2723 - Carroll County CFM Certification and Floodplain Ordinance Update.

Application Details

Funding Opportunity:	2335-Virginia Community Flood Preparedness Fund - Capacity Building/Planning Grants - CY24 Round 5
Funding Opportunity Due Date:	Mar 28, 2025 11:59 PM
Program Area:	Virginia Community Flood Preparedness Fund
Status:	Under Review
Stage:	Final Application
Initial Submit Date:	Jan 23, 2025 10:55 AM
Initially Submitted By:	Gary Bergeron
Last Submit Date:	
Last Submitted By:	

Contact Information

Primary Contact Information

Active User*:	Yes
Type:	External User
Name*:	Mr. (Salutation) Gary (First Name) Middle Name Bergeron (Last Name)
Title:	Emergency Manager/FPA
Email*:	gary.bergeron@carrollcountyva.gov
Address*:	605 Pine Street
	HILLSVILLE (City) Virginia (State/Province) 24343 (Postal Code/Zip)
Phone*:	276-733-4172 Ext. (Phone ###-###-####)
Fax:	###-###-####
Comments:	

Organization Information

Status*:	Approved
Name*:	Carroll County
Organization Type*:	County Government
Tax ID*:	54-6001192
Unique Entity Identifier (UEI)*:	KU9YGWKHXR27
Organization Website:	

Address*: 605 Pine Street

HILLSVILLE (City) Virginia (State/Province) 24343-0000 (Postal Code/Zip)

Phone*: 276-730-3001 Ext.
###-###-####

Fax: ###-###-####

Benefactor:

Vendor ID:

Comments:

VCFPF Applicant Information

Project Description

Name of Local Government*: Carroll County

Your locality's CID number can be found at the following link: Community Status Book Report

NFIP/DCR Community Identification Number (CID)*: 510197

If a state or federally recognized Indian tribe,

Name of Tribe:

Authorized Individual*: Gary (First Name) Bergeron (Last Name)

Mailing Address*: 605 Pine Street
Address Line 1

Address Line 2

HILLSVILLE (City) Virginia (State) 24343 (Zip Code)

Telephone Number*: 276-733-4172

Cell Phone Number*: 276-733-4172

Email*: gary.bergeron@carrollcountyva.gov

Is the contact person different than the authorized individual?

Contact Person*: No

Enter a description of the project for which you are applying to this funding opportunity

Project Description*:

The County is seeking funding to update its floodplain ordinance. It is also seeking funding to have one staff member trained to become the County's Certified Floodplain Manager.

Low-income geographic area means any locality, or community within a locality, that has a median household income that is not greater than 80 percent of the local median household income, or any area in the Commonwealth designated as a qualified opportunity zone by the U.S. Secretary of the Treasury via his delegation of authority to the Internal Revenue Service. A project of any size within a low-income geographic area will be considered.

Is the proposal in this application intended to benefit a low-income geographic area as defined above?

Benefit a low-income geographic area*: Yes

Information regarding your census block(s) can be found at census.gov

Census Block(s) Where Project will Occur*: Blocks 1000-4036 (Entire County)

Is Project Located in an NFIP Participating Community?*: Yes

Is Project Located in a Special Flood Hazard Area?*: Yes

Flood Zone(s) (if applicable): Range (Zone X, AE)

Flood Insurance Rate Map Number(s) (if applicable): Entire County

Eligibility - Round 4

Eligibility

Is the applicant a local government (including counties, cities, towns, municipal corporations, authorities, districts, commissions, or political subdivisions created by the General Assembly or pursuant to the Constitution or laws of the Commonwealth, or any combination of these)?

Local Government*: Yes

Yes - Eligible for consideration
No - Not eligible for consideration

If the applicant is not a town, city, or county, are letters of support from all affected local governments included in this application?

Letters of Support*: N/A

Yes - Eligible for consideration
No - Not eligible for consideration

Has this or any portion of this project been included in any application or program previously funded by the Department?

Previously Funded*: No

Yes - Not eligible for consideration
No - Eligible for consideration

Has the applicant provided evidence of an ability to provide the required matching funds?

Evidence of Match Funds*: No

Yes - Eligible for consideration
No - Not eligible for consideration
N/A - Match not required

Scoring Criteria for Capacity Building & Planning - Round 4

Scoring

Eligible Capacity Building and Planning Activities (Select all that apply) ? Maximum 100 points. To make multiple selections, Hold CTRL and click the desired items.

Capacity Building and Planning*:

Floodplain Staff Capacity,Resource assessments, planning, strategies, and development - Policy management and/or development

Is the project area socially vulnerable? (based on ADAPT Virginia?s Social Vulnerability Index Score)

Social Vulnerability Scoring:

Very High Social Vulnerability (More than 1.5)
High Social Vulnerability (1.0 to 1.5)
Moderate Social Vulnerability (0.0 to 1.0)
Low Social Vulnerability (-1.0 to 0.0)
Very Low Social Vulnerability (Less than -1.0)

Socially Vulnerable*: Moderate Social Vulnerability (0.0 to 1.0)

Is the proposed project part of an effort to join or remedy the community?s probation or suspension from the NFIP?

NFIP*: Yes

Is the proposed project in a low-income geographic area as defined below?

"Low-income geographic area" means any locality, or community within a locality, that has a median household income that is not greater than 80 percent of the local median household income, or any area in the Commonwealth designated as a qualified opportunity zone by the U.S. Secretary of the Treasury via his delegation of authority to the Internal Revenue Service. A project of any size within a low-income geographic area will be considered.

Low-Income Geographic Area*: Yes

Does this project provide ?community scale? benefits?

Community Scale Benefits*: More than one census block

Comments:

See attached documents for social vulnerability of each block group. Most recent reported median household income is $49,113 (in 2022 dollars), 2018-2022 (U.S. Census Bureau, ACS 5-Year Estimates).

Scope of Work and Budget Narrative - Capacity Building and Planning - Round 4

Scope of Work - General Information

Upload your Scope of Work

Please refer to Part IV, Section B. of the grant manual for guidance on how to create your scope of work

Scope of Work Attachment*: CFPF Scope of Work Attachment_Carroll.docx

Comments:

Budget Narrative

Budget Narrative Attachment*: CFPF Budget Narrative_Carroll.docx

Comments:

Scope of Work Supporting Information - Capacity Building and Planning

Scope of Work Supporting Information

Describe identified resource needs including financial, human, technical assistance, and training needs

Resource need identification*:

The County requests financial assistance from the Department of Conservation and Recreation (DCR). Currently, the County has no staff certified as a Certified Floodplain Manager (CFM), highlighting the need for certification to enhance flood resilience and compliance with FEMA regulations.

Describe the plan for developing, increasing, or strengthening knowledge, skills and abilities of existing or new staff. This may include training of existing staff, hiring personnel, contracting consultants or advisors

Development of Existing or New Staff*:

To strengthen the effectiveness and adaptability of this ordinance update, the County intends to hire consultants to lead the floodplain ordinance update process. Additionally, one county employee will be enrolled in a CFM certification training program.

Where capacity is limited by funding, what strategies will be developed to increase resources in the local government? (This may include work with non-governmental organization, or applying for grants, loans, or other funding sources)

Resource Development Strategies*:

Other funding opportunities, such as available State grant programs, will be explored by the county.

Describe policy management and/or development plans

Policy management and/or development*:

The floodplain ordinance update is expected to support coordination across existing activities, plans, and policies.

Describe plans for stakeholder identification, outreach, and education strategies

Stakeholder identification, outreach, and education strategies*:

Stakeholder outreach is an important part of this project. County staff will engage stakeholders throughout the floodplain ordinance update process and work to use established best practices for outreach to identified areas of the county. Also, the County will work to have meetings and information sources to best educate stakeholders of the county ordinance, floodplain management practices, required permitting, and other information sources.

Budget

Budget Summary

Grant Matching Requirement*:

LOW INCOME - Planning and Capacity Building - Fund 90%/Match 10%

*Match requirements for Planning and Capacity Building in low-income geographic areas will not require match for applications requesting less than $3,000.

Is a match waiver being requested?

Match Waiver Request Note: only low-income communities are eligible for a match waiver. *:	Yes
I certify that my project is in a low-income geographic area:	Yes
Total Project Amount (Request + Match)*:	$48,500.00 **This amount should equal the sum of your request and match figures
REQUIRED Match Percentage Amount:	$4,850.00

BUDGET TOTALS

Before submitting your application be sure that you meet the match requirements for your project type.

Match Percentage:	10.00% Verify that your match percentage matches your required match percentage amount above.
Total Requested Fund Amount:	$43,650.00
Total Match Amount:	$4,850.00
TOTAL:	$48,500.00

Personnel

Description	Requested Fund Amount	Match Amount	Match Source
Personnel Time	$0.00	$4,850.00	
	$0.00	**$4,850.00**	

Fringe Benefits

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Travel

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Equipment

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Supplies

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Construction

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Contracts

Description	Requested Fund Amount	Match Amount	Match Source
Contract for Consultant	$43,650.00	$0.00	
	$43,650.00	**$0.00**	

Pre-Award and Startup Costs

Description	Requested Fund Amount	Match Amount	Match Source
No Data for Table			

Other Direct Costs

Description	Requested Fun Amount	Match Amount	Match Source
No Data for Table			

Supporting Documentation - General

Supporting Documentation

Named Attachment	Required	Description	File Name	Type	Size	Upload Date
Detailed map of the project area(s) (Projects/Studies)						
FIRMette of the project area(s) (Projects/Studies)						
Historic flood damage data and/or images (Projects/Studies)						
A link to or a copy of the current floodplain ordinance		Carroll County Flood Hazard Reduction Plan	Carroll Co. Flood Hazard Reduction Plan.pdf	pdf	8 MB	01/22/2025 10:51 AM
Maintenance and management plan for project						
A link to or a copy of the current hazard mitigation plan		This is the Mount Rogers PDC Regional Hazard Mitigation Plan to which Carroll County is included.	Hazard Mitigation Plan.pdf	pdf	2 MB	01/22/2025 11:31 AM
A link to or a copy of the current comprehensive plan		Carroll County Comprehensive Plan	CarrollCountyVA2010ComprehensivePlan.pdf	pdf	5 MB	01/22/2025 11:20 AM
Social vulnerability index score(s) for the project area		Carroll - Social Vulnerability Index Map	CARROLL_MAP_SOCIAL_VULNERABILITY.pdf	pdf	740 KB	01/22/2025 11:13 AM
Authorization to request funding from the Fund from governing body or chief executive of the local government		Authorization to request funds statement.	Authorization to request funds signed.pdf	pdf	261 KB	01/23/2025 10:37 AM
Signed pledge agreement from each contributing organization						
Maintenance Plan						
Benefit-cost analysis must be submitted with project applications over $2,000,000. in lieu of using the FEMA benefit-cost analysis tool, applicants may submit a narrative to describe in detail the cost benefits and value. The narrative must explicitly indicate the risk reduction benefits of a flood mitigation project and compares those benefits to its cost-effectiveness.						
Benefit Cost Analysis						
Other Relevant Attachments		Three flood maps for the locality to illustrate at risk and prone areas of the county.	CARROLL_FEMA_MAPS.pdf	pdf	10 MB	01/23/2025 10:55 AM

Letters of Support

Description	File Name	Type	Size	Upload Date
No files attached.				

Carroll County
Office of the Administrator

605-1 Pine Street
Hillsville, VA 24343

Michael Watson,
County Administrator

Crystal Adams
Michelle Dalton

Authorization to Request Funding from the Virginia Community Flood Preparedness Fund

I, Michael Watson, as County Administrator of Carroll County, do authorize staff within the Floodplain Management Department, to prepare, submit, and execute all necessary documents to request funding from the Virginia Community Flood Preparedness Fund.

The Floodplain Management Department is further authorized to take any actions required to facilitate the funding in compliance with reporting requirements as stipulated by the Virginia Community Flood Preparedness Fund Grant.

Michael Watson
County Administrator

Legend

County Boundary

CDC SVI BlockGroup 2020

SVI Class

- Very Low Social Vulnerability
- Low Social Vulnerability
- Moderate Social Vulnerability
- High Social Vulnerability
- Very High Social Vulnerability

N

0 1.25 2.5 5 7.5 10

Miles

MAP

CARROLL COUNTY, VIRGINIA
CFPF ROUND 5 APPLICATION MATERIALS

SOCIAL VULNERABILITY INDEX

DEC 2024 SCALE: NOTED

Weston & Sampson

Remembering Yesterday, Celebrating Today and Inventing Tomorrow:

The 2030 Carroll County Plan

Adopted by the Carroll County Board of Supervisors

December 14, 2010

Acknowledgements

The time, effort and sincerity of all participants in the Plan Carroll County process are appreciated by Carroll County, including County Staff and the Planning Team. We would like to extend our thanks to everyone who gave of their time and talent in helping craft a vision and a plan the citizens of Carroll County can use to help move the county from the reality of today towards the possibilities of tomorrow.

"Would you tell me, please, which way I should go from here?" asked Alice.

"That depends a good deal on where you want to get to," said the Cat.

Lewis Carroll, Alice in Wonderland

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Chapter 1. Introduction

This is an action-oriented update of Carroll County's Comprehensive Plan (adopted in 1978, as amended and revised since). This Plan Update is a statement of the community's vision for its own future and a guide to achieve that vision through the year 2030. The future expressed in the Plan is shaped by local values, ideals and aspirations about the best management and use of the Carroll County's resources. The Plan Update is based on the County and its communities working cooperatively to define future growth areas and establish land use and infrastructure policies. This updated Plan is a *guide to action*, that:

- Provides a clear, understandable and widely supported vision for land use in Carroll County, to the year 2030;
- Operates as a development guide to ensure that the County's vision is considered during the public policy and development review decision-making processes;
- Guides growth and change to achieve economic benefits while protecting environmental quality and local cultural values; and
- Encourages intergovernmental cooperation between the unincorporated and incorporated areas of the County.

The Plan Update presents a preferred future for Carroll County and a series of actions that will help move the county from the realities of today toward the promises of tomorrow.

There is no single lifestyle or experience that shapes life in Carroll County – instead there are a variety of lifestyles and experiences that residents enjoy. This variety of opportunity contributes to Carroll County's appeal and success. In terms of land use planning, development regulation and infrastructure management, it is counterproductive to insist on doing things "one way." The Plan supports a varied approach to achieve local goals, rather than a blanket approach that doesn't appreciate the differences among Carroll County's communities and rural areas. The following five "themes" tell the story of the context for planning in Carroll County and set the stage for the Plan update.

Theme 1: Town and Country

There is a striking duality in the division of land in Carroll County which is reflected by the data in **Table 1** and **Charts 1** and **2**. As is shown, over 80% of parcels in the County are 10 acres or less, that is, small to large size lots primarily suitable for residential use. However, over 80% of the total acreage in the County is divided into tracts of land that are more than 10 acres in size, which are more suitable for agriculture or conservation uses. That is to say, *most of the parcels* in the County are small residential lots, but *most of the County's land* is actually in large open tracts.

Most of the parcels in the County are small residential lots, but most of the County's land is actually in large open tracts.

Carroll County is home to both traditional and suburban communities as well as large rural and agricultural areas. Residential and rural land use patterns generate different impacts and needs, and should therefore be treated differently. There is a need for two levels of land use planning, development regulation and facility and service provision in the County. While development should be managed *consistently,* different standards should apply within different types of areas.

Map created at a Public Workshop

In the more densely populated communities and urban/suburban areas of the county, there is a desire for land uses that are compact; protects existing development; ensures land use compatibility; and allows for provision of a high level of public facilities and services. Standards governing setbacks, buffering, screening, landscaping, design, public improvements, access and other improvements should be designed to ensure the maximum value for existing and future residents.

In the less densely populated rural and agricultural areas, there is a desire to limit regulation and allow continuance of existing rural uses and development patterns. Many rural residents prefer the County continue to take a "hands-off" approach; although there is recognition that development standards are needed to protect rural, sensitive, natural resource and prime agricultural areas from urban and suburban encroachment.

The Plan supports a higher level of development standards in suburban areas, and minimal standards in rural areas.

These two major land use patterns enjoy peaceful co-existence in the County, and the Plan will support and recognize the needs of both urban/suburban and agricultural/rural areas. The Plan supports clustering of development and other compact development forms in areas served efficiently by facilities and services while protecting prime agricultural land and allowing a rural

way of life. It will support provision of different levels of service depending on the location and character of development to provide the best value and meet the expectations of residents.

Table 1: Parcel Size (2010)

Parcel Size (in acres)	Number of Parcels	Percent of Total Parcels	Total Acres	Percent of Total Acres
0 - .25	3,497	10.4%	340	0.1%
.26 - .5	4,541	13.5%	1,745	0.6%
.51 - 1.00	6,235	18.5%	4,509	1.5%
1.01 - 2.5	6,289	18.7%	9,839	3.3%
2.51 - 5	3,398	10.1%	12,415	4.1%
5.01 - 10	3,389	10.1%	23,357	7.8%
10.01 - 20	2,428	7.2%	34,698	11.6%
20.01 - 40	2,051	6.1%	58,032	19.3%
40.01 - 100	1,437	4.3%	86,643	28.8%
100.01 - 160	269	0.8%	32,561	10.8%
160 +	114	0.3%	36,266	12.1%
Total	**33,648**		**300,405**	

WHY IS A GROWTH PLAN NEEDED?

- ***In the Ag Protection Tier, there are 15,000 parcels that are 5 acres or less, which means a potential of at least 15,000 additional homes.***

- ***In the Planned Growth Area Tier, there are 7,500 parcels that are 5 acres or less, which means a potential of at least 7,500 additional homes.***

- ***But the County only needs 2,000 additional homes to accommodate projected growth over the next 20 years!***

Chart 1: Number of Parcels by Size

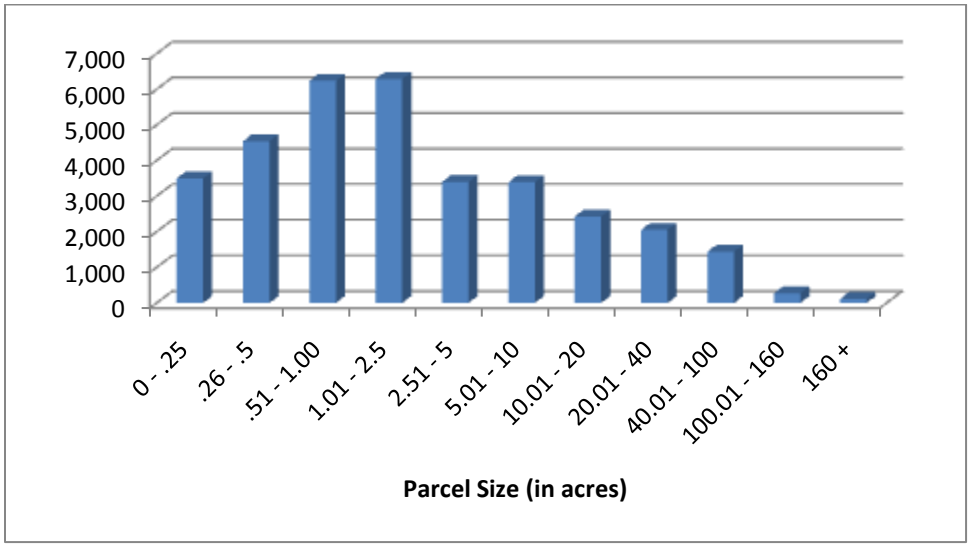
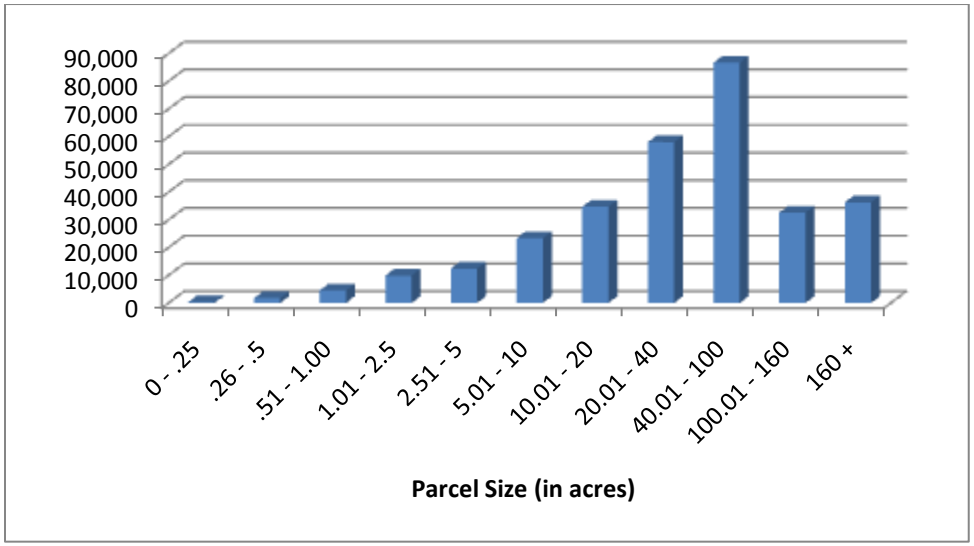


Chart 2: Total Acres Consumed by Parcels by Size



Theme 2: Protecting Agriculture

There has been a noticeable loss of farms and farmland in Carroll County, which not only impacts farm families, but Carroll County families. The reverberations from these losses can't help but be felt countywide.

- Farms with dairy cattle have decreased from 651 farms in 1969, to 21 farms in 2000, to 8 farms in 2010.
- Farms with beef cattle have decreased from 2,229 farms in the 1970s, to 859 farms in 2010.
- Farms producing cabbage decreased from 133 farms on 2,200 acres in the 1970s, to seven farms on 344 acres in 2010.
- Farms producing apples have decreased from 57 farms on 1,206 acres in 1969, to 37 farms on 468 acres in 2007.
- Farms producing peaches seen mixed results having increased from 31 farms in 1969, to 33 farms 2007, but decreasing their acreage, from 155 acres to 150 acres.

Carroll County is a place where:

- Farmland is protected while accommodating growth and maintaining a high quality of life.
- Private property rights are respected. The rights of property owners are equitably balanced with their responsibilities to adjacent property owners and the community at large.
- The use of land and resources are planned and maintained through cooperation of rural and urban interests.

Addressing these issues will require decision-makers to balance priorities, considering important factors such as: land use compatibility, economic impacts, County character, aesthetics, availability of public facilities, site suitability, proximity to urban development and the availability of alternative sites. For example, while agricultural preservation typically is a top priority, when a highly productive tract of farmland is surrounded by urban development and

Stakeholders provide input at a public workshop.

has adequate public facilities, the County may more effectively promote smart, non-sprawl growth by approving the tract's development.

The Challenge for Agriculture

The issue of preservation of agricultural land centers on the conversion of agricultural land to other uses and the subsequent erosion of the agricultural base in the County. Preservation of agricultural land would not be meaningful unless the viability of farming could be addressed. To support a viable agricultural economy in Carroll County, it is important to have agricultural areas unrestricted by residential development. Farming adjacent to residential land uses can be highly incompatible. Agricultural production is often associated with noise, dust, vibration, odors, extended hours of operation, and the application of chemicals, items commonly addressed by "industrial performance criteria". These conditions are generally not well received by residents in adjacent residential developments. It is a situation much like locating homes next to industrial areas in a city.

As agriculture has become more sophisticated and technological, the intensity of agricultural operations places it on a par with industrial land uses. Except for the most genteel of farming operations, agriculture is a more intense use of land than residential. As residential subdivisions are introduced into agricultural areas, conflicts between the land uses arise. The collective voice of new residents may be louder than that of the working farmer. Agricultural operations are being squeezed out by the conflicts brought on by these incompatible land uses, coupled with the higher per acre price for land zoned residential.

People who move from the "city" to the "country" are looking for a retreat, a bit of nature and a quiet place to live. They want to live in a quiet rural setting. However, they often bring with them expectations for services similar to those they experienced in the city: paved roads, sidewalks, near-immediate public safety response times and roads cleared of snow before the commute to work. Those looking for the "peace and quiet" of the country often are not aware of the noise, dust, odors and long hours of operations associated with agricultural operations.

As agricultural areas become interspersed with residential and other types of development, farming becomes much more difficult and, in some cases, impossible. The effect is similar to that which occurs when large, older homes are converted to apartments in the midst of single family neighborhoods. The change of use is generally perceived as the coming trend. It often

Community members discuss planning issues at a Public Planning Forum

leads to a sense of impermanence toward the current land use. For property owners in the immediate vicinity, the result may be a disinvestment in the current use and eventually, sale of the property.

Theme 3: Development Opportunities and Responsibilities

Carroll County's natural beauty, when combined with the county's mix of locational assets, makes it an attractive community for business and industry, as well as agricultural activities. Accordingly, the county will need a deliberate strategy to ensure that it is able to efficiently provide facilities and services, to provide economic opportunity, and to capitalize on its opportunities and assets. As an example, over 6 million cars pass through Fancy Gap via the Blue Ridge Parkway every year. To leverage the impact of these visitors, the county, in partnership with the residents and businesses in and around the Fancy Gap community, should develop a strategy to capture a portion of the parkway travelers and generate local economic activity. A crucial step will be to strengthen the County's development standards in this unique gateway.

To promote high quality development that contributes to the long-term quality of life and provides economic opportunity for residents, developers must believe that their investment will be protected. Existing development must be protected by requiring new development to be held to the same high standards. Development and building standards must ensure that land uses are compatible.

The Plan supports development of regulations that provide developers with flexibility, both in terms of the types and locations of projects, while establishing standards to prevent the worst forms of development. Inflexible plans and ordinances stifle creativity, preclude innovations in design and reduce all development to the same lowest common denominator. Conversely, an overly flexible plan can be unclear and therefore arbitrarily administered. Existing and new residents and businesses should be provided with the certainty they need regarding the planning and development process to continue to make informed investment decisions regarding their property.

Existing development must be protected by requiring new development to be held to the same high standards. Development standards should ensure surrounding uses are compatible.

The balance between flexibility and certainty is a key aspect of this Plan. Developers, neighbors, County staff and decision-makers can all perform their roles more effectively when they are certain of the Plan policies and development review process. The knowledge that the process will always occur in a predictable manner helps all participants remain focused on creating quality development rather than navigating a confusing and unpredictable process, while flexibility allows them to create the best-possible development without the burden of excessive regulation that stifles the ability to create a high-quality product.

It is important to note that protection of development investment and agricultural investment are flip sides of the same coin. While separate standards will be developed to apply to communities and to rural areas, the standards work together to ensure that unregulated rural uses will not impact planned development, and that planned development will not encroach on agricultural areas. By establishing policies to prevent incompatible land use patterns, the Plan protects both types of investment.

Theme 4: Balancing Fiscal Responsibility and Infrastructure Provision

The quality of life in Carroll County is contingent on the County's continued ability to provide quality services at a reasonable cost to taxpayers. If development projects go forward without a plan for recouping increased service provider expenses, existing tax payers subsidize those expenses. To achieve equity and fairness in the funding and provision of public facilities and services, the Plan will recommend strategies to:

- Enhance the local property and sales tax bases to balance fiscal obligations for capital facilities, operations and maintenance;
- Ensure that new development funds the costs of capital facilities and services required to serve that new development; and
- Ensure that facilities and services are planned in a way that allows ongoing operations without significant increases in the costs to residents and businesses.

The quality of life in Carroll County is contingent on the County's continued ability to provide quality services at a reasonable cost to taxpayers.

Fiscal stability is a cornerstone of a sustainable community. Existing residents should not suffer a decline in the quality of their services or be unduly burdened by costs of new growth. New residents and business should pay their fair share of the costs associated with extending infrastructure and urban services to new growth areas.

There are a wide variety of methods local governments use to ensure the adequate provision of facilities and services required by new development. For instance, the County chooses when and where to extend facilities such as water and sewer, which influences the suitability of an area for development. However, due to the rather aggressive extension of water and sewer throughout significant portions of the county, the ability to direct growth in the described fashion has become more challenging.

The Plan will direct growth into compact and sustainable development patterns within areas already served with infrastructure, or in areas where infrastructure provision is planned and included in a Capital Improvement Program (CIP). It will set forth policies to guide infrastructure provision and funding to ensure the County's fiscal sustainability.

Carroll County must actively manage and direct growth to maintain the community's quality of life.

Theme 5: Working Together as a Region

Increasingly, we have come to the realization that many vital issues are regional in nature – watersheds, air quality and other ecosystems, economic conditions, land use, service delivery, commuter patterns, housing, employment centers and other growth impacts 'spill over' municipal or County boundaries and impact the region as a whole. Our communities are not islands. The problems a community faces do not begin and end at its borders, so why should its solutions? The health of Carroll County's communities, the incorporated municipalities, the rural areas of the County and the welfare of the region are interconnected.

In many areas across the nation as well as Virginia, the lack of intergovernmental coordination has resulted in the loss of population and economic development. Such losses undermine economic stability and reduce public facility and service efficiencies, thereby making it more costly for local residents. The lack of inter jurisdictional cooperation and coordination make an area less attractive for major economic development. Competing with one another rather than working together can be a deal breaker in the new economy.

Many vital issues are regional in nature – Carroll County must work together with other jurisdictions and service providers to provide efficient services and promote economic development.

The Plan sets forth a coordinated strategy for managing growth and future development. Such a strategy is needed to promote the efficient use of valuable infrastructure that is already in place, to minimize the cost of new infrastructure and facilities, and to prevent the unnecessary loss of open space and agricultural land.

The Plan will lay the foundation for building more effective regional partnerships in the County. Coordinated planning efforts will result in benefits to citizens of all communities in the region.

About the Plan

Why Plan?

Successful communities do not just happen; they must be continually shaped and guided. A community must actively manage its growth and respond to changing circumstances if it is to continue to meet the needs of its residents and maintain the quality of life that initially attracted those residents to the community.

Residents of Carroll County value their natural environment, the character and diversity of their neighborhoods, the quality of public services, the cultural resources and breadth of recreational opportunities, as well as the strong sense of "community." Concern about the impact of new growth has increased as residents have experienced increased traffic congestion, commercial encroachment on neighborhoods and the inappropriate development of agricultural and natural, open areas. Effective growth management can help the County address each of these concerns.

