Shenandoah County

Comprehensive Plan

Adopted June 28, 2005
Revised:
August, 2014; March 2016; July 2016

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1.0 Introduction

The purpose of this comprehensive plan, as set forth in the Code of Virginia, is to "guide and accomplish a coordinated, adjusted, and harmonious development of the territory which will, in accordance with present and probable future needs and resources best promote the health, safety, morals, order, convenience, prosperity and general welfare of the inhabitants."

Shenandoah County's first comprehensive plan was prepared in the early 1970's by the staff of the then Division of State Planning and Community Affairs for the recently formed County Planning Commission. It was adopted November 13, 1973 with little public input or comment. It covered the period 1973-1990. At the time, growth and development were new for the County. Its population had remained almost constant at approximately 20,000 for the preceding century. Development of the interstate highway system, however, opened the County to north-south interstate commerce and to retirement and second home development from Washington, DC and other metropolitan areas of Virginia and Maryland. The comprehensive planning process and implementing ordinances offered the County a way to deal with impending growth.

A second County comprehensive plan, covering the period 1991-2010, was adopted by the Board of Supervisors on December 10, 1991. Unlike the first plan, this plan had the benefit of extensive involvement by County officials, a review by an appointed citizens review committee, and a series of public meetings and hearings. Much of the Vision statement and the General Development Goals espoused in the 1991-2010 Plan remains valid to this day.

In the fall of 2002, the County sponsored a series of three public meetings distributed throughout the County for the purpose of soliciting citizen inputs for an update to the comprehensive plan, such plan to cover the period to 2025. As a direct product of those public meetings, a committee of citizens was appointed by the Board of Supervisors. The mission of the committee was to update the 1991-2010 Plan, chapter by chapter, under the guidance and direction of the Director of Planning and Code Enforcement. Meeting on a monthly basis, the committee completed a draft of the new comprehensive plan in October 2004.

At that time the committee hosted a series of six public meetings, one in each electoral district. Public response was spirited and constructive. Comments from the six public meetings were then assessed by the committee and, where appropriate, became revisions to the draft. The committee then proceeded to prepare the Implementation chapter. Following completion of the draft plan update, a joint workshop was held on April 7, 2005 between the Board of Supervisors, the Planning Commission and the committee of citizens where consensus on the Plan's goals, objectives and strategies was obtained.

The plan was formally approved by the Shenandoah County Board of Supervisors on June XX, 2005. Reviisons to the plan were approved in XXXX and XXXXX.

2.0 Shenandoah County 2025 – "The Vision"

The following Vision Statement describes in a broad sense what we as a county want to be twenty years from now. It is based on a consensus of popular aspirations and a realistic projection of current socio-economic trends. The Vision Statement provides the framework for formulating a meaningful set of goals and policies for Shenandoah County for the unforeseeable future.

In the year 2025, Shenandoah County is and will be a primarily rural community that:

- Protects its natural resources
- Directs its growth to the towns ensuring its open, agricultural character
- Provides a variety of jobs in business, light industry, tourism, and sustainable agriculture
- Maintains moderate growth of a demographically varied population
- Supports safe and efficient interstate transportation and maintains the rural character of its primary and secondary roads
- Affords its students excellent and appropriate education
- Serves its citizens with public facilities and services that enhance their quality of life
- Ensures preservation of its natural beauty and unique, historical character by strictly adhering to the goals and objectives of the Comprehensive Plan.

3.0 Major Issues and Challenges

During the series of public meetings held in October-November 2004, major Comprehensive Plan-related issues were identified that the County leadership will need to manage for many years.

1. Protecting the quality of our wells and streams.

The limestone geology of the Valley, and particularly the fractionated limestone (karst) that characterizes much of Shenandoah County, puts the quality of our groundwater at substantial risk. The fractured bedrock, sinkholes, caverns and caves of karst terrain mean that surface contamination is easily transferred to underground water supplies. Several tributary streams and portions of the North Fork are "impaired," meaning that they are sufficiently polluted that swimming in them or eating fish caught in them is unsafe. This condition results from such causes as failed septic systems, improper manure management, runoff from farms and urban areas, and even wildlife. Surface water and groundwater are interconnected throughout much of the region. Sample testing indicates that a significant percentage of septic systems are failing (21%) and that many

private wells do not meet safe standards for bacteria and nitrates (38%). The Implementation chapter contains a number of recommendations, some voluntary and some regulatory, for ensuring that the quality of the water supply is adequate for the foreseeable future.

2. Attracting quality business and industry.

The median family income in Shenandoah County of $45,000 is $3,500 below that of the Northern Shenandoah Valley Regional Planning District (of which Shenandoah County is a part) and $9,000 below that of the Commonwealth of Virginia. This relatively low figure is due largely to the predominance of manufacturing in the County. These industries require mostly semi-skilled labor and pay relatively low wages. Daily some 6000 residents of the County commute elsewhere to jobs that pay more than they could earn here. During the past decade there have been few new jobs created in the County that pay more than the average.

If the County is to break out of the current cycle of low-paying jobs, it will need to attract a different kind of business and industry – ones that require a better educated workforce, a more highly skilled workforce, a more technically oriented workforce, a more knowledge-based workforce. Such companies hire mostly college graduates, and they pay substantially higher wages and salaries. Recruiting such companies requires a collective community effort to create a business-friendly climate and a targeted effort to recruit the right kind of companies to build or relocate here.

With a more highly educated workforce, new companies will look closely at the quality of the public schools in the county. Shenandoah County schools currently spend over $1000 less per student than the state average, have a significantly higher student/teaching position ratio in grades 8-12 than the state, show lower average SAT scores than the state average, and otherwise show indications that the quality of instruction offered to high school students who aspire to four-year college degrees needs improvement. See the Implementation chapter for specific recommendations related to attracting quality business and industry to the County.

3. Promoting and protecting farming as an occupation.

Farming is the traditional economic lifeblood of the Shenandoah Valley and also the foundation of much of its culture. The County ranks 5th in the state in agriculture. However, there are many current trends that are slowly but surely eroding the agricultural orientation of the County. Since 1980 there has been a 20.7% reduction in farm employment. In just the last five years some 52 new housing subdivisions (565 lots) have been created in rural areas. The farm acreage lost during that period is the most in the Valley over the same time period. Younger generations are reluctant to continue in farming; the average age of farmers is approaching 60.

Preserving farmland and farming as an occupation is becoming a challenge of major proportions. The County has several tools at its disposal to promote

farm preservation, such as conservation easements and purchase of development rights. The former has been sparsely used; the latter has yet to be used in this County. As for promoting farming as an occupation, there is no easy solution. Maintaining agricultural programs in the schools, promoting an emphasis on agriculture in the media, promoting new markets, exploring further agricultural tax relief, and promoting the health and growth of agriculture as an industry---all of these and more will be required.

4. Balancing residential growth in rural areas of the county.

While a stated Goal of this Plan and its predecessor is to guide and direct future growth in and around the towns and other areas served by public utilities (primarily water and sewer), there is no legal mechanism to preclude development in the rural areas of the County. The challenge is to control growth so that it does not lead to endless sprawl and so that it preserves as much open space and rural ambiance as possible. To that end, and as a first step, in 2003 the County increased the minimum lot size in Agricultural districts (A-1) to 3.5 acres and to 10 acres in Conservation districts (C-1). In 2004 the County created two new rural residential zones (RR-A in Agricultural districts and RR-C in Conservation Districts). Developers wishing to convert a parcel of land to a subdivision will be required to go through the rezoning process with the County. Subdividing is thus no longer a "by right" action.

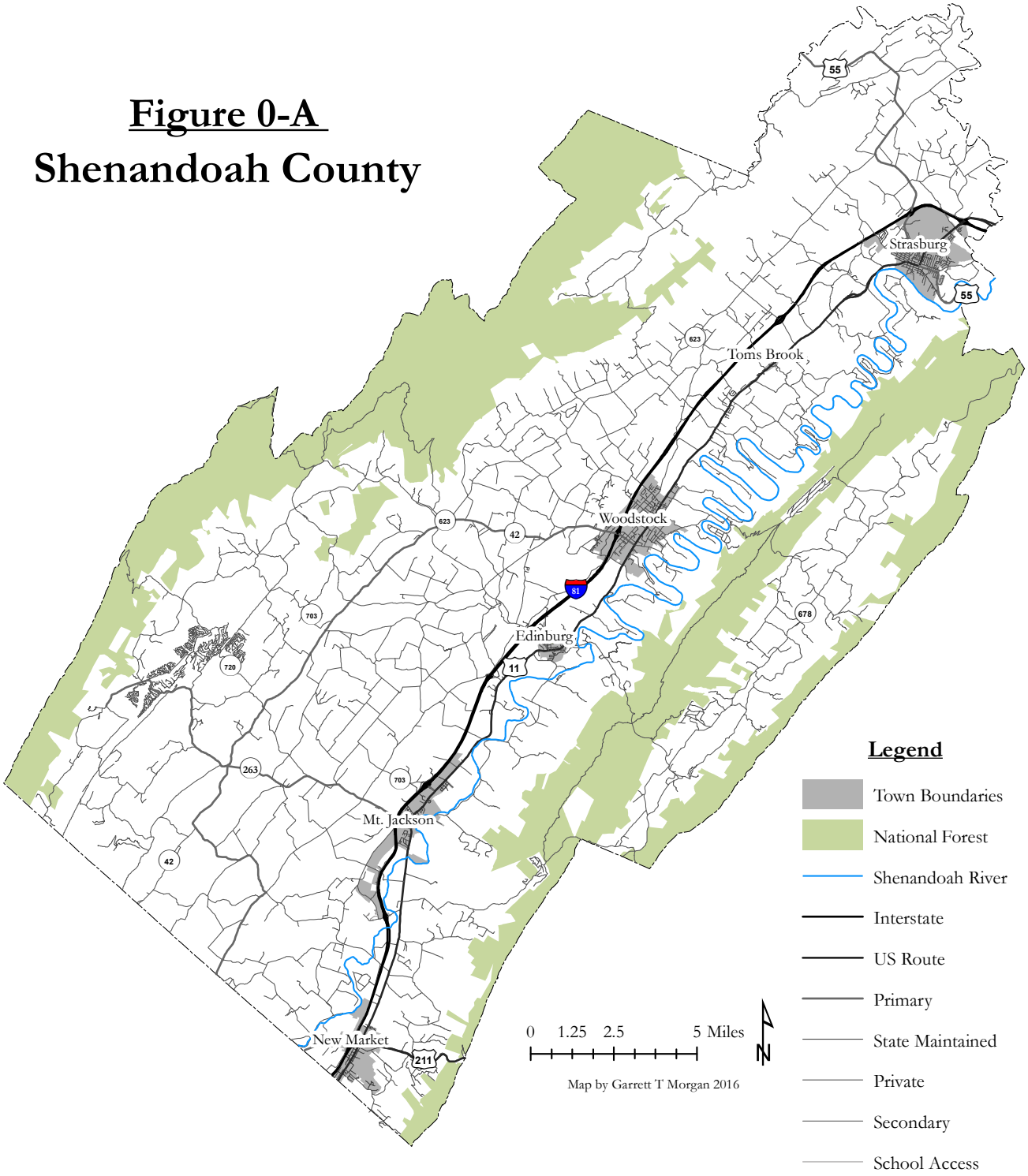
A distinctive feature of this Comprehensive Plan is the re-introduction of Open Space or Cluster Development. Under this provision, a rezoning to RR-A or RR-C would require that the homes be clustered and that a majority of the acreage of the parcel be preserved as open space in perpetuity. Minimum lot sizes would be reduced so as to preserve the same density as at present. The Implementation chapter provides further details.

5. Community facilities to meet growing needs.

Shenandoah County's population has nearly doubled since 1970 –from 20,000 then to over 37,000 in 2004. It is forecast to increase by another 12,000 by 2025. Growth since the 2000 census, however, suggests that the forecast for 2025 may be too conservative. In the 20-year period between the 1980 Census and the 2000 Census, the median age increased from 33.9 to 40.9, reflecting the large influx of older families and retirees. School-age children increased only 3% during that entire period while the overall population increased 27%. However, since the 2000 census, school enrollment has increased **by 2% per year**, so the demographics are changing.

As the population continues to grow there will be increased demands for services and facilities. Some of these demands can be met from the private sector, some from tax-supported public sources, and some through a partnership of private and public entities. In the last decade the County has added $40 million in school capital improvements, and has added a new government center, a new county library, a new landfill cell, and the North Fork Wastewater Treatment Plant. Nevertheless, outstanding facility requirements remain, including over time new

Figure 0-A
Shenandoah County



school construction, upgrading the county jail, public safety, and court facilities, creating a cultural arts center at the former Edinburg school, implementing the County's Master Indoor/Outdoor Recreation Plan, and as part of the latter, opening a county-wide wellness center. More details on these and other initiatives are covered in the Implementation chapter. As the County moves further into the 21st century, balancing the cost of increased facilities and services with tax revenue policy will be a major challenge for the County's leadership.

6. Accountability.

A comprehensive plan should be a "living" document in the sense that it needs to guide the decisions of the county leadership on a regular basis and it needs to be updated to reflect the inevitable changes that occur in the physical, economic, social and cultural fabric of our society. To that end, this Plan recommends that the Board of Supervisors establish a permanent Citizens Advisory Committee to support the Board and the Planning Commission and to function under the direction of the Director of Planning and Code Enforcement. The committee would propose updates and revisions to the Plan as they are needed and, on an annual basis, review the actions of the previous 12 months and report its findings to the Planning Commission and the Board of Supervisors.

Chapter 1:
Regional Context and History

Design and Maps updated June 2016

1.0 Introduction

This section describes Shenandoah County's regional setting and provides a brief history of the County. Included is a listing of properties included in the Historic Landmarks Survey done in the County and on file with the Department of Historic Resources in Richmond, and a map showing sites that are within areas that are likely to develop.

The Shenandoah County Comprehensive Plan -1990, adopted November 13, 1973, henceforth referred to as the "1973 Plan," covered County history in four paragraphs of the plan preface.

2.0 Regional Setting

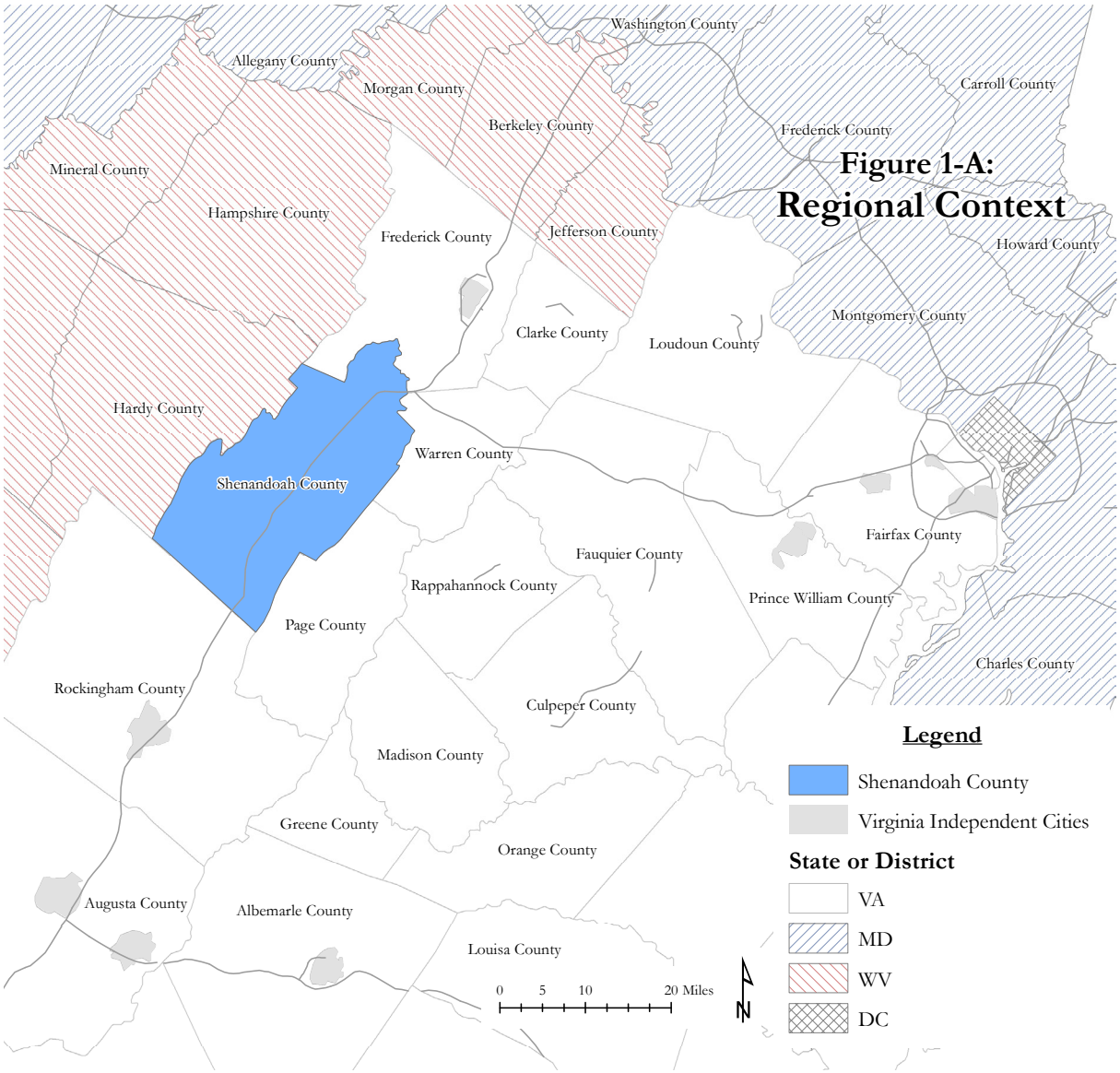
Shenandoah County is located in the scenic northern Shenandoah Valley of Virginia. The County is 34 miles long, running in a northeast-southwest direction, an average of 16 miles wide, and contains a land area of 512 square miles. It is bounded by Frederick County on the north; by Rockingham and Page counties on the south; by Page and Warren counties on the east; and by Hardy County, West Virginia on the west. Major cities lying within a 150 mile radius of the County include Washington, D.C.; Richmond, Virginia; Baltimore, Maryland; and Harrisburg and Pittsburgh, Pennsylvania. See Figure 1-A Regional Location Map on the following page.

Part of the Ridge and Valley geologic province, the County contains elevations ranging from 537 feet above mean sea level (msl) at the Shenandoah River to over 3,000 feet msl in the Great North Mountain range which forms its western boundary. This province is characterized by steep slopes and wide river valleys.

Shenandoah County is served by the parallel routes of the Old Valley Pike (U.S. Route 11) and Interstate I-81 which run its length, and the I-81 intersection with I-66 which runs east to Washington, D.C. is just a short distance north of the County line.

3.0 History

Shenandoah County was formed in 1772 from Frederick County, and was originally named Dunmore County in honor of Governor Dunmore. In 1778 the name was changed to Shenandoah after the Shenandoah River, an Indian name



meaning "Daughter of the Stars."

Many of the earliest settlers were Scotch, Irish, and German, who moved to the County from Pennsylvania. The Town of Woodstock, formed in 1752, was selected as the County Seat in 1772 upon the formation of Shenandoah County. The English colonial government encouraged the creation of a frontier buffer between the settled tidewater and French and Indian influences to the northwest.

The early settlers brought their German language, religion, culture, crafts, folk art and architecture. For the most part, they did not own or believe in the ownership of slaves. Their family farms were much smaller that the plantation system of the English settlers to the east of the mountains. Gradually these distinctions faded and blended into a new American culture. But to the discerning eye, the influence of these early Germans can still be noticed – as can their family names.

The County provided men and supplies during three periods of conflict: the French and Indian War, the Revolutionary War, and the Civil War.

The earliest economic activity in Shenandoah County by settlers, beginning about 1670, revolved around fur trapping and trading. With permanent settlement, soon after 1726, came the introduction of flax, tobacco and new varieties of grain, livestock, vegetables, and fruit. Gradually, towns developed along the Valley Turnpike (now U.S. Route 11), which was the most important transportation route in and through the Shenandoah Valley for over 200 years until Interstate 81 was completed.

As communities grew at intersections of travel routes through the County, manufacturing was soon started to meet local demand, using products of nearby farms, forests, and mines. Small industries, tanneries, lumber mills, and primitive iron smelting furnaces were established by the middle of the 18th century.

A vigorous pattern of trade soon evolved in Shenandoah County. Supplies came from and Valley produce went to such market centers and port towns as Baltimore, Georgetown, Alexandria, and Richmond. Until after the Revolutionary War, hemp was a major cash crop. Tobacco was packed in wooden barrels built in the area and then exported. Cattle were driven to Baltimore and Alexandria. Turkeys were also raised. Other surpluses from farms went to market by wagon and river barge.

Many of the local manufacturing activities, which once met only the needs of nearby settlers, expanded, supplying items for sale outside the County. Industries commercially processing farm produce and other raw materials were developed. Flour and cornmeal were ground at many stream-side mills. Hams and bacon were cured in large quantity in area smokehouses. Sawmills became more productive. Plentiful iron ore, limestone, and timber led to the establishment of iron mining, milling, and smelting operations, which continued between 1742 and 1907. The furnaces soon became a major source of pig iron for forges in Maryland and Pennsylvania. Manganese and zinc ores were also mined intermittently between 1834 and 1962. Limestone has been quarried on a large scale since 1868.

Other industries were started because of the special skills of Shenandoah County residents. The Henkel Press, in New Market, was established in 1806. During the 1800's, Strasburg was noted for its pottery made by the Town's German settlers and their descendants.

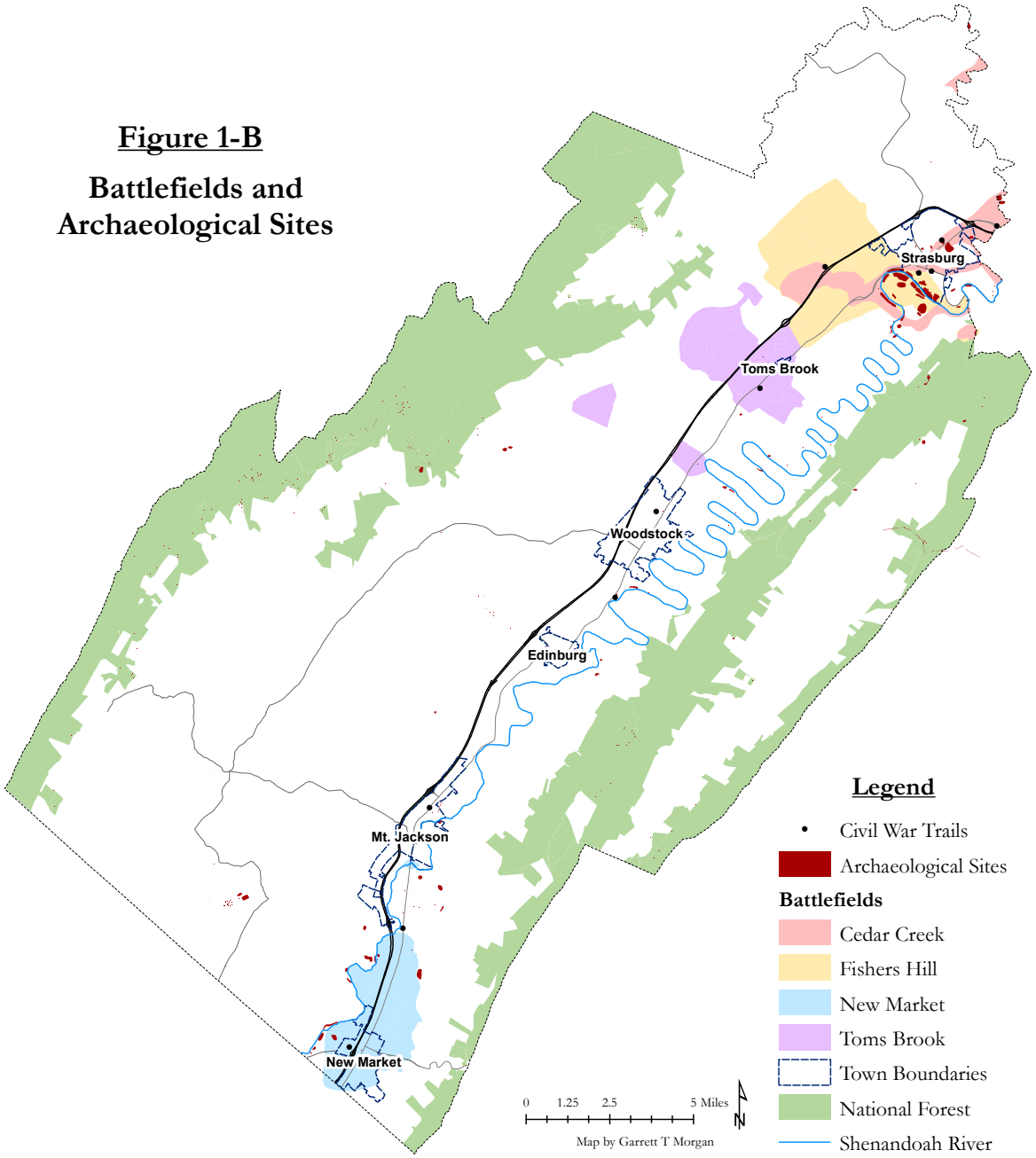
The limestone soils of the Shenandoah Valley are excellent for agriculture. The great volume of grains which were produced here caused this region to be called the "Granary of the Confederacy" during the Civil War.

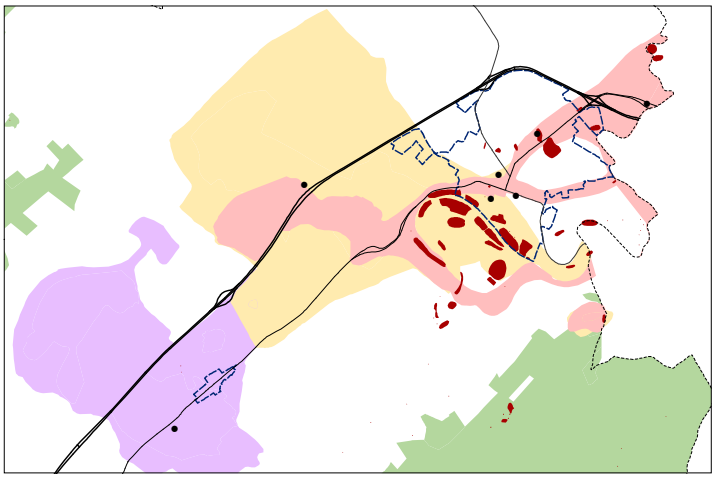
Shenandoah County was the scene of much fighting between 1861 and 1865. There were troop movements and skirmishes over most of the land area of the County, and there are four major battle sites: New Market, Toms Brook, Fishers Hill, and Cedar Creek. All of these actions took place in 1864. The Battle of New Market is one of the most famous battles of the war. It took place on May 15, 1864. In it, the cadets of Virginia Military Institute made a heroic charge against the Union forces advancing down the Valley. The Battle of Cedar Creek ended the fight for control of the Shenandoah Valley.

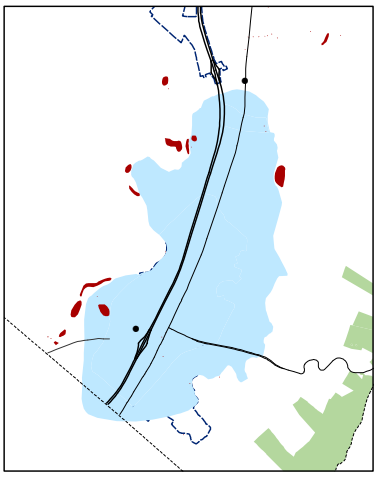
By the late 1870's, tourism was becoming an important industry in the County. Born of increased prosperity, improved transportation, and the local

Figure 1-B

Battlefields and Archaeological Sites







climate and scenic beauty, the tourism industry began slowly when wealthy persons built dwellings for seasonal homes. Summer hotels and resort spas appeared, as at Orkney Springs and Seven Fountains. Then came a number of summer visitors, seeking fresh air and outdoor recreation. Tourism began to flourish with the opening of the Shenandoah National Park and the Skyline Drive. Tourists are also attracted to the County's mineral springs and limestone caverns.

The County is noted for its many historic sites and structures, including the New Market Battlefield Park, the Henkel Press Publishing House, and the Confederate Hospital of Mount Jackson. The preservation and enhancement of these resources must be kept in mind while reviewing development proposals. To assist in that effort, the historic sites that have been inventoried in Shenandoah County are now included in the GIS system. Figure 1-C, is a listing of those sites and districts in the County that are included in the Virginia Landmarks Register and/or the National Register of Historic Places.

There have been two major surveys of historic structures, places, and potential historic districts completed in Shenandoah County. The first one was completed in 1985 and contained information on approximately 180 listings. At that time, there were only two historic districts listed on the Virginia Landmarks Register and the National Register of Historic Places, the New Market Historic District and the Strasburg Historic District.

One objective of the Comprehensive Plan that was adopted in 1991 was to have further surveys done to document additional properties, and also to obtain information on other potential historic districts, including those in the rural part of the County. Since then, two phases of an additional survey have taken place in cooperation with the County and the Virginia Department of Historic Resources (VDHR); one was completed in 1993 and the second in 1995.

The Historic Landmarks Survey Report that was published in 1993 provided documentation on 326 sites at the "reconnaissance level" and 38 sites at the "intensive level" for a total of 364 sites that were located outside of the corporate limits of the six towns and also outside the boundaries of the George Washington National Forest. Fourteen of the sites were rural communities, villages or crossroads; they include Calvary, Columbia Furnace, Conicville, Forestville, Hudson Crossroads, Lebanon Church, Moores Store, Mount Clifton, Mount Olive, Oranda, Quicksburg, Saumsville, Wheatfield and Williamsville.

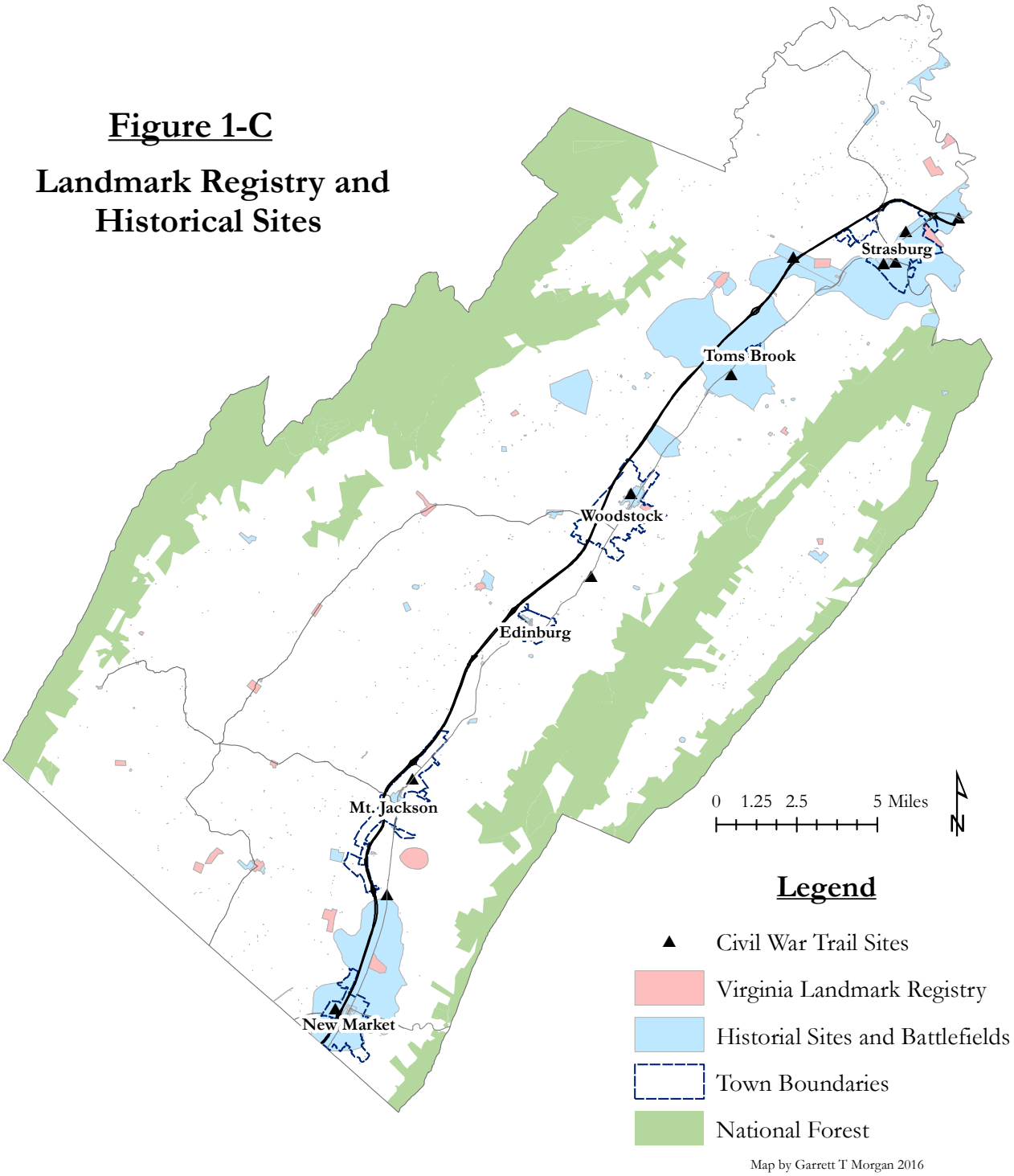
All of the information that was gathered was entered into the Integrated Preservation Software (IPS) that is utilized by the Department of Historic Resources. In addition, Preliminary Information Forms were prepared for the rural communities that can be used as a first step in the nominating process of making determinations of eligibility for the Virginia Landmarks Register and/or the National Register of Historic Places.

This report, the Shenandoah County Historic Landmarks Suvey, can be reviewed in the Archives section in the Shenandoah Room of the Shenandoah County Library, located at 514 Stoney Creek Boulevard in Edinburg.

The second phase of the Shenandoah County Historic Resources Survey was undertaken in 1994 and 1995, and was also funded jointly by the County, the Department of Historic Resources and the Shenandoah County Historical

Figure 1-C

Landmark Registry and Historical Sites



Society. The 1995 report includes documentation of 359 individual sites at the "reconnaissance level" and 32 at the "intensive level" and also included documentation on 10 communities that were evaluated for their potential as rural historic districts. Recommendations for further research and for ten properties to be considered for listing in the Virginia Landmarks

Figure 1-D:Virginia Landmarks Register National Register of Historic Places
Updated through NPS Jan 2016

Property	USGS Quad Map	VLR	NRHP	File #
Bauserman Farm	Mount Jackson	09-30-10	12-27-10	85-5172
Beydler, Abraham House	Toms Brook	06-13-01	02-07-02	85-096
Campbell Farm	Middletown	04-17-90	08-15-90	85-127
Clem-Kagey Farm	Edinburg	06-18-09	08-20-09	85-206
Edinburg Historic District	Edinburg	12-03-97	07-22-98	215-001
Edinburg Mill	Edinburg	06-19-79	09-07-79	85-110
Elizabeth Furnace	Strasburg	03-17-99		85-940
Forestville Historic District	Forestville	09-22-11	11-30-11	85-405
Fort Bowman or Harmony Hall	Middletown	11-05-68	11-25-69	85-04
Hockman, Dr. Christian, House	Edinburg	01-17-84	02-23-84	85-76
Hupp House	Strasburg	12-04-96	02-21-97	85-7
Lantz Hall, Massanutten Military Academy	Woodstock	10-21-92	12-30-92	330-05
Lantz Mill	Edinburg	09-05-07	11-01-07	85-933-1
Meems Bottom Covered Bridge	New Market	04-15-75	06-10-75	85-103
J.W.R. Moore House	Mount Jackson	9-15-05	11-16-05	265-5002
Miley Site (44SH2)	Toms Brook	04-16-74		85-101
Mount Jackson Historic District	Mount Jackson	04-21-93	06-17-93	264-04
Munch, Daniel House	Rileyville	12-05-01	03-13-02	85-363
New Market Battlefield Park	New Market	06-02-70	09-15-70	85-27
Orkney Springs Hotel	Orkney Springs	03-18-75	04-22-76	85-39
Quicksburg Site (44SH3)	New Market	04-16-74		85-29
Shenandoah County Courthouse	Woodstock	06-19-73	06-19-73	330-02
Shenandoah County Farm	Maurertown	11-21-78	05-07-79	85-29
Snapp House	Toms Brook	11-21-78	05-07-79	85-29
Stoner-Keller House and Mill	Strasburg	12-13-12	02-05-13	85-84
Strasburg Historic District	Strasburg	05-15-84	08-16-84	306-16
Strasburg Stone and Eathernware Manufacturing Company	Strasburg	04-17-79	06-19-79	306-09
Toms Brook School	Toms Brook	06-16-11	08-18-11	313-5001
Van Buren Furnace	Woodstock	03-17-99		85-051
Wierman, Benjamin House	Quicksburg	12-05-07	02-21-08	85-37-3
Wilkins Farm	Edinburg	12-12-14	02-10-14	85-216
Woodstock Historic District	Woodstock	06-27-95	10-25-95	330-15
Zirkle Mi	New Market	12-14-82	02-10-83	85-122

4.0 Summary

Shenandoah County's location in the Northern Shenandoah Valley and its underlying geology and soils have played a key part in its history and development in the past and continues to do so today.

Over 750 historic sites have been identified by the historic landmarks surveys that have been accomplished in the County, ranging from individual homes, farms, taverns, bridges and other structures to complete historic districts. The towns of Edinburg, Mount Jackson, New Market, Strasburg and Woodstock now have historic districts that are listed on the State and National Registers of Historic Places.

The preservation and enhancement of the County's historic assets is one of the major goals of this plan. One action which is recommended to implement this goal is the completion of the nomination process for the individual sites and potential rural historic districts that have been identified in the latest Historic Resources Survey. Partial funding for such efforts may be available through the Department of Historic Resources on a matching basis.

In addition, there are several battlefield sites in Shenandoah County which should be preserved and enhanced. The County supports the efforts of the Shenandoah Valley Battlefields Foundation, and will participate in detailed preservation studies for some of the identified battlefields.

The Historic Resources Survey reports for the County and the Management Plan for the Shenandoah Valley Battlefields National Historic District are available for public reference at the County Library and the Planning and Zoning Office in the County Government Center. Any development proposals submitted should identify historic features found on the site. This will aid in the preservation of additional structures and features which are significant from an historic or archaeological viewpoint.

The overall goal of these recommendations is to preserve the quality of life in the County for today's citizens as well as for those who will follow.

Chapter 2:
Natural Resources

Design and Maps updated June 2016

1.0 Introduction

This section describes both the land and water resources of Shenandoah County. It presents information on the County's topography, geology, soils, and water resources. These resources provide many opportunities, but also pose some severe environmental problems. Development should be guided away from areas with serious limitations, such as steep slopes, shallow depth to bedrock, flood plains, prime agricultural lands, wetlands, and sinkholes. Maps showing general geology, general soils, the hydro-geologic survey of Shenandoah County, and generalized development limitations are included.

2.0 Land Resources

The county's land resources include: topography, geology, forests and agriculture;

2.1 Topography

Shenandoah County lies within the Ridge and Valley physiographic province of Virginia. This province is known for its steep slopes in the mountainous areas with wide valleys lying between. The County's topography is steep to gently rolling, and well drained. Elevations vary from 537 feet above mean sea level in the valley to approximately 2,500 feet along the Massanutten Mountains on the east and over 3,300 feet along the North Mountains on the west. Intersected by narrow valleys in a northeast to southwest direction, these mountains comprise approximately one-half of the County's total land area.
The central portion of the County is the valley proper which is relatively level. Meandering through this area is the North Fork of the Shenandoah River, a major tributary of the Potomac River. Other major watersheds include Cedar Creek, Passage Creek, Stony Creek, and Smith Creek.

Approximately 45 percent of the County contains steep slopes ranging from 15 to 25 percent and, along the eastern and western borders, lands containing slopes of from 25 to 45 percent. The land along the eastern and western sides has severe slope limitations for both farm and non-farm uses.

2.2 Geology

Shenandoah County is underlain by bedrock which geologists have assigned to many different formations and groups which are shown on Figure

2-A on the following page. The formation and group classifications are combined into major geologic belts, and the County lies within three of them. Both the eastern and western sections are made up of Appalachian Sandstones and Shales. The eastern-central part of the County is underlain by the Valley Shale belt and the west-central area is part of the Valley Carbonate belt.

Appalachian Sandstones and Shales are made up of several rock types. The major geologic units found in the belt are the Hampshire, Brallier, Chemung, Tuscarora Formations and the Clinton and Cayuga Groups. Where the bedrock is exposed at the earth's surface, sandstone forms the many high, narrow, linear, northeast-trending ridges characteristic of the area. The Valley Shale belt is made up of a single rock unit, called the Martinsburg Formation. Shale and easily erodible sandstone are the major rock type of this belt.

Valley Carbonates are made up of six major formations or groups. The most common rock types are limestones and dolomites of sedimentary origin. The major geologic units included are the Edinburg Formation, Lincolnshire and New Market Limestones, the Beekmantown Formation, and Conococheaque Limestone.

The bedrock underlying the County influences almost every other feature of the environment and directly or indirectly affects many of man's land use decisions. Each of the major belts shows up in distinct land forms, and each also has an influence on water and its movement above or below the surface. Carbonate rocks (limestone and dolomite) commonly show considerable solution activity and surface collapse features consisting of sinkholes and caves. Such features are direct conduits into the County's groundwater.

One of the direct effects of geology on the use of land is the presence or possibility of rocks and minerals having commercial value. High-calcium limestone is quarried northeast of Strasburg to produce lime. Limestone for roads, concrete and other uses is quarried near Forestville. In the past, limestone and dolomite have been quarried at many other sites. Clay materials near Strasburg and Woodstock were used in the manufacture of brick. Clay near Strasburg was also used to make pottery products and drain tile.

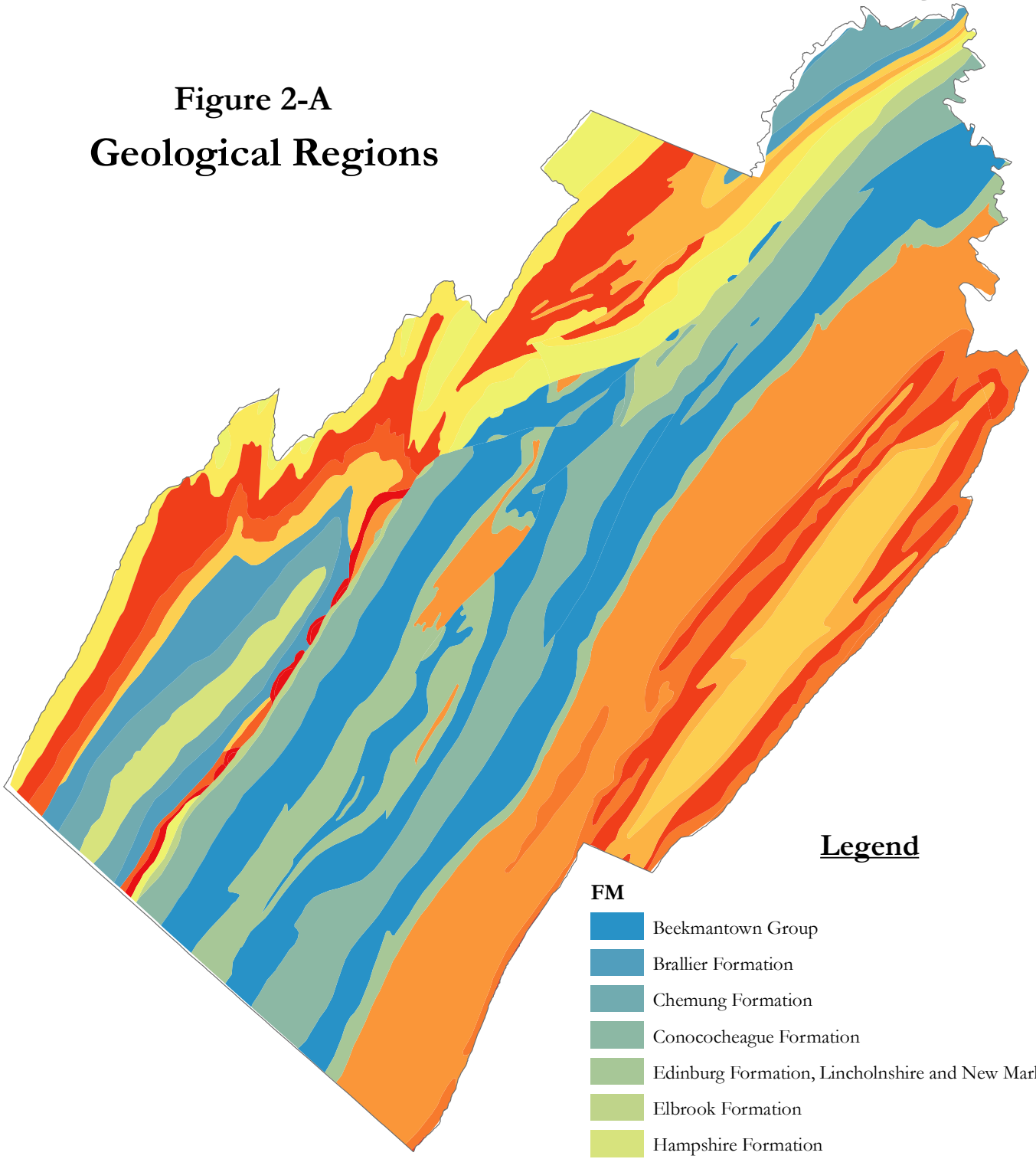
Sand and gravel were produced near Edinburg and Maurertown. Manganese minerals have been mined in the Cedar Creek Valley-Capola Mountain and Massanutten Mountain areas. Iron minerals have been mined in the western part of the County and in the Massanutten Mountain area. A small quantity of zinc ore was mined near Forestville. Samples of shale from selected localities in the County have been tested and found potentially suitable for use in the manufacture of brick, tile, and lightweight aggregate. Sandstone and quartzite at some localities may have potential as sources of high-silica raw materials.

2.3 Soils

The information in this sub-section was provided by the Soil Conservation Service from the Soil Survey of Shenandoah County. Seven major soil associations are found within the County. They are listed below in Table 2-A, and shown in Figure 2-B, "Soils", on page 2-5.

The soil associations in the survey were grouped into four general kind

Figure 2-A
Geological Regions



Legend

FM

- Beekmantown Group
- Brallier Formation
- Chemung Formation
- Conococheague Formation
- Edinburg Formation, Lincholnshire and New Market Limestones
- Elbrook Formation
- Hampshire Formation
- Juniata, Oswego, Martinsburg, Eggleston Formation
- Keefer Sandstone, Rose Hill and Tuscarora Formations
- Mahantango Formation
- Marcellus Shale and Needmore Formation
- Martinsburg and Orando Formations
- Massanutten Sandstone
- Millboro Shale and Needmore Formation
- Ridgeley Sandstone, Helderber and Cayuga Groups
- landslides with intact stratigraphic units - undivided

1 in = 4 miles

N

0 1.5 3 6 Miles

Figure 2-B
Generalized Soils

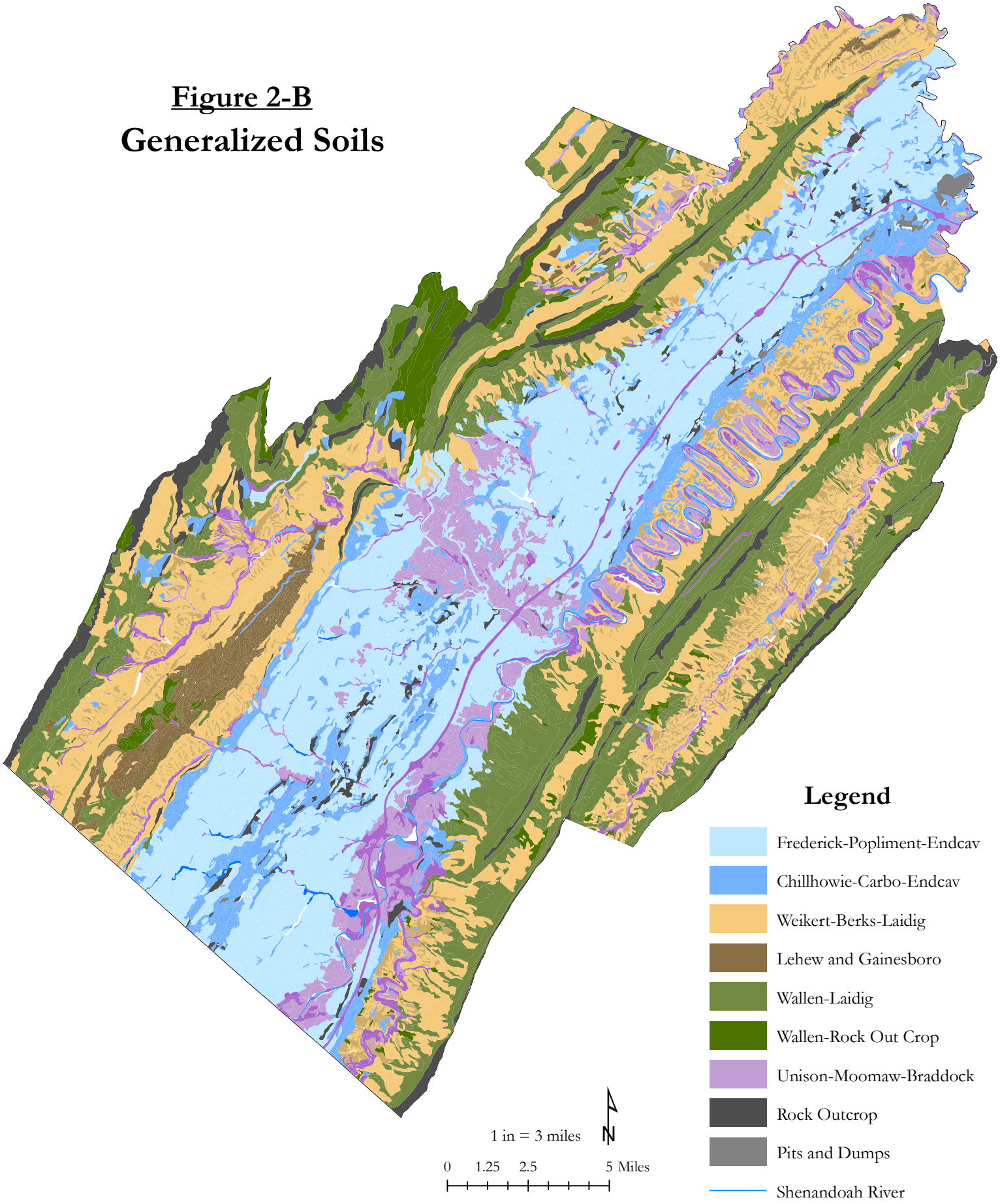


Figure 2-C
Major Soil Association
1. Frederick-Poplimento-Endcav
2. Chilhowie-Carbo-Endcav
3. Weikert-Berks-Laidig
4. Lehew-Gainesboro
5. Wallen-Laidig
6. Wallen-Rock outcrop-Drall
7. Unison-Monongahela-Braddock
Source: Draft Soil Survey of Shenandoah County, Virginia

of landscapes for broad interpretive purposes. Each of the broad groups and the soil associations in each group are described below.

Soils in the Shenandoah Valley Formed in Residuum of Limestone and Interbedded Limestone and Calcareous Shale; on Uplands:

2.3.1. Frederick-Poplimento-Endcav

This association is composed of very deep, well drained soils that have clayey subsoils. Areas of these soils are located on broad uplands whose slope varies from gently sloping to steep; they generally have long smooth slopes. This map unit makes up about 23 percent of the County. It is about 35 percent Frederick soils, 24 percent Poplimento soils, 15 percent Endcav soils and 26 percent soils of minor extent.

The Frederick and Poplimento soils are dominantly gently sloping and sloping. Both soils have a surface texture of silt loam and are gravelly or rocky in some areas. The Endcav soils are dominantly gently sloping and sloping and have silt loam surface textures. Some areas are rocky. Of minor extent in this map unit are well drained Carbo and Timberville soils. Also of minor extent are somewhat poorly drained Toms soils and poorly drained Maurertown soils along small streams and drainage ways and areas of rock outcrop.

The soils in this map unit are used mainly for crops and pastures. The non-rocky soils are used mostly as cultivated cropland and are well suited to this use. The steeper soils and the rocky soils are suited to grasses and trees. The hazard of erosion, rockiness, and steep slopes are the main limitations for farming. The clayey subsoil, rockiness, and steep slopes are the main limitations for community development and most other uses.

2.3.2. Chilhowie-Carbo-Endcav

This association is composed of moderately deep to very deep, well drained soils that have clayey subsoils. Areas of these soils are mainly on gently sloping to moderately steep slopes and broad ridge tops. Rock outcrops and sinkholes are numerous throughout the unit. This map unit makes up about 10 percent of the County. It is about 30 percent Chilhowie soils, 15 percent Carbo soils, 12 percent Endcav soils and 43 percent soils of minor extent.

Carbo and Endcav soils are dominantly gently sloping to strongly sloping and have silty clay loam surface textures. The Carbo soils are moderately deep and

the Endcav soils are very deep. The Chilhowie soils are on ridge tops and short, steep side slopes. Chilhowie soils are moderately deep and have a surface texture of silty clay loam. Rock outcrops and sinkholes are numerous throughout this map unit. Of minor extent in this unit are shallow, well drained Opequon soils, deep well drained Edom and Timberville soils and pits and dumps.

This unit is mainly used for crops and pasture. Most of the steep and rocky areas are in pasture and woodland. The hazards of erosion, rockiness and slope are the main limitations for farming. The clayey subsoil, depth to bedrock, and steep slopes are the main limitations for community development and most other uses.

2.3.3 Soils formed in Residual or Colluvial material from shale and sandstone on uplands and mountain foot slopes.

Weikert-Berks-Laidig

This association comprises shallow to very deep, well drained soils that have loamy subsoils.

Areas of these soils are on hills and ridges, lower side slopes and foothills, and are generally gently sloping to very steep. This map unit makes up about 38 percent of the county. It is about 21 percent Weikert soils, 20 percent Berks soils, 12 percent Laidig soils and 47 percent soils of minor extent.

The Weikert and Berks soils are predominantly in moderately steep to very steep areas. Both have silt loam surfaces and are closely intermingled on the landscape. Weikert soils are shallow and Berks soils are moderately deep. They are on hills and ridges in the Valley and lower mountains side slopes. Some areas are very stony.

The Laidig soils are very deep and well drained. Most areas are stony or very stony. It is on lower side slopes and narrow ridge tops and side slopes of the foothills. Of minor extent in this map unit are well drained, Gilpin, Sequoia and Wheeling soils, somewhat poorly drained Toms and Guyan soils, and poorly drained Maurertown and Purdy soils.

This unit is mostly in woodland. A few areas are in cultivated crops and pasture. These areas are mostly along small streams and the North Fork of the Shenandoah River. Slope and depth to bedrock are the main limitations for community development and most other uses.

Lehew-Gainesboro

This association has moderately deep, well drained soils that have loamy subsoils. Areas of these soils are on hills and ridges. They generally have short smooth slopes and are highly dissected. They map unit makes up about 30 percent of the county. It is about 40 percent Lehew soils, 20 percent Gainesboro soils and 40 percent soils of minor extent.

The Lehew and Gainesboro soils are dominantly on steep side slopes. They are moderately deep and well drained. Of minor extent in this unit are the moderately deep, well drained Berks, Gilpin and Wallen soils and shallow, well drained Weikert soils. This unit is mostly wooded. A few small areas along the ridge tops are in pasture. Slope and depth to bedrock are the main limitations for

community development and most other uses.

Soils in the Appalachian Mountains; Massanutten Mountains, and mountain food slopes that formed in residual or colluvium material weathered from sandstone.

Wallen-Laidig

Soils in this association are moderately deep and very deep, somewhat excessively drained and well drained and have loamy subsoils. Areas of these soils are gently sloping to very steep, on the tops and side slopes of the Appalachian Mountains. Most of this unit is in the George Washington National Forest. This unit makes up about 11 percent of the county. It is 38 percent Wallen soils, 35 percent Laidig soils and 27 percent soils of minor extent.

