan's revised list of Goals, Objectives, and Strategies – collectively these items describe the County's program for protecting water resources.

Chapter II details the short term implementation goals.

Chapter III describes the Valley and Blue Ridge regions that are geologically different. Also described are the groundwater areas that could assist future water- management activities because such areas contain similar physical, geologic, and hydrologic characteristics.

Chapter IV Provides background information on water quality and quantity protection efforts.

Chapter V describes the process for reviewing and updating the Plan on a regular basis.

2018 WATER RESOURCES PLAN

(this page is intentionally blank)

CHAPTER I

PLAN GOALS, OBJECTIVES, AND STRATEGIES

2018 WATER RESOURCES PLAN

(this page is left intentionally blank)

2018 WATER RESOURCES PLAN

CHAPTER I -- PLAN GOALS, OBJECTIVES, AND STRATEGIES

This Chapter contains the Water Resources Plan's Goals, Objectives, and Strategies. The Goals Statement depicts the purpose and long-term expectations of the Plan in general terms. The Objectives describe the specific topics to be addressed in furtherance of the Goals Statement. Strategies are detailed action items to be followed to implement the Plan's Goals and Objectives.

A. Goals Statement

The Goals of the 2018 Water Resources Plan are as follows:

- 1. Protect and enhance water quality.**
- 2. Protect and maintain water availability.**
- 3. Engage and educate individuals, communities and governments in watershed stewardship.**

Section B below lists the Objectives associated with each of the three Goals and the recommended implementation Strategies for each Objective.

B. Plan Objectives and Strategies

GOAL 1: Protect and enhance water quality

Objective 1. Protect groundwater resources from contamination and reduce contamination where present

Strategy (a). Continue to review and update the County ordinances related to groundwater protection.

- I) Evaluate the Spring Conservation Overlay District (regulations in the County Zoning Ordinance) protecting Prospect Hill Spring to update septic system requirements and consider expansion to include EPA sole source aquifer boundaries.**

2018 WATER RESOURCES PLAN

II) Septic Ordinance (County Code Chapter 143):

a. Implement regular maintenance, monitoring, and reporting of all septic system components including drain lines, distribution boxes, and septic tanks. Included in the maintenance is a regular pump-out schedule as recommended by the Virginia Department of Health (VDH). A mandatory pump-out has been adopted in the County Code but never implemented due to lack of administrative capabilities.

b. Utilize VDH staffing resources to ensure annual operation and maintenance inspections of alternative septic systems and identification of substandard systems. Provide County funding if necessary to ensure VDH resources remain available and capable to manage this program.

c. Identify grant opportunities and other funding sources to replace inadequate systems with those meeting current standards.

d. Continue to require resistivity testing to ensure drainfields are located away from karst features.

III) Sinkhole Ordinance (County Code Chapter 180, Article II): Develop

educational information to increase awareness of sinkholes and the potential threat to groundwater. Other approaches include direct mailing to affected landowners, adding information to County website, brochures, and press releases.

IV) Karst Plans (Zoning Ordinance Section 6-H-15): Continue to require karst plans for all site plans in karst soils to insure protection of karst features from potential contamination threats.

2018 WATER RESOURCES PLAN

Strategy (b). Continue to work with state agencies and the legislature to insure the County has sufficient authority to protect water resources through local ordinances and land use controls.

Strategy (c). Continue to work with The Virginia Department of Health (VDH) Office of Drinking Water (ODW) and the Department of Environmental Quality to obtain grants for the development of Wellhead Protection Plans for public wells throughout the County, including those serving Shenandoah Retreat, Pine Grove and River Park.

Strategy (d). Groundwater database development

- I) Develop a database of all existing well and septic permits on file in cooperation with the Health Department. Homes with systems not on file should be surveyed to determine the type and location of water source and sewage disposal. Consider permanent funding for a part-time employee to GPS well and septic locations.
- II) Work with VDH to share data collected by state employees regarding well and septic systems throughout the County.
- III) Compile a clearinghouse of past, present, and future water resource studies to insure that data remains available to future planners for continued protection of water resources.

Strategy (e). Work with Lord Fairfax Soil and Water Conservation District (LFSWCD) to minimize levels of nitrate leading to groundwater from cultivated crops by encouraging use of Best Management Practices (BMPs).

2018 WATER RESOURCES PLAN

Strategy (f). Establish a well water test program with FOSR, or others, to measure groundwater levels of nitrate and other contaminants and track such contaminant levels.

Objective 2. Protect surface water resources from contamination

Strategy (a). Cooperate with and encourage use of the programs administered by the Lord Fairfax Soil and Water Conservation District and other agencies involved in developing Best Management Practices (BMPs) to reduce non-point source pollution.

Strategy (b). Encourage development of comprehensive Resource Management Plans, which are designed to create a comprehensive approach for installing all available BMPs for a particular property to maximize water resource protection for agricultural and urban land uses. These plans could be a requirement to qualify for land use taxation.

Strategy (c). Continue to work cooperatively with DEQ and all partners to generate TMDLs and Implementation plans for impaired waters. Secure regular updates on status of implementation of such plans.

Strategy (d). Continue to support Friends of the Shenandoah River (FOSR) monitoring in the Shenandoah River and area streams in order to identify changes in water quality. Secure annual reports from FOSR indicating level and trends in collected data.

Strategy (e). Work with DEQ to reevaluate TMDLs to take into consideration natural sediment levels in marl streams, as identified by FOSR, when establishing impairment levels.

2018 WATER RESOURCES PLAN

- Strategy (f). Support and encourage use of all available grant funding sources to implement water quality improvement efforts and provide in-kind or monetary match to insure viability of grant applications.
- Strategy (g). Protect wetlands for their hydrologic and ecological functions, and pursue opportunities to mitigate, restore or create wetlands.
- Strategy (h). Continue to participate in and support the Chesapeake Bay TMDL water quality improvement efforts through the Regional Commission and LFSWCD.
- Strategy (i). Consider development of a real-time water quality monitoring network to provide timely water-quality information in order to assess total maximum daily loads (TMDLs) and the effects of urbanization and agriculture on the water supply. Incorporate related FOSR data and well water testing conducted by County Extension in an annual report.

GOAL 2. Protect and maintain water availability

Objective 1. Protect water availability through regulatory action

- Strategy (a). Continue to work with the Northern Shenandoah Valley Regional Commission and state agencies to update the Water Supply Plan to insure that adequate water resources are available for Clarke County residents. Specifically, encourage off-stream storage of river water during high flows to avoid supplementing water supplies with groundwater or interbasin transfer.
- Strategy (b) Encourage Conservation Easements, appropriate LFSWCD BMPs installations, limit contamination sources, impervious surfaces, and high water users within

2018 WATER RESOURCES PLAN

the limestone ridge area identified in the 2010 USGS report as the designated recharge area for the County, to protect groundwater availability.

Strategy (c) Evaluate and consider establishing regulation requiring hydrogeologic studies (such as drawdown tests) for water users greater than 10,000 gallons per day, to insure adequate water availability and to minimize impact to existing wells.

Strategy (d). Establish minimum well construction depth to protect water availability during drought based on the base-level altitude values as developed in the 2010 USGS study.

Strategy (e). Protect aquifers and stream base flows from unnecessary withdrawals by municipalities, industry, agriculture, or residents during periods of low flow and drought events by reducing water use, particularly in the Shenandoah River watershed by incorporating data collected from the Minimum Instream flow studies.

Strategy (f). Protect and enhance ground water recharge and quality by evaluating the petitioning the State Water Control Board to designate the County as a groundwater management area in accordance with State law.

Strategy (g). Work with State agencies and legislature to recognize the interrelationship between ground and surface water in the Shenandoah Valley when considering permitting of municipal water supplies and how groundwater withdrawals may impact surface water flow.

Strategy (h). Work with the Town of Berryville to consider utilizing Berryville Waste Water Treatment Facility effluent for crop irrigation and other non-potable usage.

2018 WATER RESOURCES PLAN

Strategy (i). Consider impoundments in streams where appropriate for groundwater recharge, crop irrigation, and public water supply.

Objective 2. Protect water availability through programmatic action

Strategy (a). Begin to look at developing sustainable yields for groundwater withdrawals as discussed in the 2010 USGS report.

Strategy (b). Protect and maintain natural stream flows during low flow and drought periods through water conservation and reuse.

Strategy (c). Continue to fund USGS real-time network to provide timely water-quantity information to resource managers and others to make informed decisions about floods and water availability.

Strategy (d). Consider reinstating the real-time well at the Chet Hobert Park which was discontinued in 2013. This well represents the Dry Marsh groundwater area that experienced the most impact during the 1999-2000 drought.

Strategy (e). Add a streamflow gage on the Blue Ridge as no streamflow data is measured on the mountain.

Strategy (f). Continue to support USGS research efforts to enhance the County's understanding of water resources.

Strategy (g). Establish permanent funding for water resources studies including but not limited to the real-time monitoring network and groundwater quality network.

2018 WATER RESOURCES PLAN

GOAL 3. Engage and educate individuals, communities and governments in watershed stewardship

Strategy (a). Engage the public at all levels to implement watershed stewardship and “good housekeeping” practices within the County.

Strategy (b). Expand and sustain public education at all levels to achieve widespread public understanding of the inter-relationship of human activities and natural resources, and the economic, public health, environmental, and community benefits of preserving the integrity of the natural watershed ecosystems.

Strategy (c). Engage governments at all levels to implement all appropriate goals and strategies in their regulations, programs and activities.

Strategy (d). Utilize the internet, websites, and social media to promote water quality and quantity awareness and the importance of stewardship.

CHAPTER II



RECOMMENDATIONS

2018 WATER RESOURCES PLAN

(this page is left intentionally blank)

2018 WATER RESOURCES PLAN

CHAPTER II—RECOMMENDATIONS

Project Priorities

Based on the Objectives and Strategies outlined in the previous section, the following strategies are recommended for short-term implementation (< 5 years).

1. Implement regular maintenance, monitoring, and reporting of all septic system components including drain lines, distribution boxes, and septic tanks. Included in the maintenance is a regular pump-out schedule as recommended by the Virginia Department of Health (VDH).
2. Develop a database of all existing well and septic permits on file in cooperation with the Health Department. Homes with systems not on file should be surveyed to determine the type and location of water source and sewage disposal. Consider permanent funding for a part-time employee to GPS well and septic locations.
3. Work with VDH to share data collected by state employees regarding well and septic systems throughout the County.
4. Consider development of a real-time water quality monitoring network to provide timely water-quality information in order to assess total maximum daily loads (TMDLs) and the effects of urbanization and agriculture on water supply.
5. Protect and enhance ground water recharge and quality by evaluating the petitioning of the State Water Control Board to designate the County as a groundwater management area in accordance with State law. At a minimum a groundwater management area should be established for the limestone ridge area identified in the 2010 USGS report as the designated recharge area for the County.
6. Encourage Conservation Easements, appropriate LFSWCD BMPs installations, limit contamination sources, impervious surfaces, and high water users within this area to protect groundwater availability.
7. Establish minimum well construction depths, to protect water availability during drought, based on the base-level altitude values, as developed in the 2010 USGS study.

2018 WATER RESOURCES PLAN

8. Consider reinstating the real-time well at the Park that was discontinued in 2013. This well represents the Dry Marsh groundwater area that experienced the most impact during the 1999-2000 drought.
9. Add a streamflow gage on the Blue Ridge as no streamflow data is measured on the mountain.
10. Engage the public at all levels to implement watershed stewardship and “good housekeeping” practices on private, commercial, industrial, institutional, and public lands and roads.

CHAPTER III

DESCRIPTION OF BLUE RIDGE AND GREAT VALLEY REGIONS

2018 WATER RESOURCES PLAN

(this page is left intentionally blank)

2018 WATER RESOURCES PLAN

CHAPTER III – DESCRIPTION OF THE BLUE RIDGE AND GREAT VALLEY REGIONS

The eastern third of the County consists of the western slope of the Blue Ridge Mountains. This region is primarily forested. The Shenandoah River divides the mountain from the valley portion of the County. Approximately twenty-two miles of the main stem of the Shenandoah River run through the County. The western two-thirds of the County are in the northern Shenandoah Valley and are primarily open land in agricultural use.

The Blue Ridge area is characterized by elevations greater than 1,400 ft., steep slopes, low sinkhole density, high stream density, mean annual precipitation 40 in/yr.

In contrast, the Valley region has low elevation, generally less than 350 ft., gentle slopes, high sinkhole density, low stream density, mean annual precipitation 39 in/yr. Rainfall is the primary source of recharge with approximately 1 inch of rain covering 1 sq. mile equates to 17.4 million gallons of water. Groundwater is the dominant source of streamflow, especially in droughts. Differences in resistance to weathering are also shown by the extent of bedrock openings where groundwater occurs and moves.

In the Blue Ridge bedrock, water occurs in fractures in the rock, joints, faults, and bedding plane separations.

In the Valley area, the carbonate bedrock is more easily dissolved by water, and many fractures can become enlarged into solution channels.

Clarke County was divided into nine groundwater areas based on surface-water basin boundaries as part of the 2010 USGS study (Figure 3). As stated in the USGS report, these areas are based on surface water basin boundaries that contain similar physical, geologic, and hydrologic characteristics. The first numbers in parentheses represent the USGS groundwater area number (BR = Blue Ridge, VR = Valley/Ridge). Each area has been characterized based on total area and percentage of the County land base, land cover, urban areas, livestock exclusion, details on perennial streams, current active sampling sites, and contamination issues. Livestock exclusion data was derived from the Department of Conservation and Recreation BMP database query form. BMP records are organized based on the Virginia National Watershed Boundary Dataset (VaNWBD) 6th Level Units (VAHU6) that is described on the DCR website. These are shown as the 2nd code in parenthesis (Figure 7).

Long Marsh Run (B01VR) (PS-85, PS-86, PS-87)

- Land area: 23% (25,922 acres)
- Land cover is 66% agriculture, 20% forested and 13% urban.
- Urban areas: Berryville

2018 WATER RESOURCES PLAN

- 14 miles of livestock inclusion installed since 2000
- Perennial tributaries:
 - Long Marsh Run – 7 miles long, 15% forested
 - Wheat Spring Branch – 4.7 miles long, 9% forested
 - Craig Run – 3 miles long, 7% forested
 - Buckmarsh Run – 2 ½ miles long, 0% forested
 - Dog Run – 4.8 miles long, 21% forested
 - Unnamed tributary (originates at Cool Spring) - .6 mile long, 43% forested
- Sampling points:
 - DEQ – 4 sites
 - FOSR – 5 sites
- Contamination Issues: This area includes 3 impaired waterways, Wheat Spring Branch, Dog Run, and Long Marsh Run. Craigs Run is listed as Category 3A meaning that no data are available within the data window of the current assessment to determine if any designated use is attained and the water was not previously listed as impaired.

Raven Rocks Run (B01BR) (PS-85)

- Land area: 10% (10,986 acres)
- Land cover is 87% forested, 7% agriculture and 6% urban.
- Urban areas: Shenandoah Retreat, Pine Grove
- No livestock exclusion installed
- Perennial tributaries (from north to south):
 - Unnamed tributary (Shenandoah University River Campus) - 860' south of WV line, drainage extends into West Virginia, 1,640' long, 100% forested
 - Unnamed tributary (Shenandoah University River Campus) - 2,900' south of WV line, 2,190' long, 90% forested, drains though Shenandoah Retreat
 - Unnamed tributary (Shenandoah University River Campus) - just north of Clubhouse, 1,181 long, 45% forested, drains though Shenandoah Retreat
 - Unnamed tributary (Shenandoah University River Campus) - just south of Clubhouse, 4,524' long, 73% forested, drains though Shenandoah Retreat
 - Unnamed tributary - 1000' south of Route 7 bridge, 1 ½ miles long, 100% forested
 - Spout Run: 1.6 miles long, 100% forested
 - Unnamed tributary - junction of Rt. 606 (River Rd) and Rt. 607 (Saw Mill Hill Rd.), 2.5 miles long, 100% forested
 - Unnamed tributary - 3,880' north of junction of Rt. 606 (River Rd.) and Leeds Manor Lane, 1.7 miles long, 100% forested

2018 WATER RESOURCES PLAN

- Sampling points:
 - DEQ – 0 sites
 - FOSR – 0 sites
- Contamination Issues: All streams in the area are classified as Category 3A meaning that no data are available within the data window of the current assessment to determine if any designated use is attained and the water was not previously listed as impaired. In the early 1986, 10 wells in the village of Pine Grove were contaminated by petroleum believed to have leaked from underground storage tanks.