By shifting urban and suburban service demands to areas that lack adequate services and facilities, growth threatens to create detrimental fiscal impacts in addition to its impacts on the character of developed neighborhoods, communities and rural areas. The County must develop a strategy for growth management to make efficient use of both valuable infrastructure that is already in place, and to prevent unnecessary loss of the surrounding agricultural and open space areas where such infrastructure is not yet in place. Effective plan implementation measures can curb the trend towards sprawl development and promote appropriate and available infill development and redevelopment. While allowing appropriate development opportunities in

outlying areas, this plan seeks to promote development and economic growth in areas that can be effectively and efficiently served by public facilities and utilities.

As the Comprehensive Plan is implemented, it will strengthen the partnership between the public and private sectors. This partnership can achieve infinitely more when both parties work together rather than alone. An important byproduct of an effective comprehensive plan is that it creates a "win/win" situation for the public and private sectors, for existing and new neighborhoods, for economic development and open space land conservation, and for fiscal integrity and enhanced quality of life.

Development regulations and building codes should regulate development in conformance with the Comprehensive Plan.

How Should the Plan be Used?

The Comprehensive Plan is a policy guide. While it discusses and describes land uses, the Plan itself does not regulate actual land use. Other tools, such as development regulations, site plan and performance standards, are the primary means by which a locality implements, or brings to life, the goals, policies and strategies noted in the comprehensive plan. Thus it is important that the comprehensive plan feature an implementation schedule that will enable the community to move in the direction of its professed vision.

The Comprehensive Plan also functions as a platform for the articulation of development standards that will help implement the provisions and actions noted in the plan. Once the plan is adopted, considerable effort will be needed to make sure the county's subdivision and building codes are in general conformance with the plan. The Plan also should guide the preparation of detailed facility master plans and capital improvement programs for the County's facilities and services.

The Plan is a dynamic document that should be updated periodically or when conditions change.

The Plan should be a dynamic document, subject to periodic amendment when conditions within the County change significantly. Periodic updates of the Plan will be needed to ensure that it continues to meet the needs of County businesses and residents.

Who Implements the Plan?

The policies and strategies of the Plan must be implemented in a timely manner in order to ensure that the vision of the Comprehensive Plan becomes a reality. Who should be charged with the implementation of the goals, policies and strategies? It should be a joint effort of the county Board of Supervisors, the county planning commission, the county staff, and county

citizens. The implementation program featured in the plan identifies and prioritizes strategies to ensure that the plan's vision becomes a reality. The schedule establishes priorities which should guide private actions as well as public actions.

Goals, Policies and Strategies

Goals, policies and strategies describe how Carroll County will meet the challenge of managing future growth and community development. Each Element contains related goals and policies. Strategies are designed to achieve goals and policies, and are included in the Implementation Chapter.

Goal: Description of a desired state of affairs for the community in the future. Goals are the broad, public purposes toward which policies and programs are directed. Goals are phrased to express the desired results of the Comprehensive Plan.

Policy: Statements of government intent against which individual actions and decisions are evaluated. Policies indicate the *direction* the County should take.

Strategy: Individual regulations and action which, taken together, will enable the County to achieve Goals and Policies. Strategies are the basis for implementation of the Plan by identifying and recommending specific courses of action. Strategies are included in the Implementation Chapter.

"The Comprehensive Plan shall be made with the purpose of guiding and accomplishing a coordinated, adjusted, and harmonious development of the territory…"

- Code of Virginia

Purpose

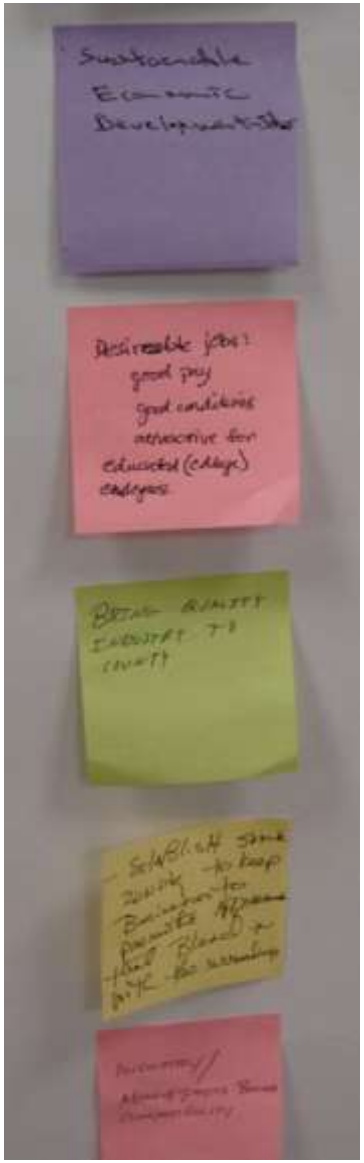
Title 15.2 of the Code of Virginia, 1950, as amended, is devoted to regulations affecting counties, cities, and towns, Subsection 2223 states, "The local planning commission shall prepare and recommend a comprehensive plan for the physical development of the territory within its jurisdiction and every governing body shall adopt a comprehensive plan for the territory under its jurisdiction."

"In the preparation of a comprehensive plan the commission shall make careful and comprehensive surveys and studies of the existing conditions and trends of growth, and of the probable future requirements of its territory and inhabitants. The comprehensive plan shall be made with the purpose of guiding and accomplishing 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."

Chapter 2. Participation and Vision

The Comprehensive Plan is both a document and a process. The planning process includes building consensus for a unified community vision, developing goals and policies to support the vision, and prioritizing strategies to achieve the vision. This chapter provides a brief overview of the outcomes of the participation activities that form the core of the Plan's vision statement and policy framework.



Participation Process

Kick-Off Meeting

The first public participation opportunity was the Kick-Off Meeting, held on January 14, 2010. The kick-off meeting provided residents with the first opportunity to learn about the process and provide direction to the Planning Team (County staff and the consultant planners).

Public Workshop Week

The County sponsored public visioning workshops in each of the five election districts from March 22-25, 2010. At the workshops, the public was asked to share their vision for the County's future and identify key issues and priorities for the Plan Update. The Planning Team also met with numerous focus groups and stakeholders during the March 22-25 timeframe to gather input and discuss priority issues.

Public Meeting Schedule

From the very early discussion stages, the Board of Supervisors and Planning Commission determined that the updated Carroll County Comprehensive Plan would be drafted based on citizen input. To accomplish this goal, numerous community meetings and focus group meetings were held during the process. Each of the countywide or community meetings, the Board of Supervisors and Planning Commission workshop, and the public hearing were advertised in newspapers with general circulation in Carroll County.

The following Comprehensive Plan Workshop Meetings were held:

January 14, 2010	Consultants/Staff Meeting	
	Countywide Kick-off Meeting – Carroll County High School	
March 22, 2010	Saint Paul School Cafeteria	5:30 – 7:00 p.m.
	Oakland Elementary Gym	7:30 – 9:00 p.m.
March 23, 2010	Gladesboro Elementary Gym	5:30 – 7:00 p.m.
	Hillsville Elementary Gym	7:30 - 9:00 p.m.
March 24, 2010	Carroll County High School Government Classes	
March 25, 2010	Woodlawn School Cafeteria	5:30 – 7:00 p.m.

Meetings were held during the day on these dates with Focus Groups including Agriculture, Tourism, Developers, Press, and neighboring localities

May 13, 2010	Fancy Gap Elementary School	5:30 – 7:30 p.m.

Citizen comments and completed surveys were received through June 30, 2010 from the above meetings, electronic submission, personal visits or phones calls with the Office of Land Use and Planning. Results from each of these were compiled to complete the first draft of the Plan which was made available for public inspection beginning July 8, 2010.

July 8, 2010	Carroll County High School – presentation of first draft of Plan	
August 3, 2010	Carroll County High School – 6:30 -8:30 p.m.	
August 4, 2010	Focus Group Meetings – Agriculture, Tourism, Economic Development	
August 16, 2010	Woodlawn School Cafeteria	5:30 – 7:00 p.m.
	Hillsville Elementary Gym	7:30 - 9:00 p.m.
August 17, 2010	Gladesboro Elementary Gym	5:30 – 7:00 p.m.
August 18, 2010	Oakland Elementary Gym	5:30 – 7:00 p.m.
August 23, 2010	Saint Paul School Cafeteria	5:30 – 7:00 p.m.
October 12, 2010	Joint Public Workshop of the Board of Supervisors and Planning Commission – 3:00 p.m.	

November 18, 2010	Fancy Gap Community Meeting	2:00 p.m.

Comprehensive Plan Consultants and County Staff considered the comments received from the meetings listed above to revise the draft of the Comprehensive Plan. The revised Plan was made available for public inspection beginning October 20, 2010 in preparation for the November 18 Public Hearing.

November 18, 2010 Hearing	Carroll County High School	6:00 Public
December 14, 2010	Carroll County Governmental Center - Joint Public Meeting of the Board of Supervisors and Planning Commission	5:30 p.m.

Youth Outreach

A workshop was held with the government classes at Carroll County High School in order to secure the input and perspective of the county's high school seniors regarding Carroll County's strengths and weaknesses as a community, as well as ascertain what kind of future the young people envisioned for Carroll County in the year 2030. It is important to note that the high school students completed the same visioning and issues identification exercises the county residents completed during the five district meetings held in March.

Website and Social Media

A dedicated project website (www.plancarrollcounty.org) was established to provide information to the public, gather feedback and enhance communications. It includes meeting notices, background information, project updates, a document library and other information. The website allows stakeholders to register for notification of upcoming events and send comments to the Planning Team.

The planning process is taking advantage of social media to spread the word about participation opportunities and project updates. The Planning Team regularly posts comments and updates to the County's Facebook page, which has 812"friends" that receive the updates. The Planning Team also maintains a Twitter account that is updated regularly, although as a new communication tool it does not yet appear to have a measurable impact for the Carroll County planning process. Use of these social media tools is intended to keep participants engaged in the process and make it more relevant to the public.

Survey

A community survey was conducted for the Plan Update. The survey was online and available at County offices and during the public workshops. A total of 347 survey responses were received. The survey was not a scientific survey because it did not attempt to poll a random sample of County residents. The purpose of the survey was to identify the common concerns and ideas of the people who live and work in Carroll County, summarized below.

Press

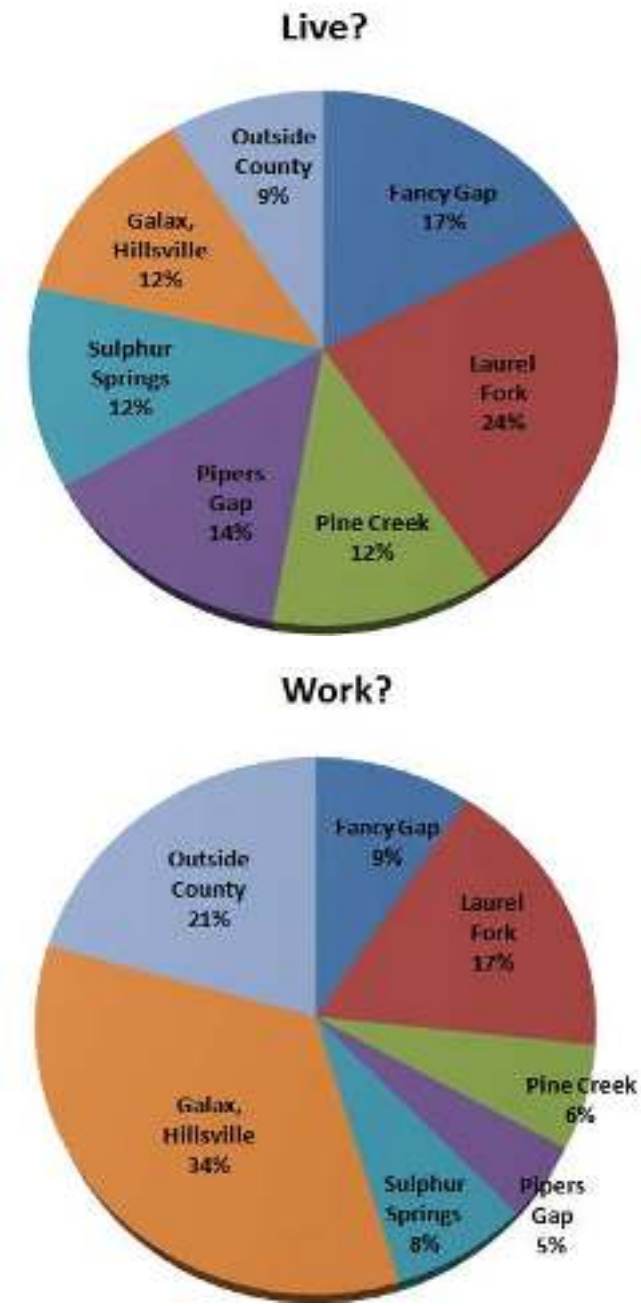
Press releases were sent to local media outlets to notify the public about the planning process and workshops. The Planning Team is coordinated with *The Carroll News* to publish a series of

articles about the planning process and key topics. Topics in the series included summaries of the surveys, the purpose of planning, agriculture, and economic development.

Survey Summary

A total of 347 responses were received. The pictogram on the right indicates where the survey respondents reside in the county. It is interesting to note that respondents were equally distributed across the five election districts save for the Laurel Fork district. With regard to where respondents work, more than one third of the respondent stated they work in either Galax or Hillsville, while one in five respondents stated they worked outside Carroll County.

In which Election district do you…



What are the three most important issues facing Carroll County today?

Respondents identified several major issues facing Carroll County today:

- Job loss, unemployment rates and the economy
- Education
- Infrastructure
- Tourism
- Land use practices
- Recycling
- Preservation of the natural environment
- Perceived drug use

What have been the three most important changes in Carroll County over the past few years?

As a group, respondents appear to be satisfied with improvements in public facilities, services and governance in Carroll County over the past few years, indicating an increase in the perceived quality of life. Many respondents recognized improved water and sewer infrastructure throughout the county as a positive change in Carroll County. Respondents also identified improved schools and overall education, as well as improved police and emergency medical services throughout the County.

In particular, respondents identified the new Carroll County Wellness Center; the Crossroads Institute; the addition of exits and infrastructure along I-77; and the addition of the Hillsville and Highway 58 Bypass. Other changes cited included high speed internet and the reemergence of the expanded local farmer's market.

Positive changes?

The Carroll County Wellness Center, the Crossroads Institute, the Farmers Market, improved infrastructure and good schools.

What have three changes in Carroll County over the past few years concern you the most?

Not surprisingly given the local and national economic outlook, respondents' key concerns were related to the economy, including the loss of jobs, the lack of job opportunities, and the lack of industrial development and commercial activities resulting in a decline in local revenues.

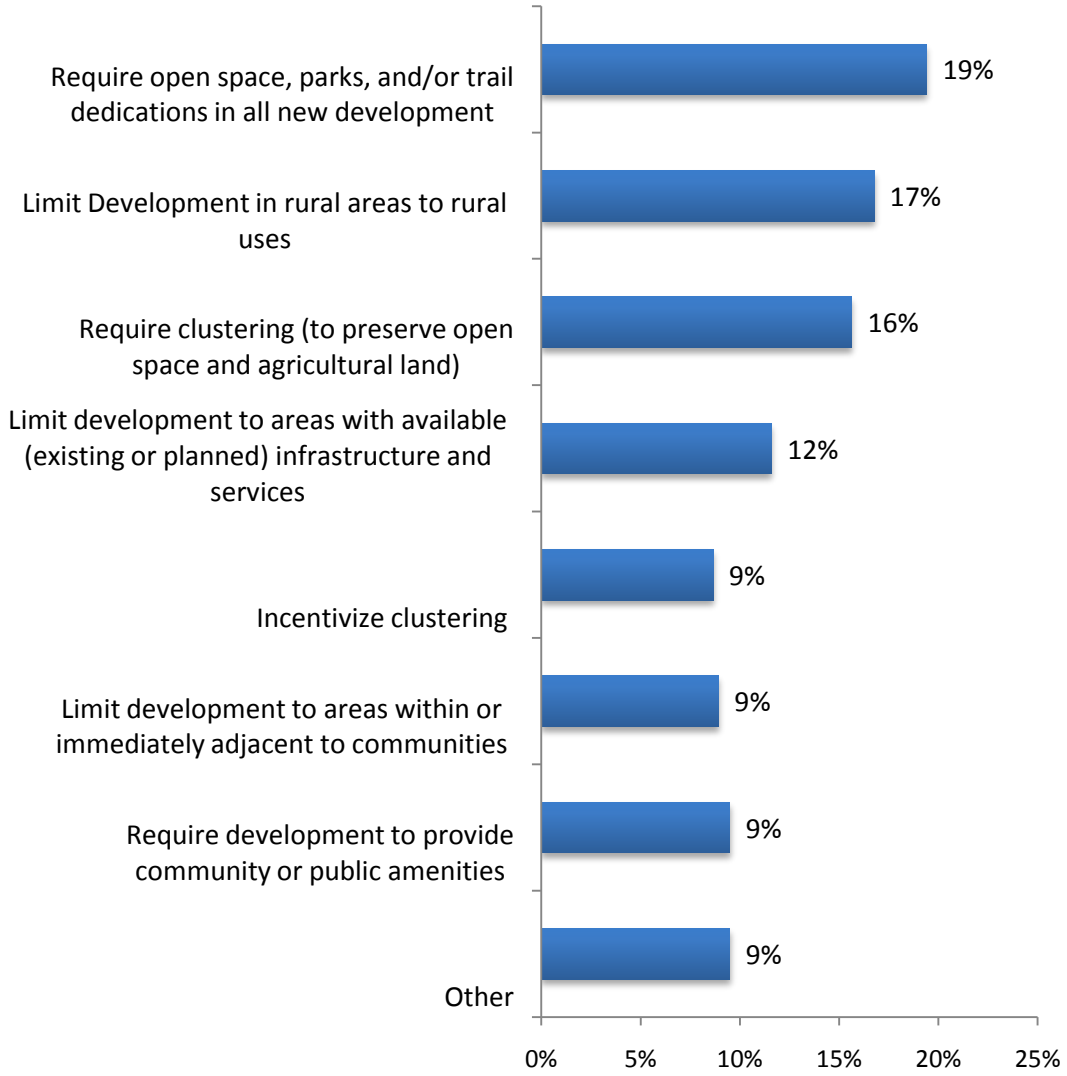
Other key concerns were related to the County's Land Management Program. Respondents were concerned by both uncontrolled development and by proposed establishment of zoning regulations. Loss of agricultural land was another frequently mentioned land use issue.

While many respondents identified improved emergency medical services as being emblematic of positive change, many residents also expressed concern about the lack of medical training and preparation for Carroll County Fire and Rescue Departments. Other issues of concern cited included drug use in the county and the loss of the community swimming pool.

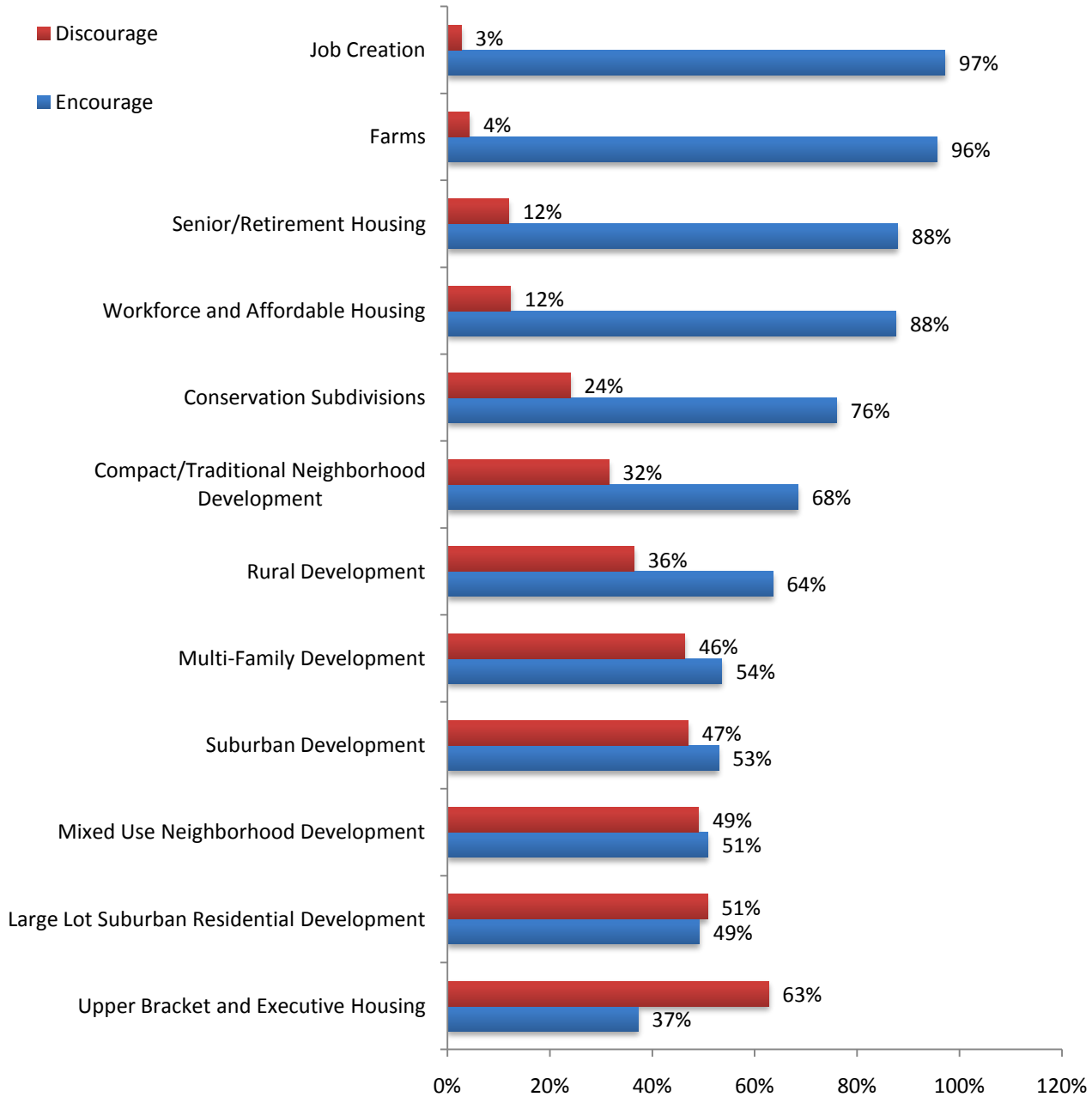
Concerning changes?

Job loss, lack of industrial development, uncontrolled development and loss of agricultural land

How should the County plan for rural areas?



How should the County plan for future development?

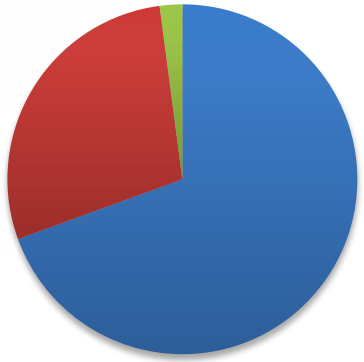


Current County water and sewer policies are being used to support economic development. Should these policies be expanded to include other public facilities and services?

Agree	56%
Disagree	19%
No Opinion	25%

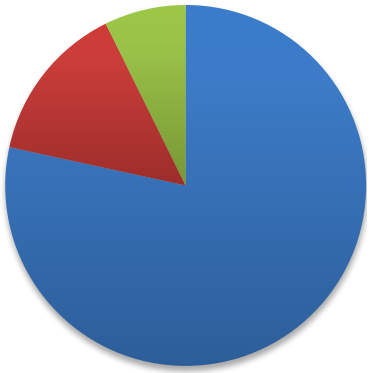
Adequate public facilities and services required to serve new development should be paid for by:

By new development	69%
By new development and existing residents	28%
By existing residents	2%



There should be available and adequate public facilities and services (roads, water, sewer, public safety, schools, and parks) before development is approved.

Agree	78%
Disagree	14%
No Opinion	7%



What three characteristics / attributes do you want to see in the Carroll County of 2030?

Looking to the future, respondents want the County to maintain the characteristics that make it a good place to live – such as outdoors recreation, rural heritage and agricultural uses. Improving economic opportunities and the quality of life in the county are clear priorities for the future. The following attributes were frequently cited by respondents:

- Economic development, including increased commerce, job opportunities, industrial development and increased tourism
- Safety, including a low crime rate and no drug use
- Affordability, including affordable housing and low taxes
- Rural character, including agricultural heritage, open space protection and retention of scenic views
- Education, including a new high school and more investments in education
- Recreational opportunities, including hiking, biking and equestrian trails, youth recreation and a community pool
- Infrastructure investment, including sewer and water service and high speed internet provision
- Controlled, sustainable growth
- Additional development adjacent to the Hillsville bypass and along the I-77 corridor including restaurants, hotels and other development

Carroll County in 2030:

Economic Development
Safety
Affordability
Rural Character
Education
Recreation
Infrastructure Investment
Controlled Growth

Youth Survey Summary

The results of the Carroll County High School Seniors survey are noted below.

What three factors about Carroll County will keep you here after high school or bring you back after college?

It is clear that young people value their family and social ties in Carroll County. Students frequently cited the community, their family and friends as the key factor that will keep them in or bring them back to Carroll County after college or military service. Quality of life issues were also cited as community positives capable of keep the youth in the county. The county's rural atmosphere, small town feel, and beautiful scenery were listed as attributes. The students also liked the fact that everyone knew everyone thereby making Carroll County a friendly place and relatively safe place to live.

What three factors will drive you away from Carroll County?

The lack of jobs and employment opportunities are the two factors students cited as a reason for leaving Carroll County. While the overall lack of jobs was the single most common response, some students felt that there was no market for what they want to do, thus they may have to leave the county. A large number of students stated there is "nothing to do," in the County, or, "nothing but scenery," and some stated that the County is too remote and rural.

What does Carroll County do that is good for youth, teens and young adults?

Quality schools, sports programs, the Wellness Center and outdoor recreation were frequent responses. Other recreation programs, including organized activities at churches, youth groups, clubs and recreation centers were also mentioned. However, several respondents said that the County does "nothing" for youth, or chose not to answer the question.

What can Carroll County do that is good for youth, teens and young adults?

There were many ideas presented of things the County can do or improve to serve youth. Building a new pool and expanding recreation programs and parks were popular ideas. Many students are interested in more entertainments options, such as an amusement park, movie theaters, skating rinks and other types of entertainment. Many respondents would like to see

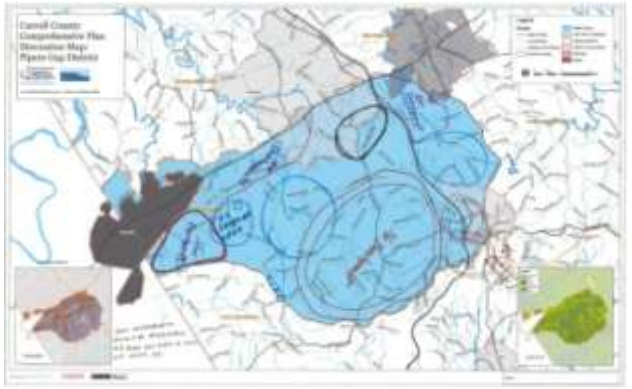
more retail stores, shopping centers, restaurants and other places to “hang-out” at. Students would also like to see more job opportunities available to them.

What makes you *Carroll Country Proud*?

The attributes that make students Carroll County proud are very similar to those that will keep them in the county after high school. Family and friends, the rural and small town feel, the natural beauty, and the people help make the youth Carroll County proud. The county’s natural and clean environment and the way neighbors watch out for each other were also cited.

What bugs you about Carroll County?

The Students concerns centered on the lack of jobs and the lack of development in the County. The students also expressed some disdain about the route 58 bypass around Hillsville. They also expressed concern about the high rate of drug use in the county and the rate of teen pregnancy across the community. Lastly, many students stated they wished there were more things for young people to do in the county and that teen activity centers were available across the county. The growing elderly population was also cited as a concern.



Vision Statement

A comprehensive plan is a community's common vision of its future. The Carroll County Comprehensive Plan is intended to define a long-term vision for the future (that is shared by its residents) and guide public and private actions to help achieve that vision. A long-term vision, rooted in community values, is the foundation of the Carroll County planning process. The vision statement helps citizens and decision-makers remember the ends to which the Plan aspires. In concert with Plan goals, it should temper and guide the interpretation, application and amendment of the Comprehensive Plan over time. The vision is summarized in a succinct vision statement below and is more clearly defined through the goals, policies and strategies presented in this Plan.

Carroll County Vision Statement:

Heritage and Opportunity
in the Blue Ridge Mountains.

Chapter 3. Demographic Analysis

Population Trends

Changes in the total population and the characteristics of the population may have profound impacts on the economic, social and natural environment of the County. Population increases generate demands for additional facilities and services. Different age and income segments of the population have different needs, which shape demands for housing, services and infrastructure. For instance, an elderly population creates demand for communal housing types, medical services, passive recreational opportunities and public transportation. Families with young children, on the other hand, generate demands for different housing types, day care facilities, schools, athletic recreational opportunities and a mix of transportation options.

This Chapter summarizes various demographic indicators relevant to the development of Carroll County's Comprehensive Plan, including a projection of the community's likely population in 2030. This information in turn will allow the County to craft land development policies that are responsive and reflective of the community's shifting demographics.

Changes in the total population and the characteristics of the population may have profound impacts on the economic, social and natural environment of the County. Different segments of the population have different needs, which shape demands for housing, services and infrastructure.

Historic Trends

Carroll County's population has fluctuated over the past century as shown in **Chart 3**. Between 1900 and 1950, the county's population gradually increased from 19,303 to 26,695. This steady growth was propelled by an expanding agricultural economy. During the 1950s, significant changes in methods of agricultural production reduced the demand for farm labor, thereby initiating a stream of out-migration that persisted for nearly two decades. The actual low point for the period of population decline was in the mid-1960s. By 1968, Carroll County's population decline leveled off.