The Wallen soils are somewhat excessively drained and have very stony and extremely stony surfaces. They are on side slopes and tops of the mountains and are droughty in the summer. The Laidig soils are well drained and have very stony surfaces. They are on the lower side slopes and foot slopes. Of minor extent in the map units are well drained Zepp, Lehew and Gilpin soils, excessively drained Drall soils and Rock outcrops. All areas in this map unit are wooded. Slope and stones on the surface are the main limitations of this unit for community development and most other uses.

Wallen-Rock outcrop-Drall

This association contains moderately deep and very deep, somewhat excessively and excessively drained soils that have a loamy or sandy subsoil and areas of Rock outcrop. Areas of these soils are gently sloping to very steep, on the tops and upper side slopes of the Massanutten Mountains. Most of this unit is in the George Washington National Forest. This unit makes up about 9 percent of the county. It is 40 percent Wallen soils, 18 percent Rock outcrop, 8 percent Drall soils, and 34 percent soils of minor extent.

The Wallen soils are somewhat excessively drained and have very stony and extremely stony surfaces. They are on upper side slopes and tops of the mountains. The Rock outcrops which consist of sandstone are mainly 30 feet apart and are on the upper side slopes and tops of the mountains. The Drall soils are excessively drained and have extremely stony surfaces. They are on tops and upper side slopes of the mountains. Of minor extent in this map unit are well drained Massanutten and Laidig and Weikert soils.

All areas of this map unit are wooded. Slope, rock outcrops and surface stones are the main limitations of this map unit for community development and most other uses.

2.3.4 Soils on river terraces that formed in alluvial materials.

Unison-Monongahela-Braddock

These soils are very deep, well drained soils that have a loamy or clayey subsoil. They are located in areas that are nearly level to moderately steep, on terraces along the North Fork of the Shenandoah River and Stony Creek. This map unit makes up 6 percent of the county. It is 26 percent Unison soils, 15

percent Monongahela soils, 11 percent Braddock soils and 48 percent soils of minor extent.

The Unison and Braddock soils are well drained and are at slightly higher elevations that the Monongahela soils. In some areas these soils are gravelly or cobbly. The Monongahela soils are moderately well drained and are usually adjacent to the flood plain. This soil has a seasonal high water table. Some areas of this soil are cobbly. Of minor extent in this map unit are well drained Allegheny, Chavies and Nolin soils, and moderately well drained Cotaco soils.
This unit is used mostly for crops and pastures. A small acreage is wooded. The seasonal high water table in the Monongahela soils and the permeability of the Unison and Braddock soils are the main limitations of this unit for community development and most other uses. Flooding is a hazard on some of the minor soils.

The Soil Survey of Shenandoah County includes an interpretation of the soil data and detailed mapping of soil types overlaid on aerial photography. In addition, through the use of the geographic information system that was developed at the Natural Resource Conservation Service's Culpeper office, generalized maps of soil limitations for various uses and maps of prime agricultural soils are available. These resources should be incorporated as appropriate into proposed development plans.

3.0 Forests and Agriculture

The forests of Shenandoah County are one of its most precious resources. These woodlands add to the economic vitality of the County, its natural beauty, and to the quality of life for its residents. The County's woodlands are used for recreation, watershed and wildlife management, and for a variety of forest products.

Shenandoah County's woodlands are dominated by the Upland Hardwood – Southern Pine forest type. The most common tree species in this forest type include: white oak, black oak, chestnut oak, scarlet oak, northern red oak, pignut hickory, bitternut hickory, mockernut hickory, red maple, white ash, tulip tree, Virginia pine, shortleaf pine, pitch pine, table mountain pine, white pine, eastern hemlock and black gum. The forests are dominated by saw-timber-size trees which are16 inches in diameter or greater in size. Major forest pests affecting the health of these trees include the gypsy moth, southern pine bark beetle and hemlock wooly adelgid.

There are 184, 400 acres of forest land in Shenandoah County. The majority of these acres belong to private landowners, both residents of the County and also absentee owners. There are also federal landholdings (George Washington – Jefferson National Forest), state lands (Devil's Backbone State Forest) and county lands (County parks) located within the boundaries of Shenandoah County. Following is a table displaying the data for each of these ownership classes:

Shenandoah County's economy is very dependent upon its forest resources. At least 1,031 workers are dependent upon the forest products industry. Shenandoah County's forest products economy ranks 61st in the state, but is the leader among all of the counties in the Lord Fairfax Planning District. Following

Figure 2-B

Farm and Forested Land

Figure 2-E Forest Ownership in Shenandoah County		
Ownership	Acres	% of Total Forest Land
Private	116,500	63%
County & Local Government	300	.2%
State	400	.2%
Federal	67,200	36%
Source:Virginia Department of Forestry		

Figre 2-F Shenandoah County Forest Economic Information	
Direct Economic Impact (primary and secondary industries)	$54,493,794
Indirect Economic Impact (services to industry: trucking, supplies, maintenance etc).	$8,652,295
Induced Economic (employee spending)	$18,678,811
Total Annual Forest Economic Impact	$81,824,900

is a table showing the forest economic information for the county:

The commercial quality and value of these trees vary greatly depending upon the soil types which underlay these woodlands. There are many acres of forests growing upon shale-derived soils that are of very low quality and value. Conversely, trees growing on limestone soils, or river bottom alluvial soils, are of very high quality and value. It is these better quality soils that make Shenandoah County a leader in the world market of fine hardwood products.

From 1986 through 1992, cumulative harvest revenues for Shenandoah County landowner averaged approximately $380,000. Beginning in 1993, and through the end of 2001, these same annual harvest revenues have significantly increased to $1,380,000. The reasons for this one million dollar increase in annual revenues can be attributed to an improved global hardwood market, an increased demand for hardwood products, a decrease in timber harvested from National Forests and the recognition of the superior quality of Shenandoah Valley hardwoods. For every $1.00 landowners receive for their timber, an additional $35.39 of "value added dollars" is generated for Virginia's economy.

Shenandoah County relies upon its rural landscapes to support its population and, in part, its economy. Yet trends for the county show increasing fragmentation and parcelization of once manageable forested acreage. The loss of productive forest land equates to a possible decline in the economic viability of the county due in part from the decreased revenues generated by traditional forest products. The county should seek a balance between managed growth and the retention of productive forest land.

Approximately 41 percent of the land in Shenandoah County (133,032 acres) is classified as "land in farms" according to the 2002 Census of Agriculture. Agricultural land includes crop land and pasture land, orchards, and confined

feeding operations.

There were 989 farms in Shenandoah County as of 2002, which represented an increase of about 19 percent in the number of farms since 1987. During that period, the average size of a farm also decreased by about 19 percent from 167 acres to 135 acres. The recent trend in farming in Shenandoah County is toward less land-intensive uses, including the development of additional confined feeding operations (predominantly poultry).

Almost one-third (30 percent, or 98,506 acres) of the County is regarded as having prime agricultural soils. This is the highest percent and acreage of all the counties in the Northern Shenandoah Valley Region. The largest area of prime farm land is in the central part of the County. Every effort should be made to reserve prime agricultural land for agricultural uses.

4.0 Hydrology

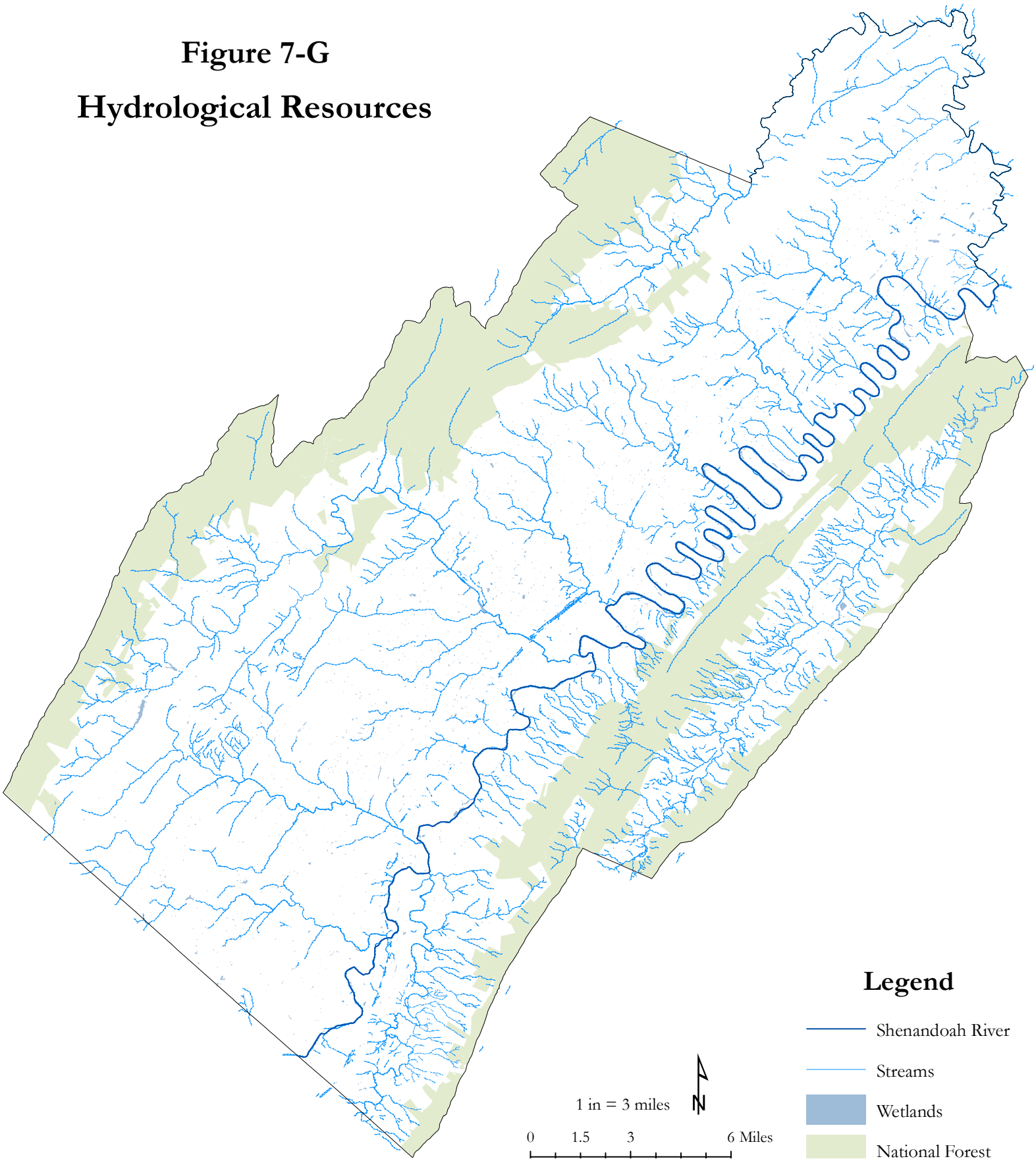
The hyrdology section of this chapter includes sub sections on water sources; water quality; water quantity; water and land use; surface water pollution and protection; ground water pollution and protection; water conservation; drought management; and storm water management. The section concludes with several recommendations to conserve and protect the county's water resources.

4.1 Water Sources

On average, approximately 36 inches of precipitation per year fall onto Shenandoah County land. Approximately 26" of this water returns to the atmosphere through evaporation, 6" enters the county's streams as surface runoff, and 4" infiltrates the soil and eventually recharges the groundwater supply.
Surface runoff (water which does not infiltrate the soil) becomes part of approximately 1150 miles of permanent and intermittent county streams. All of these streams or tributaries, whether or not they originate in Shenandoah County, eventually enter the North Fork of the Shenandoah River, which has averaged over the period 1925-2000 some 375 million gallons per day as it passes the USGS gage at Strasburg. Approximately two miles further downstream the North Fork leaves the county, entering, in order, the Shenandoah River, the Potomac River, and the Chesapeake Bay. Shenandoah County land represents 49% of the total North Fork watershed, and 7% of the total Potomac River watershed.

Water that infiltrates and percolates into bedrock (the earth's crust below the soil) enters one of four hydrogeological regions (Figure 2-C, page 2-14). Water may remain here, depending on local hydrogeological conditions, for days, years, decades, or longer. At some point, however, much of this water returns to the surface by one of three routes: 1) through one of the numerous springs in the county; 2) through one of the thousands of wells, both private and public; or 3) through subsurface connections between groundwater and stream channels. During periods of base flow, when no surface runoff is occurring, all of a stream's flow comes from groundwater inputs.

Figure 7-G
Hydrological Resources



Surface water may also enter the groundwater system. This may occur through subsurface connections, or by way of surface depressions or sinkholes which occur especially in areas underlain by carbonates (limestone and dolomite). Groundwater Under the Influence of Surface Water (GWUISW) is the term applied to this phenomenon.

Approximately 30% of county land, concentrated in the central valley area, overlies carbonate rock, primarily limestone. This bedrock material is characterized by numerous caves and caverns, sinkholes, underground solution channels, and fractionated layers. When these conditions are present the term karst is applied. Groundwater in karst terrain is noted for easy entry from surface water sources, quite rapid lateral movement, and hence susceptibility to contamination which can spread rapidly over large underground areas.

4.2 Water Quality

Water quality in general refers to the suitability of water for its intended or desired uses. Both aesthetic characteristics and safety influence water's suitability for a particular use. Water suitable for one use may not be suitable for another. For example, the water in a high quality trout stream is still not safe to drink without treatment.

Drinking water supplies for the people who live and work in Shenandoah County come from the following sources: 1) water for the towns of Strasburg and Woodstock is drawn from the North Fork and is treated at treatment plants for the two towns respectively; 2) water for the towns of New Market, Mt. Jackson, Edinburg, and the county's two sanitary districts (Stoney Creek Sanitary District, serving the Bryce Mountain area, and Toms Brook/Maurertown Sanitary District) is drawn from drilled wells and treated in treatment plants before reaching the consumer; 3) approximately 60 other public water systems (serving 25 or more people on a year-round basis) obtain their drinking water from drilled wells and treat it as necessary; 4) the rest of the rural population of the county (the majority of county residents) obtains drinking water from private wells, with only rare treatment of the water before it reaches the tap; and 5) a relatively few rural residents who obtain their drinking water from cisterns or from water haulers.

Surface water quality in Virginia is evaluated by the Virginia Department of Environmental Quality (DEQ) as to its suitability, not only for fishing and swimming, but also for the maintenance of aquatic life and in-stream usage. In its most recent report, DEQ listed segments of the following streams in Shenandoah County as "impaired" meaning unfit for swimming or fishing: Holmans Creek, Smith Creek, Mill Creek, Toms Brook, and portions of the North Fork. Fecal coliform and high nitrate levels are the most common sources of impairment. It should be evident that the quality of river water at the intakes for the public water systems of Woodstock and Strasburg, and hence the amount of treatment necessary to make the water potable, is directly affected by the impaired nature of the upstream tributaries.

Besides water for human uses, habitat for many aquatic species is provided by county streams and riparian areas. The North Fork, Passage Creek, Cedar Creek, and Little Stony Creek are examples of many of the streams in the county

with valuable ecological features to accompany their value for traditional off stream uses.

4.3 Water Quantity

In 2001 a Regional Water Supply Committee study (Northern Shenandoah Valley Regional Partnership) forecast that by 2025 the maximum daily demand for water from the North Fork would exceed the low mean flow of record supply of water. In the absence of augmentation, i.e., impoundments of water upstream in the watershed, or reduced demand (for example, rerouting Frederick County and Winchester water supply to the main stem of the Shenandoah River), the demand for water from the North Fork will continue to out pace the low mean flow of record by an ever widening margin. Nine dams temporarily impound the flows of seven county streams resulting in a potential maximum storage of approximately 1800 million gallons.

These dams, however, were constructed for other purposes such as flood control, hydroelectricity, and recreation, and none are connected with existing treatment plants or distribution systems. Looking to the long term, therefore, the availability of water from the North Fork for human consumption is clearly in jeopardy during periods of drought conditions. The issue of adequate flow in the North Fork was addressed by a Minimum Instream Flow (MIF) study conducted jointly by the United States Geological Survey (USGS) and Virginia Tech and completed in 2004. This study established the minimum instream flow requirements to support drinking water supplies, aquatic habitats and recreational uses of the river.

As for groundwater supplies, the very complex nature of the bedrock geology underlying Shenandoah County makes it virtually impossible to know with any degree of certainty how much groundwater is stored beneath the county. Individual wells vary greatly as to depth and yield, suggesting that there are an infinite number of small aquifers of varying capacity but no main aquifer or underground river. During periods of drought such as the summer of 1999 there were reports of a number of springs and wells which ceased to function, indicating that the water table in those areas had receded significantly.

It is clear that the county does not have an unlimited supply of groundwater. Over time the demand for groundwater has increased and will continue to do so as the population grows and as per capita consumption rates remain much higher than they were 50 or 100 years ago. Groundwater is also the main source of water for much of the county's livestock as well as for a number of industries located here. For example, the poultry processing plant at Columbia Furnace consumes over one million gallons of water per day, drawn from company wells.

4.4 Water and Land Use

Water quality and quantity on the one hand and land use activity on the other are inextricably intertwined. As growth development continues to expand westward from the greater Washington area, counties located in the path are faced with the challenge of preserving their agricultural heritage, their rural culture,

and open spaces. Shenandoah County is no exception. One of the major goals stated in the 1991 Comprehensive Plan was "to guide, and direct growth into and around the towns served by the road network and other public facilities [meaning water and sewer primarily], while preserving the rural and open space character of those areas outside the public service areas."

Unfortunately there is a disconnect between that stated goal and reality. Between 1990 and 2000 there was an increase of 1,549 total dwelling units, and 795 of them (51.3%) were located in the towns; 754 (48.7%) were located in the rural areas of the County. Each new home in rural areas requires its own well and septic system, both of which put added strain on the fragile groundwater environment.

4.5 Surface Water Pollution and Protection

Under the federal Clean Water Act (1972), point source discharges (sewage treatment plants, industrial facilities, etc.) are regulated through the National Pollutant Discharge Elimination System, a nationwide permitting program. In Virginia this permitting authority is under the State Water Control Board which issues and renews hundreds of Virginia Pollutant Discharge Elimination System (VPDES) permits annually through the DEQ. These permits authorize individuals, municipalities, and industrial facilities to discharge directly to surface waters provided they meet certain specified discharge requirements

Nonpoint source (NPS) pollution is a very complex issue. Unlike pollution from a discharge pipe, which is point source and readily identified, NPS pollution comes from many diffuse sources and is not always easy to identify. NPS pollution can come from agricultural land, parking lots, construction sites, lawns, driveways, etc. As rainwater or snowmelt moves over these areas it picks up numerous contaminants and carries them to nearby streams and rivers. NPS pollution also can affect groundwater, especially in the Shenandoah Valley with its karst geology where surface water and groundwater are so easily interchanged.

The contaminants commonly found may include the following:

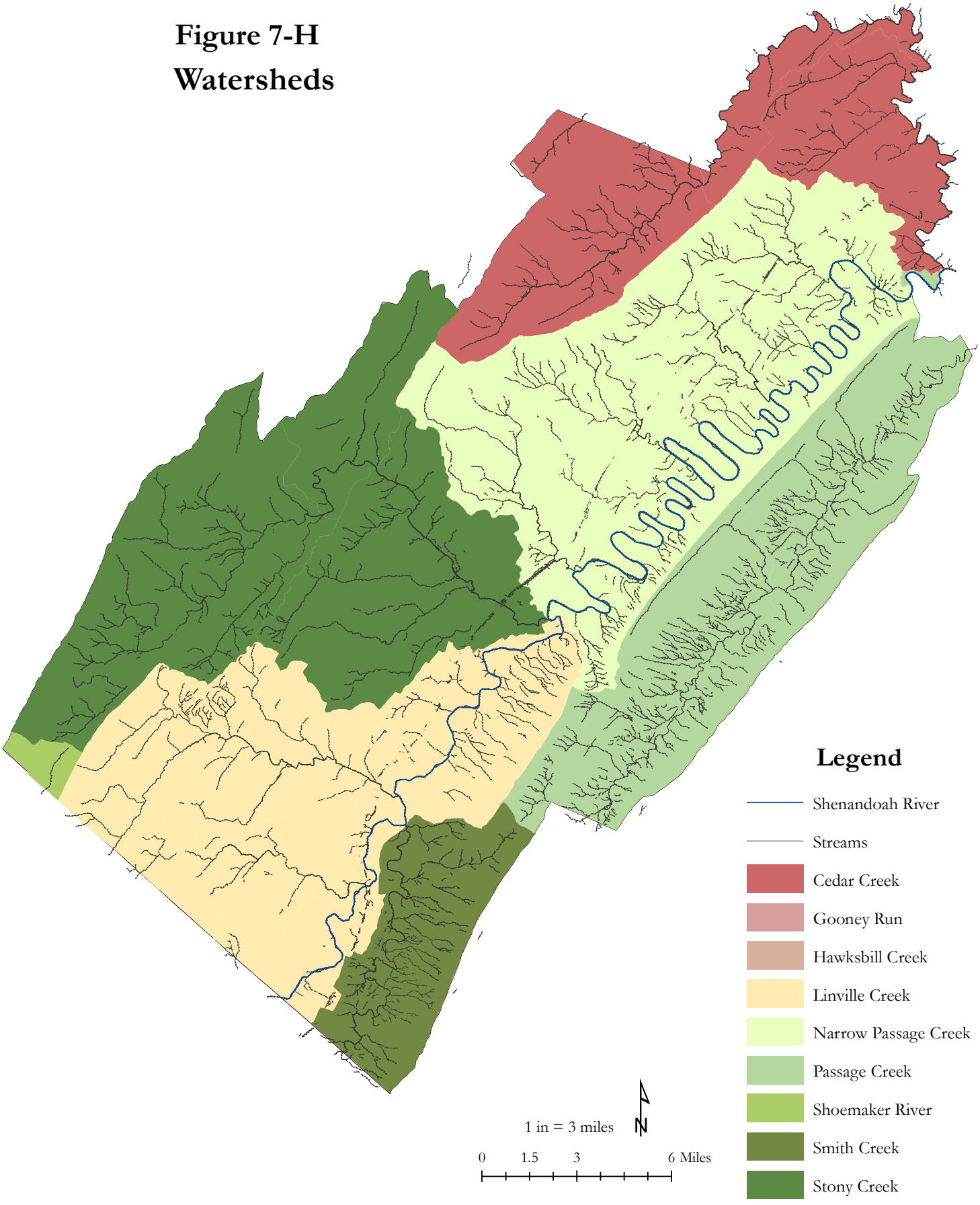
- Oil, grease, and toxic chemicals from urban runoff
- Excess fertilizers or pesticides from agricultural and residential areas
- Sediment from improperly managed construction sites or cropland
- Bacteria and nutrients from livestock and faulty septic systems

Best Management Practices (BMPs) are among the best means of controlling gricultural NPS pollution. The Virginia Water Quality Improvement Act provides financial incentives to landowners for the installation of BMPs which minimize the movement of agricultural pollutants such as sediment, nutrients, and pesticides to water resources. Riparian fencing, vegetative filter strips, controlled manure storage, and alternative watering systems are a few examples of BMPs.

Riparian areas are very important to the ecological health of stream systems. Protection of riparian areas is needed to help maintain the ecological, aesthetic, and recreational qualities of streams, especially coldwater streams. Some coldwater (trout) streams have been affected by acid precipitation and are vulnerable to further acidification.

The number of alternative wastewater treatment systems designed

Figure 7-H
Watersheds



for surface discharge has increased substantially. Improperly constructed or maintained systems potentially threaten stream water quality. The number and location of these systems need to be monitored to ensure that they do not adversely affect streams.

Under the Clean Water Act there is provision for addressing and restoring those streams that have been designated as "impaired" by DEQ and EPA (see section above on Water Quality). The terminology used is Total Maximum Daily Load (TMDL) which is the pollution threshold below which a stream must be restored to make it safe for swimming and fishing. The program is complex, controversial, and costly, and will take at least a decade to complete. It requires establishing for each impaired stream, based on modeling of that stream's watershed, the TMDL of specific pollutants such as fecal coliform, sediments, nutrients, aquatic or benthic, metals, organics, pH, etc.. It also requires identifying point and non-point sources of these pollutants as well as remedial action to bring them into compliance. Public participation by interested property owners is both encouraged and essential.

4.6 Groundwater Pollution and Protection

Groundwater located in karst terrain, which is the case for much of Shenandoah County, is particularly vulnerable to pollution from surface sources. Among the main threats are underground storage tanks, sinkholes, uncapped abandoned wells, improperly managed animal waste, excessive use of fertilizers and pesticides, and poorly maintained septic systems.

In 2000-2001 the county sponsored a Source Water Assessment and Protection Plan (SWAPP) study for the five major public water systems that obtain their drinking water from groundwater sources: New Market, Mt. Jackson, Edinburg, and the Stoney Creek and Toms Brook/Maurertown Sanitary Districts. Using the science of hydrogeology the recharge areas for all of the wells in these five systems were delineated for the first time, and potential sources of contamination within each recharge area were identified and characterized as to risk. It was discovered that the recharge areas are quite large (on the order of four square miles per well) and quite irregular in shape. It should be noted that each of these five systems treats the groundwater before it passes on to the consumer. This is also true of the approximately 60 smaller "public systems" in the county that are regulated by the health department.

The number of individual property owners who treat their drinking water or have it tested on a regular basis is unknown, but is believed to be very small. Since 1994 there has been a county-wide long-term Citizen Groundwater Monitoring Program under the auspices of the Friends of the North Fork with funding support from the county. Currently 36 wells are tested on a semi-annual basis for fecal coliform, nitrates, metals, chemicals, herbicides, and the like. During the mid-90s there were frequent positive samples of fecal coliform, nitrates, manganese, lead, and the herbicides atrazine, and metholachlor.

With the exception of those who live in the towns and sanitary districts where sewer service is provided, the majority (approximately 60%) of the county's residents rely on septic systems. The fact that most of these are located

in karst terrain poses an exceptionally serious potential threat to groundwater quality. Aside from meeting the initial installation requirements set by the health department, there is no regulation of a septic system thereafter. In the absence of any required inspections or pump-outs it is a virtual certainty that many septic systems in the county are failing to perform their intended function. The Virginia Cooperative Extension Service reports that: "Malfunctioning septic systems are currently the leading cause of groundwater pollution in Virginia." To the extent that this occurs in karst terrain the problem can be particularly pervasive.

4.7 Water Conservation

The fragile nature of the quantitative water supply in Shenandoah County is addressed in the earlier section on Water Quantity. The situation with respect to groundwater is of particular interest because the quantity of groundwater available is essentially unknown and unknowable and because upwards of 80% of the population obtains its drinking water and household water from wells or springs and both the agricultural and industrial sectors are similarly dependent on groundwater.

During the droughts of the summer of 1999 and again in 2002, the county issued a drought advisory with guidelines for voluntary water conservation. The guidelines included such measures as: discontinuing watering of lawns, washing cars only at commercial car washes, discontinuing irrigation of crops during daily periods of high evaporation, use of soaker hoses to water trees, shrubs, and vegetable gardens, and a host of steps to reduce water consumption in individual households.

As population increases and periodic droughts occur, developing an ethic of water conservation as a permanent way of life in the Valley should be a serious consideration. In the event of extreme drought conditions, some form of mandatory conservation measures may be necessary, although action by the Governor would be required to put such measures in effect.

Public education is the key to creating an ethic of water conservation. Citizens and businesses need to understand that water quantity is critical in the Valley and they need to learn what they can do to reduce their own water demands. Simple things like low volume flush toilets and shower heads can in the aggregate cut a household's water demands by a substantial percentage.

4.8 Drought Management

During the drought of 1999 the county formed an emergency committee to deal with drought issues, particularly the plight of farmers with dwindling supplies of water for livestock and poultry. Out of this effort grew some very positive measures, both short and long term, for drought management. Among the short-term measures were development of a list of commercial water haulers, a list of locations where individual farmers with portable water storage capability could load them, advice regarding procurement of suitable water bladders for hauling and/or storing water, advice on proper well management, conservation techniques, and in the extreme, delivery of water by volunteer fire departments.

Long-term measures focused on monitoring the status of streams and individual wells and springs; permanent on-farm water storage, including ponds; water metering systems for livestock; and financial incentives for farmers through agencies such as FSA, NRCS, and the Soil and Water Conservation District. The Virginia Cooperative Extension Service agent took the responsibility of disseminating all of this information to the farm community.

4.9 Stormwater Management

Inadequate management of accelerated runoff of stormwater resulting from development throughout the North Fork watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of streams and storm sewers, infiltrates municipal sewer systems, increases the cost of public facilities to carry and control stormwater, undermines flood plain management and flood control efforts in downstream communities, reduces groundwater recharge, and threatens public health by way of pollutants washed from the surface into drinking water supplies (automobile oil and grease, sediment from construction sites, bacteria from animal waste, excess lawn care and farm fertilizers and pesticides, as well as deposits of airborne pollutants).

Historically, managing storm flows focused on simple routing of stormwater through gutters and storm sewers with the objective of removing the stormwater as quickly as possible. A more effective approach to stormwater management is to maintain as nearly as possible the natural runoff flow characteristics. This can be accomplished either by augmenting the infiltration process or by temporarily storing stormwater for release at controlled rates of discharge. Actual stormwater management techniques can be structural (detention ponds, pipes, etc.) or non-structural (land use planning to effectively preserve existing vegetation, drainage swales, perviousness, etc.). Both techniques should be used as complementary elements of a management plan. The effectiveness of a stormwater management program is a function of comprehensive planning and sound engineering design.

A comprehensive program of stormwater management, including reasonable regulation of development and activities causing accelerated runoff, is fundamental to the county's and the towns' health, safety, and welfare, their resources, and the environment. The Virginia Stormwater Management Program (1990) gives the counties and the towns the option of establishing local stormwater management programs to regulate activities on private property within their jurisdictions.

5.0 Water Resources Recommendations

Five general objectives of good water resource management are proposed to achieve the major goals of this plan relating to preserving and enhancing the environmental quality of the County and providing for the economical delivery of necessary public services. These objectives are: Efficiency in the use of existing water supplies and wastewater facilities; appropriate development of needed new water supplies, water facilities, and wastewater facilities; protection of surface and groundwater resources from depletion, pollution, and ecological degradation;

acquisition and maintenance of necessary data and information; involvement of local officials and citizens in water resource decisions. Recommendations to help accomplish these objectives are presented below:

5.1 Efficiency in use of existing supplies and facilities

- Develop a county-wide water conservation plan with emphasis on public education and the nurturing of an ethic which promotes the voluntary conservation of water resources as a way of life in Shenandoah County.
- Reduce the percentages of unaccounted-for water from municipal systems.
- Follow the Drought Management Plan for the county when appropriate, and ensure that it is updated annually. The plan should provide for both voluntary and mandatory (in the case of extreme drought) water conservation and allocation.

5.2 Appropriate development of new supplies or facilities

- Maintain and improve as necessary existing public water supplies and wastewater facilities
- Develop a plan for utilizing the assets of the North Fork Wastewater Treatment Plant to best advantage. Process all septage at this plant in place of the current Toms Brook facility.
- Reexamine existing land use codes with a view toward guiding future growth into areas with existing water and sewer and minimizing new development requiring individual wells and septic systems
- As a member of the Regional Water Resources Policy Committee, support planning for augmenting the flow of the North Fork by 2015. Impoundment of a significant amount of water for release as needed during periods of extreme drought is indicated.
- Along the Route 11 corridor, extend the water line north from Woodstock to join the Toms Brook/Maurertown system at its southern terminus. This stretch currently has sewer service but no water service.

5.3 Protection of Water Resources

- Address nonpoint source pollution by promotion of agricultural, urban, forestry, and other BMPs; cooperation with the Natural Resources Conservation Service and Cooperative Extension Service to implement BMPs; promotion of techniques to reduce agricultural and household chemical use; and appropriate enforcement of the Erosion and Sediment Control Law.
- Adopt, as appropriate, the recommendations of the SWAPP project pertaining to the five major public water systems that depend on groundwater supplies.
- Additions to the Code of Virginia in 1998 and 1990 gave local governments the authority to "protect surface and groundwater." The County Code should be amended to specifically provide for this protection in all planning and zoning land use actions.
- Use available local tools to protect groundwater from contamination by underground storage tanks, animal wastes, biosolids, excessive fertilizer and pesticide use (both agricultural and residential), or other threats as identified.
- Institute a program for periodic inspections of septic systems and, if

warranted, pump-outs. Encourage citizens to have their septic tanks pumped out every five years.

- Locate sinkholes and sinkhole dumps, and implement sinkhole protection with a sinkhole ordinance
- Continue improvement to municipal sewer facilities, particularly with respect to stormwater infiltration. Encourage cooperation among towns and other water and sewer service providers and outlying areas to provide services as needed.
- Monitor all discharge from alternative systems.
- Support the efforts of the U.S. Forest Service and the Virginia Department of Game and Inland Fisheries to mitigate the acidification of coldwater streams.
- Support implementation of the Minimum Instream Flow Study for the North Fork recommendations.
- Encourage riparian landowners to maintain streambank vegetation and minimize disturbances in riparian areas in order to protect stream habitat and water quality. Encourage landowners to apply to have riparian land placed in the Conservation Reserve Program or conservation easements.
- Develop site plan review criteria for the definition and protection of wetlands.
- Stress the role that individual landowners must play in the protection of groundwater by proper on-site wastewater system maintenance (items 5 and 8 above), limited use of fertilizers and pesticides, control of animal wastes, wellhead maintenance, proper use and disposal of household chemicals and waste oil, and the like.
- In coordination with the towns, develop a county-wide stormwater management plan (Virginia Stormwater Management Program, 1990)

5.4 Acquire and maintain data

- The county's Geographical Information System (GIS) is the central repository for water and other geographical data for the county. The GIS Coordinator is responsible for entering appropriate and accurate data into the system and for ensuring that it is kept up- to- date. The GIS should continue to be supported as a matter of priority.
- The SWAPP project provides a specific database on potential sources of contamination located within the groundwater recharge areas of five major public water systems. Changes will inevitably occur within these recharge areas so this data base needs to be kept current
- Numerous federal and state agencies maintain extensive data bases that are accessible through the internet. USGS, EPA, DCR, DEQ, and the Virginia Department of Health are especially pertinent. County and town planners should access these as a matter of course.
- The Friends of the North Fork and the Friends of the Shenandoah have each engaged in monitoring and recording surface water quality on selected streams in the county. The Friends of the North Fork in cooperation with the Board of Supervisors have sponsored the Citizen Groundwater Monitoring (testing of 36 individual wells) program. These efforts should continue to be supported, and expanded. Furthermore, systematic trend analysis should be performed so as to better exploit the value of the data being compiled.

- In the event that a Groundwater Monitoring Network is established by the State Water Commission, the county should be prepared to participate in a major way. Few if any counties stand to benefit more from filling in the unknowns about our groundwater supply.

5.5 Local Involvement

- In June 1999 the county Board of Supervisors created the Water Resources Advisory Committee (WRAC) to advise the Board on matters of water quality and quantity and to help provide both the leadership and the public participation needed to continue the process of water resource management. The SWAPP project, which was funded by the county, is an example of how this committee can contribute to public awareness of the importance of protecting the sources of groundwater to the major public water systems in the county. The WRAC should continue to be supported by the county.
- Public education is an essential factor. The county and town governments, the schools, the libraries, the media, and local service groups are all conduits for public awareness and education. In 2000 the WRAC published and distributed a 16-page "Primer on Water in Shenandoah County," written in layman's language for all citizens of the county. It is important that this document be kept current and reprinted at yearly intervals.

6.0 Natural Resource Limitations

Approximately 56% of the county's total land area has severe limitations for on-site septic systems and almost 40% has severe excavation limitations. These limitations include slow permeability, a seasonally high water table, flooding, rock fragments, shallow depth to bedrock, steep slopes, danger of well contamination, surface rock outcroppings, and other factors.

Land with severe limitations for on-lot sewerage systems is located along the eastern and western portions of the county and in the extreme center. Generally this area corresponds to the Appalachian Mountain section (including the Massanuttens) and the land underlain by the Martinsburg Formation.

The best general areas for constructing septic tank and drain field systems are those underlain by limestone and terrace gravel, which generally occupy the valley lowlands in the center of the county. However, these areas also have the greatest potential for groundwater pollution and the danger of well contamination from septic systems because of the underground stream network and solution channels associated with the limestone formations.

In summary, the land area of Shenandoah County is not well suited for excavations and conventional septic tanks and drain fields. Public policy should be toward limiting growth in those areas where public sewer systems are not available now nor economically feasible in the future.

7.0 Air Quality

As development continues and perhaps accelerates, as traffic on I-81 continues to grow, and as federal and state air quality standards become more

stringent, the subject of air quality in the Shenandoah Valley will likely become a hot environmental issue. As of 2004, several locales in the region, and the Shenandoah National Park, were in non-compliance with the EPA air quality standards for ozone.

Early that year the Shenandoah Valley Air Quality Project (SHENAIR) was initiated under the auspices of the Northern Shenandoah Valley Regional Commission. The mission of SHENAIR, which was spawned in the Frederick County/Winchester area, is to study and improve air quality in the northern Valley. In order to gather data throughout the region, additional air quality monitoring stations will be required. Currently monitoring stations are located in Frederick County, Winchester, Front Royal, Luray, Harrisonburg, and the Shenandoah National Park.

Federal legislation in the form of the Clean Air Act requires EPA to establish National Ambient Air Quality Standards (NAAQS) and reevaluate those standards every five years. Virginia has an Air Pollution Control Law and supporting regulations to supplement the federal statute. In addition to ozone, other pollutants such as particulate matter, carbon monoxide, lead, nitrogen dioxide, and sulfur dioxide are governed by these statutes. Emission sources include power generating stations and large industrial facilities (some of which are located hundreds of miles upwind in Ohio, West Virginia, and western Pennsylvania), gasoline marketing and distribution centers, solvent-based paint processes, on-road vehicles, and off-road mobile sources such as farm and construction equipment and lawn and garden equipment.

One tool in the process of coping with air quality threats and maintaining ambient air quality within the prescribed standards is air quality modeling. Modeling can be used to simulate air quality events and concentrations, recreate air pollution episodes, determine causes and contributing factors, predict future conditions, test control strategies, and demonstrate success.

At this point in time, the subject of protecting air quality in the northern Shenandoah Valley is still in its infancy. While there is little that any one county can do on its own to stop pollution, a regional approach, such as the SHENAIR initiative, offers substantial promise of success. As a member of the Northern Shenandoah Valley Regional Commission, Shenandoah County should support the SHENAIR project.

8.0 Summary

The natural resources of Shenandoah County provide many opportunities, but also pose some severe environmental problems. Development should be guided away from areas with serious limitations, such as steep slopes, shallow depth to bedrock, flood plains, prime agricultural lands, wetlands, and sinkholes.

Forest areas and agriculture should be preserved as major natural and economic assets. Floodplains along the North Fork of the Shenandoah River and its tributaries must be protected, and riparian lands kept in their natural state. The water resources of the County must be protected, both surface water and groundwater. Because of the rock and soil conditions and the hydrogeological cycle, the water resources are directly inter-connected.

A first step was the development of the Shenandoah County Water Resources Assessment as part of the 1991 plan. Now the recommendations of that assessment need to be carried out by the Planning Commission and Board of Supervisors. Specific recommendations for water resource protection are included on pages 2-20 through 2-23 of this section.

The following points summarize the major efforts that are needed to implement those recommendations and to mount a comprehensive water resources management effort:

- Develop a comprehensive Shenandoah County Water Resources Plan which deals with both surface and ground water issues, and delineates and protects wells, wetlands, and sinkholes.
- Work with the other counties in the region to develop a Shenandoah Valley Regional Water Supply Plan.
- Look for long-term solutions for storm water management and non-point source pollution abatement.
- Monitor the progress of the Health Department and Department of Environmental Quality in their permitting and monitoring of individual alternative treatment systems.
- Consider special County ordinances which may require higher standards than the State for wells and septic systems.
- Explore a county-wide mechanism for the monitoring and maintenance of alternative and septic treatment systems.
- Participate in a regional approach to improving air quality by supporting the SHENAIR project.

Chapter 3:
Land Use

Content Updated August 2014
Design and Maps updated June 2016

1.0 Introduction

This chapter describes the history of land use regulation in Shenandoah County, depicts ways the land area of the County is utilized, and presents forward-looking policies to guide future land use activities within the unincorporated County boundary.

2.0 History of Land Use in Shenandoah County

From its earliest settlement by European settlers during the 1730s, Shenandoah County has been an extremely productive agricultural area. The strong tradition of agriculture is a key element of the Shenandoah County economy, landscape and culture and has always been widely and enthusiastically embraced by past and present generations of citizens. The Vision statement in the Comprehensive Plan, confirmed many times in recent years, states that "In the year 2025 Shenandoah County will still be a primarily rural community."

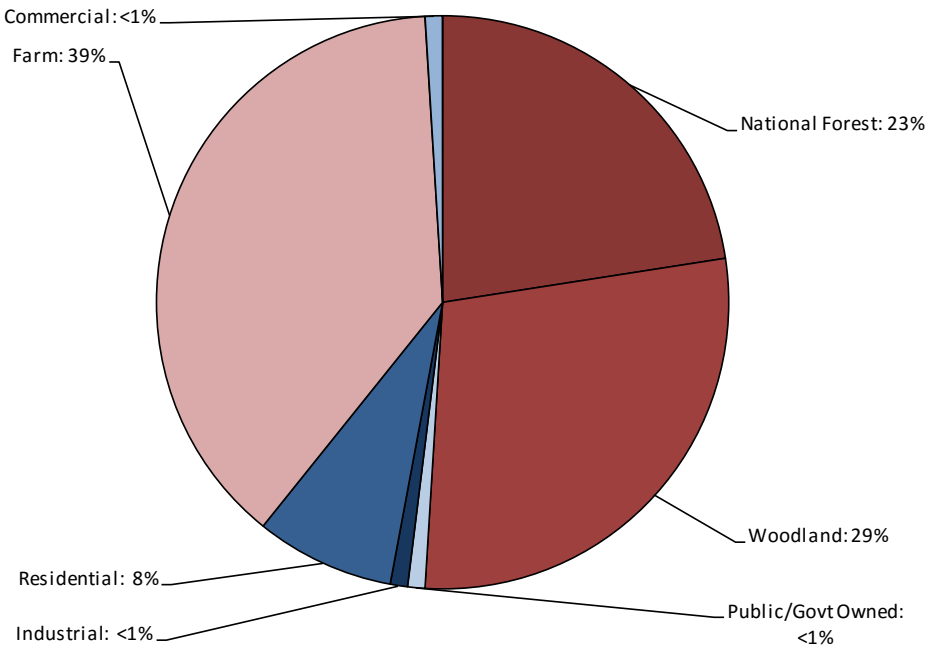
Before the 20th Century, landowners outside the towns of the county had few choices other than agriculture for productive use of their property. As a result, there was little need for local government to intervene to ensure the continued survival of the rural character of the county. During the 20th Century, as transportation systems improved and employment opportunities became more diverse, changes in land use patterns shifted away from open space. Subdivision of large, rural parcels for homes and other non-farm purposes became feasible and the rural character of the county was jeopardized. During the last several decades, a proliferation of small lots in the rural districts has occurred. Increasing numbers of residential units in the agricultural area and the creation of many parcels too small for agriculture prompted local government action to preserve Shenandoah County's rural character.

Local government management of land use through subdivision and zoning ordinances has been an option in Virginia since the 1940's. In the 1950's, the Division of State Planning and Community Affairs began providing technical assistance to encourage local governments to establish Planning Commissions, develop local plans, and implement the plans through land use ordinances. Towns are responsible for land use within their corporate limits, and counties are responsible for the unincorporated areas.

Actions of the General Assembly in the early 1970's contributed to increases in the level of planning by localities. The problems encountered in Northern Virginia and the Tidewater area, plus the spread of vacation home development in the Valley and other rural areas, indicated the need for local regulation. Requirements for

Figure 3-A: Proportion of All County Land Uses

Estimated from 2011 aerial photography

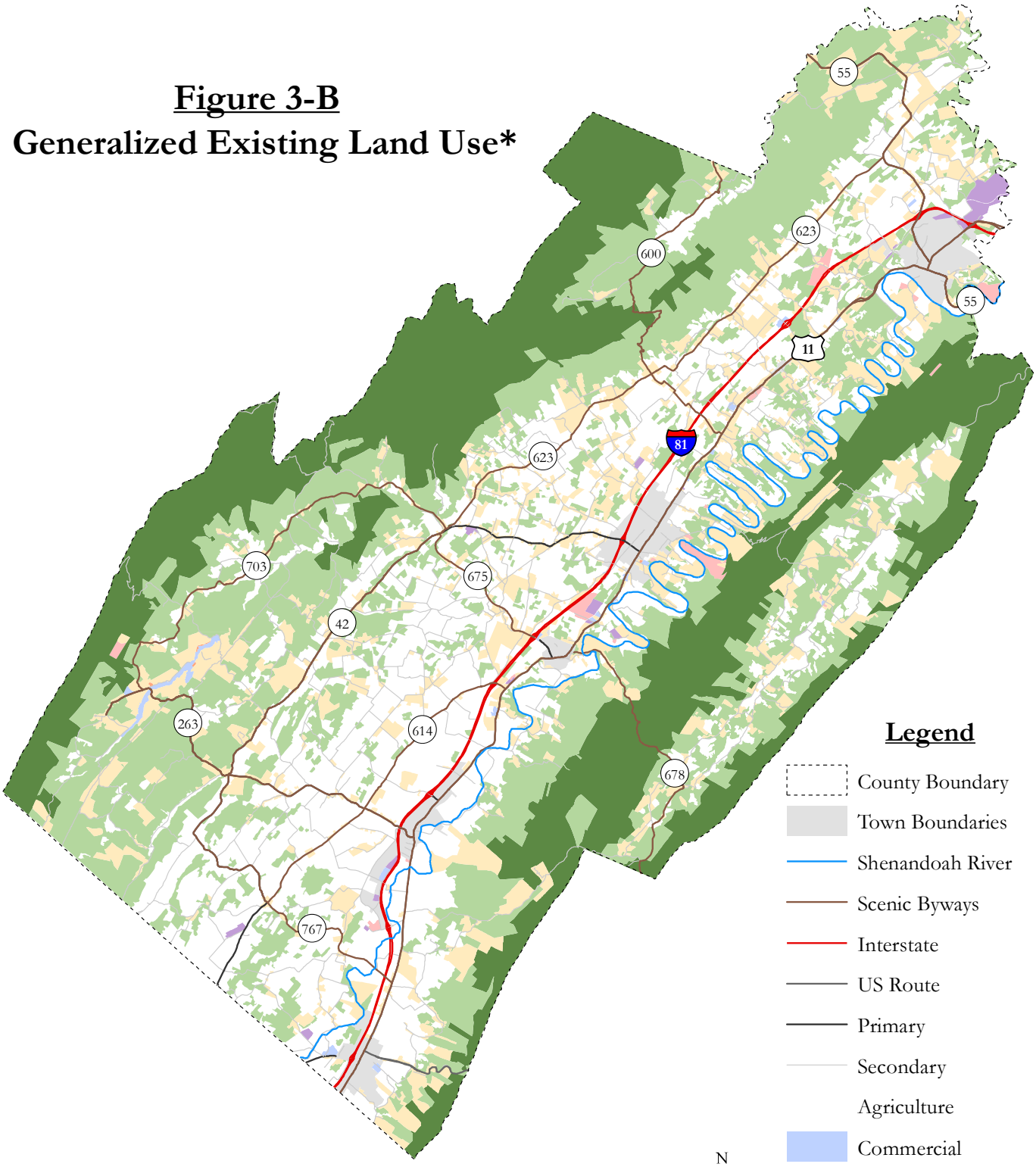


establishing local planning commissions by 1976, subdivision ordinances by 1977, and comprehensive plans by 1980 were included in the Code of Virginia. Zoning, however, is still a local option. The basic premise of zoning is to avoid land use patterns that cause activities on one property to inherently and negatively affect neighboring properties. Writing down the rules for land use is a necessary fact of modern life. Since the adoption of the 1973 Comprehensive Plan by the county, each of the county's six towns have adopted their own plans, and corresponding zoning ordinances to implement them. All towns also have subdivision ordinances.

Shenandoah County first established a planning commission in 1971, adopting its first subdivision ordinance in 1972. The Shenandoah County Comprehensive Plan 1990 was prepared with the Planning Commission by planners from the Virginia Division of State Planning and Community Affairs and adopted in 1973. This included a future land use map and recommendation for a zoning ordinance to implement it.

After the first plan adoption, a zoning ordinance was developed by the same state planners and presented for local adoption in 1975. A large crowd in a meeting at Woodstock's Central High School convinced the then Board of Supervisors that the citizens were not ready for a zoning ordinance to implement the County Plan. In 1976, the Planning Commission began working with staff from the Lord Fairfax Planning District Commission to develop a more appropriate zoning ordinance. In 1978, after much discussion and debate, Shenandoah County enacted its first set of land use (zoning) regulations. These regulations provided for basic zoning district types and created some restrictions on residential development in rural areas. In 2005, the frequency of allowable subdivision of parcels in A-1 (agriculture) and C-1 (conservation) zoning districts was set at one subdivision per three year period.

Figure 3-B
Generalized Existing Land Use*



* Note: This land use map is an estimation of how land was used based on a reviewof 2011 aerial photography. Land use does not reflect county zoning.

During the period from 2000 to about 2006, unprecedented residential growth occurred throughout the County, including development in the A-1 and C-1 zoning districts. Investigation of the impact of this residential development revealed that the existing land use and subdivision ordinances of Shenandoah County did not support the Vision statement in the Comprehensive Plan. In particular, over time, those regulations would facilitate the breaking up of large, rural parcels into thousands of small parcels which would not support sustained agriculture. The projected result of such partitioning would be the decline of agriculture and loss of the rural character of Shenandoah County in violation of the Vision expressed in the Comprehensive Plan. A further concern that developed during this period of rapid residential development was the cost of providing residential services (e.g. education and emergency services) in rural portions of the county.

3.0 The Community Planning Project

In 2008, Shenandoah County convened an effort, known as the Community Planning Project (CPP), to assess what policy changes, if any, were needed to achieve the long term goals reflected in the Vision statement of the Comprehensive Plan. The first step in the CPP process was to verify, through public participation, the Vision expressed in the Comprehensive Plan approved in 2005. Those guiding principles (shown at left) were overwhelmingly supported and confirmed by the many residents that participated.

In 2010, the CPP Steering Committee issued its final report with recommendations to achieve the Comprehensive Plan goals. Shenandoah County then passed a series of modifications to zoning and subdivision regulations (see top right, next page) to encourage the retention of large agricultural lots and discourage the creation of numerous small parcels in the A-1 and C-1 zoning districts.

4.0 Land Use Patterns

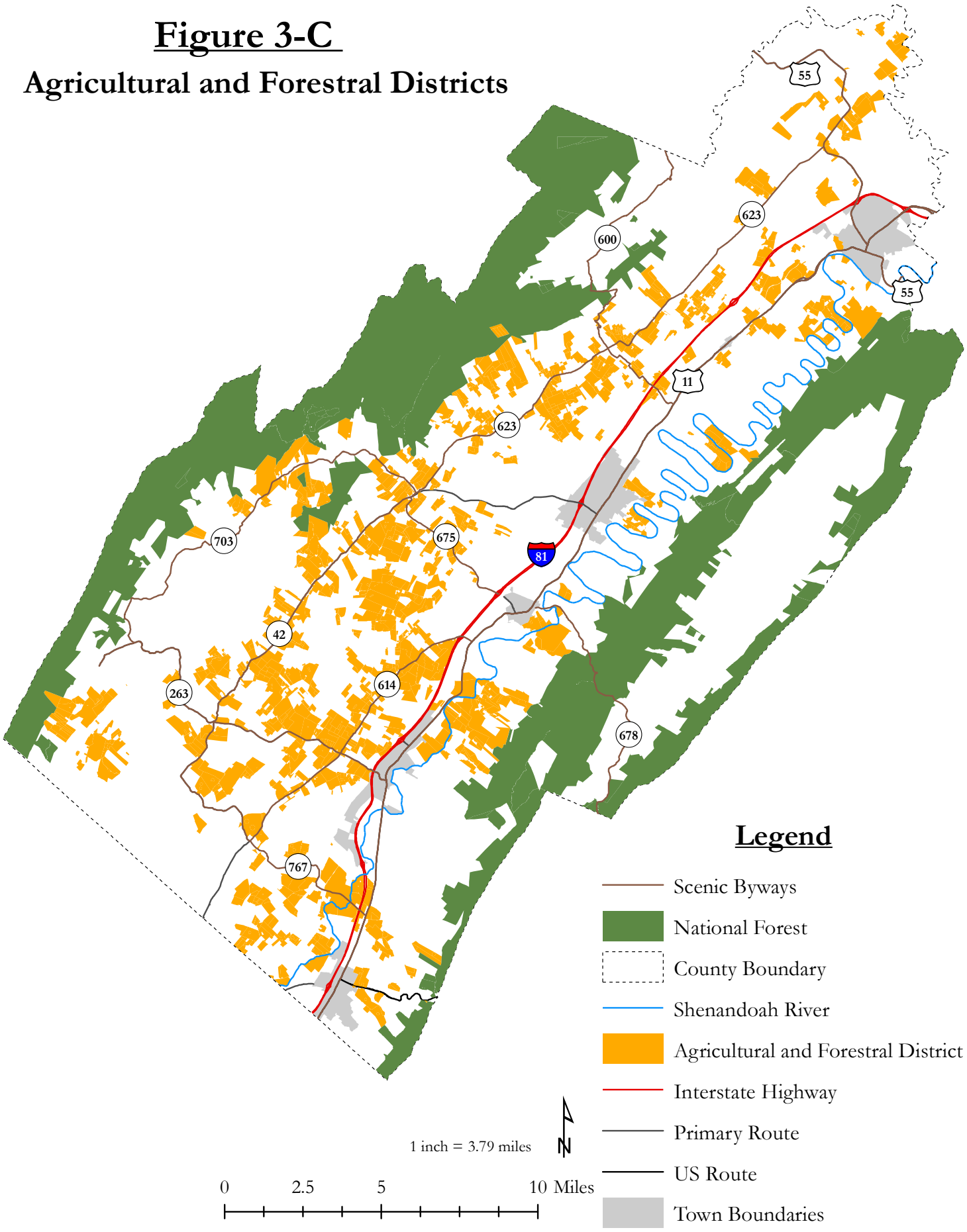
The general land use pattern of the County has not changed greatly over the past 40 years; Shenandoah is still largely rural, with the predominant land uses being farm and woodland. (See Figure 3-A for percentages of each type of land use, and see Figure 3-B for a map of land use distribution throughout the County.) Farm land includes crop and pasture land, orchards, animal feeding operations, and small tracts of timber. According to the 2012 Census of Agriculture, there were 980 farms in Shenandoah County comprising 133,519 acres.

4.1 Agricultural & Forestal Districts

Shenandoah County has 21 Agricultural and Forestal Districts (AFDs) encompassing over 46,000 acres (see Figure 3-C). These districts are rural zones dedicated to the production of agricultural products and timber and the maintenance of open space land as an important economic and environmental resource. The AFDs were established according to state guidelines with the

Figure 3-C

Agricultural and Forestral Districts



approval of the Board of Supervisors. AFDs constitute a voluntary agreement between landowners and the county that no new, non-agricultural uses will take place in the district for a period of ten years. Districts provide much stronger protection for farmers and farmland than does traditional zoning.

Agricultural and Forestal Districts provide the following benefits for landowners:

- eligibility for land use taxation;
- certainty that agriculture will be maintained in the area;
- protection from nuisance ordinances that would limit customary farming practices such as manure spreading;
- assurance that the district will be taken into account in local planning decisions such as rezonings; and
- protection, in many cases, from government acquisition of land.

From the county's perspective, AFDs serve the public good by maintaining the rural character of the community and protecting productive agricultural and forest lands.

4.2 Forested Lands

Roughly 23% of the unincorporated County can be classified Woodland. The George Washington – Jefferson National Forest contains approximately 78,250 acres of land in Shenandoah County, located along both the western and eastern edges of the County. It represents almost one-fourth of the entire land area of the County that will basically be preserved in its natural state and as managed timber land, thereby contributing to the County's air and water quality. Over half of the forested land in Shenandoah County is privately owned. These woodlands add to the economic vitality of the County, its natural beauty, and to the quality of life for its residents. The County's woodlands are used for recreation, watershed protection, wildlife management and for a variety of forest products. Over the past several decades a number of these privately held forest tracts have been subdivided for development, thereby creating a very fragmented forest resource. Having ownership of this forest land divided among multiple owners creates many challenges for resource managers as they attempt to assist landowners with managing the land for the more traditional uses such as forest harvesting and wildlife management.