Shenandoah River/Spout Run (B02VR) (PS-82, PS-83, PS-84)

- Land area: 27% (31,367 acres)
- Land cover is 64% agriculture, 27% forested and 7% urban.
- Urban areas: Boyce, Millwood, and Waterloo
- 12 miles of livestock exclusion installed since 1999
- Perennial tributaries:
 - Long Branch - 4.6 miles long, 13% forested
 - Lewis Run – 3.3 miles long, 69% forested
 - Chapel Run – 5.9 miles long, 43% forested
 - Page Brook – 3.8 miles long, <1% forested
 - Roseville Run – 3.8 miles long, 29% forested
 - West Brook – 2.1 miles long, 25% forested
 - Spout Run (in the valley) – 6.1 miles long, 71% forested
- Sampling points:
 - DEQ – 5 sites
 - FOSR – 8 sites
- Contamination Issues: Spout Run and Long Branch are impaired based on high fecal coliform counts and sediment. A TMDL was developed in 2012 for Spout Run and 2015 for Long Branch. The TMDL for Long Branch also includes other tributaries including Borden Marsh Run and Crooked Run, along with several in Warren County.

Morgan Mill (B02BR) (PS-82, PS-84)

- Land area: 14% (15,955 acres)
- Land cover is 91% forested, 5% agriculture and 4% urban.
- Urban areas: Calmes Neck and Carefree Acres
- No livestock exclusion installed
- Perennial tributaries:

2018 WATER RESOURCES PLAN

- Morgan Mill Stream - 2.3 miles long, 99% forested
- South Branch of Morgan Mill - 2.3 miles long, 100% forested
- Unnamed tributary - 1000' north of Route 50, 1.4 miles long, 100% forested
- Unnamed tributary - at junction with Route 50, 2.7 miles long, 100% forested
- Wrights Mill - 1.4 miles long, 100% forested
- Sampling points:
 - DEQ – 0 sites
 - FOSR – 0 sites
- Contamination Issues: All streams in the area are classified as Category 3A meaning that no data are available within the data window of the current assessment to determine if any designated use is attained and the water was not previously listed as impaired.

Rock Spring Branch (B03BR) (PS-81)

- Land area: 0% (448 acres)
- Land cover is 98% forested and 2% urban.
- Urban areas: Shenandoah Farms
- Perennial tributaries include the headwaters for Rock Spring Branch
- Sampling points:
 - DEQ – 0 sites
 - FOSR – 0 sites
- Contamination Issues: This is a very small section of the County with the majority of the basin in Warren County. No known contamination issues.

Borden Marsh Run (B03VR) (PS-81)

- Land area: 6% (6,413 acres), extends into Warren County
- Land cover is 76% agricultural, 17% forested, and 6% urban.
- Urban areas: White Post and Double Toll Gate
- 3.8 miles of livestock inclusion installed since 2000
- Perennial tributaries:
 - Borden Marsh Run - 3.8 miles long, <1% forested
 - Wolfe Marsh Run - 1.2 miles long, <1% forested
- Sampling points:
 - DEQ – 0 sites

2018 WATER RESOURCES PLAN

- FOSR – 0 sites
- Contamination Issues: Borden Marsh Run is classified as impaired due to high e.coli levels, a TMDL was developed and approved in 2015. In 1992 the groundwater supply for the community of White Post was contaminated by petroleum products that necessitated the expenditure of more than 2 million dollars by the State Water Control Board to bring potable water from Prospect Hill Spring to White Post residents.

Crooked Run (B04VR) (PS-79)

- Land area: 1% (787 acres)
- Land cover is 81% agricultural, 7% forested, and 12% urban.
- Urban areas: southern Double Toll Gate
- No livestock exclusion installed
- Perennial tributaries include the headwaters of Crooked Run but it is intermittent in Clarke County
- Sampling points:
 - DEQ – 0 sites
 - FOSR – 1 sites
- Contamination Issues: Crooked Run is classified as impaired due to high e.coli levels, a TMDL was developed and approved in 2015.

Dry Marsh Run (B054VR) (PU-18, PU-19)

- Land area: 14% (16,488 acres)
- Land cover is 62% agriculture, 30% forested and 8% urban.
- Urban areas: scattered development
- 2.5 miles of livestock exclusion installed since 2001
- Perennial tributaries:
 - Dry Marsh Run – 3 miles long, 33% forested
 - Unnamed tributary – located at the junction of Wadesville Rd. and Swimley Rd., 2.5 miles long, 27% forested
 - Opequon Creek - 10 miles long, 60% forested
- Sampling points:
 - DEQ – 0 sites
 - FOSR – 0 sites

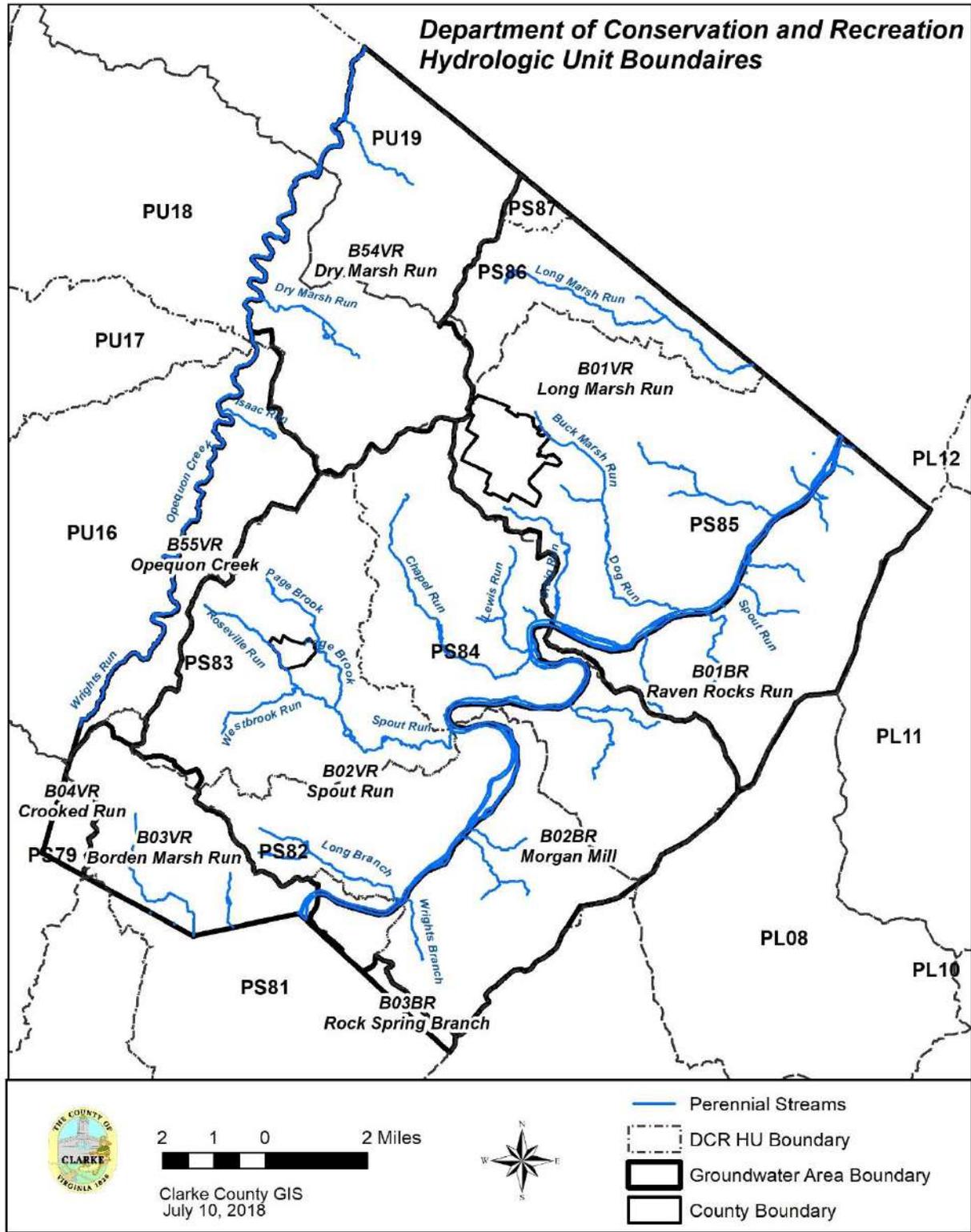
2018 WATER RESOURCES PLAN

- Contamination Issues: Dry Marsh Run is considered fully supporting and not contaminated. Unnamed tributaries of Opequon Creek are classified as Category 3A meaning that no data are available within the data window of the current assessment to determine if any designated use is attained and the water was not previously listed as impaired.

Opequon Creek (B055VR) (PU-16)

- Land area: 5% (5,578 acres)
- Land cover is 64% agriculture, 30% forested and 5% urban.
- Urban areas: scattered development
- 4/10 mile of livestock exclusion installed in 2014
- Perennial tributaries:
 - Opequon Creek – 17.5 miles long, 40% forested
 - Isaac Run - 1 mile long, 67% forested
 - Wrights Run – 2.1 miles long, 8% forested
- Sampling points:
 - DEQ – 0 sites
 - FOSR – 0 sites
- Contamination Issues: The Opequon Creek was classified as an impaired water and a TMDL was developed in 2003, the implementation plan was developed in 2006. The cause of impairment was e. coli, and sediment. Isaac Run, Wrights Run are classified as Category 3A meaning that no data are available within the data window of the current assessment to determine if any designated use is attained and the water was not previously listed as impaired.

Figure 7



2018 WATER RESOURCES PLAN

(this page is intentionally blank)

CHAPTER IV

BACKGROUND INFORMATION

2018 WATER RESOURCES PLAN

(this page is left intentionally blank)

2018 WATER RESOURCES PLAN

CHAPTER IV – BACKGROUND INFORMATION

A. Interrelationship between Ground and Surface Waters

The 2010 USGS study evaluated ground-water availability in Dry Marsh Run and Spout Run. These drainages were selected as representative of distinct geologic regions in the County and the watershed boundary is completely within the County. These real-time stream gages were placed in the lower reaches of these waterways and the data collected were used in the water budget equation.

Dry Marsh Run effective recharge ranged from 6.4 to 22.5 with an average of 11.6 in/yr. Baseflow of streams is 81-93% groundwater.

Spout Run Basin effective recharge ranged from 6.7-23.0 in/yr with an average of 11.9 in/yr. The baseflow 80-97% mean streamflow.

This high baseflow index indicates that groundwater is the dominant source of stream flow.

Another finding was that on average, annual effective recharge is about 30% of the annual precipitation. The timing and type of precipitation, however, is critical in determining the amount of water that will actually recharge the groundwater system. The majority of groundwater recharge occurs between January and April of each year when plants are dormant and evapotranspiration is at a minimum.

Below average recharge causes water level declines, effective recharge increases as precipitation increases but lack on snow during critical recharge periods (Nov-Apr) dramatically impacts amount of recharge. Water availability can be based on the amount of effective recharge.

Of principle concern is the fact that groundwater is the dominant source of streamflow. Too much water withdrawn without enough recharge can adversely affect aquatic systems.

2018 WATER RESOURCES PLAN

B. Public Water and Sewer

In Clarke County public water and sewer is administered by the Clarke County Sanitary Authority (CCSA). The sewer system consists of the Boyce Wastewater Treatment Plant (BWWTP) that serves the residents and businesses in designated exclusive sewer service areas for the Town of Boyce, the Waterloo Business Area, and the Village of Millwood (County Code Section 180 Article V, VI, and VII). Public water comes from Prospect Hill Spring that serves Millwood, Boyce, Waterloo and White Post.

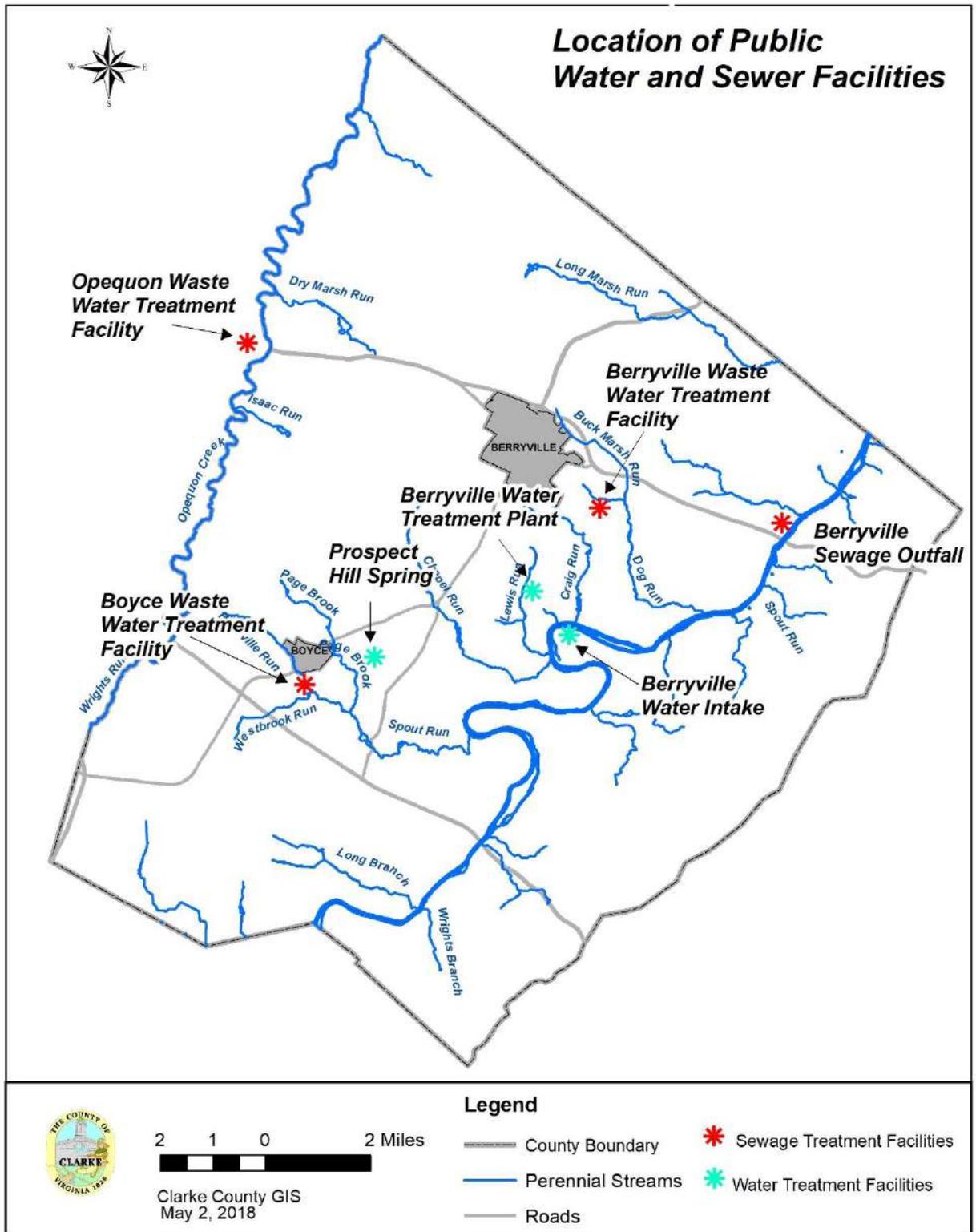
The Town of Berryville provides separate water and sewer for the residents of Berryville. The waste water treatment facility is located on Parshall Road; the treatment capacity is 0.7 MGD. Public water comes from the Shenandoah River; the treatment plant is on Springsbury Road and is permitted to withdraw up to 0.864 MGD (Figure 8). The remaining areas of the County utilize private wells and septic systems. The County does not have a septage disposal facility so it has entered into a long term contract with the Frederick-Winchester Service Authority (FWSA) to utilize the Opequon Water Reclamation Facility, located in Frederick County, for septage disposal and treatment. This facility is permitted to treat up to 12 MGD and is located on the south side of Route 7 on the Frederick/Clarke County line (Figure 8). Other regional facilities utilizing water from the Shenandoah include Winchester, Frederick County, and Front Royal.