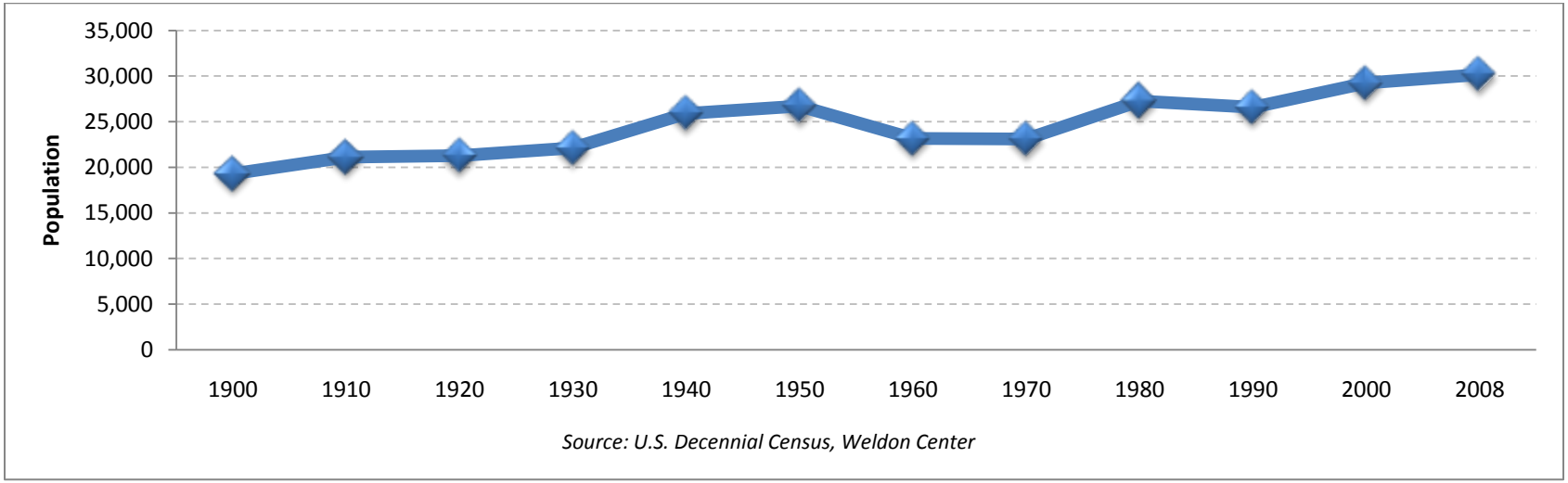
Between 1970 and 1980, Carroll County's population increased at a rate of 1.8% per year. During that decade, the 18.1% increase was driven by a boom in manufacturing, specifically in the textile and furniture industries. This rapid growth realized during the decade of the 1970s

was stifled during the 1980s as the County's population decreased by 2.5%. This trend reversed during the 1990s as the County grew at an average annual rate of 1%. Growth after 2000 slowed to an annual rate of 0.4%. Growth after 2000 has slowed to an annual average rate of 0.4%.

This rate of growth, however, is somewhat higher than that of the Mount Rogers PDC, and is comparable to many adjacent municipalities both in Virginia and North Carolina, while lagging behind the State as a whole. **Table 3** compares Carroll County's population to other geographies such as the Nation, State, Mount Rodgers Planning District and other adjacent Counties (MRPDC) and Cities both within Virginia and North Carolina after 1980.

Since 2000, Carroll County has grown at an annual rate of .4%. As of 2008, 30,160 residents call Carroll County "home."

Chart 3: Carroll County Population by Year



Source: U.S. Decennial Census, Weldon Center

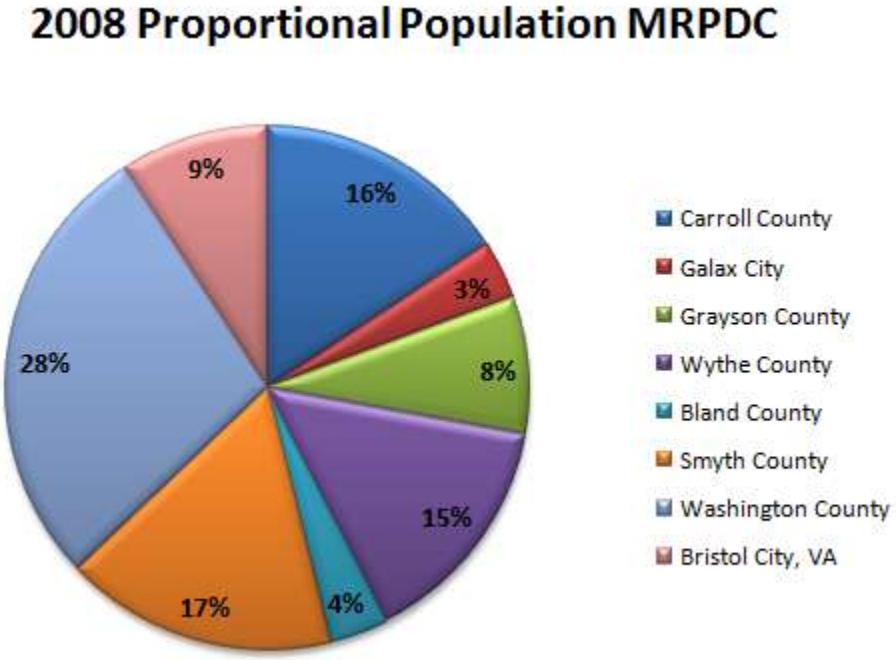
Table 2: 1980-2008 Population Estimates

City / Community	1980	1990	1980-1990		2000	1990-2000		2008	2000-2008	
	Population	Population	Annual Growth Rate	Growth Rate	Population	Annual Growth Rate	Growth Rate	Population	Annual Growth Rate	Growth Rate
Carroll County	**27,270**	**26,594**	**-0.3%**	**-2.5%**	**29,245**	**1.0%**	**10.0%**	**30,160**	**0.4%**	**3.1%**
Hillsville, VA*	2,123	2,008	-0.6%	-5.4%	2,607	2.6%	29.8%	2,849	1.1%	9.3%
Galax City	6,524	6,670	0.2%	2.2%	6,837	0.2%	2.5%	6,837	0.0%	0.0%
USA	226,545,805	248,709,873	0.9%	9.8%	281,421,906	1.2%	13.2%	301,237,703	0.9%	7.0%
Virginia	5,346,818	6,187,358	1.5%	15.7%	7,079,030	1.4%	14.4%	7,795,424	1.2%	10.1%
MRPDC (remainder)	181,118	178,205	-0.2%	-1.6%	190,020	0.6%	6.6%	190,566	0.0%	0.3%
Grayson County	16,579	16,278	-0.2%	-1.8%	16,881	0.4%	3.7%	16,110	-0.6%	-4.6%
Wythe County	25,522	25,466	0.0%	-0.2%	27,599	0.8%	8.4%	27,904	0.1%	1.1%
Bland County	6,349	6,514	0.3%	2.6%	6,871	0.5%	5.5%	6,918	0.1%	0.7%
Smyth County	33,345	32,370	-0.3%	-2.9%	33,081	0.2%	2.2%	31,905	-0.5%	-3.6%
Washington County	46,487	45,887	-0.1%	-1.3%	51,103	1.1%	11.4%	53,308	0.5%	4.3%
Bristol City, VA	19,042	18,426	-0.3%	-3.2%	17,367	-0.6%	-5.7%	17,424	0.0%	0.3%
Other Adjacent Counties										
Pulaski County	35,229	34,496	-0.2%	-2.1%	35,127	0.2%	1.8%	34,409	-0.3%	-2.0%
Floyd County	11,563	12,005	0.4%	3.8%	13,874	1.5%	15.6%	15,173	1.1%	9.4%
Patrick County	17,647	17,473	-0.1%	-1.0%	19,407	1.1%	11.1%	19,288	-0.1%	-0.6%
Surry County, NC	59,449	61,704	0.4%	3.8%	71,209	1.4%	15.4%	73,388	0.4%	3.1%
Stokes County, NC	33,086	37,224	1.2%	12.5%	44,711	1.8%	20.1%	46,638	0.5%	4.3%
Alleghany County, NC	9,587	9,590	0.0%	0.0%	10,680	1.1%	11.4%	11,125	0.5%	4.2%

Sources: U.S Census, Weldon Cooper Center for Public Service, 2007 Carroll County Comprehensive Plan, MRPDC, Town of Hillsville, NC OSBM

*Included in Carroll County Population.

The pie chart below depicts the percentage of each member of the MRPDC according to data published in 2008 by the Weldon Cooper Center for Public Service at the University of Virginia. Carroll County population portion comprises approximately 1/6th of the MRPDC population in 2008. The cartograms to the right depict the actual geography of the MRPDC (**top**) and the adjusted geography based on each jurisdiction's proportion of the area's population (**bottom**). Both Carroll County and Galax are enlarged in the cartogram which illustrates that they have higher population densities than the area as a whole.



Source: Weldon Cooper Center for Public Service

Geographic Representation

Population-Based Cartogram

As shown in **Table 3**, natural increase (the number of births minus the number of deaths) has not been a factor in Carroll County's population growth. These figures indicate a sustained decline in the county's young adults in the years of greatest childbearing potential. Thus, there are two main factors driving Carroll County's population trend, an out-migration of young adults and an in-migration of older age groups. According to the 2006 - 2008 Census American Community Survey (ACS), 6% of the County's populations had migrated in; 3% from another place within Virginia and 3% from outside of the State between 2006 and 2008.

The two main factors driving Carroll County's population trend are an out-migration of young adults and an in-migration of older age groups.

Table 3: Natural Increase / Decline

Year	Live Births	Deaths	Natural Increase
1995	307	297	10
1996	284	322	-38
1997	303	321	-18
1998	254	298	-44
1999	288	311	-23
2000	259	293	-34
2001	274	294	-20
2002	296	312	-16
2003	284	326	-42
2004	286	349	-63
2005	280	329	-49
2006	311	352	-41
2007	302	332	-30
2008	289	358	-69

Source: Virginia Department of Health

Table 4 clearly provides evidence of in-migration as the key driver of recent population growth in the County. From 2006-2008, 88% of the people at least one year old living in Carroll County were living in the same residence one year earlier. Another 6% had moved from one location to another location within the County, while 3% moved to the County from elsewhere in Virginia

and another 3% moved to the County from another state. Less than 0.5% moved to the County from outside of the United States.

Table 4: Previous Year's Residence

Previous Residence	Population
Population 1 year and over	28,920
Same house	25,457
Different house in the U.S.	3,463
Same county	1,875
Different county	1,588
Same state	737
Different state	851
Abroad	0

Source: U.S. Census 2006 – 2008 ACS

Pipers Gap and Sulphur Springs magisterial districts, both of which border the City of Galax, maintain the largest population concentrations in Carroll County.

Population Distribution and Density

The distribution of Carroll County's population has followed the same basic pattern over the past 40 years. Population is distributed relatively evenly across the county, with a heavier concentration of people between Galax and Hillsville. As can be seen in **Table 5**, both the Pipers Gap and Sulphur Springs magisterial districts, the two districts that border the City of Galax, maintain the largest population concentrations in the county. The Sulphur Springs magisterial district is the most populous of the County's five election districts. Development along U.S. Route 58 between Galax and Hillsville, especially in the Woodlawn community, continues to grow at a relatively high rate. Areas south of Blue Ridge Parkway near Interstate 77 and U.S. Highway 52 (Fancy Gap) are also experiencing increased development activity due to investment made in this area of the County.

The population density of the Mount Rogers Planning District is less than 40% of the population density of the Commonwealth of Virginia.

The population density of Carroll County is calculated by dividing the 2000 total population (29,245) by the County's total land area (477.7 square miles), and is 61.22 persons per square mile. Typically, any area with less than 50 persons per square mile is considered rural;

therefore, based on population and land area, Carroll County would not be classified as rural. However, if the population concentrated along the U.S. Route 58 corridor is removed from the calculation, then Carroll County has a population density of only 53.21 persons per square mile and better represents the county's rural nature. The 36 square miles along the U.S. Route 58 corridor between Galax and Hillsville (two miles on each side of U.S. Route 58) has a population density of 159.39 persons per square mile and a total population of 5,738. In comparison, the Commonwealth of Virginia has a population density of 177.77 persons per square mile, while the population density of the Mount Rogers Planning District is 68.19 persons per square mile. The U.S. 58 corridor, in many respects, functions as the County's population center.

Table 5: Population Distribution by Magisterial District

District	Population			Percent Change
	1980	1990	2000	1980 - 2000
Fancy Gap	4,542	4,443	4,926	8.45%
Laurel Fork	4,499	4,375	4,769	6.00%
Pine Creek	3,550	3,293	3,623	2.06%
Pipers Gap	6,787	6,860	7,530	10.95%
Sulphur Springs	7,892	7,623	8,397	6.40%
Total:	27,270	26,594	29,245	7.24%

Source: US Census Bureau, Decennial Census.

Race and Ethnicity

Historically, the population of Carroll County has been predominantly white. The results of the 2000 Census indicate that, while the county's population is still predominantly white, the percentage of non-white population has increased since 1990. **Table 6** list selected racial data for Virginia, the Mount Rogers Planning District, Carroll County, and Galax in 1990 and 2000 respectively. Racial and ethnicity data was not made available for the 2006 – 2008 ACS due to margin of error constraints.

As **Table 6** indicates, between 1990 and 2000 the Hispanic population in Carroll County grew by 217% from 151 persons in 1990 to 479 persons in 2000. Overall, Hispanics comprised 0.6% of

the total population of the county in 1990 and 1.6% of the total population in 2000. The county's remaining non-white population remained statistically equal from 1990 to 2000. It should be noted that for the 2000 Census, the number of persons indicating Hispanic identity was a function of the Census questions focused on ethnicity rather than race. The 2010 Census will likely confirm an increase in the number of Hispanics who live in Carroll County.

Table 6: Racial and Ethnic Composition; 1990-2000

	Percent White		Percent Black		Percent Asian		Percent Hispanic	
	1990	**2000**	**1990**	**2000**	**1990**	**2000**	**1990**	**2000**
Virginia	77.4%	72.3%	18.8%	19.6%	2.5%	3.7%	2.6%	4.7%
MRPDC	97.1%	95.7%	2.5%	2.7%	0.2%	0.2%	0.4%	1.3%
Carroll County	98.8%	97.2%	0.4%	0.4%	0.1%	0.1%	0.6%	1.6%
Galax	93.2%	86.1%	5.8%	6.3%	0.2%	0.7%	1.0%	11.1%
Source: US Census Bureau, Decennial Census								

Age and Gender

As noted, Carroll County's population Carroll County's population has grown older over the past 30 years. This trend includes higher median age for females than for males, which has consistently increased for both sexes since 1970 as shown in **Table 7**. While gender specific data is not available for 2008, there is a strong likelihood the aging trend has not abated in Carroll County. For comparison, the 2008 median age for the State was 37.1; for the Nation the median age was 37.

Table 7: Median Age; 1970-2008

Year	Males	Females	Total Population
1970	30.7	32.4	31.6
1980	31.7	34.8	33.3
1990	36.0	39.6	37.8
2000	39.2	42.3	40.7
2008	-	-	42.7

Source: U.S. Census Bureau, Decennial Census; 2006 – 2008 ACS

The population pyramids in **Charts 4 and 5** show that growth was not balanced across the various age cohorts. Males continue to outnumber females in the 0 - 19 age brackets, while females continue to outnumber males in the 50 and older age categories. As a percentage of the county's total population, the secondary school age categories (15 -24) are declining, a fact supported by the negative natural increase in the county beginning in 1995. Since 1990, the 45 – 59 age brackets have experienced the highest rate of growth. Overall, Carroll County's population is growing older as identified in **Table 7,** and in-migration continues to be the most contributing factor to population growth.

Accelerating growth within the 50 – 64 age cohort groups coupled with the continued decline of the 20 – 34 age groups offer further evidence of Carroll County's graying as a community.

Mirroring national trends, the median age in Carroll County has increased consistently since 1970.

Chart 4: Population Pyramid by Age Group and Gender; 1990-2000

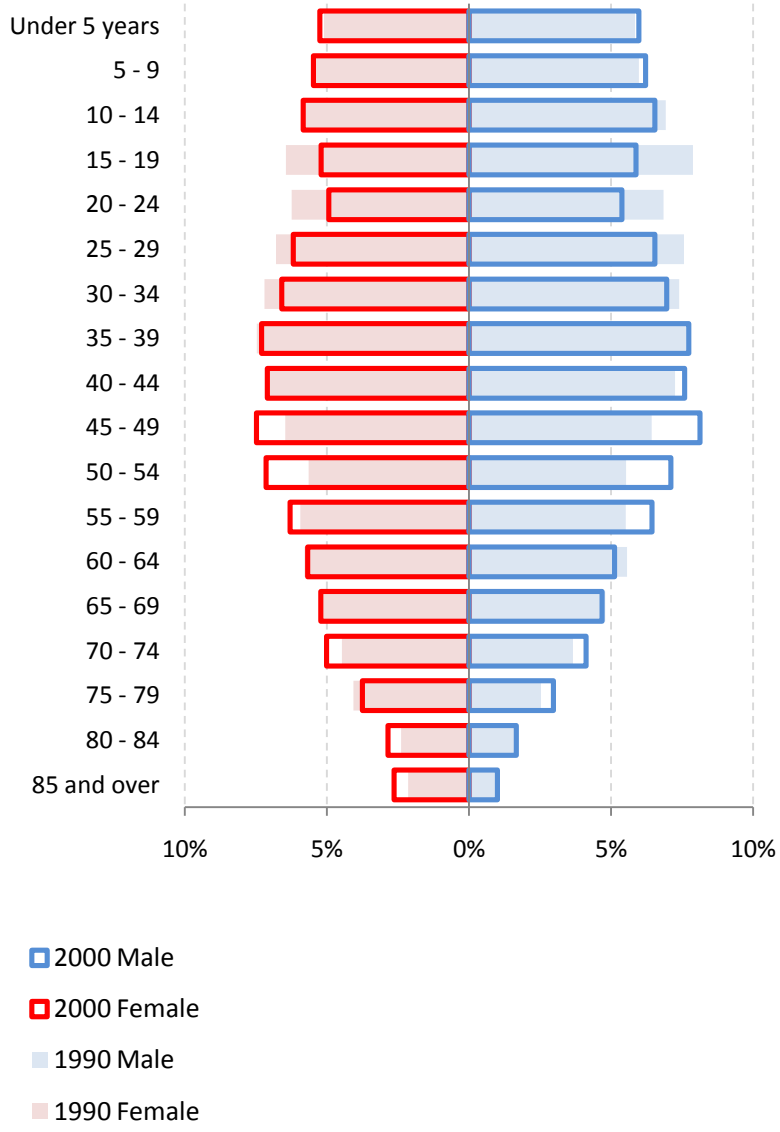
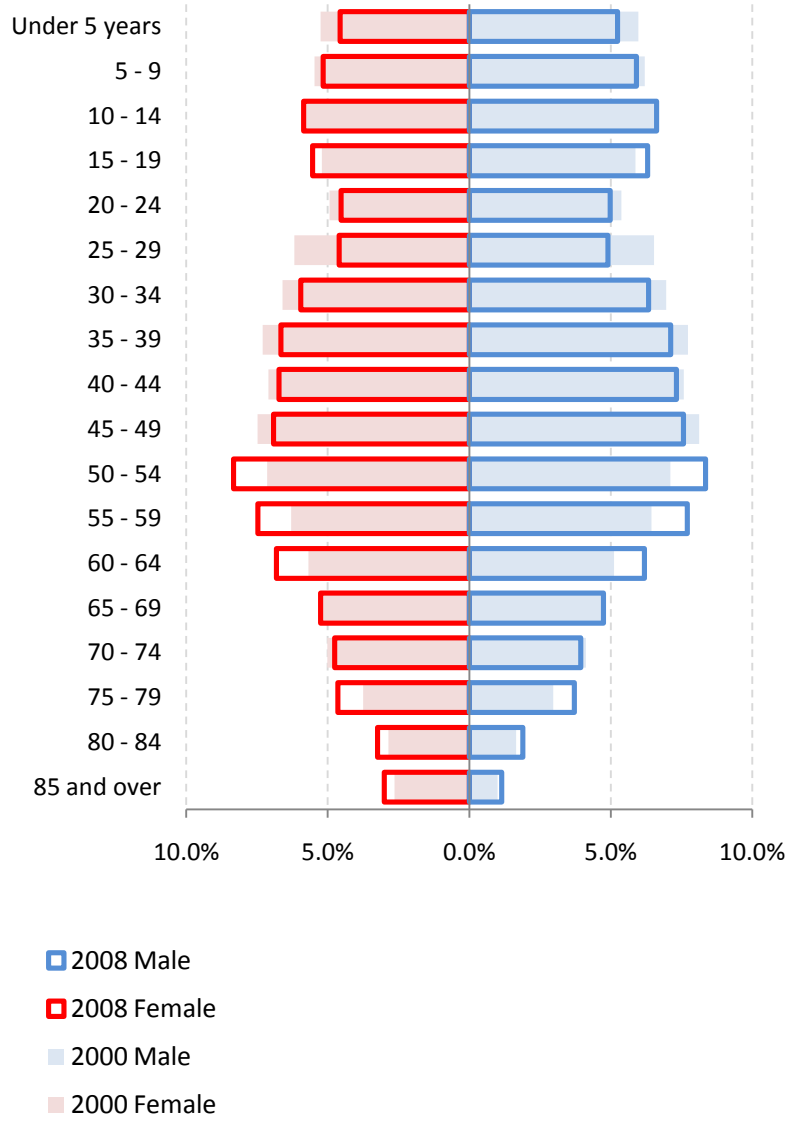


Chart 5: Population Pyramid by Age Group and Gender; 2000-2008



Dependency

Table 8 provides youth dependency and aged dependency ratios. These rations reflect the number of people in the working age population for every young person and older person who are not in their prime wage earning years. In general terms, these ratios indicate whether there is a significant imbalance between the workforce and those dependent on the workforce for goods and services. This factor, when combined with other economic indicators, can provide insight regarding the vitality of the local economy. In terms of the youth dependency ratio, Carroll County has 2.86 working aged person for each youth, somewhat higher than both the State (2.31) and the Nation (2.19).The aged dependency ratio shows a wider variation. Consistent with its relatively high percentage of residents in older age cohorts, Carroll County has 3.39 workers for each person of retirement age, lower than the ratios for both the State and the Nation. Over the next two decades, with more retirements looming on the horizon, Carroll County will likely feel added pressure vis-à-vis the aged dependency ratio. A decrease in either ratio will create addition burden on the local government fiscally by spreading available services to a greater population while losing the most economically active age group and related loss of tax revenues.

Over the next few decades trends indicate that the retirement age population will continue to increase. This could potentially create a fiscal burden on local government by spreading available services to a greater population while losing a portion of tax revenues.

Table 8: Dependency Ratios; 2006-2008

	Carroll County		Virginia		United States	
Age Group	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Youth (0 - 19)	6,189	21%	2,053,543	27%	82,523,083	27%
Working (20 - 64)	17,724	61%	4,735,400	62%	180,734,484	60%
Aged (65+)	5,236	18%	909,795	12%	37,980,136	13%
Total	29,149		7,698,738		301,237,703	
Youth Dependency	2.86		2.31		2.19	
Aged Dependency	3.39		5.20		4.76	

Source: U.S Census ACS 2006 – 2008

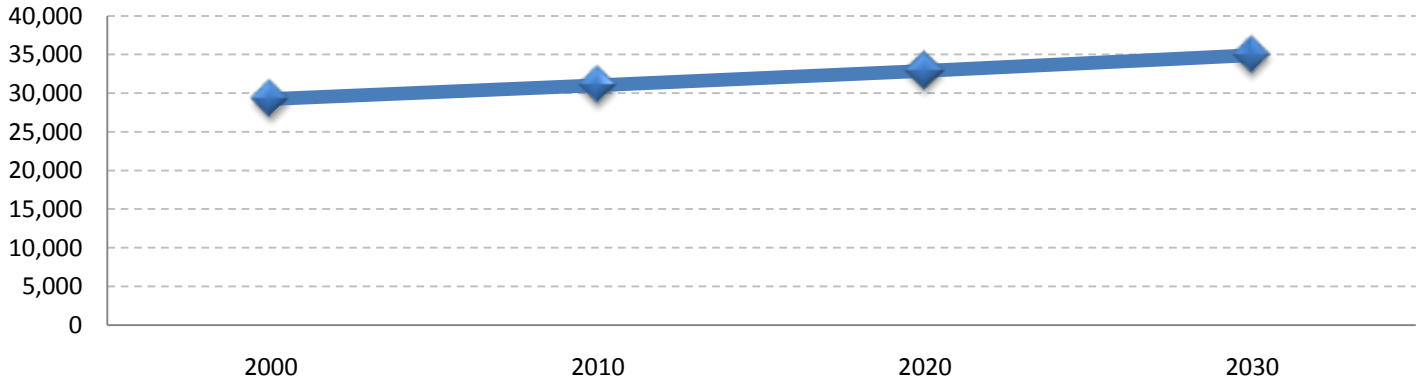
Population Projections

Estimating population size into the future is an inexact science based on historic trends and various sets of available data. The aim of these projections is to establish a reasonable baseline that Carroll County can use to inform its land use policies during the planning period. The Virginia Employment Commission (VEC) is tasked at the State level for projecting Virginia's and its Cities and Counties future population.

Factors affecting future population in a community include changing economic conditions, rate of natural increase, and the rate of in- and out-migration. Projections are based on information available at the moment; the estimates cannot account for unforeseen circumstances, such as industrial closings or changes in the national or international economy. **Chart 6** shows VEC has projected Carroll County's population to grow at a steady pace over the next 20 years with a 2030 population just shy of 35,000.

Carroll County's population is projected to remain at a steady conservative pace over the next 20 years with a 2030 population just shy of 35,000.

Chart 6: Population Projection



Source: Virginia Employment Commission - 05/03

Table 9 shows population projections made by the Virginia Employment Commission for Carroll County, the surrounding region, and the state. Behind Bland County, Carroll County's population is projected to grow by the second highest percentage (19.34%) in the Mount Rogers region between 2000 and 2030, and is predicted to have the highest overall growth in the region during that time period. Also included in the table are North Carolina counties that border Carroll County.

Carroll County is projected to have the highest overall growth in the Mount Rodgers region between 2000 and 2030.

Table 9: Population Projections

	2008	2010	2008-2010		2020	2010-2020		2030	2020-2030	
City/Community	**Population**	**Population**	**Annual Growth Rate**	**Growth Rate**	**Population**	**Annual Growth Rate**	**Growth Rate**	**Population**	**Annual Growth Rate**	**Growth Rate**
Carroll County	**30,160**	**31,000**	**1.4%**	**2.8%**	**32,900**	**0.6%**	**6.1%**	**34,900**	**0.6%**	**6.1%**
Hillsville, VA*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Galax City	6,837	6,800	-0.3%	-0.5%	6,800	0.0%	0.0%	6,800	0.0%	0.0%
USA	301,237,703	308,935,581	1.3%	2.6%	335,804,546	0.8%	8.7%	363,584,435	0.8%	8.3%
Virginia	7,795,424	7,892,900	0.6%	1.3%	8,601,900	0.9%	9.0%	9,275,101	0.8%	7.8%
MRPDC	190,296	192,803	0.7%	1.3%	199,400	0.3%	3.4%	204,600	0.3%	2.6%
Grayson County	16,110	17,100	3.0%	6.1%	17,300	0.1%	1.2%	17,500	0.1%	1.2%
Wythe County	27,904	28,600	1.2%	2.5%	29,600	0.3%	3.5%	30,600	0.3%	3.4%
Bland County	6,918	7,600	4.8%	9.9%	8,300	0.9%	9.2%	8,800	0.6%	6.0%
Smyth County	31,905	33,800	2.9%	5.9%	34,500	0.2%	2.1%	35,200	0.2%	2.0%
Washington County	53,038	51,103	-1.8%	-3.6%	53,400	0.4%	4.5%	54,400	0.2%	1.9%
Bristol City, VA	17,424	16,800	-1.8%	-3.6%	16,600	-0.1%	-1.2%	16,400	-0.1%	-1.2%
Other Adjacent Counties										
Pulaski County	34,409	34,200	-0.3%	-0.6%	34,000	-0.1%	-0.6%	34,000	0.0%	0.0%
Floyd County	15,173	15,800	2.0%	4.1%	17,200	0.9%	8.9%	18,500	0.7%	7.6%
Patrick County	19,288	20,000	1.8%	3.7%	20,600	0.3%	3.0%	21,200	0.3%	2.9%
Surry County, NC	73,388	74,216	0.6%	1.1%	78,352	0.5%	5.6%	82,700	0.5%	5.5%
Stokes County, NC	46,638	47,334	0.7%	1.5%	49,863	0.5%	5.3%	51,350	0.3%	3.0%
Alleghany County, NC	11,125	11,294	0.8%	1.5%	12,142	0.7%	7.5%	13,000	0.7%	7.1%

Sources: Weldon Cooper Center for Public Service, VEC, NC OSBM

*Included in Carroll County

Education

In 2006-2008, 73% of people 25 years and over had at least graduated from high school and 14% had a bachelor's degree or higher credential, as shown in **Table 10**. Twenty-seven percent were not enrolled or had not graduated from high school. The total school enrollment in Carroll County was approximately 6,100 in 2006-2008. Nursery school and kindergarten enrollment was 580 and elementary or high school enrollment was 4,100 children. College or graduate school enrollment was 1,500.

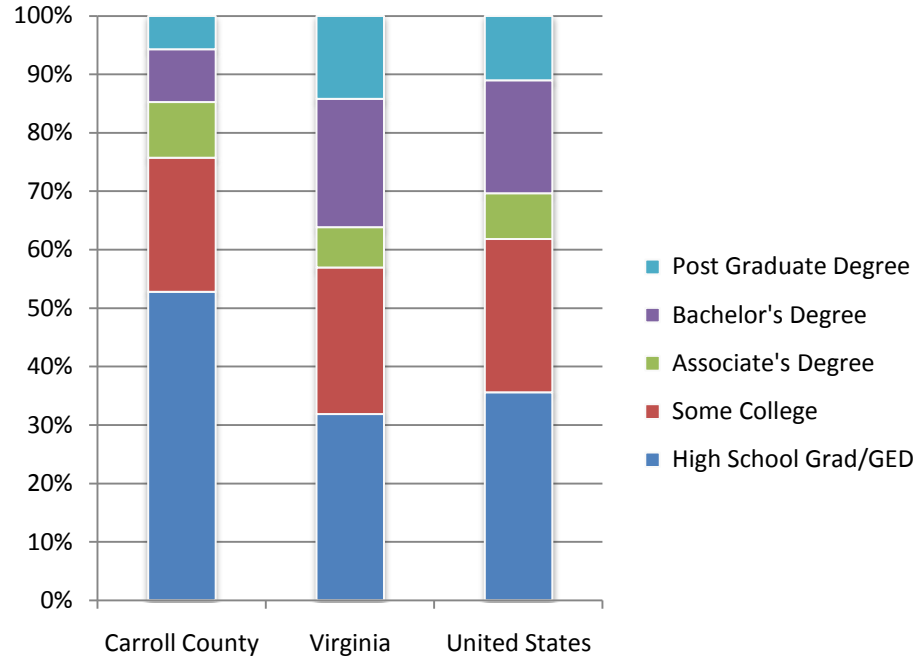
Table 10: Educational Attainment

Level Attained	Population
Population 25 years and over	21,604
Less than 9th grade	2,446
9th to 12th grade, no diploma	3,381
High school graduate (includes equivalency)	8,088
Some college, no degree	3,339
Associate's degree	1,439
Bachelor's degree	1,989
Graduate or professional degree	922

Source: U.S Census 2006 – 2008 ACS

Chart 7 below is an illustration of the difference between educational attainment levels of the County, the State and the United States. Carroll County lags behind both. Various factors attributing to this include the agricultural nature of the County, the overall age pattern and the lack of retention of high school graduates within the County. Data obtained from the Virginia Employment Commission allows us to gain a better understanding of the graduation rates of more recent years.