4.3 Developed Land Uses

While the majority of land in the county is open space, the major types of developed uses—residential, commercial, and industrial—have increased considerably over the last several decades (see Figure 3-D). Land committed to residential development accounts for an estimated eight percent of the unincorporated area of the County. This represents a marked increase from the 1988 figure of less than five percent, and indicates a shift to larger lot sizes and increased interest in subdividing rural land for residential use.

Industrial and commercial land uses in the unincorporated areas more than doubled from 1988 to 2012, despite annexations of developed land by the towns over that period. Growth and development has taken place in two distinctive patterns over the 14 year period. Where public facilities were

Figure 3-D: Changes in Developed Land 1988-2012

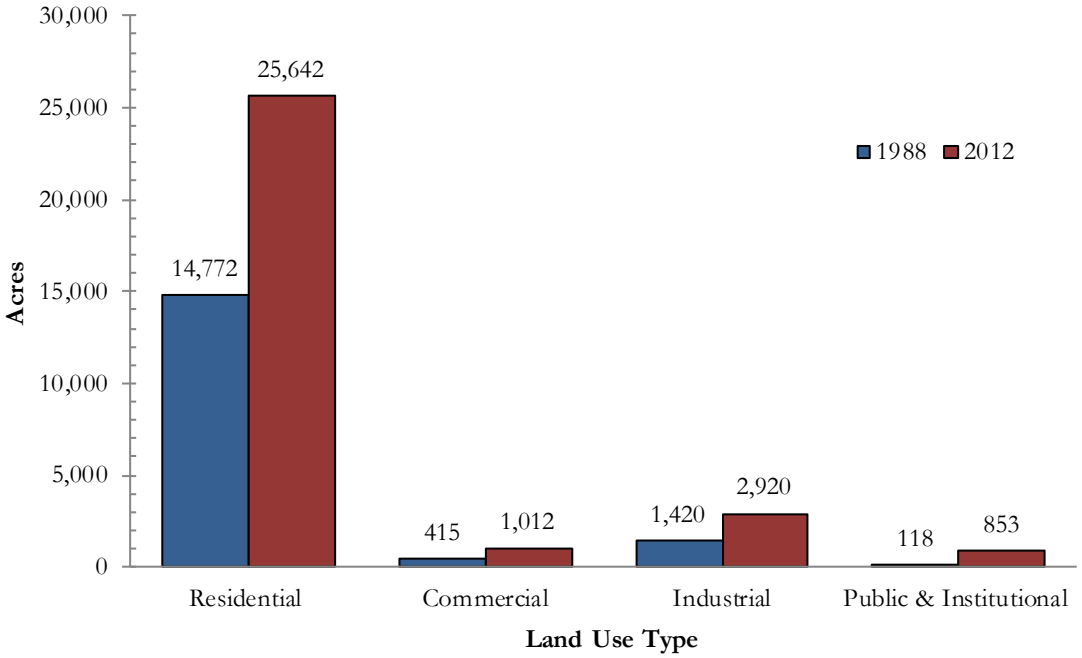


Figure 3-E: Population and Land Area 1980-2010					
Location	**'90 Pop**	**'00 Pop**	**'10 Pop**	**% Change '90-'10**	**Land Square**
Rural County	20,287	21,751	23,806	17	492.89
Basye / Bryce Mtn	300	986	1,253	318	2.16
Edinburg	860	813	1,041	21	0.76
Mt Jackson	1,583	1,664	1,994	26	2.77
New Market	1,435	1,637	2,146	50	2.03
Strasburg	3,762	4,017	6,398	70	3.57
Toms Brook	227	255	258	14	0.13
Woodstock	3,182	3,952	5,097	60	3.81

available, there was concentrated growth in and around the towns and the Bryce Mountain service area. Due to the availability of water and sewer, it was possible to construct several types of housing, including townhouses and apartments, as well as commercial and industrial facilities.

Outside of those areas, the growth has been primarily residential on spacious residential lots with individual on-site water and septic systems, and that growth was scattered throughout the County along rural secondary roads. This dispersed development, combined with topographic characteristics that isolate certain areas like Fort Valley and Cedar Creek, makes it impractical to economically serve remote neighborhoods with public water and sewer facilities, and it also impacts the County's natural resources, the secondary road network, and the ability to provide other community services.

The six incorporated towns in the County are located in a linear pattern

running northeast and southwest along Old Valley Pike (U.S. Route 11) from south of Cedar Creek, the Frederick County line, to the Rockingham County line at the southern end of New Market.

Table 3-A shows the population trends and approximate land areas for each of the towns and the Basye area. The population in the Basye area, a resort community, fluctuates seasonally; at times it is several times the permanent year-round population and may approach 3,000. Public facilities such as water, sewer, and roads must have the capacity to serve the maximum number of residents and commercial establishments, even though this capacity may only be needed for one or two periods in the year.

5.0 Development Trends

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5.1 Population and Housing Units

Table 3-B examines the growth which took place in Shenandoah County between 1980 and 2010. Overall, a third of the population growth and just over half of the increase in housing units took place outside of the towns in the rural portions of the County during this time period. As of 2010, 57% of the county population and 62% of housing units were in the rural areas. However, the trend since 2000 shows greater population and housing growth in the towns. Several factors have affected the type and amount of growth that has occurred in the county. Historically, there has been a strong second home/retirement home market in Shenandoah County over the last several decades. Also, the proximity to rapid growth and housing markets of Northern Virginia has contributed to recent growth in the northern part of the County in and near Strasburg, and to some extent in Woodstock.

The rate of housing growth increased rapidly from 2000 to 2006, but has since fallen dramatically. While the number of housing units constructed between 1980 and 2010 was slightly higher in the rural areas, the population growth was greater in the towns over the same period. Figures 3-E to 3-G display these growth trends.

5.2 Recent Development

In accordance with the Annexation Agreement between the County and the Town of Strasburg that was adopted in 1984, the town has been able to annex, by ordinance, developing areas that it serves with public utilities. Strasburg has annexed land along the Route 11 corridor between the downtown area and the I-81 interchange (including the industrial park, a shopping center, apartment and condominium complexes, planned residential development areas and many commercial areas).

Woodstock has been enlarged through a series of boundary adjustment agreements with the County as owners of undeveloped parcels adjacent to the

Figure 3-G Population Growth
Source: US Census Bureau

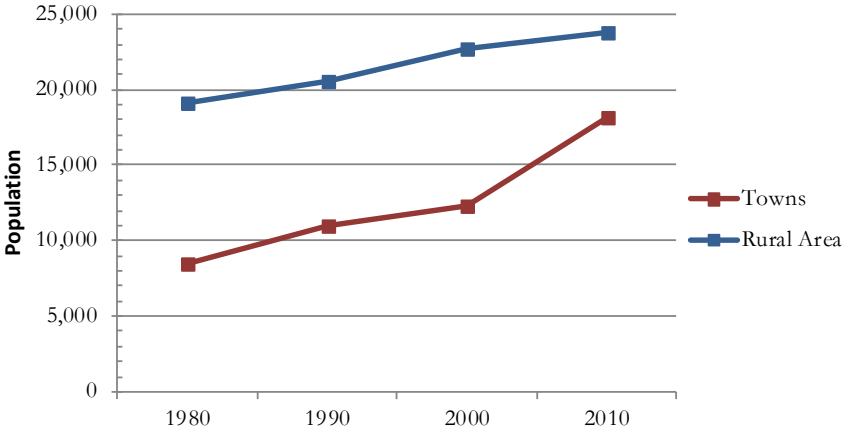


Figure 3-H: Housing Growth 1990-2010
Source: US Census Bureau

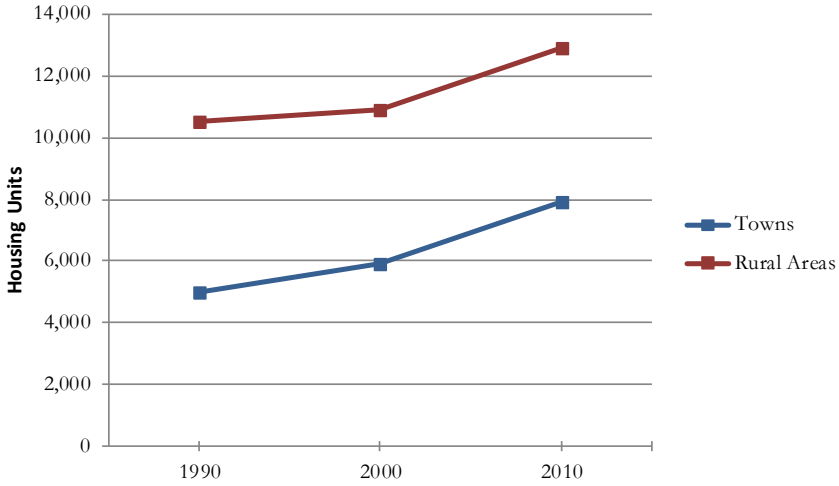
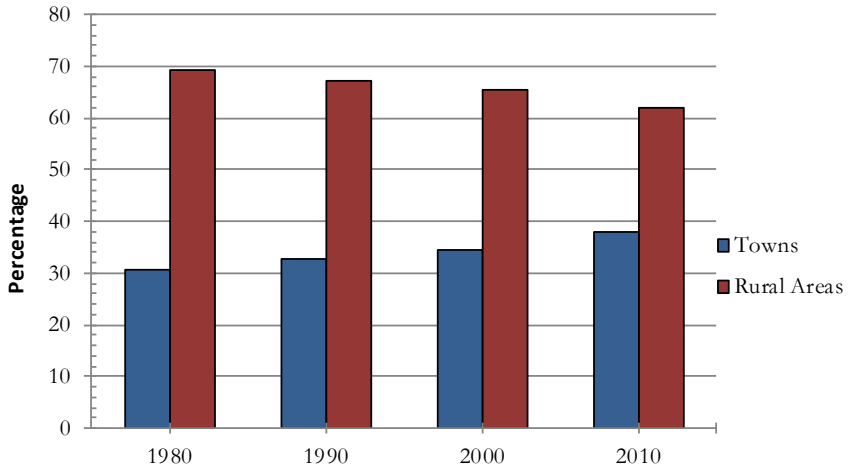


Figure 3-I: Percentage of Housing Growth in Rural Areas vs Towns
Source: US Census Bureau



corporate limits requested their properties be brought into the Town and have utility services extended to them.

In 2001, Mount Jackson also completed an Annexation Agreement with the County and proceeded to annex a 2.47 square mile area into the Town. There have been additional small annexations between 2002 and 2005 under the same agreement.

The industrial park in Mount Jackson continues to be developed with light industrial users. A second major industrial park, the Northern Shenandoah Industrial Park (NSIP), was developed in the northern end of the County. The NSIP provides easy access to I-81, and is served by rail and all utilities (including water, sewer, electricity, natural gas and broadband internet). It contains several major industries and plans are proceeding to create additional road access to and within the park to stimulate further growth. An agreement between the County and Strasburg allowed the Town to annex the NSIP as of January 2014. New Market has a Voluntary Settlement Agreement with the County, last amended in 2012, that outlines future growth of the Town.

5.3 Development Constraints

Due to soil and rock conditions, not all of the previously subdivided lots in the County will be buildable. In some cases multiple lots may have to be combined to obtain sufficient land for a well and a septic system. Where the ground is unsuitable for the approval of a conventional septic system, an alternative on-site wastewater disposal system may be required.

The topography of the land is another limiting factor. Although no current ordinance restricts development on steep slopes, construction on such slopes is limited by natural topography. In flood plains, no permanent buildings are allowed by ordinance, although uses such as parks and other recreational areas may be developed. A similar ordinance governing the development of steep slopes and ridgelines should be considered.

Access by the primary highway and secondary road systems can be another development constraint. There are many locations in the County that do not now have adequate roads, and some where the potential for creating them is very limited due to excessive grades, limited areas for rights-of-way or poor soils. Constraints imposed due to topography, geology, soils and water resources are discussed in further detail in Chapter 2, Natural Resources.

6.0 Impact of Land Use Practices on Water Resources

As stated above, most County land is used in agriculture or is woodland. Because of the amounts of land involved, the potential for polluted runoff from agricultural and forestal uses is one major concern for the quality of water in Shenandoah County. This could take the form of erosion and sedimentation, excess bacteria and nutrients from failed septic systems, animal waste and fertilization, and toxic substances such as herbicides, and pathogens. To avoid these problems, it is important that Best Management Practices (BMP's) be utilized for agricultural and forestal activities.

BMP's are practices or combinations of practices which will prevent or

reduce the amount of polluted runoff. Extensive catalogues of effective BMPs are available from the local Soil & Water Conservation District and several state environmental agencies. There are individual handbooks for Agriculture, Forestry, Sources Affecting Groundwater, Urbanized land uses, and others. Urbanized land uses include built-up areas (such as the towns), and residential, industrial, and commercial uses.

Potential stormwater runoff from urban and urbanizing areas include bacteria, fertilizers and pesticides, traffic-generated pollutants, chlorides from roadway deicing, and erosion and sedimentation from construction projects. As with agricultural and forestal lands, BMP's for urban areas should be followed. Because of the prevalence of karst in the underlying local geology and to the presence of many surface waters, it is of the utmost importance that good practices are followed in all development activities to prevent any degradation of the County's water supply.

7.0 Zoning

The County and all of the incorporated towns have enacted zoning ordinances to implement their land use plans. These ordinances control the types of uses permitted on the land, the density of development, and contain requirements for minimum lot sizes, lot widths, and building set-backs.
The County's zoning ordinance has districts designated for agriculture, conservation, residential, commercial, and industrial uses. In addition, there are "overlay" districts or additional regulations that govern such things as uses in flood plains.

The unincorporated areas of the County are subject to the Shenandoah County zoning ordinance. The zoning districts and the acreages which are covered by each are shown in Table 3-C. Figure 3-H (Shenandoah County generalized Zoning Map) shows the location and distribution of zoning districts, while Figure 3-I displays the proportions of each zoning type. It

Figure 3-H: Zoning Districts and Characteristics

Zoning District	Acreage	Percent
Conservation (C-1)	69,229	28.85%
Agriculture (A-1)	159,160	66.32%
Rural Residential – Conservation (RR-C)	0	0.00%
Rural Residential – Agricultural (RR-A)	0	0.00%
Low-Density Residential (R-1)	3,600	1.50%
Medium-Density Residential (R-2)	4,112	1.71%
High-Density Residential (R-3)	606	0.25%
Local Business (B-1)	77	0.03%
General Business (B-2)	654	0.27%
General Industrial (M-1)	2,348	0.98%
Limited Industrial (M-2)	202	0.08%

Figure 3-K
Generalized Zoning

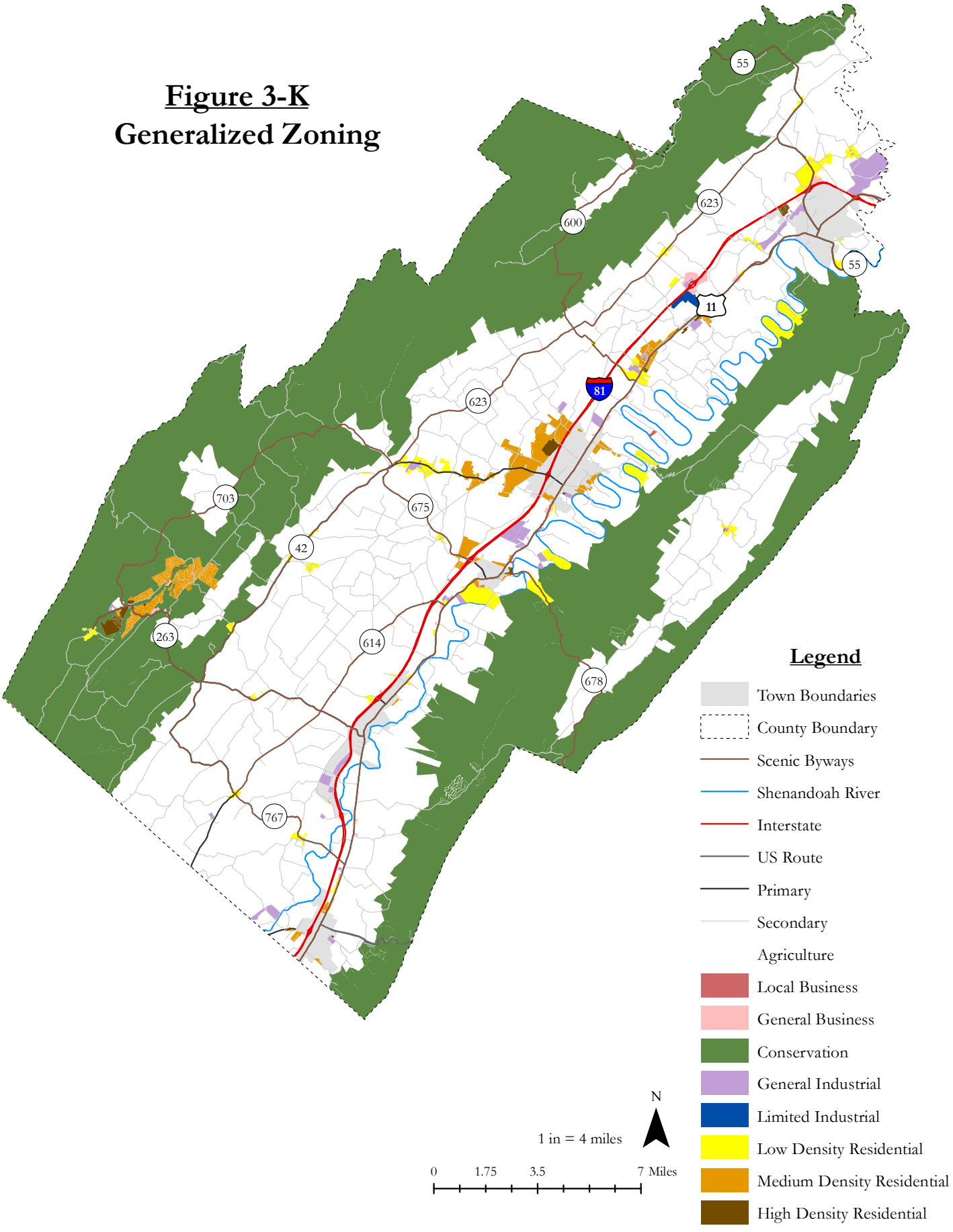
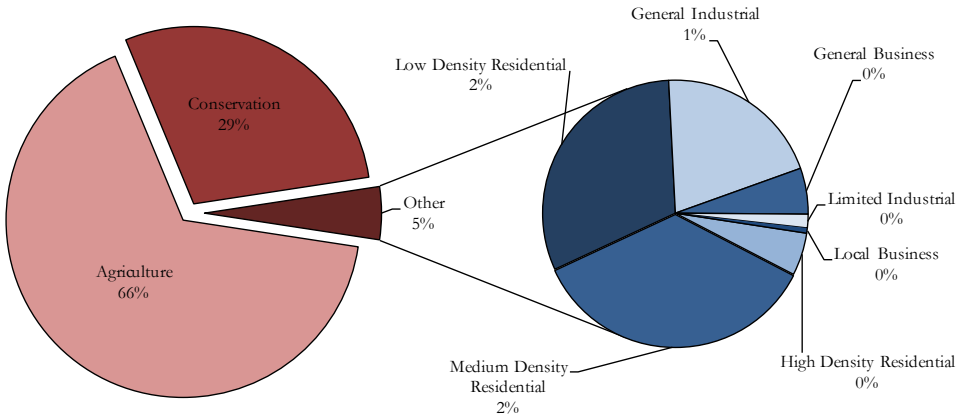


Figure 3-L: Acreage by Zoning District



is important to note that zoning and land use are not always the same (for example, it is common to have residential subdivisions as a use of land in areas zoned for agriculture).

The residential districts range from low-density areas which require a 30,000 square foot lot for a single family house (R-1) to an area which will allow a density of 20,000 square foot lots that could contain duplex units if public water and services are provided (R-3). Lower-density residential areas are located near several towns, in some rural "villages", and in several recreational subdivisions. Medium-density districts are located near towns and in the Basye/ Bryce Mountain area. New subdivisions being created in all of the residential districts require urban type services such as water, sewer, roads, curbs, gutters, sidewalks, underground utilities and street lights. The "high-density" designations are located within the Toms Brook-Maurertown Sanitary District and the Stoney Creek Sanitary District.

The two business districts are designed to provide for neighborhood convenience type shopping and services (B-1), and more general business operations and services which require frequent access from a major roadway (B-2). Local Business B-1 districts are located in the rural village areas, while General Business B-2 districts are located primarily at interchanges of I-81 and along the Old Valley Pike (U.S. Route 11).

The General Industrial District (M-1) is designed to permit limited industrial uses in order to encourage the development of the local economy. This classification is found in several areas of the County, with large parcels located in the County industrial park and in the Strasburg area.

A Limited Industrial District (M-2) is designed to permit "high tech" research and development type industries and other light industrial uses that generally assemble or process goods from parts that have previously been manufactured.

The Conservation District (C-1) covers parts of the County which contain various open uses such as forests, recreation areas, and farms. It is designed to promote the protection of such open lands and to protect the natural resources.

The Agriculture District (A-1) is designed to preserve the character of those areas where the major uses are agriculture and related uses, and is located primarily in a wide belt running northeast-southwest through the center of the County. Some residential uses are allowed in the conservation and agricultural districts. The required minimum lot size was raised to 3.5 acres in 2003 to reduce the number of lots that could be developed on agricultural land. In 2010, density and lot size requirements were separated. Overall subdivision density was decreased from one lot per 3.5 acres to one lot per 10 acres, and minimum lot size was decreased from 3.5 acres to 1.5 acres.

Two new districts were enacted in 2004: the Rural Residential - Conservation District (RR-C) and the Rural Residential - Agriculture District (RR-A). The purpose of these districts is to provide opportunities for low-density residential lots in areas of the county where there are primarily open uses, such as forests, recreation areas, lakes or streams, agricultural and other low-intensity uses predominate. Uses not consistent with the existing character of the districts are not permitted. As of this writing, no land had been rezoned into either Rural Residential category.

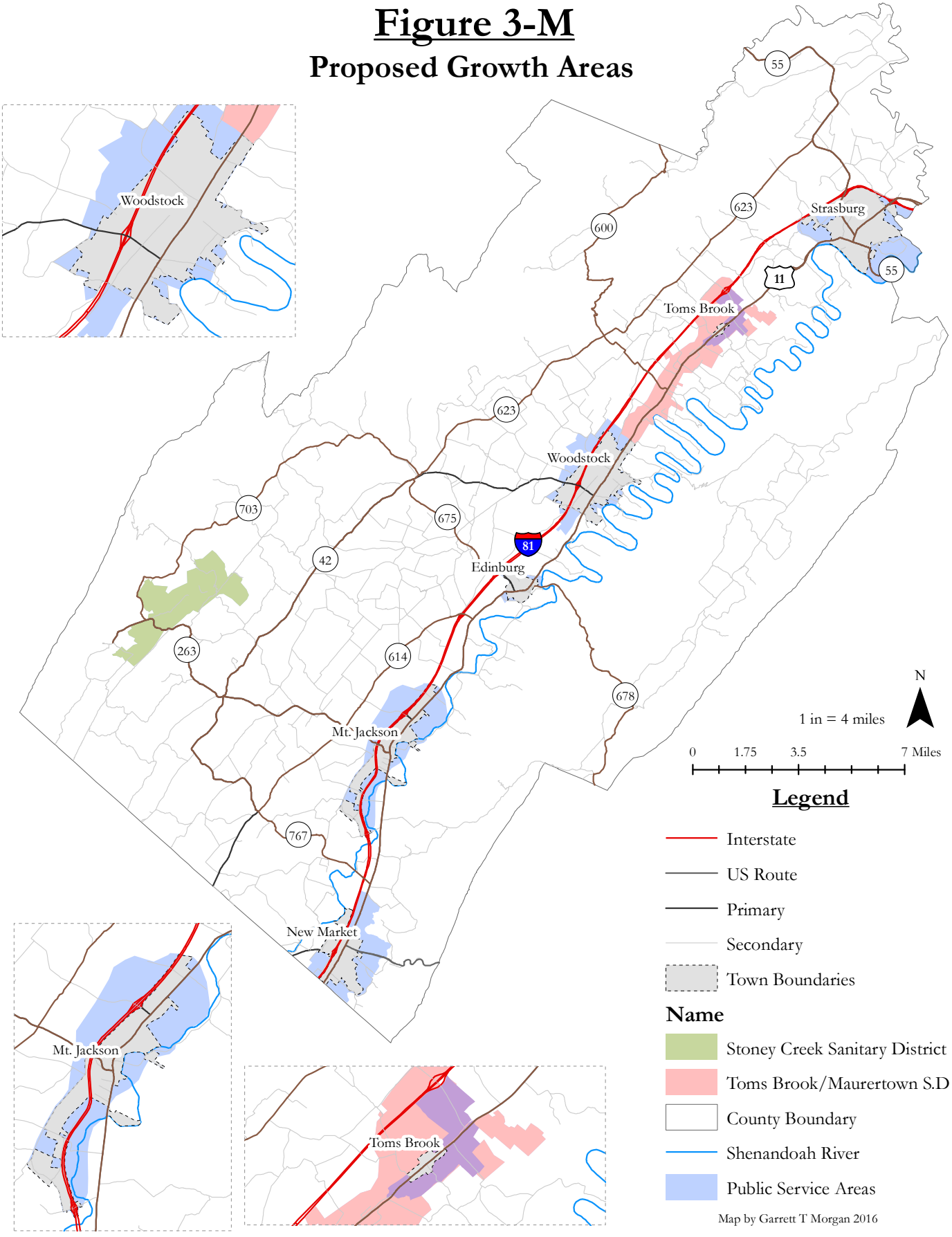
8.0 The Future of Land Use

One purpose of the Comprehensive Plan and its supporting ordinances is to provide guidance for the continued orderly growth of the County while maintaining its rural character and the quality of its environment. Efforts to manage the proliferation of small lots in traditional agricultural areas began with the establishment of zoning districts during the 1970s. Early efforts to preserve the rural and agricultural nature of the County concentrated on ordinances related to lot sizes and limitations on the allowed frequency of subdivision of individual parcels. Despite these ordinances, there was a significant growth in the number of small parcels in the A-1 and C-1 districts with a resultant threat to the rural character of the County and its water resources.

In order to preserve agricultural land and to prevent hazards to the ground and surface waters in the county, the County's future growth should be tied to the availability of public water and sewer facilities ("public service areas", or PSAs), with higher density allowed where utilities and services are available or planned to be available. Where individual water and sewage disposal systems must be used and rural secondary roads exist, only low density should be permitted. In order for the goals of the Comprehensive Plan to be met, the average density in the rural (A-1 and C-1) areas should not increase significantly during the period of the Comprehensive Plan.

Future growth areas have been proposed by each of the towns (see Figures 3-J and 3-K). The County has annexation agreements with Mt. Jackson, New Market and Strasburg. (Figure 3-K provides a detailed concept plan for the New Market Growth Area, as agreed to in the voluntary settlement agreement negotiated between the Town and the County.) These

Figure 3-M
Proposed Growth Areas



agreements specifically delineate the areas jointly targeted for future growth. Edinburg, Toms Brook and Woodstock have each published their intent to expand town boundaries into existing or planned PSAs. Those proposed growth areas are also displayed in Figure 3-J for reference purposes, but those three growth areas have not received County review and concurrence. The Toms Brook-Maurertown and Stoney Creek Sanitary Districts are also shown on the growth areas map. County ordinances and policies should encourage most new development (residential, commercial and industrial) to occur in and around the towns.

Changes in development techniques and technology will continue to occur and it is necessary to constantly examine the provisions of the approved plan to see if they conform to the stated Vision of the plan while meeting the needs of the County's citizens. Additional provisions that allow for flexible development and encourage developers to provide needed facilities should be explored and incorporated into the zoning and subdivision ordinances of the County consistent with channeling growth to the public service areas.

Finally, until the Vision of the Comprehensive Plan is modified, Shenandoah County's zoning and subdivision ordinances should be consistent with the following principles and procedures which were confirmed during the recently completed Community Planning Project:

- Creation of policies and ordinances that direct most residential growth to Towns and growth areas around the Towns and other public service areas
- Promote business and economic development in appropriately zoned areas
- Support for agriculture
- Management of rural residential development through overall density
- Provide for landowner flexibility in subdivision of existing parcels
- Allow for smaller, but fewer lots for development
- Preservation of large lots
- Encouragement and means for conservation of rural parcels
- Joint land use planning with Towns
- Consideration of ridgeline and steep slope ordinances
- Land use policies and ordinances should be protective of the quality and quantity of groundwater and surface water resources.
- Periodically evaluate and adjust policies and regulations to implement the Vision stated in the Comprehensive Plan.

4: ECONOMY or ECONOMIC DEVELOPMENT

1.0 Introduction

The purpose of this chapter is to provide guiding principles for economic development in Shenandoah County that adhere to the vision of the Comprehensive Plan, summarize Shenandoah County's economy, and identify trends and changes important to the county's economic vitality. The County economy has been examined several times before the comprehensive planning process began, first during the development of an Overall Economic Development Program in the late 1970s, and as part of meeting certification requirements of the Virginia Department of Economic Development's Community Certification program. Most recently the County's economy has been re-examined through updates to the Comprehensive Plan and a 2013 Economic Development Strategic Plan. In 2019 the County initiated a process to update the 2013 Strategic Plan. The following vision and guiding principles are intended to help guide that process.

Vision
By 2030, Shenandoah County will have a diverse economy driven by a population mix of citizens educated at high school, trade school, college and post-graduate levels. Economic opportunities will exist in technology, manufacturing, agriculture, small business, tourism and business innovation in a rural, historic, environmentally conscious area of the Commonwealth attracting, encouraging and balancing population growth with ever improving educational, recreational and governmental service.
Economic development in Shenandoah County is based upon the following principles:

Principle #1: Encouragement of agriculture and related businesses

The County and its citizens recognize and appreciate our strong agricultural heritage. In the most recent census of agriculture, this County ranked fifth overall of all Virginia counties in the dollar value of agricultural production. As agriculture and the related businesses that support and sustain agricultural production are expected to remain an important economic sector, the County will remain committed to policies and programs to strengthen our existing industry including land use valuation and other favorable taxation policies, encouraging enrollment of farms and open land into Agricultural and Forrestal Districts, use of the County Farm as a positive example for farm management and conservation, and making full and advantageous use of the County's Conservation Easement Program. To encourage added growth in this sector, the County will educate farmers on the programs and vast array of assistance through available educational resources to improve farm profitability from new products and production opportunities, diversification, value added products and agritourism. The County will also actively recruit additional agricultural related business including additional processing, equipment sales and repair, and new production and retail business opportunities presented by cooperative agricultural partnerships and farmers' markets.

Principle #2: Active Promotion of tourism based upon scenic, historic and recreational assets

Shenandoah County recognizes tourism as a leading industry along with agriculture with potential to contribute to the environmental, economic, and social viability of the community. Tourism activities will be focused on marketing Shenandoah County as a tourist destination based on its scenic, cultural, historical, natural and recreational assets across the state and region. The County

will assure that adequate resources are devoted to building capacity of existing businesses and cultivating opportunities for future tourism based enterprises to meet the needs of a changing population. Ongoing planning and analysis will determine future areas of growth and opportunity. Active promotion of attractions will be conducted in a manner that encourages the conservation of elements such as open space, historic buildings, and rural viewsheds.

Principle #3: Providing educational and vocational preparedness training consistent with career opportunities

Shenandoah County understands and values the significant importance of providing quality education not only for the benefits of students, but also for overall societal well-being. Changing demographics in the County will require increased levels of service related careers such as health care, elderly care, legal services, and a wide range of domestic assistance. The County will attract innovative, forward-thinking enterprises to promote new local employment opportunities. A wide variety of traditional trades will continue to be needed to support agriculture, tourism and other existing businesses. Educational and vocational training will match these diverse and forward-looking workforce needs and career opportunities locally and globally.

The County must engage businesses and manufacturers to identify skills and training that are needed to support a robust and employable work force. Building and maintaining strong partnerships and programs with local colleges, universities, and public and private educational facilities will help the County be responsive to changing and emerging needs in workforce training.

Principle #4: Recognition of existing businesses as a key, the County will support economic gardening

Local businesses are the foundation of our community. The County will support them through (1) regular communication, (2) training for people who seek the jobs needed for local businesses, i.e., services business training, retention and expansion, and (3) providing incentives that encourage a special connection with the community, allowing them to pursue expansion and diversification.

Principle #5: Encouraging the establishment of small to moderate scale businesses and industries in appropriate locations

Consistent with its vision of remaining a primarily rural and agricultural county, Shenandoah County will look primarily to smaller businesses for economic growth. This includes businesses employing less than 100 people, not placing undue burden on the County's natural resources such as clean water, open space, and attractive viewsheds. Light manufacturing, warehouse operations, and other commercial operations will be encouraged in existing industrial parks and other areas currently zoned for business and commercial use. Where the supply of appropriate sites is insufficient, limited rezoning will be considered. Special use permits will be carefully considered in terms of their impact on neighborhood areas including traffic, noise, and lighting.

Resources to be used for the establishment of new business include state and regional partnerships, the IDA, and Lord Fairfax Small Business Development Center. The County will consider tax incentives for the new or expanding businesses. The County will support the development of an incubator process for start-up businesses. The County will develop a process to identify the types of businesses most desired.

Principle #6: Encouraging entrepreneurship with incentives and a responsible regulatory climate

Economic progress is fueled by small business success. The County will foster an environment that encourages and promotes individuals to start new businesses. The County will work with the local Chamber of Commerce to establish a program to assist individuals wanting to begin their own business. Resources and assistance are available from the Lord Fairfax Small Business Development Center and Shenandoah County Chamber of Commerce. The County will continually review its regulations to ensure that barriers to small businesses do not exist. The County will consider incentives to promote business expansion.

Understanding the county's economic sectors, drivers, and challenges is important for developing a strategic plan that can pursue building a diversified portfolio of economic opportunity. A financially sound economic development program in the County will attract and retain industry from commercial, agricultural, and manufacturing sectors providing a balanced economic tax base. A well-rounded diverse tax portfolio will also strengthen the economy of Shenandoah County by helping it be more resilient to changes in markets and capable of withstanding a drop in one sector while other sectors can continue to generate revenue.

This chapter incorporates data from several sources. The best available recent data has been used for each specific topic, from a variety of State and Federal agencies including: Shenandoah County's Economic Development Strategic Plan: A Roadmap to the Future, the Virginia Employment Commission, the Weldon Cooper Center, the U.S. Bureau of the Census, and the Bureau of Economic Analysis. Due to multiple statistical methods and source data, some variation may be evident throughout the chapter; however, this does not affect the larger economic picture.

In accordance with the state code, this Comprehensive Plan presents existing conditions and trends of growth of the probable future requirements of the County. To guide a coordinated, adjusted, and harmonious development of the County, which will address existing conditions and the next 10-15 years, the trends identified herein point to the future needs and resources to best promote the prosperity and general welfare of the citizens of Shenandoah County. Updates to the Comprehensive Plan's Economic chapter have been evaluated and coordinated through the Citizen Advisory Committee to reflect current growth and projected trends.

2.0 Labor Analysis

2.1 Labor Force

A thriving economy relies on the workforce labor pool in the County. Maintaining a trained workforce in a variety of business sectors including manufacturing, industry, commercial and agriculture will improve the County's economic profile. Below is a description of the existing labor pool.

Labor force refers to the number of persons living in Shenandoah County who are 16 years of age or older employed or seeking work, either within the County or elsewhere. Of the two basic labor force components-- armed forces and civilian--the military portion consisted of only a small number of persons. Accordingly, only the civilian labor force is considered in this study. In Shenandoah County, according to the 2017 American Community Survey data from U.S. Census Bureau for employment data, 61.3% of the total County population over 16 years of age were in the civilian

labor force. Over 94% of the civilian labor force was employed, and 58% of the total County population over age 16 years were employed. The survey revealed 5.19% of the civilian labor force was unemployed. Those found not in the labor force include people in the Armed Forces, and all others in the 16 years of age and older population not classified as members of the civilian labor force.

Below, in Figure 4-1, is a table of the Labor Force Data and historic results for comparison.

Figure 4-1: Shenandoah County Workforce

	2010	2015	2016	2017
Total Civilian population 16 years and over	33,432	34,469	35,040	34,718
Civilian labor force	21,159	21,275	21,396	21,287
Employed	20,013	19,990	20,212	20,182
Unemployed	1,146	1,285	1,184	1,105
Not in labor force	12,270	13,194	13,540	13,380

Sources: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates. The margin of error is less than 2% for each category. Descriptions of each category can be found here https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF

In Figure 4-1, it is important to note the 2017 American Community Survey (ACS) data is the most recent available and involves collecting data from a sample of people, versus a survey from all people as the decennial censuses do. Therefore, note there will be a margin of error for the 2015 ACS data when comparing to previous years of decennial census data. Prior to the 2010 Census, data on industry, and class of worker were collected on the decennial long-form (File 3); however, from 2010 to present, the data now is collected through the ACS. Therefore, when comparing data to determine trends, one is cautioned to use the decennial long-form File 3 for data prior to 2010 and the ACS data for characterizing data from 2010 to present. Because of this difference in methodology data prior to 2010 is not presented.

2.2 Labor Characteristics by Industry

The resident labor force is classified in two different ways by the Bureau of Census ACS. The first is by the industry, and the second is by occupation. This section provides a description of employment by industry.

Figure 4-2 depicts the County population occupations in various industries based on the 2011-2015 U.S. Census Bureau American Community Survey (ACS) 5-Year Estimate from table S2405. Due to the U.S. Census industry classification changes from the ones currently in the last edition of the County Comprehensive Plan, it is not possible to compare previous years' data. Figure 4-2 breaks down the employed civilian persons by industry sectors for years 2015, 2016, and 2017.

Figure 4-2 Employment by Industry in Shenandoah County

	Total by 2015	Total by 2016	Total by 2017	Percent change from 2015 to 2017
Civilian Population Employed (16+ years)	19,990	20,212	20,182	1.0
Agriculture, forestry, hunting, and mining	767	923	689	-10.2
Arts, entertainment, recreation, accommodation, and food services	1,606	1,544	1,429	-11.0
Construction	1,638	2,069	1,994	21.7
Educational Services, health care, and social assistance	4,021	3,883	4,215	4.8
Finance and insurance, and real estate and rental leasing	671	700	772	15.1
Information	539	482	563	4.5
Manufacturing	3,340	3,222	2,679	-19.8
Other services, except public administration	915	815	948	3.6
Professional, scientific, management, administrative, and waste management services	1,538	1,605	1,616	5.1
Public administration	1,027	1,211	1,163	13.2
Retail Trade	2,386	2,475	2,675	12.1
Transportation and warehousing, and utilities	1,034	862	942	-8.9
Wholesale Trade	508	421	497	-2.2

Sources: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates Table S2405. The margin of error is less than 2% for each category.

The data in Figure 4-2 represents Shenandoah County civilian citizens employed regardless of the location of that employment. Figure 4-2 indicates the predominant field of employment is educational services, health care, and social administration. The second largest industry employing Shenandoah County employed civilians is manufacturing, followed by retail trade. It is important to note that these data refer to the job where a person worked the greatest number of hours. According to the 2012 Census of Agriculture approximately half of farm operators in Shenandoah County indicated their primary occupation was something other than farming. While the figures for employment in agriculture, forestry, hunting, and mining look comparatively low to other industry categories many farmers that contribute to the local economy have second jobs off the farm.

The ACS five-year data indicates a stable percentage of the total population (aged 16 and older) employed in the civilian labor workforce. For example, in 2017 the ACS data revealed 20,182 employed civilians in the total population (16 years and older) of 34,718 for 58% employed. In the 2015 and 2016 five-year ACS data, the percentage was 58% and 57%.

In Shenandoah County, the largest percentage gains from 2015 to 2017 of nonfarm jobs occurred in Construction (21.7%), Finance and insurance real estate (15.1%), Public Administration (13.2%), and Retail Trade (12.1%). Eight industrial sectors added jobs from 2015 to 2017 while five industrial sectors lost jobs.

2.3 Labor Characteristics by Occupation

The data for employment by occupation from 2015 to 2017 is presented in Figure 4-3.

The two leading occupation groups for County residents in all three years were “management, business, science, and arts occupations” at 28-30% and “sales and office occupations” at 22%. Production, transportation, and material moving occupations represented 16-19% of the employed civilian population, and service occupations were 16-17%. Natural resources, construction, and maintenance occupations had the least percentage of employment at 12.5-14%.

All occupations had net increases from 2015 to 2017, except for "Production, transportation, and material moving occupations" which had a net decrease of 568 (14.7%). The occupations are displayed in Figures 4-3.

Figure 4-3: Occupations of Employed Residents

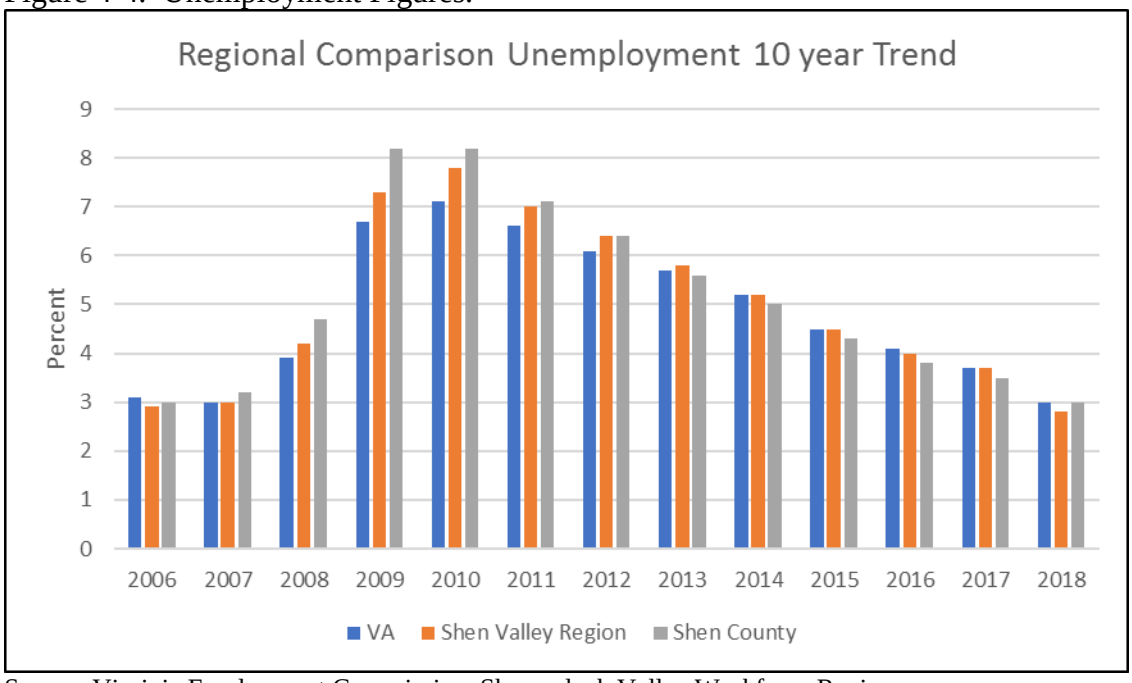
	Total by 2015	Total by 2016	Total by 2017	Percent Change from 2015 to 2017
Civilian Population Employed (16+ years)	19,990	20,212	20,182	1.0
Management, business, science, and arts occupations	5,715	5,864	6,062	6.1
Service occupations	3,531	3,335	3,567	1.0
Sales and office occupations	4,379	4,365	4,482	2.4
Natural resources, construction, and maintenance occupations	2,509	2,927	2,783	10.9
Production, transportation, and material moving occupations	3,856	3,721	3,288	-14.7

Sources: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates Table S2405. The margin of error is less than 2% for each category.

2.4 Unemployment

A twelve-year view of the regional unemployment rate during 2006 through 2018, profiles Shenandoah County as having higher unemployment in 2006 through 2011 than the surrounding Shenandoah Valley workforce region, but lower 2013 through 2017. This data is presented in Figure 4-4.

Figure 4-4. Unemployment Figures.



Source: Virginia Employment Commission, Shenandoah Valley Workforce Region.

The monthly unemployment rate in Shenandoah County in December 2018 was 2.5%, while the state rate for the same month was 2.6% and the regional rate was 2.5%.

3.0 Employment/Work Force Composition

3.1 Shenandoah County

The County's employment is divided into basic and supporting employment. Basic employment industries sell most of their goods and services outside the County. Manufacturing and farming are considered basic industries and are subject to national and regional demands. The nonbasic industries provide support to the basic industries. This supporting sector markets their goods and services locally. These industries include wholesale and retail trade, construction, finance, insurance, real estate, and most services along with local and routine state government functions. Most supporting industries rely upon the basic industries and local economy rather than regional and national markets. The Virginia data for the second quarter of 2018 noted the top ten employers in Shenandoah County, shown below in Figure 4-5.

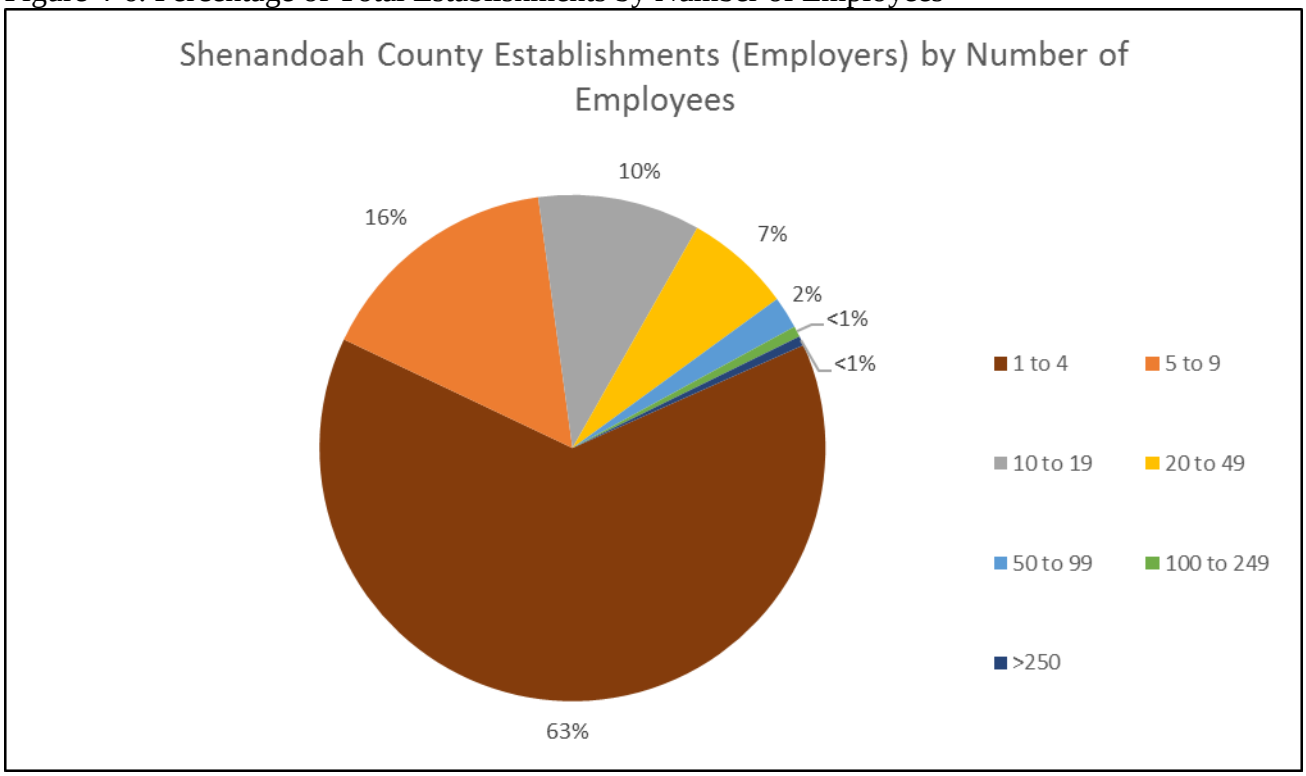
Figure 4-5: Shenandoah County Major Employers

Figure 4-5: Shenandoah County Major Employers	
Employer	
Shenandoah County Public Schools	
George's Chicken, LLC	
Shentel Management Company	
Bowman Andros Products	
LSC Communication US, LLC	
County of Shenandoah	
IAC Strasburg, LLC	
Valley Health Care System	
Masco Builder Cabinet Group	
Wal-Mart Associates	

Source: Virginia Employment Commission, Economic Information & Analytics, Quarterly Census of Employment and Wages (QCEW), 2nd Quarter (April, May, June) 2018.

As depicted in the Figure 4-6 below, the majority of establishments (employers) 743 out of 1,169 in Shenandoah County have under five employees, this pattern parallels Virginia employers by size of establishment.

Figure 4-6. Percentage of Total Establishments by Number of Employees



Source: Virginia Employment Commission, Economic Information & Analytics, Quarterly Census of Employment and Wages (QCEW), 3rd Quarter (July, August, September) 2018.

3.2 Regional

While the county's office of Economic Development is actively engaged in attracting new businesses to Shenandoah County, the county is also participating in local and regional economic development with multiple agencies and organizations to increase economic opportunities with a diversity of jobs. Partners include the Shenandoah County Industrial Development Authority, GOVirginia, Shenandoah Valley Workforce Development Board (SVWDB), and the Shenandoah Valley Partnership (SVP). Shenandoah County staff and elected officials or designees are members appointed to both the SVP and the SVWDB. Shenandoah County makes annual financial contributions to the SVP as part of its membership.

The Shenandoah Valley Partnership (SVP) is a public- private partnership to support economic success for businesses. The footprint of the SVP includes the counties of Shenandoah, Page, Rockingham, Augusta, Highland, Bath, and Rockbridge. Through regional cooperation, the SVP brings together business, government, and education leaders to attract new business to the area, help existing businesses expand, and guide strategic workforce development to grow and sustain a healthy economic future for the Shenandoah Valley region. The SVP collaborates with localities and the SVWDB to hold high school and college training programs.

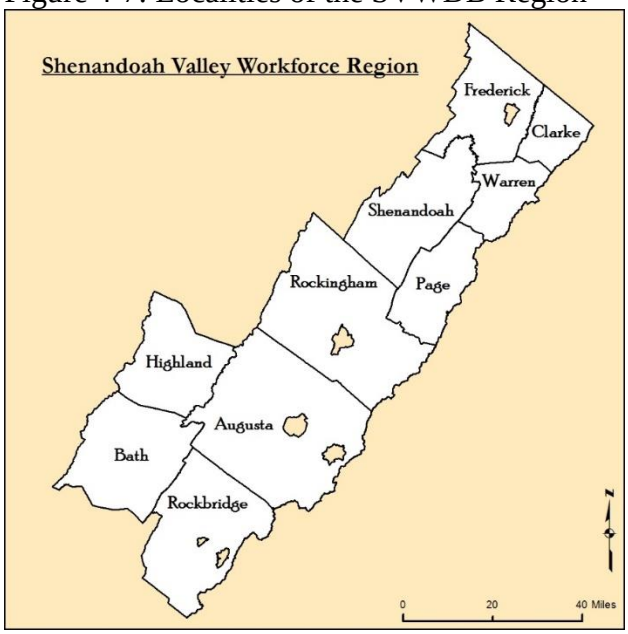
The Virginia Growth and Opportunity Board and Fund (GOVirginia) was approved by the 2016 Virginia General Assembly, and is a business-led, bipartisan initiative that is incentivized by the state with voluntary participation by localities. Shenandoah County is a member of the Region 8 GOVirginia region that covers the same footprint as the Shenandoah Valley Workforce Development Board region of 10 counties spanning from Frederick and Clarke to the north, to Rockbridge and Bath Counties in the south. GOVirginia is a collaborative initiative of private businesses, local governments, and state agencies administered by the Virginia Department of Housing and Community Development (DHCD). GOVirginia boosts local and regional economic development efforts by engaging business, education, and community leaders collaboratively in each region, and encouraging statewide partnering to maximize efforts. GOVirginia leverages local and regional economic efforts to attract greater financial and technical assistance supporting private-sector growth and job creation. GOVirginia ties local economic development efforts into the "New Virginia Economy" Plan and the Virginia Chamber of Commerce's "Blueprint Virginia" Strategic Plan.

The Virginia Employment Commission (VEC) prepares regional and local demographic data. The VEC work force labor data is presented for Shenandoah County compared to the surrounding counties in the Shenandoah Valley Workforce Development Board (SVWDB) area.

The SVWDB region covers a ten-county area stretching from Frederick and Clarke Counties to the north and Bath and Rockbridge Counties to the south.

The Valley region is depicted on the map below in Figure 4-7.

Figure 4-7: Localities of the SVWDB Region



By leveraging marketing and outreach resources throughout the larger region, Shenandoah County receives multiple benefits being part of the Shenandoah Valley Workforce Development Board. An additional economic partnership is realized through the County's membership with the Shenandoah Valley Partnership. The SVWDB retained an economic analysis of the manufacturing workforce in 2016, as a follow up to the 2013 study and prepared a report entitled "The SVWDA State of the Workforce Report – 2017 by Magnum Economics."

The findings of that analysis revealed an aging workforce in the manufacturing industry with an age composition higher than the national average with 25% of the workforce over 55 years of age in manufacturing. Based on surveys, 12% of the Shenandoah Valley workforce is expected to retire in the next five years.

The SVWDB report recommended a strategy to address skill shortages with aging workforce that includes a 5-Step Registered Apprenticeship Program. This involves older workforce mentoring younger hires, working with the community and local schools (K-12 through community colleges), and partnering with labor organizations to develop internship programs and training in areas of needed skills for local manufacturing.

The Shenandoah Valley 2017 State of the Workforce Report (Magnum Economics, 2017) presented the regional population growth rates for the years 2010 through 2015 and revealed a high growth rate in persons aged 65 years and over. The Workforce Report also indicated the greatest ethnic/race growth as Hispanic. The Workforce Report noted that the overall population growth in the region between 2000 and 2015 was comparable to the state average population growth. The region's population reflects losses in persons aged 19 years and younger,

The SVWDB commissioned Chmura Economics & Analytics to assess the manufacturing industry and workforce in the Shenandoah Valley region. In 2017, the economic report was released by Chmura with the following key findings for the SVWDB region:

- Age composition depicted 24% of all industries had workers 55 years and older, with 25% of manufacturing workers were 55 years and older.
- On average, the report indicated 12% of workforce are expected to retire in the next five years (2014 third quarter data).
- Firms surveyed indicated they hire 30% high-skilled employees and 23% of their low-skilled employees from outside Shenandoah Valley region
- 61% of firms use staffing agencies to fill vacancies
- An apprenticeship program partnering employers, schools, and agencies can improve workforce readiness and help fill employer needs.

Shenandoah County, in relation to other localities in the Shenandoah Valley Workforce Development Board footprint, had a 1% growth in employment from 2015 to 2016, which was less than the regional average of 1.9% employment growth.

The 2017 SVWDB Workforce Report presented the one-year change in total employment in the Shenandoah Valley region, by employer ownership category. The results from 2015 to 2016 in total employment change by ownership category is presented below. The private sector high growth represents primarily the Health Care sector. Although, in 2014 Health Care declined below the region's overall private sector; recent trends have indicated Health Care is once again a high performing employment sector rising above the regional private total (SVWDB Workforce Report, Jan. 2017, Magnum Economics). The private Manufacturing sector declined during the five-year period of 2011 through 2016, during the second quarter (Q2). The rate was a -2.5% in contrast to the 6.9% overall increase in the total private sector employers during the same time (Workforce Report, 2017, Magnum Economics). More information on the SVWDB can be found at https://vcwvalley.com

Commuting Patterns

As of 2015, approximately 7,214 persons live and work within Shenandoah County. Over 11,300 working residents commute out of Shenandoah County to work in other localities. Top localities workers commute to are Winchester City and Counties of Frederick, Fairfax, Warren, and Loudoun. Over 6,000 commuters from other localities travel to work in Shenandoah County, primarily from Rockingham, Frederick and Page Counties. (U.S. Census Bureau, OnTheMap Application and Census Longitudinal Employment Household Origin Destination Employment Statistics, 2015).