The current State Water Resources Plan (2015) states that, through careful planning and conservation efforts, there will be sufficient water to support the majority of needs through the year 2040. However, based on current supply, a deficit of 0.81 MGD is anticipated to occur in Frederick County by 2030. The Frederick County Sanitation Authority alternatives include quarry expansion and groundwater well improvements, and adding a water withdraw from the Opequon Creek at the northern section of the stream on the Clarke/Fredrick County border.

Concerns regarding water supply for Clarke residents based on excessive use in Frederick County and the City of Winchester stem from interbasin transfer from the North Fork of the Shenandoah that is treated and released into the Opequon Creek, bypassing the main stem of the Shenandoah River.

2018 WATER RESOURCES PLAN

Figure 8



2018 WATER RESOURCES PLAN

C. Water Quality

Water quality refers to the chemical and biological constituents of water.

Natural groundwater quality depends primarily on bedrock composition.

Groundwater in the Valley area has generally higher concentrations of total dissolved minerals, because the rocks of the Valley are more soluble than those of the Blue Ridge.

Water from Valley wells and springs has relatively high calcium, low magnesium, and very low sodium and potassium. Except where onsite sewage disposal systems add water softener sodium, a growing problem.

Water in the Blue Ridge has variable amounts of calcium, low magnesium, and variable (but often high) sodium and potassium. Total hardness ranges from 89-422 milligrams per liter as calcium carbonate (mg/l) in the Valley, compared to 4-242 mg/l in the Blue Ridge. Valley area groundwater is classified as very hard (Wright, 1990).

Unnatural groundwater quality or contaminated groundwater is caused primarily by human land uses.

D. Water Quality Impacts – Point and Non-point sources

Due to the environmental concerns caused by excessive nutrient discharges, state and federal regulatory agencies are implementing stringent limitations on both point source and non-point source nutrient discharges. "Point source" is defined by the U.S. Environmental Protection Agency as "a source of pollution that can be attributed to a specific physical location – usually an identifiable, "end-of-pipe point."

Specifically, sewage treatment facilities, stormwater discharge, and large animal feeding operations all are regulated and require permits from DEQ.

The positive outcome of these regulatory requirements is that water quality is improved where voluntary measures are not as effective.

2018 WATER RESOURCES PLAN

E. Point Source – Regulated discharge

Sewage Treatment Facility upgrades.

Wastewater discharged from sewage treatment plants is the second largest source of surface water nitrogen pollution to the Chesapeake Bay.

Agriculture contributes 42% of the nitrogen loading and is the largest source of nitrogen pollution to the Bay.

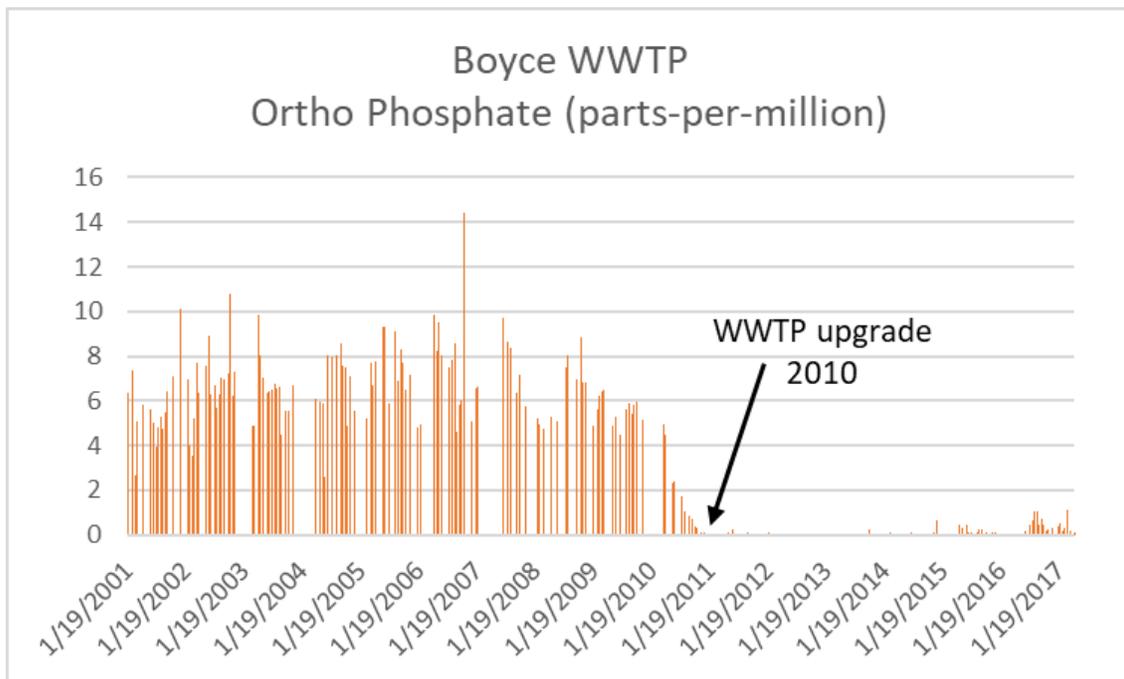
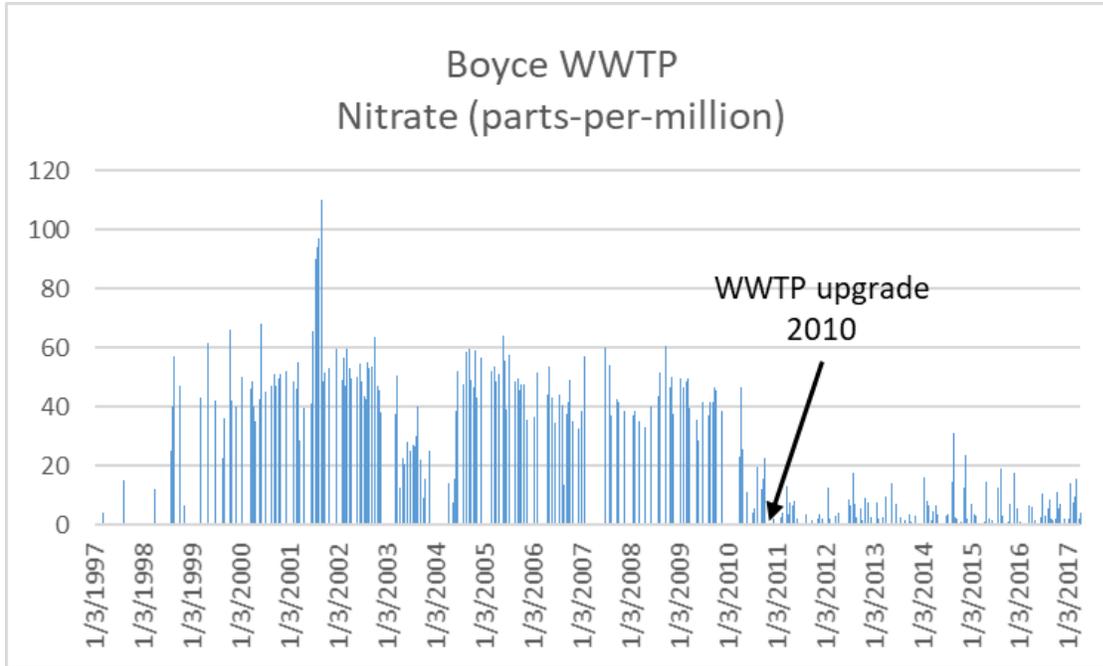
When approximately 12 million of the 16 million residents of the watershed flush their toilets, the wastewater goes to Sewage Treatment Plants (STP), which discharge into the Chesapeake Bay and its tributaries.

There are 304 “significant” STPs in the watershed, which discharge 1.5 billion gallons of wastewater each day. These plants contribute about 52 million pounds of nitrogen pollution annually to the Bay and its tributaries (Chesapeake Bay Foundation, 2003).

For wastewater treatment plants in Virginia nutrient discharge limitations require upgrading existing treatment systems to provide some form of biological nutrient removal (BNR). These systems provide the biological steps necessary to remove nutrients (nitrogen and phosphorus) from the wastewater.

The Berryville, Boyce and Opequon Waste Water Treatment facilities have all completed the required upgrades (DEQ, 2018 Wastewater Assistance & Training Nutrient Removal website).

2018 WATER RESOURCES PLAN



FOSR data (2017)

According to DEQ, point source pollutant loads have been significantly reduced due to waste water treatment plant upgrades, but these reductions will level off as growth occurs in the service areas of these plants.

2018 WATER RESOURCES PLAN

Agricultural and urban source sectors have benefitted from overachievement of nutrient reductions from waste water treatment plants. Although sediment loads from agricultural activities have decreased, these loads remain a primary source of sediment and further reductions are needed.

In addition, there is an additional need to address nutrient and sediment loads from urban sources.

F. Urban

Stormwater runoff from streets, lawns, parking lots, construction sites, industrial facilities and other impervious surfaces occurs as a result of precipitation events (for example, rain water or melted snow). The stormwater runoff may enter surface waters directly or through natural and constructed channel systems.

Activities occurring in developed and urban areas contaminate stormwater runoff with pollutants such as automobile oil, grease, metals, sediment, bacteria from animal waste, nutrients and pesticides from lawns, as well as deposits from airborne pollutants.

Unmanaged stormwater can cause erosion and flooding. It also can carry excess nutrients, sediment and other contaminants into rivers and streams.

Properly managed stormwater can recharge groundwater and protect land and streams from erosion, flooding and pollutants.

DEQ is currently the lead agency for developing and implementing statewide stormwater management and nonpoint source pollution control programs to protect the Commonwealth's water quality and quantity.

In 2010 the County updated its own stormwater regulations in an attempt to reduce the discharge limits for phosphorous from state levels of 0.45 lbs/ac/yr depended on site size and location to 0.28 most sites. In addition, the pollutant load was computed based on impervious surface and "managed turf" areas, like residential lawns, and additional BMPs and site design techniques were permitted. Beginning in 2014 phosphorous is excluded from lawn fertilizer in Virginia.

2018 WATER RESOURCES PLAN

The County also developed a Stormwater Design Manual that contains technical plan requirements; methods, design tools and details for engineers; easements, inspections and maintenance enforcement.

In June 2016, the Virginia Department of Environmental Quality (DEQ) notified County Planning Department Staff that the County is not authorized to enforce its more stringent local stormwater regulations and that the County's stormwater ordinance is "null and void."

State law only authorizes localities to have more stringent regulations if they are a Virginia Stormwater Management Program (VSMP) Authority responsible for issuing the State permits – also referred to as an "opt in" locality. Localities such as Clarke County that have "opted out" of accepting responsibility of managing the VSMP process are prohibited under State law from applying more stringent regulations. Those counties that have "opted in" and are VSMP Authorities can only have more stringent regulations if they are approved by the State to have such regulations.

The County Attorney reviewed DEQ's position and concurred, ultimately resulting in action by the Board of Supervisors to repeal the County's stormwater ordinance.

As authorized under the State Water Control Law and the federal Clean Water Act, the Virginia Pollutant Discharge Elimination System (VPDES) permitting program, administered by DEQ, regulates point source pollution. This includes stormwater discharges from construction. The total phosphorus load of new development projects shall not exceed 0.41 pounds per acre per year, as calculated pursuant to 9VAC25-870-65 (DEQ, 2018, Stormwater management website).

G. Agriculture

The DEQ animal waste program is regulated under both the Virginia Pollution Abatement (VPA) Permit Regulation (9VAC25-32) and the Virginia Pollutant Discharge Elimination System (VPDES) Permit Regulation (9VAC25-31).

In Clarke County there are 3 facilities, all dairy farms, operating with a VPA General Permit, Mercer Vu Farms (former White Post Dairy), Harvue Farms, and Riggs and Stiles Inc.

2018 WATER RESOURCES PLAN

These farms are required to have a nutrient management plan, a manure storage facility, and may require water quality monitoring (Figure 9) (9VAC25-192-70).

All other agricultural operations in the County are considered non-point sources and installation of Best Management Practices (BMPs) is strictly voluntary with cost-share for some practices available from LFSWCD.

H. Non-point Source

Best Management Practice Installation.

Reductions in nonpoint source (NPS) pollution can be attained by reducing activities that produce NPS pollutants, reducing the amount of pollutants generated by an existing activity and reducing the negative effects these pollutants can have by controlling their dispersal.

To that end, NPS (BMPs) are important tools in controlling NPS pollution and its impact on the environment.

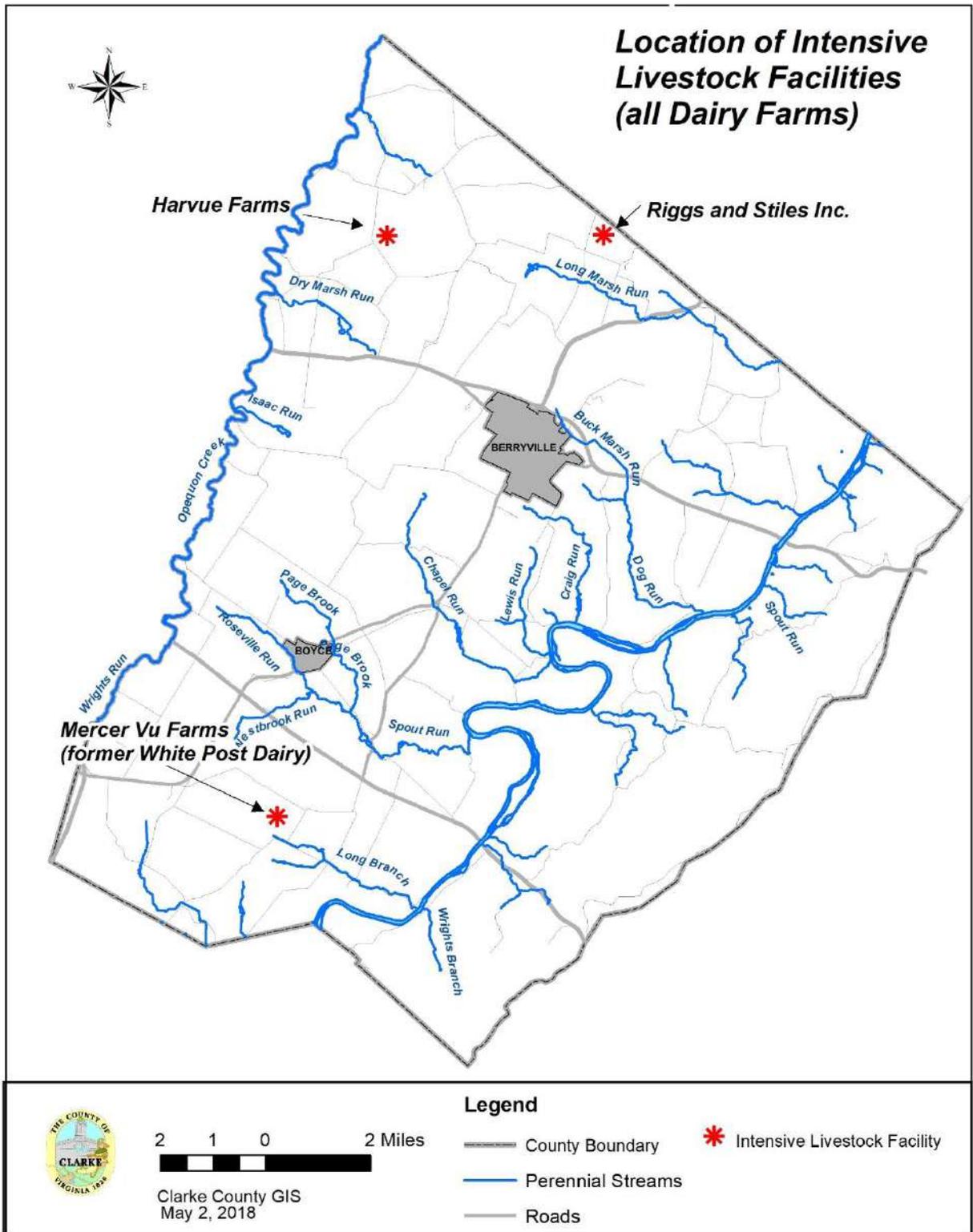
While there are many sources of NPS pollution, agriculture is among the most significant in Clarke County because the majority of land use is devoted to farming.