Chart 7: Educational Attainment



Source: 2000 U.S. Census / VEC

Chapter 4. Land Use

In a nutshell - Carroll County is located in Southwestern Virginia, bordered by Patrick County to the southeast, Floyd County to the east, Pulaski and Wythe Counties to the north, Grayson County and the City of Galax to the west, and Surry County, North Carolina to the south. The county was formed primarily from Grayson County, in 1842, and partly from Patrick County, in 1954. The Town of Hillsville is the County Seat and lies near the geographic center of the county. There are five magisterial districts in the County – Fancy Gap, Laurel Fork, Pine Creek, Pipers Gap, and Sulphur Springs. Land area totals approximately 494 square miles (316,160 acres), most of which is gentle rolling land, and includes forests, agriculture and open space, and the Jefferson Nation Forest in the northwest corner. Local relief (difference in elevation between highest and lowest points) is 2,470 feet. A base map is shown as **Map 1.**

Introduction

Addressing public safety, convenience and welfare needs of all Virginians is a fundamental reason the state of Virginia has mandated that all local governments plan for the future. The Code of Virginia, specifically Title 15.2, Chapter 22, outlines the legislative intent of the state with respect to the laws and statutes every county, town and city must follow regarding the planning and regulation of land within its political boundaries.

Localities in Virginia plan for two major reasons: state law mandates that every local government in Virginia prepare and adopt a comprehensive plan (§ 15.2-2223), and to prepare for and cope with change. Change is inevitable, and whether it is a positive or negative force may depend on the effectiveness of the community's planning efforts in managing change.

The Comprehensive Plan is the foundation for all decision-making, not just those involving land use planning.

Map 1: Carroll County Base Map

Using Planning To Protect Agriculture

Agriculture is an intrinsic part of life in Carroll County, contributing to the County's heritage and economic health. Agriculture has been the predominant force behind the historic development and settlement patterns of the County. The County and its citizens recognize the importance of preserving and maintaining agriculture's role in the overall economy and life of the County and of preserving natural resources for the future residents of the communities in the County. Croplands and forested areas are shown in **Map 2.**

A key challenge of this Plan is to protect agricultural uses from encroachment by non-agricultural development.

In 2007, the 1,001 farms in Carroll County created agricultural sales of nearly $34 million, employing 1,194 people. The total economic impact of agriculture in Carroll County in 2007 was estimated to be $155 million, including the local economic impact for supplies and services provided by local merchants, further procession of commodities grown in Carroll County, and commodities grown outside the County but processed in the County to add additional value[1].

The importance of agriculture is not solely economic. Food safety and security are also a growing concern. As communities increase their resilience to natural and man-made disasters, there is an increased awareness of the importance of having productive farms "close to home." Rising production costs, including fuel, fertilizer, feed and land, have generated interest in growing food closer to home, thereby saving consumers money.

The total economic impact of agriculture in Carroll County in 2007 was estimated at $155 million.

Supporting agriculture is meaningful even for those not actively employed in agriculture. Eating "locally grown" has become a lifestyle for many people looking to improve their health, reduce their impact on the environment, and support local farms and the local economy. Community Supported Agriculture (CSA) is one example of the locally grown movement. CSA programs are cooperatives that bring the farmer and the consumers together, enabling consumers to buy shares of a harvest, keeping money in the local economy and bringing consumers into closer contact with food producers and the environment.

The success of the Southwest Virginia Farmers Market shows the support for locally grown produce in Carroll County. It is not only the sales of products at the Market, but also the

[1] *Sources:* NASS 2001/2007 Agricultural Census Report.

festivals, events and social contact that occurs at the Market that shows community support for agriculture.

But, while its value is clear, the sustainability of agriculture in Carroll County is not guaranteed. One of the biggest threats to agricultural operations is the subdivision and development of land in rural areas. Development can fragment agricultural lands, reducing the long-term viability of agriculture. Conflicts between non-agricultural development and agricultural uses are detrimental to everyone involved.

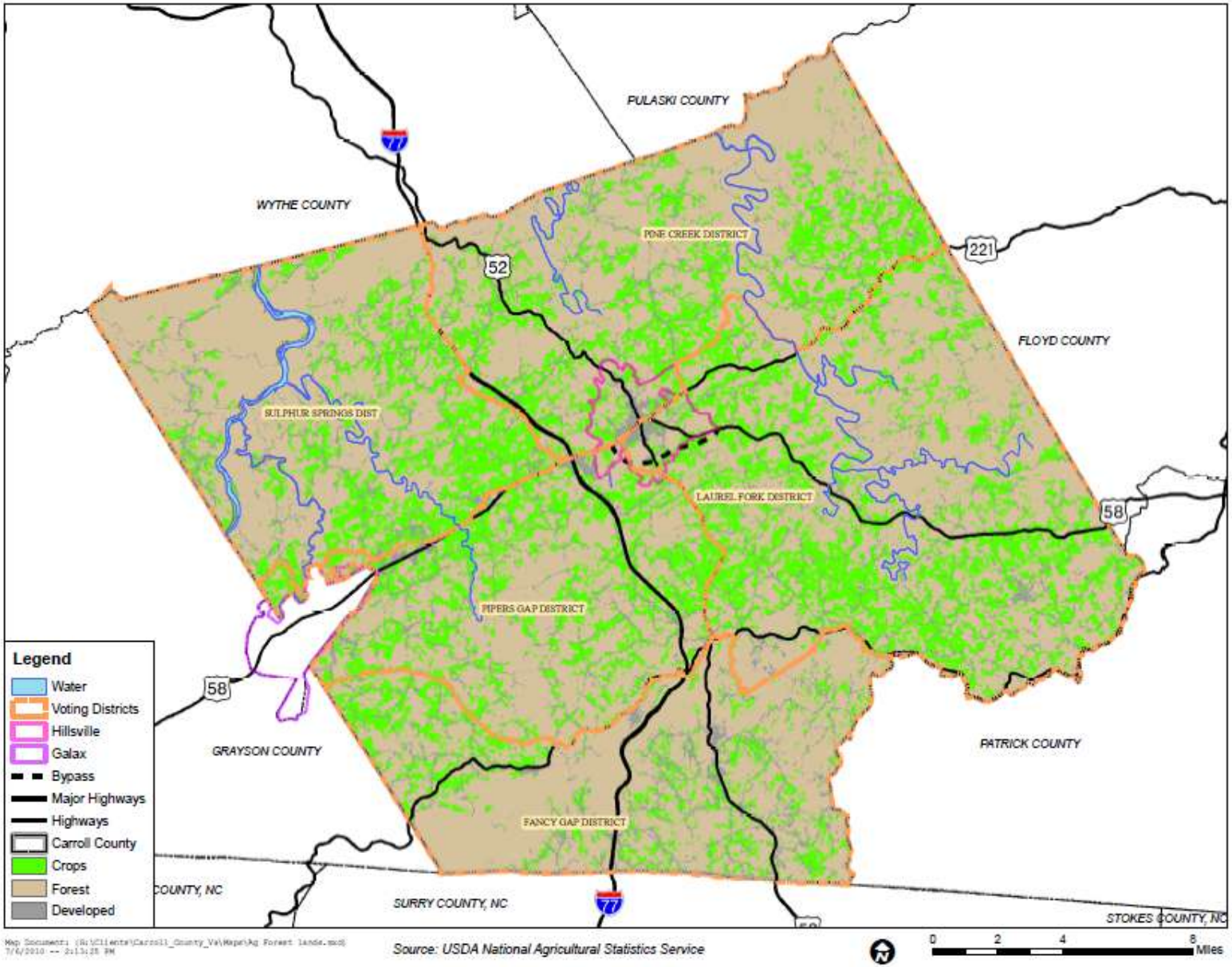
According to the American Farmland Trust (AFT), every year 1.2 million acres of the nations' farmland is taken over for development. Nationwide, more than 4 million acres of active agricultural land were developed from 2002-2007. Carroll County must develop strategies to slow this trend and recognize the implications of a declining local agricultural base.

A key challenge of this Plan and any subsequent land development regulations is to protect agricultural uses from encroachment by non-agricultural development, while still allowing opportunities for a wide variety of needed development types. As discussed in the Future Land Use section, the Land Evaluation and Suitability Analysis model and the Tiers system delineate areas most appropriate for agricultural preservation and establish policies to prevent incompatible or intensive development.

In addition to loss of prime farmland, there are other challenges for on-going agricultural operations and development. It is becoming increasingly difficult to survive economically in the farming business due to high expenses, lack of markets and environmental concerns. Agricultural operations will be changing hands as aging farmers retire, and the future of agricultural practices as they exist is uncertain. Large estate taxes play a role in whether the land will remain agricultural or transition to residential development.

However, there are many emerging markets for local agricultural products. Expanding markets for local agricultural products, local-value added food manufacturing and production present opportunities for local farmers and processors. Such opportunities include "farms to schools" programs that put fresh, local produce into schools and other institutional cafeterias; organic and sustainably grown products; and agri-tourism, including "pick your own" operations.

Map 2: Agricultural and Forested Lands



Agricultural Land Use Challenges

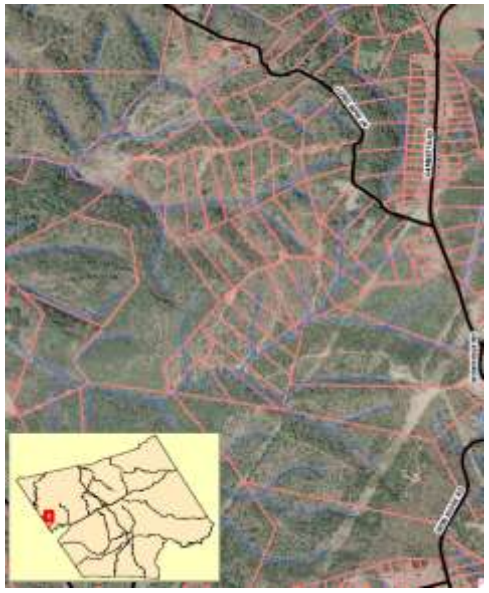
There are a number of challenges to agriculture and efficient land management attributable to past planning and development review outcomes. The timing of the Comprehensive Plan with additional County geographic information system (GIS) capabilities allows stakeholders and decision-makers the opportunity to learn from past practices via a birds eye (albeit riding atop a satellite in geosynchronous orbit) view of development patterns, parcel boundaries and natural features. As shown in **Chart 8**, there are numerous examples, countywide, of planning practices that shouldn't be repeated if we are to protect agriculture, efficiently manage our fiscal resources and create a quality place for our families and businesses.

"Burn down your cities and leave our farms, and your cities will spring up again as if by magic; but destroy our farms, and grass will grow in the streets of every city in the country."

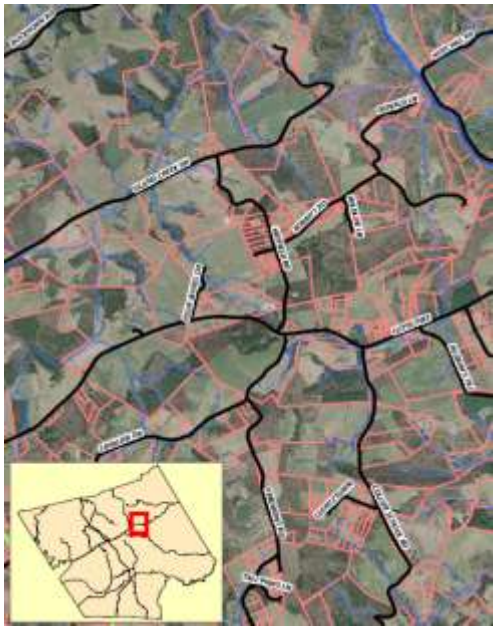
- William Jennings Bryan, July 9, 1896

Chart 8: Land Use Challenges

Inadequate roadway access (too many lots for one access road, which also is on a curve and hill), too compact to preserve woodlands or open space, incompatible with adjacent farmland.



Accessibility was not considered (lots with no direct and legal access to right-of-way – roads in black), no rational pattern of subdivision (a spider web of lots), drainage was not considered (blue lines are creeks and streams).



No rational subdivision or development pattern (another spider web), many lots without access to right-of-way, irregular-shaped lots, little consideration of drainage, small lots adjacent to and encroaching on active farms (future nuisance complaints).

This is not a rural subdivision but a series of rural cul-de-sacs (concerns for public safety, turnarounds and connectivity), large lots (future subdivision?) with no access to right-of-way, ultra-compact development at lower right corner not compatible.

Smart Growth is growth that is fiscally sound and environmentally responsible. Among other components, this means efficient provision of infrastructure and a greater emphasis on the mix of uses, transportation options and environmental sensitivity. Smart Growth cannot be achieved through the use of a single tool that accomplishes all of the community's objectives, but is achieved through the use of an integrated approach that uses carefully chosen tools calibrated to the County's needs and ability to implement specific programs.

Sprawl refers to unplanned, single use, auto dependent development built without regard to availability of infrastructure, facilities and services. Smart Growth is the antithesis of sprawl. Unplanned growth can produce negative externalities, such as fostering more growth in areas that are unsuitable due to environmental constraints. It can create traffic congestion and overcrowded schools. If unplanned, low density development prevents the orderly growth of urban development contiguous to the existing urban center, it can cause long-term fiscal stress for a jurisdiction. New growth should be planned in order to generate positive fiscal impacts and not burden current residents with higher taxes to pay for infrastructure that primarily serves new residents.

Smart Growth channels new development to areas already served with infrastructure, or into areas where infrastructure provision is planned, and is referenced in the in a CIP. Smart growth does not seek to change the character of the community, but instead builds on the community's existing characteristics and supports amenities that improve the quality of life for residents. It is a framework for achieving Carroll County's vision for the future.

"Growth has helped fuel … unparalleled economic and population boom and has enabled millions … to realize the enduring dream of home ownership … but sprawl has created enormous costs… Ironically, unchecked sprawl has shifted from an engine of … growth to a force that now threatens to inhibit growth and degrade the quality of our life."

Beyond Sprawl, 1995
Bank of America

Protecting Ag Supports Economic Development

Smart growth policies that protect agricultural lands also promote economic development countywide. Economic vitality includes larger disposable income for residents, a larger tax base and an increased standard of living community-wide. The economic stability of a community is based, in part, on providing employment and development opportunities, including research and educational facilities. Using Smart Growth to protect agriculture also means requiring efficient development patterns, which can be designed to support and advocate economic stability. The American Economic Development Council believes that when smart growth concepts succeed, so do agriculture and rural prosperity.

The County has a strong agricultural economy. Though the County has experienced a loss of farms and farmland, new markets for agricultural products provide opportunities for local farmers. For example, local food markets capitalize on the growing interest in supporting alternatives to imported foods that are better for human health and food security, the environment and the stability of the economy. Supporting agriculture as a critical component of economic development is important even for those not actively employed in agriculture.

Protecting Ag Promotes Land Use Compatibility

One of the primary purposes of the planning process is to ensure compatibility among various land uses in order to preserve and protect the health, safety and general welfare of the populous. Future land use planning provides predictability and security by protecting property values and public and private investments in property improvements. Land use compatibility provides compatible edges between communities, ensures adequate transportation network capacity and establishes connectivity between existing and new development.

Key components of land use compatibility include the intensity of development and how transitions between uses are addressed. Intensity of use is measured by density in residential zones – typically dwelling units per acre. In commercial areas, intensity is typically measured by floor area ratio (FAR), which compares the area of a building's footprint on a lot to the amount of total area that the building is allowed to encompass. A higher FAR ratio indicates a more intense land use.

Land use compatibility issues include how well a proposed land use achieves the goals of the Comprehensive Plan, if there are adequate facilities to serve the proposed use, and how performance standards can be used to promote employment and economic growth while protecting residential areas from noise, traffic, fumes and other externalities.

Protecting Ag Creates Efficient Development Patterns

While rural, large lot development is a popular lifestyle option, it is also resource-intensive, expensive to serve, overly consumptive of land, and results in excessive vehicle miles traveled. This low-density subdivision pattern is neither urban nor rural, a pattern that requires urban facilities and services but is not dense enough to fiscally support such services. Continued

CARROLL COUNTY AG HIGHLIGHTS

- ***Pumpkins - #1 in Virginia***
- ***Vegetables - #4 in Virginia***
- ***Tomatoes - #4 in Virginia***
- ***Cattle & Calves - #5 in Virginia***
- ***Fruit - #7 in Virginia***
- ***Apples - #8 in Virginia***

sprawl development erodes the County's scenic appeal, threatens the viability of agricultural operations, and undercuts the County's fiscal stability.

Efficient land use planning results in compact, mixed-use development served by adequate facilities and services that minimizes impacts on the environment and supports land and resource conservation. An effective growth management strategy based on Growth Tiers, as set forth by this Plan, directs intensive growth to appropriate areas served by facilities and services, and preserves rural areas for open space, agricultural and less intensive rural uses. The Tier system, by establishing specific levels of service, helps in directing growth to appropriate areas of the county while preserving the rural character and agriculturally significant areas.

Protecting Ag Protects the Food Supply

Agriculture in the United States is the envy of the world, because of its ability to provide a safe and economical source of food. America's agricultural landscape, products, and methods are exceptionally diverse-- ranging from compact practices to open fields, feedyards, pastures, public auctions and farmer's markets. The economic value of these products is based on the abundance of animals and crops, made possible through successful farming techniques. Its value, as America's food supply, is among the most important, most vulnerable and least protected of all potential targets of terrorists. With exposed fields, farms, and feedlots, our livestock industry is considered a "soft" target in military terms.

Agriculture is one example of what can be called a critical infrastructure, or a system without which our society cannot function. The contribution of agriculture to the overall economy is undeniable and includes over $1 trillion per year, or approximately one-sixth of our gross domestic product. As the nation's largest employer, it includes one out of eight Americans, who are involved in food production, distribution, or sales.

What is Agriculture Security?

Our trust in the modern food system (we have unparalleled access to food from around the world) is so strong that many have come to take local agriculture for granted. The potential for a breach of food security and/or skyrocketing costs seems increasingly more likely. Relying on global markets as a main source of our food at the expense of a local food supply system seems increasingly more questionable. The need for a comprehensive plan to protect the food production system has emerged as a critical issue over the last several

The issue of food security is critical to a local ag-based economy.

years. Partnerships—the best way to protect our food supply – requires the cooperation and coordination of local farmers, truckers, feedlot owners, and other critical members of the food-supply chain such as veterinarians and animal and plant health inspectors.

Communities throughout the United States are taking stock of what food and key items are being produced locally (within a 100-mile radius) and identifying gaps in production. These are first steps to securing on-going access to vital resources and addressing the issue of food security as critical to a local economy. Emphasis on a localized economy will favor small-scale localized diverse industry over mass-marketed products.

- **Protect the national and international food chain from natural and manmade events.** Security from events that have a widespread negative effect on the food chain, such as transportation disruptions, weather events, water shortage, food-borne illness, energy supply scarcity, protection of research facilities and other components of the nation food system.
- **Viability of Local Farm/Local Food System.** Security by promoting economic viability of the local agriculture sector through management practices, resource preservation, product diversity, value added activities, direct marketing and complimentary uses.
- **Affordable access to food.** Security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

The goal for rural communities is to establish a system that protects agricultural operations, protects the local economy, secures the local food supply and identifies threats to agriculture before they become incidents. A broad range of tools, including communication, partnerships, agricultural districts, community policing (Agro-Guard and Consolidated American Network for Agriculture Resource Intelligence (CANARI) are two common programs) can facilitate the transition towards a reliable and secure local, and regional, food supply.

Planning for Change

The Virginia Code (§ 15.2-2224) identifies four primary tools communities can use to implement local plans - the Official Map, Subdivision Regulations, Zoning Regulations and the CIP. These tools are identified in the land use element to emphasize their importance in helping coordinate land use policy in a systematic and logical manner. Carroll County is committed to developing a Comprehensive Plan that remembers our history, preserves our lifestyle, protect fiscal resources and protects agricultural areas for future generations.

Official Map

The Carroll County Official Map is actually the series of maps found in the Comprehensive Plan. Identifying all of the necessary components on a single map, such as public facilities, streets, growth areas and future land uses, would produce an image only decipherable in an electronic format. Using a series of specific purpose [official] maps is a more manageable and usable approach. By showing the area on the Official Map, the County furthers the implementation of the Plan by establishing the location of existing and proposed streets, open space, parks, other public lands and facilities, waterways and floodplain, informing property owners and developers of planned public improvements and land and easement acquisitions. The Official Map identifies private and public lands for which the public may have a current or future need, identifies and protects future improvements and extensions of the municipal road network and provides notification of the location of potential public improvements and acquisitions, thus preventing construction within future rights-of-way and other future public areas and conservation easements. This provides for the coordination of public and private goals as property owners are informed early in the capital improvements planning process of long-range County goals for public facilities and services which allows development plans to be adjusted before detailed and costly plans are prepared.

The Official Map is not a zoning map and it does not imply County responsibility for maintaining or improving mapped roads or facilities. The inclusion of proposed right-of-way, easement or other public facility does not constitute the opening or establishment of the street, the taking or acceptance of land or obligate the County to improve or maintain such streets or land until the time of dedication or purchase. The Official Map is not a taking of land; it does not prevent use of all land rights on mapped parcels. Inclusion of a parcel within the Official Map indicates the

need for additional review to ensure that the proposed use or development is compatible with existing or planned County facilities, and that development will not preclude efficient building or operation of such facilities.

Subdivision Regulations

"Subdivision" means the division of any parcel of land into a number of lots, blocks or sites as specified in a local ordinance, law, rule or regulation, with or without streets or highways, for the purpose of sale, transfer of ownership, or development. The term "subdivision" may include any alteration of lot lines or dimensions of any lots or sites shown on a plat previously approved and filed in the office of the county clerk or register of the county in which such plat is located. Subdivisions may be defined and delineated by local regulation, as either "major" or "minor", with the review procedures and criteria for each set forth in such local regulations.

Subdivision regulations set standards for streets, drainage ways, sewage disposal, water systems, and other aspects of public welfare. They are needed to protect communities and ensure building lots provide a wholesome living environment for future residents. These regulations ensure adequate lot size, public access and the availability of public services to each lot created. They also help to conserve natural, scenic, historic and recreational areas. Subdivision regulations also eliminate the need for excessive public expenditures by making the developer responsible for the installation of basic public facilities before the recording and sale of lots.

The Plan will not impact the standards and requirements of the Carroll County Subdivision Regulations.

Zoning Regulations

Zoning divides a locality into specific districts and establishes regulations concerning the use, placement, spacing and size of land and buildings within the respective districts. Zoning is intended to avoid disruptive land use patterns by preventing activities on one property from generating external effects that are detrimental to other properties. Zoning ordinances, if drafted by the planning commission and adopted by the governing body, must feature text describing each district and the district regulations, as well as a map detailing the location and extent of each district throughout the community.

Development regulations are considered the quintessential tool of plan implementation.

To be effective, zoning ordinances need to reflect the views of how land within a jurisdiction can, or should, be used at the present time, as well as in the future. These views should be reflected in the community's comprehensive plan. Thus, when a property owner petitions a locality for a rezoning (zoning map amendment), the planning staff, planning commission and the local governing body must refer to the comprehensive plan to determine if the rezoning request comports with the plan's goals, objectives, policies and vision. Indeed, the planning commission and the governing body must each hold public hearings before acting on any rezoning proposal. In addition to hearing the public's perspective regarding the proposed rezoning, the commission and governing body alike must identify and share the facts and findings each body used in deciding to support or reject the proposed rezoning.

Zoning regulations, in both theory and practice, must be consistent with the Comprehensive Plan - this is a mandate in Virginia and more than half of the states nationwide. This does not necessarily mean that a community should zone to the plan, which means to rezone property to conform to the planned future land use map. Rather, it means that the development standards pertaining to various districts and land uses should reflect the goals and policies set forth in the comprehensive plan. At present, Carroll County does not rely on zoning, and it is important to understand that the Comprehensive Plan is not another name for zoning.

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Zoning for Agriculture

Large lot zoning is one of the techniques in a more inclusive category of zoning techniques called agricultural zoning or agricultural protection zoning. Agricultural zoning simply requires that the minimum lot size in a designated rural zoning district is set at a large enough size to protect agricultural activities from excessive encroachment of residential and other non-agricultural land uses. In Virginia, many counties use large lot zoning.[2] In particular, Virginia counties with a large agricultural industry rely on many farm owners and operators to help protect farms and rural areas from the encroachment of residential and other urban land uses.

[2] Examples of Agricultural and Large Lot Zoning in Virginia, with their minimum lot sizes identified, include Accomack County (5 acre minimum lot size), Amelia County (5 acre minimum lot size), Fauquier County (25 to 50 acre minimum lot size), Hanover County (10 acre minimum lot size), Isle of Wight County (40 acre minimum lot size), Loudoun County (20 to 40 acre minimum lot size), Powhatan County (10 acre minimum lot size), Prince William County (10 acre minimum lot size) and Rappahannock County (25 acre minimum lot size). Of these, Accomack. Fauquier, Hanover, Isle of Wight, and Loudoun also encourage clustering to preserve agricultural lands.

Agricultural and large lot zoning limits the intensity of rural development by dispersing new houses in a low density pattern. It reduces the immediate development pressure on farmland, but is not a permanent measure. When establishing large lot zoning regulations, care must be given to ensure that landowners continue to be permitted a reasonable use of their property.

The concept of agricultural zoning is very flexible. It can be broadly or narrowly defined, as needed, to accomplish the goals the County is attempting to achieve. It also can be used to prevent intense subdivision of land, or discourage non-ag uses, adjacent to farms. Through the numerous discussions that have taken place during the planning process, Carroll County absolutely concurs with the sentiment repeatedly heard and offered by the Farm Bureau that the role for development regulations in agricultural areas isn't about taking away rights, but protecting farm investment and protecting public health and safety.

Agricultural zoning can be used as an incentive, to encourage the location of agricultural businesses and support services in appropriate areas. It also can be used to promote the clustering of lots, homes and structures on agricultural lands in order to protect other areas for agricultural uses, and promote development on lands that have easy access to highways and are served by public water and sewer. By promoting more compact development patterns, the County can reduce the amount of land needed for new development; retain more land for conservation and agricultural purposes.

Other frequently used tools for agricultural preservation include nuisance easements (also referred to as 'right to farm' easements, conservation easements and supporting property tax incentives.

- Nuisance easements may be placed on any property in an agricultural area as a condition of development. Future property owners are notified through the easement that their property might be negatively impacted by nearby farm operations, and they are restricted from taking legal action against agricultural uses for creating "nuisances," such as noise or odor.
- Conservation easements allow agricultural property owners to voluntarily restrict the right to develop their land. Related to this are Transfer or Purchase of Development Right (TDR) programs. These programs allow a farmer to voluntarily give up the

development rights of their property, and transfer or sell those development rights to a developer in an area that is more appropriate for development. The farmer generally receives a cash payment and tax benefits, and the developer is allowed to develop at higher intensities than would otherwise have been possible. TDR programs are now permissible in Virginia.

- Common tax incentives include differential or preferential taxation. Differential taxation ensures that a parcel is taxed at its value for agricultural use, rather than for its potential value as developed property to reduce the tax burden on farmers. Preferential taxation taxes property at a lower rate in exchange for the property owner agreeing to not develop for an agreed upon time period in order to slow potential conversion of agricultural land to development (there also may be federal tax credits available for lands used and conserved as farms).
- Farm Priority Areas (FPAs) can be established, which are smaller than exclusive agricultural zoning districts, but may cross political jurisdictions. FPAs can be designed to require that any development must serve farms or farming families in the area.
- Small-Acreage Farming Areas (SAFAs) are a type of exclusive agricultural zoning district, with a minimum lot size of less than 35 acres. These areas can be established to support Community Supported Agriculture (CSA) farms, including vegetable or other specialty farms that don't require large amounts of land and may be less intensive than other commercial farming operations.

Capital Improvement Program

The CIP is an important tool that ensures the County has the capacity to provide and maintain necessary public facilities and services and that the facilities and services are cost-effectively planned and equitably financed. A short-range CIP (and budget) should identify and estimate costs of capital improvements and annual obligations (for staffing, training, etc.) required to serve development for a 5- to 10-year period, whereas a long-range CIP (and budget) should identify and estimate costs of improvements and annual obligations needed to serve development for a 10- to 20-year period. As part of the planning process, and updated with each annual CIP and budgetary process, the County will use the new CIP to guide the development of facilities and services in a sustainable, planned manner. Projects within the CIP

would be prioritized to identify which are most important and critical, such as by the following factors:

- Removes/prevents imminent threat to public health or safety;
- Improves the quality / corrects deficiency of existing services;
- Provides incentive for economic development;
- Reduces long-term operating costs;
- Improves efficiency; and
- Furthers the goals of the Comprehensive Plan.

The "2232" Review

The comprehensive plan is considered advisory and it serves as a guide for the physical development of the territory within the locality's jurisdiction. However, according to § 15.2-2232 of the Virginia Code, the comprehensive plan —shall control the general and approximate location, character, and extent of each feature shown. Thus, while the comprehensive plan itself does not directly regulate land use, the plan does have status as a fundamental instrument of land use control once it is adopted by the local governing body.