4.0 Agricultural Economy

This section highlights the role the agricultural sector plays in the County's economy and visions to promote and enhance agricultural entrepreneurship. According to the most recent U.S. Department of Agriculture's Census of Agriculture (2012), Shenandoah County ranks 5th in the state

for total value of agricultural products sold. The land area in Shenandoah County devoted to agriculture is 133,519 acres, or approximately 41% of the total land area. Since Shenandoah County is a rural area as opposed to an urbanized area, an analysis of the agricultural economy is vital to understand how it relates to Shenandoah County's economy as a whole. In addition to information provided in this section, a summary of agricultural data for the county can be found at: https://www.nass.usda.gov/Publications/AgCensus/2012/Online_Resources/County_Profiles/Virginia/cp51171.pdf

The total market value of all agricultural products sold in 2012 was $128,766,000, almost double the revenue from agricultural products sold in 2002. While these figures indicate a substantial rise, much of it can be attributed to inflation rather than an increase in farm production. In Figure 4-23, below, net dollar values are given for comparison.

Figure 4-8:

MARKET VALUE OF AGRICULTURAL PRODUCTS SOLD

(Value in $1,000)	1997	2002	2007	2012	2017
Total Market Value of All Products Sold	$73,044	$69,658	$101,766	$128,766	

Source: Census of Agriculture, 1997, 2002, 2007, 2012, 2017.

The number of farms in Shenandoah County is presented in Figure 4-9. The greatest number of farms are those sized 10 to 49 acres and 50 to 179 acres. These mid-size farms are located throughout the landscape.

Figure 4-9: Shenandoah County Farms by Size from 1992 to 2012

Farm Size (Acres)	1997	2002	2007	2012	2017
1-9	67	59	90	107	
10-49	230	349	399	341	
50-179	317	370	339	322	
180-499	181	166	162	162	
500-999	35	34	36	28	
1,000+	11	11	17	20	
Total	841	989	1043	980	

Source: USDA Census of Agriculture 1997, 2002, 2007, 2012, 2017.

Agricultural entrepreneurialism is a focus area of the Shenandoah County Community Development office. Many tourists visit Shenandoah County to experience the open farmlands against the mountain backdrop. Additionally, locally grown products are being endorsed by local restaurants and industries, Chamber of Commerce, and Shenandoah County's tourism department. Farm2Fork is an event supported by Shenandoah County and counties and businesses throughout the Valley. At this one-day event, farmers are connected with large-scale consumers throughout Virginia, West Virginia and Washington, D.C. Lasting partnerships between producers and buyers are created, allowing producers to market directly to buyers. Local foods are also promoted through the public school system to raise awareness of eating local heathy foods and support County producers.

To help this important sector of the County's economy remain viable, several methods are being used. There are 18 Agriculture and Forestal Districts (AFDs) encompassing over 38,000 acres of agricultural and forested land. These districts prevent land from being taken out of agricultural production for a period of ten years while providing enrolled landowners several incentives in return. In accordance with State Code, there is a Board-appointed AFD Advisory Committee that supports the AFD program and annual renewals. More information about AFDs can be found in Chapter 3 of the comprehensive plan http://shenandoahcountyva.us/planning/comprehensive-plan/ and on the County website at https://shenandoahcountyva.us/ag-forest/.

Permanent easements are used to keep land in agricultural use when landowners are willing to voluntarily give up the right to develop the land for non-agricultural uses. Shenandoah County has easements held by private and semipublic holdings. In addition, the County is the holder/ co-holder of three easements located within the County. There is a Board appointed Conservation Easement Authority to support the County easement program. More information on conservation easements can be found: https://shenandoahcountyva.us/conservation/

The County's zoning ordinances direct growth to areas near towns or sanitary districts where central water and sewer service exists, while reducing development elsewhere in the County.

5.0 Tourism

According to the Virginia Tourism Corporation, tourism-generated revenue in 2017 totaled $223,671,059 in Shenandoah County (including the towns) and ranked highest in the 11 jurisdictions located in the Shenandoah Valley region. There were 1,835 tourism-related jobs in 2017, which is a 28% increase since 2000. The Shenandoah County department of tourism reports visitors spent an average of $612,797 per day during 2017. Bryce Resort, Shenvalee Golf Resort, Shenandoah Caverns, the American Celebration on Parade, the Civil War Battlefields, and an increased interest in agritourism (wineries and breweries, pick-your-own farms, etc.), have all contributed to these revenues. In 2017 Shenandoah County tourism generated $6.6 million in local taxes and supported 1,835 local jobs with salaries totaling nearly $38 Million. It is expected that tourism related jobs will continue to increase in the future.

6.0 Income Analysis

6.1 Income and Wages

Based on the U.S. Census American Community Survey (ACS) 2017 data estimates, the income for Shenandoah County households is summarized below in Figure 4-10. The estimated median household income in Shenandoah in 2017 was $53,934. Statewide the median household income was $68,766. The ACS household income estimates includes eight types of income:

- wage or salary,
- self-employment (both farm and non-farm),
- Interest, dividends, net rental income, royalty income, or income from estates and trusts,
- Social Security or Railroad Retirement income,
- Supplemental Security Income (SSI),
- Public assistance income (does not include payments for hospital or medical care or Food Stamps),
- Retirement, survivor, or disability income,
- All other income.

Detailed descriptions of each income type can be found in the American Community Survey 2017 Subject Definitions at the US Census Bureau website.

Figure: 4-10: Households by Income Brackets Shenandoah County and Virginia

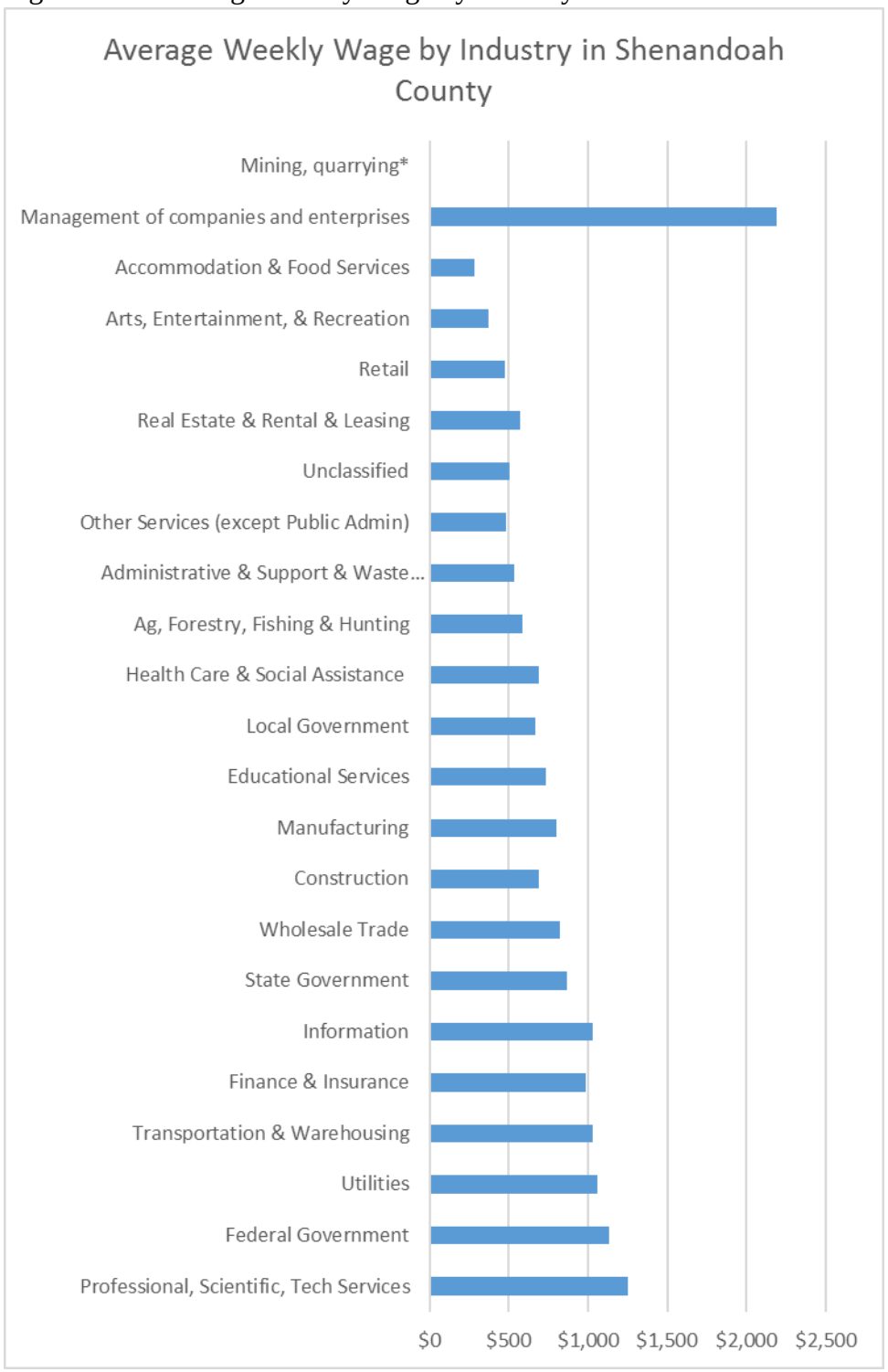
Household Income (IN 2017 INFLATION-ADJUSTED DOLLARS)	Percent of Households Shenandoah County	Percent of Households Virginia
Total households	17,262	3,105,636
Less than $10,000	6.4%	5.5%
$10,000 to $14,999	4.7%	3.8%
$15,000 to $24,999	11.0%	7.8%
$25,000 to $34,999	9.4%	7.9%
$35,000 to $49,999	15.8%	11.7%
$50,000 to $74,999	20.4%	17.1%
$75,000 to $99,999	14.3%	12.8%
$100,000 to $149,999	11.6%	16.4%
$150,000 to $199,999	4.2%	7.8%
$200,000 or more	2.2%	9.2%

Source: U.S. Census American Community Survey (ACS) 5 year estimates, 2013-2017

Per capita personal income for 2017 is $43,015 according to the Federal Reserve Bank of St. Louis which incorporates income received by persons from all sources including wages and salaries, supplements to wages and salaries, proprietors' income with inventory valuation and capital consumption adjustments, rental income of persons with capital consumption adjustment, personal dividend income, personal interest income, and personal current transfer receipts, less contributions for government social insurance. This measure of income is calculated as the personal income of the residents of a given area divided by the resident population of the area. Additional sources for per capita income are available that calculate income using different methods. For example, per capita income in 2017 according to the ACS was $27,016 but does not include income from capital gains, money received from the sale of property (unless the recipient was engaged in the business of selling such property) among other sources.

The data in Figure 4-11 provides a summary of Shenandoah County wages by industry. Additional resources detailing population, income, and demographics are presented in Chapter 5, of this Comprehensive Plan. The Shenandoah County Community Profile developed by the Virginia Employment Commission offers much additional data and information and can be found at the following website:
http://virginialmi.com/reportcenter/communityprofiles/5104000171.pdf

Figure 4-11: Average Weekly Wage by Industry



Source: Virginia Employment Commission, Shenandoah County Economic Profile, 2nd Qtr 2018
*No data available for the industry of mining/quarrying.

7.0 Economy and Budget

Shenandoah County maintains economic expenditures and through an annual budget and Capital Improvement Plan. The annual budget cycle is summarized below. The five year Capital Improvement Program Plan can be viewed on our website at: https://shenandoahcountyva.us/wp-content/uploads/2013/11/FY-2016-CIP-Program-Summary-Final-ADOPTED.pdf

County Finance and Taxation

The County Board of Supervisors (CBOS) provides financial oversight for and is the primary taxing authority for our county government including public education. However, it should be noted, that incorporated towns (i.e. Woodstock) within the county boundaries have additional taxing authority. Those living within the boundaries of these towns are subject to both county and town taxation receiving services from both.

The general practice is to adopt a balanced budget and to maintain an unassigned fund balance (reserve) of at least 12.5% of general fund expenditures. For the last several years Shenandoah County has maintained an unassigned fund balance exceeding 12.5%. In 2017, the CBOS adopted a 70-million-dollar budget to provide services within county boundaries. In general terms, the budget provides funding for education (37%), public safety (22%), county administration (4%), and other county services including debt service (37%). Funding for the county is provided from taxes on real and personal property (62%), State and Federal funds (22%), and other local sources (16%).

The budget process begins in November and ends in April when the CBOS adopts a final budget and sets the year's tax rate. During the budget process all departments of government - including the Shenandoah County Public Schools (SCPS), sheriff's office, fire and rescue, and courts - submit a proposed budget which is considered by the CBOS during any number of public budget work sessions. Individuals or groups may request an audience at a work session or regular meeting to solicit public funds for public/private partnerships.The budget is further discussed at regular CBOS meetings and culminates with the announcement of a proposed tax rate, final public hearing, and subsequent vote. The vote is twofold; 1) to establish the current year's tax rates and 2) to adopt the next fiscal year budget. Subsequently, revisions to the budget may be made by the CBOS throughout the year, however, the tax rate is set for the year.

For example, tax rates (per $100 assessed value) for FY 2018 were as follows: real estate and mobile homes ($0.64); for automobiles, machinery and tools ($3.90); and for merchants' capital ($0.60). In 2018 a home, mobile home, or property valued at $150,000 would be taxed at $960. An automobile or recreational vehicle valued at $15,000 would be taxed at $585. Payments are due and payable in two installments on June 5th and Dec 5th.

To further provide for transparency in government, a report is issued for public review at the end of each fiscal year, July 1 - June 30. In 2017 the *Government Finance Officers Association*

awarded a Certificate of Achievement for Excellence in Financial Reporting to the County of Shenandoah. Comprehensive financial reports for previous fiscal years can be found on the County website. In addition, detailed financial reports for the SCPS can be found on the school's website.

8.0 Summary

The economic base of the County has slowly changed over the past several decades. Textiles were the dominant manufacturing industry for many decades, with plants in several of the towns as well as in the unincorporated area. There are no longer any active textile plants remaining in the County.

Manufacturing is still the classification that has the highest percentage of local jobs (although that percentage is falling). It is worth noting that several of the manufacturing enterprises and service industries that are located here are dependent upon the agricultural base for their existence.

Approximately 42 percent of the jobs in the County are in the industries which provide the County's economic base. Those "basic" industries are industries which sell most of their goods and services outside the County, thus bringing to the County revenue from other areas. Much of the County's basic employment is in manufacturing, but the composition of those manufacturing jobs is changing with advancements in technology and automation.

The manufacturing sector of the economy has decreased both in the number of employees and percentage of total employment between 1990 and 2010. Significant increases in employment and in total distribution have occurred in recent years in tourism in Shenandoah County.

Changes in the occupational distribution of the County's residents indicate a continued shift from blue collar to white collar type jobs. This trend may be due somewhat to those who have recently moved into the County but still retained their jobs in other areas, and now commute out to maintain their higher-skill and higher-pay employment.

The agricultural economy is a very important part of the County's overall economy. Livestock, poultry and their products account for most of the market value of all agricultural products sold. Many farmers also have second off the farm occupations that contribute to the local economy.

Historically, Shenandoah's unemployment rate had been higher than the State and the Planning District. Beginning with the late 1980s, the County's yearly average unemployment rate has been lower than both the State's and the Northern Shenandoah Valley Region.

The income of Shenandoah's residents has historically been lower than the average of the region and of the State, and it remains so as of the year 2017. It is also considerably lower than that of those living in the Northern Virginia/D.C. metropolitan area, providing an incentive for some residents to commute to those areas. In fact, twice as many workers commute to jobs outside the County as commute into the County from elsewhere.

Economic analysts agree that a locality's economic viability in the 21st century depends upon a quality work force in terms of basic education, continuing education to upgrade skills and a positive work ethic to maintain a critical mass of employable workers. To achieve the economic vision set forth in this chapter the county will need to attract different kinds of business and industry – ones

that require a better educated workforce, a more highly skilled workforce, a more technically oriented workforce, and a more knowledge-based workforce. Such companies hire mostly college graduates and pay substantially higher wages and salaries. Recruiting such companies requires a collective community effort to create a business-friendly climate and a targeted effort, perhaps on a regional basis, to recruit the right kind of companies to build or relocate here.

Chapter 5:

Population and Demographics

Approved by Board of Supervisors August 23, 2016

1.0 Introduction

Shenandoah County's policy decisions and growth strategy are determined by current and projected demographics and socio-economic conditions. Despite rapid growth between 1980 and 2010, the County's population has stabilized and is only expected to experience marginal growth or decline. While the population has stabilized, the age break down of county residents has shifted dramatically. In the coming years and decades, the school age population is expected to continue its decline as the average age of county residents' increases.

This is due to three factors: first, that current residents are aging and not having as many children as they once did; second, young people are not moving to the county like they were in the 2000s and therefore are not starting families here; and third, the new retirees moving to the county, especially those from Northern Virginia. An older population with fewer school aged children presents unique policy and service delivery challenges and opportunities for the public, private, faith based, and non-profit sectors.

The charts, graphs, and descriptions are designed to meet three related goals: first, to illustrate historical demographic conditions and trends. Second, to provide a snapshot of the conditions between 2010 and 2015, depending on data availability. And third, to project the demographic changes will likely occur out to the year 2040 and the policy implications of these projections.

1.2 Snapshot of Current Conditions

Since the 1980s the county has experienced significant growth driven by a strong housing market, its close geographic proximity to Northern Virginia, and an influx of retirees and second home buyers. Economic growth in Rockingham and Frederick Counties has also increased housing demand, especially in the southern and northern parts of the County.

The County's growth rate peaked in the mid-2000s before the financial crisis and housing market collapse. While the population continues to rise, the rate of change has decreased significantly. In 2010, for example, the total population of Shenandoah County was 41,993. The Weldon Cooper Center estimates that the population on July 1, 2015 was 42,228; an increase of 235 residents or 0.6% between 2010 and 2015. The growth rate between 2010 and 2015 is in contrast to what the County experienced between 2000 and 2005, where population increased by 2,526 or 6.0%.

While the population growth rate has fallen, the average age of a county resident continues to rise. In 2010, the average age of a county resident was 43.1. Other counties in the Shenandoah Valley also have average ages of over 40, which are higher than both the Virginia average of 37.5 and the national average of 37.2. Not only is the County older, but it also has a lower birthrate.

Children are not being born fast enough to replace aging baby-boomers, who are often integral to economic, social, and cultural organizations. If these trends continue, which they are expected to do, county and town governments, area health care providers, and social service agencies are likely to see an increased demand for their services while at the same time feeling the pressure to operate more efficiently with fewer resources in times of slowing economic growth.

This is particularly important in Shenandoah, where retirees from outside the County comprise a major source of in-migration. With growth occurring in both towns and unincorporated areas at similar rates, providing sufficient services to new homes and businesses outside of current public service areas will require greater investment by the public and private sectors and may require changes to existing County policies and procedures.

2.0 Data Sources & Description

This chapter describes the county's population including its size, characteristics, and geographic distribution; discusses the components of change in the population; and outlines population projections to the year 2040. Data are derived from the US Census Bureau's Decennial Census and annual American Community Survey; Virginia Department of Health; the Center for Disease Control; the Weldon Cooper Center for Public Service and Demographics Research Group at the University of Virginia; and the Housing Assistance Council. Additional qualitative and quantitative analysis is provided by the United States Department of Agriculture's Economic Research Service. Brief definitions of these sources are provided below.

The ***United States Decennial Census*** counts every resident in the United States. It is mandated by Article 1, Section 2 of the Constitution and takes place every 10 years. The data collected by the decennial census determines the number of seats each state has in the US House of Representatives and is also used to distribute billions in federal funds to local communities. In 2010, approximately 74% of households nationwide returned census forms by mail while the remaining households were counted by census workers walking neighborhoods throughout the United States.

The ***American Community Survey (ACS)*** is an ongoing survey that provides vital information on a yearly basis about the US and its people. Information from the survey generates data that help determine how more than $400 billion (2016) in Federal or State funds are distributed each year. Through the survey, the Census Bureau learns about jobs and occupations, educational attainment, veterans, whether people own or rent their home, and other topics. The information helps communities plan hospitals and schools, support school lunch programs, improve emergency services, build bridges, and explore new economic opportunities.

The ***Centers for Disease Control (CDC)*** works 24/7 to protect

Americans from health, safety, and security threats, both foreign and in the US. As the nation's health protection agency, CDC conducts critical science and provides health information that protects the US against expensive and dangerous health threats, and responds when these arise.

The ***US Department of Agriculture's (USDA) Economic Research Service's*** mission is to inform and enhance public and private decision making and policy issues related to agriculture, food, the environment, and rural development. With over 300 employees, The Economic Research Service is a primary source of economic information and research in the USDA.

The ***University of Virginia's Weldon Cooper Center for Public Service*** is a research and training organization focused on the Commonwealth of Virginia. The Center provides objective information, data, and applied research. The Cooper Center's 60 member staff (2016) includes experts in public management, demography, economics and public finance, political science, leadership and organizational development, workforce issues, and survey research.

The ***Demographic Research Group*** at the Weldon Cooper Center produces the official annual population estimates for Virginia and its localities; conducts practical and policy-oriented analysis of census and demographic data under contract; and communicates rigorous research and its policy implications to clients including state and local governments, employers, non-profit organizations, and the general public through meaningful, intuitive publications and presentations.

In between census years, the Center calculates intercensal population estimates by analyzing changes in housing stock, school enrollments, births, deaths, and driver's licenses issuances. The data are used by state and local government agencies in revenue sharing, funding allocations, planning, and budgeting. Importantly, the data sourced in this chapter are the industry standard for demographic analysis, which allows for comparisons between the current conditions and trends in Shenandoah and other counties in the Commonwealth.

The ***Virginia Department of Health (VDH) Division of Health Statistic's*** mission is to assure access to timely, comprehensive, population based health data to support community needs assessments, evidence based policy and program decisions, and evaluations of health outcomes and services. Data is collected via vital records, through the use of surveys, and by partnerships with other public and private entities such as the US Census Bureau and National Center for Health Statistics.

The ***Housing Assistance Council (HAC)*** is a national nonprofit organization that supports affordable housing efforts in rural areas of the United States. Their Rural Data Portal aggregates information from public data sets including the US Census, ACS, and Home Mortgage Disclosure Act. The portal further divides the data into subgroups that are useful to gain a more detailed look into the county's demographics as well as when comparing Shenandoah to similar

counties in the commonwealth

For example, the HAC developed a sub-county designation of rural and small-town areas which incorporates measures of housing density and commuting at the Census tract level to establish a precise measure of rural character. The Center describes the classification system as follows: "This alternative residence definition includes six classifications: 1) rural, 2) small-town, 3) exurban, 4) outer suburban, 5) inner suburban, and 6) urban." The first two rural tract classifications, small town and rural, are the most applicable to the conditions in the County.

Small towns are defined by census tracts with 16 to 64 housing united per square mile (.025 to 0.1 housing units per acre) and a low degree of commuting to a metropolitan core area identified by a United State Department of Agriculture's Economic Research Service (USDA ERS) designated Rural Urban Commuting Area Code (RUCA) score of 4 or higher. Rural tracts are defined by areas with less than 16 housing units per square mile (.025 housing units per acre). For perspective, the County's average is 41.3 housing units per square mile (.064 housing units per acre). With the exception of certain census block groups in Woodstock and Strasburg, all of the County meets these rural or small town designations.

3.0 Boundaries & Geographic Regions

In addition to the small town and rural categories described above, the data in this chapter also include information about the County's neighboring localities, the Northern Shenandoah Valley region, and the Commonwealth of Virginia. The Northern Shenandoah Valley region is defined by the jurisdiction of the Northern Shenandoah Valley Regional Commission (NSVRC). The NSVRC encompasses the five counties in northwest corner of Virginia including Clarke, Frederick, Page, Shenandoah, Warren and all jurisdictions within as well as the City of Winchester. The NSVRC exists to bring these local governments together to pursue common goals, work together on regional issues and find efficiencies through collaboration.

Occasionally in this chapter, figures will exclude Winchester City data in order to better compare Shenandoah with more rural and suburban localities in the district. Where this occurs a notation will be provided.

At a larger scale, the Center divides the Commonwealth into eight region's with similar geographic, demographic, and economic characteristics. These regions include: Central, Eastern, Hampton Roads, Northern, Richmond, Southside, Southwest, and Valley-Mountain. Shenandoah is in the Valley-Mountain region. This region encompasses all counties located along the western border of the commonwealth and runs north to south between the Allegheny Mountains to the west and the Blue Ridge Mountains to the east. The majority of the population in the Valley-Mountain Region lives along Route 11, which runs parallel to Interstate 81.

4.0 Population Growth

Population growth occurs through two sources: natural increase and

Figure 5-A
Census Tracts 2010

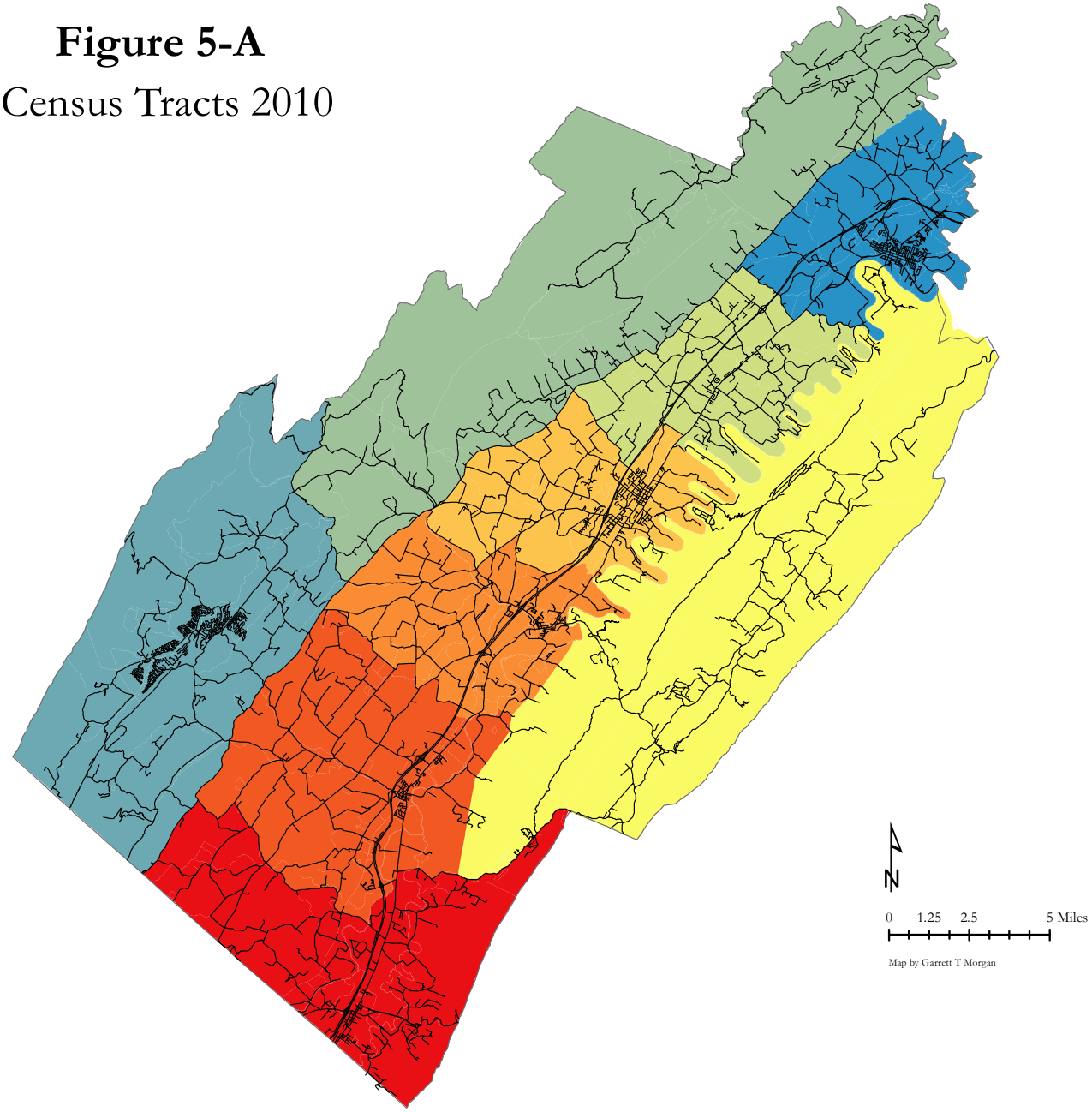


Figure 5-A:
County Census Tracts in 2010

Census tracts are relatively small statistical subdivisions of a county delineated by a local committee of census data users for the purpose of presenting data. Census tracts nest within counties, and their boundaries normally follow visible features, but may follow legal geography boundaries and other non-visible features in some instances. Census tracts ideally contain around 4,000 people and 1,600 housing units.

Source: US Census Bureau, 2016

net in-migration. Natural increase is the difference between the number of births and deaths in a year. Natural increase is dependent on fertility rates or the number of children born per 1,000 women of a childbearing age (15-50 years). Death rates are determined by individual health, access to preventative healthcare, and age. Net in-migration is the number of people who leave subtracted from the number of people who move into the locality each year. Even without significant in-migration, however, population growth does not mean that more children are being born as much as it highlights that people are now living longer.

Since the baby-boom generation of the post-World War II period, the United States has not experienced another boom in births from women in

Figure 5-B: County Population 1860-2015

Source: US Census Bureau

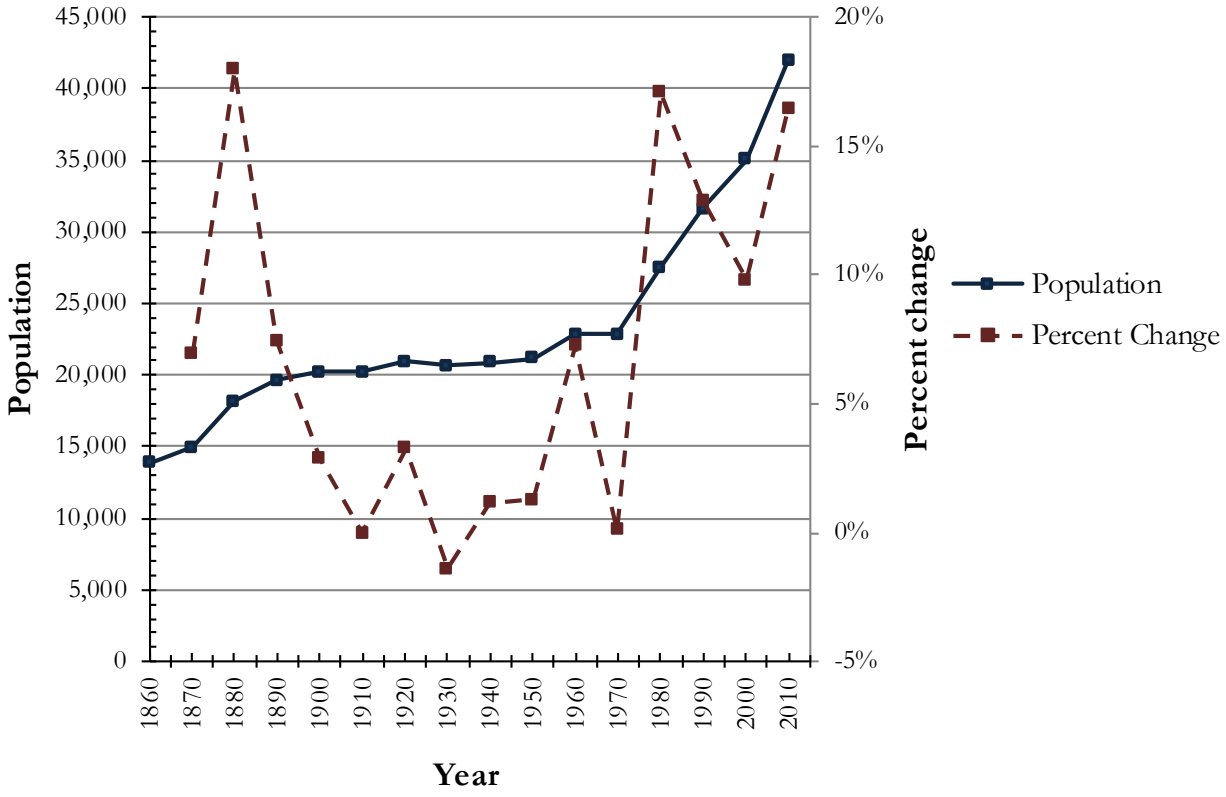
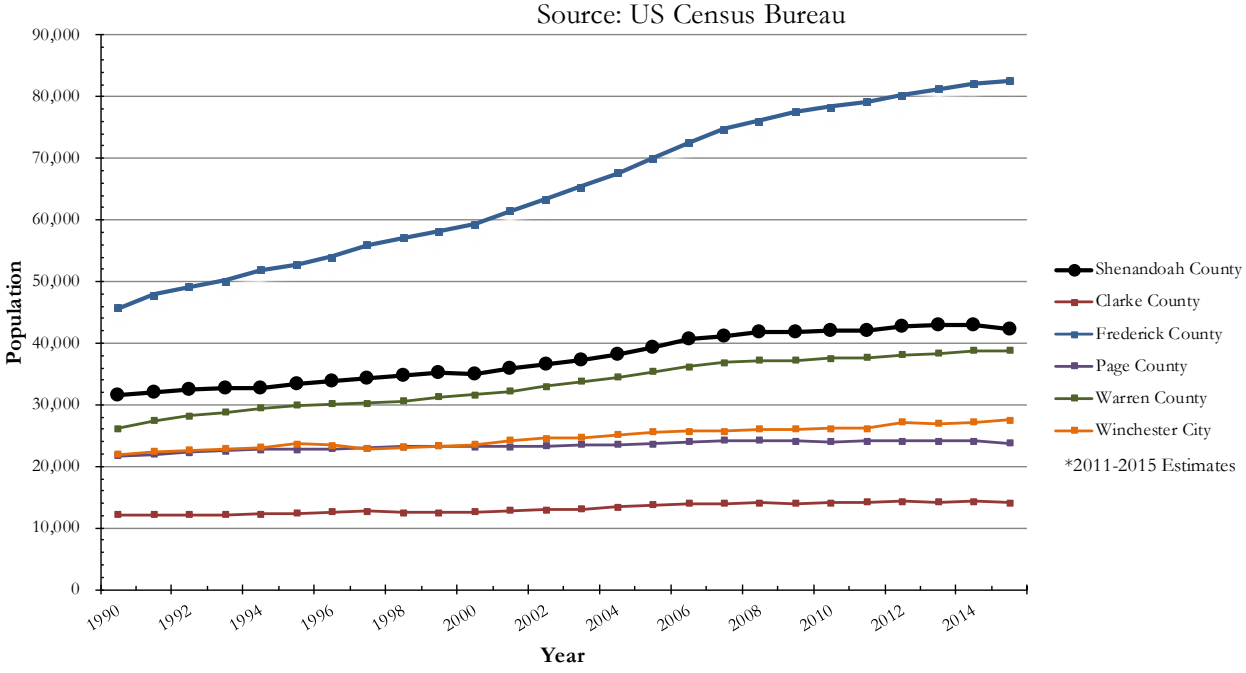


Figure 5-C: Annual Population Growth 1990-2015*

Source: US Census Bureau



their prime childbearing years. The decrease in fertility rate among these women has had a spillover effect, leading to smaller age cohorts entering those primary childbearing years in the future. When combined with changes to socio-economic conditions and marriage patterns, it is not expected that fertility rates will increase in the coming decades. As a smaller locality, Shenandoah County may be acutely affected by these conditions.

4.1 Historic Population Growth

Figure 5-B illustrates the County's population growth from 1860 to 2010. Since the mid 19th Century, the County has grown modestly, with the greatest increases occurring since 1980. The highest rates of change occurred over two periods: from 1870 to 1890 and from 1980 to 2010. Unlike many rural areas in the region, the County did not experience a post war population boom. Since the 1960s, however, the County has consistently grown at a faster rate than the Commonwealth as a whole; seeing the largest gains between 1980 and 1989 and 1990 to 1999, where the population increased by 20.6 and 14.8 percent respectively.

This growth can be primarily attributed to the County's proximity to the Washington DC Metro Area. In the 1990s and 2000s, Northern Virginia experienced exponential growth due to increased Federal government spending and corresponding economic activity. Combined with the high costs of living in the District and its inner suburbs, workers and their families moved further out into Northern Virginia where home prices were more affordable. As the popularity of these areas increased, workers moved further into the Northern Shenandoah Valley. Shenandoah County's relatively low cost of living, strong public schools, and rural character attracted many of these commuters and their families.

Slowing growth in Northern Virginia due to the aforementioned economic challenges, has decreased migration as the second home market struggles and disposable income for many retirees becomes more constricted. These conditions have diminished the financial benefits of residing in Shenandoah and commuting to Northern Virginia for employment.

4.2 Regional Population Growth

Figure 5-C illustrates how populations of the localities in the Northern Shenandoah Valley have increased at uneven rates since 1990. Frederick County has, by far, experienced the greatest growth, with its population increasing from 45,723 in 1990 to 78,305 in 2010. Warren and Shenandoah counties experienced moderate growth during the same period, increasing from 26,142 and 31,636 in 1990 to 37,575 and 41,993 respectively. Page County and Winchester City increased at a slower rate. Clarke County increased by the smallest amount, increasing from 12,101 in 1990 to 14,034 in 2010.

In January 2016, the Weldon Cooper Center released population estimates for all counties and cities in the Commonwealth for the period of 2010-2015. The State's population increased by less than 1 percent each year since 2010, which is the Commonwealth's lowest rate in decades. Despite the slowing growth, Northern Virginia still accounts for nearly three fifths of the Commonwealth's gain, with eight of the 10 fastest growing localities located there. The slowdown has had a greater impact in non-metropolitan counties like Shenandoah.

Figure 5-D
Population by
Census Block 2010

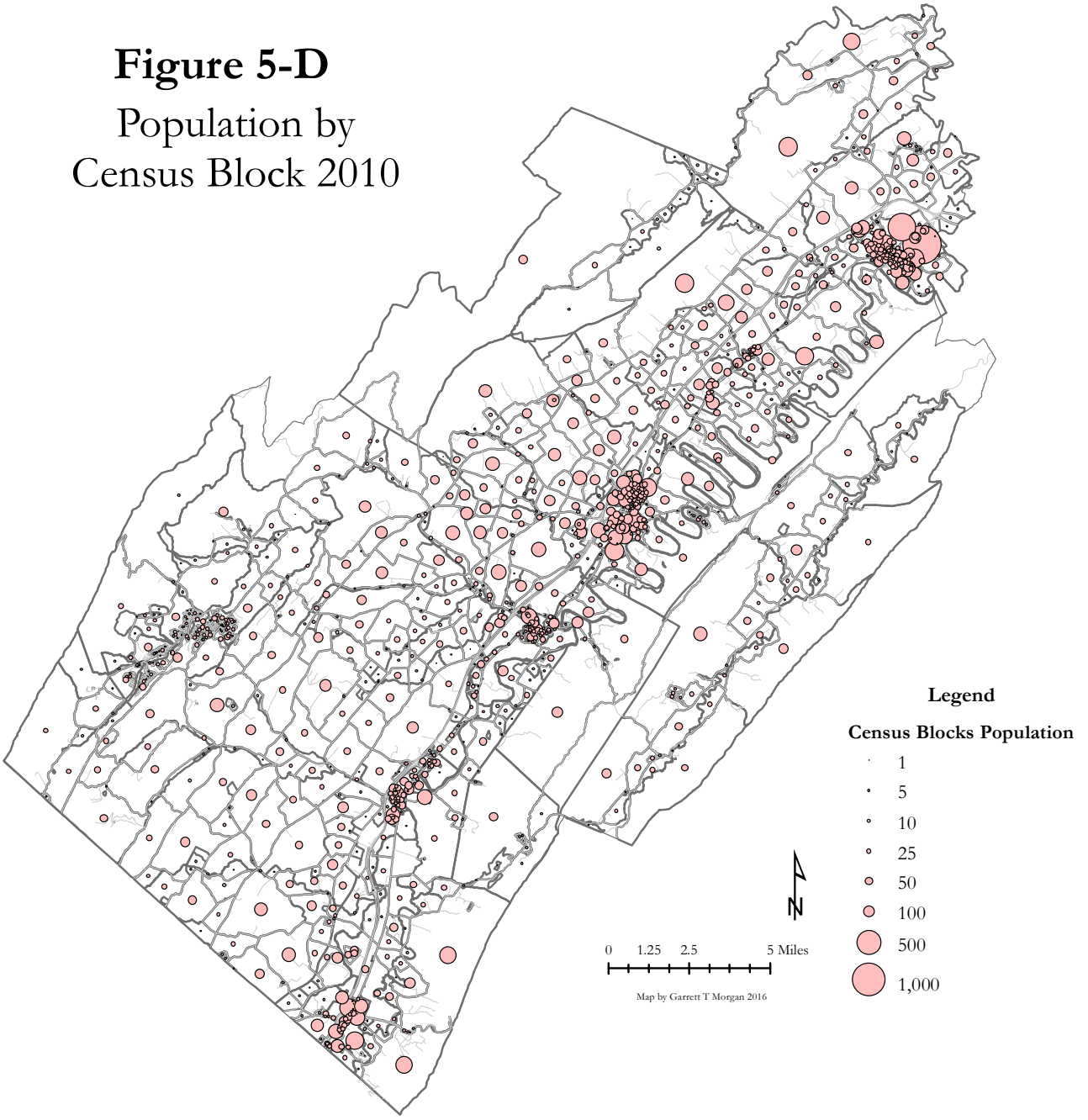


Figure 5-D:
Population by Census Block.

The size of the circle inside each block corresponds to the number of residents living there.

5.0 Density & Town vs. Unincorporated Area Growth

Population trends cannot be fully understood without considering where people are physically moving to or away from. Two indicators: density and the growth in the town vs. unincorporated areas, provide greater details about how population changes are impacting the county. These indicators also illustrate whether or not the county's communities are developing in a more compact and sustainable way or continuing the previous patterns of dispersed subdivisions and sprawl.

5.1 Density

Figure 5-E
Population Density 2010

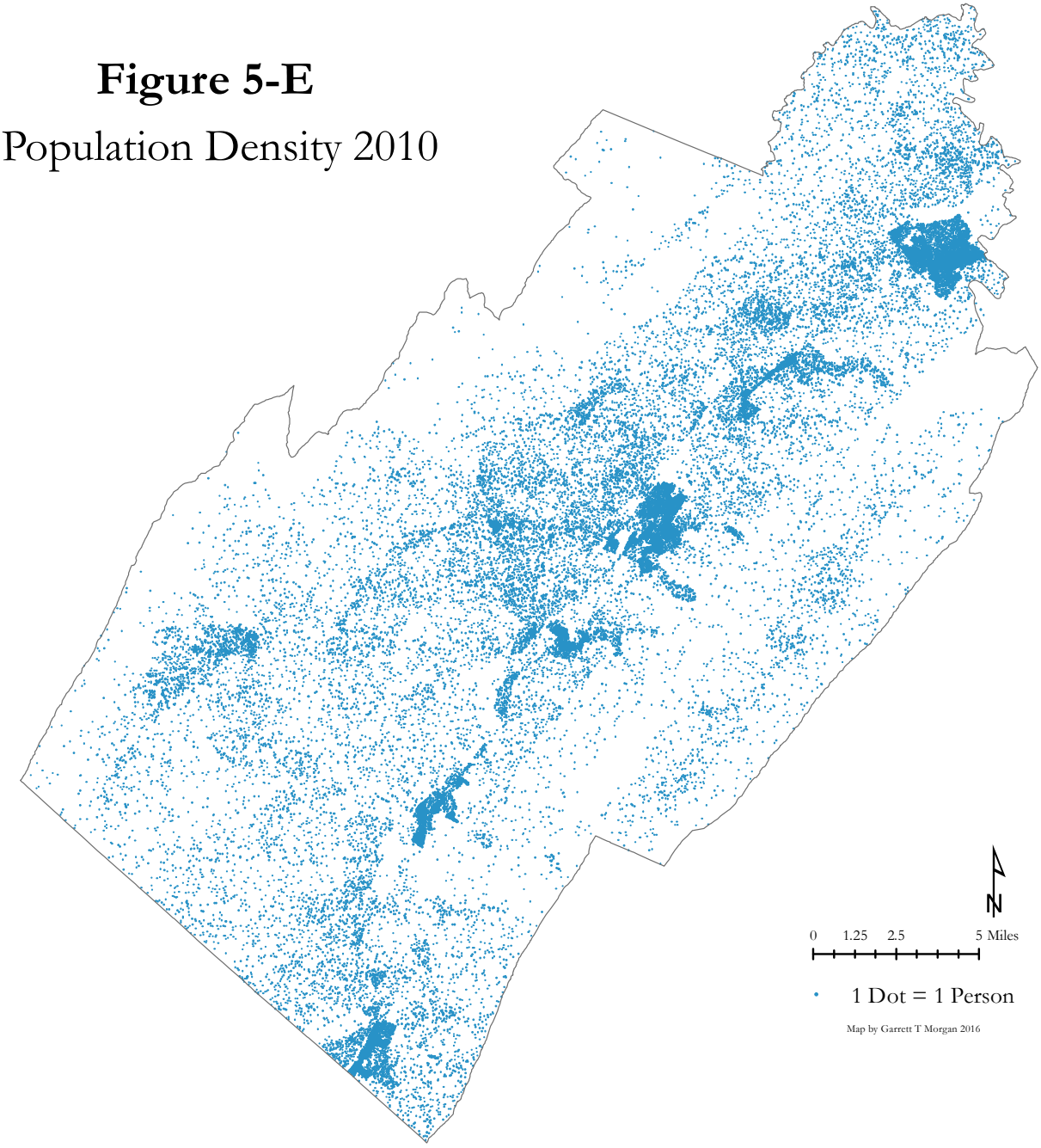


Figure 5-E
Dot Population Density.

Each dot represents one individual and where they live in the county.

Population density is the total population divided by the total acreage of an area. A low density means that residents are spread out, while a higher density means residents are closer together. The distance between residents has an impact on service provision, particularly emergency services. Typically, the greater distance between residents, the greater the cost of government services required to adequately service the residents' needs during times of crisis, which in turn leads to greater costs. Figures 5-D and 5-E illustrate the population density of the County in different ways.

Figure 5-D shows the population of the county by census block. The higher the population, the greater the size of the circle within each census block boundary. This provides a generalization of where most of the County's residents live, which is in the towns along Route 11. A more detailed illustration

Figure 5-F: Population Increases 1990-2010

Source: US Census Bureau

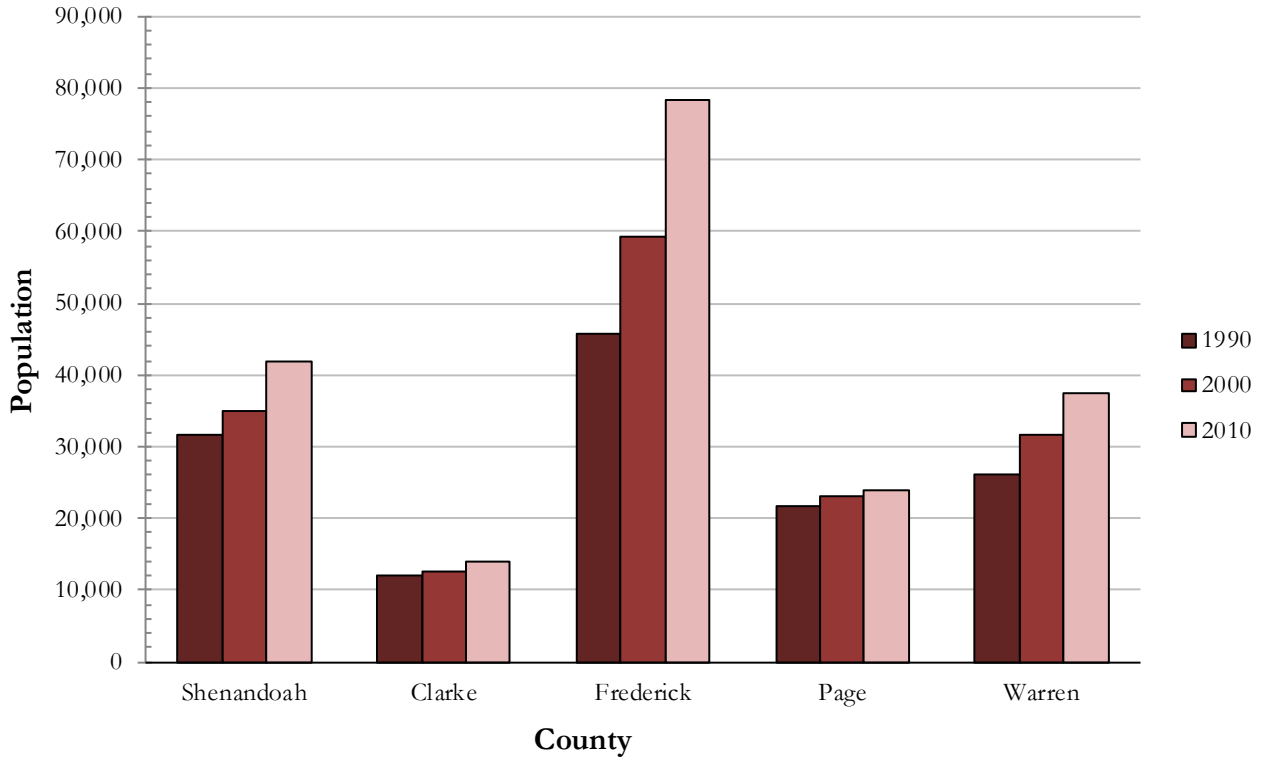
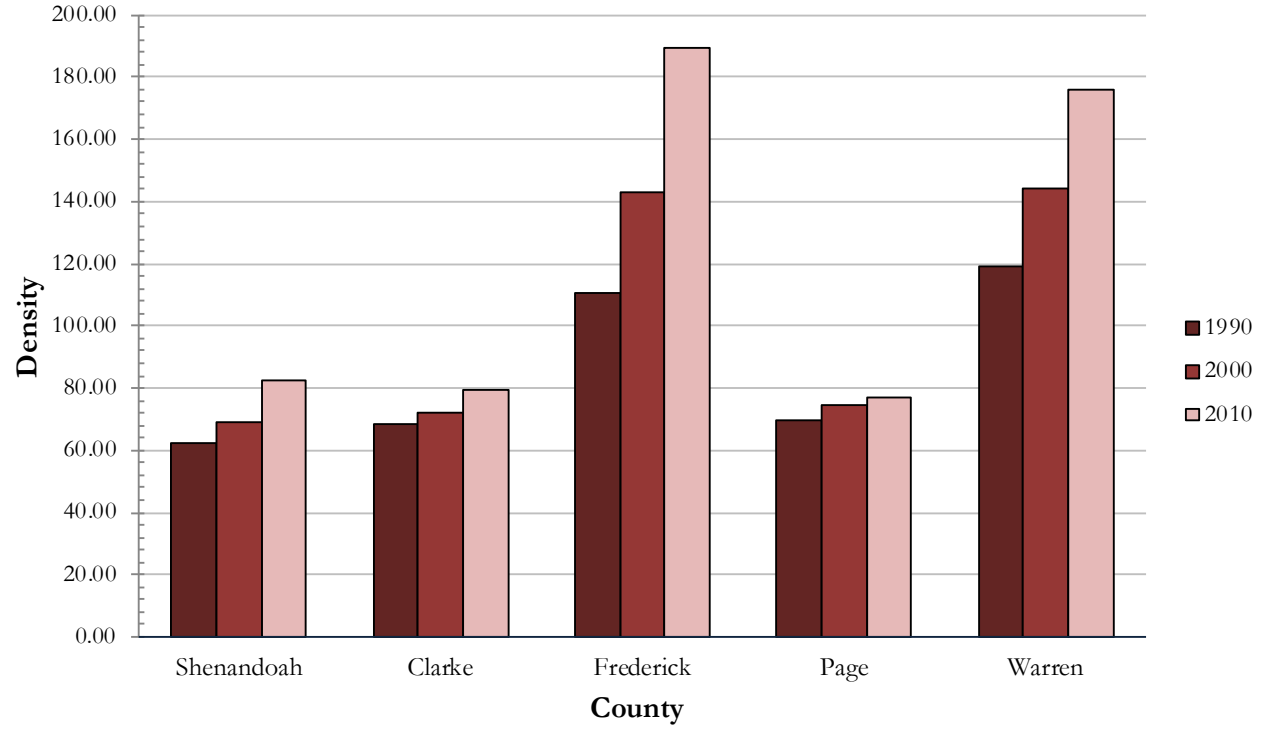


Figure 5-G: Population Density 1990-2010

Source: US Census Bureau

*Winchester City Densities Excluded: '90:2,377; '00: 2,555: '10: 2,838



of where each individual lives in shown in Figure 5-E, where one dot equals one resident.

Figures 5-D and 5-E illustrate the popularity of the towns as residential locations. However, Figure 5-E provides a more accurate depiction of the low density of the County, with many residents living on large agricultural or residential plots in unincorporated areas. Although this dispersion of residents is inherent to an agricultural community, it presents challenges to local policy makers seeking to address the needs of both town residents and more isolated homeowners.

Figures 5-F and 5-G compare population growth and density between Shenandoah County and other localities in the Northern Shenandoah Valley. Figure 5-F illustrates the population increases from 1990-to 2010 in the region. Frederick County has experienced the greatest increase during this period, while Clarke and Page both experience low levels of growth. Shenandoah and Warren counties grew at similar rates, but at a more moderate rate.

When examining population density during this same period as shown in Figure 5-G, similar trends emerge. Frederick has become significant more dense, nearly doubling its density from 1990 to 2010. Page and Clarke counties increased slightly during the same period. While Shenandoah and Warren Counties saw similar population growth, however, Warren's density has increased at a much higher rate. This may be attributed to some extent, to growth experienced in Front Royal, the county seat.

Shenandoah County's density in 2010 there was 82.50 people per square mile, compared to an average of 573.81 in the Northern Shenandoah Valley and 202.6 for the Commonwealth. When Winchester City is excluded, the average density of the region is 120.97. By both measures, Shenandoah County ranks as the third most dense locality, is slightly more dense than Clarke and Page with 79.66 and 77.30 respectively but considerably less dense than Frederick, Warren, and Winchester City who measure densities of 189.40, 176.00, and 2,838.00 respectively.

5.2 Town Population

The US Census Bureau defines an urban cluster as any incorporated area having at least 2,500 people. By 1980 the Towns of Strasburg and Woodstock crossed this threshold. While growth has occurred in all of the towns since 1980, Strasburg and Woodstock remain the only urban areas in the county, with 2010 populations of 6,398 and 5,097 respectively. Figure 5-H illustrates population growth in the five towns in the county during this period.

Outside of Woodstock and Strasburg, New Market experienced significant growth with a population increasing from 1,118 in 1980 to 2,146 in 2010. Edinburgh saw more limited population growth, increasing from 752 to 1,041. Toms Brook saw the slowest growth of the towns, increasing from 226 in 1980 to 258 in 2010.