For example, one EPA study estimates that 27 percent of the phosphorus and 60 percent of the nitrogen entering the Chesapeake Bay originate from cropland. These pollutants need to be controlled to protect the environment.

The Department of Conservation and Recreation (DCR) administers programs through local soil and water conservation districts (SWCDs) to improve or maintain water quality in the state's streams, lakes and bays through the installation or implementation of agricultural BMPs (DCR. 2018. BMP cost-share program).

Through these programs, financial and technical assistance are offered as incentives to carry out construction or implementation of selected BMPs.

Figure 9



2018 WATER RESOURCES PLAN

The state provides funds to SWCDs for targeted priority hydrologic units. Areas with the greatest pollution potential receive the greatest funding.

Clarke County is within the Lord Fairfax Soil and Water Conservation District (LFSWCD).

The cost-share program supports the use of various practices in conservation planning to treat cropland, pastureland, hay land and forested land. Some are paid for at a flat rate or straight per-acre rate. Others are cost-shared on a percentage basis up to 80 percent.

In some cases, the United States Department of Agriculture (USDA) also pays a percentage. The cost-share program's practices can often be funded by a combination of state and federal funds, reducing the landowner's expense to less than 30 percent of the total cost.

A 100% cost-share was provided by the LFSWCD in 2015 and 2016 for livestock exclusion from streams (SL-6). Current cost share for that practice is 80%. Landowners are responsible for the maintenance of BMPs.

Data is available at the DCR website which details the extent of BMP's installed in watershed across the Commonwealth since 1998.

In Clarke County, the farming community has installed 486 practices over this time period. A variety of BMPs have been installed including CREP Riparian Forest Buffer Planting (CRFR-3, N=23), Harvestable Cover Crop (SL-8H, N=49), Manure Application to Corn Using Pre-app. Nitrate Test (NM-3B, N=37), Nutrient Management Plan Writing and Revision (NM-1, N=22), Riparian Buffer Rent (CP-22, N=22), Small Grain and Mixed Cover Crop for Nutrient Management and Residue Management (SL-8B, N=87), Stream Exclusion With Grazing Land Management (SL-6, N=86), Streambank protection (fencing) (WP-2, N=19).

These practices have resulted in 216,171 linear feet of stream fencing, creating over 49,000 acres of riparian buffer in the County. This shows a deliberate effort on the part of farmers to maintain and improve water quality (DCR. 2018. Website Virginia Agricultural BMP and CREP Database Query Form).

2018 WATER RESOURCES PLAN

Stream Fencing



Stream Crossing



Waterer



Another state program is the Virginia Resource Management Planning program that provides a voluntary way to promote the use of conservation practices that improve farming operations and water quality. Resource management plans can help farm owners and operators take advantage of all the conservation measures at their disposal.

The plans are designed to encourage farmers, either the farm owner or operator, to use a high level of best management practices (BMPs) that reduce runoff pollution to local waters and, in many cases, improve the farmer's financial bottom line.

2018 WATER RESOURCES PLAN

In return for full implementation, the plan holder can be assured that he or she is in compliance with any new state nutrient, sediment and water quality standards; in particular, regulations related to the Chesapeake Bay and all local stream segment TMDLs.

The certificate of safe harbor is valid for nine years provided the farmer continues to implement the RMP. Participation in the program is completely voluntary.

This could be tied to qualifying for use value taxation in Clarke County as an incentive.

I. Biosolids

The Virginia Department of Environmental Quality (DEQ) regulates oversight of all land application of treated sewage sludge, commonly referred to as biosolids.

A total of 11,125 acres are permitted for biosolids application in the County -- proportionately more than many other counties in the area -- and averaging 18,000 wet tons per year.

Biosolids contain about 5-8 pounds of nitrogen per ton. There is interest and concern about the effect of biosolids application on the quality of ground water in Clarke County.

In order to address this concern, the County applied for and received two grants in 2013, totaling \$16,000, to monitor 10 springs in northern Shenandoah Valley for discharge, TN, TP, ammonia, ortho phosphate, nitrate-nitrite, E. coli, flow, and general water chemistry. Springs are located in Karst areas.

The purpose is to identify contribution of contamination from springs to surface waters to assist in:

- 1) Determining appropriate BMP's on agricultural lands, and
- 2) Determining the impact of biosolids applications on water quality as compared to other fertilizer sources (Webb W., et. al. 2014).

2018 WATER RESOURCES PLAN

J. Improvement Programs- Federal, State, Regional, Local

Total Maximum Daily Load (TMDL) Watershed Restoration

Since 1998, DEQ has developed plans, with public input, to restore and maintain the water quality for impaired waters. These plans establish "total maximum daily loads" or TMDLs. TMDL is a term that represents the total pollutant a water body can assimilate and still meet standards.

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Efforts to improve surface water quality throughout the region have been driven by the need to improve water quality in the Chesapeake Bay. Water quality degradation caused by nutrient over-enrichment has played a key role in the decline of the living resources of the Chesapeake Bay and its tributaries.

The need to reduce the nutrient flow from tributaries into the Chesapeake Bay prompted states, including Virginia, to enter into the Chesapeake Bay Agreement in 1987.

This agreement included a commitment to reduce and maintain the controllable loads of phosphorus and nitrogen entering the Bay by 40% by the year 2000 by developing tributary-specific strategies for each of the Bay's major tributaries.

Virginia's strategy for the Shenandoah and Potomac River Basin was completed in 1996 (Tributary Strategy Plan, 1996).

Despite extensive restoration efforts, including implementation of the Tributary Strategy Plans during the prior 25 years, the U.S. Environmental Protection Agency established a new Chesapeake Bay Total Maximum Daily Load (TMDL), a historic and comprehensive "pollution diet", in 2010.

This TMDL includes accountability features to guide sweeping actions to restore clean water in the Chesapeake Bay and the region's streams, creeks and rivers. The TMDL is designed to ensure that all pollution control measures needed to fully restore the Bay and its tidal rivers are in place that are expected to achieve 60 percent of the nutrient and sediment

2018 WATER RESOURCES PLAN

pollution load reductions necessary to achieve applicable water quality standards as compared to 2009 levels by 2017.

By 2025, the goal is to have all practices and controls installed to achieve the Bay's dissolved oxygen, water clarity/submerged aquatic vegetation and chlorophyll a standard as articulated in the Chesapeake Bay TMDL document. Scientific evidence shows that many of the pollution-reducing practices we are placing on the ground now may take years to show visible improvements in water quality. This is sometimes referred to as "lag" time.

French and Canadian researchers tracked the movement of fertilizer through a plot of land over the course of three decades. While more than half of the fertilizer applied to the land in 1982 was absorbed by agricultural crops like wheat and sugar beets, 12 to 15 percent remained in the soil. The researchers predicted it would take an additional 50 years before the fertilizer fully disappeared from the environment (DiPasquale, 2013).

Watershed Implementation Plans (WIPs) are the roadmap indicating how Bay jurisdictions, in partnership with federal and local governments, will achieve the Chesapeake Bay TMDL allocations by 2025.

Bay jurisdictions include Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia and the District of Columbia.

There are three phases of WIPs developed by the Bay jurisdictions. Phase I and Phase II WIPs were developed and submitted to EPA in 2010 and 2012, respectively. Both Phase I and Phase II WIPs describe actions and controls to be implemented by 2017 and 2025 to achieve applicable water quality standards.

The Phase II WIPs build on the initial Phase I WIPs by providing more specific local actions. Phase III WIPs will be developed by jurisdictions based on a midpoint assessment of progress and scientific analyses was through 2017.

Phase III WIPs will provide information on actions the Bay jurisdictions intend to implement between 2018 and 2025 to meet the Bay restoration goals.

The County participates in development of the WIP's through the Northern Shenandoah Valley Regional Commission (EPA Chesapeake Bay TMDL, website).

2018 WATER RESOURCES PLAN

Beyond the requirements for the Chesapeake Bay TMDL, specific sections of the 1972 Federal Clean Water Act relevant to water quality improvement efforts include Section 303(d) and 305(b).

Section 303(d) requires States to submit a list of impaired and threatened waters, those not meeting water quality standards, for EPA approval every two years. For each water on the list, the state identifies the pollutant causing the impairment, when known. In addition, the state assigns a priority for development of Total Maximum Daily Loads (TMDL) based on the severity of the pollution and the sensitivity of the uses to be made of the waters, among other factors (40 C.F.R. §130.7(b)(4)).

In addition to section 303(d), lists of impaired waters, states are required to submit section 305(b) water quality reports to EPA. Section 305(b) reports provide information on the water quality status of all waters in the state, not just impaired or threatened waters.

In Virginia the agency responsible for monitoring and developing the 303(d) list is the Department of Environmental Quality (DEQ. 2016. Impaired Waters Fact Sheet).

Determining the amount of contamination a stream can assimilate without degrading water quality below the state water quality standards is the purpose of establishing TMDLs.

Water quality standards consist of statements that describe water quality requirements. They also contain numeric limits for specific physical, chemical, biological or radiological characteristics of water. These statements and numeric limits describe water quality necessary to meet and maintain uses such as swimming, fishing, and other water-based recreation, public water supply, and the propagation and growth of aquatic life (DEQ, 1998).

Those streams whose water quality currently does not meet minimum standards are declared “impaired” waterways. This designation or “priority ranking” is important to localities for targeting limited resources for stream pollution reduction improvements.

2018 WATER RESOURCES PLAN

K. Impaired Waters

DEQ extensively tests Virginia's rivers, lakes and tidal waters for pollutants. More than 130 pollutants are monitored annually to determine whether the waters can be used for swimming, fishing and drinking. Waters that do not meet standards are reported to the citizens of Virginia and the U.S. Environmental Protection Agency in the Virginia Water Quality Assessment 305(b)/303(d) Integrated Report.

DEQ has developed lists of impaired waters in every even year since 1992. This impaired waters list individually describes segments of streams, lakes and estuaries that exhibit violations of water quality standards. The report details the pollutant responsible for the violations, and the suspected cause and source of the pollutant.

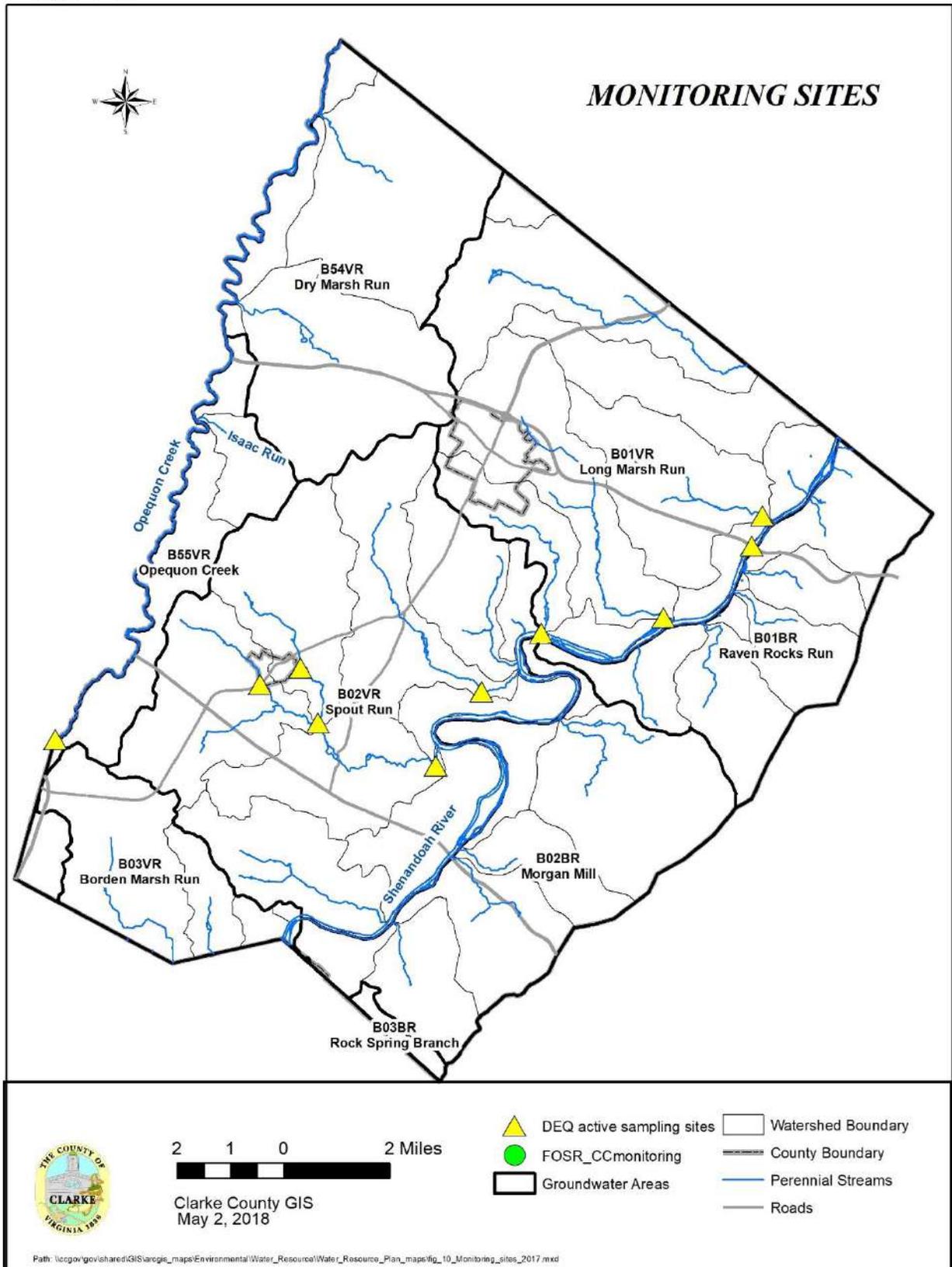
DEQ currently has 7 active TDML monitoring sites in Clarke County. In addition, the Friends of the Shenandoah River (FOSR) has semi-monthly monitoring on 12 sites since 1997 (Figure 10). FOSR has been monitoring water quality in the Shenandoah and its tributaries since 1989. The Lab was certified by EPA in 1997 certified lab at Shenandoah University has analyzed over 40,000 surface water samples, resulting in over 249,000 individual measurements for a range of physio-chemical and biological parameters.

The FOSR citizen monitoring data is included in the Integrated Report on Water quality that is put together and submitted to EPA.

DEQ regularly coordinates with citizen monitoring groups to plan for monitoring of priority implementation areas (BMP installation) or before TMDL development begins or at other times, too.

2018 WATER RESOURCES PLAN

Figure 10



2018 WATER RESOURCES PLAN

Table 2. EPA ASSESSMENT CATEGORIES and VIRGINIA SUBCATEGORIES

FULLY SUPPORTING	Waters are supporting one or more designated uses
EPA Category 1	Attaining all associated designated uses and no designated use is threatened
EPA Category 2	Available data and/or other information indicate that some, but not all of the designated uses are supported.
INDETERMINATE	Waters needing additional information
EPA Category 3	Insufficient data and/or information to determine whether any designated uses are met
IMPAIRED	Waters are impaired or threatened but a TMDL is not required.
EPA Category 4A	Water is impaired or threatened for one or more designated uses but does not require a TMDL because the TMDL for specific pollutant(s) is complete and US EPA approved.
IMPAIRED	Waters are impaired or threatened and require a TMDL
EPA Category 5	Waters are impaired or threatened and a TMDL is needed
Va. Category 5A	A water quality standard is not attained. The water is impaired or threatened for one or more designated uses by a pollutant(s) and requires a TMDL (303d list).

Currently, 636 waters are impaired statewide, 11 are in Clarke County. Most impaired waters require TMDLs. Then a TMDL Implementation Plan will be developed to bring the impaired water body up to standards. Implementation Plans include a schedule of actions, costs, and monitoring. Implementation Plan development typically starts within a year of EPA approval of the TMDL Study. Virginia state law requires the development of an Implementation Plan. The following watersheds are listed as impaired and scheduled for TMDL development and implementation planning. Several watersheds in the County must also complete the TMDL process.