Section 15.2-2232 provides that unless a feature is already shown on the adopted plan, no street or connection to an existing street, park or other public area, public building or public structure, public utility facility or public service corporation, whether publicly or privately owned, shall be constructed, established or authorized until its location has been approved by the local planning commission as being substantially in accord with the adopted comprehensive plan.

Growth Boundaries / Community Services Boundaries

A growth boundary, also called a community services boundary, is an officially adopted and mapped line beyond which the local government does not support development for a specified period of time. Growth and service boundaries are planning tools that promote more efficient, orderly, and compact development. For communities adopting them, they are two components of a growth management program designed to uphold community character, protect water and

other natural resources, promote efficient development and use of public infrastructure, stimulate community and economic development, and impart long term, comprehensive thinking about the community's future. Growth is supported inside the boundary with utilities and development-friendly policies. Growth is discouraged outside the boundary. Growth boundaries promote compact and contiguous development patterns that can be effectively served by public services and preserve open space, agricultural land, and environmentally sensitive areas that are not currently suitable for urban development. Growth boundaries also help:

- Manage leapfrog or sprawling development;
- Support densities needed for public transportation systems;
- Protect natural resources;
- Protect farmland so that it is viable for modern agriculture operations;
- Manage expenditures for urban services including road maintenance, water and sewer service provision, and police and fire protection.

Extensions of infrastructure, particularly water and sewer lines and major streets, significantly affect the timing and density of development. Community service areas (the area within a growth or services boundary) are the area in which certain public services, primarily water and sewer, will be provided and outside of which such services will not be extended thus discouraging development sprawl.

The Comprehensive Plan will designate areas which are planned for immediate or long-term utility service, coordinating development approvals and utility extensions to achieve an orderly and compact development pattern adjacent to existing developed area. Growth boundaries in Virginia are not zoning designations, but rather policy designations established in the comprehensive plan so as to guide decisions about rezoning applications and public

infrastructure investments.[3] As described in this element, a growth boundary and community service areas are identified as the Planned Growth Area Tier.

Service Districts

A service district is a defined area within which the County would plan for, coordinate and provide and maintain public facilities and services, such as water and sewer. Service Districts (sometimes called Special Service Districts) are legally defined geographic portions of a jurisdiction established by the local governing body.[4] They are created to provide additional, more complete, or more timely services of government than are desired in the locality as a whole. Property owners within the special service district may pay a higher tax rate in exchange for these enhanced services. The service district allows the County to develop and manage facilities and services more efficiently and cost effectively. A district of this type also could be used to stimulate infill development or economic development within its boundaries and provide a more efficient use of land in harmony with its natural characteristics; preserve more usable open space, agricultural land, tree cover, recreation areas or scenic vistas and expand the opportunity for the development of affordable housing. Service districts are easy to create and have a long history of use across the Commonwealth for the purposes listed above.

Building the Plan

The Carroll County Comprehensive Plan has been built around a methodology designed to serve as a development guide for decision-makers and stakeholders. To accomplish this task, past and current land use development patterns were examined and future patterns were projected based data and local preferences. The process, which will be described in detail in the following pages, can be summarized as follows:

1. Identify and analyze existing land uses and development patterns;

[3] *See* Virginia Code § 15.2-2223, *et seq*. Chesterfield and Hanover counties identify Planned Growth Areas (public water and sewer is required for development in the planned growth area). Chesterfield also has a Deferred Growth Area (no planned water and sewer extensions in this area, where development is discouraged).

[4] Sections 15.2-2400 through 15.2-2405 of the Code of Virginia grant localities the authority to create and fund service districts.

2. Use GIS (geographic information system) data to conduct a data-based land evaluation and suitability analysis;
3. Apply zonal statistics aggregate the raw data into parcel-based data and maps;
4. Identify and apply existing and planned water and sewer service areas, using centroid analysis to establish parcel-based service areas;
5. Refine the resulting data into broad Development Tiers, including an Agricultural Protection Tier, a Planned Growth Areas Tier and a Developed Areas Tier; and a matrix of future land uses applicable to each Tier, based on the need for and the availability and adequacy of public facilities and services.

Existing Land Use

Table 11 and Map 3 show existing land uses in Carroll County, which indicates the following trends:

- Residential development is the single most intensive use of developed land in rural areas. As the County expands, the demand for land for residential development far surpasses the demand for land for other uses. Carroll County has a relatively low projected rate of growth, but the greatest demand on the land will come from the residential sector.
- Suburban Residential uses, as designated by the Assessor, have sprawled across the County, encroaching into agricultural and rural areas, but are most prevalent west of I-77 and south of the Blue Ridge Parkway.
- Traditionally, commercial activity within the County has been limited to scattered small general merchandise stores located within farming communities, while high density commercial development has occurred only in the population centers of Hillsville and Galax. Evidence suggests a change in this historic pattern, however, as the commercial sector expands to meet the increasing demands of the population. Increased commercial activity of recent years has resulted in the development of commercial establishments along major roadways, principally Highways 58, 52, and 221. With the

completion of Interstate 77 through the County, income from travelers has played an expanding role in the commercial sector.

- Through the growth of manufacturing employment, industrial activity has become the dominant economic factor in the County's economy, and manufacturing jobs are now the predominant type of employment. In order to enhance the continued economic growth of the County and provide a stable and broad employment base to residents, the Comprehensive Plan emphasizes continued development of the industrial sector.
- It will only be a matter of a few years until development between Galax and Hillsville, along Highway 58, forms a continuous commercial corridor. Planning now, to anticipate *how* that corridor should look and operate is crucial.
- Opportunities abound for creating a purpose-driven activity center at Fancy Gap as well as other activity centers including recreation-based mixed use activity centers. The map also shows the potential for rural activity centers, ideal for rural businesses, along Highways 52 (in the south), 58 (in the southeast) and 221 (in the northeast).

Table 11: Existing Land Use

	Acres	Percent
Vacant	48,364	16.0%
Conservation	14,422	4.8%
Forestry	34,635	11.5%
Agricultural	165,700	54.9%
Suburban Residential	30,821	10.2%
Urban Residential	1,042	0.3%
Commercial	2,677	0.9%
Multi Family	71	0.0%
Public Quasi Public	3,605	1.2%
ROW	162	0.1%
Unknown	398	0.1%
Total	301,897	

Map 3: Existing Land Use

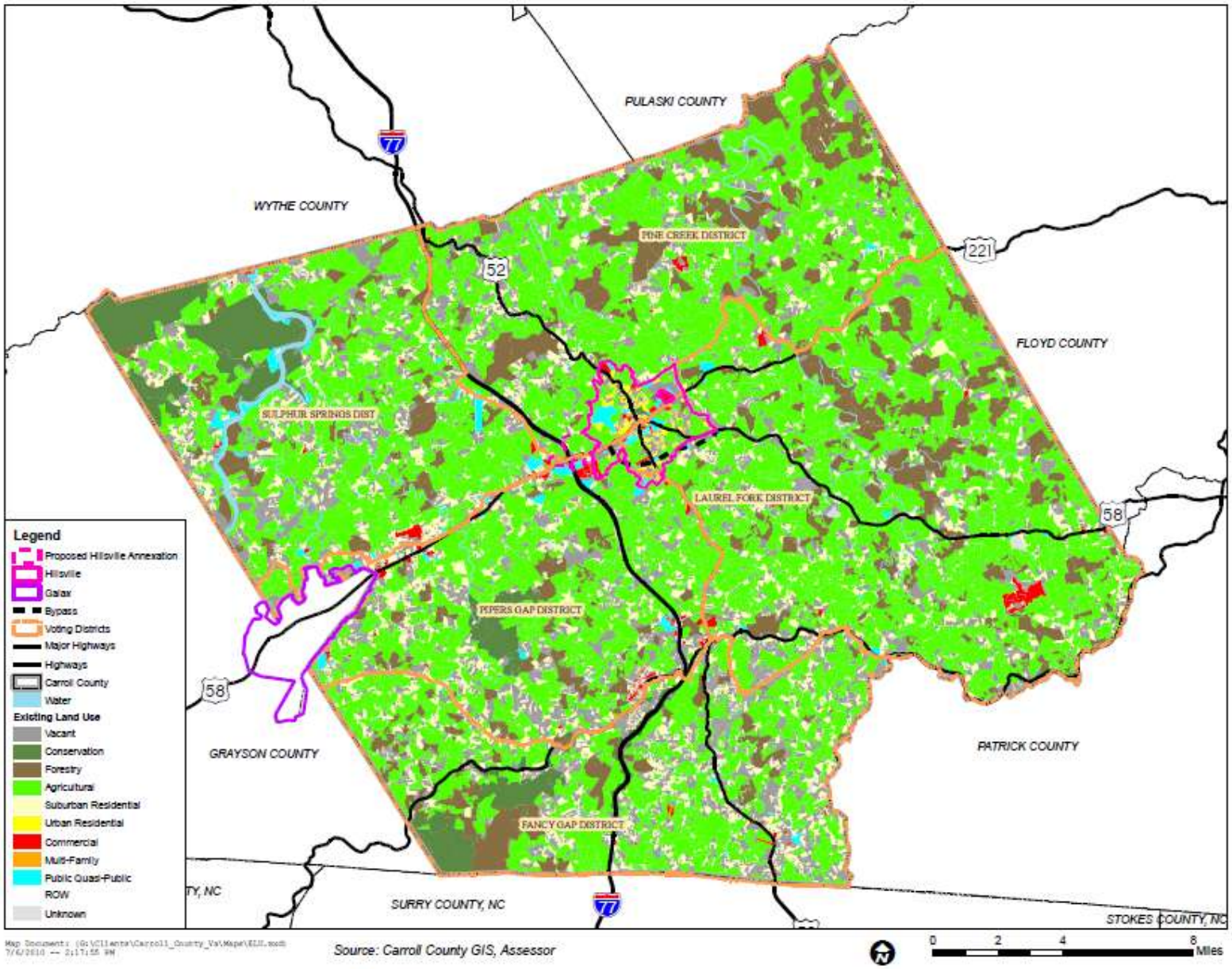
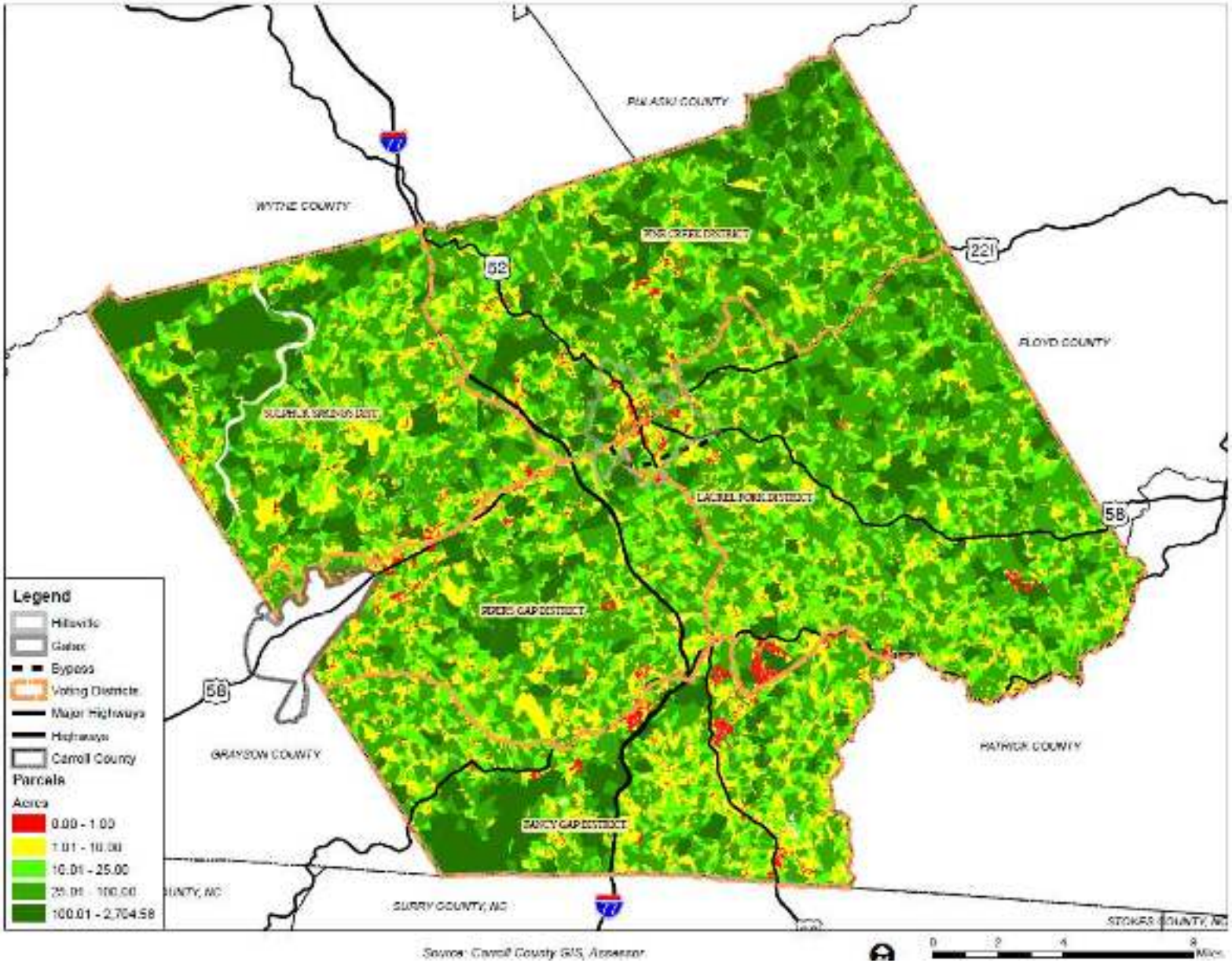


Table 12 and **Map 4** show the distribution and size of parcels throughout the County. **Map 5** is a "heat map" that identifies parcel density.

Table 12: Parcel Size Distribution

Size in Acres	Number of Parcels
0.00 - 1.00	14,606
1.01 - 10.00	13,155
10.01 - 25.00	3,166
25.01 - 100.00	2,753
100.01 +	383

Map 4: Parcel Size Distribution / Fragmentation



Map 5: Parcel Density

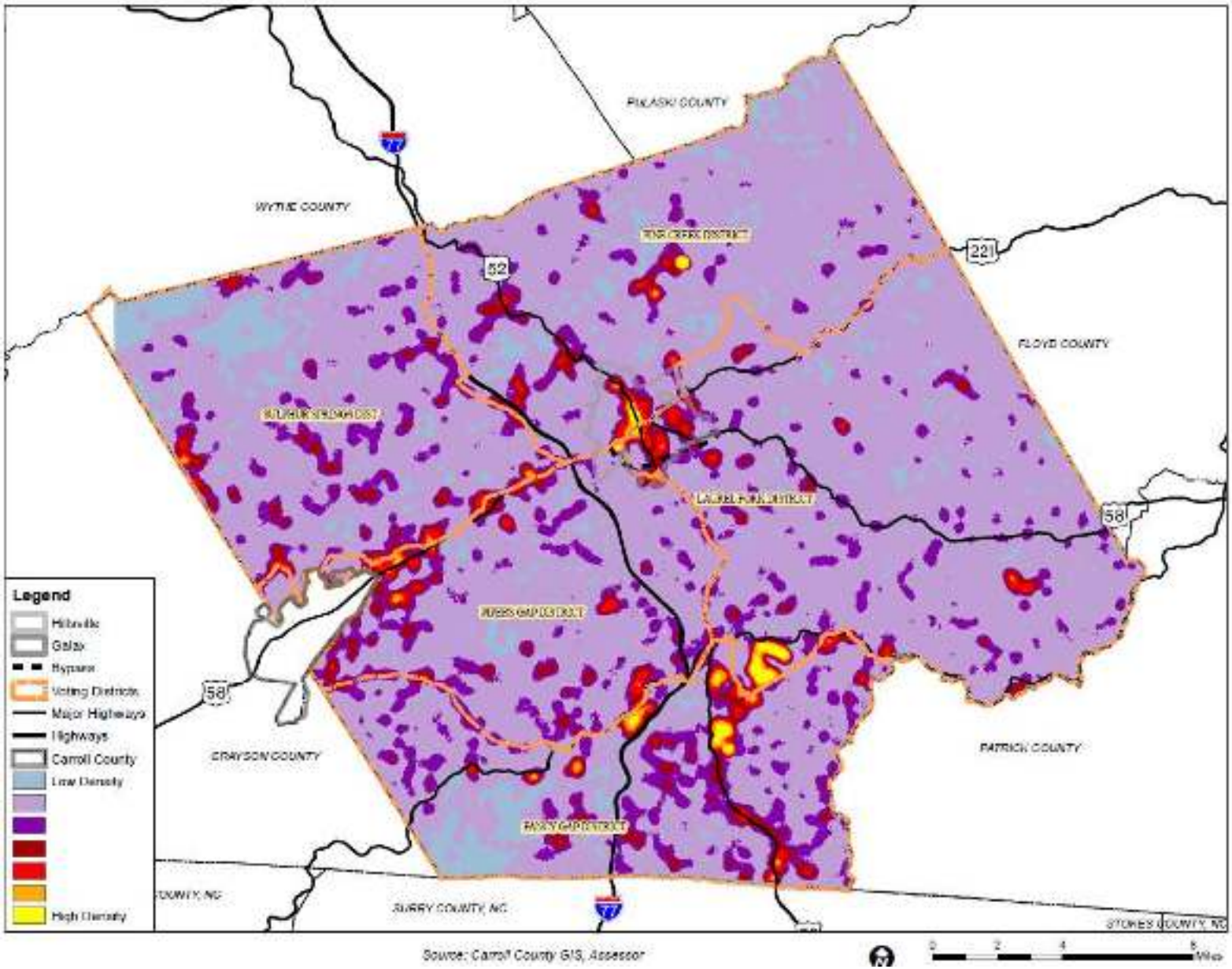
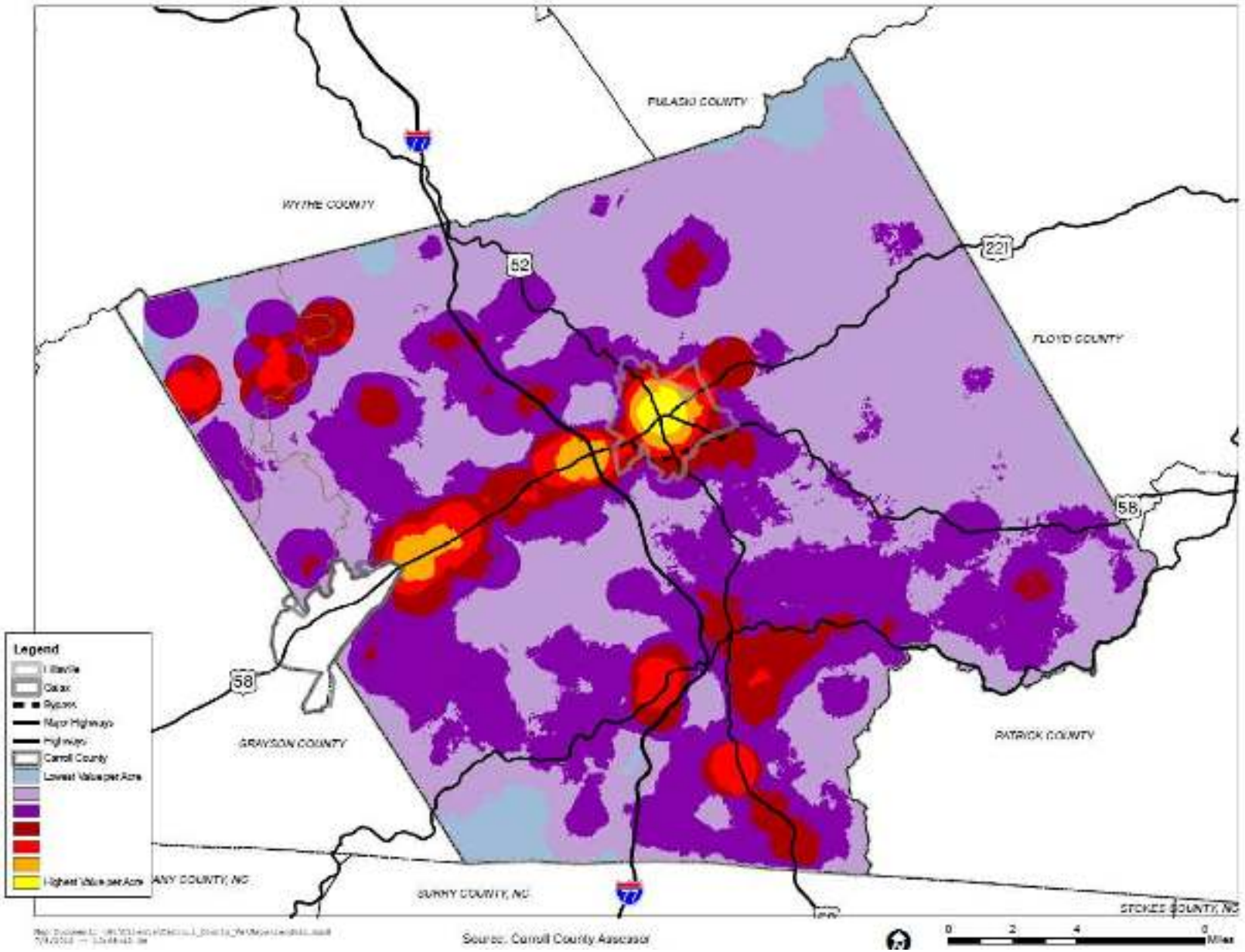


Table 13 shows the average assessed dollar value of building permits by district and the total assessed value of all building permits by district (districts are delineated in **Map 1**). The average value per acre is illustrated in **Map 6**. **Map 7** illustrates the relative assessed value per acre in the County. The average assessed value per acre is $10,926.

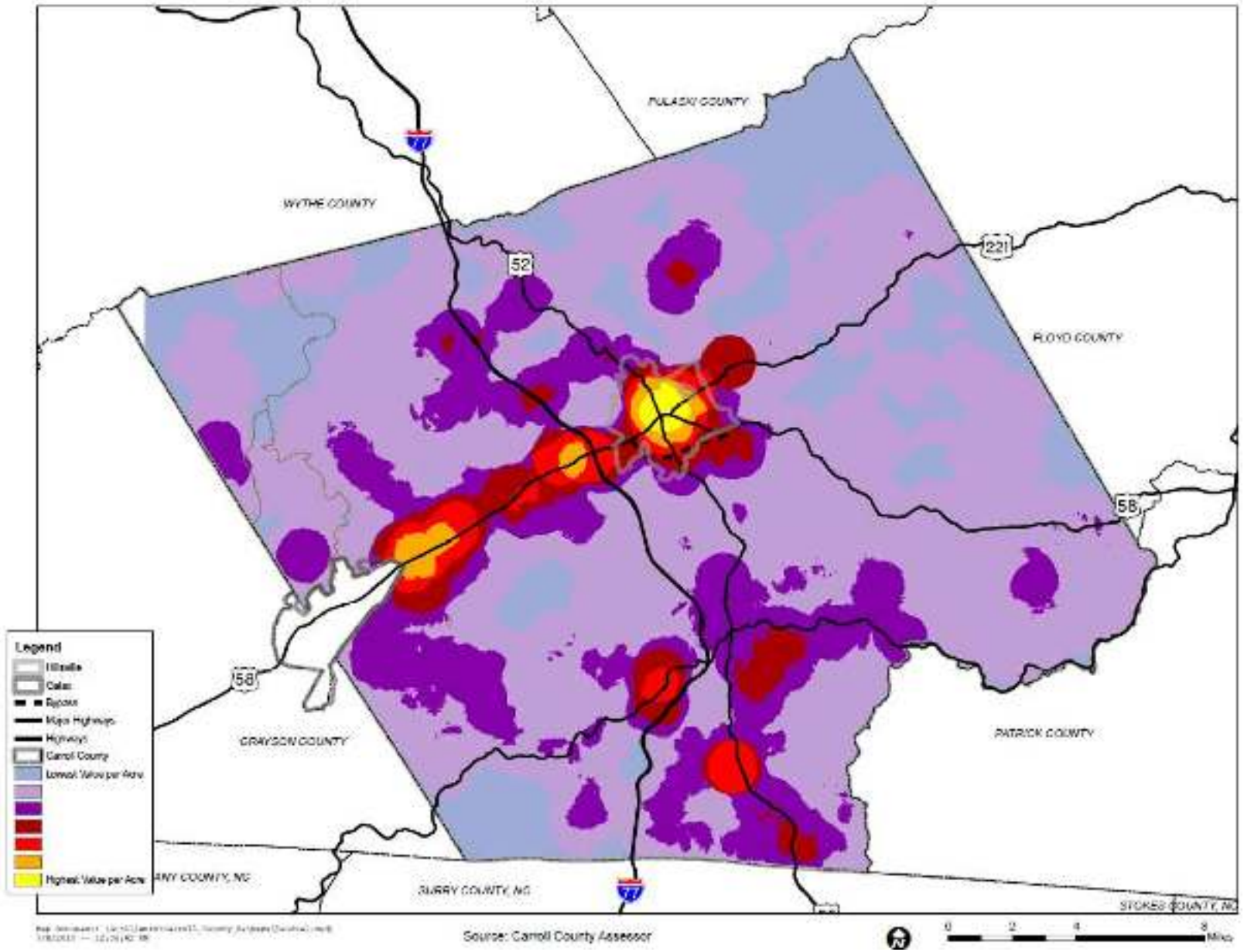
Table 13: Assessed Value of Building Permit Activity

District	Average Value Building Permit Activity	Total Value Building Permit Activity
Fancy Gap	$65,451	$46,732,000
Laurel Fork	$53,244	$37,696,600
Pine Creek	$51,011	$22,750,900
Pipers Gap	$58,036	$55,018,400
Sulphur Springs	$50,068	$42,357,800
Hillsville	$32,801	$9,643,500
Total	$54,132	$214,199,200

Map 6: Average Value Per Acre



Map 7: Building Permit Assessment Value



Land Evaluation and Suitability Analysis

A land development suitability model was developed to provide decision makers and interested parties with a quantitative tool for assessing the environmental and infrastructural opportunities and limitations within the County. The model incorporates a weighting procedure that allows the user to increase or decrease the relative importance of a variety of economic and natural resource factors. Factors are based on geographic information system (GIS) datasets assembled from multiple sources including local, state, federal and other non-governmental sources. A development suitability map is only one of many tools that are used in the preparation of a land use plan. A final land use plan cannot be simply generated directly from a suitability map; although it is possible to generate a conceptual-level map showing where development should occur from a suitability map. Three broad factor categories were used:

- Identify land suitable for agricultural protection;
- Identify environmentally sensitive land;
- Identify lands proximal to infrastructure and investment.

The purpose of a land use suitability analysis is to provide a rational, systematic guide for identifying areas which are more suitable for development, and identifying areas which should be maintained for rural or agricultural uses, or protected as conservation areas. The suitability analysis is created using (GIS) data, which is data that is registered to a geographic coordinate system. The fact that the data sets are registered to a coordinate system makes it possible to add up the values of the input data sets, to create an overall score that indicates the degree of development suitability at every point on the map within the Carroll County.

Various factors were weighted, as shown in **Table 15**, by applying multipliers that reflect judgments regarding the relative importance of each factor. A total of twenty-three factors were used to create the development suitability map for Carroll County. The source and content of these input data sets, and their relevance to land development suitability, is described in the following sections. Maps for each of the factors are shown following the table. After each factor is presented, a composite map (**Map 8**) shows the output based on the 22 factors, indicating development suitability based on the following presumptions:

- Low Suitability for Development (High Agricultural Sensitivity). In these areas, there is a presumption that land is not suitable for development. This does not preclude development, but requires a showing by the applicant that sufficient conditions exist that, should development occur, on- and off-site mitigation attributable to the proposed development is required and addressed.
- Moderate Suitability for Development (Moderate Agricultural Sensitivity). In these areas, there is no presumption regarding suitability (that land is suitable or not suitable for development).
- High Suitability for Development (Low Agricultural Sensitivity). In these areas, there is a presumption that land is suitable for development. This does not guarantee that a proposed development is appropriate for any specific location.

Table 14 shows the total land acreage in each suitability ranking.