5.3 Town vs Unincorporated Area Growth

Figure 5-I illustrates the breakdown of total population between the towns and unincorporated rural areas. From 1980 to 2010 the population of towns grew from 8,968 in 1980 to 16,934, increasing 89%. During the same period rural areas

Figure H: Population Growth in Towns 1980-2010

Source: US Census Bureau

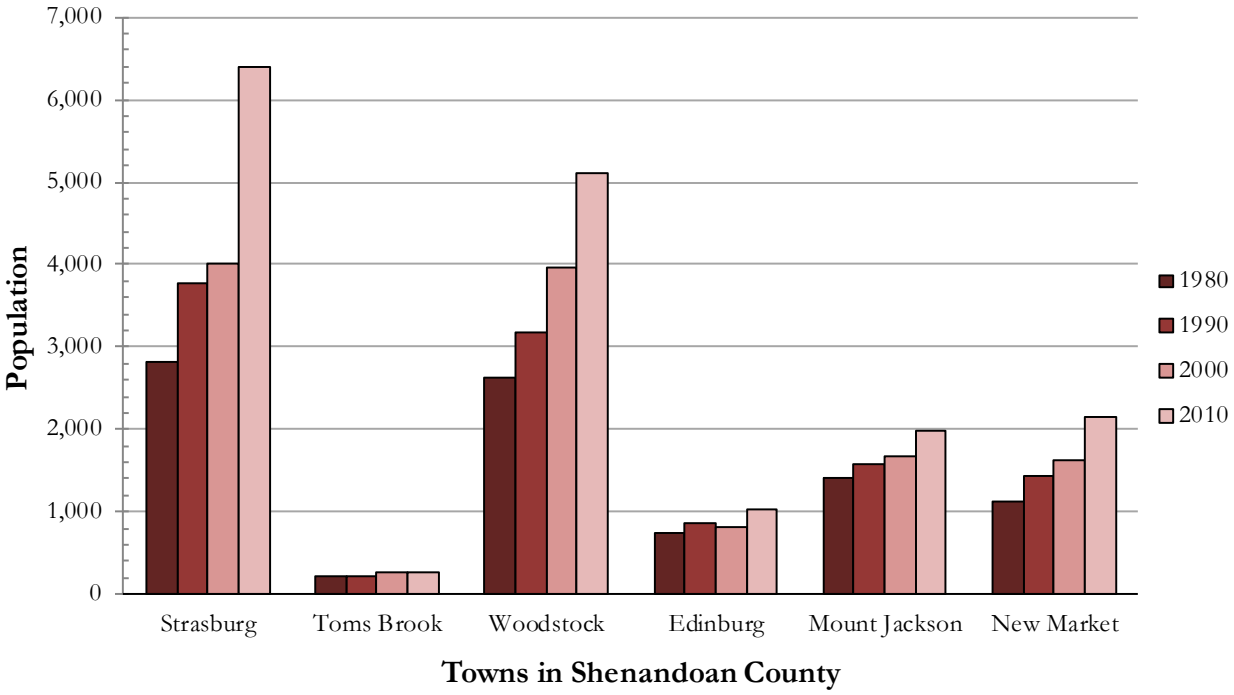
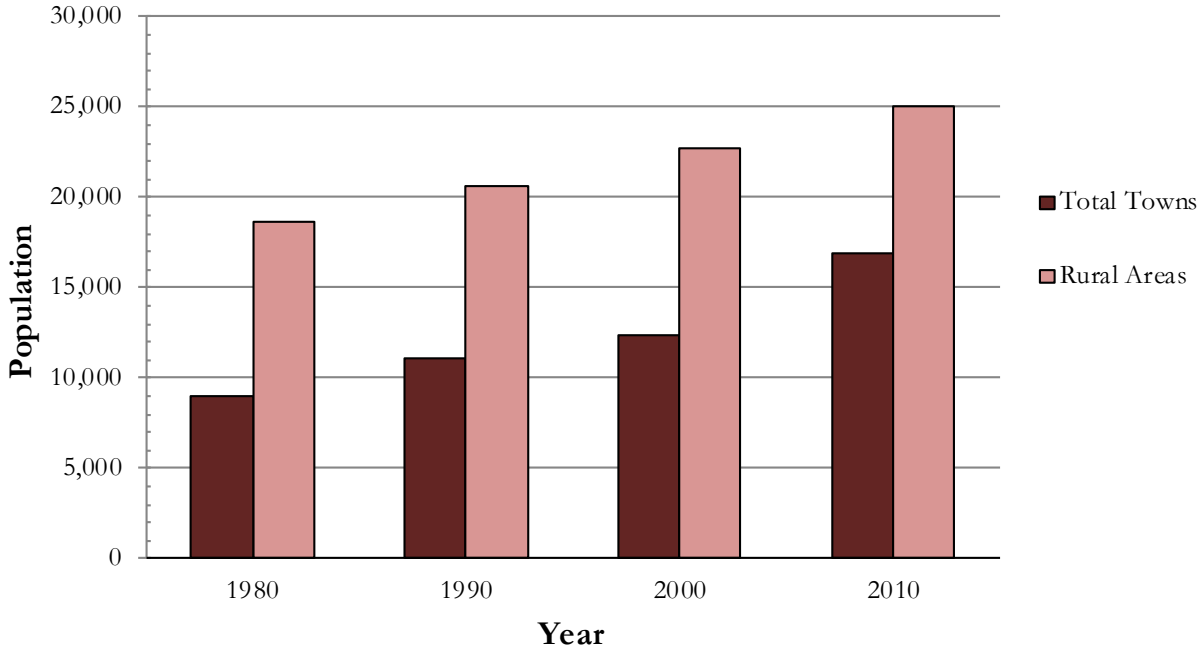


Figure I: Town vs Rural Growth 1980-2010

Source: US Census Bureau



increased from 18,591 to 25,059 or 35%. Although the rate of growth was faster in the towns, the absolute number of persons added to the county was still greater in the unincorporated areas.

There are several factors contributing to this growth pattern as well as causes for concern if it continues. During the recent growth period there was a notable increase in the raw amount and different types of housing units available in the towns to serve more segments of the population (i.e. apartments and townhomes rather than detached single family dwellings), and many older residents moving into the County chose to live where services were most readily available.

There are significant financial and infrastructural benefits of building new housing units in the towns or within existing public service areas. However, many residents move to the county to immerse themselves and their families in the rural character, and as a result, prefer to build single family dwellings on tracts of land outside of town boundaries. The County's housing needs will be further addressed in Chapter 6: Housing of this Comprehensive Plan.

Spread out development is consistent with county's rural aspects, but they also have higher relative costs of servicing - particularly in terms of Fire, Rescue, and other Emergency Services due to the distance from population centers and their tendency to be on narrow or unpaved roads which may be difficult to traverse during certain weather events.

6.0 Components of Change: Natural Increase and Migration

As described earlier, population change occurs through two events: natural increase and net in-migration or out-migration. Natural increase is the difference between the number of births and deaths in a year. Net in-migration is the number of people who leave subtracted from the number of people who move into the locality each year. Natural increase is dependent on fertility rate or the number of children born per 1,000 women of a childbearing age (15-50 years). Even without significant in-migration, however, population growth does not mean that more children are being born as much as it highlights that people are now living longer.

The County's population is slowly growing and rapidly aging. This section discusses and analyzes these trends and identifies their causes. The analysis will provide a basis for formulating expectations of development and providing government services to the County's population.

6.1 Fertility

Since the baby-boom generation of the post-World War II period, there has not been another boom in births from women in their prime childbearing years across the United States. The decrease in fertility rate among these women has had a spillover effect, leading to smaller age cohorts entering those primary childbearing years in the future. When combined with changes to socio-economic conditions and marriage patterns, it is not expected that the County's fertility rates will increase in the coming decades.

Acting in conjunction with national trends, there are several local factors

that are not only affecting the number of births in the County but also how these births are being recorded. In 2009 the maternity ward at Shenandoah Memorial Hospital in Woodstock closed. This lead to the number of births registered in the county to drop from 291 in 2008, to 134 in 2009, and 10 in 2010.

While the decrease in births in the county continued to decline based on general trends, the closing of the maternity ward appears to have had a major impact. Without access to a maternity ward in the county, women are having their children in neighboring localities – particularly Winchester City and Warren County. These women then return with their newborn children to their homes in Shenandoah County. This results in a data collection time lag because these childrenare not counted as residents of the county until the following year when annual surveys are conducted.

This practice has been amended recently by the Virginia Department of Health (VDH), where all live births are reported. From 2000 to 2010, the agency reported live births by county, not by the mother's area of residence. Beginning in 2009 the VDH began attributing births of resident's outside the county to the county itself. The difference between mothers giving birth in the county and residents giving birth outside of the county but returning to their homes here after hospitalization is considerable.

For example, in 2010 only 10 live births were recorded in the county. For the same year, the VDH also reported 455 live births using the more nuanced model. Data from 2009-2013 for Shenandoah and its peer counties are shown in Figure 5-J. Importantly, both indicators illustrate a downward trend of births in

Figure 5-J: Total Live Births per 1,000 Families 2009-2013

Source: Virginia Department of Health, 2015

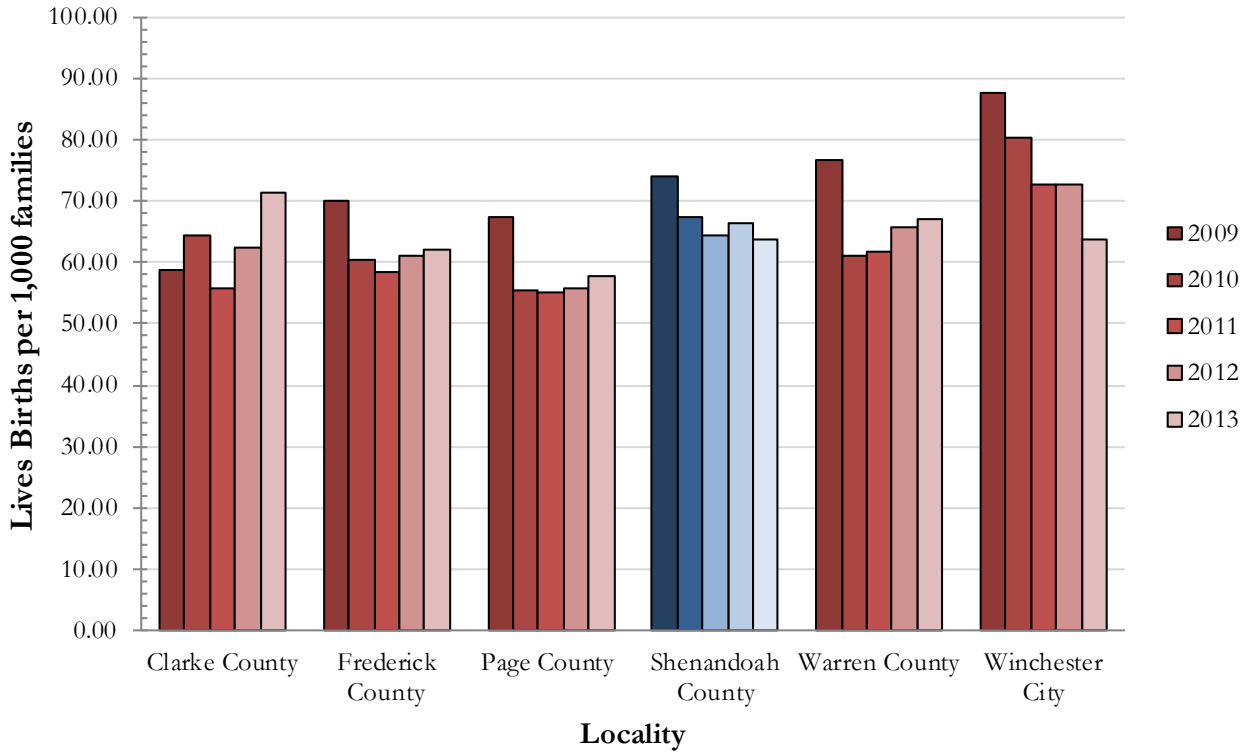


Figure 5-K: Total Deaths per 1,000 People 2009-2013

Source: Virginia Department of Health, 2015

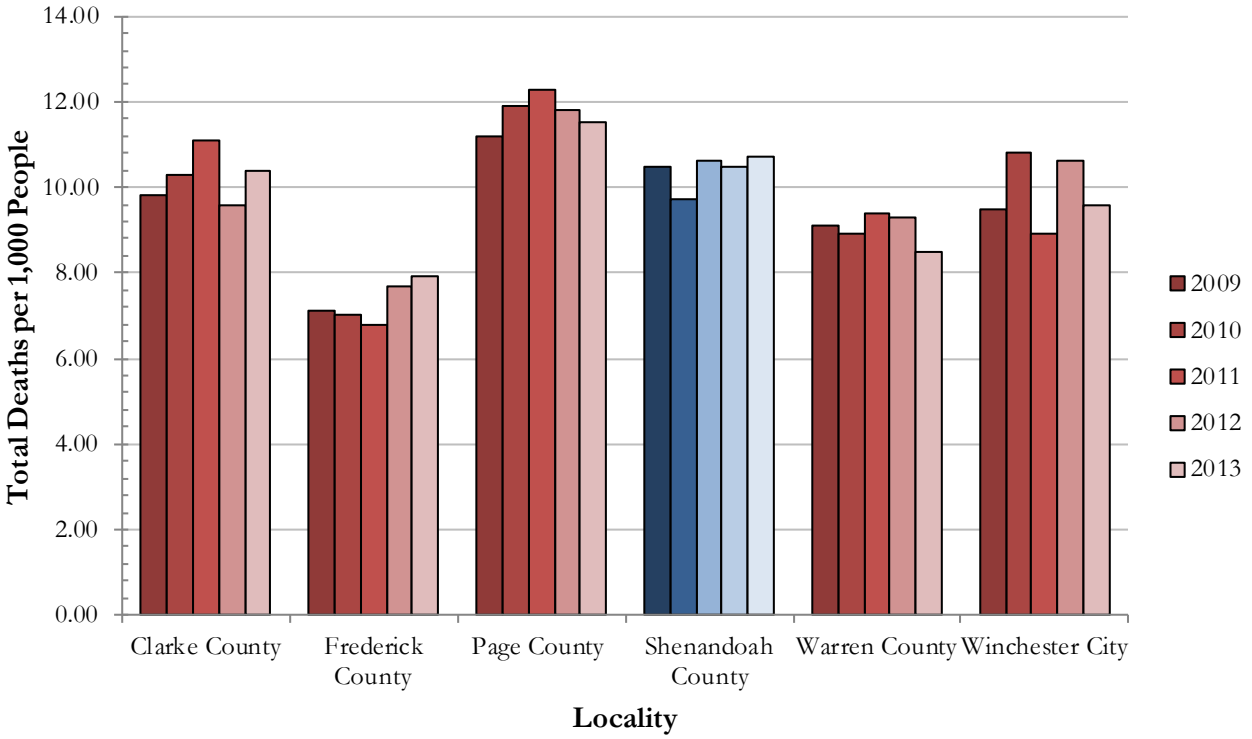
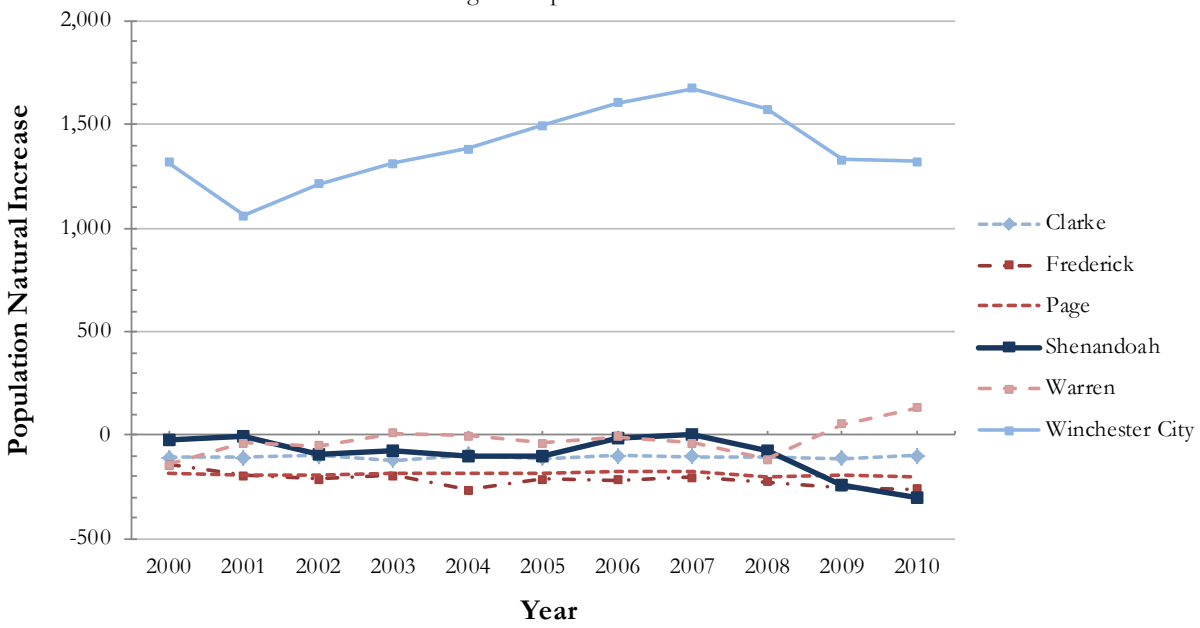


Figure 5-L: Population Natural Increase 2000-2010

Source: Virginia Department of Health



the County.

All counties in the Northern Shenandoah Valley experienced declines in birth rates between 2000 and 2013. Birth rates peaked between 2006 and 2008, but have steadily declined since. If the current trends continue, birth rates will decline, which will have an impact on the County's school age population and demand for social services.

6.2 Natural Increase

Natural increase is the annual difference between the number of births and deaths. While the County's birth rate has been decreasing, the death rate remained relatively constant from 2000 to 2010. As a result of this imbalance, the average age of County residents will continue to rise. Assuming medical advances and national health trends continue, it is unlikely that significant changes to the death rate will occur in coming decades.

Figure 5-L illustrates natural increase data across the Northern Shenandoah Valley from 2000 to 2010. The figure highlights the region's dependency on migration in order to counteract low birth rates and an aging population. Winchester City saw the greatest natural growth over the period, in part because of its role as the regional medical center, but also experienced a noticeable decline after peaking in 2007. Alternatively, Warren saw an increase in natural growth after 2008, while all other localities saw decline. This may, however, be in part attributed to Front Royal's women's health services. Shenandoah's natural growth rate was declining by 2008 and further dropped off after the Woodstock clinic closed in 2009.

6.3 Net Migration

Net migration is the difference between total population increase and natural increase occurring annually. This accounts for the number of residents in a county who have moved to or away from the county. Net migration rates illustrate if a county is growing or shrinking. Net migration is frequently associated with economic growth as well as increased diversity. Figure 5-M illustrates annual net migration from the Northern Shenandoah Valley from 2000 to 2010.

After a decline of population from 1999 to 2000 of 101 people, Shenandoah saw considerable increases in migration from 2001 to 2007. For example, net migration was 572 in 2001, 685 in 2002, 689 in 2003, 886 in 2004, 1,029 in 2005, and peaked at 1,100 at 2006. In 2007 and 2008, the county experienced low net migration rates of 592 and 506 respectively. In 2009, the county experienced significant decline – with a negative net migration rate of 48. In 2010, the net migration rate increased slightly to 10.

Figure 5-N illustrates cumulative net-migration for localities in the Northern Shenandoah Valley from 2000 to 2010. By far, Frederick County saw the greatest in-migration, nearly three times greater as Shenandoah and Warren, attracting 17,500 new residents. Conversely, the City of Winchester saw the greatest decrease, at negative 10,928, which can be almost entirely attributed to the city's regional hospitals.

Shenandoah experienced a positive net migration number of 5,920 during the same period. Page experienced moderate out migration, losing 1,288

Figure 5-M: Annual Net Migration by County & City 2000-2010

Source: US Census Bureau

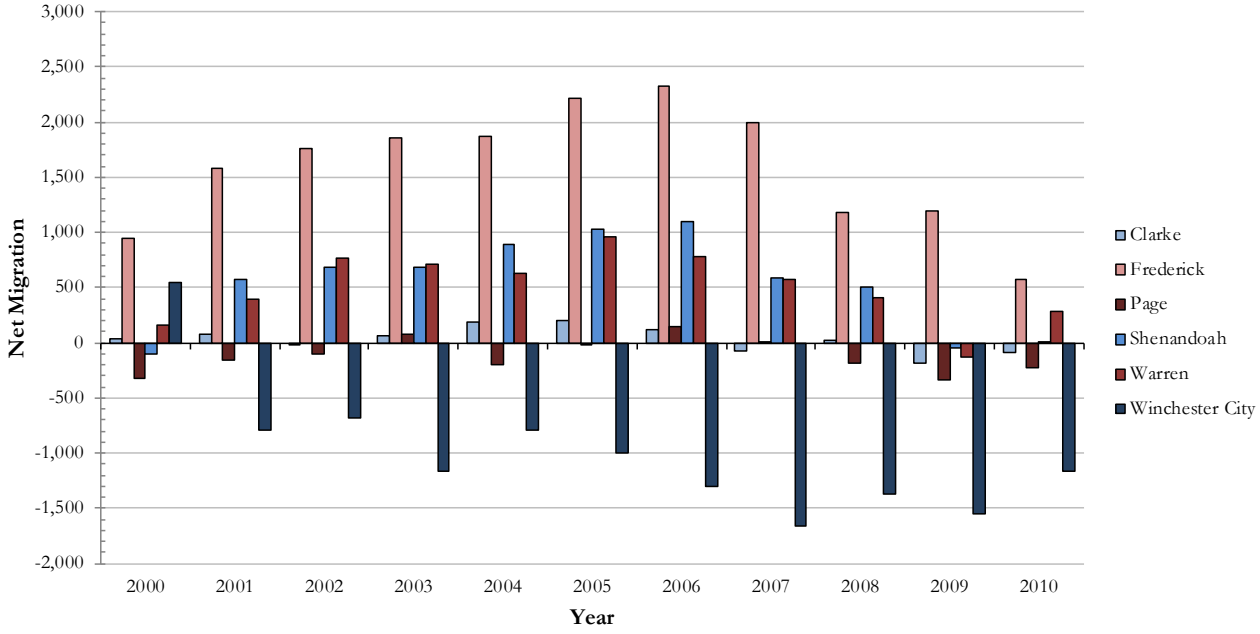


Figure 5-N: Cumulative Net Migration 2000-2010

Source: Virginia Department of Health, US Census Bureau

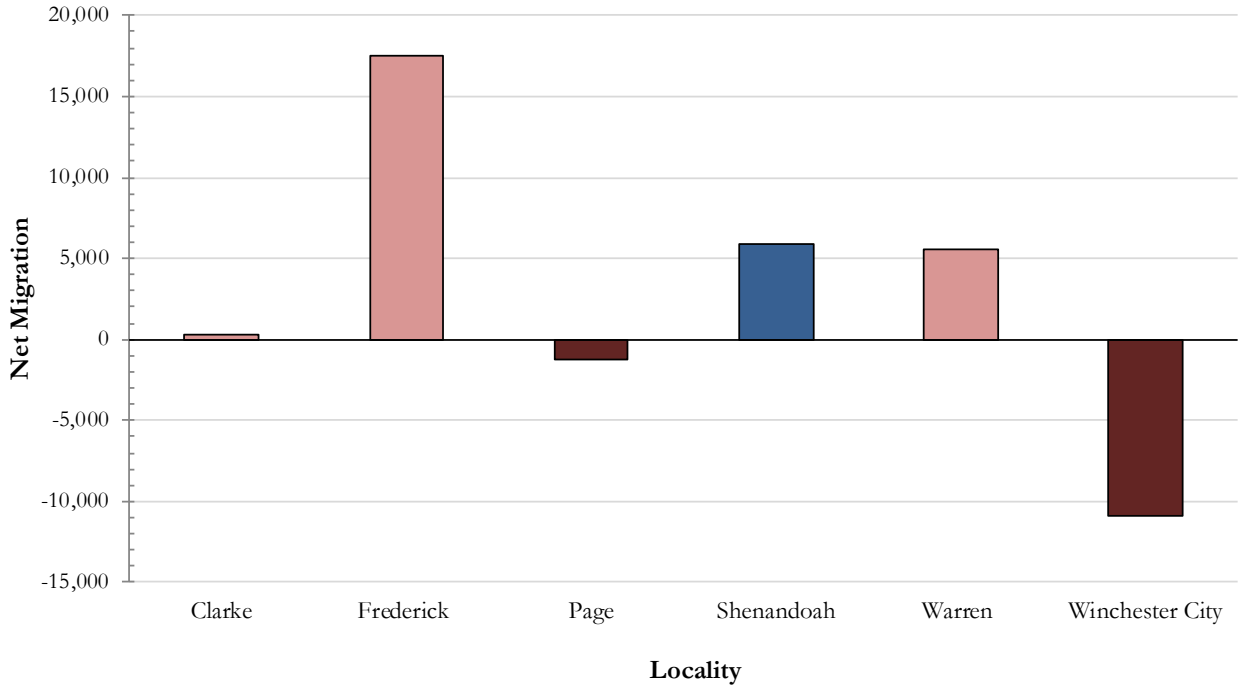
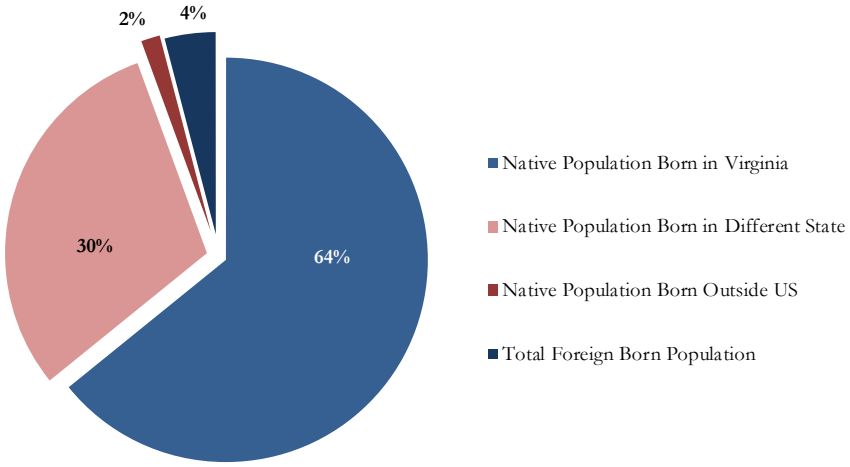


Figure 5-O: Nativity and Place of Birth 2010
Source: US Census Bureau; American Community Survey



residents, while Clarke remained relatively static, attracting 308 new residents. While Shenandoah is following the regional trends, without increased net in-migration, the County's population will begin to shrink.

6.4 Nativity

Nativity status is a another way to look at migration – although not as detailed or time sensitive as annual net in or out migration. Native born individuals are defined as anyone who is a US citizen at birth. These include those born in the US, Puerto Rico, in a US Island Area, or born abroad of US citizen parents. Foreign born individuals are defined as anyone who is not a US citizen at birth. These include Naturalized US Citizens, legal permanent residents, temporary migrants, Humanitarian migrants, and unauthorized migrants.

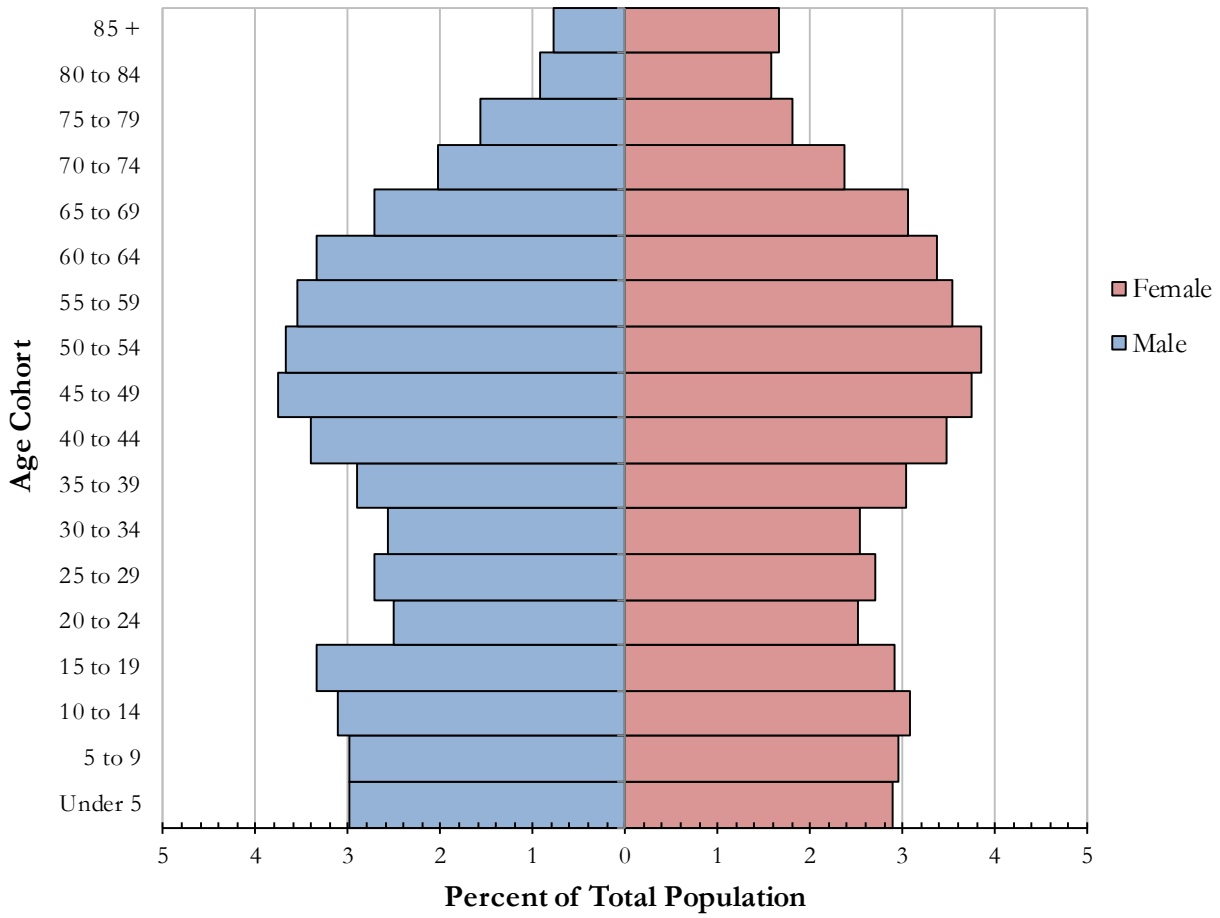
Figure 5-O illustrates the nativity breakdown of the County in 2013. Between 2000 and 2013, the county's population continued historic trends, with the majority of residents being born in the US (95%) and predominately born in Virginia (64%). The biggest change that occurred between 1980 and 2010 was the increase in the foreign born population, which increased from 213 in 1980 to 1,721 in 2010. Despite the increase, the foreign population remains approximately 3.5% of the total population.

Changes in nativity indicate how diverse a locality is as well as how a region's demographics are changing. The nativity of citizens does not correspond directly to educational attainment, however. For example, a locality that is increasingly attracting foreign born populations may have a high-skilled industry cluster or be largely agricultural and rely on a migrant workforce.

7.0 Population Characteristics

An analysis of additional demographic characteristics is required to gain a more nuanced understanding of a county's population beyond the raw numbers inherent to components of change measurements. In the following sections

Figure 5-P: Population Pyramid 2010
Source: US Census Bureau



many, but not all of the unique characteristics that impact policy and growth will be discussed further. These include: age distribution, race and ethnicity, languages spoken at home, household size, educational attainment, and general health indicators.

7.1 Age Distribution

Figure 5-P shows a population pyramid that shows the age distribution of County residents in 2010, separated by age cohort and sex. If a population is growing, the lower age cohorts will be much larger than the older cohorts, to illustrate more births than deaths. While Shenandoah does have a moderately sized population under 9 years of age, the pyramid illustrates the majority of the County's population is over 40.

There is also a visible gap of residents between the ages of 20 and 40, a demographic key to both natural population increase and net in-migration that contribute to long term community development. When combined with an aging population, this gap has possible policy implications as government services will need to accommodate a County where the majority of residents are over 45.

Figure 5-Q illustrates how the county's age distribution has changed

Figure 5-Q: Age Distribution 1970-2010
Source: US Census Bureau

	1970		1980		1990		2000		2010	
	Pop	%	Pop	%	Pop	%	Pop	%	Pop	%
Under 5	1,713	7.5	1,639	5.9	1,932	6.1	1,948	5.6	2,475	5.8
5-19	6,182	27.0	6,398	23.2	5,876	18.6	6,625	18.9	7,724	18.4
20-44	6,706	29.3	9,352	33.9	11,495	36.3	11,229	32.0	11,906	28.4
45-64	5,190	22.7	6,083	22.1	7,053	22.3	9,190	26.2	12,120	28.9
Over 64	3,061	13.4	4,087	14.8	5,280	16.7	6,083	17.3	7,768	18.5
Totals	22,852	100	27,559	100	31,636	100	35,075	100	41,993	100
Median Age	31.4		33.9		37.4		40.9		43.1	

Figure 5-R: Cohort Migration by Virginia's Regions
Percentage Change 2000 to 2010
Source: Demographics Research Group, University of Virginia, 2013

	Age Cohort					
Region	**15-24**	**25-34**	**35-44**	**45-54**	**55-64**	**65-74**
Blue Ridge Corridor	62.2	-20.8	2.2	6.0	5.2	5.0
Cresecent Exurbs	-0.9	14.6	36.9	18.4	15.5	10.8
Eastern Virginia	-18.4	-9.3	8.7	6.9	15.9	8.9
Hampton Roads	4.1	1.9	-5.1	-5.1	-1.7	0.5
Northern Virginia	6.0	66.8	16.9	5.9	-4.1	-10.1
Richmond	16.9	21.2	6.4	3.3	-0.3	-1.2
Southside	-13.2	-6.7	3.2	4.1	7.2	5.1
Southwest	-6.0	-7.7	5.1	4.6	6.9	4.6
Valley-Mountain	-6.6	-1.0	19.1	10.3	10.9	9.8
Virginia	13.8	14.2	8.3	4.1	1.7	-0.1

between 1970 and 2010. During this period the average age of a county resident increased from 31.4 to 43.1 years. This increase corresponds with larger demographic trends in the United States and Virginia. As the baby boomer generation continues to age, regions and municipalities across the state will increasingly rely on younger generations to support public services. Shenandoah County has experienced a slight, but steady decline of as a percent of the total population of residents under the age of 19 since 1970.

While the raw numbers of all age cohorts have increased as the total population grew, older age cohorts continue to outnumber those under the age

of 19. For example, approximately 47% of the total population the county is over 44. This intergenerational numeric imbalance should be considered when creating and revising government policies in the near future.

7.1.1 Age-Cohort Migration

The aging population is not unique to Shenandoah County. To gain a better understanding of aging across the commonwealth, it is useful to look at Virginia's nine separate regions. Figure 5-R shows age-cohort migration from 2000 to 2010 across the Commonwealth in these regions. Shenandoah County is in the Valley-Mountain Region, which is located along the western border and runs north to south between the Allegheny Mountains to the west and the Blue Ridge Mountains to the east. The majority of the population lives along the Old Valley Pike Corridor or Route 11, which runs parallel to Interstate 81.

Between 2000 and 2010 nearly three-quarters of the total growth in the Valley region was concentrated in its three largest urban areas: Harrisonburg, Roanoke, and Winchester. Net in-migration contributed to more than four-fifths of the Valley's growth, while natural increase continues to decline. The figure also illustrates that the region has experienced negative growth in both the 15-24 and 25-34 age cohorts by 6% and 1% respectively.

The loss of younger age cohorts often changes the demographic pressure on local services. For example, priorities may shift away from education towards health care and other sectors associated with an aging population rather than children and young adults. As a result, the localities in the Valley-Mountain region will need to focus on attracting young people in the near future in order to support existing institutions and businesses.

7.2 Race, Ethnicity, and Hispanic or Latino Origin

Race encompasses inherited, characteristic traits. Ethnicity refers to cultural origin. For the 2010 Census, the questions on race, ethnicity, and Hispanic origin were asked of individuals. An individual's responses to these questions were based upon self-identification.

Individuals chose from six races: White, Black or African American, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islanders, or Some other Race. Data on race have been collected since the first US decennial census in 1790. Individuals were given the option to identity as more than one race in the 2000 census. The overwhelming majority of US individuals reported only one race in 2010.

Ethnicity differs from race. Ethnicity is a category of people who identify with each other based on common ancestral, social, cultural or national experiences.

Hispanic or Latino origins are a separate category. In addition to their race or races, all respondents are categorized in membership in one of two categories, which are Hispanic or Latino or Non-Hispanic or Latino. It refers to a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race. More than half of the growth in the total population of the US between 2000 and 2010 was due to the increase in the Hispanic population.

Figure 5-S:Racial Diversity of Shenandoah County 2010

Source: US Census Bureau

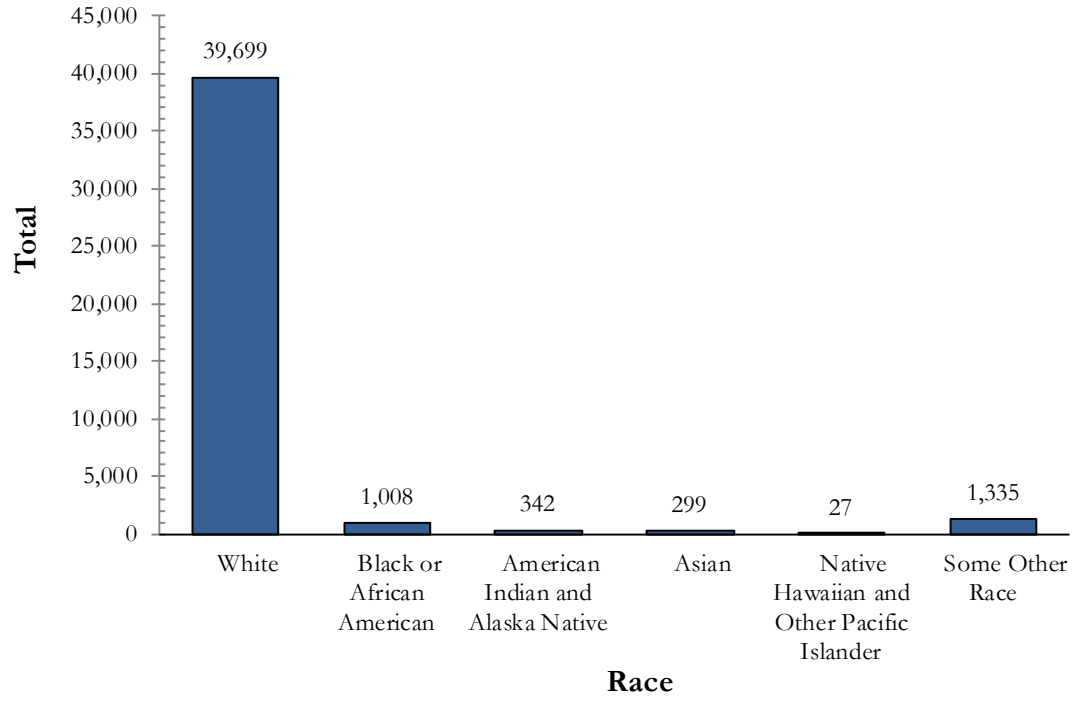


Figure 5-T: Hispanic or Latino Population Origin 2010

Source: US Census Bureau; American Community Survey

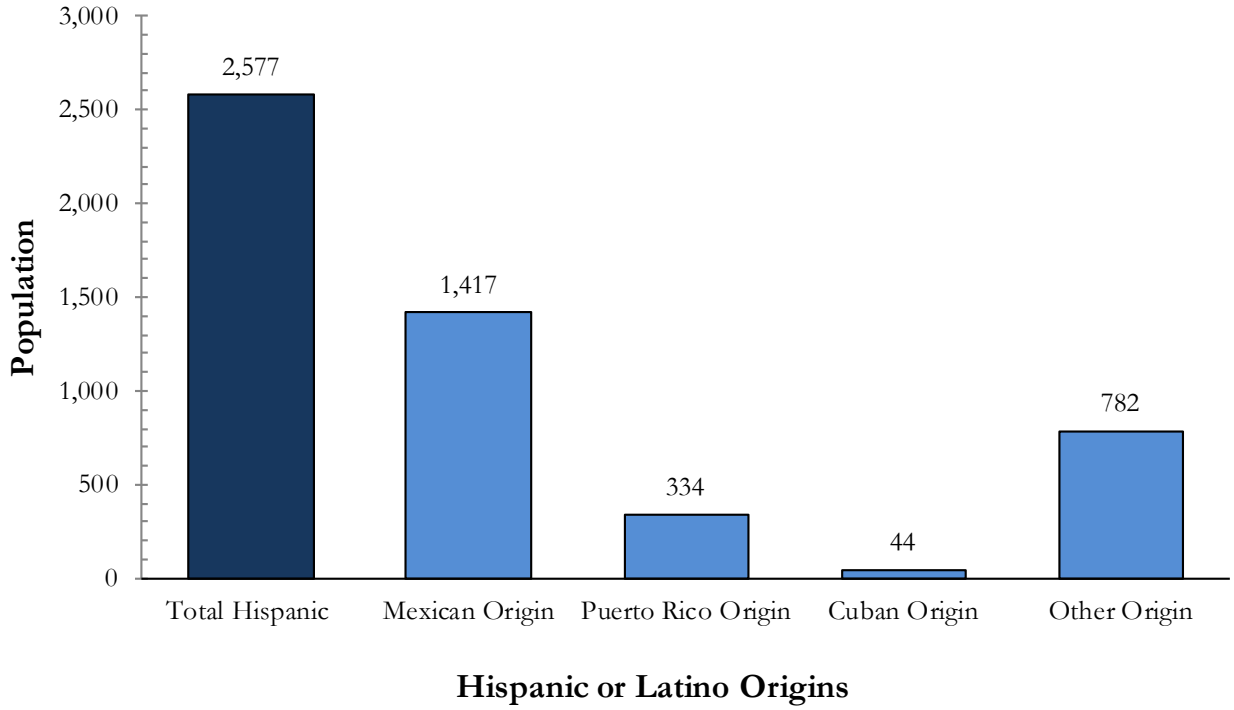
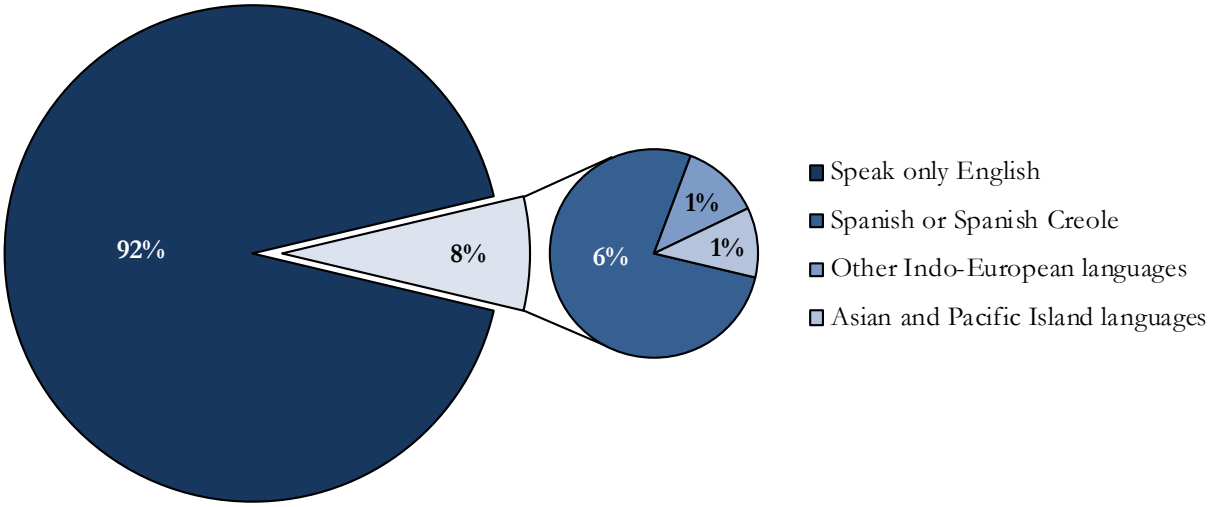


Figure 5-U: Language Spoken at Home

Source: US Census Bureau; American Community Survey 2010-2014



Shenandoah County has a very small minority population despite national diversity trends. Diverse populations are associated with stronger, more resilient localities that are able to better withstand economic shifts while also being more welcoming to migrants – a key demographic to the County's economy.

Shenandoah has been overwhelming white for decades. This trend has only experienced slight change in recent years due to an increase in the number of residents whom identify as Hispanic or Latino Origin. In 2010, the county was 94.5% white, 2.4% Black or African American, 0.8% American Indian and Alaska Native, 0.7% Asian, 0.1% Native Hawaiian and Other Pacific, and 3.2% Some other Race. Figure 5-S illustrates this breakdown.

One in three new Virginians between 2000 and 2010 were Hispanic or Latino Origin. Hispanics or those with Latino Origin, who can be from any race, have however, seen moderate growth in the County, but not nearly as large as in other parts of Virginia. Figure 5-T illustrates the characteristics of Shenandoah's Hispanic or Latino Origin population.

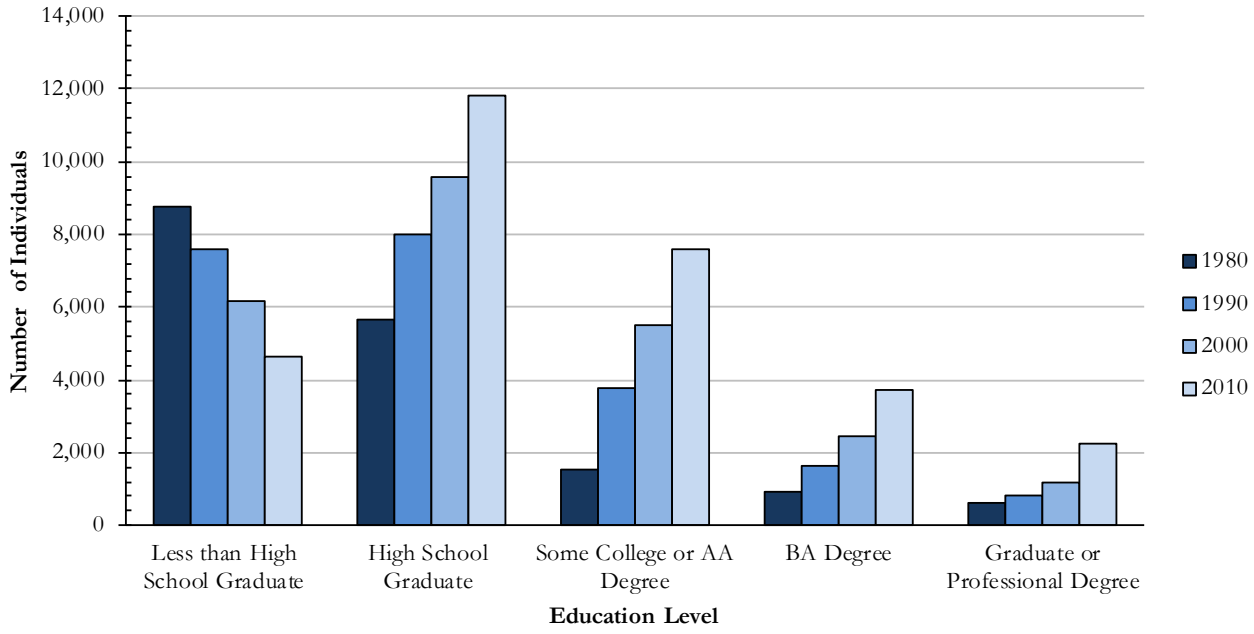
In 2010, 2,577 residents identified as Hispanic or Latino Origin. Of this group, 1,417 or 55% were of Mexican Origin; 334 or 13% were of Puerto Rican Origin; 44 or 1.7% were of Cuban Origin; and 782 or 30.3 percent were of Other Origin. The integration of new residents into the overall community, encouraging and assisting adults to learn english, and teaching english as a second language to school age children, are essential to creating an inclusive, welcoming environment in which new residents can thrive.

7.3 Languages Spoken at Home

In addition to Race, Ethnicity, and Hispanic or Latino Region, understanding what languages are spoken at home provides further information about the county's diversity. Between 2009 and 2014, the American Community

Figure 5-V: Educational Attainment 1980-2010

Source: US Census Bureau



Survey 92.6% of the population only speaks English at home. 5.7% speak Spanish or Spanish Creole, 0.9% Speak Other Indo-European languages, and 0.8% speak Asian and Pacific Island languages at home. Figure 5-U illustrates this breakdown.

It is expected that the percentage of County households that speak a language other than English at home will increase slightly in the near and long term. As a result, the county may need to make changes to existing policies and procedures as well as tailor communication with members of the public to those who do not necessarily have a strong command of the English language.

7.4 Educational Attainment

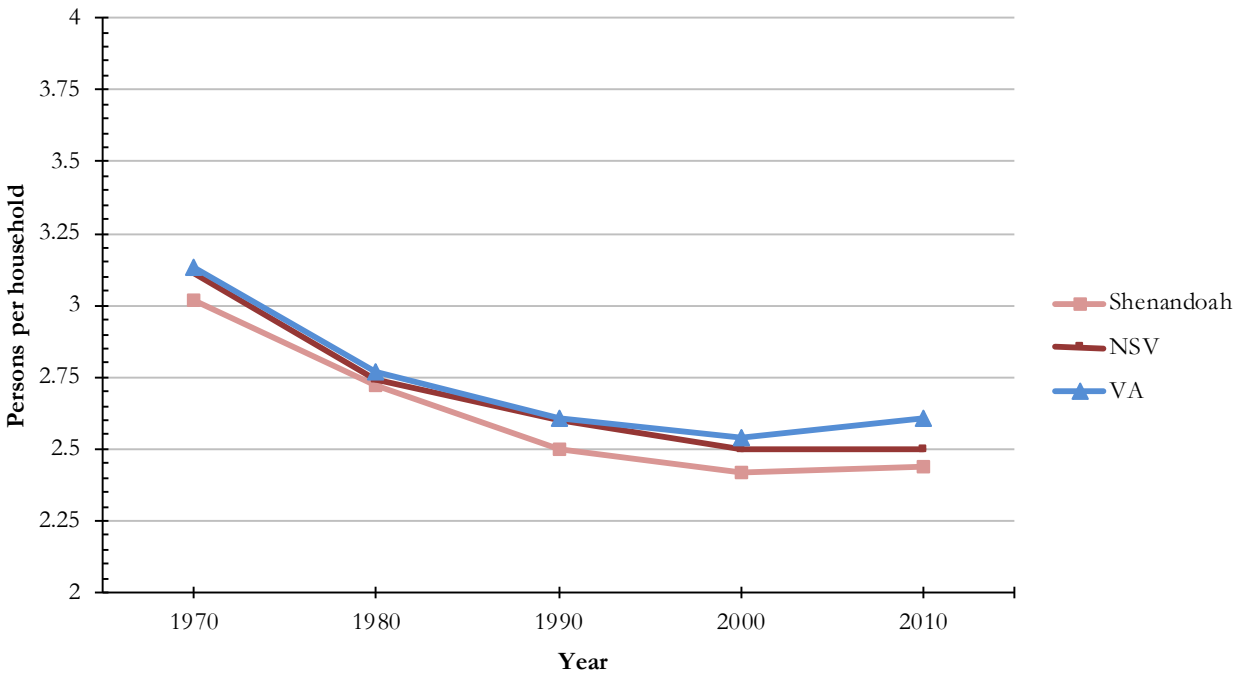
Educational attainment is an important indicator of local economic growth. In general, the higher a localities educational attainment, the more economic opportunities there are for local residents, higher household incomes, and more resilient local tax bases. The County's historic employment emphasis in the past had been "blue collar" oriented, in which twelve years of schooling was not always necessary. Local, regional, and national economic trends have required residents to obtain higher education levels.

Figure 5-V depicts educational attainment for persons age 25 years or over from 1980 to 2010. During this period education attainment has improved dramatically. For example, in 1980 only 49.9% of County residents were high school graduates, compared to 84.6% in 2010.

Although educational attainment has increased substantially in recent decades and subsequent higher credentials have improved career prospects for County residents, changes to the labor market in recent years, however, have meant that completing an associates degree or bachelor's degree have not necessarily translated into higher paying local employment opportunities. Further, a decline

Figure 5-W: Household Size 1970-2010

Source: US Census Bureau



in middle class jobs across the county and especially in rural areas, has led to a growth of low paying, previous employment opportunities for area residents. The economic implications of educational attainment will be discussed further in Chapter 4: Economy.

7.5 Household Size & Relationship Status

The number of persons per household, as defined by the Census Bureau, includes all persons living in a single dwelling unit. Figure 5-W shows the average household size for the County, the Northern Shenandoah Valley Region, and the State from 1970 to 2010. Across Virginia, household size has declined steadily. Figure 5-X illustrates the Household Relationship Status by Percentage of all households between 2009 and 2013. Shenandoah has a lower share of non-family and non-family-living alone households than other rural areas in the State.

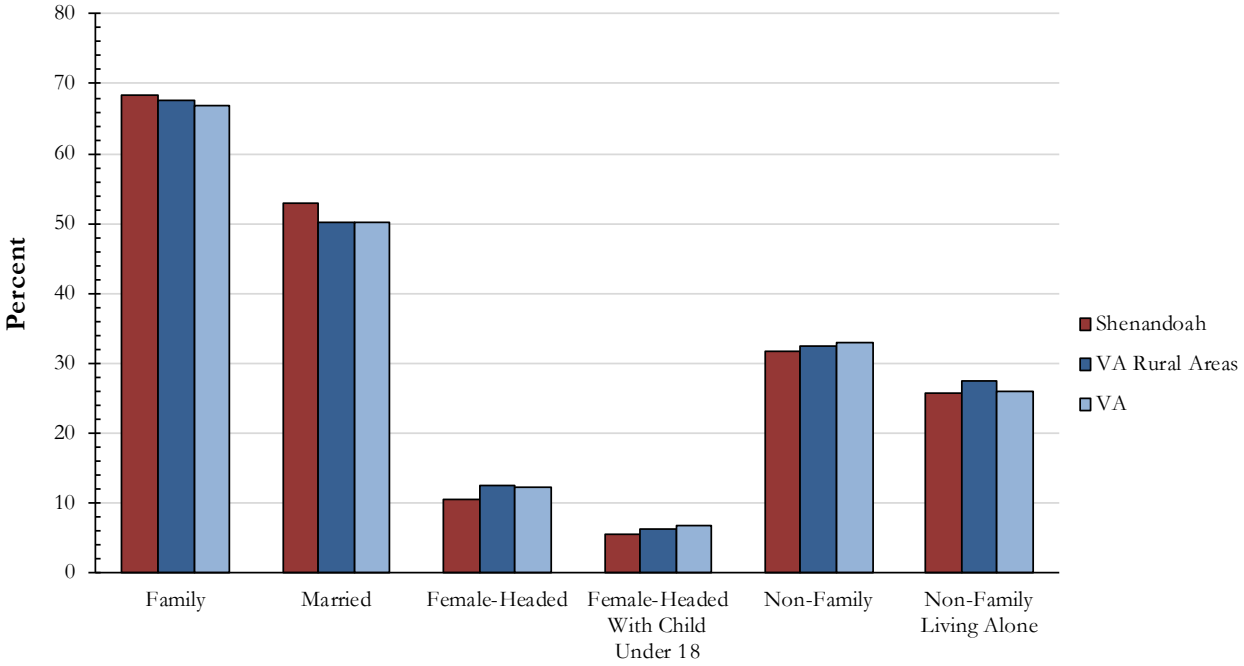
It is expected that Shenandoah will begin to move towards resembling other rural areas in the state due to declining fertility rates and a rapidly aging population. As a result of this trend, the demand for certain housing types, particularly apartments and multi-family units, will increase as households will not be large enough to afford or maintain single-family homes on large parcels of land. This is addressed further in the Chapter 6: Housing.

7.6 Grandparents Living with or Serving as Primary Caregivers

Nationally, the number of children living in grandparent-headed households has increased significantly since the 1990s. Regardless of the reason why grandparents have taken on this responsibility: parents struggling with

Figure 5-X: Household Relationship Status By Percentage 2009-2013

Source: Rural Data Center, Housing Assistance Council;
US Census Bureau, American Community Survey



substance abuse, mental illness, incarceration, economic hardship, divorce, domestic violence, or other challenges, grandparents provide a vital safety net to children inside and outside the foster care system in Virginia.

According to the American Community Survey five year estimates between 2009 and 2013, 2.9% of households in Shenandoah County (509) included a grandparent living with their own grandchild. 1% of households in the county (176) include a grandparent living with their own grandchild of which they are responsible. The County has a higher percentage of multi-generational households than Virginia, with 2.9% and 1.5% respectively. Compared to other small town and rural areas, however, Shenandoah has a smaller percentage, with 4.2% compared to 2.9%.

It is important to ensure that these caregivers are supported by the County's policies and programs, the children's needs are being met, and that the challenges faced by parents that may lead them to be unable to care for their children be addressed systematically across all County agencies and departments, the private sector, and/or faith based groups.