2018 WATER RESOURCES PLAN

Table 3. Impaired waters Clarke County, VA (Figure 3)

Waterbody Name	Cause of Impairment	Category	TMDL Schedule
Shenandoah River	PCB/Mercury	4A	2002
	e. coli	5A	2024
Borden Marsh Run	e. coli	4A	2018
Page Brook/Spout Run	e. coli/benthic	4A	2016
Long Branch	e. coli	4A	2016
Chapel Run	e. coli/benthic	5A	2020
Roseville	e. coli	4A	2022
Dog Run	e.coli	5A	2020
Wheat Spring Branch	e. coli	5A	2020
Long Marsh Run	e. coli	5A	2024

The majority of work to improve water quality has occurred in the Spout Run watershed.

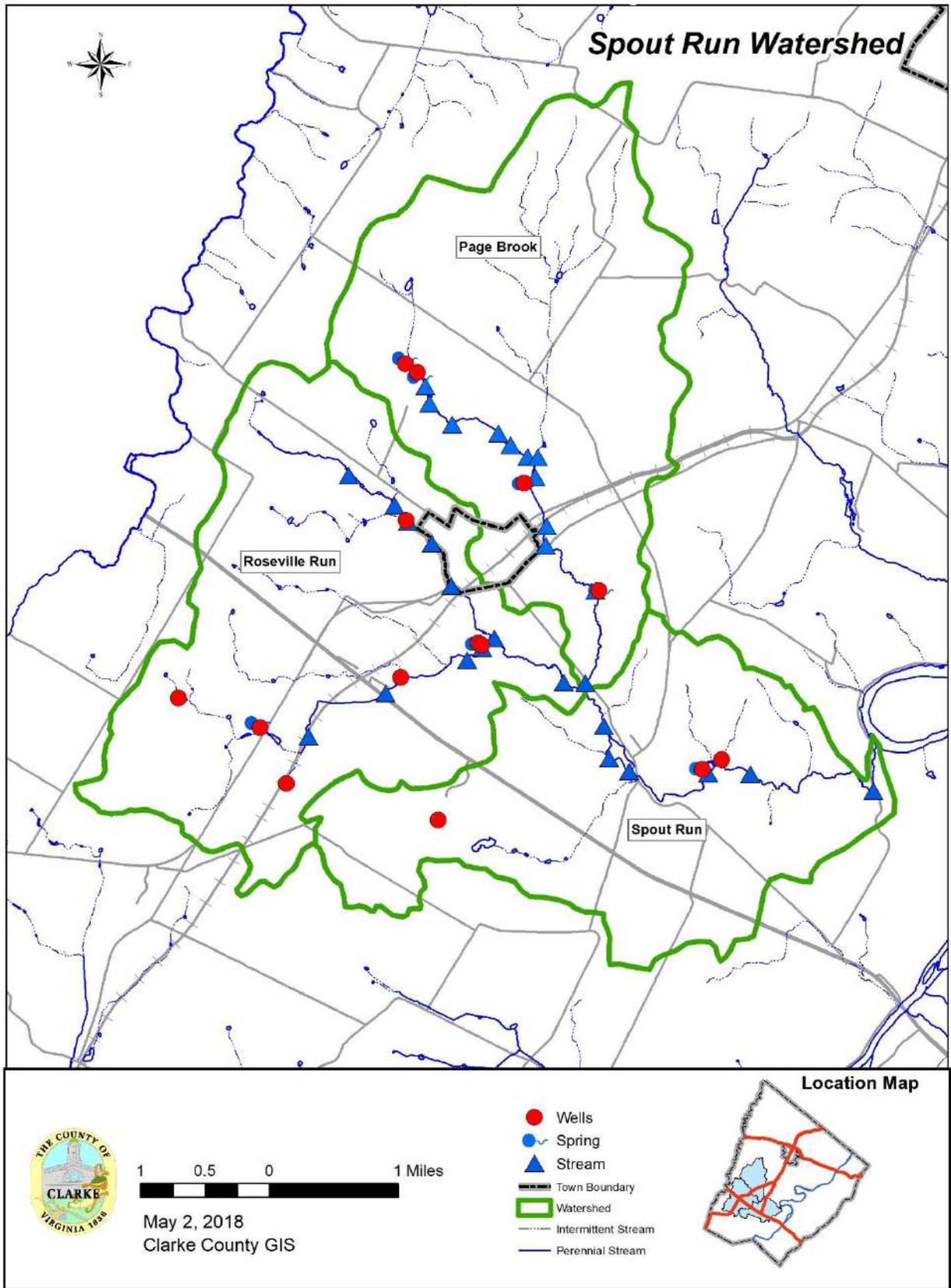
When a watershed is identified as impaired and has a TMDL developed multiple grant opportunities are available to assist landowners financially with BMP installation.

All of the grants, to date, related to water quality improvement projects in Clarke County have been in the Spout Run Watershed (Figure 11), contained in the EPA Sole Source Aquifer (Figure 12)

A complete list of past and current watershed Programs and Grant Projects for Clarke County is detailed in Appendix II.

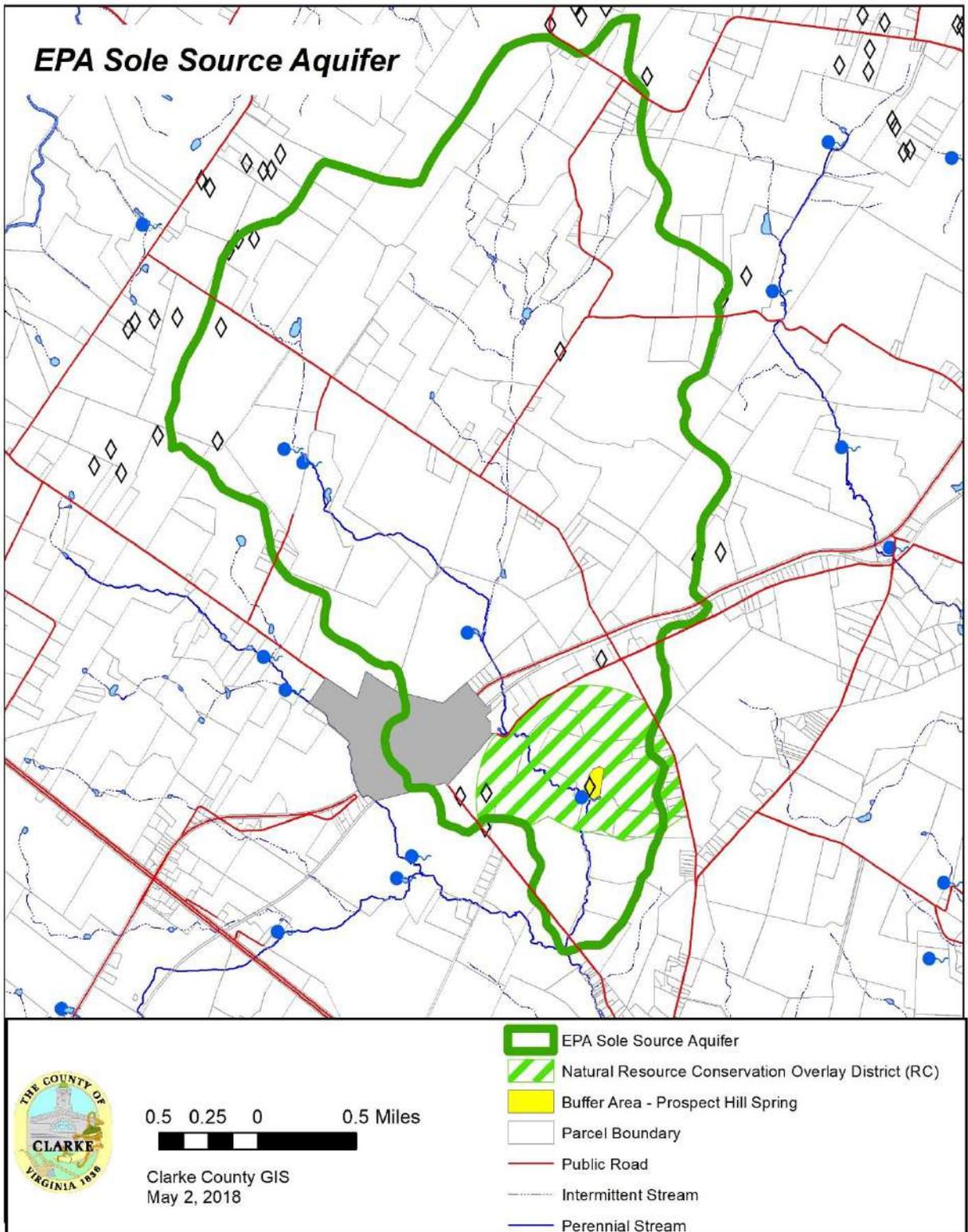
2018 WATER RESOURCES PLAN

Figure 11



2018 WATER RESOURCES PLAN

Figure 12



2018 WATER RESOURCES PLAN

L. Water Supply Planning

The Department of Environmental Quality oversees the Commonwealth's water supply planning efforts. This includes development of a state plan, assisting with local and regional plans, and implementing the Virginia Water Withdrawal Permitting Program. The regulation affecting the development of water supply plans in the Commonwealth is the Local and Regional Water Supply Planning Regulation (9VAC25-780), which became effective on November 2, 2005.

The purpose of this regulation is to establish a comprehensive water supply planning process for the development of local, regional, and state water supply plans. This process shall be designed to (i) ensure that adequate and safe drinking water is available to all citizens of the Commonwealth; (ii) encourage, promote, and protect all other beneficial uses of the Commonwealth's water resources; and (iii) encourage, promote, and develop incentives for alternative water sources, including but not limited to desalinization.

In addition, the regulation requires that all counties, cities, and towns in the Commonwealth of Virginia submit a local water supply plan or participate in a regional planning unit in the submittal of a regional water supply plan to the State Water Control Board. The most recent State Water Resources Plan was published in 2015 (DEQ, 2015). The State Plan was developed based on information provided by Virginia's counties, cities, and towns in response to the Water Supply Planning Regulation (9 VAC 25-780). The local and regional water supply plans include information about existing water use and sources of supply, future projections of population and water demand, anticipated water supply deficits, potential sources of future water supply, and current efforts to use water efficiently.

In addition to information from the local plans, the State Plan includes an analysis of how meeting future water needs may affect key water uses such as pollution assimilation, fish and wildlife habitat, and other existing downstream users. The Plan takes an extensive look at surface water and groundwater sources and includes an assessment of the capacity of these sources to meet the projected water demand in 2040. The Plan will be subject to incremental revision at five-year intervals as DEQ, localities, and other stakeholders provide input through ongoing water supply planning efforts.

2018 WATER RESOURCES PLAN

Clarke County and the Towns of Berryville and Boyce worked with other localities in the Valley including Frederick County and the Towns of Middletown and Stephens City; Page County and the Towns of Luray, Shenandoah, and Stanley; Shenandoah County and the Towns of Edinburg, Mt. Jackson, New Market, Strasburg, Toms Brook, and Woodstock; Warren County and the Town of Front Royal; City of Winchester, to develop a regional plan coordinated by the Northern Shenandoah Valley Regional Commission. The plan states that, through careful planning and conservation efforts, there will be sufficient water to support the majority of needs through the year 2040.

Based on current supply, a deficit of 0.81 MGD is anticipated to occur in Frederick County by 2030. Frederick County Sanitation Authority alternatives include quarry expansion and groundwater well improvements, and adding a water withdraw from the Opequon Creek at the northern section of the stream on the Clarke/Frederick County border. They have established the Opequon Water Supply Plan (OWSP) initiative, designed to ensure a safe and reliable, and sustainable supply of water to help meet the community's projected water needs.

By 2035, Frederick Water's water customers may require up to twelve million gallons of water every day, more than doubling from today's average of 5.6 million gallons per day. A detailed report is available on their website.

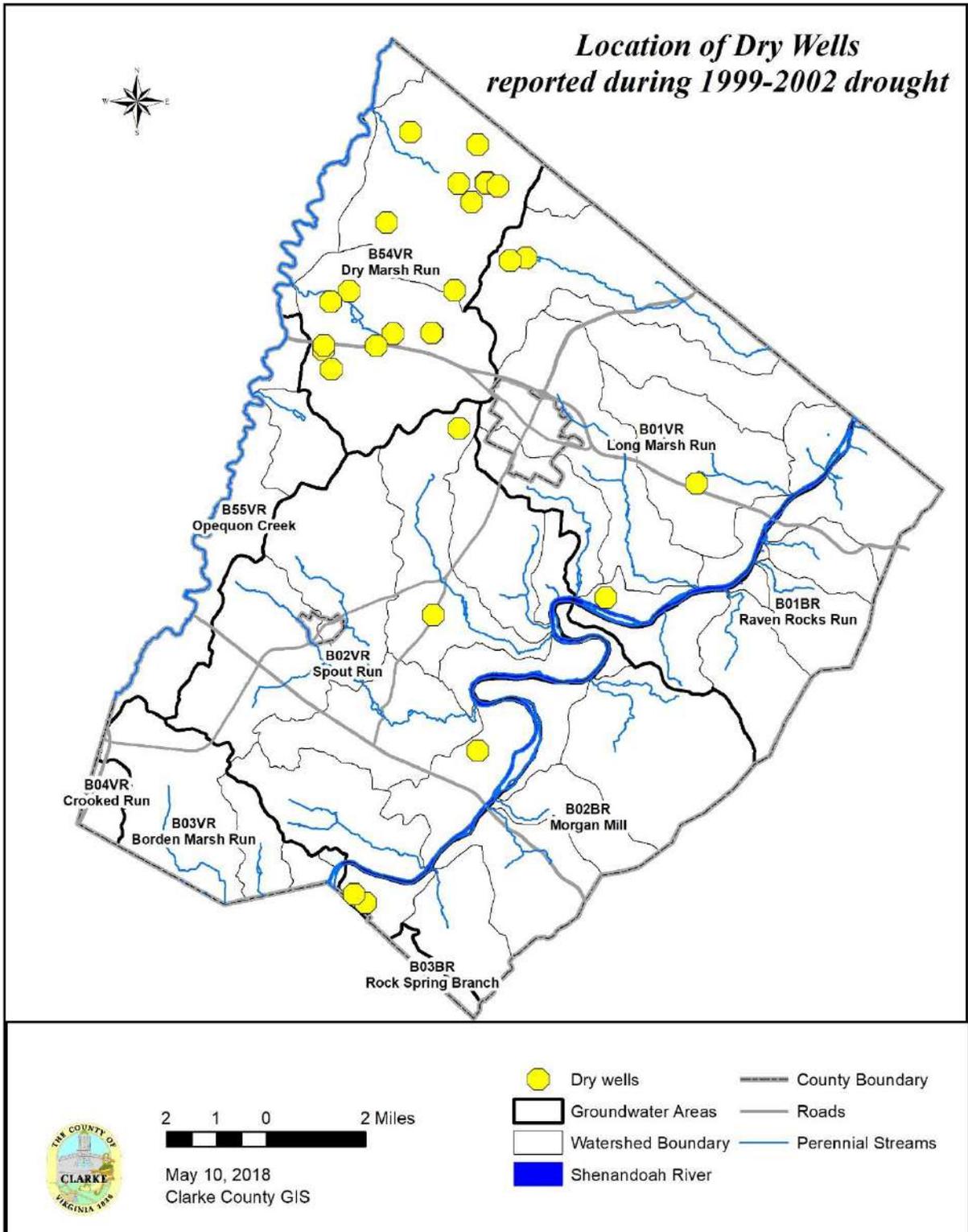
M. Drought Response Plan

During the summer of 2002 Virginia experienced significant drought impacts due to precipitation deficits that dated to 1999 in most areas of the Commonwealth. While this drought did not reach the level of severity of the drought of record (1930-1932), increases in water demands when compared to the 1930's resulted in significant impacts to all sectors of Virginia's economy and society. This prompted the Department of Environmental Quality to require localities to develop drought response plans. In addition to providing alternate water sources, the water supply regulations require localities to develop drought response plans.