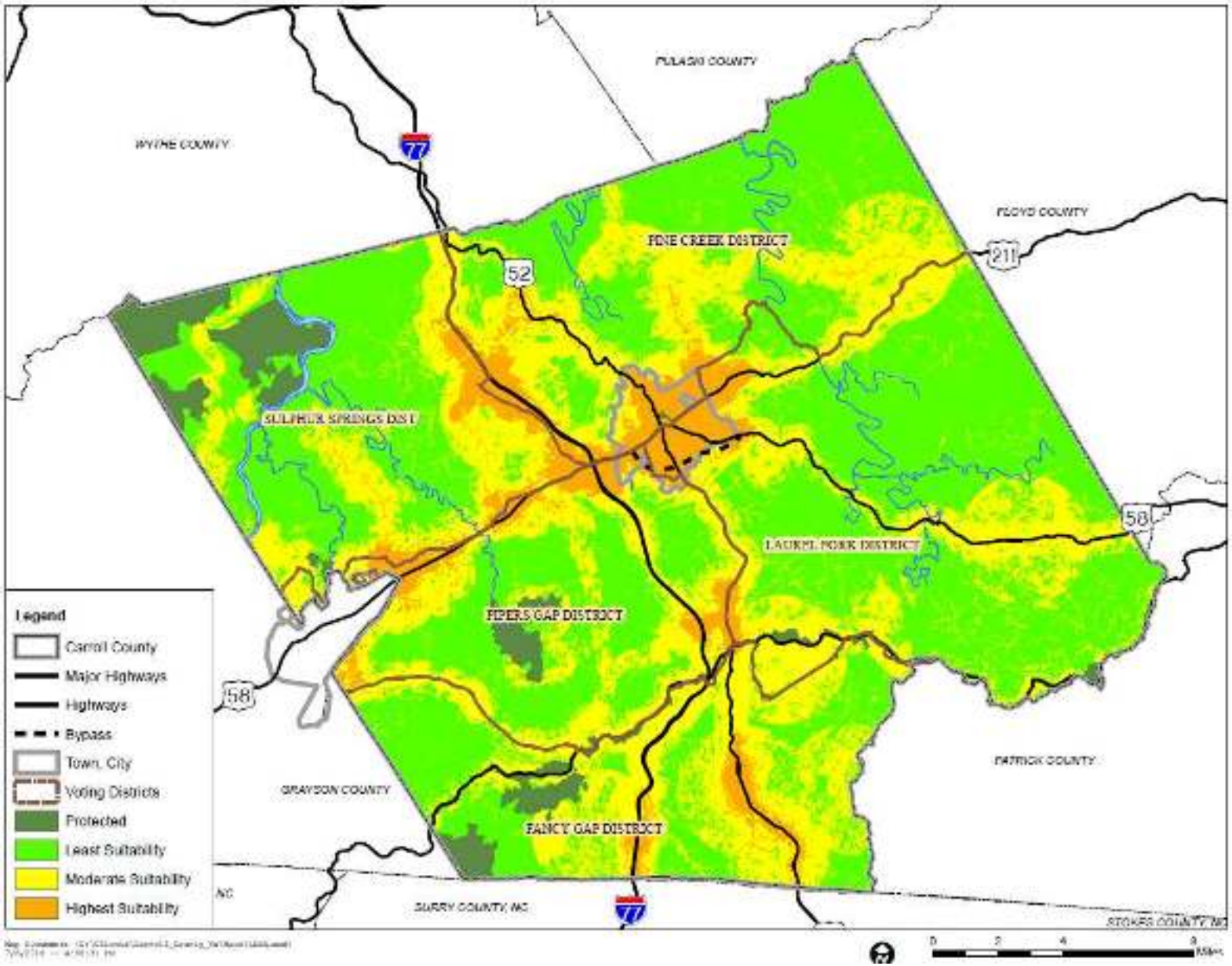
Table 14: Land Suitability Acreage

	Percent	Acres
Protected	5.3%	16,228
Least Suitability	53.0%	162,007
Moderate Suitability	34.4%	105,094
Highest Suitability	7.4%	22,504
		305,833

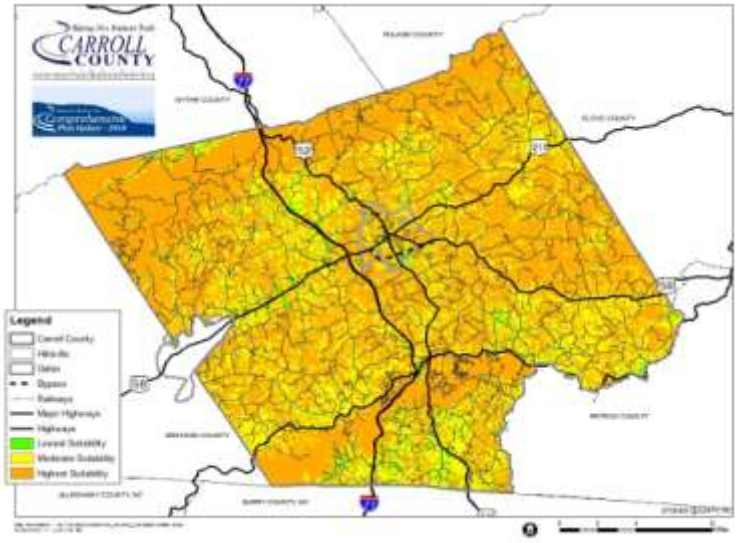
Table 15: Factors and Weighting Table

Land Evaluation and Suitability Analysis Factors			Presumption of Non-Ag Development Suitability			Factor Weighting	
			Low Suitability	Moderate Suitability	High Suitability		
Factor 1	**Identify land suitable for agricultural protection**						
1.1		Identify on-site agricultural use	Cropland	Grassland	Developed	6	15.0%
1.2		Identify prime farmland classification	All Prime farmland	Farmland of Statewide Importance	Not Prime Farmland	1	2.5%
Factor 2	**Identify environmentally sensitive land**						
2.1		Identify land proximal to wetlands	within 500 ft	outside, within 1/4-mile	outside, 1/4-mile or greater	1	2.5%
2.2		Identify important habitat areas	confirmed	modeled	not within	2	5.0%
2.3		Identify lands with steep slope	Greater than 25%	10% to 25%	Below 10%	2	5.0%
2.4		Identify land proximal to drainage	within 500 ft	outside, within 1/4-mile	outside, 1/4-mile	1	2.5%
2.5		Identify land proximal to 100 year floodplain	within 100 year FP	within 500 feet	outside 500 feet	2	5.0%
2.6		Identify land within fire risk areas	highest risk	moderate risk	lowest risk	2	5.0%
2.7		Identify forested land	forest land		non-forest land	1	2.5%
2.8		Proximity to impaired and or scenic rivers	within 500 ft	outside, within 1/4-mile	outside, 1/4-mile or greater	1	2.5%
2.9		Identify land with septic limitations	Very Limited	Somewhat Limited	Not Limited	1	2.5%
2.10		Conservation and game lands	within 500 ft	within 1/4 mile	outside 1/4 mile	1	2.5%
Factor 3	**Identify lands proximal to infrastructure and investment**						
3.1		Identify soil suitable for dwellings without basements	Very Limited	Somewhat Limited	Not Limited	1	2.5%
3.2		Identify land proximal to municipal boundary	outside 1/2 mile	within 1/2 mile	within boundary	1	2.5%
3.3		Identify land proximal to fire station	greater than 4-miles	2-mile to 4-miles	less than 2-miles	2	5.0%
3.4		Identify land proximal to school	greater than 1 mile	1/2 mile to 1 mile	less than 1/2 mile	2	5.0%
3.5		Identify land proximal to highway interchange	More than 1/2-mile	1/4-mile to 1/2-mile	Within 1/4-mile	2	5.0%
3.6		Identify land proximal to major road	greater than 1/2-mile	1/4-mile to 1/2-mile	less than 1/4-mile	2	5.0%
3.7		Identify economic development opportunities	outside	-	inside	2	5.0%
3.8		Identify land proximal to sewer lines	outside 1/2 mile	within 1/2-mile	within 1/4 mile	3	7.5%
3.9		Identify land proximal to water lines	outside 1/2 mile	within 1/2-mile	within 1/4 mile	3	7.5%
3.10		Proximity to community trails and parks	outside 1/2 mile	within 1/2-mile	within 1/4 mile	1	2.5%

Map 8: Composite Land Evaluation and Suitability Analysis Map



Factor 1.1 – Agricultural Use of Land



Data Source:

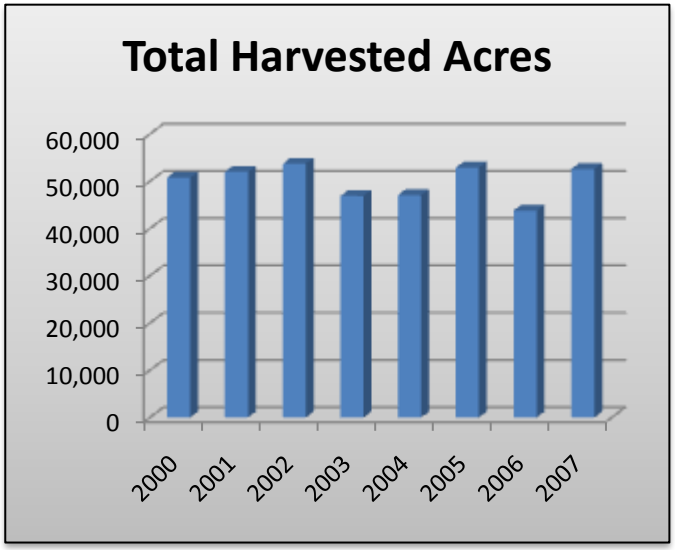
United States Department of Agriculture (USDA), National Agricultural Statistics Service (NASS).

Description of the Data:

The USDA, National Agricultural Statistics Service, 2008 Virginia Cropland Data Layer (CDL), 2008 Edition. The CDL is produced using satellite imagery from various sources that are converted to agricultural crop types. The strength and emphasis of the CDL is agricultural land cover. Please note that no farmer reported data are derivable from the Cropland Data Layer.

Relevance:

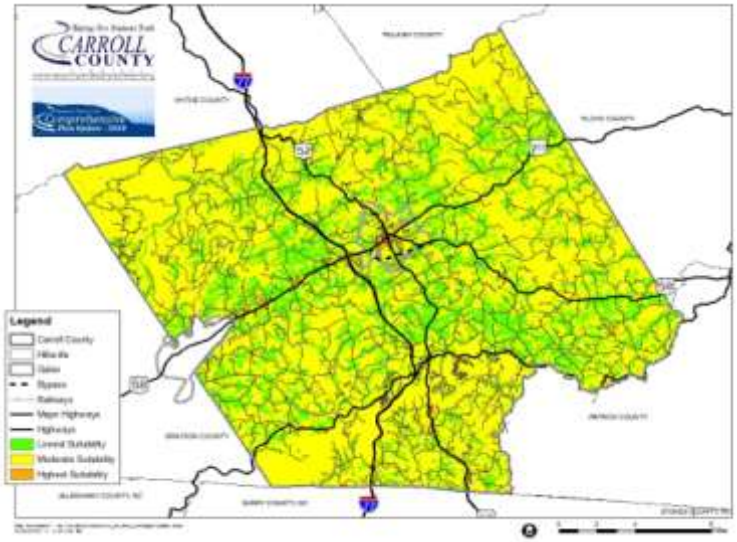
When farmland is developed, the resulting fragmentation of the land base puts new pressures on farmers and foresters who now face a public that is increasingly divorced from agriculture, and who are not accustomed to the sights, sounds and smells associated with working farms and forests. Approximately 1/6th of the County is harvested agricultural land.



Methodology:

The Cropland Data Layer depicts numerous types of agricultural products. All of these crop types were consolidated into an agricultural use class. The agricultural class was given the lowest development suitability, grasslands and other barren land was given a moderate suitability, and developed or urban classed lands were given the highest suitability.

Factor 1.2 – Prime Farmland Soil Classification



Data Source:

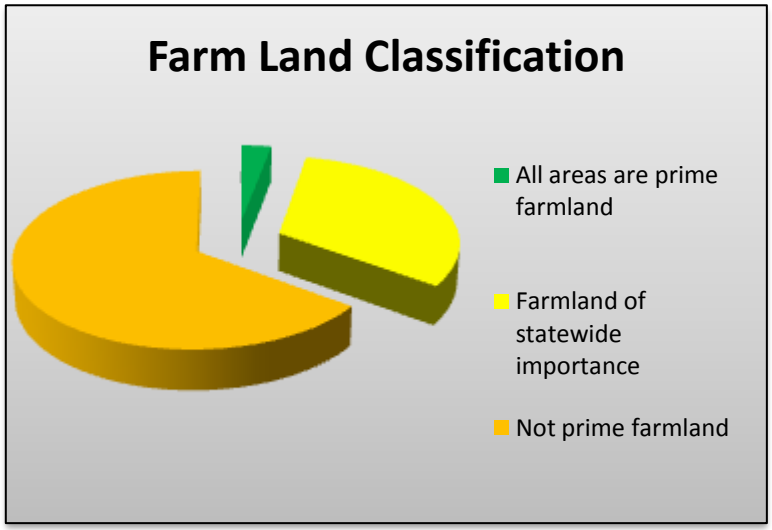
United States Department of Agriculture (USDA), National Natural Resources Conservation Service (NRCS).

Description of the Data:

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods.

Relevance:

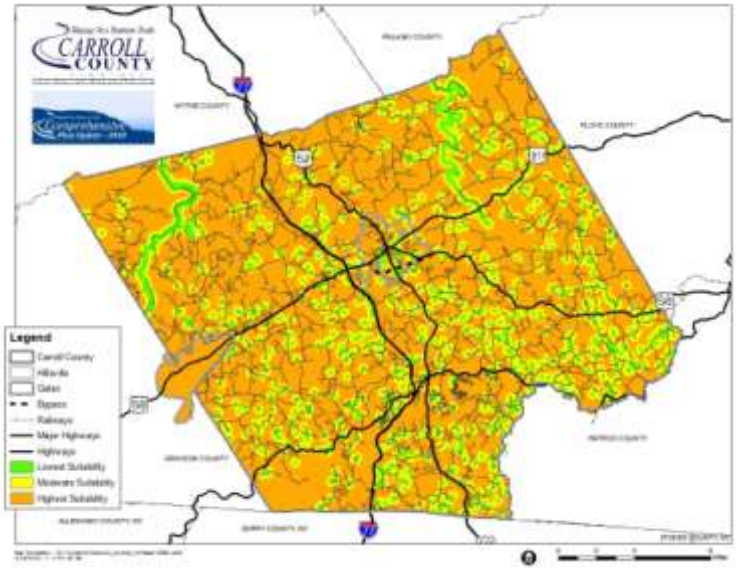
Food is produced on prime farmland more efficiently and with less soil erosion, resulting in less pollution from sediment, nutrients and pesticides. When prime land is lost, it not only takes more non-prime land to produce the same amount of food, but also results in lower returns per unit of production input. Approximately 1/3rd of the County is Prime or Statewide Importance lands.



Methodology:

Prime Farmlands received the lowest suitability rating, Statewide Importance land received a moderate rating while Not Prime Farmland received the most suitable for development rating.

Factor 2.1 – Wetlands



Data Source:

U.S. Fish and Wildlife Service (FWS), Virginia Department of Environmental Quality (DEQ).

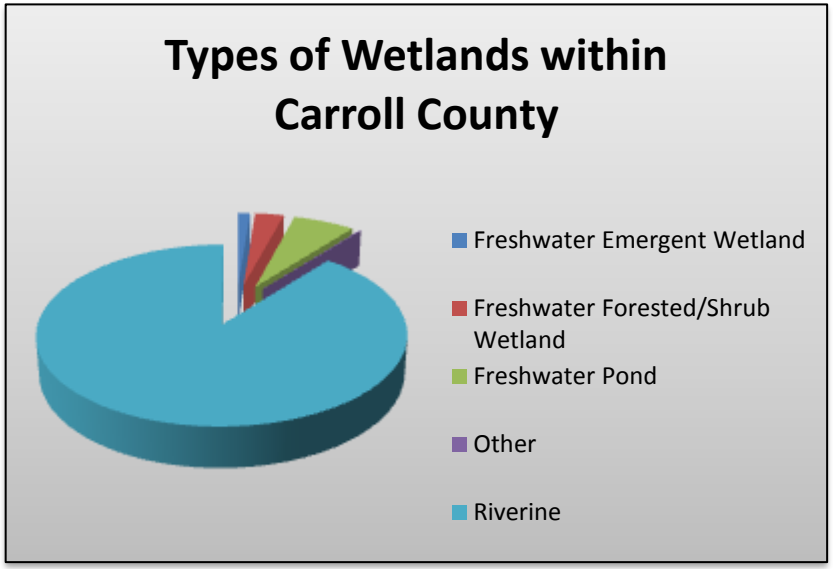
Description of the Data:

"Wetlands" is the collective term for marshes, swamps, bogs, and similar areas found in generally flat vegetated areas, in depressions in the landscape, and between dry land and water along the edges of streams, rivers, lakes, and coastlines. This data set represents the extent, approximate location and type of wetlands and deepwater habitats in the conterminous United States.

Relevance:

Wetlands have important filtering capabilities for intercepting surface water runoff from higher dry land before the runoff reaches open water. Wetlands comprise 1.5% of the County. Benefits include:

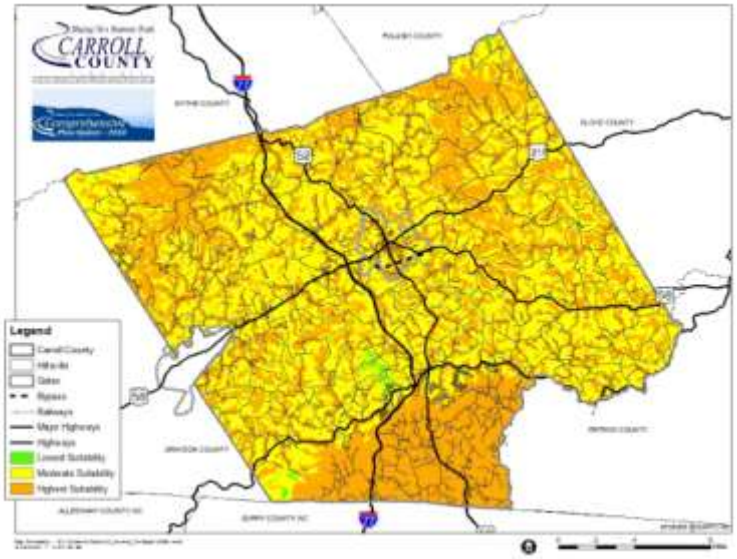
- filters and replenishes groundwater
- acts as a flood buffer like a sponge
- provides and protects fishing and hunting habitat
- mitigates / prevents erosion
- provides natural products (food)



Methodology:

Areas in or within 500 feet of wetlands received the least suitable rating, lands between 500 feet and ¼ mile were moderate and land outside ¼ mile received the highest development suitability rating.

Factor 2.2 – Habitat



Data Source:

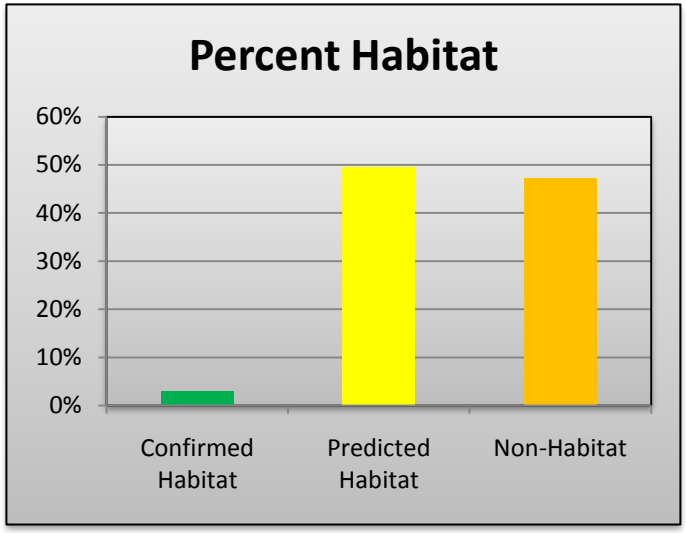
Virginia Department of Game and Inland Fisheries (DGIF), Virginia Marine Resources Commission (VMRC), U.S. Fish and Wildlife Service (FWS).

Description of the Data:

Carroll County is mostly situated within the "Blue Ridge" habitat region as defined within the Virginia Wildlife Action Plan. According to the Wildlife Plan, the County is habitat for one endangered turtle species (Bog turtle). This indicates either a lack of bio-diversity within the County, or a lack of habitat fragmentation due to development.

Relevance:

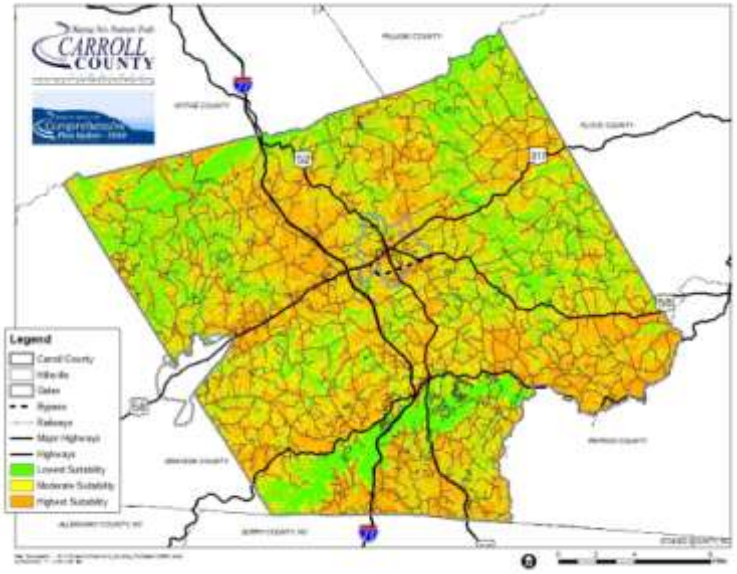
Fragmentation and development of habitat is one of the most frequently identified issues facing wildlife preservation and diversity. To address these issues, those responsible for land planning will need to be more fully engaged in wildlife conservation efforts.



Methodology:

Areas that are confirmed to be habitat of the Bog turtle received a least suitable rating; areas that were calculated to be habitat of the bog turtle received a moderate rating, while areas outside of those received the highest development suitability rating.

Factor 2.3 – Steep Slope



Data Source:

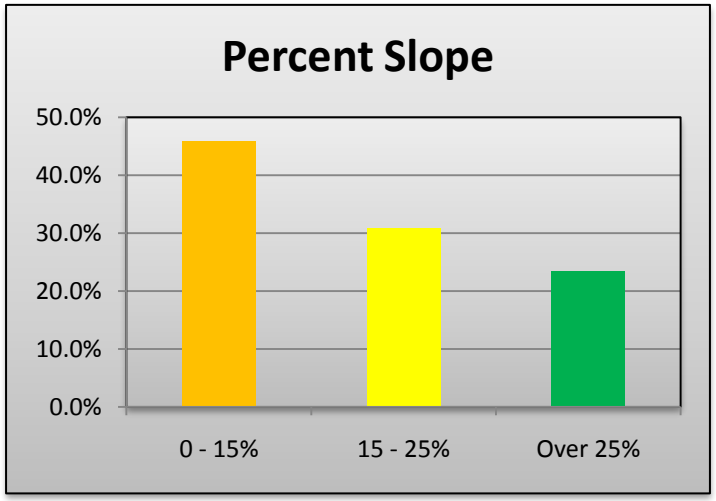
United States Geological Survey (USGS).

Description of the Data:

The data is a 10 meter grid file of elevation within the County. This data is widely used in LESA type models.

Relevance:

Steep slope areas are more prone to erosion, subsidence, and landslide hazards, as well as high wildfire hazards (wildfire spread rapidly up steep slopes). Erosion on steep slopes contributes to siltation and other water quality problems in water bodies that are fed by runoff from these slopes. In addition, most of the scenic landscape features in the County (canyons, escarpments, prominent peaks and ridges) are characterized by steep slope areas. Development is more costly due to grading.



Methodology:

Topography was evaluated for the% of slope using GIS software. The areas of less than 15% slope were given the highest suitability rating while areas over 25% received the least suitable rating. Land in between 15% and 25% received a moderate development suitability rating.

Factor 2.4 – Drainage

Data Source:

U.S. Geological Survey (USGS); Horizon Systems.

Description of the Data:

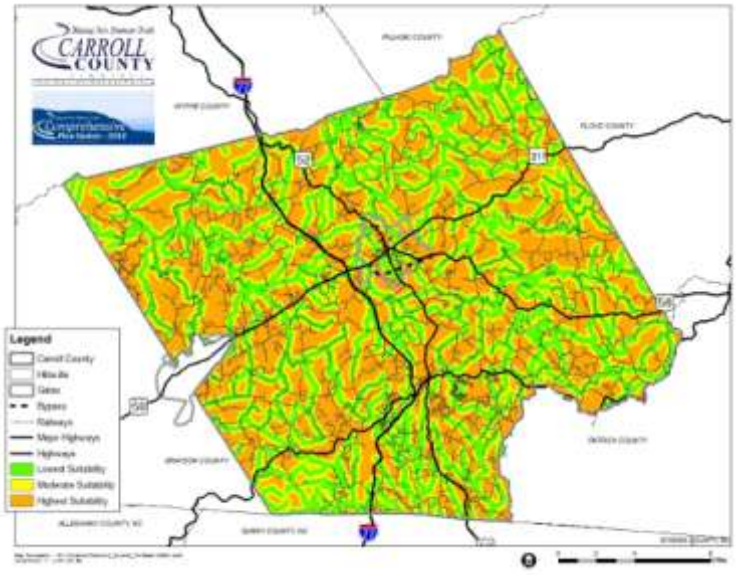
Horizons Systems has been tasked with updating drainage paths data. This data depicts likely and known paths of water flow and their direction.

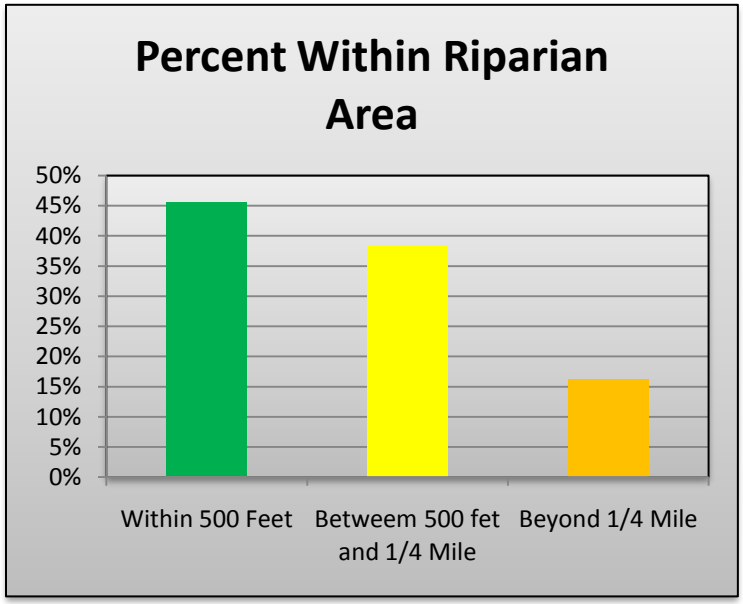
Relevance:

Carroll County is uniquely situated within 50 miles of 4 (out of 18 contiguous USA) sub-basins; the Mid-Atlantic, the South Atlantic-Gulf, Ohio and Tennessee. Areas in close proximity to surface waters have a higher degree of impact on these surface waters from storm water runoff contaminants, siltation, septic tank effluent, and leaks and spills of chemicals and petroleum products. Areas in close proximity to streams and rivers are also more prone to flash flooding, and often contain significant wildlife habitat and wildlife movement corridors. Protecting drinking water sources is always a high priority for sustainable development.

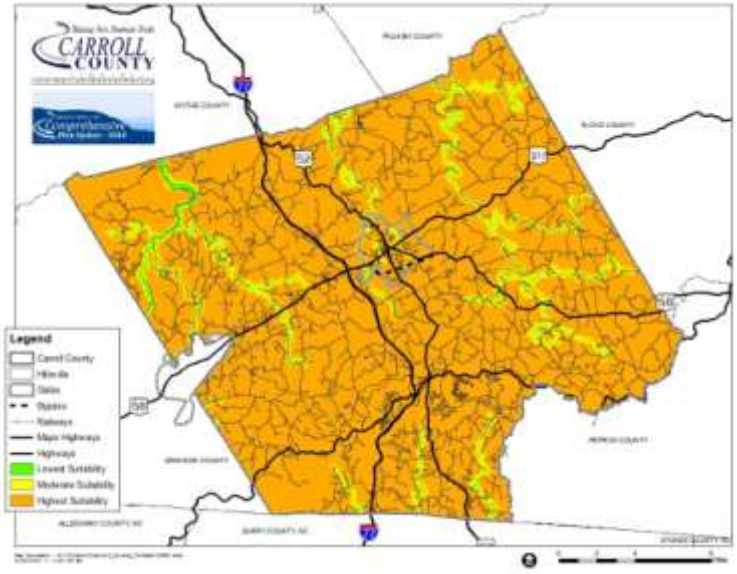
Methodology:

"High Constraints" are locations within 500 feet of stream or river. "Moderate Constraints" are within 500 feet and one quarter mile from drainage. "Low Constraints" are greater than one quarter mile from drainage and are most suitable for development.





Factor 2.5 – Floodplain



Data Source:

Federal Emergency Management Agency (FEMA)

Description of the Data:

Flood hazard areas are determined using statistical analysis of records of river flow, storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and hydraulic analyses. FEMA defines a 100 year flood as: a flood that has a 1% chance of being equaled or exceeded in any given year. The 100-year flood, which is the standard used by most Federal and State agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. A structure located within a special flood hazard area shown on a NFIP map has a 26% chance of suffering flood damage during the term of a 30 year mortgage. Mortgaged property within areas designated in the 100 year floodplain is required to carry flood insurance.

Land Area in Carroll County	Acres	Percent
Within 100 Year Floodplain	5,713	1.9%
Outside 100 Year Floodplain	299,725	98.1%
Total	305,438	

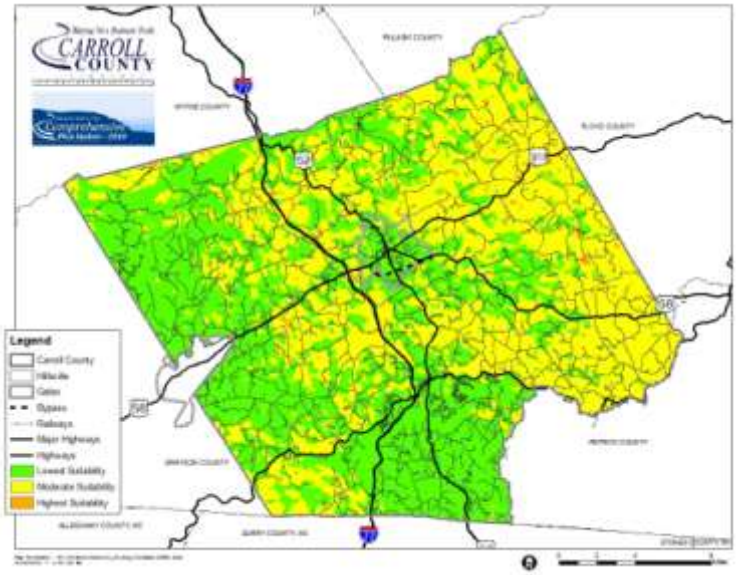
Relevance:

100-year floodplain consists of those areas that are most susceptible to inundation from floods. Development in floodplains has a high level of susceptibility for damage to life and property.

Methodology:

"Least Suitable" locations represent those areas within FEMA's 100 year floodplain "Moderate Suitability" are within a 500 foot buffer of the 100 year floodplain, and "Most Suitable" areas are outside the 500 foot buffer.