8.0 Socio-Economic Information

In addition to the indicators described above, any analysis of the County's demographics must include information about the socio-economic status of its residents. The following section describes household income, earnings, individual and family poverty status, and the number of students receiving free or reduced lunch in County Schools. These indicators provide valuable information that

Figure 5-Y: Household Income
Source: US Census Bureau, American Community Survey 2009-2013
Total Households: 17,397
SC = Shenandoah County

Household Income Group ($)	SC #	SC %	US%
<10,000	1,017	5.9	7.3
10,000 - 14,999	680	3.9	5.4
15,000 - 24,999	2,510	14.4	10.8
25,000 - 34,999	1,931	11.1	10.3
35,000 - 49,999	2,621	15.1	13.6
50,000 - 74,999	3,551	20.4	17.9
75,000 - 99,999	2,189	12.6	12.2
100,000 - 149,999	2,181	12.5	12.9
150,000 - 199,999	459	2.6	4.9
200,000 <	258	1.5	4.8
Median Household Income	49,625	100	100

Figure 5-Z: Household Earnings
Source: US Census Bureau, American Community Survey 2009-2013
Total Households: 17,397
SC = Shenandoah County

Households	SC #	SC %	US%
With Earnings	13,163	75.7	78.2
With Earnings From Social Security	6,463	37.2	28.9
With Earnings from Supplement Security Incomes	610	3.5	4.9
with Earnings from Public Assistance Income	391	2.3	2.8
With Earnings from Retirement Income	4,164	23.9	17.7

should be considered by development or future growth plans. The full gamut of economic conditions will be discussed in Chapter 4: Economy.

8.1 Household Income and Earnings

Income and earnings are different. The Census Bureau collects data on how much money households obtain from 50 different sources, all of which they label income. Earnings, primarily wages and salary from a job, are usually a big source of income. Other sources of income include Social Security payments, pensions, child support, public assistance, and annuities; money derived from rental properties, interest and dividends.

The county's median household income between 2009 and 2013 was $49,625, which is $3,421 lower than the national median of $53,046. Figure 5-Y breaks down household income by income group. Shenandoah County has a higher concentration of households with incomes between $15,000 and $99,000 than the national average, but fewer households with incomes below $14,999 and above $100,00.

Figure 5-A1: Federal Poverty Level 2016*
Source: US Department of Health and Human Services
*2016 Poverty Guidelines for the 48 Contiguous States and the District of Columbia
For Families with more than 8 persons, add $4,160 for each additional person

Number of People in Family	Income ($)
1	11,880
2	16,200
3	20,160
4	24,300
5	28,440
6	32,580
7	36,730
8	40,890

Examining household earnings provides a more nuanced breakdown of how residents earn the necessary income to maintain their lifestyles. Figure 5-Z breaks down the sources of household earnings by source, including social security, supplement security income, public assistance income, and retirement income. The categories are not mutually exclusive; a household may fall into several categories. For example, a household could be receiving earnings from public assistant and social security while another receives retirement income and social security; these households would be double counted.

Despite this limitation, the data supports the general trend that county residents are older and many are retired. 37.2% of households in the county have some earnings from social security, 8.3% higher than the national average of 28.9%. Likewise 23.9% of households have some earnings from retirement income, which is 6.2% higher than the national average of 17.7%. These percentages can be expected to rise in the County as the population ages and the birth rate remains low.

8.2 Individuals and Families Living in Poverty

The number of individuals and families that live at or below the federal poverty threshold (as defined by Figure 5-A1: Federal Poverty Guidelines 2016) has a profound impact on the County's resources and development. Figure 5-A2 breaks down the poverty status of individuals.

The county's population in 2013 was 41,993, with 4,887 or 11.7% of individuals living below the poverty threshold. This is lower than the national average of 15.4%. There were 578 individuals over the age of 65 living in poverty as well as 1,533 children under the age of 18.

Figure A3 breaks down the poverty status of families living below the poverty line. In 2013 1,025 of the County's 12,209 families lived below the poverty line. Of these, 757 of the 5,159, or 14.8% families with a child under 18 live in poverty and 86 of the 815, or 10.6% families with children under 5 live in poverty. Both of these rates are below the national averages of 17.8 and 18.6% respectively.

Although the number of individuals and households living below the

Figure 5-A2: Select Individuals Living Below Poverty Threshold '09-'13
Source: US Census Bureau, American Community Survey 2009-2013
Total Individuals 2013: 41,993
SC = Shenandoah County

Individuals Living Below Poverty Threshold	SC #	SC %	US %
Overall County Total	4,887	11.7	15.4
Age 18 or Older (Total of 32,751)	3,275	10.0	13.4
Age 65 or Older (Total of 7,815)	578	7.4	9.4
Related Children Under 18 (Total of 8,950)	1,533	17.1	21.3
Related Children Ages 5-17 (Total of 6,587)	1,208	18.3	20.0

Figure 5-A3: Families Living Below Poverty Threshold '09-'13
Source: US Census Bureau, American Community Survey 2009-2013
Total Families 2013: 12,209
SC = Shenandoah County

Family Groups Living Below Poverty Threshold	SC #	SC %	US %
Total Families	1,025	8.4	11.3
With Child Under 18 (Total of 5,129)	757	14.8	17.8
With Child Under 5 (Total of 815)	86	10.6	18.6

Figure 5-A4: Students Receiving Free and Reduced Meals 07-15
Source: Shenandoah County Public Schools 2016

Year	Attendance*	Free & Reduced	Percent (%)
2007-2008	6,282	2,046	32.56
2008-2009	6,298	2,147	34.09
2009-2010	6,255	2,391	38.23
2010-2011	6,270	2,392	38.15
2011-2012	6,252	2,662	42.58
2012-2013	6,233	2,764	44.34
2013-2014	6,280	2,756	43.89
2014-2015	6,243	2,616	41.90
2015-2016	5,931	2,829	47.70
*Attendance is measured on the same day each year.			

poverty threshold in the County are below national averages, there is still cause for concern. Especially when considering that families may be living just above the poverty level and their acute exposure to changes in local social policies.

8.3 Free or Reduced Meals in County Schools

The number of students receiving free and reduced lunches in school is another indicator of the socio-economic conditions present in the County. The United States and Virginia Departments of Education determine the guidelines

(which change annually) of the program but the County School Board administers the program at the local level. At the beginning of each school year, letters and meal applications are distributed to households of children attending school. This letter informs households that school nutrition programs are available and that free and reduced-price meals are available based on income criteria. Students are required to have a meal application on file.

In 2016, children from families with incomes at or below 130 percent of the poverty level are eligible for free meals. Those between 130 percent and 185 percent of the poverty level are eligible for reduced-price meals, for which students can be charged no more than 40 cents for lunch and 30 cents for breakfast.

Figure 5-A4 shows the percentages of students who received free or reduced meals from the 2007-2008 to the 2015-2016 school years. Since 2007, this percentage has increased dramatically, from 32.56 to 47.70 percent. This increase can be attributed to two separate, but equally concerning factors. First, school attendance dropped from a high of 6,298 in 2008-2009 to 5,931 in 2015-2016. Second, the number of students that qualified for free and reduced meals, increased every year, from 2,046 in 2007-2008 to 2,829 in 2015-2016.

While free and reduced lunches have financial costs, the raw numbers serve as an indicator of County's socio-economic health. An increasing share of students qualifying for free and reduced meals will not only have implications for the school system, but also on how the County should tailor policies and programs in the future to address the root causes of poverty affecting students and their families.

9.0 Health Statistics

Population change, density, and demographic characteristics are essential to developing a nuanced understanding of Shenandoah County's residents current and future needs. It is also important, however, to discuss the health characteristics of residents, as they also have an impact on government service provision. The conditions in which people are born, grow up, live, work, and age affect a wide range of health risks and outcomes. These are called social determinants of health.

These circumstances are shaped by the distribution of resources at the national, state, and local levels. By identifying these social determinants, as well as current health challenges and opportunities, the County can integrate health and other quality of life indicators into its long term development, to not only improve individual and population health but also advance health equity.

Due to data availability challenges, this section will provide a snapshot of current conditions; it will not describe past trends or project how the data will change in the future. There are two primary data sources.

First, the Center for Disease Control, and specifically the Community Health Status Indicators (CHSI) 2015 report. The CHSI is a program that produces health profiles for all 3,143 counties in the United States. Each profile includes key indicators of health outcomes, which describe the population health status of a county and factors that have the potential to influence health outcomes, such as health care access and quality, health behaviors, social factors and the physical

Figure 5-A5: Shenandoah County vs. Peer Counties*
Source: Center for Disease Control (2015).

Indicator	Shenandoah	Peer Counties
Geography		
Population Size	42,583	23,985 - 76,793
Population Density (per square mile)	83	13-113
Median Household Income	$48,667	$33,021 - $58,673
Age & Sex Distribution		
Under 18	21.4%	17.6% - 25.0%
Age 18-64	59.1%	54.3% - 65.4%
Age Over 65	19.4%	13.8% - 25.7%
Female	51.1%	46.6% - 51.4%
Male	48.9%	48.6% - 53.4%
Race / Ethnicity Distribution		
American Indian or Alaska Native	0.4%	0.1% - 23.0%
Asian	0.6%	0.3% - 1.6%
Native Hawaiian or Other Pacific Islander	0.0%	0.0% - 0.2%
Black or African American	1.8%	0.2% - 32.3%
White	89.8%	57.6% - 96.9%
Hispanic or Latino	6.4%	0.7% - 20.8%

*Peer Counties are determined by an anaylsis of 19 county-level equivalent indicators, including those listed above, from all 3,143 counties in the United States. Shenandoah has 49 peer counties. It's peers in Virginia are Orange and Page counties.

environment. The social determinants of health are especially important because they help identify areas where the County and partner organizations can efficiently allocate its resources to ensure the most impact on the health of residents.

Second, the Robert Wood Johnson Foundation County Health Rankings & Road Maps program in partnership with the University of Wisconsin Population Health Institute. The program helps communities identify and implement solutions that make it easier for people to be healthier in their homes, schools, workplaces, and neighborhoods. The measures look at a variety of measures that affect the future health of communities, such as high school graduation rates, access to health foods, rates of smoking, obesity, and teen births. The rankings also provide an opportunity to compare Shenandoah to other counties in the Commonwealth.

9.1 Community Health Rankings & Road maps

The CHSI Summary Comparison provides an "at a glance" summary of

Figure 5-A6: Shenandoah County vs. Peer Counties*
Source: Center for Disease Control (2015).
Data is from CDC Estimates for 2015. The numbers may differ slightly than those identified in earlier sections.

Indicator	Worse (Least favorable quartile)	Moderate (Middle two quartiles)	Better (Most favorable quartile)
How to read this chart: **Consider the Example:** Work related injuries	(Example) The county has more work related injuries than at least 75% of its peer counties	(Example) The county's number of work related injuries falls between 25% and 75% of the rate of peer counties.	(Example) The county has less work related injuries than at least 75% of its peer counties.
Mortality (Causes of Death)	Chronic Kidney Disease Deaths	Cancer deaths Disabilities deaths Female life expectancy Male life expectancy Stroke deaths	Alzheimer's disease deaths Chronic Lower Respiratory Disease (CLRD) deaths Coronary heart disease deaths Unintentional injury (including motor vehicle)
Morbidity (how often a disease occurs in a specific area)	Adult disabilities	Adult obesity Adult overall health status Alzheimer's disease / dementia Gonorrhea HIV Older adult depression Pre-term births	Older adult asthma Syphilis
Health Care Access and Quality	Older adult preventable Hospitalizations Uninsured	Cost barrier to care Primary cafe provider access	
Health Behaviors	Adult female routine pap tests Teen Births	Adult physical inactivity Adult Smoking	Adult binge drinking
Social Factors	Inadequate social support	Children in single-parent households High housing costs On time high school graduation	Poverty Unemployment Violent Crime
Physical Environment	Access to parks Annual average of PM2.5 concentration Living near highways	Housing stress Limited access to health food	

***** CDC states that is important to caution against over-interpretation of the "Better", "Moderate", and "Worse" categorizations. In many cases, these categorizations and rankings are based on point estimates not considering the associated confidence intervals. The CDC advises users to examine all CHSI 2015 Primary and Associated indicators for their county of interest, including those that are rated as "Better" and "Moderate" compared to the set of peer counties. For example, a county's stroke death rate ranked as "Better" compared to peers may compare unfavorably to the median for all U.S. counties. Additionally, the rate may be trending in an unhealthy direction or masking important disparities within subpopulations. Despite these data limitations, it is important to include these rankings and indicators in this chapter to provide a snapshot of Shenandoah's public health.

Figure 5-A7: Obsesity Rates by Percentage of Total Population 2004-2012
Source: Centers for Disease Control 2014

County	2004	2005	2006	2007	2008	2009	2010	2011	2012	% Change '04 - '12
Clarke	23.0	23.8	25.7	26.4	26.3	28.4	29.8	30.1	28.0	+5.0
Frederick	23.8	25.3	26.7	27.7	29.1	28.5	29.3	30.7	32.5	+8.7
Page	22.7	26.0	26.6	28.0	28.4	31.8	30.9	30.6	29.5	+8.7
Shenandoah	26.4	26.2	25.9	25.9	27.4	30.0	30.0	26.7	26.3	-0.1
Warren	22.5	24.9	27.5	29.7	27.8	28.6	26.0	27.3	27.5	+5.0
Winchester City	22.1	25.4	25.8	27.0	26.8	29.0	29.7	28.6	26.5	+4.4
Average	23.4	25.3	26.4	27.5	27.6	29.4	29.3	29.0	28.4	+5.3

Figure 5-A8: Diabetes Rates by Percentage of Total Population 2004-2012
Source: Centers for Disease Control 2014

County	2004	2005	2006	2007	2008	2009	2010	2011	2012	% Change '04 - '12
Clarke	8.6	9.0	9.3	10.1	10.3	10.5	10.9	11.1	11.0	+2.4
Frederick	7.4	8.2	8.6	9.0	9.1	8.9	9.0	9.1	9.4	+2.0
Page	8.2	9.0	8.6	9.3	9.5	10.4	10.5	11.4	11.0	+2.8
Shenandoah	8.8	8.6	10.2	10.2	11.5	10.4	11.9	11.7	12.1	+3.3
Warren	7.9	8.5	9.0	9.4	9.9	10.4	11.5	10.7	10.0	+2.1
Winchester City	7.6	8.2	8.7	9.2	9.9	10.2	10.0	10.1	9.8	+2.2
Average	8.1	8.6	9.1	9.5	10.0	10.1	10.6	10.7	10.6	+2.5

how Shenandoah County compares with peer counties on the full set of primary indicators. Peer groups or counties are defined by the following parameters shown in Figure 5-A6.

Within each parameter, the CHSI ranks Shenandoah with its peer groups. Peer county values for each indicator were ranked and then divided into quartiles. These quartiles are then split into three categories: better, moderate, and worse. Better is the most favorable quartile, meaning that the county has lower rates than peer counties; Moderate, is the middle two quartiles, which means that the County is performing similar to its peer counties; Worse, is the least favorable quartiles, which means that county is performing worse than peer counties on these indicators. Figure 5-A6 illustrates how the County compares to its Peer group across these various indicators.

The county has mixed results when its health indicators are compared to its peer counties. It performs better on several key indicators including: adult binge drinking, poverty, unemployment, and unintentional injury. It performs in the moderate range on the majority of indicators; including, but not limited to cancer deaths, adult overall health status, primary care providers' access, and limited access to healthy food. While overall the County performs well, there are some

challenges to residents' public health. The county performs in the lower quartile on the following indicators: adult diabetes, older adult preventable hospitalizations, teen births, inadequate social support, and living near highways.

In the future, the County's performance on indiciators like the CHSI should be taken into consideration when developing and implementing programs to ensure that tax dollars are allocated to initiaitves that have the greatest impact on the health of residents. As the population ages and population growth slows, these indicators will become increasingly important and illustrate greater costs on the county's public, private, and non-profit sectors.

9.2 The Costs of Ill-Health

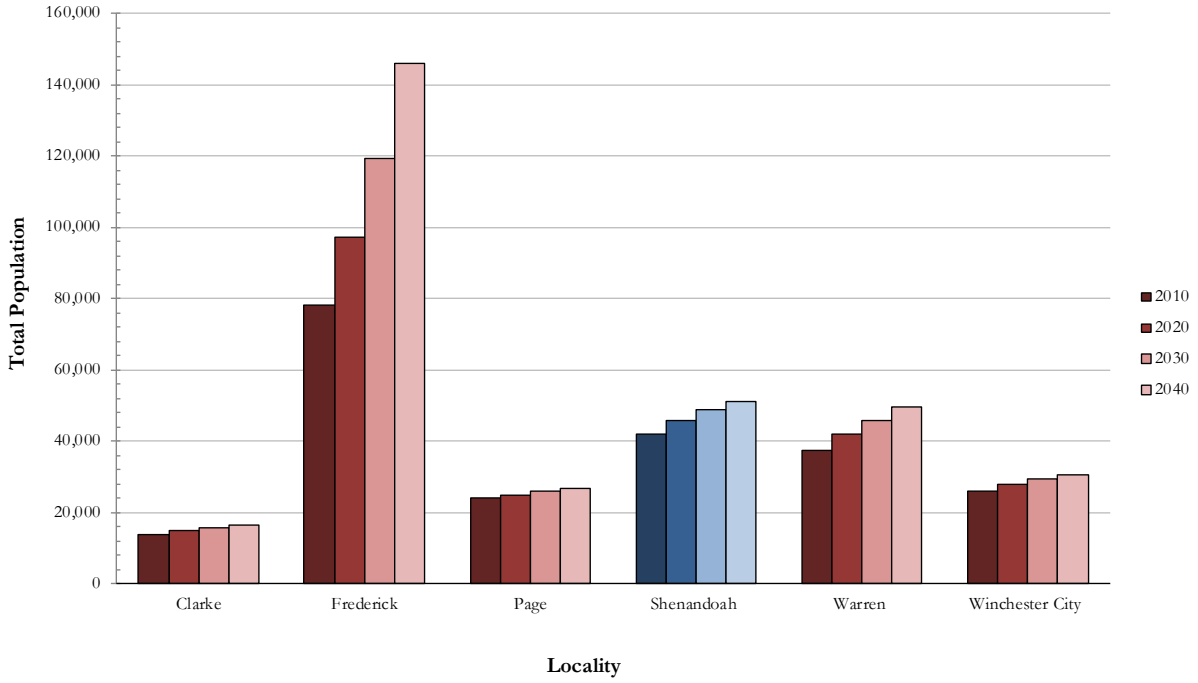
According to the Harvard School of Public Health, ill health – like obesity, diabetes, and poor social support – can harm virtually every aspect of health. Preventing obesity, diabetes, and other poor health outcomes should begin at an early age and extend across a lifespan to vastly improve individual and public health, reduce suffering, and save millions of dollars each year in health care and the indirect related economic costs such as value of lost work, insurance, and wages. Public Health must be considered when examining development decisions across the county in the near and long term.

One example of a public health indicator that the county is performing well on is obesity. The most recent data available illustrates that Shenandoah County saw a decrease in obesity rates from 2004 to 2012 by 0.1%. This is in stark contrast to the trend in the Northern Shenandoah Valley, where counties experienced an average increase of 5.0% during the same period.Figure 5-A7 breaks down obesity rates in the region. Frederick and Page Counties saw the largest increases with 8.7% and 6.8% respectively. However, with a an obesity rate of 26.3% or more than 1 in 4 residents, Obesity remains a public health concern for the County.

At the same time, however, diabetes rates in the county have increased by 3.3 percent. As of 2012, the County had the highest level of diagnosed diabetes in the region, with 12.1% of the population living with the disease. Figure 5-A8 illustrates how diabetes rates changed in the Northern Shenandoah Valley between 2004 and 2012. In 2012, the national average of individuals with diabetes was 9.3% nearly 3% lower than Shenandoah's.

According to the CDC, both the prevalence and incidence of diabetes have increased rapidly since the mid-1990s, with minority racial/ethnic groups and socioeconomically disadvantaged groups experiencing the steepest increases and most substantial effects from the disease. It is important to monitor diabetes and obesity rates moving forward and to tailor growth and policy decisions to face the challenges that may arise from increased ill-health as well as the acute social and economic impacts these conditions may present.

Figure 5-A9: Population Projections 2020-2040
Source: Weldon Cooper Center, University of Virginia, 2012



10. Population Projections

Population projections are necessary for planning future public improvements and programs. For the purpose of this comprehensive plan, project data are taken from the Demographics Research Group at the Weldon Cooper Center at the University of Virginia; the Commonwealth's official source of demographic information. By using the Commonwealth's official projection, the County can more accurately compare itself to similar localities both within and outside of the Valley. The most recent population projections were developed in 2012 and extend to 2040. The Cooper Center is scheduled to revise their projections again by the end of 2016. As new projections become available, this section of the chapter will be revised accordingly to accommodate changes that may impact public policies.

All projections are developed based on current assumptions about the future. They rely heavily on past demographic trends, economic conditions, and local factors; such as housing availability or planned industrial development or closures. Because they make statements about the future, however, projections may prove to be inaccurate due to unforeseen factors such as cultural, economic, environmental, and/or political shifts or events. Despite the inherent limitations of projections, they remain essential for informing evidence-based long term policy decisions.

The Center projects that Shenandoah County's population will increase by 18% between 2010 and 2040, to a total population of 51,104. This marks a considerable slowdown in growth compared to previous decades where double

digit growth was common. Between 1970 and 1980, for example, the county grew 20.6% alone. Several decades of double digit growth followed, with 2000-2010 seeing an increase of 19.7%.

The predicted decline of the growth rate after 2010 despite major recent trends is indicative of the wider regional and national trends described earlier, primarily the slowdown in Northern Virginia since 2010. While the Center projects that Shenandoah will continue to grow beyond 2040, the growth rate itself will change, decreasing from 8% between 2010-2020, to 7% between 2020-2030, and finally down to 4% between 2030-2040. This slowly growth rate is particularly important to consider in long range planning.

During the same period, Warren County is projected to grow at a faster rate than Shenandoah County, but remain slightly less populated, increasing 24% from 37,575 to 49,709. Winchester City and Clarke County are projected to grow at similar rates, increasing by 15% and 16% from 26,203 in 2010 to 30,781 in 2040 and from 14,034 in 2010 to 16,631 respectively. Page County is projected to increase by 10% from 24,042 to 26,716, which is the lowest overall growth rate in the region. Regardless of these rates of change, the Center predicts a tapering down of growth for all localities in the Northern Shenandoah Valley, except for Frederick County.

Frederick County is expected to see the significant growth, increasing 46% from 2010 levels to a total population of 145,938. It is projected that Frederick will grow approximately 19% each decade. This large influx of new residents will have an effect on Shenandoah's overall population as some of these new residents may choose to live in Shenandoah while they work in Frederick. The extent of this type of potential commuting, however, cannot be measured at this time. It will be important to regularly evaluate the conditions in the northern part of the county in order to ensure development decisions are meeting the needs of current residents and accommodate the possible migration of residents from Frederick County.

10.1 School Age Projections

According to the Weldon Cooper Center, since the mid-2000s the State of Virginia has experienced a dramatic shift in demographic changes. As described in earlier sections of this chapter, while many young couples in the past have started families while they lived in urban areas, a good number would move to suburban counties before enrolling their children in school. Today many parents are staying put in urban areas, thanks to stricter mortgage regulations that make it harder to secure resources for homes, and the combination of a difficult ,precarious labor environment and declining wages.

The Cooper Center estimates that by 2018, 40% of Virginia public school enrollment will decline, with the largest decreases occurring in rural areas due to low birth rates and fewer families moving to these areas, like Shenandoah County. The declining enrollment in rural school divisions will be more challenging when taking into consideration that many of the schools with declining enrollment are also those most dependent on state funding. Since state funding is in large part tied to the number of students in a division, many divisions face the prospect of less state funding.

11. Summary

Shenandoah County's policies, service delivery, and growth strategy are determined by current and projected demographics and socio-economic conditions. Despite rapid growth between 1980 and 2010, the County's population has stabilized and is expected to experience marginal growth or decline in the coming decades. While the population has stabilized, however, the age-break down of county residents has shifted dramatically. If current trends continue, in coming years and decades, the school age population is expected to continue its decline while the average age of county residents continues to rise. Further as an agricultural county, replacing aging farmers will prove vital to the County's future economic growth.

These opposing trends can be attributed to three factors: first, that current residents are aging and not having as many children as they once did; Second, young people are not moving to the county like they were in the 2000s and therefore are not starting families here; and third, retirees moving to the county have different needs of services than younger populations. An older population with fewer school aged children presents unique policy and service delivery challenges and opportunities for the public, private, faith based, and non-profit sectors.

The county remains well over 90 percent Caucasian, despite increases of individuals who identify as Latino or of Hispanic Origin. Further, 92 percent of households speak English at home, whereas 6% speak Spanish. If these trends continue, efforts should be made by private and public sector stakeholders to reduce barriers of participation in local communities.

As the county rapidly ages and in-migration slows and natural increase slows, socio-economic conditions also affect how the County develops and allocates resources in the future. According to the American Community Survey data from 2009 to 2013, 10 percent of the County's population aged 18 or Older and 18.3% of children under 18 live below the federal poverty level. Yet, other data indicate that a significant number of county residents are living at or just above the federal poverty line, and thus are also in a precarious socio-economic position. For example, from 2007 to 2016, the percentage of students receiving free and reduced meals increased from 32.56 to 47.70. It is imperative that county policies and services take into account the socio-economic conditions faced by county residents when allocating funds.

Despite socio-economic and demographic changes, the county is well positioned to remain a beautiful place to live and raise a family in the coming decades.

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Chapter 6:

Housing

Design and Figures updated June 2016

1.0 Introduction

Since the housing needs of the County's residents can be expected to change and because the provision of housing is affected by the actions of the County and Town governments, it is necessary to plan to meet both present and future housing needs. This section considers the housing market in Shenandoah County, the need for housing, and the projected changes in the total housing stock through 2020.

2.0 Definitions

Dwelling unit: A house, manufactured home, apartment, group of rooms, or single room occupied or intended for occupancy as separate living quarters.

Household: All of the people who occupy a dwelling unit. It could be a single family, one person living alone, two or more families living together, or any other group of related or unrelated persons who share living arrangements, except those in group quarters.

3.0 Housing Market

Shenandoah County is defined as a basic housing market. As of 2000, 65.2% of its workers lived and worked in the County. The County is also part of the regional housing market, offering relatively lower-cost housing than Clarke County, Frederick County-Winchester, Rockingham County-Harrisonburg, or Warren County. Further, the County is a sub-market of the Washington, D.C. Metropolitan Area housing market. Because of moderately easy access to the D.C. metropolitan area afforded by I-81 and I-66, workers and retirees from that area consider have discovered that Shenandoah County is an attractive place to live with their families

Since 2009, the housing market in the County has been depressed. For about 10 years prior to that, nationally-known construction firms built large housing developments throughout the Northern Shenandoah Valley. During 2004-2007, applications for building permits in Shenandoah County increased by XX percent from the previous four year period. Since 2007, appklications have decreased by XX percent. As of this revision, analyst are unable to predict when

the housing market will recover, but anticipate that it will be at least another year (2012).

There has been a corresponding slow-down in population growth in Shenandoah County. During 2004-2007, population growth averaged XX percent compared to XX percent during 2008-2009. School population grew by an average of 1.8 percent each year during 2004-2007, but only .07 percent during 2008-2009.

2.1 Demand For Housing

One of the primary goals of the County is to ensure that there is adequate housing for its citizens. While the County cannot directly provide that housing, it can partner with federal, state, and non-profit agencies, as well as for-profit firms, to achieve the goal. In order to so, we must have a method for estimating the demand for housing. Based on the Federal Housing Administration market analysis criteria contained in the HUD/FHA Desk Guide on Principles and Techniques of Comprehensive Housing Market Analysis (1 June 2004), the major determinants of demand are: 1) the rate of growth in the number of households; 2) income and employment patterns; 3) liquid asset holdings, down payment and mortgage term requirements; and 4) space, convenience and style requirements.

2.2 Growth in Households

The household is the basic unit of demand. Each household requires a dwelling unit, or housing. The terms "dwelling unit" and "housing" are used interchangeably. In 1990, Shenandoah County's average household size was 2.50 compared to 2.63 for the United States. In 2000, the national average was 2.59 persons per household which was again higher than the 2.42 persons per household in the County at that time. (Update data.

A continued decline in the size of households is predicted (Who or what predicted? Update data.) through the year 2030 (2020?). Figure 6-A below shows projections for persons per household and total number of households in Shenandoah County until 2020?/2030?.

The declining household size means that housing units will be required at an even higher rate than the population growth. A 10.9% increase in population between 1990 and 2000, combined with a decline in the average household size, generated a 14.8% increase in the number of households. Between 2000 and 2010, a projected 11.5% population increase would yield a 13.4% increase in households. In total, for the projection period between 2000 and 2020, a 22.6% increase in population is expected to generate a 26.4% increase in the number of households.

2.3 Income and Employment Patterns

The economic characteristics of the County are discussed in detail in Chapter 4 - Economy. This section will consider the distribution of income as it affects the housing market.

Figure 6-A: Projections of Households				
	Actual		Projections	
	1990	2000	2010	2020
Population	31,636	35,075	39,400	43,000
Persons not in Households	530	513	520	520
Persons per Household	2.50	2.42	2.38	2.35
Number of Household	12,452	14,296	16,336	18,077
Source: US Bureau of the Census, 1990 & 2000				

Figure 6-B: Distribution of New Households by Affordable Housing Costs						
Income $	Affordable Housing Range at 2 & 2.5 Times Gross Annual Income ($)	Affordable Total Monthly Housing at 30% Gross Monthly Income ($)	Affordable Mortgage or Rental Payment at 75% Total Monthly Housing Cost	2002 Distribution of Income for Married Households %	Distribution of New Households 2000-2010	2010-2020
<9,999	<20,000	<250	<188	13.0	249	243
10,000 - 14,9999	20,000- 37,000	250-375	188-281	4.0	77	75
15,000 – 19,999	30,000- 50,000	375 - 500	281-375	4.6	88	86
20,000 – 24,999	40,000 – 62,500	500-625	375-469	5.6	107	105
25,000 – 29,999	50,000 – 75,000	625-750	469-563	5.7	109	106
30,000 – 39,000	60,000 – 100,000	750 – 1,000	563-750	12.1	232	226
40,000 – 49,999	80,000 – 125,000	1,000 – 1,250	750-938	13.1	251	245
50,000 – 74,999	100,000 – 187,500	1,250 – 1,875	938-1,406	24.8	474	462
75,000 +	150,000 or more	1,875 +	1,406+	17.1	327	319
				100	1,914	1,867
Source: US Census, Weldon Cooper Centre						

The most recent data available is 2002 income tax returns for the State of Virginia, and it is presented in nine income ranges with the highest being $75,000 and above. Of major concern to a builder is the price range affordable to new householders. To determine what ranges might exist in the County, the 2002 distribution of married couple Adjusted Gross Income (AGI) was used to project the income of new households. This assumes that married households will represent the majority of new households and that the income distribution among these households will be approximately the same for the near future as that in 2002.

Figure 6-B on the next page uses this information as follows: Column 1 shows the nine income ranges. Column 2 computes the affordable range of housing costs for a household in each income range. Column 3 then computes the affordable total monthly housing cost at 30 percent of the gross monthly income. This figure is a currently-accepted guide for total monthly housing cost. This figure is then multiplied by 75 percent to determine an affordable mortgage or rental payment, shown in Column 4. The remaining 25 percent is to cover utilities, maintenance, taxes, insurance, and other incidental housing costs. Depending upon which costs are included in the rental payment, the rent figure may equal Column 3, total monthly housing costs. Column 5 shows the 2002 distribution of income for Shenandoah County married households. Column 6 and 7 is the distribution of total anticipated households between 2000 - 2010 and

2010 - 2020, based on the 2002 distribution. Total new households are the same as shown in Table 6-A.

Based on affordable housing costs, most of the lower income households will be unable to find homes that can be purchased on their incomes and will, therefore, probably seek rental units. In order to get adequate housing, these households may have to spend more than 25 percent of their income. Households in all income ranges may be willing to spend more than 25 percent of their incomes for housing. In part, for these projections to occur, the local economy must continue to expand.

2.4 Liquid Asset Holdings and Financing

This category of determinants is difficult to predict. Mortgage interest rates and down payment requirements may be variable over time. Down payment requirements for banks are generally held to a 20 percent minimum; to finance greater than 80 percent of the value, banks will require private mortgage insurance (PMI). Credit unions may allow a lower down payment. Lower down payment loans are also offered through the Virginia Housing Development Authority or Farmers Home Administration for low and moderate income households who are first time buyers. The most important figure for the home buyer is the monthly housing payment. Those households with little or no liquid assets will need State and Federal programs to make home ownership within their reach.

Those new households which consist of retirees or out-commuters are likely to have higher assets with which to purchase housing in the local market. Both of these groups either come primarily from or travel to the Washington Metropolitan Area. They may have equity from the sale of property or be earning higher wages relative to the area, and thus be able to afford more costly housing than the typical Shenandoah County family. This may also be true with respect to households in higher income jurisdictions within the Planning District.

2.5 Space, Convenience, and Style

The County's housing consists primarily of single-family, detached, owner-occupied homes; 13,208 out of a total 16,709 houses (79%) were included in that category in 2000. Although most households would prefer that type of home, many may not have the resources to buy such a home in the future. Over the last two decades, there has been a demand for more rental units to serve the increased number of small households and those families which cannot afford, or may not wish to buy, a home. These demands are now being met by the sale or rent of townhouse units and by apartments. More apartment construction may be anticipated in the future, along with efforts to convert large single-family homes into apartment units.

3.0 Housing Need

If all existing housing units met minimum standards, the housing

Figure 6-C: Shenandoah County Housing Stock 1989-2000						
	1980	% of Total	1900	% of Total	2000	% of Total
Total Year-round	11,861	100	15,160	100	16,709	100
Vacant-For Sale / Rent Sale / Rent	423	3.6	352	2.3	372	2.2
Not for Sale/Rent	371	3.1	507	3.3	579	3.5
Held for Occasional Use	1,032	8.7	1,849	12.2	1,462	8.7
Total Occupied	10,035	84.6	12,452	82.1	14,296	85.6
Owner	7,622	76.0	8,903	71.5	10,462	73.2
Renter	2,413	24.0	3,549	28.5	3,834	26.8
In-Town	3,877	32.7	4,976	32.8	5,771	34.5
Out-of-Town	7,984	67.3	10,184	67.2	10,938	65.5
Source: US Census Bureau						

market would only require the addition of enough units to meet the growth in households with enough surplus to provide an adequate vacancy rate. However, not all housing units meet standards for adequacy, so substandard units must be brought up to standards or new units provided to replace substandard units.
Adequacy of the housing stock was measured only indirectly in the 2000 Census. The two most common indicators of substandard units are overcrowding - defined as 1.01 or more persons per room - and a lack of complete plumbing facilities for exclusive use of the household. Since an overcrowded unit may be otherwise adequate, the best available indicator of structural inadequacy is lack of complete plumbing.

In 2000, 290 (2.0 percent) of the occupied housing units lacked one or more plumbing facilities for the exclusive use of the occupants. Plumbing facilities were hot and cold piped water, a flush toilet, and a bath tub or shower. Another measure of adequacy has to do with the cost of a unit compared to household income. If the household is paying more than 25 to 30 percent of its gross income for housing, including utilities, then the unit (whether structurally standard or not) may be considered too costly relative to the household income. In some respects this is a measure of the adequacy of the income; however, it also indicates to what degree the market does not provide adequate housing at certain price levels.

Additional data on the 1980, 1990, and 2000 housing stock are shown in Table 6-C, below. Due to the existence of a second home housing market in the County, there is also a large stock of homes held for occasional use. They are generally suitable for year round occupancy and therefore, if so utilized, on a wide scale, could result in a rapid increase in population without the construction of more new units.

The housing market is the system which currently allocates housing resources within the County. In simple terms, people buy or rent the kind of housing they can afford on their income. The Virginia Housing Development Authority and Farmers' Home Administration expand the range of choice for low and moderate income households through their loan programs.

U.S. Department of Housing and Urban Development Section 236 and Section 8 rental housing program units provide some assistance to renters, either through direct subsidies or interest rate subsidies for construction of units, as does the Farmers Home Administration Section 515 Rural Rental Housing Program. There are over 800 subsidized units in Shenandoah County as of 2004.

The County recognizes the need for additional affordable housing, and encourages small developments of it dispersed in and around the towns and public service areas. In addition, the existing housing stock should be preserved, and upgraded where necessary. Substandard housing should be brought up to code wherever possible.

3.1 Housing Stock Improvement

Substandard housing units should either be brought up to standard by rehabilitation or removed from the housing stock. Due to the high costs of new construction, it is expected that most such units would be rehabilitated. Many homeowners cannot afford to move, and therefore choose to improve their current homes. Some families purchase older but larger and perhaps substandard structures and gradually improve them, which gives them more square footage of living space than they could purchase outright in perfect condition. Other substandard units may have to be replaced.

An objective for the County is for all year-round housing units to meet the standards by the year 2020. This could be achieved by encouraging the elimination of half of the substandard housing units in each of the next two decades. Using lack of complete plumbing as the best available indicator of adequacy, the 1980 substandard housing stock was 975 units, or 8.2% of year-round units. By the year 2000, this was reduced to 290, and a goal is to reduce the balance to zero by 2020.

3.2 Replacement of Losses

In addition to planned replacement of substandard units, other losses can be expected to occur in the housing stock. Units are lost due to: deterioration to a point where they are unfit for habitation; natural disasters such as fire and flood; man-made changes such as conversion to non-residential uses, or to group quarters, or removal from the site. Based on previous changes, documented by the U. S. Bureau of Census Components of Inventory Change, approximately 6.4 percent of each decade's beginning housing stock is lost. This percentage is applied to the projections in Table 6-E on page 6-13.

3.3 Current Estimates

The most current estimates through 2003, based on building permit data are shown in the Housing Data Report table on the next page. The 2000-2003 growth figures and resulting densities are also shown on the following two maps. These three pages were extracted from the Annual Housing Report prepared by the Northern Shenandoah Valley Regional Commission, and show that the housing growth rate has increased (9.2% for 2000-2003 compared to 10.2 for the last decade).

Figure 6-D:Vacant Dwelling Units 1990-2000					
Rural Portion of Census Tract	**Vacant '90**	**Vacant '00**	**'90 – '00 Change**	**Ttl. DU's '00**	**'00 Vacancy Rate**
401	33	50	51.5%	920	5.4%
402	1,456	1,131	-22.3%	3,208	35.2%
403	112	99	-11.6%	1,268	7.8%
404	331	288	-13.0%	1,131	25.5%
405	82	76	-7.3%	1,325	5.7%
406	76	71	-6.6%	973	7.3%
407	130	117	-10.0%	1,030	11.4%
408	191	157	-17.8%	1,083	14.5%
Incorporated Towns:					
Edinburg	32	40	25.0%	425	9.4%
Mount Jackson	29	51	75.9%	718	7.1%
New Market	51	71	39.2%	808	8.8%
Strasburg	57	104	82.5%	1,877	5.5%
Toms Brook	3	3	0.0%	103	2.9%
Woodstock	125	155	24.0%	1,840	8.4%
Source: US Census Bureau					

4.0 Vacancy

The number of vacant units for 1990 and 2000, and the 2000 vacancy rate are shown for each rural Census Tract and for the six incorporated towns in Table 6-D. In some areas of the County there is a very high vacancy rate; the Census Tract which contains the Basye/Bryce Mountain area has a vacancy rate of 35.2 percent, and the Fort Valley area has a vacancy rate of 25.5 percent. Much of this vacant housing stock represents second homes or retirement homes that are held for occasional use. The northern-most section of the County, west of routes 623 and 628, has the lowest vacancy rate of the unincorporated area. The towns have considerably more moderate vacancy rates, ranging from 2.9 percent in the Town of Toms Brook to 9.4 percent in the Town of Edinburg.

An adequate vacancy rate should be maintained in the housing market to provide for movement of households and the creation of new households. The Virginia Housing Development Authority identifies three recommended levels of vacancy rates based on population growth rates (derived from annual percentage increases.) They are:

A. Areas of slow growth - less than 1% average annual increase
owner vacancies = 1.0%
renter vacancies = 4.0%

B. Areas of moderate growth - between 1% and 5% average annual increase
owner vacancies = 1.25%
renter vacancies = 5.0%

Figuire 6-E: Dwelling Unit Projections by Decade, Shenandoah County			
	1990-2000	2000-2010	2010-2020
Average Annual Growth	1.20%	1.30%	1.00%
Vacancy Rate Considered Appropriated			
Owner	1.25%	1.25%	1.25%
Renter	5.00%	5.00%	5.00%
Occupied Units, End of Decade	14,296	16,210	18,076
Owner Units (71.5%)	10,462	11,865	13,231
Rental Units (28.5%)	3,834	4,345	4,845
Vacant Units, End of Decade	2,413	2,406	2,448
Owner Units	202	148	165
Renter Units	170	217	242
Other* Not for sale/rent and/or held for occasional use	2,041	2,041	2,041
Total Units, End of Decade	16,709	18,616	20,524
Total Units, Beginning of the Decade	15,160	16,709	18,616
Loss for Decade (6.4%)	-970	-1,069	-1,191
Net Dwelling Unit Base	14,190	15,640	17,425
New Units in Decade	2,519	2,976	3,099
Annual Average	252	298	310

* The 2000 other vacancies is the balance of units after vacant for sale & rent is subtracted from the 1990 vacant unit counts. The total of other vacancies is held constant for 2010 and 2020. This other vacant figure is added to the vacant for sale & rent to determine the total vacant units for 2010 and 2020. These other vacant figures could be smaller if the household size declines faster than projected or the County population has been under-estimated.

C. Areas of fast growth - greater than 5% average annual increase
owner vacancies = 1.75%
renter vacancies = 7.0%

In 2000, there was a 73.2% - 26.8% split between owner and renter-occupied units. The vacancy rates shown in Table 6-E are based on the assumption that the 2000 percentage of owner-occupied units would be maintained and are applied to the average annual rate of growth on a decade-by-decade basis.

5.0 Projections

Between 2000 and 2020 an additional 6,075 housing units will be required to house the projected growth. This translates into an annual average of about 304 new units. As with all projections, these projections are based on assumptions about the continuation of recent growth trends into the future, making periodic re-evaluation of the trends and projections necessary for proper planning. Table 6-E on the following page shows Shenandoah County's projected Dwelling Unit needs to the year 2020, based on the projected number of households, the projected number of units that must be replaced, and the expected vacancy rate needed for the housing market.

6.0 Summary

Shenandoah County's housing stock is a reflection of the market demand for housing. In addition to serving the needs of natives, it also is a desirable location for other housing buyers within the Northern Shenandoah Valley Region and the Northern Virginia/Washington, D.C. metropolitan area. Based on projections of population growth and declining household size, a 13% increase in households can be expected between 2000 and 2010, and an additional 12% increase between 2010 and 2020. The types of housing that are affordable will be dictated by the household income.

The housing stock is primarily single-family, detached, owner-occupied homes. In 2000, the County had a vacancy rate of 14.4 percent. The County has a large share of second homes which accounted for 60.6 percent of all the vacant units or 8.7 percent of the 1990 total housing stock. As for quality, as of 2000 only 290 (1.7 percent) of total dwelling units lacked complete plumbing facilities. As the County grows, the housing stock will change. Losses will need to be replaced. The vacancy rate will fluctuate with the market demand. Taking into account such dynamic factors, it is projected that 2,976 units may be added from 2000 to 2010 and 3,099 from 2010 to 2020.

A basic objective of the local governments should be to provide for a wide variety of housing opportunities within the County. This is important for the maintenance of a healthy economy. Quality, however, should also be a major criteria, both in the maintenance of the existing housing stock and for additions. Additional affordable housing is needed; small developments should be encouraged in and around the towns and public service areas. Substandard housing should be brought up to code wherever possible.

Federal and State programs are available to provide some assistance in the area of affordable housing. Detailed analyses of the housing stock and targeted planning is required to access funds.

Chapter 7:
Community Services

Design and Maps updated June 2016

1.0 Introduction

Community facilities and services in Shenandoah County are provided by the County, by other governmental agencies, and by private companies and organizations. County facilities and services include the County Government Center, Court Houses and jail complex including the Sheriff's Department, school system, County Park, Shenandoah County Library, solid waste management facilities, animal shelter, Department of Social Services, Health Department, and the Virginia Cooperative Extension Service. Some of these services are provided in conjunction with the Commonwealth of Virginia, but housed in County offices.

Consideration of facilities construction by the county is part of a Capital Improvements Program (CIP). Currently, County Administration provides recommendations to the Board of Supervisors regarding the CIP. In the future, the Planning Commission should play an expanded role in the consideration and recommendation of facilities projects included in the CIP.

The six incorporated towns provide general local government services and, in all but Toms Brook, their own police protection. In addition, they supply water and sewer facilities and services to most of the residents and businesses in the county that have public service. The Stoney Creek Sanitary District provides water and sewer service to the Basye/Bryce Mountain area and the Toms Brook-Maurertown Sanitary District provides service covering an area from Toms Brook to just north of Woodstock.

2.0 Utilities

These systems are described in detail as to their capacities, sources (for water), methods of treatment, and discharge points (for sewer) in the Economic Development Profile, and are summarized in this section. The major effect of these facilities on the County's planning efforts lies in the location of the current and future service areas, and their ultimate capacities.

Private companies or organizations provide the other utilities (electricity, gas, telephone and cable), own and operate the Shenandoah Memorial Hospital in Woodstock and other health clinics and services, provide volunteer fire and rescue services, a sheltered workshop for the handicapped, and various recreational facilities.

Dominion Virginia Power serves five of the six incorporated towns and almost half of the County. The Shenandoah Valley Electric Cooperative--which receives power from Virginia Power's transmission system--serves the remaining portion of the County.

Shenandoah Telecommunications Company (Shentel) is headquartered in Edinburg, Virginia. Founded as a rural telephone cooperative in 1902, Shentel now has more than 700 employees serving customers in Virginia, West Virginia, Maryland and Pennsylvania. In Shenandoah County, Shentel provides a broad range of telecommunications services including local and long distance telephone, Internet and data services and cable TV. As a Sprint PCS Affiliate of Sprint/ Nextel, Shentel offers mobile telephone service from a network of towers.
Since 2005, high-speed Internet (DSL) has been available to 100% of Shentel local exchange subscribers-an important option for the increasing number of residents who work from home.

Living in a beautiful rural area does not mean surrendering technology in Shenandoah County. Current DSL service provides data speeds from 384 kilobits per second to 10 megabits per second for residential customers. Natural gas, LP gas, fuel oil and coal are all available in Shenandoah County through a variety of distributors.

3.0 Schools

Since the fall of 1994, the Shenandoah County Public Schools system has been divided into three distinct campuses located in the north, center, and south of the County. Each campus is comprised of one elementary school, one middle school, and one high school. In March 2012, the combined enrollment of the school system was 6,003, with 523 teachers.

Located in the Strasburg area, the Northern Campus consists of Sandy Hook Elementary, Signal Knob Middle, and Strasburg High School. The Central Campus contains W. W. Robinson Elementary, Peter Muhlenberg Middle and Central High School and is located in Woodstock. The Southern Campus lies halfway between Mt. Jackson and New Market, off the Shenandoah Caverns exit of I-81. It is the home of Ashby-Lee Elementary, North Fork Middle and Stonewall Jackson High School.

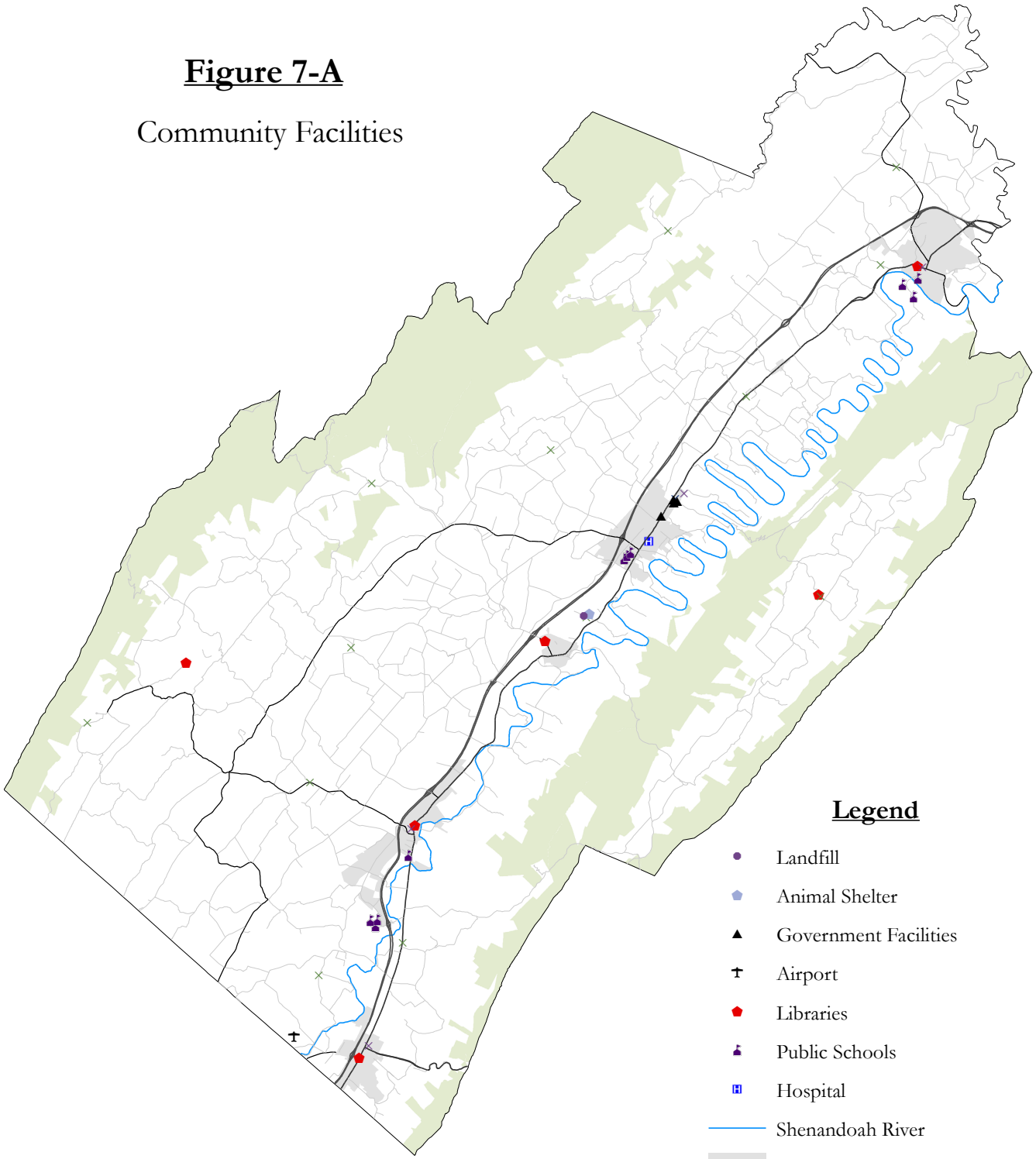
Triplett Tech, located in the Town of Mt. Jackson, is the career and technical center serving secondary school students from the three high schools in Shenandoah County. Occupation specific programs are offered that are taught by industry-experienced professionals using current equipment. Business and industry representatives serve on the advisory board, and assist yearly in keeping programs current with industry standards.

Programs offered include career and technical instruction in Automotive Technology and Collision Repair, Carpentry, Masonry, Electricity and Professional Cosmetology. Expanded instructional opportunities now include Animation, Culinary Arts, CISCO Systems Networking, Criminal Justice, Industrial Co-Operative Training (ICT), and Health Care Science. Many students completing career training at Triplett Tech successfully complete requirements for a variety of industry certifications. Dual enrollment opportunities with Lord Fairfax Community College are available for students enrolled in Health Care Science, Criminal Justice, and Electricity.

Triplett Tech is also the site of the regional Massanutten Governor's School for Integrated Environmental Science and Technology for gifted and

Figure 7-A

Community Facilities



highly motivated high school juniors and seniors who have demonstrated an advanced mastery of the traditional high school curriculum. Approximately 75 pupils attend the program from the school divisions of Harrisonburg City Public Schools, Page County Public Schools, Rockingham County Public Schools and Shenandoah County Public Schools. The Governor's School curriculum provides students a rigorous academic program that demands the integration of academic disciplines with technology. It integrates the study of environmental science, mathematics, technology, computer science, information systems, society and business. Using principles of problem-based learning, scientific theory will combine with hands-on experience to encourage further interest in environmental science and technology and its impact on society.

Figure 7-B shows the grade levels, capacity, and March 2012 enrollment at each school. Enrollment versus capacity is highest at the elementary schools, with the highest at Sandy Hook Elementary School which is located where the greatest growth in the County has occurred. Sandy Hook's enrollment exceeds its capacity. In due course, an additional school will be needed. It should be noted, however, there is unused capacity at the middle schools and high schools at each of the campuses. As an interim measure, consideration needs to be given to reallocation of these resources.

School capacity figures found in Figure 7-B was taken from the November 2006 report "Population Planning and Facilities Review" prepared for Shenandoah County Public Schools by the Commonwealth Educational Policy Institute (CEPI) of the Virginia Commonwealth University. As explained in Part II, School Capacities and Facility Utilization, these capacity figures are "an estimate of the capability of the facility to offer its program."

The capacity of individual school buildings has been reduced over time with such variables as increased federal and state program requirements that result in lowered capacity for individual instruction spaces or changes in local community expectations related to class size. Having first determined a "standard operating capacity" for each facility, the 2006 CEPI review made a final adjustment or reduction (using standards or principles explained in the review) to the "standard operating capacity", which resulted in the "adjusted operating capacity" for each facility. A full description of how the "adjusted operating capacity" is determined can be found in the 2006 CEPI review. Figure 7-B reflects the "adjusted operating capacity" for each school facility as found in the 2006 CEPI review.

The U.S. Census indicated a population of 41,993 citizens in the county in 2010 with a public school enrollment of approximately 6,100 students. The State population projections prepared by the Virginia Employment Commission show that there will be a total of 49,427 county residents by the year 2020 and 56,927 county residents by 2030. Assuming the April 2010 ratio of student enrollment to total county population it is estimated that the student enrollment will be 7,187 students by 2020 and 8,277 students by year 2030.

All of the public schools in the County are fully accredited by the State of Virginia, and the pass/fail rates on the Standards of Learning examinations are competitive with the state averages. As the County shifts toward newer businesses which require a more highly educated workforce, more emphasis will be focused on the preparation of high school students to advance to four

Figure 7-B:
Shenandoah County School Enrollment & Capacity
As of March 31, 2013
Source: Shenandoah County School Board, April 2012

School	Grades	Enrollment	Capacity
Northern Campus			
Sandy Hook	K-5	1,010	953*
Signal Knob	6-8	478	713
Strasburg	9-12	683	810
	Campus Total	2,171	2,476
Central Campus			
W.W. Robinson	K-5	1,126	1,192*
Muhlenberg	6-8	552	893
Central	9-12	758	1,002
	Campus Total	2,436	3,087
Southern Campus			
Ashby-Lee	K-5	634	796*
North Fork	6-8	331	685
Stonewall	9-12	506	808
	Campus Total	1,471	2,289
	Totals	**6,078**	**7,852**

** Based on a K-3 ration of 21:1 for elementary schools*
Source: Shenandoahn County School Board, April 2012

Figure 7-C:
Comparison of Shenandoahn County Schools with State of Virginia Averages

Metric	Shenandoah County	Virginia
Pupil / Teaching Position Ratio (K-7)*	10:1	12:1
Pupil / Teaching Position Ratio (8-12)*	15:1	11:1
SAT Scores - Class of 2011**		
SAT Reading	510	512
SAT Math	516	509
SAT Writing	498	495
Advanced Studies Diplomas (2009)***	44.36%	41.33%

** Source: Superintendent's Annual Report - Table 2,209 - 2010*
*** Source: Shenandoah Countty School Board - April 2012*
**** Source: Superintedent's Annual Report - Table 5, 2009-2010*

year college programs. Figure 7-C compares the County's schools with the state average for three relevant parameters: pupil/teaching position ratios, SAT scores, and advanced studies diplomas.