Clarke was proactive and adopted a Plan and Ordinance in 2008, ahead of the the Regional Drought Plan (2011), as there were 26 reported dry wells in the County due to the 1999-2002 drought (Figure 13). The purpose of the plan is to describe a low flow/drought

2018 WATER RESOURCES PLAN

Figure 13



2018 WATER RESOURCES PLAN

response plan for the Shenandoah river basin. This plan utilizes the Virginia Drought Assessment and Response Plan developed by the Commonwealths Drought Response Technical Advisory Committee as a framework and incorporates the data collected and recommendations made in the final MIF report.

Clarke County receives an average of 36 inches of rainfall annually, spread fairly evenly throughout the year. In most years, rainfall is adequate to maintain and replenish our ground and surface water supplies.

However, the occurrence of droughts is a normal part of the weather cycle and should be expected. In the Shenandoah Valley drought is a cyclical phenomenon with a historical pattern of extreme drought occurring every thirty years with less severe droughts occurring roughly every decade.

During droughts, water available from our streams, rivers, and wells can be severely diminished. In addition, water use can increase drastically. The statewide Drought Assessment and Response Plan was used as a framework for this Drought Response Plan. Important differences between the State Drought Assessment and Response Plan and this local plan include:

- 1) Drought onset and stage declarations shall be made by the County staff under advisement from, but responsive to, USGS and the State Drought Monitoring Task Force.
- 2) Local data available from the USGS Groundwater Study, regional stream gages, and precipitation data will be utilized in drought stage declarations.

In order to monitor potential drought, the County will use the three drought indicators; precipitation, stream flows, and ground water levels; as the initial indicators to be considered when advising the Board of Supervisors regarding the declaration of a particular drought stage.

The drought stages are watch, warning, and emergency. When two indicators exceed the threshold for stage determination, this advisement may be to declare a specific drought stage or may include an explanation of why the particular drought stage should not be declared at that time. In Drought Watch responses are generally intended to increase awareness, in the

2018 WATER RESOURCES PLAN

public and private sector, to climatic conditions that are likely to precede the occurrence of a significant drought event. During this drought stage, the primary activities that are suggested are to prepare for the onset of a drought event.

The response phase in this stage is voluntary conservation. Voluntary conservation involves the reduction of non-essential uses, fixing leaks, installing water saving devices, and a general increase in awareness to conserve water. It is unlikely that significant water use reductions will occur at this stage although it is possible that the increased public awareness of water conservation activities may reduce water use up to 5%.

During a Drought Warning responses are generally responses that are required when the onset of a significant drought event is imminent. Water conservation and contingency plans that have been prepared during a drought watch stage would begin to be implemented.

From the perspective of the Commonwealth, water conservation activities at this stage would generally be voluntary. Voluntary water conservation activities generally result in reductions in water use of 5-10%. In this stage all water users would be encouraged to spread out water use. For example, rather than filling large livestock water troughs once a day, consider installing automatic waterers that respond to demand by livestock throughout the day.

For a Drought Emergency responses are generally responses that are required during the height of a significant drought event. During these times, it is likely that some water supplies will not provide the quantity of water needed by all users. Non-essential uses of water should be eliminated. Mandatory water conservation requirements contained in water conservation and contingency plans should be initiated at this stage. Mandatory water conservation activities generally result in water use reductions of 10-15%.

The Town of Berryville has adopted its own Drought Response Plan (Code of Ordinances Chapter 17 - Water, Sewers and Sewage Disposal Article II. - Water Generally Sec. 17-25. - Drought response ordinance).

The Town of Boyce water supply is administered by the Clarke County Sanitary Authority (CCSA). The CCSA has opted to follow the County's Plan.

2018 WATER RESOURCES PLAN

N. Groundwater Availability

In 2002, as a result of a prolonged and serious drought, the County initiated a second USGS study of groundwater. The first was conducted in the late 1980's and published in 1990 (Wright, 1990). This study focused primarily on groundwater quality. The second USGS study was a 6-year ground-water study with the United States Geological Survey (USGS). The primary objective of this study was to enhance the County's understanding of the quantity and sustainability of our ground-water resources. A report entitled "Hydrogeology and Ground-Water Availability in Clarke County, Virginia" details the results of the 6-year study. The report describes the methodology used to describe the groundwater flow patterns that ultimately determine how groundwater is recharged.

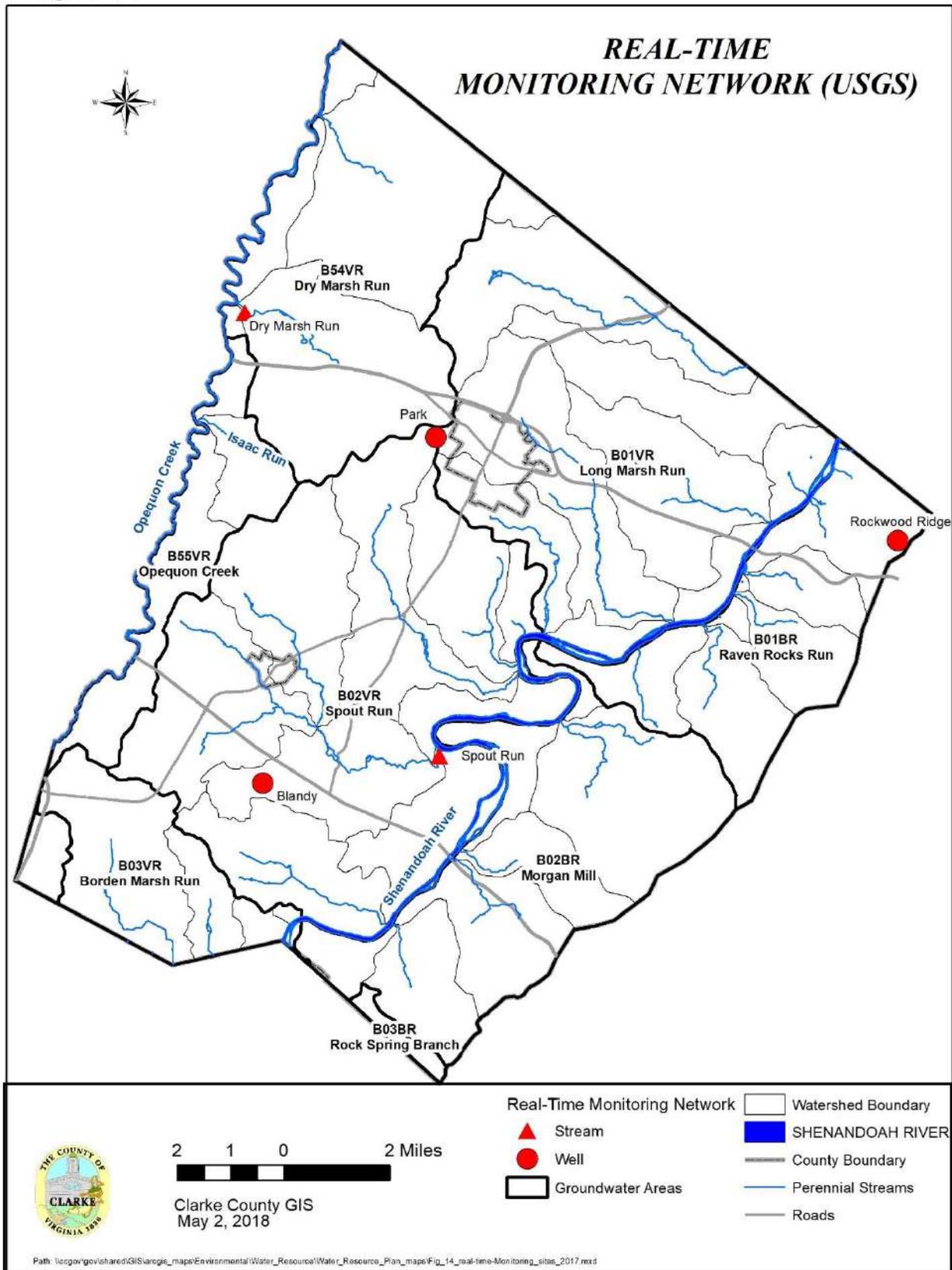
Understanding how water gets into the system explains water availability and the potential for contamination. A summary of the report and description of how the data will be used to protect ground-water resources and reduce future impacts of drought follows. A PowerPoint presentation with graphics is available on the County website.

As a result of this study the County now has some data in which begin to evaluate its groundwater resources. Including numbers that detail when low groundwater recharge levels will begin to impact streams and aquatic systems; how changes in zoning and land use may impact groundwater resources; how groundwater volume is distributed in the County; where contamination is more likely to occur; and where recharge occurs.

Continued minimum monitoring of established real-time gage stations and wells (Figure 14) will add to this body of knowledge and allow for refinement of management strategies.

2018 WATER RESOURCES PLAN

Figure 14



2018 WATER RESOURCES PLAN

(this page is intentionally blank)

CHAPTER V



CONCLUSION

2018 WATER RESOURCES PLAN

(this page is left intentionally blank)

2018 WATER RESOURCES PLAN

CHAPTER V -- CONCLUSION

A land use plan is only as good as the degree in which it is implemented so it is critical to work towards researching, evaluating, and pursuing the recommendations set forth in this Plan. Likewise, a land use plan is only effective if it is kept up to date and reflects the community's current conditions, needs, and impacts.

It is recommended that the Plan be reviewed on a five-year review schedule according to the following process:

1. On a five-year schedule from the adoption date of the current Water Resources Plan, the Planning Commission shall adopt a resolution addressing the status of the Plan, whether it should be updated, and to what degree it should be updated. This resolution may come in one of the following forms:
 - A finding that the current Plan recommendations are sufficient and that no amendment is necessary.
 - A finding that changes in the community warrants a comprehensive review and update of the Plan. An example would be the release of decennial Census data and growth projections.
 - A finding that the Plan does not address, or inadequately addresses, a specific topic area or areas warranting a focused update of the Plan. While the update may have a specific purpose, the review should remain comprehensive to ensure that all impacts are carefully evaluated.
2. It is recommended that at the beginning of year four in the five-year schedule, the Commission should begin work evaluating the Plan status. This can be accomplished as a committee of the whole or by designating a special subcommittee. If the Board of Supervisors has established an agricultural advisory committee, the Planning Commission should include this committee's input on the Plan evaluation either by joint meetings with the committee or including representatives from its membership on a special subcommittee with Commission members.

Plan status should be evaluated by considering factors including, but not limited to:

2018 WATER RESOURCES PLAN

- Recent release of updated data concerning TMDL implementation or water supply planning.
- Recent updates to the County Comprehensive Plan or related component plans.
- Changes to State law impacting water resources.
- Any other subject not addressed or inadequately addressed by the current Plan.

While not recommended, a proposal may be considered to amend the Plan outside of the scope of the Plan's five-year review cycle. Frequent, piecemeal changes to the Plan can result in the document becoming fragmented and inconsistent. It can also devalue the importance of the document as a long-range planning guideline. For these reasons, interim amendments are strongly discouraged.

REFERENCES CITED



2018 WATER RESOURCES PLAN

(this page is left intentionally blank)

2018 WATER RESOURCES PLAN

REFERENCES CITED

Chesapeake Bay Foundation. 2003. "Sewage Treatment Plants: The Chesapeake Bay Watershed's Second Largest Source of Nitrogen Pollution" 10 p. Water Resources Education Network. http://wren.palwv.org/products/documents/STP_final_no_watermark.pdf

Clarke County Comprehensive Plan. 2013. The Clarke County Board of Supervisors, Clarke County Virginia. 103 pp.

Clarke County Nutrient Reduction Strategy. 1996. In Virginia's Potomac/Shenandoah Tributary Strategy Plan. Richmond, VA. Virginia Department of Environmental Quality. 129 p.

DiPasquale, N.. 2013. Letter from Leadership: Lag-times call for patience in awaiting a restored Bay. Website <https://www.chesapeakebay.net/news/blog>

Eberly, H. T. 1994. Letter from State Health Department, Office of Water Programs to Mr. Arthur Weiss, Chairman Clarke County Sanitary Authority, June 28, 1994.

Enferadi, K. M., R. C. Cooper, S. C. Goranson, A. W. Olivieri, J. H. Poorbaugh, M. Walker, and A. Wilson. 1986. Field Investigations of Biological Toilet Systems and Gray Water Treatment. E.P.A. Water Engineering Research Laboratory. Cincinnati, Ohio. 4 pp.

Graves, A. K., et. Al., 2002. Antibiotic Resistance Profiles to Determine Sources of Fecal Contamination in a Rural Virginia Watershed, *Journal of Environmental Quality* 31:1300-1308

Hagedorn, C. 1994. Letter from Virginia Polytechnic Institute Professor of Environmental Microbiology, to Natural Resource Planner, Alison Teetor, November 10, 1994.

Honkala, Adolph U.. 1980. Letter to County Administrator G. Robert Lee, August 5, 1980.

Hrezo, M. S. and Nickinson. 1986. Protecting Virginia's Groundwater: A Handbook for Local Government Officials. Virginia Water Resources Research Center. Blacksburg, VA.

Jones, W. K.. 1987. Overview of groundwater resources of Clarke County, Virginia, with emphasis on the carbonate aquifers west of the Shenandoah River. In: Clarke County groundwater protection plan: Lord Fairfax Planning District Commission, p. 7.1-7.22.

Krstolic, J.L. and Ramey, R.C., 2012. South Fork Shenandoah River Habitat-Flow Modeling to Determine Ecological and Recreational Characteristics during Low-Flow Periods.

Krstolic, J.L. and Hayes, D.C., 2010. GIS Data Release: Physical Habitat Characteristics on the North and South Forks of the Shenandoah River, VA in 2002-2007.

2018 WATER RESOURCES PLAN

Krstolic, J.L., Hayes, D.C., and Ruhl P.M., 2006. Physical habitat classification and instream flow modeling to determine habitat availability during low-flow periods, North Fork Shenandoah River, Virginia.

Krstolic, J.L. and Hayes, D.C., 2004. Water-quality synoptic sampling, July 1999: North Fork Shenandoah River, Virginia.

LoCastro, Richard P. 1984. The Influence of Geology and Agriculture on Groundwater Quality in Clarke County and Frederick Counties, Virginia. M.S. Thesis Department of Environmental Quality, University of Virginia. 180 pp.

Lord Fairfax Planning District Commission. 1987. Clarke County Groundwater Resources Plan. LFPDC, Front Royal, VA. 112 pp.

Nelms, D.L., and Moberg, R.M., Jr., 2010, Hydrogeology and groundwater availability in Clarke County, Virginia: U.S. Geological Survey Scientific Investigations Report 2010–5112, 119 p.

Ross, B.B, J.E. Woodward, T.A. Dillaha, L.D. Kauf, N.R. Thompson, C.C. Childs, and S.K. Worley. 1992. Evaluation of Household Water Quality in Clarke County, Virginia. Department of Agricultural Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA. 49 p.

Schnabel Engineering Associates. 1983., Stephen Werner and Ray Martin associates, Hydrogeologic and Engineering Study, Prospect Hill Spring, Clarke County, Virginia. Unpublished. 40 pp.

U.S. Environmental Protection Agency. 1987. SSA32, Prospect Hill Aquifer, Clark County SSA Federal Register ID 2 FR 21733 (1987).

U.S. Environmental Protection Agency. 1989. Wellhead Protection Programs: Tools for Local Government. 1989.