Factor 2.6 – Fire Risk



Data Source:

The Virginia Department of Forestry (VDOF)

Description of the Data:

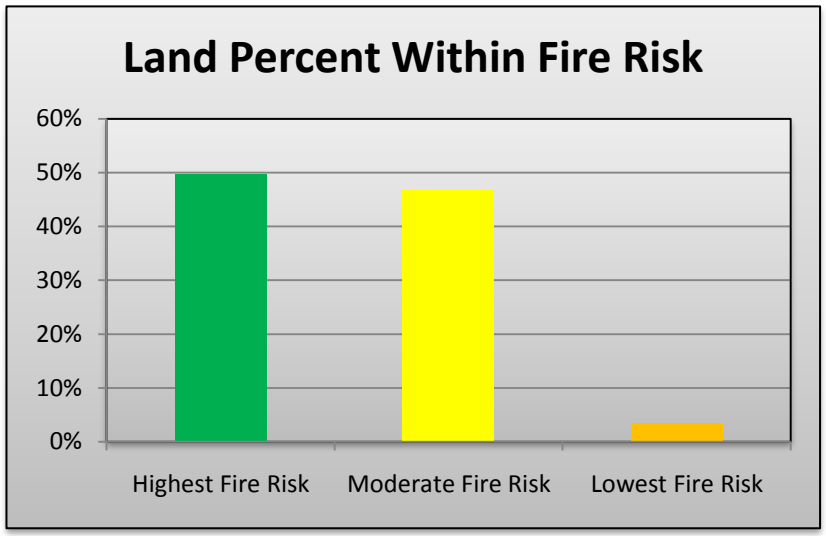
The VDOF Wildfire Risk Assessment model that aims to: (1) identify areas where conditions are more conducive and favorable to wildfire occurrence and wildfire advancement; (2) identify areas that require closer scrutiny at larger scales; and (3) examine the spatial relationships between areas of relatively high risk and other geographic features of concern such as woodland home communities, fire stations and fire hydrants.

Relevance:

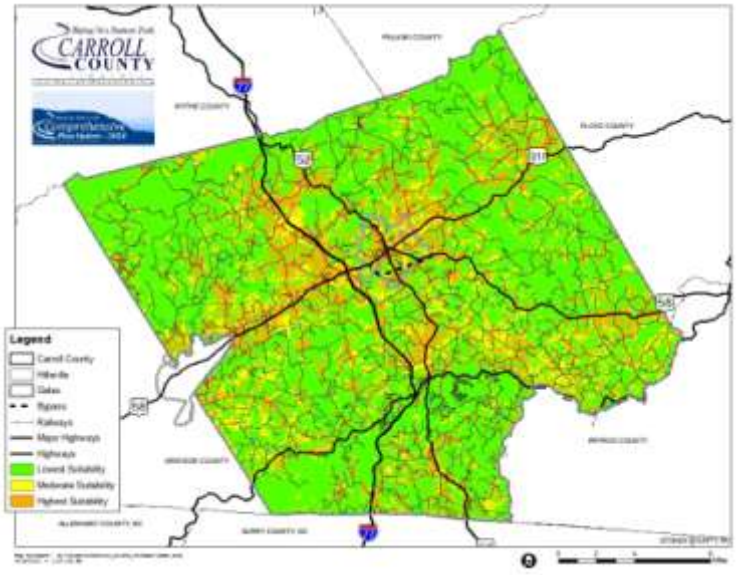
High wildfire fuel loads is associated with a high level of hazard for wildfire damage to property and injuries to persons, and high costs to the public for fighting wildfires.

Methodology:

Lands with the highest Fire Risk received the lowest development score while lands with the lowest Fire Risk received the highest development suitability score.



Factor 2.7 – Forested Land



Data Source:

United States Forest Service

Description of the Data:

The Virginia Forest Cover Map (VFCM 2005) was developed to identify forest in Virginia as defined by the United States Forest Service (USFS) Forest Inventory and Analysis (FIA) Program.

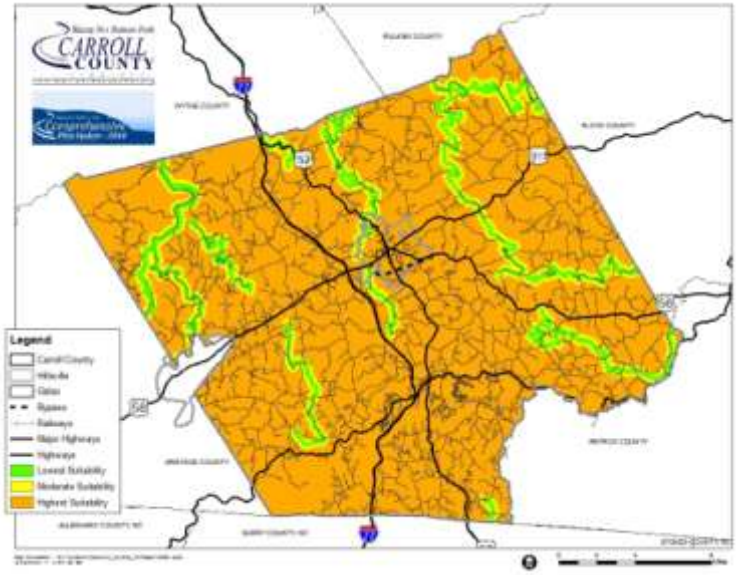
Relevance:

Forest fires can endanger and burn homes and businesses. Fires that start as structural fires can also spread to the forest. Ninety-eight% of forest fires in Virginia are caused by humans. More people in or near the forest can cause more forest fires. Surveys show that over the past 15 years the number of woodland homes developments in Virginia has increased from 524 to 2,914 and the number of dwellings in those developments from 18,203 to 138,111.

Methodology:

Data is based on VFCM forest fragmentation analysis dataset.

Factor 2.8 – Impaired or Scenic River



Data Source:

Virginia Department of Environmental Quality (DEQ); Virginia Department of Conservation and Recreation (DCR)

Description of the Data:

The DCR Scenic Rivers Program encourages the protection of rivers with scenic, recreational, historic and natural characteristics. If locally adopted, the properties along designated scenic rivers may be eligible to get a special tax assessment to reduce the tax liability. DEQ Impaired Rivers data derives from water quality reporting requirements of the Commonwealth of Virginia under Sections 305(b), 303(d), 106, 314 and 319 of the Federal Clean Water Act and the Virginia Water Quality Monitoring, Information and Restoration Act (Section 62.1-44.19:5 C of the Code of Virginia).

Relevance:

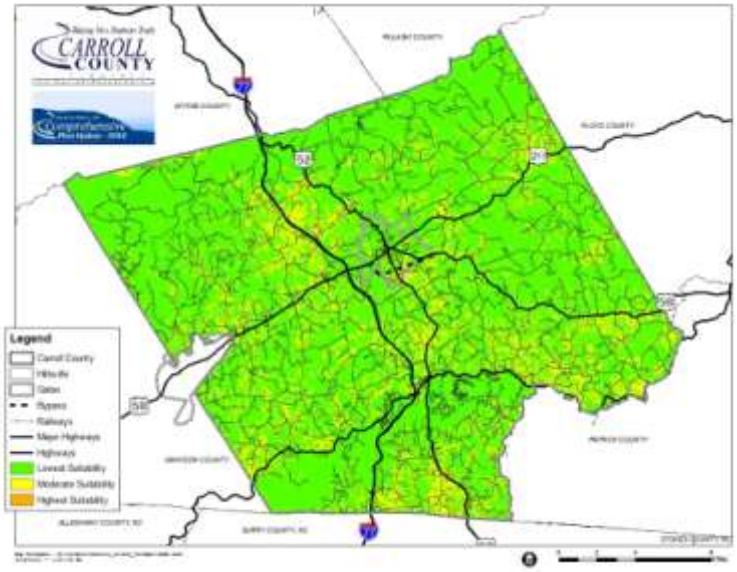
Additional conservation measures should be considered for rivers designated as Impaired and or scenic. These rivers have been specially designated by either a panel or advisor committee or through thorough analysis of existing conditions as mandated by Federal Law. Encroaching development can have adverse impacts on both the scenic and ecosystematic qualities of rivers.

Methodology:

Impaired and Scenic River datasets were merged into one file. Areas within 500 feet of an impaired or scenic river received the least development suitability score, areas between 500 feet and ¼ mile received moderate suitability score while areas outside ¼ mile received the highest development suitability score.

Carroll County Rivers	Length in Miles
Impaired River	111.6
Scenic River	57.8
*There is a small degree of overlap.	

Factor 2.9 – Soil Septic Limitations



Data Source:

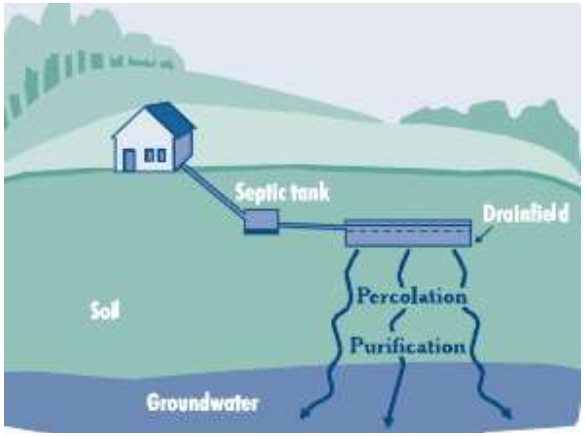
Natural Resources Conservation Service (NRCS)

Description of the Data:

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Saturated hydraulic conductivity, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Relevance:

Areas with soils that are poorly suited to septic tank use are more prone to surface and groundwater contamination from septic tanks, higher costs of septic tank installation and maintenance, and higher risks of septic tank failure.

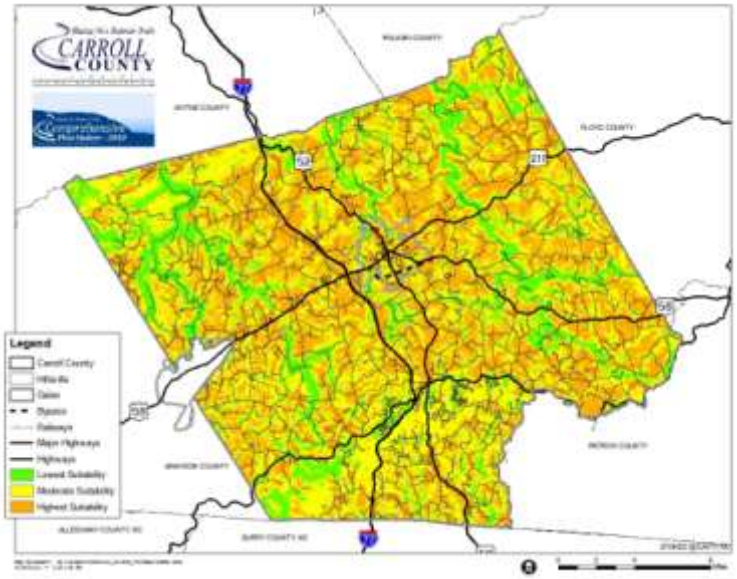


Methodology:

Soils with Septic Limitations	Acres
Not rated	32,694
Somewhat limited	56,177
Very limited	219,772

Areas that are classified as “Very Limited” received the least suitable development score, while “Somewhat limited” areas received a moderate score. There are no areas that are classified as “Not Limited” within Carroll County. “Not Rated” Areas received the lowest suitability score. These areas generally are areas with excessive slope.

Factor 2.10 – Conservation and Recreation Protected Lands



Data Source:

Virginia Department of Conservation and Recreation (DCR)

Description of the Data:

This dataset contains the boundaries for lands of conservation and recreational interest in Virginia.

Relevance:

Development is usually discouraged in close proximity to lands that have been identified as conservation or are managed by a conservation entity such as VLCF, VDOF, DCR, and other various state federal and local organizations and agencies. These lands include:

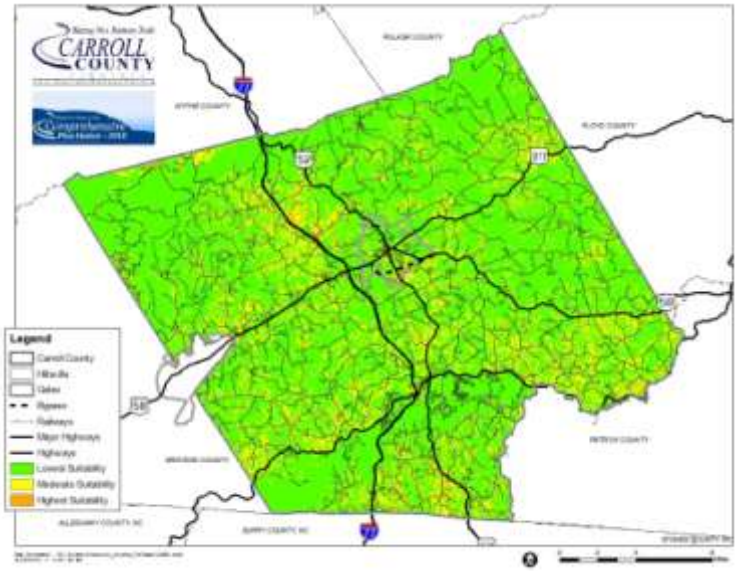
- lands for recreational purposes
- lands for threatened or endangered species, fish and wildlife habitat
- natural areas
- and agricultural and forestall lands and open space.

Methodology:

Areas within 500 feet of protected land received the least development suitability score, areas between 500 feet and ¼ mile received moderate suitability score while areas outside ¼ received highest development suitability score.

Carroll County Conservation Land Acres	Federal	Local	Private	State
Big Branch NF Special Biological Areas	498			
Blue Ridge Boy Scout Camp*			13,822	
Blue Ridge Parkway National Park	40,642			
Crooked Creek Wildlife Management Area				1,733
George Washington and Jefferson National Forest	140,726			
Hawks State Forest				122
Mountain Meadow Preserve		42		
New River Trail State Park				642
Stewarts Creek Wildlife Management Area				1,080
Total	181,865	42	13,822	3,577
*Boy Scout Camp abuts the County and is included within the analysis				

Factor 3.1 – Soil Dwelling without Basements Limitations



Data Source:

Natural Resources Conservation Service (NRCS)

Description of the Data:

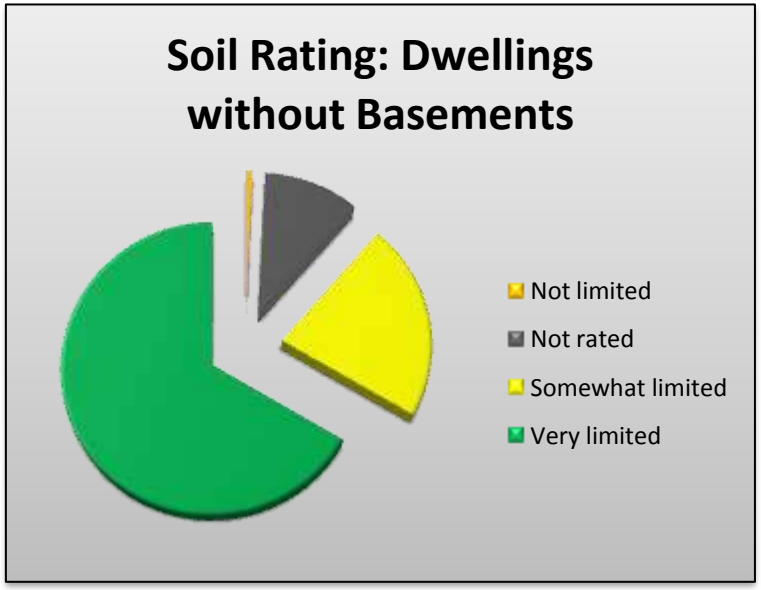
The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility.

Relevance:

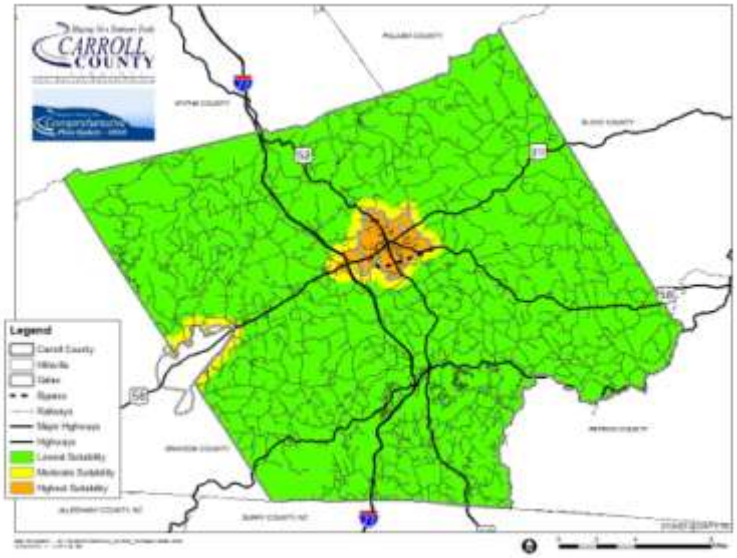
Areas with low bearing strength and stability of soils for structure are associated with higher development costs and potential failure of structures, roads, and water and sewer lines from subsidence.

Methodology:

Areas rated as "Not Limited" received the highest suitability score while areas rated "Very Limited" received the lowest score. "Not Rated" areas are generally areas of significant slope.



Factor 3.2 – Proximity to Municipal Boundary



Data Source:

Carroll County GIS

Description of the Data:

Municipal Boundary proximity is commonly used in LESA systems throughout the County. Current municipal boundaries usually indicate areas where investment in infrastructure is greatest. Building upon and utilizing existing infrastructure is generally regarded as a more sustainable approach to new development.

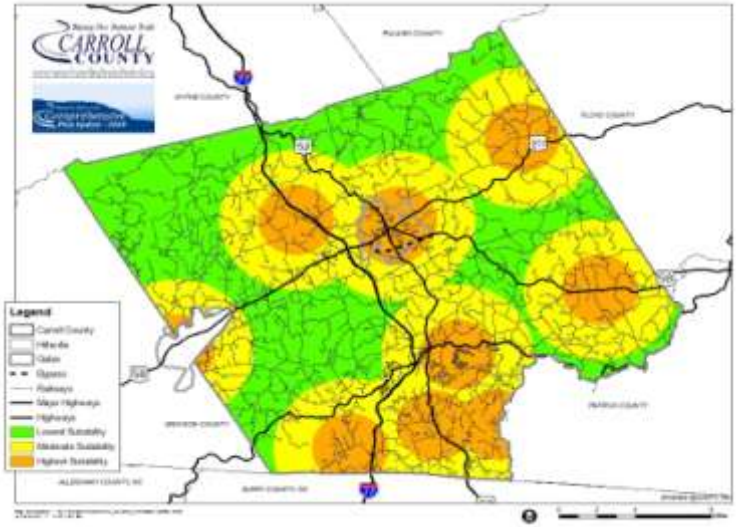
Relevance:

Proximity to existing municipalities associated with the availability and efficiency of public facilities and services, and proximity to employment and retail centers which are more commonly found within municipalities, as opposed to outlying areas. Encouraging development within areas close to existing municipalities promotes a compact and efficient pattern of development, which decreases the cost of public facilities and services and transportation.

Methodology:

Areas within the communities of Hillsville and Galax were determined to be most suitable for development activity, while areas outside of half mile were determined to be least suitable for development.

Factor 3.3 – Fire Station Proximity



Data Source:

Carroll County GIS

Description of the Data:

The dataset represents the location of each fire station within the County.

Relevance:

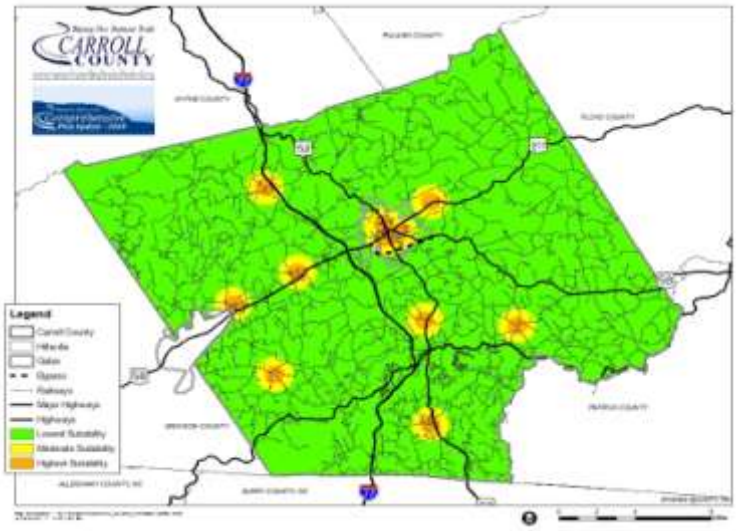
Proximity to fire stations is associated with adequate emergency response times, and is associated with the cost to the public of maintaining adequate levels of fire protection. Response coverage also affects insurance rates.

Methodology:

Areas within a 2 mile radius (4 minute response radius at 35 mph) received the highest development suitability, areas within 2 – 4 miles (8 minute response radius at 35 mph) received moderate suitability score while areas outside the 8 minute response radius received the least suitable for development score.

Carroll County Fire Stations
Laurel Fork Fire
Cana Fire #1
Cana Fire #2 - Lambsburg
Hillsville Fire #1
Hillsville Fire #3 - Dugspur
Cana Fire #3 - Mt Bethel
Cana Fire #4 - Cascade Station
Carroll County Fire And Rescue
Hillsville Fire #2 - Airport

Factor 3.4 – Elementary and Middle School Proximity



Data Source:

Carroll County GIS

Description of the Data:

The dataset represents the location of each school within the County.

Relevance:

Proximity to elementary and middle schools is associated with the desirability of land for residential development (parents generally prefer to be close to schools), and is associated with the costs to the public of transporting children to and from schools.

Methodology:

Areas within .5 mile of elementary or middle schools receive the highest suitability score while areas between .5 and 1 mile receive moderate development suitability scores. Areas outside 1 mile receive the lowest suitability score.

Carroll County Elementary and Middle Schools
Gladesboro Elementary School
Fancy Gap Elementary School
Laurel Elementary School
Woodlawn School
Gladeville Elementary School
Oakland Elementary School
Carroll County Intermediate
Hillsville Elementary School
St Paul School

Factor 3.5 – Highway Interchange Proximity

Data Source:

Planning Works, ESRI

Description of the Data:

Planning Works identified major highway interchanges within the County.

Relevance:

Proximity to freeway interchanges is an indicator of the degree of access of land to the thoroughfare network and the regional transportation system. These areas tend to foster commercial investment.

Methodology:

Areas within ¼ mile of an interchange receive the highest development suitability. Areas between ¼ mile and ½ mile receive moderate suitability score, while areas outside ½ mile receive the least development suitability score.

Carroll County Highway Interchanges
Exit 1 (Old Pipers Gap & I-77)
Exit 8 (Chances Creek and I-77)
Exit 14 (58 Highway and I-77)
Exit 19 (Coulson Church and I-77)

Factor 3.6 – Major Road Proximity

Data Source:

Carroll County GIS, ESRI

Description of the Data:

The most recently available depiction of the road network was utilized.

Relevance:

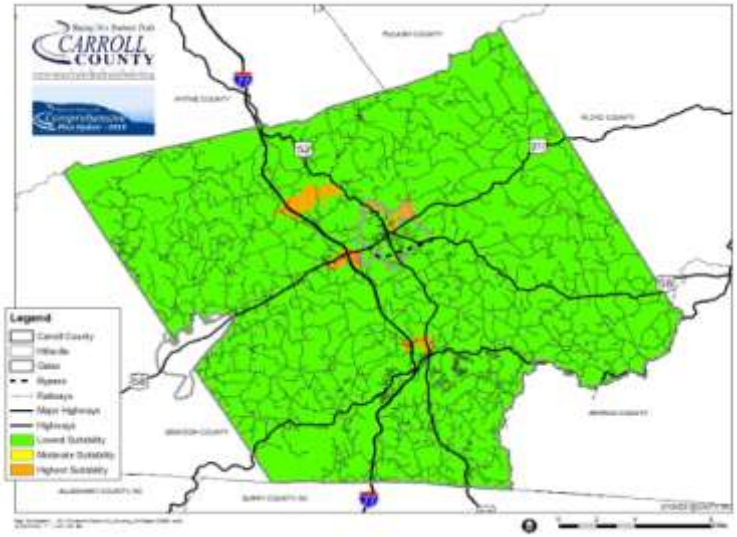
Major roads are highways, arterials and major collectors that carry a significant portion of the County's traffic. Proximity to highways and other major roads is an indicator of the degree of access of land to the thoroughfare network and the regional transportation system, and the cost of building and maintaining local roads between major roads and development sites.

Methodology:

Areas within ¼ mile of an interchange receive the highest development suitability. Areas between ¼ mile and ½ mile receive moderate suitability score, while areas outside ½ mile receive the least development suitability score.

Street Type	Miles
Major	221
Minor (Local)	1,052
Private (Driveway)	77
Grand Total	**1,351**

Factor 3.7 – Economic Opportunities



Data Source:

Virginia Economic Development Partnership (VEDP)

Description of the Data:

The datasets depict available industrial sites and land that are within an Enterprise Development Zone. Enterprise zone boundaries are important when creating information packages for economic development prospects. This coverage is useful with other business quality of life or environmental layers to help identify areas available for development that may benefit from certain tax advantages. This coverage is also used to identify sites and buildings available that are in an enterprise zone.

Relevance:

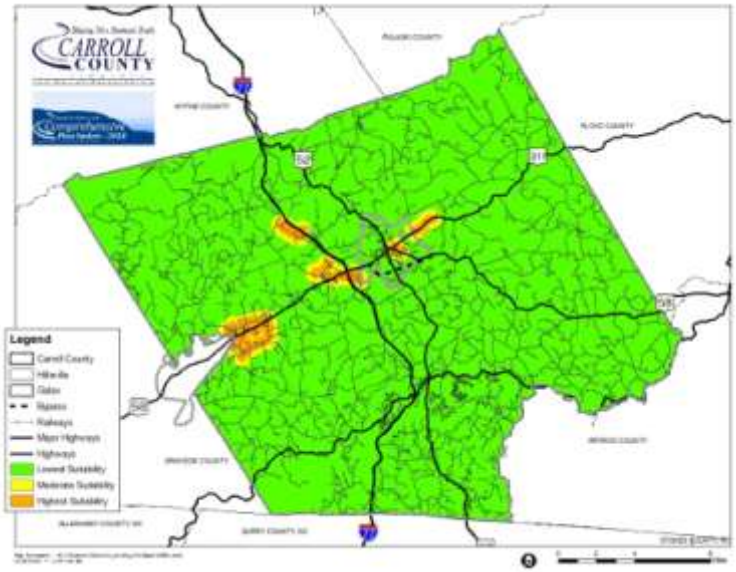
These sites have been identified as areas with tax incentives. Tax incentives can drive growth and development.

Methodology:

Areas within these sites receive the highest development suitability score while areas outside the sites receive the least suitable for development score.

Economic Opportunities Sites	Acres
Enterprise Zones and Industrial Sites	4,561.61

Factor 3.8 – Sewer Infrastructure Proximity



Data Source:

Carroll County GIS

Description of the Data:

The data depicts both existing and proposed waste-water infrastructure within the County.

Relevance:

Proximity to sewer lines is associated with the feasibility of providing sewer to new development, which impacts service efficiency and cost. Availability of sewer allows for clustered development and higher densities without adversely impacting groundwater quality.

Methodology:

Areas within ¼ mile of a sewer line receive the highest development suitability. Areas between ¼ mile and ½ mile receive moderate suitability score, while areas outside ½ mile receive the least development suitability score.

Factor 3.9 – Water Infrastructure Proximity

Data Source:

Carroll County GIS

Description of the Data:

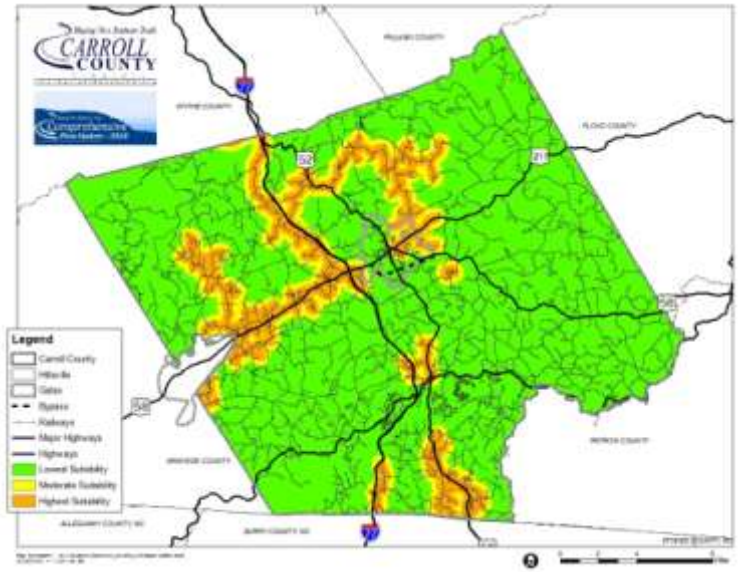
The data depicts both existing and proposed water infrastructure within the County.

Relevance:

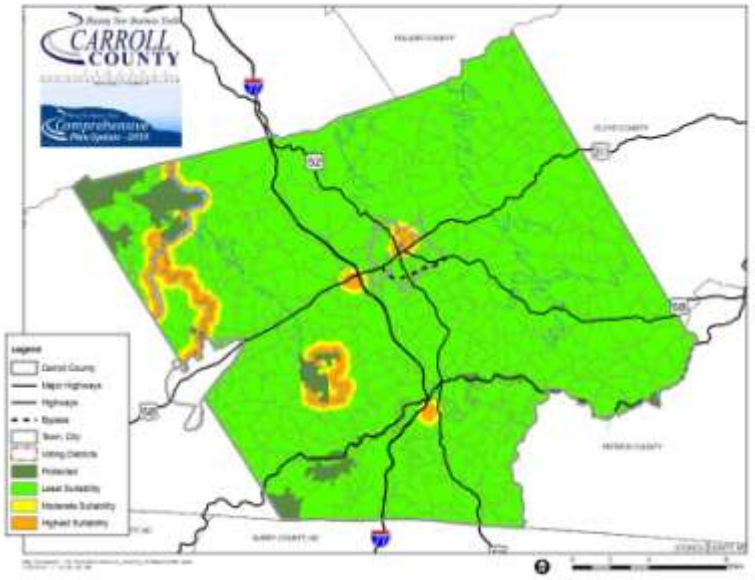
Proximity to central water lines is associated with the feasibility of water to new development, which impacts service efficiency and cost.