3.1 Colleges

A college education is available at many locations close to Shenandoah County. A partial listing of nearby colleges and universities and others which serve the entire state follows:

Area Colleges and Universities	
Institution	**Location**
Blue Ridge Community College	Weyers Cave, VA 24486
Bridgewater College	Bridgewater, VA 22812
Christendom College	Front Royal, VA 22630
Eastern Mennonite University	Harrisonburg, VA 22801
George Mason University	Fairfax, VA 22030
James Madison University	Harrisonburg, VA 22807
Lord Fairfax Community College	Middletown, VA 22645
University of Mary Washington	Fredericksburg, VA 22401
Shenandoah University	Winchester, VA 22601
University of Virginia	Charlottesville, VA 22903
Virginia Military Institute	Lexington, VA 24450
Virginia Tech	Blacksburg, VA 24061
Old Dominion University	Middletown, VA 22645*
	*satellite campus at LFCC

4.0 Libraries

There are seven libraries serving Shenandoah County. The Shenandoah County Library System consists of the County Library in Edinburg, the Basye/Orkney Springs station, and community libraries in Strasburg, Fort Valley, Mount Jackson and New Market. The County Library opened in 1985 and formed the library system in 1997. The County Library features an archive and a local history and genealogy collection. An independent library is located in Woodstock.

The County Library system has collections with over 155,000 cataloged items, including e-books, DVDs, audios and periodicals in several formats. The system has a fully integrated automation system and provides access to an array of electronic resources through its website. Internet access is available at all locations in the system, whether by Wi-Fi or by use of one of the more than 40 public access workstations. In 2011 there were over 150,000 visitors to the County Library System. They checked out over 235,000 items, with 35,000 registering to use a computer.

The County Library has six full time and seven part time staff members. Volunteers staff the other libraries. The Shenandoah County Library Foundation supports the County Library system with a Book Endowment Fund, a Technology

Endowment, annual fund drives, and capital drives. In 2012-2013 the County Library will receive $146,000 in State Aid for the system's materials budget.

The County owns the two plus acre lot immediately west of the County Library. It is used for parking and offers space for expansion of the County Library. The Stone House on the property houses the Richard A. "Dick" Golden Meeting Room and the library's technical services offices.

5.0 Parks

Shenandoah County has numerous parks and recreation facilities which offer a wide range of activities for people of all ages. These facilities are owned and operated by a range of agencies and organizations including Shenandoah County, several towns, recreational associations, and private companies. Figure 7-D shows the location of the parks and recreation facilities.

The Shenandoah County Park is located between Toms Brook and Maurertown. It contains two large picnic shelters with double-sided grills, one lighted softball field, one non-lighted softball field, and one non-lighted baseball field, a playground, sand volleyball court, two tennis courts, a basketball court, four horseshoe pits, two rest room facilities, three gazebos, and a newly-renovated one-mile walking trail.

Edinburg, Mt. Jackson, New Market, Strasburg, and Woodstock each have town parks. The old Madison District Park was deeded to the Town of Edinburg by the County in 2003. It has a pool and bath house, playground, two tennis courts with lights and three picnic shelters. A walking trail has been started within the wooded area of the park; it is approximately 1,000 ft. The Town is planning to continue improving the existing facilities. Behind the Edinburg School and adjacent to the Edinburg Madison District Park, Shenandoah County Parks & Recreation also maintains the Woodstock-Edinburg Little League baseball field and one basketball court.

The Shenandoah County Soccer League opened its soccerplex south of Mt. Jackson in September 2009 with three of the planned five full size fields in operation. The non-profit SCSL provides soccer for over 500 children ages 4-15 every fall and spring season.

Mt. Jackson's Town Park contains a swimming pool with a new bathhouse (2009), tennis court, a baseball field, a tee ball field, basketball courts, a playground, and a picnic shelter. The Town also has a fishing area along Mill Creek and a downtown festival park in conjunction with its new Visitors Center/Town Hall project, and a new Veteran's Park.

New Market's Town Park has a swimming pool, a bath house with showers, two basketball courts, five lighted tennis courts, a softball field, a little league baseball field, playground equipment, a fitness/walking trail, a gazebo, six picnic shelters, a soccer field, one large barbeque pit, two horseshoe courts, four parking lots and public restrooms. New Market has Rebel Park which is home to the New Market Rebels of the Valley Baseball League and the New Market Shockers of the Rockingham County Baseball League.

Strasburg's Town Park includes a swimming pool with bath house, the new Riverside Park walking trail that connects to Strasburg High School, newly-

renovated playground, picnic shelters, two tennis courts, basketball courts, soccer fields, and a boat ramp access to the Shenandoah River.

The Parks and Recreation System for the Town of Woodstock has a significant effect on the quality of life enjoyed by town and county residents. Recreation facilities available to residents are located in Woodstock at the W.O. Riley, Riverview, Fairview and Main Street Parks; the elementary, middle, and high schools; and the Shenandoah County Fairgrounds. Additionally, a new state park, the Seven Bends State Park, has been approved east of town with access to the park being provided along E. Reservoir Road.

W.O. Riley Park has a swimming pool, playground, volleyball courts, tennis courts, basketball court, picnic shelters, an all-purpose field and arboretum. Riverview Park consists of two Little League fields with one field equipped for night games, and a nature walking trail.

Fairview Park (Future) consists of a 73 acre parcel on the northwest corner of the town limits. The master plan for Fairview Park displays elements that include: an historical event center, two field sports complex, tennis complex, central park, small amphitheater, arboretum, picnic areas, playground areas, public restrooms, park-wide trails, college level baseball/multi-use complex and a recreation/wellness/community center. The town anticipates this project to develop over a twenty year time period.

A total of 241 acres of local public park land is located throughout the County. In 2002, the County acquired the 151 acre Keister tract of land, east of Strasburg, to be developed as an additional park facility. Recreation areas are also located at each of the County's schools.

Seven Bends State Park is named for a series of oxbow curves in the river. The 1,066 acre site has almost four miles of river frontage. The state park master planning process is complete with the development of a park mission statement and goals and objectives. The Commonwealth of Virginia Department of Conservation and Recreation is now in the process of implementing the plan as funding becomes available.

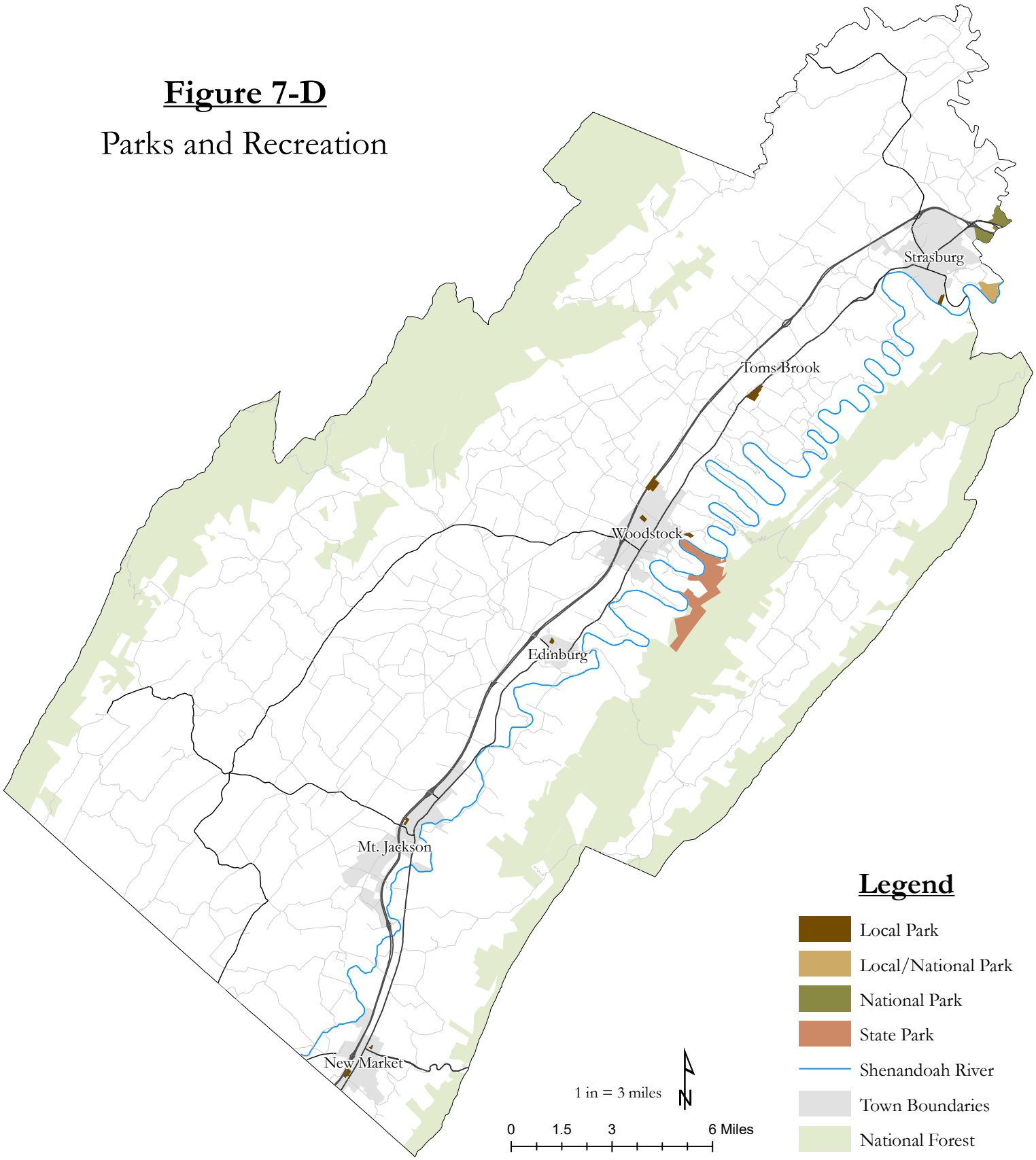
The North Fork of the Shenandoah River and the County's other waterways provide residents and tourists with opportunities for boating, canoeing, swimming, and fishing. Currently, there are three public access landing sites on the North Fork in Shenandoah County: Meems Bottom near the Route 730 bridge, Chapman's Landing south of Woodstock, and at the Strasburg Town Park. Additionally, a fourth public access landing site may be added in the future at the Deer Rapids Bridge. In addition to public recreational facilities, Shenandoah County has a number of privately owned and operated recreational activities that are open to the public. These include two golf courses, driving ranges, miniature golf, skiing and snow tubing, horseback riding, bowling alleys, swimming, lake sports, museums and caverns.

6.0 National and State Forests

The George Washington National Forest contains 77,681 acres of forest in the county, offers hiking trails, ATV trails, campgrounds, and picnic areas, along with hunting and fishing, for both residents and tourists. There is also

Figure 7-D

Parks and Recreation



a newly created Cedar Creek and Belle Grove National Historic Park located at the northern edge of the County and extending into Warren and Frederick counties. The county-owned Keister tract and future park is within the national park boundary.

Creation of a series of trails on land owned by the National Park Service (NPS) and key partners such as the Cedar Creek Battlefield Foundation, The National Trust for Historic Preservation and Belle Grove Inc., and the Shenandoah Valley Battlefields Foundation (SVBF), along with local and community partners, is included in the Cedar Creek and Belle Grove National Historic Park final general management plan. The SVBF is managing the creation of a trail system to link Fishers Hill Battlefield properties with the new Cedar Creek and Belle Grove National Historic Park in the northern portion of the county. SVBF has engaged a professional planning and design firm to accomplish this work. Initial trail development will be within the Fishers Hill parcels currently owned by SVBF. It is expected that completion of the entire project, including new trails located on privately owned property, will take several years.

The Virginia Department of Forestry is still in the process of receiving final land donations for the Devil's Backbone State Forest (DBSF). Located in the northwestern portion of the county in the Cedar Creek Valley, it is presently 715 acres in size. The future estimated size of the DBSF will be approximately 900 acres. The main goals for this State Forest are conservation education, forest research concentrating mainly on the reestablishment of the American Chestnut in Shenandoah County, and passive outdoor recreation such as hiking, bird watching and nature study.

The Shenandoah County Parks & Recreation Department's Master Indoor/Outdoor Recreation Plan for the County was adopted in 2000. Its overall goal is to "Provide a range of high quality indoor and outdoor recreational facilities and activities that meet the expressed needs of all County citizens." Major recommendations include: work with the School Board to develop and manage joint-use facilities; rehabilitation and expansion of the County Park at Maurertown; addition of walking/biking trails to all parks; additional boat access sites along the North Fork; acquisition and development of a new park with river access; meet the needs for indoor wellness and fitness activities and sports; and meet the needs for arts performance and instruction.

7.0 Arts

Whether as student, artist or member of an audience, Shenandoah County provides the opportunity for community participation in the visual and performing arts. The Shenandoah County Department of Parks & Recreation and private art organizations such as VECCA and The Art Group Gallery at the Bowman-Shannon Cultural Arts Center in Mt. Jackson offers classes and mentorships in the visual and performing arts. The Shenandoah Valley Music Festival, Masterworks Chorus and Theater Shenandoah offer performances throughout the year. Masterworks Chorus and Theater Shenandoah are composed of local musicians and actors while the Shenandoah Valley Music Festival brings nationally known musicians to the county.

A facility to support the activities of these groups is needed. The Master Indoor/Outdoor Recreation Plan for the County, referenced above, specifically addresses the need for arts performance and instruction in the community. Shenandoah County, at present, does not have an adequate performing arts space. A theater with raised seating for the audience and appropriate sound and lighting systems is needed. Practice spaces, classroom space and a gallery for the display of artwork are additional needs.

From the mid 1990's to late 2011, the old Edinburg School building had housed the offices of the Shenandoah County Parks & Recreation Department and several county non-profit agencies, including space provided to the Shenandoah Area Agency on Aging for a senior center and the meals on wheels program. The Edinburg School building was built in the 1930's and a cafeteria addition was added in the 1950's. A plan was presented in February 2011 by the School Superintendent and County Administration to renovate the Edinburg School. In May 2011 the county received an unsolicited Public Private Education Act (PPEA) proposal to convert the existing building interior spaces into an education facility for alternative education as well as continued use for a senior center and parks and recreation programs. After advertising for additional proposals the County entered into an interim agreement in September 2011 for a 35 percent partial site and design plan which was received in April 2012. The building was fully vacated in December 2011 with all former occupants moved to permanent or temporary locations pending final decisions and actions on the project design proposal.

8.0 Law Enforcement

Four categories of law enforcement agencies serve Shenandoah County citizens. Central dispatch for the County is located in the County Government Center. The towns of Edinburg, Mt. Jackson, New Market, Strasburg, and Woodstock all have their own Police Departments. The Shenandoah County Sheriff's Department, headquartered in Woodstock, has jurisdiction in the Towns as well as the County, but concentrates on providing protection in the rural areas. It also provides court-related services at the Court House and staffs the county jail in Woodstock. The Virginia State Police has State-wide law enforcement powers. Shenandoah County is covered by troopers working out of the Page County office in Luray.

The Virginia Department of Forestry has three, full-time forest wardens living within the County. This State agency provides forest and open land fire protection on all private land holdings within Shenandoah County. The VDF also assists the U.S. Forest Service with fires occurring on national forest lands. The VDF responds to all forest and field fires and assists the county volunteer fire departments with the suppression of these fires. A dozer-fireplow unit and a forest fire engine are stationed at the VDF office in Woodstock. VDF forest wardens are responsible for the investigation of all forest and open land fires, and the pursuit of legal action towards the responsible parties as is warranted.

The Virginia Department of Game and Inland Fisheries has one, full-time Conservation Police Officer living within the County. This State agency is responsible for enforcing all portions of the Code of Virginia relating to boating

and wildlife regulations. Conservation Police Officers enforce these code sections on private, state and federal lands and also assist local law enforcement agencies with other criminal and investigative matters as requested.

The decision to construct a new Shenandoah County District Courts Building to address courthouse overcrowding and habitability issues was made in 2008 with construction completed and occupancy in June 2011. The Historic Court House Task Force, for the continued use and rehabilitation of the Historic Old Court House in downtown Woodstock, presented its recommendations to the County in December 2010. A partial site and design plan was submitted to the County in early 2012 for the renovation and rehabilitation of the historic courthouse. To address overcrowding issues at the County Jail, a decision to participate with Warren County and Rappahannock County in a Regional Jail Facility was made in 2009. Land was purchased in Warren County for this regional facility. It is anticipated that construction and occupancy of the Rappahannock Shenandoah Warren Regional Adult Detention Center will be completed in 2014.

9.0 Emergency Services

Shenandoah County has ten volunteer fire departments with a total of about 350 volunteers. These companies cover most of Shenandoah County and a portion of Rockingham County. One company from Frederick County (Company 17 in Star Tannery) covers the northwest portion of Shenandoah County.

The Shenandoah County Department of Fire and Rescue was formed in 1999. In April 2012, the department had a full-time staff of 33, including the Fire & Rescue Chief, the Fire Marshal, Operations Chief, Training Officer, Service Assistant, EMS Billing Technician, and additional members are Firefighters/EMTs ranging from basic to paramedic. In addition there are six part-time Firefighters/EMT employees. Funding for an additional eight Firefighters/EMT positions has been included in the County's 2012 - 2013 budget. Currently, the Department's vehicles include: two ALS (Advanced Life Support) vehicles, four staff vehicles, a Hazmat Trailer, an ATV and a "Serv" vehicle (a utility vehicle that can haul personnel or equipment).

The County's volunteer fire companies and their major equipment are listed in Figure 7-E.

Three volunteer rescue squads and three combination departments currently operate in Shenandoah County. One squad is located in the town of Strasburg and Woodstock. In addition, one Rescue squad from Rockingham County (Broadway Rescue Squad) provides emergency services to the Southwestern portion of the County. The three Rescue Squads and their major equipment are listed in Figure 7-F.

Figure 7-G on the following page shows the location and service areas covered by the Fire and Rescue Departments. While the entire County has fire and rescue service, it is apparent that the remote areas of the County are harder to serve. This factor should be considered for future residential development decisions.

The County is served by an Enhanced 911 emergency service dispatching system that is funded by a small surcharge on phone lines. This system provides

Figure 7-G

Emergency Services

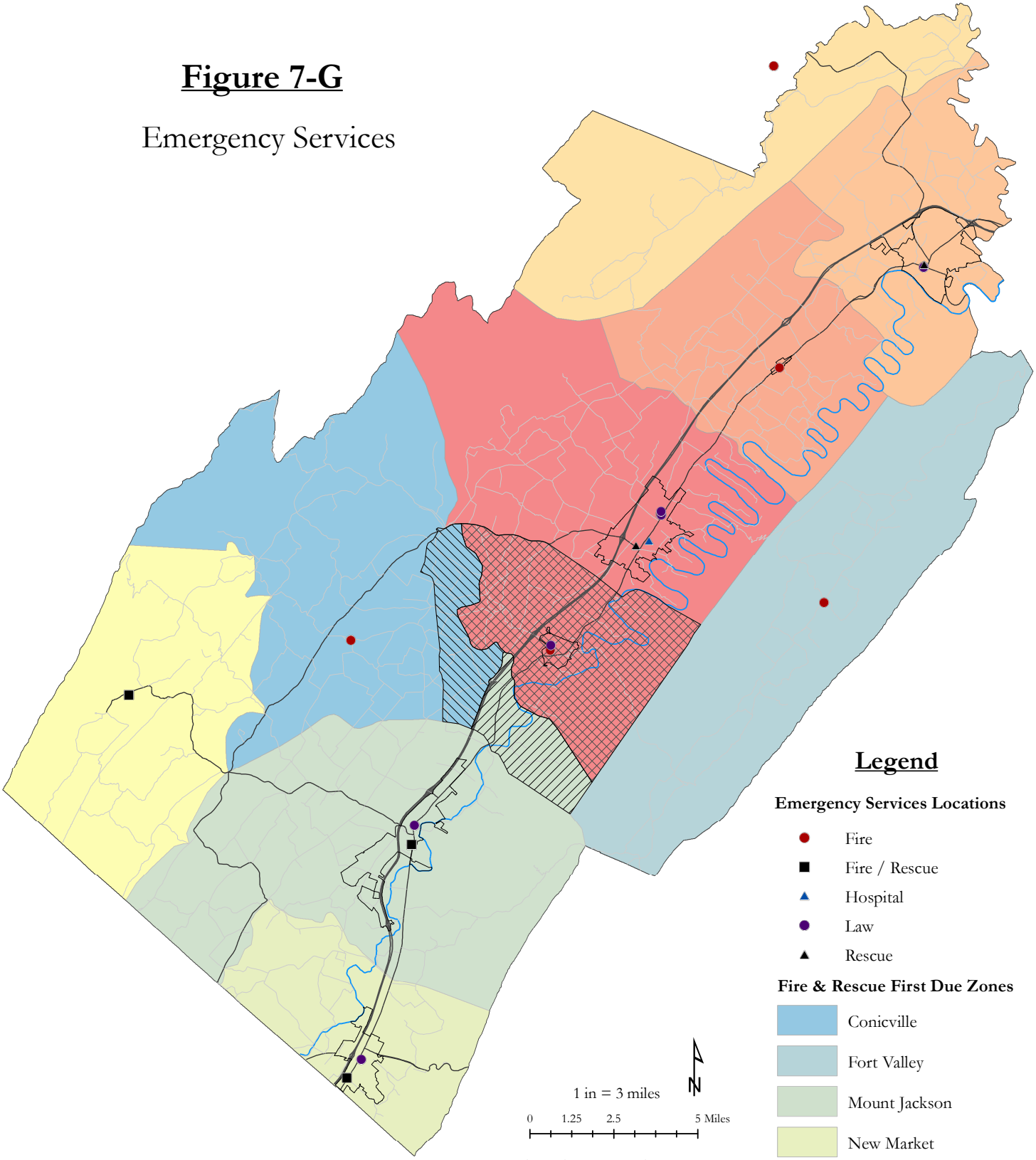


Figure 7-E
Shenandoah County Fire Departments

#	Name	Equipment
9	Toms Brook	2 Serv, 1 Wagon, 1 Rescue Engine, 1 Tanker
12	Woodstock	1 Engine, 1 Truck, 1 Wagon, 1 Brush, 1 Rescue Engine-Command Unit
13	Conicville (Fire & Rescue Combined)	1 Brush, 1 Tanker, 3 Engines, Ambulance
14	Fort Valley (Fire & Rescue Combined)	1 Mobile, 1 Mini, 1 Pumper, 1 Tanker, 1 Engine, Ambulance, 2 ATVs
15	Edinburg	1 Brush, 1 Engine, 1 Pumper, 1 Wagon
17	Star Tannery (Fire & Rescue Combined)	1 Brush, 1 Tanker, 1 Wagon, 1 Ambulance
18	Orkney Springs (Fire & Rescue Combined)	1 Brush, 1 Squad, 1 Pumper, 2 Ambulances, Serv
21	Mt. Jackson (Fire & Rescue Combined)	Engine, Squad, Pumper, 2 Ambulances, Serv
23	New Market (Fire & Rescue Combined)	Brush, 3 Engines, Truck, Serv
51	Strasburg	Brush, 1 Boat, Engine, Pumper, Squad, Serv, Truck, Wagon
10	Shenandoah County Fire & Rescue	2 Ambulances, 2 Engines, 1 Squad, 1 ATV, 2 Chase Units, 1 Hazmat Trailer, 1 EVOC Supper Trailer, 4 Staff Vehicles

** Source: Shenandoah County Department of Fire & Rescue 2012*

Figure 7-F
Shenandoah County Rescue Squads

#	Name	Equipment
5	Woodstock	4 Ambulances, Mobile, Squad
25	Strasburg Rescue Squad	4 Ambulances, Mass Casuality Unit, Mobile, Squad
10	Shenandoah County Fire & Rescue	2 Ambulances, 1 Engine

** Source: Shenandoah County Department of Fire & Rescue 2012*

location information for the source of emergency calls, and additional capabilities for the dispatchers handling those calls. A computer-aided dispatch system has been implemented to further enhance the system. In April 2012, Shenandoah County Fire & Rescue implemented the Delta Alert program, which communicates emergency situations to citizens of Shenandoah County. This automated system will notify citizens of a missing person search, evacuations and severe weather.

10. Water and Sewer Facilities

The Towns of Edinburg, Mt. Jackson, New Market, Strasburg, and Woodstock all have their own public systems; the Toms Brook-Maurertown area and the Basye/Bryce Mountain area are served by the Toms Brook-Maurertown Sanitary District and the Stoney Creek Sanitary District respectively. Each system is described below; gallons per day are expressed as "gpd."

10.1 Edinburg

The Town primarily serves the area within its corporate boundaries. Water is also provided to the Cave Springs Subdivision, located in the County off State Route 698, and water and sewer service is provided to the Edinburg Manor Subdivision off Route 675. Construction was completed in 2005 to allow sewer service to the Massanutten View Subdivision, located in the County on the west side of Interstate 81 and serves approximately 30 homes in the subdivision.

Water is provided by two wells with a Memcor Microfiltration Treatment Plant that was put on line in 1998. Plant capacity is 225,000 gpd, with average usage of 140,000 gpd. The Town has water storage capacity of 800,000 gallons. The Town's wastewater treatment plant was upgraded in 1988 and has a rated capacity of 175,000 gpd with average flows of 95,000 gpd. The Town has corrected a number of infiltration and inflow problems in recent years and continues to locate and correct these problems. There is very little undeveloped industrial zoned land within the Town. What there is belongs to Shentel, who is not historically a large water user. The Town feels that future growth will be residential and light commercial within the Town's boundaries. All out of Town water and sewer hookups require the Town Council's approval and will be studied thoroughly as to their impact on the available capacities.

10.2 Mt. Jackson

In 2001, the town completed nearly $3 million in improvements made to the water system. The town now has 5 wells, any one of which can carry the town's daily (2010) needs, and a total pumping capacity in excess of 900,000 gallons per day. There are more than 24 miles of pipes ranging in size from 2 inches to 12 inches. The larger pipes form an interconnection between the town's three 500,000 gallon water tanks (Caverns, Mountain near Fleming Park, and elevated on Dutch Lane). Pressures are uniform at approximately 80 PSI, and fire flow in all areas is excellent. The system is also interconnected with the additional storage and high production wells at Bowman Andros Apple Products to provide mutual backup in the event of emergency. Two additional wells were drilled in 2009 and will be connected to the system in the future, as funding is identified to complete the project.

The town closed its old 200,000 gallons/day sewer plant and replaced it with a new 700,000 gallons/day plant capable of handling the sewage loads from both the town's residential and business uses and the industrial park. The plant is considered "limits of technology" (state of the art) and meets all the most

stringent modern treatment standards.

10.3 New Market

The Town's water filtration plant has an 850,000 gpd continuous capacity and water tank with a storage capacity of 500,000 gallons. In 2010 the average daily consumption of water was 447,667 gallons. Six wells serve as New Market's source of water.

New Market has contracted the treatment of its wastewater with the Town of Broadway. In 2011 the Town started sending its wastewater to Broadway's regional treatment facility by way of a 4.3 mile force main. New Market received $3,656,513 in Federal Stimulus for the project. The Town's capacity was also increased from 500,000 gpd to 1,000,000 gpd. The average flows for wastewater are 484,000 gpd. New Market is also actively working to reduce inflow and infiltration through the replacement or relining of sewer mains.

The Town has had strict policies on new connections to its system. All water and sewer connections outside of the corporate limits must be approved by the Town Council. In addition, the connection fees are double for out-of-town service. New Market also does not feel it is in a position to finance the extension of its lines; any business or person wanting service would have to pay the cost of any necessary extensions.

10.4 Strasburg

Construction is currently underway on the Town's new water treatment plant that will increase capacity from 1,000,000 to 3,000,000 gpd. The Town is finalizing engineering plans and financing details for an upgrade to its current 975,000 gpd wastewater treatment plant. The upgrade will increase treatment capacity to 2,000,000 gpd. Current average flows at the plants are 890,000 gpd (water) and950, 000 gpd (sewer). Future service areas include the Northern Shenandoah Industrial and Business Park and area identified as Annexation Area B in the Town's annexation study. There is a 40 percent premium on water and sewer utility rates outside of Town limits.

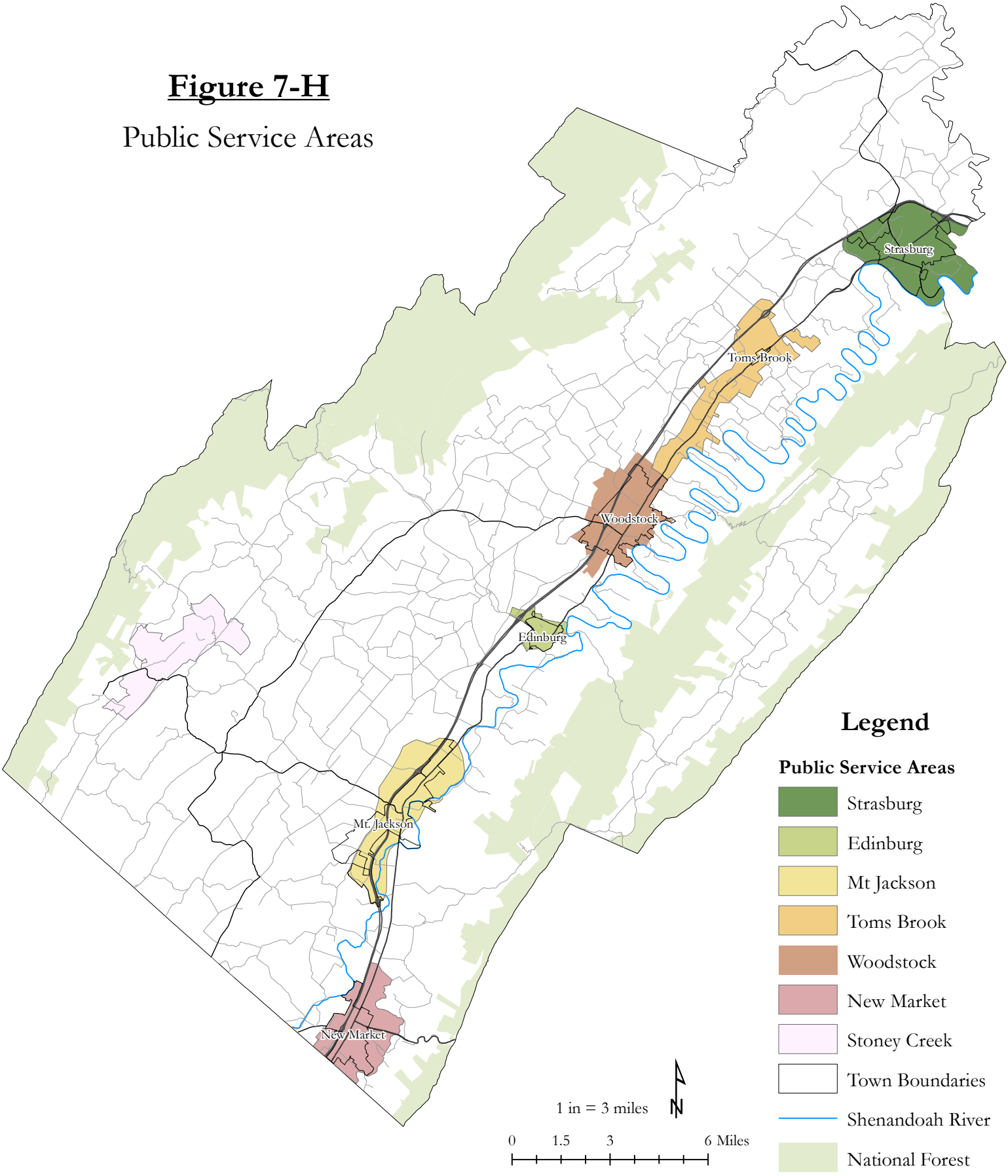
10.5 Woodstock

Wastewater Treatment: The town owns and operates a 1,000,000 gallon per day wastewater treatment facility located east of town in Shenandoah County. At present the plant treats an average of 480,000 gallons per day of wastewater with more than 2,548 households being provided with sewer service. Water Treatment: The town's water supply quality is good and the treated water meets or exceeds state and federal drinking water quality standards. Drinking water for the Town of Woodstock comes from the North Fork of the Shenandoah River.

The Virginia Department of Health has permitted the town's water treatment plant at 1.8 million gallons per day. Treatment at the Woodstock Water Treatment Plant is achieved by rapid mix, flocculation, sedimentation, and filtration for turbidity removal; chlorination for disinfection; and fluorination to aid in reducing tooth decay. Water is pumped from the water treatment plant to the storage and distribution system which consists of two elevated water storage tanks; the first, located on Ox Road has a capacity of 400,000 gallons, and the second, located on West North Street has a capacity of 2,000,000 gallons.

Figure 7-H

Public Service Areas



10.6 Toms Brook-Maurertown Sanitary District

This system provides water and sewer services to the Town of Toms Brook, the unincorporated community of Maurertown, and the surrounding area from the Toms Brook interchange at I-81 south to the Town of Woodstock. Total permitted capacity is 240,000 gpd for the water system which pumps an average of 95,000 gpd, and 189,000 gpd for the sewage system which has an average flow of 110,000 gpd. The District is governed by the Shenandoah County Board of Supervisors.

10.7 Stoney Creek Sanitary District

Water and sewer service is provided primarily to the Bryce Mountain -Basye area and several adjacent properties which have been added to the District's service area. Construction commenced in April 2012 to connect Shrine Mont and Orkney Springs into the districts sewer system and is expected to be completed by December 2012. There are no current plans to provide additional service outside of the designated service area. The District relies solely on ground water for its source. Currently, the permitted capacity of the water system is 392,800 gpd, and approximately 150,000 gpd are pumped. The sewer system's permitted capacity is 600,000 gpd (at secondary treatment), with an average flow of 300,000. The District is governed by the Shenandoah County Board of Supervisors.

10.8 North Fork Regional Wastewater Treatment Plant

The North Fork Regional Wastewater Treatment Plant (NFRWWTP) is located at 850 Aileen Road, between Woodstock and Edinburg. The activated sludge treatment facility was acquired by the County in 1998. The current operating permit has treatment capacity of 100,000 gpd, and future potential capacity of up to 750,000 gpd. The plant currently provides treatment for leachate from the County landfill and biosolids from local municipal facilities. Biosolids are eventually dewatered by means of a filter press prior to disposal. All County septage wastes are treated at the NFRWWTP. Sanitary sewer is also treated from the surrounding areas in the vicinity of the plant.

Based on the above information, current and potential future public water and sewer service areas are illustrated in Figure 7-D, Public Service Areas on page 7-22. The service areas for the Town of Strasburg and for the Town of Mt. Jackson are covered by annexation agreements, and therefore accurately represent potential future growth areas for these towns. The Town of New Market and the Town of Edinburg have jointly adopted a future growth area with the County (see figure 3-G, 3-H and 3-I). Individual annexation agreements and corresponding Growth Area Plans should be developed between the County and the Towns of Toms Brook and Woodstock to define specific future growth areas for each.

11. Solid Waste Facilities

The six incorporated towns within Shenandoah County provide refuse collection services to their residents. All the towns contract for these services with private firms via periodic bids. The County provides thirteen convenience

center drop-off sites for its residents to deposit their trash. The sites are located so as to provide minimal travel distances to all citizens. The County services these sites utilizing its own employees and equipment. These sites are open Monday – Saturday (closed on Thursday) from 7:00a.m. until 7:00p.m. and Sunday from 1:00p.m. until 5:00p.m. Several of the drop-off sites do not have compactor capability and need to be upgraded to this configuration. All thirteen sites also have specialized containers in place for the collection of recyclables. In addition, recycling-only containers are located in four of the towns.

The County operates a permitted, modern lined landfill on a 214 acre site off US 11 between Woodstock and Edinburg. Recently, the first portion of an expansion section was opened which, with growth allowances, is projected to provide thirty three years of capacity from its opening in mid-2003. This newest landfill section is the third portion of the property to be used for refuse burial; the initial section was opened in 1972, and a second section was started in 1988. These first two disposal areas are now closed.

Environmental monitoring has been conducted on the property since 1994. Currently the County is burning off methane gas onsite until the completion of the landfill gas system, which will enable the County to collect methane gas from the "old landfill" as well as current and future landfill cells. At this time, it is understood that the carbon credits may be available for the current and future cells but not from the old landfill cells. Further, it is understood that a "beneficial use" project will be actively pursued, whereby the County would be able to sell methane gas and/or electricity generated from that gas.

An underground pipeline from the county landfill to the North Fork Regional Wastewater Treatment Plant was completed and placed in service in April 2012 providing underground transfer of leachate, as well as all septage from local commercial septage haulers from the newly completed Septage Receiving Station located at the county landfill.

Recycling forms a substantial part in the County's solid waste program, which was begun in 1992 and received added focus in 1994 when a sizeable barn on the landfill property was converted by County employees into a Materials Recovery Facility (MRF) for sorting and packaging of recycled materials. The volume of items processed has grown from 3,811,854 lbs. in 2007, 4,351,300 lbs in 2008, 4,629,524 lbs in 2009, 3,226,000 lbs. in 2010 and 4,368,220 lbs. in 2011. Initially the program included plastics, glass, metals, wood wastes, and paper. Over time, scrap tires, computers and electronics, waste oils and antifreeze, household hazardous wastes (chemicals), and vehicle batteries have been included in the program. The Town of Strasburg started curbside recycling in March 2009. Woodstock began curbside recycling in July 2011.

Shenandoah County is also very active in regional solid waste cooperative programs, plus planning and reporting activities are done as a regional group. Most recently, money has been allocated via local contributions and grant funds for the purchase of a glass pulverizer which will be shared regionally. The County's landfill and existing recycling centers are shown on the Community Facilities Map

(Figure 7-A), page 7-9.

12. Summary

Adequate public services and facilities are required to serve community needs. Public service areas have been delineated around the towns to serve the major development needs in an efficient manner. It is a County objective to improve the County's school facilities and curriculum. In recent years major improvements and additions have been made to all elementary, middle and high schools. With the County's increased school-age population, particularly in the northern portion of the County, new school construction may be -considered. The capability for fire and rescue service dispatching and response was met by the enhanced 911 emergency dispatch system that has been implemented, and also by the growth of the Department of Fire and Rescue, which coordinates emergency response throughout the County.

The County complies with all state and federal requirements for the disposal of solid waste. It also actively promotes recycling and waste-minimization efforts, and has a county-wide recycling program in cooperation with the towns. It also promotes regional cooperation on solid waste disposal issues by participating in regional solid waste planning, tire recycling, and is investigating other cooperative measures to reduce the waste flow to landfills.

Capital projects are implemented through a Capital Improvements Program (CIP) for expanded services and physical facilities that is reviewed and updated annually as part of the budget process. All other county service agencies and towns are also encouraged to have capital improvement programs.

The provision of adequate public facilities requires foresight, planning, and coordination. It is essential that the several communities within Shenandoah County and all of the agencies, authorities, public service districts and other organizations providing services work with the County to provide facilities where needed, to guide development to desired locations, and to protect natural areas from encroachment.

Chapter 8:
Transportation

Approved by Board of Supervisors August 23, 2016

1.0 Introduction

Transportation in and through Shenandoah County consists of six components:

- Roads and highways
- Taxi and bus service
- Transportation provided by local human service agencies and organizations
- Airports
- Rail
- Trails (pedestrian, biking, hiking etc.)

1.1 Glossary of Terms

The ***Virginia Department of Transportation (VDOT)*** is responsible for building, maintaining, and operating the state's roads, bridges, and tunnels. And through the Commonwealth Transportation Board, it provides funding for airports, seaports, rail, and public transportation. Virginia has the third-largest-state-maintained highway system in the country, behind Texas and North Carolina.

The ***Virginia Department of Conservation and Recreation (DCR)*** works to give individuals, businesses, communities and all levels of government the tools and information needed to make wise decisions in conserving Virginia's natural and recreational resources. The agency manages, protects and provides access to numerous state parks throughout the commonwealth.

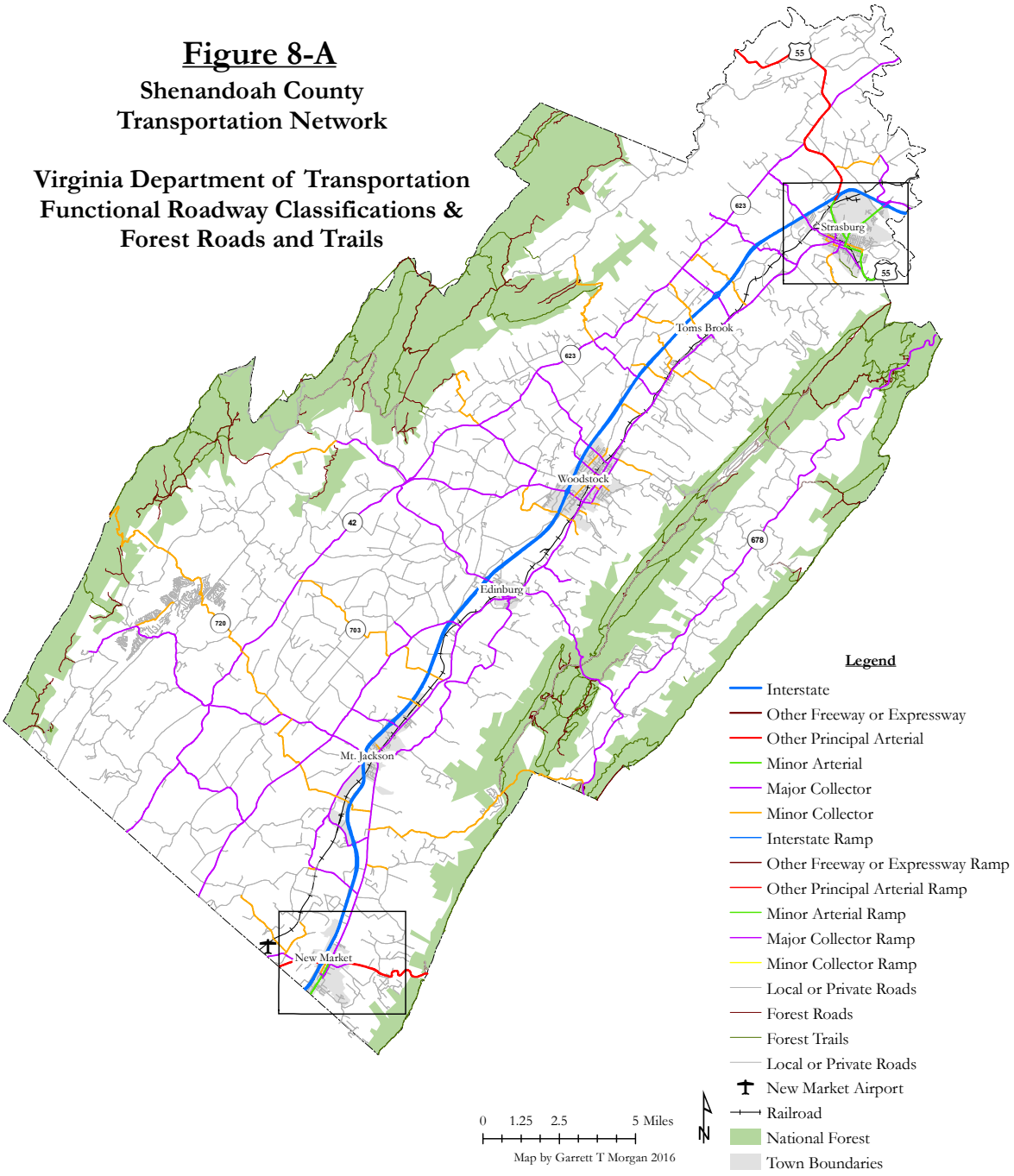
The ***Northern Shenandoah Valley Regional Commission (NSVRC)*** encompasses the five counties in the northwest corner of Virginia -Clarke, Frederick, Page, Shenandoah, Warren and all jurisdictions within- as well as the City of Winchester. The NSVRC exists to bring these local governments together to pursue common goals, work together on regional issues and find efficiencies through collaboration.

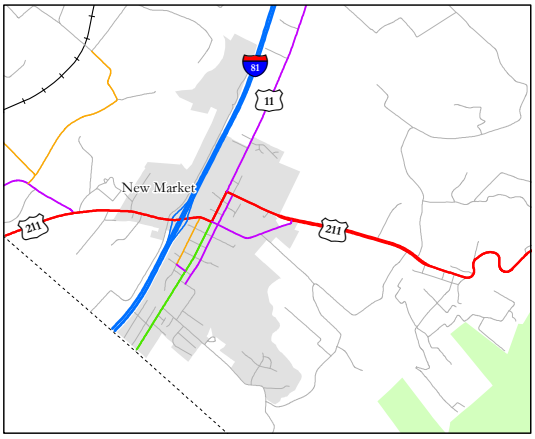
The NSVRC is one of 21 planning district commissions established by the Commonwealth of Virginia. Each commission serves a planning district, which is a political subdivision of the Commonwealth charted under the Regional Cooperation Act. The Regional Commission is made up of elected officials and citizens appointed

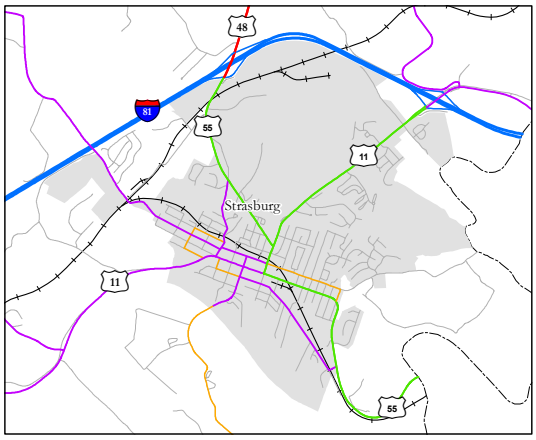
Figure 8-A

Shenandoah County
Transportation Network

Virginia Department of Transportation
Functional Roadway Classifications &
Forest Roads and Trails







to the Commission by local governments.

1.2 Functional Classification of Road Network

Based on the National Highway Functional Classification Study, the Virginia Department of Transportation (VDOT), in cooperation with the Federal Highway Administration, has classified all public roads and highways in Shenandoah County into six categories: interstate, principal arterial, minor arterial, major collector, minor collector, and local access road. They are shown in Figure 8-A and discussed below:

Interstate highways are designed to carry a large volume of through traffic between large cities. They form a national network of multi-lane, limited-access highways which carry traffic at relatively high speeds. I-81 runs through the entire length of the county and links it to the Middle Atlantic states.

Principal arterials serve substantial traffic of moderate trip length. These routes are generally four lanes in width. Route 211 and Route 55 are the only principal arterials in Shenandoah County.

Minor arterials form a highway network that forms links between towns and other traffic generators. They also connect to principal arterials and/or the interstate system. The only minor arterial in the county is Route 55 East of Strasburg.

Major collectors provide service to towns not directly linked to an arterial or interstate highways, to other traffic generators, and serve the important intra-county travel corridors. Major collectors in the county include US Route 11 and State Routes 42, 263, 623, and 678.

Minor collectors collect traffic from local access roads, rural villages, and locally important traffic generators, and bring all developed areas within a short distance of a major collector. Minor collectors in the county include State Routes 720 and 703.

Local access roads provide direct access to adjacent land uses, and facilitate short distance travel.

VDOT provides design standards which must be met when developing any public roadway, depending upon the proposed road's classification and use.

2.0 Existing Transportation Network

The most visible mode of transportation is the road network and the vehicles which travel on it (see Figure 8-A & 8-B for a complete Shenandoah County road inventory). As of December 31, 2013 (latest figures available) Shenandoah County contained 741.15 miles of roads in the Virginia Department of Transportation (VDOT) system, as follows:

Figure 8-A: Shenandoah County Road Mileage 2013	
Interstate Highway	**32.04**
Primary Highway	**94.19**
Secondary Roads	
Hard Surface*	439.38
All-Weather Surface**	164.69
Light Surface***	10.09
Unsurfaced****	.76
Total Secondary Road Mileage	**614.92**
Total Road Mileage	**741.15**

* concrete, pavement, or tar & chip
** graded gravel with drainage
*** graded dirt with drainage
**** ungraded, undrained dirt/grass

Source: VDOT Mileage Tables, 2013

There are 381 bridge structures in Shenandoah County, including many "low-water" bridges. This extensive system of bridges included in the County's road system poses a significant challenge in maintaining and upgrading it. Progress has been made over the years to upgrade unsurfaced or gravel roads to hard surfaced roads. There are still existing roads that need to be upgraded. As of December 2013, 175 miles (28 percent of the secondary road system) were not hard surfaced.

2.1 Interstate 81

Interstate I-81 runs north and south through the entire length of Shenandoah County, approximately 32 miles. This limited access highway serves local, intrastate, and interstate traffic. Increases in traffic volumes and projections for the future have raised concerns about the need to improve this important transportation link. The Shenandoah County Board of Supervisors has supported improvement plans which increase safety and improve traffic flow, such as additional climbing lanes, etc. Any changes to the footprint of I-81 should be carefully planned and coordinated to have the minimal impact on the scenic, environmental, historic, and agricultural resources of the county.

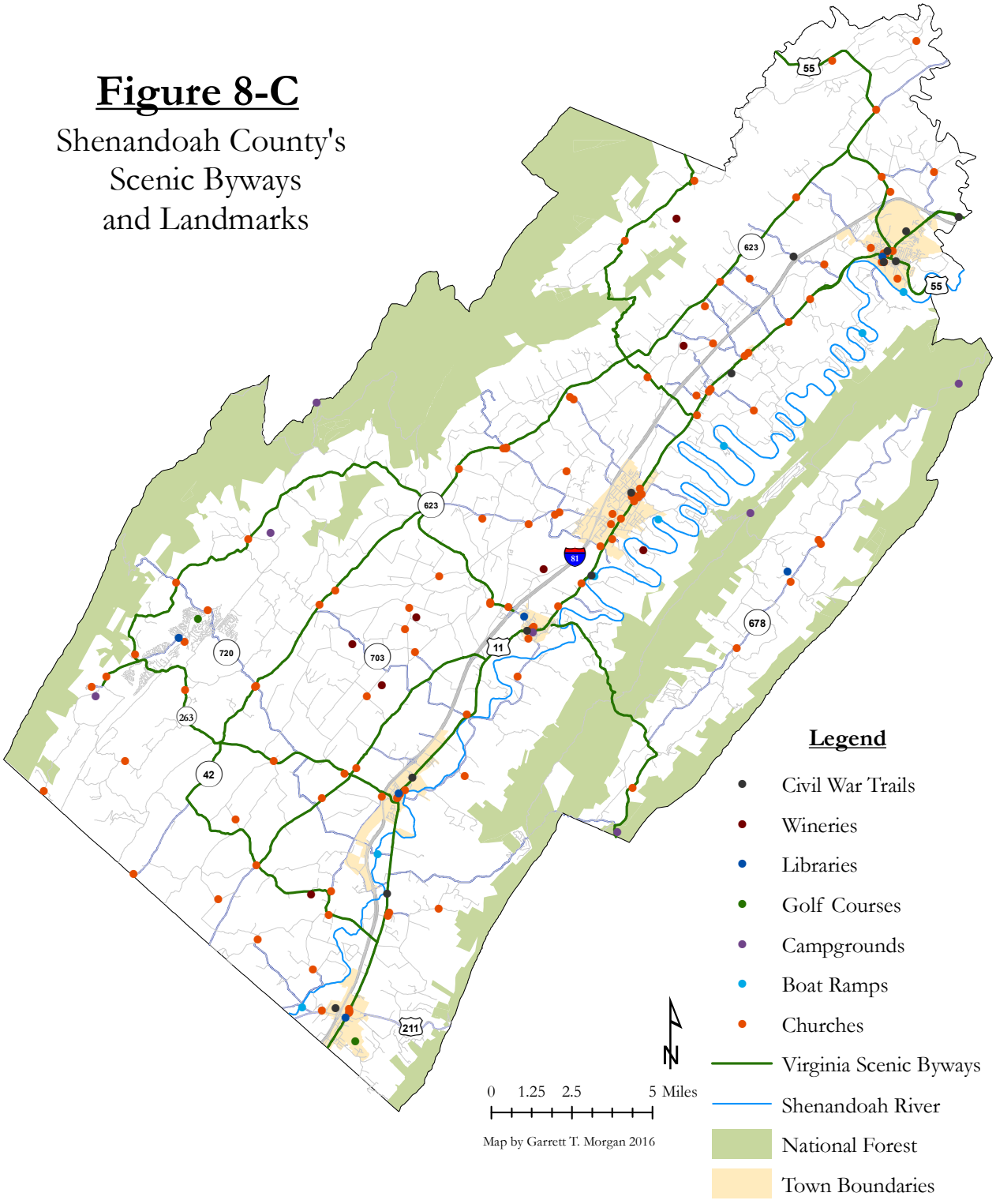
2.2 Scenic Byways

In April 2000, Shenandoah County proposed several roadways that travel through scenic, historic and tourism-related areas in the County to be designated as Scenic Byways by the Commonwealth Transportation Board. After review by both VDOT and the Department of Conservation and Recreation, who jointly administer this program, the following 10 roads were designated Scenic Byways:

- Rt. 211: From New Market to Page County line
- Rt. 11: Entire length in Shenandoah County
- Rt. 42: Entire length in Shenandoah County
- Rt. 263: Entire length in Shenandoah County

Figure 8-C

Shenandoah County's
Scenic Byways
and Landmarks



- Rt. 55: Entire length in Shenandoah County
- Rt. 717: Entire length (Rt. 675 to Basye)
- Rt. 614: Bowman's Crossing to Forestville
- Rt. 675: From Page County line to intersection with Rt. 717
- Rt. 623: Entire length (from Columbia Furnace to Rt. 55)
- Rt. 600: From Rt. 11 to Frederick County line

Together, these routes form a network of roads allowing motorists access to the scenic and historic assets of the county. Scenic Byways in the county are shown in Figure 8-C.

2.3 Rural Rustic Roads

The Rural Rustic Road Program is a practical approach to paving Virginia's low volume unpaved roads. The concept is the paving of existing unpaved roads with a compacted or impervious surface and reestablishment of existing associated ditches and shoulders. The new hard-surfaced road is on the same horizontal and vertical alignment as the prior gravel impervious area. Furthermore, a focal point of the program is on leaving trees, vegetation, side slopes, and open drainage abutting the roadway, undisturbed to the maximum extent possible. The County commits to future cooperation with VDOT for the identification and implementation of unpaved roadway improvements.

2.4 Forest Roads

With the George Washington National Forest comprising almost one-quarter of the land area of the county, there is a 125-mile network of forest roads owned by the federal government. The U.S. Forest Service maintains these roads, and regulates their use over the year depending on weather conditions. Only a third of the roads are open all year long, with most roads being closed a portion of the year or not open at all to public use.

2.5 Private Roads

In addition to the public road system, there are many private roads in Shenandoah County serving subdivisions of various sizes. Prior to 1997, private roads were frequently constructed without adequate consideration of travel width, grade, curvature, roadbed, paving or long-term maintenance.

In 1997, the county revised its subdivision ordinance to address the difficulties created by the unregulated construction of private roads. Generally, the ordinance requires that any new private roads constructed to serve more than two lots must be constructed according to Virginia Department of Transportation Subdivision standards. Existing private roads that do not meet such standards may not be used to serve any additional lots. Subdivision ordinance 142-20 (Streets) provides specific requirements for new private roads. (http://www.ecode360.com/9740437).

2.6 State Parks and National Forests

Seven Bends State Park is located in east-central Shenandoah County near the town of Woodstock. The park consists of 1,066 acres situated in the geographically unique Seven Bends area of the North Fork of the Shenandoah River. The park is governed by the Virginia DCR. In the park's 2008 master plan, one entrance is proposed for the park. Even though two roads provide access to the park, DCR determined that the "most direct route to bring visitors to the park [is] to use East Reservoir Road and South Hollingsworth Road to the park entrance." Further, the master plan states "These roads, and the low-water bridge, will need upgrades to secondary road standards. The bridge will have to be replaced before construction of the park can begin due to restricted approaches and limited weight capacity." As the park is built, the County will work in partnership with DCR and VDOT to ensure that the potential traffic impacts of the Park's growth are properly addressed.

2.7 Traffic Volumes

Traffic volumes are determined at a particular section of a road at a particular time. Volumes of a day or an hour can vary greatly, depending on the different day of the week or different time period of a day. For the purpose of this Chapter, traffic volumes are measured in units of Average Annual Daily Travel, or AADT, using 2014 Virginia Department of Transportation Daily Traffic Volume Estimates Including Vehicle Classification Estimates where available in Jurisdiction Report 85 for Shenandoah County prepared by Virginia Department of Transportation Traffic Engineering Division in Cooperation with the U.S. Department of Transportation and Federal Highway Administration. Traffic Volumes for the Shenandoah County's road network are shown in Figure 8-E. A detailed breakdown of select Primary and Secondary roads are shown in Figures 8-D and 8-F.