Virginia Department of Conservation and Recreation. 2018. Soil and Water, Resource Management Plan Program. Website <http://www.dcr.virginia.gov/soil-and-water/rmp>

Virginia Department of Conservation and Recreation. 2018. Website Soil and Water » BMP cost-share program. Website <http://www.dcr.virginia.gov/soil-and-water/costshare>

Virginia Department of Conservation and Recreation. 2018. Website Virginia Agricultural BMP and CREP Database Query Form. Website http://dswcapps.dcr.virginia.gov/htdocs/progs/BMP_query.aspx

2018 WATER RESOURCES PLAN

Virginia Department of Environmental Quality, Programs, Water, Wastewater Assistance & Training Nutrient Removal Website:

<http://deq.state.va.us/Programs/Water/WastewaterAssistanceTraining/NutrientRemoval.aspx>

Virginia Department of Environmental Quality, Programs, Water, Stormwater management. Website:

<http://www.deq.virginia.gov/Programs/Water/StormwaterManagement.aspx>

Virginia Department of Environmental Quality. 2015. Programs, Water Supply, Water Quantity, Water Supply Planning. Website:

<http://www.deq.virginia.gov/Programs/Water/WaterSupplyWaterQuantity/WaterSupplyPlanning/StateWaterResourcesPlan.aspx>

Virginia Department of Environmental Quality. 2016. Impaired water fact sheets. Website:

<http://www.deq.virginia.gov/fs2016/Choose.aspx>

Virginia Department of Health, Drinking Water, Source Water Programs, Source Water Protection Assistance & Funding Opportunities. Website <http://www.vdh.virginia.gov/drinking-water/source-water-programs/source-water-protection-assistance-funding-opportunities/>

Virginia Groundwater Protection Steering Committee. 1991. Wellhead Protection: A Handbook for Local Governments in Virginia. Dept. of Urban & Env. Planning. U. of Virginia. 54 pp.

Webb, W., R. Marzolf, K. Andersen, B. Sawyer, A. Teetor. 2014. Qualities of spring-waters of Clarke County where biosolid materials were applied as fertilizer to karst landscapes. Report No. 0001-2014 2nd Edition. Friends of the Shenandoah River. 92 pp.

Weldon Cooper Center. 2017. Cooper Center Estimates – Data and Methodology. Website:

<http://demographics.coopercenter.org/virginia-population-estimates/>

Wright, W. G. 1990. Ground-water hydrology and quality in the valley and ridge physiographic provinces of Clarke County, Virginia. U. S. Geological Survey, Water Resources Investigations Report 90-4134. 61 pp.

Zappia H. And D.C. Hayes. 1998. A Demonstration of the Instream Flow Incremental Methodology, Shenandoah River, VA. Draft U.S. Geologic Survey Water Investigations Report. Richmond, VA. 82 pp.

2018 WATER RESOURCES PLAN

(this page is intentionally blank)

APPENDICES

APPENDIX I

Status of Implementation 1999 Water Resources Plan

APPENDIX II

Programs and Grant Projects

APPENDIX III

Guidance from Comprehensive Plan

2018 WATER RESOURCES PLAN

(this page is left intentionally blank)

2018 WATER RESOURCES PLAN

Appendix I – Status of Implementation 1999 Water Resources Plan

Policy	Description	Objective	Implementation Status	Comments	Impediments
Policy 1. Review and Update of County Ordinances related to groundwater protection	A. Septic Ordinance:				
	i. Phase out of non-standard waste disposal systems such as pit privies	eliminate significant threat to public health and groundwater quality	partially implemented	ongoing effort with HD	Problems in implementation are lack of funding sources for replacement of non-standard systems.
	ii. Implement regular maintenance, cleaning, and reporting of septic systems	Septic systems fail if they are not properly maintained by pumping approximately every five years.	not implemented		Need to develop administrative component
	iii. Identify acceptable alternatives to septic systems, when failed or inadequate systems are identified.	In 2010, the Virginia General Assembly passed regulations stating that a locality shall not prohibit the use of alternative onsite sewage systems	fully implemented	Installation and use of alternative systems should be accompanied by a maintenance schedule that is regulated by the Clarke County Sanitation Authority.	
	B. Sinkhole Ordinance: Amend the ordinance to require vegetative buffering of all Class 1 sinkholes which are subject to contamination.	sinkholes are direct pathways for surface contaminants to enter the groundwater	partially implemented	No specific action has been taken to send educational material, however setbacks to the discernable edge of sinkholes has been added to the Zoning Ordinance for structures and wells.	as with stream fencing there has not been the political will to require buffering
	C. Underground Storage Tank Ordinance: Create a database of the locations of all UST's in the County, and develop a County ordinance that will serve to regulate UST with less than 1,000 capacity that are used for petroleum or chemical storage.	The potential for groundwater contamination of leaking tanks exists for all UST.	not implemented	Underground Storage Tanks (UST) with greater than 1,000 gallon's capacity for petroleum products are regulated by DEQ.	No database has been developed for tanks < 1000
	D. Stormwater Resources Ordinance: Revise the ordinance to better address both runoff quantity and quality so as to protect surface and groundwater from contamination.	Stormwater Resources addresses the runoff from new development. In 2010 a Stormwater Ordinance was passed by the Board of Supervisors to require increased standards for water quality discharge.	void	Due to changes in State law in 2016, DEQ administers stormwater management for Clarke County.	
	E. Natural Resources Overlay District: Consider enlarging to incorporate all available data that delineates the groundwater recharge area for the spring	Enlarge the overlay district to match the boundaries of the EPA designated Sole Source Aquifer to add additional protection to Prospect Hill Spring	not implemented	Attempts to expand area were thwarted by residents stating not enough data exists to justify expansion of the Overlay District.	

2018 WATER RESOURCES PLAN

Appendix I (cont.)

Policy	Description	Objective	Implementation Status	Comments	Impediments
<i>Policy 2. Public awareness and education: Designate the Clarke County Natural Resource Planner as the County official responsible for Public education concerning protection and conservation of groundwater resources.</i>		Public education is an essential component of any attempt to protect and conserve groundwater resources.	partially implemented	ongoing	
<i>Policy 3. Non-point pollution: Cooperate with and encourage use of the programs administered by the Agricultural Extension Office and other agencies involved in developing Best Resources Practices (BMPs).</i>		Non-point pollution is the single largest contributor to groundwater pollution in Clarke County.	partially implemented	ongoing	
<i>Policy 4. Well Testing: Establish a County-wide well monitoring network to effectively monitor changes in water quality over time. This would include routine testing of specific wells for coliform and water chemistry.</i>		Well monitoring is a fundamental way to track groundwater quality.	partially implemented	Establishing a long term groundwater quality monitoring network is still needed.	
Policy 5. Groundwater database development	A. Develop a database of all existing well and septic permits on file in cooperation with the Health Department. Homes with systems not on file should be surveyed to determine the type and location of water source and sewage disposal.	Identifying the types and locations of well and septic systems is important for documenting groundwater contamination. Septic systems are a known contamination source.	partially implemented	The County Planning Department compiled permit data from the 70's thru 2001, approximately 3,675 records, but this database does not have GPS location information. GPS data was collected from 2011 to 2015 but changes in Health Department personnel have caused this data collection to be discontinued.	Staffing shortages have delayed full implementation
	B. Compile existing data from all previously conducted groundwater studies	Analyzing this data in total can provide the County with valuable insight into trends relating to groundwater contamination.	partially implemented	ongoing	
	C. Use the GIS to identify and map areas sensitive to groundwater contamination. Utilize this information to prioritize areas in need of increased protection measures.	The GIS is a tool that can best serve County officials by identifying and mapping areas sensitive to groundwater contamination.	partially implemented	Due to lapses in GPS data collection and the lack of a long term groundwater quality monitoring network, mapping trends in groundwater contamination is not possible at this time.	
Policy 6. Establish a Stream Protection Overlay District and adopt regulations to protect those designated areas.		The intent of this district is to provide stream buffers for the purposes of filtering nonpoint source pollution from runoff, preventing erosion, moderating stream temperature, and providing for the ecological integrity of stream corridors and networks.	fully implemented	The Stream Overlay Protection District was adopted in 1999, Zoning Ordinance Section 3-E-5.	

2018 WATER RESOURCES PLAN

Appendix I (cont.)

Policy	Description	Objective	Implementation Status	Comments	Impediments
<i>Policy 7. Amend the Zoning Ordinance to require 100' building setbacks from perennial streams and 50' building setbacks from intermittent streams, as identified on the 7.5' USGS topographical maps, in the Agricultural-Open Space (AOC) District.</i>		Preserving stream and river riparian corridor zones is essential for protecting water quality. Building setbacks from streams have been in place in the FOC zoning district since 1994. Requiring these same setbacks in AOC will serve to protect stream corridors in the Valley portion of the County.	fully implemented	Adopted in 2003, Zoning Ordinance Section 3-A-1-c. All other zoning districts have setback requirements as well.	
<i>Policy 8. Establish a Countywide surface water monitoring network to effectively monitor changes in water quality overtime. This would include routine testing of and reporting for all perennial streams for coliform and water chemistry.</i>		Several streams in the County are currently monitored but most are not. Identifying which streams are contaminated is necessary in order to allocate limited resources effectively.	partially implemented	DEQ currently has 7 active monitoring sites in Clarke County in addition the Friends of the Shenandoah River (FOSR) have been conducting bimonthly monitoring on 14 sites since 1997. The County provides annual funding to FOSR to support their sampling efforts.	Determine if monitored streams are adequately representing water quality in all streams
<i>Policy 9. Encourage upgrading of sewage treatment plants to reduce nutrients discharging into surface waters.</i>		wastewater treatment plants contribute a significant amount of nutrients to State waters	fully implemented	The Chesapeake Bay TMDL was established in 2010 requiring waste water treatment plant upgrades. The Berryville, Boyce and Opequon Waste Water Treatment facilities have all completed the required upgrades.	Regulatory
<i>Policy 10. Encourage installation of Best Management Practices (BMPs) to reduce access of livestock to riparian buffer zones.</i>		installation of BMP's protects riparian buffers	partially implemented	Extensive cooperative projects funded through grants in the Spout Run watershed have been completed in an effort to have the waterway removed from the EPA impaired waters list	Voluntary
<i>Policy 11. Identify locations of individual onsite sewage disposal systems discharging into State waterways and replace with conventional septic systems where possible.</i>		Straight pipes are not permitted, but some may exist that were installed before the adoption of the Septic Ordinance. Identifying the type and location of all sewage disposal systems in the County is a priority outlined in the Groundwater Resources Plan. These systems can be upgraded to eliminate sources of contamination.	partially implemented	Ongoing The County continues to work with the Health Department to identify and eliminate these substandard systems.	
<i>Policy 12. Consider adopting a Shenandoah River Recreation Plan.</i>		Efforts are underway to develop a recreational use plan for the Shenandoah River. These could include sections relating to the scenic river designation, protection of aesthetic values, and establishment of vegetated riparian buffers.	fully implemented	In 2006, a plan entitled "Shenandoah Valley River Use - Floating and Fishing: An Action Plan for Recreational Access to and Stewardship of Water Resources" was developed through the Regional Commission. In 2015 an implementing component of the Comprehensive Plan Recreation Plan, was adopted that details protection efforts for the River.	

2018 WATER RESOURCES PLAN

Appendix I (cont.)

Policy	Description	Objective	Implementation Status	Comments	Impediments
<i>Policy 13. Increase funding to multijurisdictional Minimum Instream Flow study in order that the data necessary to declare a Surface Water Management Area is available as soon as possible.</i>		As currently funded, a complete MIF study will take 10 years. Requests for increased funding are necessary in order to complete this work in a timelier manner. This information is essential to designating the Shenandoah River a SWMA, for which Clarke County petitioned the State in 1990.	fully implemented	Minimum Instream Flow studies have been completed for the North Fork, South Fork, and Main Stem of the Shenandoah River.	
<i>Policy 14. Conduct a comprehensive study in cooperation with the USGS to fully characterize tributary stream flow patterns, discharge rates, and floodplains.</i>		Determining surface water flow patterns and discharge rates provides invaluable data as to the amount of water available for instream and offstream uses. Healthy stream habitats depend on adequate flow to assimilate pollutants from sources impacting surface waters. Baseline data can be incorporated into determining TMDL rankings for all County tributaries, not just those selected by the State. Once ranked, resources can be allocated to those streams with the highest potential for degradation.	fully implemented	A USGS study entitled Nelms, D.L., and Moberg, R.M., Jr., 2010, Hydrogeology and groundwater availability in Clarke County, Virginia: U.S. Geological Survey Scientific Investigations Report 2010–5112, 119 p. was completed in 2010.	
<i>Policy 15. Update the 1988 Water Supply Plan to insure adequate water resources are available for Clarke County residents.</i>		The 1988 Water Supply Plan outlined water supply needs and projected shortfalls through 2030. To date, no update has been completed or is planned. Periodic update of the section pertaining to Clarke County may be needed to prevent water deficits in the future.	fully implemented	The most recent Plan was completed in 2015 with updates proposed every five years. The County participates in these efforts through the Regional Commission.	
<i>Policy 16. Conduct additional dye tracing studies to increase understanding of the interrelationship between ground and surface waters in the County.</i>		The groundwater/surface water interrelationship is a complicated matter, requiring more technical information than is currently available.	fully implemented	Dye tracing studies were conducted in 1987, 1992, and 1998. The tests indicated that groundwater in this area can move two miles or more from recharge points, in as little as five months. No additional tracer studies have been conducted or are planned at this time. The 2010 USGS study did study ground and surface water flows and has provided detailed information on the contribution of groundwater to the base flow of surface waters.	

2018 WATER RESOURCES PLAN

Appendix II – Programs and Grant Projects

CLARKE COUNTY - WATER RESOURCES PLAN					
PROGRAMS and GRANT PROJECTS - PAST AND CURRENT					
NAME	PROGRAM/GRANT ENTITY	DATE	Grant Amount	OBJECTIVE	COMMENTS
Prospect Hill Spring - Public Water Supply Permit	State Health Department	1977		Supply Boyce, Millwood, White Post and the Waterloo commercial district	
Prospect Hill - Honkala Report - Schnabel Report	Clarke County	1980 & 1983		Determine land use policies to protect the water quality of Prospect Hill	Resulted in the 400 acre Natural Resource Overlay District (RC) being established in 1983
Page Brook 4,900 acre drainage basin declared a sole-source aquifer (includes Prospect Hill)	EPA	1987		Protection of the Prospect Hill Spring from contamination creating a public health hazard	No Federal assistance allowed for any project that might contaminate that aquifer.
Groundwater Protection Plan	PDC	1987			
USGS Study - Wright	USGS	1990	\$60,000	Characterize the ground water flow systems using hydrologic and water chemistry data and map the potentiometric surface; establish a monitoring network of wells and springs; assess the overall groundwater quality of the County.	
Prospect Hill Spring found with high bacterial levels	State Health Department	1994		County required to provide disinfection and filtration of the water	Cattle grazing around a sinkhole 500' above the spring were contributing to the contamination.
Millwood	Virginia Dept. of Health	1994		Sewage disposal systems (septic tanks) were found deficient, and constituted a public health hazard	Studies determine that up to 24% of the fecal bacteria found in the water was human in origin.
Statewide NonPoint Source Pollution / Impaired Waters Listing / Natural Heritage Priority Ranking		1996		Spout Run Watershed. Verification of Impaired Waters and TMDL Status	Source of impairment listed as NPS-Agriculture
Page Brook Watershed Restoration Project	EPA Section 319	1996	\$75,000	Page Brook watershed. Study BMP installation possibilities.	2.5 miles of fencing were installed on four farms in the watershed. Water samples analysed monthly.
County condemnation of 7 acres around contaminated sinkhole close to Prospect Hill	Clarke County	1997	\$60,000	Area fenced off and planted with vegetated buffers to decrease contamination	Substantial decrease in coliform bacteria present in Prospect Hill Spring
Roseville Run (tributary of Spout Run)	EPA	1998	\$65,250	Installation of BMPs to protect the run.	

2018 WATER RESOURCES PLAN

Appendix 2 (cont.)

NAME	PROGRAM/GRANT ENTITY	DATE	Grant Amount	OBJECTIVE	COMMENTS
Spout Run Main Stem	WQIF	1998	\$45,150	BMP installation and verification of impact of sewage treatment plants and failing septic systems on water quality	
Wellhead Protection Program	VDH Office of Drinking Water	1999		Assess quality of drinking water sources	By 2003, all existing drinking water sources were assessed.
Millwood Sewer Construction Project	Clarke County	2002 - 2004	\$1,101,850	Eliminate high levels of human fecal bacteria contaminating the Spout Run watershed	Public water and sewer lines were extended from Boyce to Millwood, replacing failing septic systems. 40 homes hooked to public
Wellhead Protection Plan Grant	VDH-ODW / DEQ	2006		Local wellhead protection implementation projects to prevent contamination and maintain good quality drinking water supplies.	Mostly implemented with the Spring Overlay District Ordinance. A few other public wells in small communities still in need.
Drought Response Plan	Clarke County	2008		Guides drought monitoring, evaluation and response in the County	
2010 Hydrology Report	USGS	2002-2008	\$1,005,500	Enhance the County's understanding of the quantity and sustainability of our ground-water resources	
Spout Run TMDL	DEQ	2010		When state waters are assessed to be impaired, Total Maximum Daily Loads (TMDLs) are developed by DEQ to determine the total amount of a pollutant that a waterbody can handle without resulting in the impaired status of that waterbody.	
Spout Run Implementation Plan	DCR	2012		The goal of TMDL implementation is to restore water quality in impaired watersheds. To gage progress toward this goal, DEQ tracks Best Management Practice (BMP) installations and continues to monitor water quality in the impaired watersheds.	
Spout Run Implementation Grant	DEQ	2012-2014	\$292,666 with \$216,718 match	Significant number of streambanks were fenced, and streambank restoration was completed, reducing erosion.	Major participation and fund matching by various private groups. Disappointing participation with many landowners uninterested in participating. \$85,250 returned due to lack of landowner participation.
National Fish & Wildlife Foundation Grant	NFWF	2013-2015	\$141,600 with \$87,822 match.		
Minimum Instream Flow Studies					
Main Stem Shenandoah River	Virginia Environmental Endowment, DEQ, USGS, and local government	1995-1998	\$280,000	Provide the counties and communities in the Shenandoah Basin a better knowledge of: 1) the water resources in the basin; 2) the regional hydraulic system; 3) the effect of withdrawals and conservation measures on the ecology, agriculture, industry, and water supply.	
North Fork Shenandoah River		1998-2004	\$400,000		
South Fork Shenandoah River		2004-2011	\$700,000		
Main Stem Shenandoah River (model update)		2011-2013	\$54,000		
Drought Response Plan	DEQ	2003		Guides drought monitoring, evaluation and response in the Commonwealth of Virginia	

2018 WATER RESOURCES PLAN

Appendix III – Guidance from Comprehensive Plan

Guidance from the 2013 Comprehensive Plan and Related Component Plans

This section is a compilation of language and recommendations from the Comprehensive Plan and related component plans that support the revised Goals, Objectives, and Strategies of the Water Resources Plan. This section organizes the relevant language and recommendations into four categories: General Guidance from the Comprehensive Plan, Protect and Enhance water quality, Protect and Maintain Water Availability, and Engage and educate individuals, communities and governments in watershed stewardship. The latter three categories correspond to the three recommended Goals that are discussed in Chapter I.

While this is not intended to be a complete listing of all plan references pertinent to the Water Resources Plan, it is a compilation of references that bear direct relationship to the Plan's revised Goals, Objectives, and Strategies in the most concise manner. Quoted text is noted in italics.

General Guidelines from the Comprehensive Plan

- COMPREHENSIVE PLAN, Summary Statement of Purpose (p. ii):
The County shall strive to support concepts, programs, projects, and regulations that ensure environmental sustainability. Clarke County's fundamental goal is to protect our natural resources so that we may pass them on to future generations. We seek to accomplish this through efforts that manage surface water and groundwater, protect and restore stream and river corridors, and preserve the integrity of our natural environment.
- COMPREHENSIVE PLAN, Chapter III Water Resources Plan (pp. III-12-15)
The Water Resources Plan is comprised of two sections, one addressing groundwater resources and the other addressing surface water resources. The Board of Supervisors adopted the groundwater section on October 20, 1998, and the surface water section on December 21, 1999. The following is an overview of these two sections.

2018 WATER RESOURCES PLAN

1. Summary

A. Groundwater Resources

The groundwater resources section of the Water Resources Plan covers issues relating to groundwater, including groundwater contamination from non-point sources, protection of the Prospect Hill Spring water supply, and enhanced public education of the sensitive nature of limestone geology. This section is designed to accomplish Comprehensive Plan's Natural Resources Objective that states: "Protect natural resources, including soil, water, air, scenery, night sky, wildlife resources, and fragile ecosystems."

The groundwater resources of Clarke County are particularly susceptible to contamination resulting from human activities because of the sensitive nature of the aquifers found in carbonate rocks underling the Valley region of the County. Groundwater protection and resource problems are generally greater in areas that are underlain by carbonate rocks, such as limestone and dolostone, than in areas underlain by most other rock types, because of the presence of solution-enlarged sinkholes, conduits, and caves. These geologic features characterize what is called karst terrane. The generally high permeability of these rocks facilitates the infiltration and transport of contaminants from the land surface to the groundwater reservoir.

Three-fourths of the people in Clarke County depend on groundwater as the source of their drinking water. Protecting groundwater from pollution, therefore, has been of primary importance in the County for many years. The urgency and economic necessity for doing so was highlighted in 1981, when the Town of Berryville had to abandon the wells that provided its public water supply. The wells had been contaminated by a combination of nitrates, phenols, and herbicides, none of which could be traced to a single point source. Because new wells might later become contaminated, the Town decided to draw its water from the Shenandoah River and to construct a \$1.3 million plant to treat the river water.

Pollution of private wells was recognized as a problem in the 1960s. Pollution sources included improperly installed and maintained septic systems, underground storage tanks, and materials placed on the soil surface, including pesticides, herbicides, and human and

2018 WATER RESOURCES PLAN

animal wastes. Improper well installation was also a factor in these incidences of groundwater contamination.

The need for potable water in the Boyce-Millwood area led to the creation of the Clarke County Sanitary Authority in 1968. By the mid-1970s, the Authority began supplying water to more than 200 residences and businesses from the high-yielding Prospect Hill Spring. The recharge area of the Spring is now protected by a natural resource conservation overlay district, in which no development may occur that would adversely affect the quantity or quality of the Spring water. In addition, the County has applied for federal designation of the Prospect Hill Spring as a sole-source aquifer.

To minimize the effects of future growth and development, the Planning Commission established a Water Study Committee in 1985. This Committee directs plans and studies aimed at protecting the water resources of the County. Accomplishments of this Committee include the creation of the Clarke County Groundwater Protection Plan (1987), which, in addition to describing the sensitivity of Clarke groundwater, proposed a) an ordinance that limits land use around sinkholes, b) septic system installation guidelines, and c) water-well construction regulations. The Groundwater Protection Plan is a precursor to the groundwater resources section of the Water Resources Plan. The Committee also contracted with the U.S. Geological Survey (USGS) to conduct an in-depth study on the hydrology and quality of groundwater to assist in land use and planning decisions made in the County. This study produced the Water Resources Investigation Report 90-4134 entitled "Ground-Water Hydrology and Quality in the Valley & Ridge and Blue Ridge Physiographic Provinces of Clarke County, Virginia" (Wright, 1990).

B. Surface Water Resources

Surface waters include secondary streams or tributaries, such as the Shenandoah River, the Opequon Creek, and Spout Run (a state-designated trout stream). The surface water resources section of the Water Resources Plan addresses related issues including surface water contamination from point and non-point sources, off-stream water use, such as domestic supply and irrigation, and recreational uses. Point-source pollution comes from

2018 WATER RESOURCES PLAN

specific, identifiable sources. Non-point source pollution is caused by diffuse sources such as erosion, runoff, precipitation, percolation, and direct deposition from livestock and wildlife.

The 2000 Bay agreement establishes a cap on the total amount of nitrogen and phosphorus that may be discharged from wastewater treatment facilities in Virginia. The cap is set at the level of those pollutants that the Bay can tolerate in order to correct its degradation. Most larger wastewater treatment facilities must upgrade their treatment facilities to achieve much lower discharges of such pollutants under individual caps placed on those facilities by the Commonwealth. In any expansion of smaller facilities (Boyce, for example) substantial reductions in the discharge of nitrogen and phosphorus are required.

Under the coordination of the Department of Conservation and Recreation there is substantial new focus on old programs and the initiation of new programs to achieve the overall non-point source reductions goals which are being carried out by the County and the Lord Fairfax Soil and Water Conservation District. These efforts are focused in the County on (1) Acceleration of Agricultural Best Management Practices; (2) Expansion of Nutrient Management Planning and Implementation Efforts; (3) Consolidation and Strengthening of the Local Stormwater Management Program; (4) Enhancing Implementation of the Local Erosion and Sediment Control Program; (5) Enhancing Outreach, Media and Education Efforts to Reduce Pollution Producing Behaviors. Nitrogen, phosphorus and sediment non-point source reduction goals have also been set for the entire Shenandoah River watershed and tributaries including Spout Run.

The Federal Total Maximum Daily Load (TMDL) Program is currently being carried out by the Lord Fairfax Soil and Water Conservation District in the Abrams/Opequon watershed where an Implementation Plan has been developed to correct the fecal and sediment impairments in the watershed. Further TMDL Program-related efforts are anticipated shortly in the Wheat Spring Branch, Dog Run and other watersheds in the County. It has not been possible to develop a plan to correct the PCB impairment of the main stem of the Shenandoah River in the County where PCBs are concentrated in river sediments. The River continues under a Health Department Advisory against consuming fish caught in the River

2018 WATER RESOURCES PLAN

because of PCBs. The TMDL-related fecal impairment of Spout Run has been dealt with, at least in part, by the installation of sewer lines in Millwood.

Major fish kills have taken place in the Shenandoah River watershed in 2004-2006 with a dramatic reduction evident in the numbers of small-mouth bass and red-breasted sunfish. The State has established a fish-kill task force and a major effort is underway to determine the cause and find a solution to this serious environmental problem.

2. Priorities for the Next Few Years

A complete review and update of the Water Resources Plan should begin shortly after the adoption of the revised Comprehensive Plan. The update should focus on adding information and policies for the following items:

1. Impact of recent changes to the State's water quality regulations and stormwater management requirements.
2. Maintaining and expanding the County's water quality and quantity programs and infrastructure.
3. Additions or changes to policies that may be impacted through the update of or development of new implementing component plans.

Protect and Enhance water quality

- COMPREHENSIVE PLAN, Objective 3 – Natural Resources (pp. II-6-8)
 - Policy 6. Apply best management practices to protect local and regional water resources and environmentally sensitive areas such as the Shenandoah River, Opequon Creek, perennial streams, floodplains, wetlands, steep slopes, slippage soils, and highly erodible soils. Establish specific water quality performance guidelines to include Chesapeake Bay Resource Protection and Resource Management Areas when considering land use and development related activities.
 - Policy 11. Encourage and expand support for the Conservation Easement Purchase Program, both philosophically and financially, to protect natural resources

2018 WATER RESOURCES PLAN

important to preserving soils, watersheds, water quality, scenery, natural habitats, and air quality.

- Policy 15. Take all appropriate steps to protect public water sources, such as the Shenandoah River serving the Town of Berryville, and the Prospect Hill Spring serving the Town of Boyce and the communities of Millwood, Waterloo, and White Post.
- Policy 16. Support Shenandoah Basin regional water planning efforts including creation of surface water management areas, and programs to study and address low flow issues. Oppose efforts to establish new interbasin transfers within the Shenandoah River watershed.
- Policy 17. Utilize USGS Groundwater Study findings when evaluating proposed changes in land use and continue to support ongoing water resource monitoring efforts.
- Policy 18. Establish and maintain a long term water quality monitoring network and real-time water quantity monitoring network, in cooperation with the USGS, to track changes and better assess impacts to our water resources.
- Policy 19. Revise and implement the adopted County ordinance requiring pump out of septic systems per State requirements.
- Policy 20. Recognize that karst terrane underlies the majority of the Shenandoah Valley, making groundwater in these areas is highly susceptible to contamination. Steps should be taken to protect groundwater and prevent contamination whenever possible.
- Policy 21. Strengthen and develop site design features that protect the environment by minimizing new stormwater runoff and that provide the most effective measure of protection for onsite disposal of sewage. Factor in cost-effectiveness and ongoing maintenance requirements for current and future property owners.
- Policy 22. Adopt the most stringent regulations for alternative onsite sewage treatment systems permitted by State law to protect the County's vulnerable surface and groundwater resources. Implement an onsite treatment system monitoring program including enforcement of mandatory pump-out requirements for septic

2018 WATER RESOURCES PLAN

systems. For new development and re-development projects that require a land use change, ensure use of the onsite sewage treatment method that provides the maximum protection to surface/groundwater resources and Karst terrane.

- COMPREHENSIVE PLAN, Objective 1 – Agriculture (pp. II-2-4)

Policy 5. Encourage the use of best management practices as outlined in the Chesapeake Bay Regulations and as determined by the Federal Total Maximum Daily Load (TMDL) program to improve water quality by the following methods.

- a. Making technical assistance available.
- b. Promoting public awareness on the benefits of, and necessity for, best management practices, erosion and sedimentation controls, storm water management and Chesapeake Bay Preservation Regulations.
- c. Assisting in the establishment of conservation plans for all farms adjacent to perennial streams.
- d. Encouraging the participation of all landowners engaged in agricultural activities to use the assistance of the Virginia Cooperative Extension Service, the Natural Resource Conservation Service, the Lord Fairfax Soil and Water Conservation District, and other public agencies.

- COMPREHENSIVE PLAN, Objective 2 – Mountain Resources (pp. II-4-5)

Policy 1. Promote multiple uses of forested land that are non-intensive and compatible, such as outdoor recreation, wildlife habitats, watershed protection, and forest management.

Policy 2. Ensure that timber harvesting is conducted in accordance with Virginia Department of Forestry and Chesapeake Bay protection standards and an approved forest management plan for each site so that sedimentation of streams and other environmental impacts are minimized.

2018 WATER RESOURCES PLAN

Policy 3. Encourage the use of best management practices as outlined in the Chesapeake Bay Regulations and as determined by the Federal Total Maximum Daily Load (TMDL) program to improve water quality through the following methods.

- a) Making technical assistance available.
- b) Promoting public awareness on the benefits of, and necessity for, best management practices, erosion and sedimentation controls, stormwater management and Chesapeake Bay Preservation Regulations.
- c) Assisting in the establishment of conservation plans for all farms adjacent to perennial streams.
- d) Encouraging the participation of all landowners engaged in forestal activities to use the assistance of the Virginia Department of Forestry, the Natural Resources Conservation Service, the Lord Fairfax Soil and Water Conservation District, and other public agencies.
- e) Supporting these and other innovative efforts to ensure continued water quality improvements in the future.

- COMPREHENSIVE PLAN, Objective 5 – Conservation Easements (pp. II-10-11)

Policy 3. Encourage and support the goals of the Conservation Easement Program to protect and preserve:

- b. Forested areas for their value as natural habitat and recreation, ability to enhance air and water quality, prevent soil erosion, and as a source of renewable wood products.
- d. All water resources with particular emphasis on land adjacent to the Shenandoah River and other perennial streams and the limestone ridge/groundwater recharge area to protect water quantity and quality (Figure 5, Groundwater Recharge Area).
- f. Land with environmentally sensitive areas important to air and water quality, plant life, and wildlife.

2018 WATER RESOURCES PLAN

- COMPREHENSIVE PLAN, Objective 7 – Energy Conservation and Sustainability (pp. II-12-13).

Policy 8. Encourage use of Low Impact Development (LID) techniques that help manage stormwater in an environmentally sensitive manner.

Policy 9. Establish water quality performance standards that include retention of vegetation, minimal site disturbance, and reduction of nutrients and sediment in post-development stormwater.

Policy 10. Coordinate with the Town of Berryville, the Town of Boyce, and the Clarke County School District on joint sustainable community practices such as energy efficiency and alternative transportation.

Policy 11. Encourage the use of cisterns and other water reuse applications in new residential and commercial developments.

- COMPREHENSIVE PLAN, Objective 8 – Village Plans (Millwood, Pine Grove, White Post) (pp. II-13).

Policy 2. Enhance the identity and appearance of established villages, such as Millwood, Pine Grove, and White Post.

- COMPREHENSIVE PLAN, Objective 9 – Designated Growth Areas for Development (pp. II-13-15).

Policy 7. Encourage the use of best management practices as outlined in the Chesapeake Bay Regulations and as determined by federal TMDL program to improve water quality and minimize runoff impacts that could be caused by development of the Berryville Growth Area and at primary highway intersections.