Figure 8-D
Annual Average Daily Traffic Volumes 2014
Primary & Interstate

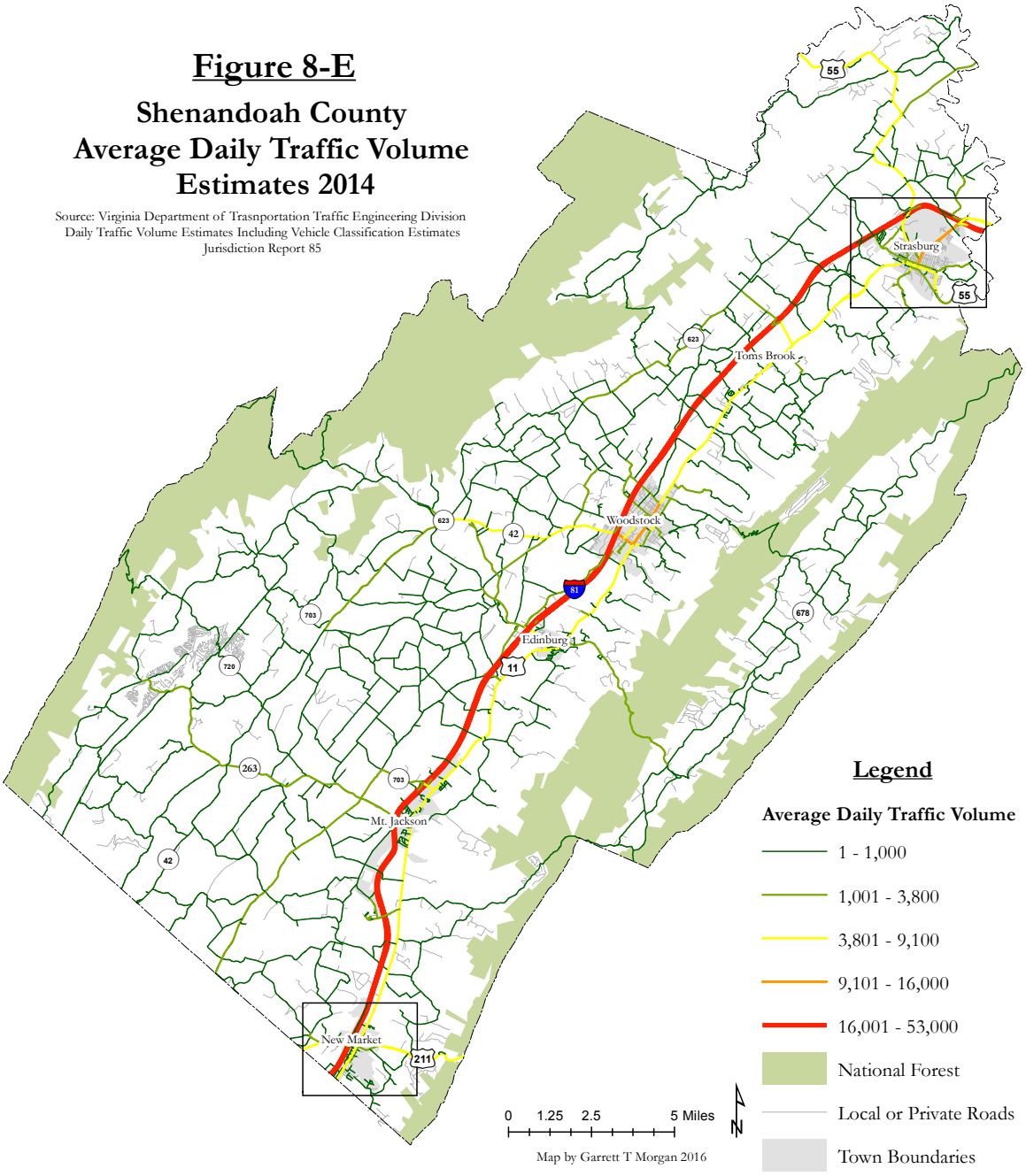
Data from 2014 Virginia Department of Transportation Daily Traffic Volume Estimates Including Vehicle Classification Estimates
Jurisdiction Report 85: Shenandoah County, Towns of Edinburg, Mount Jackson, New Market, Strasburg, Toms Brook, and Woodstock
Prepared 4/21/2015 by Virginia Department of Transportation, Traffic Engineering Division

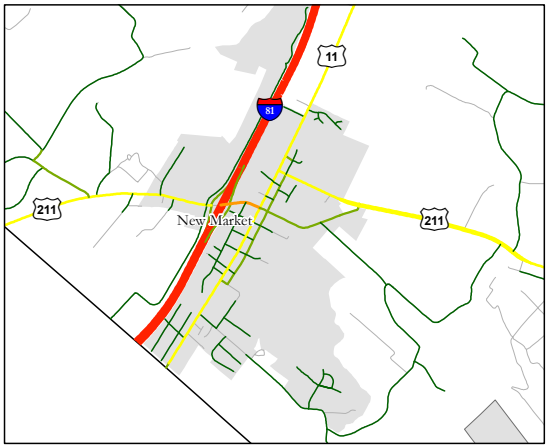
Route	Location	Northbound	Southbound	AADT
11	Strasburg	12,000	6,600	-
11	Toms Brook	6,900	6,900	-
11	Woodstock	7,500	7,800	-
11	Edinburg	6,100	5,500	-
11	Mount Jackson	5,500	4,900	-
11	New Market	5,200	3,900	-
42	at Woodstock	-	-	15,000
42	at I-81	-	-	14,000
42	at Columbia Furnace	-	-	3,900
42	at Rockingham County Line	-	-	1,200
55	Front Royal Road	-	-	3,600
55	at Route 11 Strasburg	-	-	6,800 (East)
55	at Route 11 Strasburg	-	-	13,000 (West)
55	at Lebanon Church	-	-	6,200
55	at Frederick County Line	-	-	4,800
81	at St. Rte. 55	25,000	25,000	50,000
81	Woodstock	21,000	24,000	45,000
81	St. Rte. 42	21,000	24,000	45,000
81	St. Rte. 292	21,000	21,000	42,000
81	New Market	19,000	19,000	37,000
81	at Rockingham County Line	21,000	20,000	41,000
211	at I-81 West of New Market	-	-	10,000
211	at New Market	-	-	5,900
211	at Rockingham County Line	-	-	6,300
263	at Mount Jackson	-	-	3,100
263	at St. Rte. 42	-	-	1,900
292	at I-81 Mount Jackson	-	-	9,100

Figure 8-E

Shenandoah County Average Daily Traffic Volume Estimates 2014

Source: Virginia Department of Trasnportation Traffic Engineering Division
Daily Traffic Volume Estimates Including Vehicle Classification Estimates
Jurisdiction Report 85





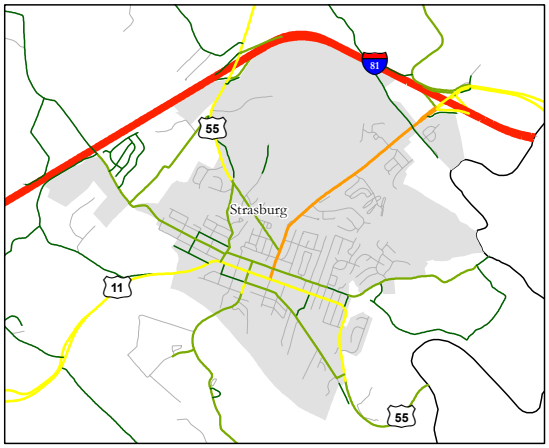


Figure 8-F
Annual Average Daily Traffic Volumes 2014
Select Secondary and Local Roads

Data from 2015 Virginia Department of Transportation Daily Traffic Volume Estimates Including Vehicle Classification Estimates
Jurisdiction Report 85: Shenandoah County, Towns of Edinburg, Mount Jackson, New Market, Strasburg, Toms Brook, and Woodstock
Prepared 4/21/2015 by Virginia Department of Transportation, Traffic Engineering Division

Route	Location	AADT
600	Rte. 623 Back Rd.	220
600	Rte. 11	280
604	Rte. 677 Baker House Lane	1,400
604	Rte. 763 Patmos Road	1,300
604	at Back Road	900
611	St. Rte 263	710
611	Rte. 703	240
614	at I-81 Ramp	1,200
614	Rte. 708	960
614	St. Rte. 42	1,200
623	Zepp Rd.	1,200
623	Fairview Rd.	1,200
623	St. Luke Rd.	840
623	Wolf Gap Rd.	1,200
628	St. Rte. 55	1,400
648	85-9090	2,600
648	Strasburg Middle School	1,200
648	Lineburg Lane	290
651	Tea Berry Road	1,100
651	US Rte. 11	4,400
651	I-81	2,500
675	Wakemans Grove Rd.	2,500
675	Johnstown Rd.	1,200
703	Scothern Rd.	2,900
703	South Middle Rd.	2,800
730	I-81	3,100
730	Industrial Park Rd.	1,900

3.0 Community Transportation/Mobility Resources

There is no public transit system in Shenandoah County. Access to inter-city bus service is available from locations in Winchester and Harrisonburg. If a citizen does not own or have access to a car, there are few options available in Shenandoah County for getting from one place to another.

There are two taxicab services listed in the local telephone directory: one in Strasburg and one in Woodstock. Private medical transportation (wheelchair or stretcher/gurney) is also listed in the local telephone directory and is available for hire.

The Shenandoah Area Agency on Aging (SAAA) offers rides to Active Living Centers so persons without transportation may fully participate in activities offered by the centers. In Shenandoah County, the Senior Center in Edinburg (a SAAA program) provides transportation to and from the Center with its van, picking up seniors at their homes in the morning and returning them to their homes in the afternoon after activities end. The area served by the Senior Center van is north to Woodstock and south to New Market.

WellTran provides pre-arranged fee-based transportation for persons 18 years and older who have a disability and persons age 60 and older. Additional transportation and mobility options may be available from a variety of voluntary associations or agency sources serving special needs populations, specifically identified groups or individuals (e.g. veterans traveling to Veterans Administration Martinsburg WV Medical Center provided van service by the local VFW Post #2447.)

Some agencies or organizations may have limited transportation resources available to assist individual clients who are participating directly in an agency-administered program. One available resource listing mobility options for transit-dependent persons is the Coordinated Human Services Mobility Plan (http://www.drpt.virginia.gov/media/1126/northern-shenandoah_chsm_sept13.pdf), last updated in September 2013, for the area covered by the NSVRC, which includes Shenandoah County.

The region-wide document lists providers, describes client types, includes the number of available vehicles and also lists local contact information. The target populations identified in this document include the mentally and/or physically disabled, elderly, and people who are involved in welfare-to-work programs. Each of the 14 organizations operates transportation programs independently of one another. Additional opportunities for collaboration, improved efficiency, and increased service levels may exist.

No comprehensive assessment exists as to the overall need for transportation for the various groups of identified transportation-dependent persons and the adequacy of available resources. It appears, at least anecdotally, that a shortfall exists in available community resources for the population that requires these resources.

In addition to those previously identified groups, there appears to be an additional group of residents lacking reliable transportation to travel to and from work. This need severely limits this population's ability to find and sustain gainful employment.

4.0 Commuter Services

Services in the County are limited, but the NSVRC is actively involved in helping commuters with their travels. There are two Park and Ride lots sanctioned by VDOT:

- Just east of I-81 at exit 291 (Toms Brook) on Mt. Olive Road (Rt. 651) with 10 spaces;
- The Oranda Park and Ride at Rt. 629/ Rt. 11 (exit 298) with 46 spaces.

NSVRC works with VDOT to establish lots where needed and is working to have the Oranda Park and Ride expanded to include additional spaces.

NSVRC offers Ride Smart (ridesmartva.org) which is a free matching service that helps residents in the northern Valley connect with others having similar commuting schedules. In conjunction with Ride Smart, emergency return home transportation is offered through Guaranteed Ride Home and may be used free of charge up to four times per year.

NSVRC also subsidizes persons wishing to create a van pool and the subsidy may be utilized until the pool becomes revenue neutral. More information on the van pool subsidy may be obtained by calling the NSVRC office in Front Royal at 540-636-8800. In addition to information listed here, searching the internet also yields information on services of interest to commuters.

5.0 Air Transportation

There are two general aviation airports in the County serving small aircraft, one in New Market and one at the Byrce Resort near Basye. New Market Airport (FAA ID 8W2) is a privately owned public use facility, located two miles west of New Market. It has a runway 2,920 feet long and 60 feet wide, operates low-intensity lighting from dusk to 10:00 PM, and has aviation fuel (100 LL) available.

Sky Bryce Airport (FAA ID VG 18) is a privately owned public use facility

found at Bryce Resort near Basye with a 2,240-foot by 50-foot runway located between mountain ridges. The airport is open from sunrise to sunset. No fuel is available.

Shenandoah County is a member of the Winchester Regional Airport Authority which operates the publicly owned Winchester Regional Airport (FAA ID OKV), located three miles southeast of Winchester and approximately 31 miles north of Woodstock, an all-weather general aviation airport with full ILS approach system with a runway 5,498 feet by 100 feet with high intensity lighting available for 24 hour flight operations, providing fuel and line services. Improvements include a new terminal building, additional hangars and new fueling facilities. Air charter service and flight instruction services are also available.

The Shenandoah Valley Regional Airport Commission operates the publicly-owned Shenandoah Valley Regional Airport (FAA ID SHD), located between Harrisonburg and Staunton at Weyers Cave. With a 6,002-foot by 150-foot runway, the airport is served by a commuter airline providing scheduled flights daily to one or more hub cities.

Washington Dulles International Airport (FAA ID IAD) is 26 miles from downtown Washington, DC and approximately 83 miles from Woodstock. In recent years, over 1.5M passengers per month and over 20M passengers annually on domestic and international flights arrive, depart, or pass through IAD.

6.0 Rail Transportation

The Norfolk Southern Railway System (NS) and the CSX Corporation both own facilities in the County, and the two railroads connect at Strasburg. All rail services are freight-only; there is no passenger service available. As of 2014, NS service was halted at Timberville, and the NS facilities in Shenandoah County have been classified as inactive. NS' decision to inactivate the lines instead of abandon the lines leaves open the possibility for the restoration of rail service in the future. However, NS' desire to retain the track prohibits conversion of the dormant track to a rail trail. CSX has maintained its freight rail service to the Strasburg area.

The Virginia Inland Port is located north of Front Royal approximately 15 miles from Shenandoah County. This facility provides daily rail service direct to the international shipping port of Hampton Roads, Virginia. This is a deep-water port with at least a 45-foot channel. The Inland Port offers excellent service to any businesses that wish to import or export materials and products.

7.0 Land Use, Economic, and Demographic Assumptions

The land use, growth, and demographic assumptions used to identify the transportation needs in the following section are outlined in previous chapters of the Comprehensive Plan. The three primary assumptions directly related to transportation are as follows:

- The assumptions for modest population growth are unlikely to drive significant tansportation improvements.

- Planned County parks are unlikely to impact roads over the next 10 years.
- Railroads in the central and southern portions of the county will likely remain in disuse.

8.0 Assumption, Expected Needs, Recommended Improvements, and Cost Estimates

The existing transportation network has shortcomings that need to be addressed, and reasonable projections have been made about future changes in road use. The various issues that are expected to arise are detailed below.

A map of the recommended bridge, segment, and site improvements is illustrated in Figure 8-G.

8.1 Commercial Development

Assumption: If/when the planned development called Strasburg Commercial is built; transportation will be impacted as projected by the 2013 VDOT report, "Study of Borden Mowery Drive at Route 55." Industrial uses also are likely to expand around I-81 near Strasburg.

Need: The VDOT report for Strasburg Commercial outlines potential future traffic needs at the intersection of I-81 and Rt. 55. Any expansion of quarry operations north of Strasburg may require safety and/or capacity improvements. Increased commuter traffic will require additional commuter lots. Traffic increases on Rt. 55 between Strasburg and Corridor H may call for capacity and safety improvements.

Recommended Improvement: As Strasburg Commercial is developed, the traffic improvements called for in the 2013 report, including a commuter park and ride, should be implemented. Near the quarry, improvements to Rt. 629 (and connecting roads) may be needed.

Cost Estimates: The VDOT has provided the following cost estimates for the Strasburg commercial study and the extension of Borden Mowery drive.

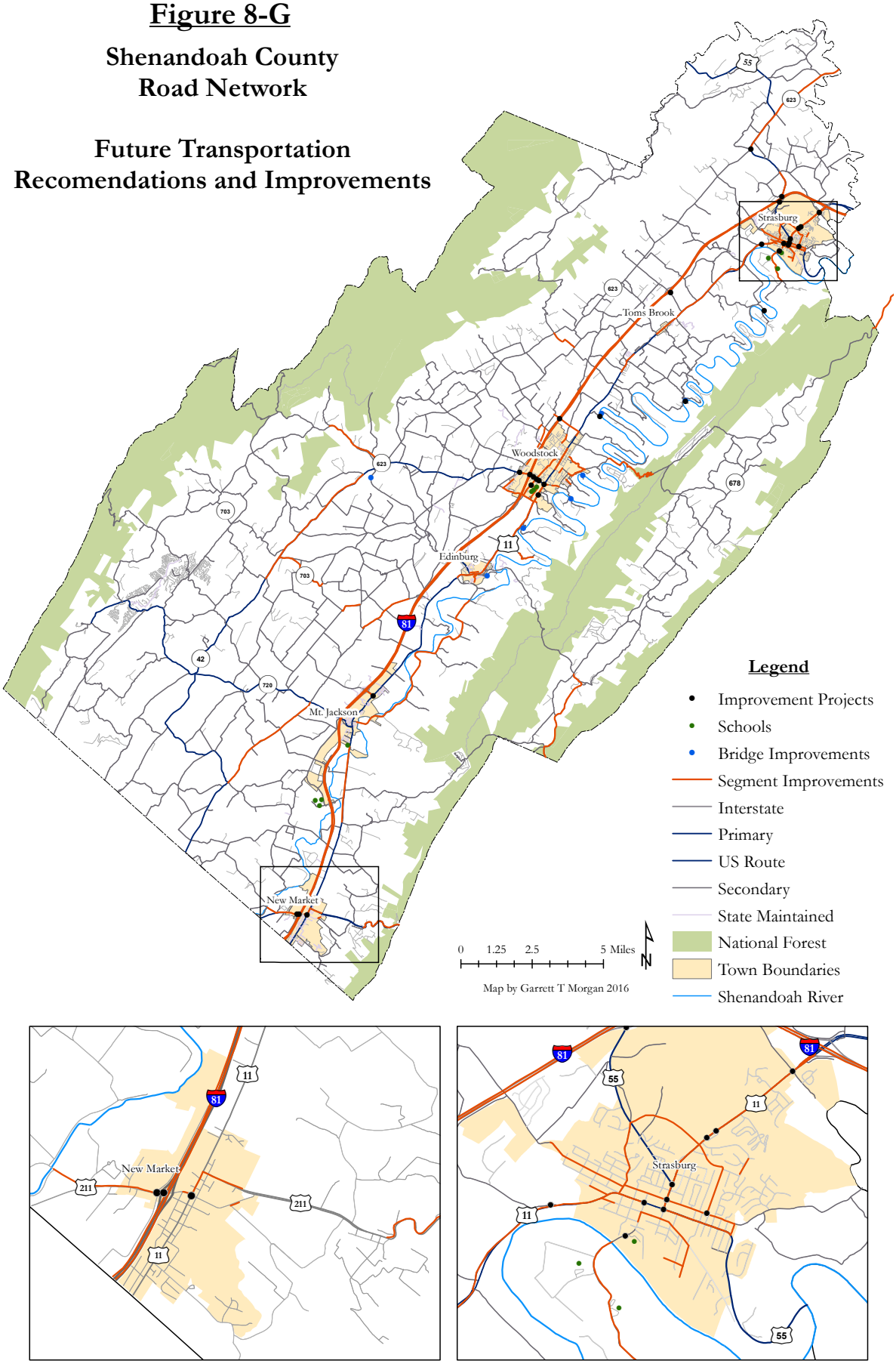
Strasburg Commercial Study 2020 Recommendations:

- Signalization of Rt. 55/Borden Mowery Dr. intersection and addition of South Bound left turn lane with 200' of storage, transition tapers and modification of rail crossing: $1,700,000.
- Rt. 55 / Aikens-Claytor development entrance intersection addition of North Bound Left turn lane with 200' of storage, transition tapers and modifications of rail crossing (Developer to install traffic signal): $1,200,000.

Figure 8-G

Shenandoah County Road Network

Future Transportation Recomendations and Improvements



- Signalization of Rt. 55/ 1-81B North Bound ramp intersection and addition of North Bound left turn lane with 200' of storage and transition tapers: $1,500,000.
- Signalization of Rt. 55/ I-81 South Bound ramp intersection: $500,000.

Extension of Borden Mowery Drive:

- Approximately 0.60 mile extension of 2 lane, ditch section road to Radio Station Road: $1,500,000 (Estimate based on recently completed 0.43 mile extension of Borden Mowery Drive: UPC 98834: $1,043, 416).

8.2 Commuter Traffic

Assumption: The current trend of high commuter traffic (of county residents) will continue and increase in the future, including on Rt. 55 between Strasburg and Corridor H in West Virginia.

Need: Traffic increases on Rt. 55 and the 298 interchange may call for capacity and safety improvements. Increased commuter traffic will require additional commuter lots. There are no commuter lots for southbound drivers in the New Market area.

Recommended Improvement: VDOT should monitor the traffic situation on Rt. 55 between Strasburg and Corridor H and address safety improvements as needed. Commuter lot capacity should be created at the intersection of Rt. 55 and I-81 near Strasburg (exit 296), and capacity should be increased at the intersection of Rt. 651 and I-81 near Toms Brook (exit 291). VDOT should explore the commuter needs and options for Park and Ride development in southern Shenandoah County. Commuter lot capacity should also be added at the existing Park and Ride facility at the 298 interchange.

Cost Estimates: Countywide Park n Ride Study to assess needs for new facilities and the expansion of existing facilities within the County: $100,000.

Left:
Traffic and Pedestrians visit locations during the Annual Route 11 Yard Crawl

8.3 Emergency Response

Assumption: During incidents on I-81, detours channel north-south traffic to Routes 11, 614 (Middle Road) and 623 (Back Road). These rural roads may not be designed for this traffic volume, which creates safety concerns.

Need: Congestion and safety issues commonly arise during detour events.

Recommended Improvement: VDOT should propose active and passive measures to minimize safety and congestion problems arising on Routes 11, 55, 614 and 623 during detour events. Specifically, completing the extension of Borden Mowery Dr. to Radio Station Rd. would help mitigate concerns when traffic is diverted between exits 296 and 298 on I-81. Further, VDOT should continue Designated Detour Route Planning, involving several/multiple incident location scenarios, with local first responder and County officials to further enhance safety and to further mitigate congestion conditions during incidents on I-81.

8.4 Farm Vehicle Traffic

Assumption: Large and slow-moving farm vehicles will continue to use main roads as part of daily farm activities, such as moving equipment between dispersed tracts. Drivers unfamiliar with such vehicles may cause safety problems. The sizes and speeds of these vehicles create additional issues.

Need: Driver education (e.g. road signs about farming equipment, ads in tourism publications, etc.) should be provided to alleviate traffic conflicts with large farm vehicles.

Recommended Improvement: Provide driver education (e.g. road signs about farming equipment, ads in tourism publications, etc.).

8.5 Schools

Assumption: School enrollment and delivery patterns will continue to increase and cause congestion and/or safety issues.

Need: Existing schools already experience traffic problems, and are at risk for more serious problems. Growing enrollment will very likely drive the need for road capacity and safety improvements.

Recommended Improvement: In the area of the northern school campus, the availability of only one exit road (across Sandy Hook Bridge) creates the potential for significant traffic problems. An alternative route will be needed over the long term, especially if additional enrollment capacity is added in the area. VDOT plans for a pedestrian bridge adjacent to Sandy Hook Bridge should be implemented. Further VDOT study and implementation is recommended to develop a second

crossing over the river as a second access route to the northern school campus in the event of an emergency. At the Central Campus, improvements to Hoover Road listed in the Woodstock transportation plan should be implemented.

Cost Estimates: Northern Campus Secondary Access Road Study to assess the need and potential location of a secondary access road to serve the northern school campus currently accessed by Sandy Hook Road: $100,000.

Hoover Road Improvements: The relocation and realignment of roadway between Ox Road and South Main Street. VDOT UPC: 105053: $4,600.000.

8.6 Bridges

Assumption: Many of the bridges in the county are old and past their projected use period. Additionally, low-water bridges are covered by water several times per year. Emergency vehicle (e.g. ambulances and fire trucks) access is critical, and should not be hindered by bridge disrepair or frequent flooding. Bridges must allow emergency vehicle access to provide for the safety of the community.

Need: Inspections of several VDOT bridges have revealed evidence of disrepair and have indicated a need for major repair or replacement. Low-water bridges subject to frequent flooding should be replaced with raised bridges less prone to flooding. Private bridges (for example, Black Bear and Helsley Bridges) also fall into this category.

Recommended Improvement: Bridge replacement projects within the county with their cost estimates provided by VDOT are illustrated below.

Bridge	UPC	Cost Estimate
Artz Rd. (Rt. 663) over NF of Shenandoah River	82769	$3,220,000
Stoney Creek Rd. (Rt. 675) of Stoney Creek	97282	$2,050,000
Headley Rd. (Rt. 600) over NF of Shenandoah River	82767	$2,150,000
Seven Fountains Rd. (Rt. 758) over Passage Creek (Completed)	90969	$1,530,000
Rt. 11 SB over Cedar Creek	90172	$9,590,000
1-81 over Cedar Creek	97636	$11,360,000
Orchard Dr. (Rt.698) over Mill Creek	98954	$2,720,000
Rt. 620 over Smith Creek	100765	$1,960,000
Rt. 11 over NF of Shenandoah River	104182	$5,150,000
Lupton Rd. (Rt. 667) over NF of Shenandoah River	N/A	$4,000,000
Hollingsworth Rd. (Rt. 609) over NF of Shenandoah River	N/A	$3,200,000
Chapman Landing Rd. (Rt. 672) over NF of Shenandoah River	N/A	$3,800,000

8.7 Tourism

Assumption: Tourism will increase at popular destinations (including Seven Bends State Park, Bryce Resort, breweries, wineries, and historic sites). Some of this increase will be on rural roads (e.g. Routes 42, 263, 623, 667, 691, 703, and 758) causing traffic volume to increase on those roads.

Need: Roads bearing tourism traffic may require capacity and safety improvements.

Recommended Improvement: Assess the impacts of increased tourism traffic on Routes 42, 263, 623, 667, 691, 703, and 758. Perform studies to determine what improvements are required.

Cost Estimates: Countywide study to assess impacts and identify needs for the County's rural road system based on anticipated future growth in tourism: $100,000.

8.8 Boating Access

Assumption: Fishing and paddling are popular activities for both residents and visitors. Shenandoah County has four public boat access ramps, not all of which are conducive to paddlers using separate put-in and take-out locations.

Need: Four boat landings are insufficient to support the boating community in the county.

Recommended Improvement: VDOT should collaborate with VDGIF to add boat access locations at intervals along the North Fork throughout the County, especially at low-water bridges.

8.9 Walking and Biking Trails

Assumption: Walking and biking trails will be developed (e.g. proposed Fishers Hill Trail to the National Historic Park) and must be accommodated. Tuscarora Trail crosses the county and passes through the County Park. Some hikers use the park as an unofficial trailhead for parking. The County may be willing to make the park an official trailhead and allow hiker parking (at least part of the year).

Need: Additional trails and other recreational opportunities are needed. Wherever trails cross roads, additional safety concerns arise. If the County offers the County Park for use as a trailhead, then sanctioning by the Potomac Chapter of the Applachian Trail Conservancy (PATC) as well as the greater Appalachian Trail Conservancy (ATC) should be pursued.

There are currently no purpose built bicyling and pedestrian facilities in the County. Opportunities to improve biking and pedestrain infrastructure are greater

in the Towns. Safety issues are paramount because of the potential danger to pedestrians, cyclists, and operators of farm vehicles on thoroughfares with high rates of speed.

Recommended Improvement: Provide safety signage where trails cross roads and are co-located on roads.

Collaborate with regional organizations, such as the NSVRC, and Towns to potentially develop a County Bike and Pedestrian Plan.

8.10 Rail to Trails

Assumption: Railroads in the central and southern portions of the county will likely remain in disuse.

Need: Pedestrian/bike-friendly access along US Route 11 is very limited. Unused (and in disrepair) rail lines take up valuable real estate through the middle of the County.

Recommended Improvement: Consider converting inactive rail lines to biking and pedestrian trials and/or green infrastructure elements.

9.0 NSVRC 2035 Rural Long Range Transportation Plan

In addition to the specific projected issues listed above, a comprehensive study of current and future road needs was completed in 2011 under the coordination of the Northern Shenandoah Valley Regional Commission. The "2035 Rural Long Range Transportation Plan" (http://www.virginiadot.org/VDOT/Projects/asset_upload_file40_52028.pdf) specifies over one hundred improvements to the County's transportation network. Some improvements are completed or are under way. The remainder should receive consideration for future funding. That plan is hereby incorporated by reference into this chapter.

Above:
An example of a low water bridge that are common thoroughout the county, especially on the North Fork of the Shenanoah River

10.0 Conclusion

The transportation system in Shenandoah County is a critical resource for the welfare of its citizens. Generally, new construction and adequate maintenance have been successful in meeting the needs of a growing population. However, continued growth of the county's population as well as growth in tourism and employment will require future improvements. Traffic studies and engineering assessments will be needed to monitor adequacy of roads, bridges and other infrastructure. This Comprehensive Plan documents high traffic volume locations and other conditions that need to be assessed.

Of particular concern are high traffic volume roads in the vicinity of the three major public school campuses in Shenandoah County. Further, Shenandoah County still retains 175 miles of unpaved public roads, including roads that serve growing tourism traffic. The need to use public roads to move agricultural machinery complicates traffic, but must be accommodated to meet the county's vision of remaining primarily rural and agricultural. Finally, the safety and volume needs of Interstate 81, the major north-south thoroughfare in Shenandoah County will have to be met with the least possible adverse impact to the environment, agricultural, scenic and historic resources.

Adequate roads and related infrastructure are not the only elements of transportation requiring careful planning in Shenandoah County. The county's diverse population includes citizens with limited or no access to private automobiles. Dependable private transportation services such as buses and taxis are very limited. Senior citizens, citizens with disabilities and citizens without the economic means for personal vehicles frequently depend upon charitable organizations for their transportation. While these multiple sources work diligently to meet urgent transportation needs, anecdotal information suggests that more is needed. A thorough, comprehensive assessment of such needs should be undertaken.

Chapter 9:

Growth Management

Design and Maps updated June 2016

1.0 Introduction

Communities and their rural environments evolve over time and are affected by the actions of local landowners, the comprehensive plans of planners, programs of environmentalists and the plats of developers. The landscape of Shenandoah County twenty years from now will be the result of the collective group of interested residents, the elected representatives, and outside factors which influence the County. The following Vision Statement describes in a broad sense what we as a county want to be twenty years from now. It is based on a consensus of popular aspirations and a realistic projection of current socio-economic trends. The Vision Statement provides the framework for formulating a meaningful set of goals and policies for Shenandoah County over the next 20 years.

In the year 2025, Shenandoah County will be a primarily rural community that:

- protects its natural resources;
- directs its growth to the towns ensuring its open, agricultural character;
- provides a variety of jobs in business, light industry, tourism and sustainable agriculture;
- maintains moderate growth of a demographically varied population;
- supports safe and efficient interstate transportation and maintains the rural character of its primary and secondary roads;
- affords its students an excellent and appropriate education;
- serves its citizens with public facilities and services that enhance their quality of life;
- ensures preservation of its natural beauty and unique, historic character by strictly adhering to the goals and objectives of its Comprehensive Plan.

2.0 Planning Policies

A ***policy*** is a written statement intended to guide decisions and activities. Policystatements are expressed at different levels of detail: 1) general overall goals, 2) objectives or principles that further define those goals within various categories, and 3) strategies which set forth specific activities for implementation.

A ***goal*** is a broad statement of a future ideal considered desirable for the County. It is a clear and concise statement of the vision of the future of

Shenandoah County.

Objectives or principles describe ideas or concepts which can be used to accomplish a goal. They are more specific in terms of the types of activities needed to achieve a particular category of goals (e.g. environmental objectives, economic principles).

Strategies are specific activities to be accomplished which will implement the goals and objectives of the plan. They are based on the facts and evidence generated throughout the planning process and used in establishing the principles or objectives.

The comprehensive planning process is dynamic. As new data are generated and trends are established, changes need to be made to the plan. While the strategies may change often (as they are accomplished or conditions change), the principles or objectives will change less often, and the general goals will not change until they have been met. The adopted goals and objectives for Shenandoah County follow. Figure 9-A depicts a generalized future land use map for the County. Chapter 10 focuses on implementation recommendations for the period of 2005-2010. A Generalized Future Land Use map appears at the end of this section as Figure 9-A. Section 10 of the plan focuses on implementation recommendations for the period of 2005 to 2010.

3.0 General Development Goals

The following goals are broad policies that the Planning Commission and the Board of Supervisors will apply in making decisions affecting the County's growth through the year 2025. The specific objectives and strategies were drawn from the general goals, and from the information contained in Sections 1 through 8 of this plan:

Goal 1: Preserve and enhance the natural environment of the County.

Goal 2: Protect and promote the historic resources of the County.

Goal 3: Guide and direct growth into and around the towns and other areas served by public utilities, while preserving the rural and open space character of the balance of the County.

Goal 4: Create a business climate conducive to economic activity and encourage a diversity of business & industrial activity.

Goal 5: Promote affordable housing for all segments of the population.

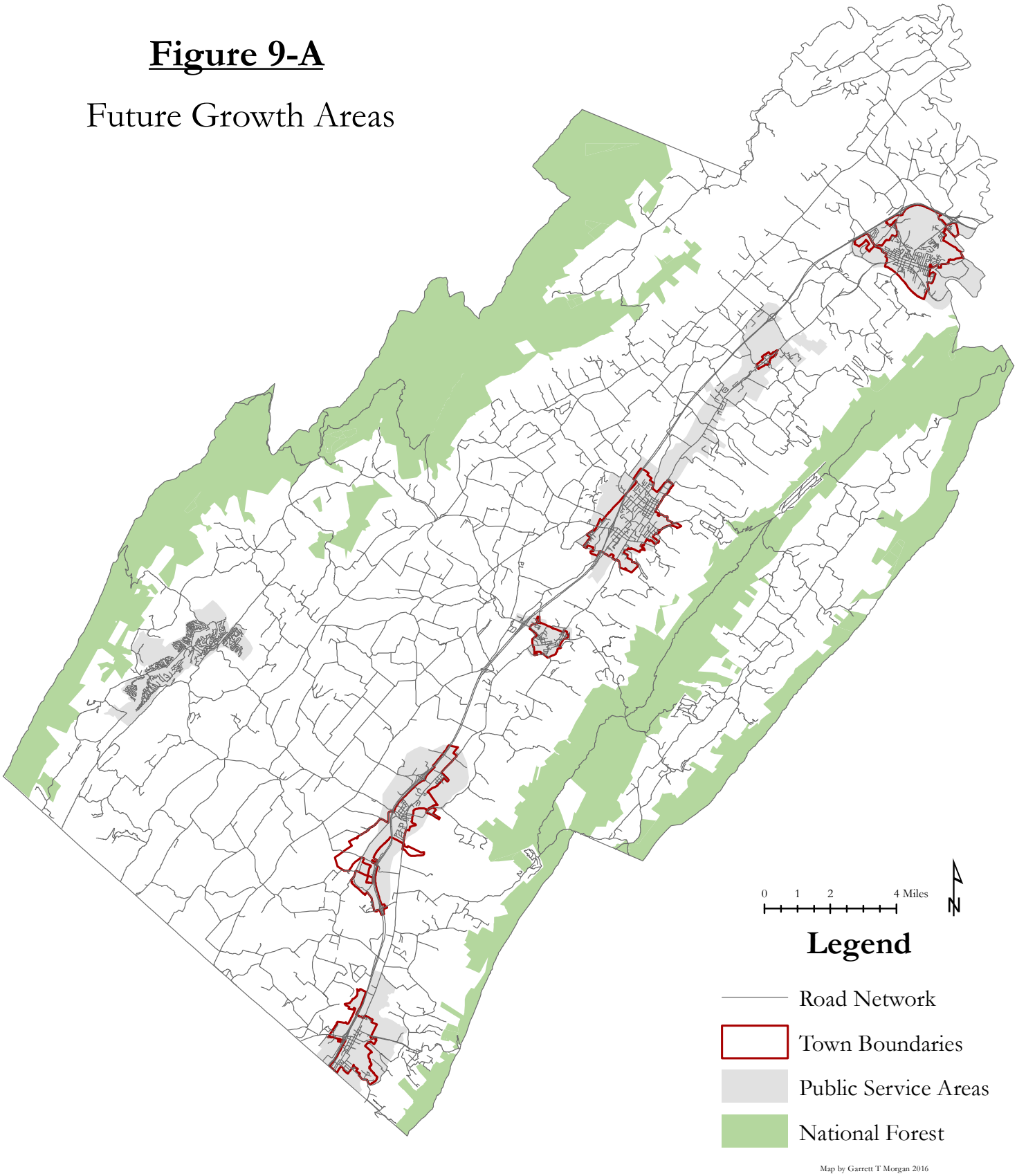
Goal 6: Provide for the improvement of public facilities and for the delivery of necessary public services.

Goal 7: Provide a safe and efficient transportation system throughout the County.

Goal 8: Provide for a continuing planning process which results in policies to

Figure 9-A

Future Growth Areas



manage the County's growth and development.

4.0 Growth Objectives and Implementation Strategies

4.1 Natural Resources

Goal: Preserve and enhance the natural environment of the County.

Objective 1.1: To protect the natural environment from damage due to development activity.

To achieve this objective, the County shall protect the natural resources and respect development limitations of slope, soils, geology, and water resources. The County shall also support the expansion of acreage in agricultural and forestall districts for their contributions to the economic base and environmental quality.

Objective 1.2: Provide for development according to the carrying capacity of the environment.

To achieve this, the County shall use multiple tools including but not limited to: overlay zones, limited development in areas identified as having high potential for groundwater pollution; protecting sinkholes, and limiting density which are identified as critical areas for septic systems.

Objective 1.3: Preserve and adopt specific measures to protect the Shenandoah River, other streams, and the County's ground water.

To achieve this the County shall regulate development in flood plains and promote landowners' participation in hazard mitigation programs that will reduce future dangers of flooding; develop and implement a groundwater protection plan; identify priority watersheds and adopt specific measures to protect sinkholes, streams, and wetlands. The Count shall also assist towns and other public water suppliers in protecting public water supplies, including wellheads and aquifer recharge areas.

Objective 1.4: Require industrial compliance with environmental standards.

The County shall support State agency implementation of environmental standards, provide for review of industrial proposals by state environmental agencies, and include performance requirements in zoning and site plan regulations for industry.

4.2 Regional Setting & History

Goal: To protect and promote the historic resources in Shenandoah County.

Objective 2.1: Preserve individual properties and sites throughout the county.

To achieve this objective, the County shall complete additional surveys and nomination of eligible properties and rural historic districts to the Virginia and National registries as well as engage with residents and businesses who occupy or own properties that may be eligible for historic designation.

The County shall require all development proposals to identify historic and prehistoric features and require specific plans to address these features. The County shall work to promote historic resources and encourage public and private preservation of these resources through the following activities: identification of historic buildings and features; nomination of properties for inclusion in historic registers; application for tax credits for historic restoration and tax deductions for donated easements; identification for funding opportunities and application for grants associated with historic preservation.

Objective 2.2: Protect and enhance battlefield sites throughout the County.

The County shall support the implementation of the Shenandoah Valley Civil War Battlefields National Historic District preservation plans; limit the extension of water and sewer service into these areas; prevent road construction or improvements to existing roads that would cause adverse impact with particular attention to Battlefield Road at Fisher's Hill; and refrain from approving infrastructure or capital projects such as solid waste disposal facilities, schools, or communication towers. The County shall consider conveying conservation easement on County-owned land at Fisher's Hill and Tom's Brook Battlefields to state and local easement holding bodies. The County shall explore implementation methods that the County can commit toward battlefield preservation efforts such as the Purchase of Development Rights, agricultural and forestal districts, agricultural support programs and a battlefield preservation overlay district.

3. Land Use

Goal: Guide and direct growth into and around the towns and public service areas, while preserving the rural and open space character of the balance of the County.

Objective 3.1: Guide major development to locate in and around the towns, utility, and public service areas.

The County shall coordinate zoning in adjacent areas around towns with zoning in the towns so as to ensure compatibility. It shall identify potential public service areas and seek annexation agreements or urban growth area plans with towns to define those areas; encourage uniform town subdivision regulations; and create incentives for development where public services are available.

Objective 3.2: Maintain the rural and open space character of areas outside of the public service areas.

To achieve this objective, the County shall confine all urban forms of land development to the public service areas; maintain a low average density of dwelling

units in agricultural and conservation areas by establishing a maximum number of dwelling units per 100 acres or fraction thereof. The County shall consider the cluster housing concept for subdivisions and set the open space requirement to seventy percent. The County shall encourage rural property owners to place their land in agricultural and forestall districts; consider the purchase of development rights of strategically located high quality rural property; as well as encouraging the use of conservation, scenic, and historic or other voluntary easements to permanently preserve land.

Objective 3.3: Guide future commercial land uses to locate where there is access to major transportation corridors and where public utility services are available.

The County shall consider locations carefully when evaluating rezoning request; provide for adequate access to and avoiding congestion along various roadways; coordinate placement of utilities with developments and the town/ service authorities; and establish adequate buffer zones between residential and commercial and industrial areas to maintain property values and physical attractiveness.

Objective 3.4: Guide future industrial land uses to locate near the interstate corridor and interchanges where public utility services are available and adequate transportation facilities exist.

The County shall promote new industry to locate in the existing industrial parks whenever feasible; provide for adequate access to and for ameliorating congestion along roadways to accommodate the safe and efficient movement of people and goods. The County shall coordinate placement of utilities with development and the towns/service authorities; encourage light non-polluting industry and business that will benefit the economy and ecology of the county; promote industrial uses in "park" settings with adequate distance and aesthetic qualifies in relation to neighboring uses and roadways; and ensure there is adequate ground or surface water to support any new industry. Along I-81, businesses that require maximum access should be placed at interchanges to retain open spaces alone the interstate and preserve the natural beauty of the Valley.

4. Economy

Goal: Create a business climate conducive to economic activity and encourage a diversity of business and industry in the County.

Objective 4.1: Encourage the development of existing and new commercial and industrial activities.

The County shall encourage the development of existing and new commercial and industrial activities, continue the activities that were required for the Virginia Certification Program; establish and maintain an adequate database of information to support economic development activities; and emphasize the recruitment of higher wage companies; those that require a better educated

work force, a more highly-skilled workforce, a more technically-oriented and knowledge-oriented workforce.

Objective 4.2: Support travel and tourism related activities.

The County shall promote tourism and destination marketing; encourage the protection of scenic beauty and historic sites; enhance recreational facilities; and support the implementation of the Shenandoah Valley Battlefields National Historic District.

Objective 4.3: Maintain and promote the role of agriculture as part of the basic economy of the County:

The County shall provide the means to preserve agricultural land through such measures as Agricultural & Forestal Districts, conservation easements, purchase of development rights, zoning laws and tax incentives. The County shall promote the health and growth of agriculture as an industry; encourage diversity in agricultural production; encourage better marketing of agricultural products; provide agricultural educational opportunities for youth.

5. Housing

Goal: Promote affordable housing for all segments of the population.

Objective 5.1: Provide for a variety of housing types and locations.

The County shall promote equal housing opportunity for all and encourage the creation of quality housing through land use ordinances and building codes.

Objective 5.2: Reduce the cost of housing.

The County shall provide for a range of housing types and styles consistent with a town/rural environment and local incomes and encourage maintenance of the existing housing stock with rehabilitation and historic preservation activities as appropriate.

Objective 5.3: Encourage energy efficient housing types and patterns.

The County shall guide residential development to locate in proximity to good transportation access; near the major retail shopping areas and major employment centers; and in areas with public services such as water and sewer, fire, and police protection.

6. Public Facilities

Goal: Provide for the improvement of public facilities and for the delivery of necessary public services.

Objective 1: The County shall provide adequate services and facilities to serve

planned land uses and development; delineate service areas around towns and phase development within those services areas consistent with the availability of services and improve the County's school facilities to meet valid need. The County shall also ensure that all infrastructure required for development be entirely or partly financed by the developers.

Objective 6.2: Contribute to the needs of the community with parks and recreation facilities for citizens of all ages.

The County shall continue to develop the County's regional and town parks; insure that all appropriate recreational facilities are provided; provide a recreational programs and activities; and provide a County-sponsored performing arts facility.

Objective 6.3: Improve the capability for fire and rescue service dispatching and response.

The County shall continue to develop a parcel-based geographic information system (GIS) for the County and tie the computer mapping into emergency dispatching operations;

Objective 6.4: Comply with state and federal requirements for the disposal of solid waste

The County shall promote recycling and waste-minimization efforts through public education; development and implement a county-wide recycling program' continue to promote regional cooperation on solid waste disposal issues; and to participate in regional solid waste planning and encourage to do the same.

Objective 6.5: As part of the annual budget process implement capital projects through Capital Improvement Plans.

The County shall conduct a fiscal analysis of trends in County revenues and expenditure to determine relative fiscal capacity for expanded services and capital projects; maintain a County CIP as part of the budget process; and encourage all towns and other country service agencies to have capital improvement programs.

7. Transportation

Goal: Provide a safe and efficient transportation system throughout the County.

Objective 7.1: Integrate transportation planning with land use planning.

The County shall coordinate land use planning and decisions with transportation; require that adequate roadways are provided for before rezoning or subdivisions are approved; coordinate transportation planning with the approved Old Valley Pike Corridor Plan.

Objective 7.2: Improve the secondary road system in the County while maintaining the rural character of the County.

The County shall widen rights-of-way and roadways only where necessary for safety; improve existing roadways surfaces with pave-in-place technologies; develop better drainage along roads where flooding occurs; and require subdivision roads in public services to meet urban standards.

Objective 7.3: Lobby VDOT to improve access to I-81 and the primary highway system.

The County shall reduce congestion at interchanges through reconstruction and transportation system management measures; prevent capacity from deteriorating as additional commercial development proceeds; and provide for rigorous review of proposed projects and determination of traffic measures needed. The County shall require traffic impact analyses for larger developments and ensure that all improvements to the highway system use adequate design to limit impact on the county's view-sheds and natural resources.

Objective 7.4: Encourage the provision of a full range of transportation options.

The County shall support exploration of a rail solution to Interstate congestion provide for adequate and safe pedestrian and bicycle travel; encourage public transportation initiatives by the private sector; and support regional airport service.

8. Growth Management Policies

Goal: Provide for a continuous planning process which results in policies to manage the County's growth and development.

Objective 1: Maintain the Comprehensive Plan process to implement the Generalized Future Land Use Map which presents a composite of recommended plan amendments.

The County shall conduct a plan review annually; prepare updates to individual sections, if required, on a more frequent basis; conduct special planning studies as conditions warrant; review and update the implementation section annually as part of the plan review process.

Objective 2: Provide for adequate personnel and financial resources to manage future growth.

The County shall provide staffing as required to assure effective plan analysis and implementation; provide a mechanism for continuity between the Comprehensive Plan and the actions of the Planning Commission and the Board of Supervisors; and indicate for each action whether or not it conforms with the Comprehensive Plan.

Chapter 10:

Implementation

Design updated June 2016

1.0 Introduction

The purpose of this section is to identify specific actions, that can be taken to implement the goals and objectives of the plan over a five-year segment of the planning period. The plan proposes controlled and managed growth tied to the availability and sufficiency of public facilities and services.

As the needs of an increasingly older population shift towards reliance upon proximity to community facilities, and the demands of new residents shift towards additional services, the efficiency of providing these services becomes more important. All of these factors contribute to the importance of directing growth to where it can be most efficiently served, which supports the policy of concerning new development mainly in and around the towns and in the unincorporated places that are served by public facilities.

To fully implement this plan will continue to require political resolve and a substantial commitment of personnel and financial resources. In addition, it will require close coordination and cooperation among personnel at the State, County, Town, and Sanitary District levels. Progress made toward implementing the actions proposed in this section will be reviewed annually by a committee formally constituted by the Board of Supervisors.

2.0 Specific Implementation Actions and Responsibility

2.1 Natural Resources

Action: Develop a county-wide stormwater management plan, coordinate with towns' stormwater management plans, and prepare a budget to implement the plan.
Responsibility: Director of Planning & Code Enforcement, 2005-2006

Action: Develop an ordinance requiring pump outs of septic systems at intervals determined by the County.
Responsibility: Director of Planning & Code Enforcement, Health Department, 2006.

Action: Develop a sinkhole ordinance to identify and protect sinkholes from accumulating groundwater contaminants.
Responsibility: Director of Planning & Code Enforcement, 2007

Action: Aggressively pursue expansion of Best Management Practices in riparian areas. Increase number of miles of stream bank protection by 10% per years, 2006-2010
Responsibility: Natural Resources Conservation Service, Lord Fairfax Soil &

Water Conservation District, County Administrator.

Action: Support the Regional Water Resources Policy Committee by participating in funding the committee's work. This committee is in the process of preparing a Water Resources Strategic Plan for the Shenandoah River watershed.
Responsibility: Board of Supervisors 2005

2.2 Land Use Controls and Residential Development

Action: Develop an Opera Space Development ordinance to replace the existing subdivision ordinance. Open Space Development would apply to any parcel rezoned RR-A or RR-C. A minimum of 70% of the subdivision acreage would be open space in perpetual easement. Minimum lot size, taking into account road requirements, would be .75 acres for RR-A and 2.75 acres for RR-C.
Responsibility: Director of Planning & Code Enforcement, Zoning Administrator, 2005

Action: Establish a system providing a reasonable basis for rezoning proffers inside and outside the public services areas.
Responsibility: County Administrator 2005

Action: Develop a specific package of incentives to encourage the inclusion of affordable housing in new development planning.
Responsibility: Director of Planning & Code Enforcement, Zoning Administrator, 2005

Action: Develop special ordinances/overlay districts to protect sensitive land and water resources from potential pollution and to preserve battlefields and other historic, scenic, and cultural resources.
Responsibility: Director of Planning & Code Enforcement, Zoning Administrator, 2006

Action: Convene an ad hoc advisory committee to study the merits of the purchase of development rights (PDR) as a means of permanently preserving agricultural land in the county. PDR is a recognized tool for protecting rural areas but has been little used in the Commonwealth. Determining what parcels of land are worthy of this designation and how such purchases would be paid for a key issues to be addressed.
Responsibility: Board of Supervisors, 2005

Action: On a detailed map of the county, identify those areas such as wetlands, sinkholes, etc. which are unsuitable for future development. Post to the Geographical Information Systems (GIS).
Responsibility: Director of Planning & Code Enforcement, 2005.

2.3 Economic Development and Tourism

Action: Working with local farmers, agricultural organizations, and agriculturally related businesses, develop a set of economic development strategies in relation to agriculture.
Responsibility: Director of Economic Development, 2005-2006.

Action: Working with local chambers of commerce, electric power companies, telecommunications companies, health service providers, the Superintendent of Schools, VDOT, the taxing authority, the Director of plans, and others as appropriate, develop a strategy for maximizing the "climate" for attracting new business and industries of the type described in the next paragraph.
Responsibility: Director of Economic Development, 2005-2006

Action: Hire a consulting firm of national stature to assist the county in finding and recruiting companies that pay significantly higher wages/salaries, are environmentally clean, and have a research, engineering, technology, or knowledge base component.
Responsibility: Director of Economic Development, 2005-2006

Action: In keeping with the view that such companies value academic excellence in their employees and future employees, commit to enhancing the academic excellence in the county's high schools, particularly with respect to those who aspire to a four-year college education. Specifically, appropriate from local resources 5% more per years, over and above other increases, for each of the next 5 years for school operating expenses. This 5% per year increases should be earmarked for improvements in education equality.
Responsibility: School Board and Board of Supervisors, 2006

Action: Utilize the additional operating funds to achieve the following goals by 2010:

Pupil/teaching position ratios, grades 8-12: reduce from 14.4 to 11.
Percent of students taking SATs: increase from 46 to 65.
Average SAT scores: increases, for each of the next 5 years for school operating
Percent of students going on to 4 year colleges: increase from 34 to 40
Percent of teachers with relevant master's degrees: increase to 50.

Responsibility: School Board & Superintendent of Schools

Action: To enhance role of Tourism as an engine for economic prosperity: Form a county-wide Chamber of Commerce
Responsibility: County Administrator; Town Chambers 2006

Action: Develop plans for all full-service County Tourism and Information Center, to become operational by 2012. Plans to be ready by 2009.
Responsibility: Director of Tourism

Action: Identify specific scenic vistas throughout the county, erect appropriate roadside markers, and promote procedures for protecting, insofar as possible, those vistas from encroachment.
Responsibility: Director of Tourism, Director of Planning & Code Enforcement 2007

Action: Explore with the Virginia Employment Commission the possibility of establishing a satellite office in Shenandoah County similar to that of the Social Security Administration. Such an office should list local job opportunities, not just regional ones.
Responsibility: Director of Economic Development 2005

2.4 Community Facilities

Action: Explore ways of making full utilization of classroom space before embarking on a new school building program.
Responsibility: School Board 2005 and following.

Action: Upgrade the county jail, public safety, and court facilities.
Responsibility: Board of Supervisors & Sheriff's Department, 2005-2006

Action: Act on one of the 3 options for renovating the Edinburg School as a cultural arts center, the cost of renovation to be borne primarily by private funding.
Responsibility: Board of Supervisors 2005

Action: Update and then fund and implement the Master Indoor/Outdoor Recreation Plan
Responsibility: Department of Parks and Recreation 2005 and Board of Supervisors 2006-2010

Action: Promote the concept of privately funded or private sector/Shenandoah Memorial Hospital partnership to create a county-wide wellness center by 2010.
Responsibility: Department of Parks & Recreation starting in 2006

Action: Commission a study to determine the optimum use of the North Fork Wastewater Treatment Facility.
Responsibility: North Fork Wastewater Treatment Authority 2005

2.5 Transportation

Action: Implement the recommendations of the Old Valley Pike Corridor Plan; create a corridor overlay district; encourage VDOT to implement safety improvements at dangerous locations; and apply access management criteria along the corridor.
Responsibility: Director of Planning & Code Enforcement 2005

Action: Review and revise as necessary the subdivision ordinance to provide appropriate design for streets and facilities and provision for pedestrian and bicycle travel in new developments.
Responsibility: Director of Planning & Code Enforcement 2005

Action: Commission a professional study to develop a transportation plan through 2025, to include; Safety and volume improvements in the primary and secondary road network; An I-81 interchange north of Woodstock; Future needs for public transportation, e.g., bus service; Protection of scenic, battlefield, and historic resource; and Provisions for pedestrian and bicycle travel.
Responsibility: Director of Planning & Code Enforcement

Action: The proposed widening of I-81 (to at least 4 lanes in each direction) could have severe adverse economic, environmental, historical, and quality of life consequences for the Valley. The County, through the Northern Shenandoah Valley Regional Commission, should work to have all jurisdictions along the I-81 Corridor petition the Governor and the General Assembly to explore all strategic alternatives to widening 1-81 in this fashion. Other alternatives should include a regional high speed rail line, and safety improvements to the existing interstate. The County should remain engaged on this subject until it is resolved.
Responsibility: Board of Supervisors and County Administrator – 2005 and following.

2.6 Administration

Action: Establish a permanent Citizens Advisory Committee on the Comprehensive Plan. The committee will support the Board of Supervisors and the Planning Commission and will function under the direction of the Director of Planning and Code Enforcement. It will propose updates and revisions to the Plan as they are needed. On an annual basis the committee will review the actions of the previous 12 months and report its finding to the Planning Commission and the Board of Supervisors.
Responsibility: Board of Supervisors 2005

Action: In the staff reports accompanying relevant Planning Commission and Board of Supervisors agenda items, indicate whether or not the proposed action conforms to the Comprehensive Plan.
Responsibility: Director of Planning and Code Enforcement, 2005 and following

Action: Form a permanent joint council composed of town managers and the county administrator, such council to meet on a regularly scheduled basis and with a jointly agreed upon agenda.
Responsibility: Board of Supervisors 2005

Action: Make planning staff additions appropriate to be expanding planning needs of the county.
Responsibility: Board of Supervisors 2005