Methodology:

Areas within ¼ mile of a sewer line receive the highest development suitability. Areas between ¼ mile and ½ mile receive moderate suitability score, while areas outside ½ mile receive the least development suitability score.



Factor 3.10 – Recreational Parks and Trails



Data Source:

Carroll County GIS

Description of the Data:

The data depicts the extents of trails in Carroll County.

Relevance:

Proximity to parks and recreation facilities provides residents with opportunities for active recreation which helps to encourage and facilitate healthy lifestyles. Parks and recreation areas may also provide secondary environmental benefits of preserved natural areas as well as better property values.

Methodology:

Areas within ¼ mile of a trail receive the highest development suitability. Areas between ¼ mile and ½ mile receive moderate suitability score, while areas outside ½ mile receive the least development suitability score.

Suitability	Acres	Percent
Protected	16,228	5%
Low	162,007	53%
Moderate	105,094	34%
High	22,504	7%
	305,833	

Growth Tiers

The Growth Tiers system is the first step in moving the County to a more reliable and functional land use scheme with a future land use that will provide confidence to residents and businesses about future development expectations. Each Tier includes a broad mix of land uses that describe and identify preferred future development patterns. Tiers are used to establish a framework for determining which growth management goals, policies and strategies should be used in different areas of the County, recognizing the uniqueness of each area and community, and to direct the location, timing and phasing of growth in order to achieve rational growth patterns, efficiently provide facilities and services and protect rural, agricultural, environmentally sensitive or other important open spaces from inappropriate development.

The Tiers Map for Carroll County is not a zoning map. The Map is conceptual and functions as a guide on which future land use decisions can be made. Future land uses should be based on the goals and policies set forth in the Plan. Tools such as development regulations, transportation plans and capital improvement plans all are used to implement the Plan. Consideration should be given to the following:

- **Tiers are not zoning designations** -- they are intended to guide local decisions on when and where growth should occur.
- **Tiers reflect a future condition** -- uses designated on the map may be appropriate in 10 to 20 years, but currently may not be appropriate due to reasons of compatibility, availability of adequate public facilities, or proximity to services.
- **The Tiers Map is dynamic** -- as justified by changing conditions in the community, the Tiers should change. While map amendments should not be made frequently, periodic adjustments to better achieve community goals will help the community achieve its planning goals.
- **The Tiers Map and text of the Plan are to be used together** -- the text and maps of the Plan will guide interpretation and implementation of the overall growth management strategy.

Carroll County has been divided into three tiers, described below. The tiers allow similar policies and programs to be used in similar areas while distinguishing different areas and using special policies to address their growth. **Map 9** illustrates the Development Tiers.

- The **Developed Area Tier** is suitable for most types of residential and non-residential development. This tier is encompasses the areas adjacent to Galax and Hillsville, consistent with their adopted plans. The highest density and intensity development will be located in areas closest to the respective communities, where service facilities are available; lower density and intensity development will be located at the edges of the more intense service areas.
- The **Planned Growth Area Tier** accommodates residential growth. It is characterized by suburban and rural residential development intermingled with small agricultural uses. As continued development occurs, there will be a significant increased demand for roads, water, emergency services, schools and other public services and infrastructure, as well as some non-residential development. The amount and timing of development will be subject to the availability of adequate public facilities.
- The **Agriculture Protection Tier** is intended to support ongoing agricultural operations and preserve valuable natural resources. Policies within this tier allow sparse residential development to minimize negative impacts on agricultural operations and to minimize the demand for public services and infrastructure. Commercial uses are limited to agricultural related services and limited retail. The County also recognizes the importance of the Agriculture Protection Tier to protect farms, residents and lifestyles in the most rural areas of the County. The County's policies are designed to retain this agricultural character rather than support encroachments of urban or suburban development in these very rural areas. Some agriculture-related or service commercial uses to meet the needs of local residents may be appropriate, including some home occupations and home industry. The Agriculture Tier offers the opportunity to preserve agriculture and open space while still allowing some development through the use of conservation subdivisions and conservation easements.

Existing and Future Community Service Areas are shown in **Map 10**. **Table 16** shows the amount of land in each tier and Community Service Areas. These areas are located within the Planned Growth Area Tier, but recognize that more intensive uses will require public facilities and services. This concept builds on the Tiers system by recognizing that different areas of the County face different needs and solutions related to growth and development. The service areas target and leverage public and private funding and investment to these priority growth areas, identifying areas in which urban/suburban-level growth is expected to occur within the next 20 years. These also serve as an incentive for compact development.

- Existing Service Areas identify where urban and suburban development is likely and reasonable to occur within the next 10 years. Infrastructure is either planned, budgeted or reasonably available. New infrastructure may be installed provided that there is required participation by new development to fund. Service providers should plan and construct facilities in these areas to meet the needs of development at these urban intensities. Capital Improvement Projects should be utilized for these primary growth areas first, before investment in Future Service Areas.
- Future Service Areas show where development is likely and reasonable to occur in these areas over the next 10 to 20 years. Infrastructure may not be currently available, but may be extended, provided there is funding participation by new development. Infrastructure may be reasonably available (it may be close, in time or location) and funding alternatives may be identified, but participation by new development would be required. These secondary growth areas are not expected to develop at urban intensities until public facilities, primarily water, sewer and improved roads, are installed, which is not intended to occur until years 10 to 20 of the planning term. Clustering will be required, but some large lot development may be permitted provided that significant open space is provided and total development capacity occurs at the maximum density identified on the future land use map.

In comparison, in the Agricultural Protection Tier, there are no plans to provide additional public facilities and services. Infrastructure is not available or budgeted and any use that requires infrastructure to be provided solely at expense of new development. Urban and suburban development is not likely and reasonable to occur in more than 20 years, if at all. As this area

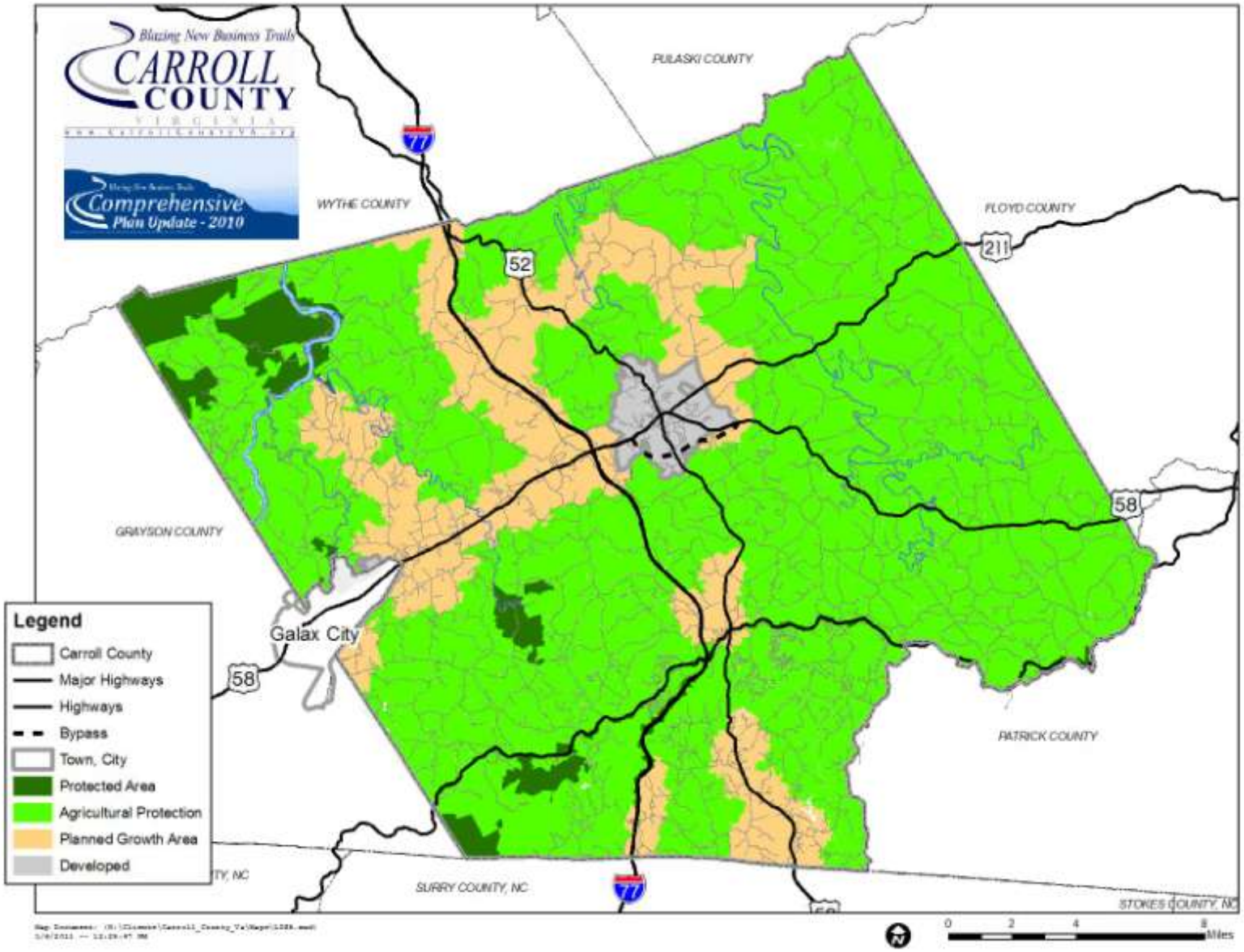
contains agriculture, hillsides and areas identified as environmentally sensitive, lands will not be sewered nor receive other capital infrastructure.

The outer boundary of the Planned Growth Area is effectively the growth boundary between developed/developing areas and the agricultural and conservation (protected national forest) areas. This defines the outer boundary of undeveloped lands that should accommodate most of the County's future growth, though it may be revised when the land contained within them is developed and additional land is needed to accommodate growth. This boundary promotes coordination between service providers and citizens in determining where urban services should and can be extended, creates an incentive to infill existing developed areas. It also provide certainty to developers in defining which areas will receive services, such as water, wastewater and improved roads in the near future. Combined with other tools, the growth boundary may help Carroll County identify where growth should and should not occur and effectively guide development accordingly.

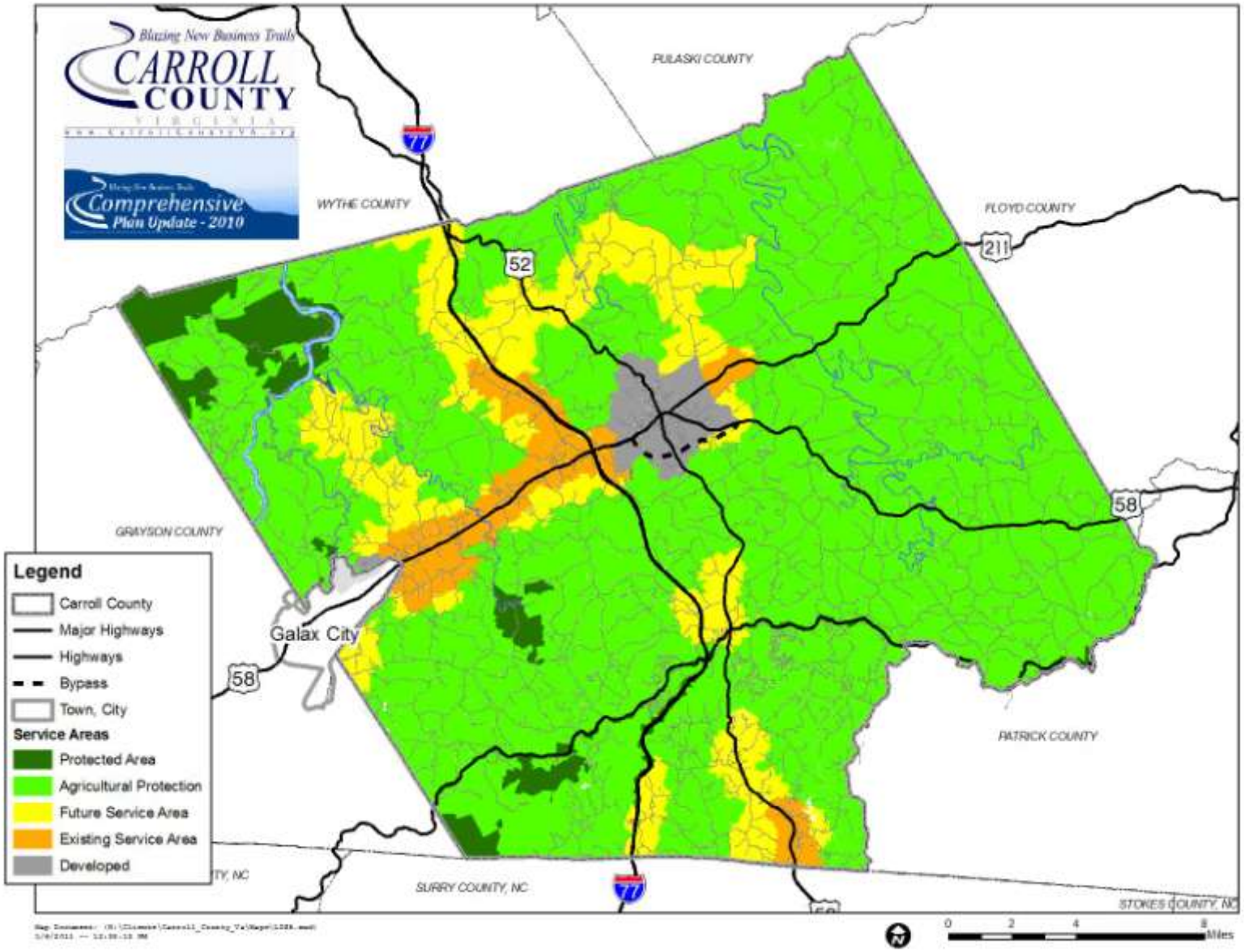
Table 16: Tiers and Community Service Area Acreage

Tier	Acres
Protected Area	13,751
Agricultural Protection	229,170
Planned Future Service Area	38,557
Existing Service Area	13,336
Developed	6,342
Total	301,576

Map 9: Carroll County Growth Tiers



Map 10: Community Service Areas



Future Land Use

This Plan authorizes compact development served by adequate facilities and services that minimizes impacts on farms and the environment and supports land, resource and energy conservation. While the County has tradition of rural uses, many newer uses are resource-intensive, inordinately expensive to serve and overly consumptive of land creating excessive vehicle miles traveled, which results in unnecessary air pollution and greenhouse gas emissions. While rural, large lot development is a popular lifestyle option, the public and private costs of such development are excessive and do not position the County or its residents to attain fiscal sustainability or protect farms. To allow continuation of large lot development that damages natural and cultural resources and lacks a desirable sense of place will also erode the County's appeal as a tourist destination, further impacting the quality of life and economic opportunity. The Comprehensive Plan also assures that future large lot rural residential development will contribute to the environmental, traffic, fiscal integrity, adequate public facility, and sustainable design and improvement standards of the County.

"The problems we face today will not be solved at the same level of thinking we were at when we first created them."

-Albert Einstein

This Plan identifies two parts to identifying appropriate future development once the Tier is identified where development is proposed to occur. First, using **Table 17**, one would identify appropriate future land uses in each tier, including the average lot size for each land use type. Then, once the proposed future land use is identified, one would use **Table 18** to identify the necessary infrastructure and improvement standards to serve the development. The tables are described in more detail as follows:

> Future land uses are identified to show the range of uses permitted, planned development patterns and relationship to growth tiers, and, together with the goals and policies contained in the Plan, establishes the County's policy direction and acts as a guide for decisions affecting future development. But, future land uses area not zoning. Future land uses operate as a guide to future land use patterns and infrastructure planning. The list of broad future land uses is shown in **Table 17**, and depicts only general expectations rather than formal regulations and requirements. This exhibit depicts where different types of development should occur based on the growth tiers framework. It is intended to guide the decision-making process for development and subdivision proposals and help staff and elected and appointed officials make recommendations.

Infrastructure and improvement requirements shall be consistent with applicable tier policies and future land use types. Public service providers should use the plan to guide infrastructure improvements to accommodate future growth. The location and capacity of public service improvements may be determined by comparing existing land use and service demands with the proposed land use pattern. **Table 18** indicates the general level of public service, infrastructure and on-site improvements required prior to or concurrently with development within each tier. Density and intensity bonuses also may be offered for projects that surpass open space requirements and provide additional sustainability and 'green design' features.

Table 17: Part 1 - Future Land Use

Land Use	Average Density / Lot Size	Uses	Ag Protection Tier	Planned Growth Areas	Developed Areas
Agriculture	20 acres	Farm and timber lands to be protected from encroachment of non-farm development and conversion to urban uses. Non-farm development is strongly discouraged. Rural homes on large lots, sometimes as part of rural subdivisions (a subdivision of only a few lots and very low densities).	P		
Rural Residential	5 acres	Farms and ag uses permitted. Large lot single-family residences with access to adequate water and road improvements. Centralized water and sewer service and access to chip-sealed or paved roads are required for subdivisions in this category. Clustering and conservation and nuisance easements are encouraged and may be required as a condition of subdivision approval.	P		
Community Residential	4 DU per acre	Residential development connected to centralized water and wastewater systems. This category is limited to areas with access to paved roads, centralized water and wastewater systems. This type of development is allowed only in Developed or Planned Growth Areas.		C	P
Rural Business		Limited commercial uses serving the needs of rural residents. Uses include small retail, agricultural support operations (co-ops, feed stores, etc), rural services and natural resource based uses.	P		
Community Center		Neighborhood or community scale shopping centers and personal and professional services conveniently located near residential areas. Intended to be designed and integrated with adjacent uses and development patterns, typically as part of a mixed use or planned development. Mixed use encouraged.		P	P
Regional Center		Larger, regional scale shopping centers, which may be anchored by department or home improvement stores or other large-scale anchors, and employment centers. Because of intensity, must be designed and integrated with adjacent uses and development patterns as mixed use or planned development. Mixed use encouraged.		C	P
Opportunity Center		Unique, site- or purpose-specific uses, not likely to be replicated in other locations, benefiting from locational attributes, such as natural resources, viewsheds or recreational/environmental amenities. Non-residential uses range from energy, to eco-tourism, to supporting other economic development activities.	C	C	C
P = Permitted; C = Conditionally Permitted					

Table 18: Part 2 - Infrastructure and Improvement Requirements

Improvement	Agriculture	Rural Residential	Community Residential	Rural Business	Community Center	Regional Center	Opportunity Center
WATER							
Centralized		✓	✓		✓	✓	
Individual Well	✓	✓					
Site and Use Dependent				✓			✓
WASTEWATER							
Centralized		✓	✓		✓	✓	
Onsite	✓	✓					
Site and Use Dependent				✓			✓
TRANSPORTATION							
Legal Access	✓	✓	✓	✓	✓	✓	✓
Grants of Right-of-Way and Easements	✓	✓	✓	✓	✓	✓	✓
Arterial			✓		✓	✓	
Paved Road			✓		✓		
Within 1/4-mile of a Paved Road				✓			
Within 1/2-mile of a Paved Road		✓					
Dust Control Required		✓					
Site and Use Dependent							✓
PUBLIC SAFETY							
Sheriff - Average Response Time of Less Than 8 Minutes			✓		✓	✓	✓
Sheriff - Average Response Time of 8 Minutes or More	✓	✓		✓			
Fire - Average Response Time of Less Than 8 Minutes			✓		✓	✓	✓
Fire - Average Response Time of 8 Minutes or More	✓	✓		✓			
Adequate Fire Flow			✓	✓	✓	✓	✓
DEVELOPMENT AND DESIGN							
Curbs, Gutters, Sidewalks			✓		✓	✓	✓
Paved Parking					✓	✓	✓
Shared Parking					✓	✓	✓
Drainage Detention/Retention Facility			✓		✓	✓	✓
Landscaping, Buffering			✓		✓	✓	✓
Open Space		✓	✓		✓	✓	✓
Cluster, Conservation Subdivision		✓			✓	✓	
Planned Development			✓		✓	✓	✓
Density Bonus for Additional Open Space		✓	✓		✓	✓	
Density Bonus for Sustainability		✓	✓		✓	✓	

Regionalism

Regionalism means more than neighborliness. Regionalism recognizes that the future quality of life and competitiveness of a region is a shared responsibility, of all communities. It requires the coordination, cooperation and consensus of communities working strategically to effectuate change. That a regional approach is needed goes without challenge - southern Virginia is facing new challenges. The region faces years of slow growth and uncertainty following our worst recession in 50 years. Despite the considerable funds local government and providers spend every year on facilities and services; the uncomfortable truth is that communities have been living off the legacy of investments of previous generations. The region continues to be challenged by sprawling development into rural and sensitive environmental areas. A regional perspective is the proper scale and context for analyzing and addressing many of these difficult and challenging issues.

Counties are not islands - the problems we face do not begin and end at our borders, neither should our solutions.

Our region shares a common destiny. Regionalism recognizes that our communities are intertwined, transcending arbitrary political divisions. Regionalism lays the foundation for building more effective regional partnerships in the metropolitan area. Intergovernmental cooperation is any arrangement by which two or more jurisdictions can communicate visions and coordinate plans, policies, budgets and capital improvement programs to address and resolve regional issues of mutual interest. Many issues in today's interdependent complex society cross jurisdictional boundaries, affecting more than one community with the actions of one governmental unit impacting others.

Increased communication technologies and personal mobility enables people, money and resources to move across jurisdictions as quickly and freely as air and water. Persons traveling along roadways use a network of transportation routes, moving between jurisdictions without even realizing it. Increasingly, we have come to the realization that many vital issues are regional in nature – watersheds, air quality, ecosystems, economic conditions, land use, service delivery, commuter patterns, housing, employment centers and other growth impacts 'spill over' County and municipal boundaries and impact the region as a whole. The health of Carroll County and the welfare of our region are interconnected. Issues cross jurisdictional boundaries. The activities of one level of government have extraordinary impacts beyond its jurisdictional

boundary. Coordinated planning efforts will result in benefits to citizens of all communities in the region, such as:

- **Coordinated strategies** - to address regional issues by communicating and coordinating actions to address and resolve issues which are regional in nature.
- **Cost savings** - by increasing efficiency, avoiding unnecessary duplication and using area-wide cooperation and economies of scale to provide services that would otherwise be too costly, as well as to stabilize taxes by improving the performance and delivery of programs and services. To reduce the cost of providing facilities and services by local government and other providers (water districts, fire districts, school districts, *etc*) and improve the level of service and delivery of facilities and services. Man-made (roads, transit, stadiums and jails) and natural features (water basins, air shed) affect the region.
- **Economic development** - by enhancing economic growth by planning, funding and providing the infrastructure and services needed for sustainable community and regional growth including requiring developments whose impacts or services and facilities cross the approving jurisdiction's boundaries, to pay their fair share of the costs needed to mitigate the impacts generated by their growth and demand.
- **Sustainability** - to achieve sustainable development practices. Development is pushing against capacity. As we balance growth with environmental preservation and social equity, part of the solution requires acting regionally.
- **Early identification of issues** - to identify and resolve potential conflicts at an early stage, before public and private entities have established rigid positions, before the political stakes have been raised and before issues have become conflicts or crises.
- **Reduced litigation** - by resolving issues before parties engage in litigation, resulting in diverting funds that could have been used to provide facilities and services, unwanted outcomes, and reducing tensions to improve the working relationships of local government, service providers and community organizations in the region.
- **Consistency and predictability** - of plans, development regulations, policies, implementation actions and development approvals between service providers and

among neighboring jurisdictions, for residents, businesses and developers that establishes a framework of reasonable expectations and decision-making in the development process.

Land Use Goals and Policies

Goal 1: Growth is managed through designation of Development Tiers that guide the location, timing and phasing of development.

Policy1.1: Establish a Sustainable Development Tiers program that maintains a balanced, sustainable land use pattern based on the availability, timing, adequacy and equitable funding of necessary infrastructure and services.

Policy1.2: Establish a Developed Area Tier to distinguish existing developed areas that are served by facilities and services and where compatible infill development is likely to be appropriate.

Policy1.3: Establish a Planned Growth Area Tier that contains Existing Service Areas and Future Service Areas.

Policy1.4: Existing Service Areas include areas where urban and suburban development is likely and reasonable to occur within the next 10 years. Infrastructure is planned, budgeted or reasonably available. New infrastructure may be installed provided that there is required participation by new development to fund.

Policy1.5: Full urban services will be required for any development in Existing Service Areas, including approved public water and wastewater systems, urban road improvements, and urban service levels for public safety, fire and emergency medical assistance. Service providers should plan and construct facilities in these areas to meet the needs of development at these urban intensities.

Policy1.6: County and service provider Capital Improvement Projects should be utilized for Existing Service Areas first, before investment in Future Service Areas.

Policy1.7: Future Service Areas, urban and suburban development is likely and reasonable to occur in these areas over the next 10 to 20 years. Infrastructure may not be currently available, but it is planned and identified in short- or long-range Capital Improvements Plans. Infrastructure may be reasonably available (it may be close, in time or location) and funding alternatives may be identified, but participation by new development is required.

Policy1.8: Future Service Areas are not expected to develop at urban intensities until public facilities, primarily water, sewer and improved roads, are installed, which is not intended to occur until years 10 to 20. Clustering will be required, but some large lot development may be permitted provided that significant open space is provided and total development capacity occurs at the maximum density identified on the future land use map.

Policy1.9: Establish an Agricultural Protection Tier to protect farms and agricultural uses and prevent all non-compatible development.

Policy1.10: Direct new development to the Developed Area Tier and Planned Growth Area Tier where infrastructure and service levels are adequate to minimize development costs.

Policy1.11: Direct growth to Developed and Planned Growth Area Tiers to curtail haphazard and scattershot development patterns.

Policy1.12: Use Capital Improvements Plan (CIP) to support provision of water and sewer in Developed and Planned Growth Areas in coordination with partial or full funding by new development.

Policy1.13: Limit provision of water and sewer service to the Developed and Planned Growth Area Tiers.

Policy1.14: Limit extension of utilities in the Agricultural Protection Tier and require development to fund the expense of extending infrastructure.

Policy1.15: Curtail County subsidies for development in the Agricultural Protection Tier by no longer providing free water and sewer access in order to prevent further encroachment into agricultural areas.

Policy1.16: Improve the value and quality of new and existing development through establishment of zoning, subdivision and design standards in Developed and Planned Growth Area Tiers.

Policy1.17: Identify and support opportunities for regular and continuing intergovernmental communication, including but not limited to economic development, agricultural protection, tourism, parks and recreational facilities, transportation, water and sewer facilities, solid waste, and stormwater management.

Goal 2: A sustainable, orderly and compatible mix of land uses in Carroll County is achieved through coordinated growth management.

Policy2.1: Engage community residents and property owners in the development and implementation of plans and development standards for residential, commercial and mixed-use neighborhoods throughout the County.

Policy2.2: Promote appropriate interconnectivity between adjacent land uses, including connections between non-residential development and adjacent neighborhoods. Lot patterns should be designed to provide safe and direct connections between residential and non-residential uses for pedestrians as well as automobiles.

Policy2.3: Develop and maintain a coordinated intergovernmental planning and development review process to foster efficient County growth patterns.

Policy2.4: Use the Comprehensive Plan and future land use map to guide land use and development decisions. Require findings that any amendments to the Future Land Use Map:

- Will be consistent with Plan priorities;
- Will be compatible with existing and future land uses for surrounding areas of the County;
- Will not create a shortage of any particular type of residential or non-residential land;
- Will support the efficient provision of public facilities and services; and
- Will enhance the overall quality of life in the County.

Policy2.5: Provide and support a detailed, County-wide GIS database of existing data and enhance data inclusion and availability.

Goal 3: A high quality built environment exists throughout the County.

Policy3.1: Promote private investment in existing commercial and residential neighborhoods through a combination of public investment in infrastructure and active efforts to enforce County codes and eliminate code violations that erode property values.

Policy3.2: Enhance the overall design and quality of development along major corridors and at key intersections, including enhanced gateway signage and standards for building site design, materials, architectural design, signage, landscaping and street trees and other design considerations. Ensure that open space areas and street frontages project attractive images of the development.

Policy3.3: Promote good site design and layout, architectural design and building materials through regulatory tools and incentives.

Policy3.4: Provide additional sidewalks and trails in development neighborhoods and require the development of such amenities in new neighborhoods and commercial areas

Policy3.5: Promote high quality design of signage through regulatory tools and incentives.

Policy3.6: Promote high quality landscaping and encourage the use of environmentally sensitive landscaping techniques, such as rain gardens, xeriscaping and the use of native plants through regulatory tools and incentives.

Policy3.7: Ensure that new development and redevelopment along major corridors includes pedestrian oriented design features that provide linkages between residential and commercial uses.

Policy3.8: Support a clean and attractive environment.

Policy3.9: Improve visual appeal by encouraging and requiring property maintenance.

Goal 4: Commercial centers meet the needs of residents and visitors.

Policy4.1: Enhance downtowns and commercial centers as destination places for residents and visitors and promote the development of retail, service and entertainment businesses.

Policy4.2: Maintain the predominant scale and design character established by historical development patterns in downtown areas.

Policy4.3: Encourage mixed use buildings in downtown areas that are primarily occupied by retail uses on the ground-level and office or residential uses on upper levels.

Policy4.4: Encourage walkability in downtown and commercial areas by requiring walkways and sidewalks and supporting the provision

of pedestrian amenities, including green spaces, seating areas, plazas and public art.

Policy4.5: Promote convenient and safe access to commercial centers and prevent linear or “strip” development along roadways.

Policy4.6: Direct the development of commercial activities in or adjacent to the areas that they primarily serve, such as convenience stores in residential areas, and agriculturally oriented enterprises in agricultural areas.

Policy4.7: Coordinate with the Town of Hillsville to ensure that infrastructure is available to establish the Town as a prime regional commercial center

Policy4.8: Encourage local-serving commercial development.

Goal 5: Diversified industrial development contributes to economic development and a strong tax base.

Policy5.1: Promote industrial development to provide employment opportunities.

Policy5.2: Direct industrial development to locations where it will have a minimum adverse impact on existing and future residential development, agricultural lands and natural resources.

Policy5.3: Protect existing and potential industrial sites from encroachment by non-industrial activities.

Policy5.4: Direct industrial development to established or planned industrial parks to more efficiently provide necessary facilities and services.

Policy5.5: Establish performance, site, dimensional, design and access standards to ensure high quality, compatible industrial development.

Policy5.6: Encourage industrial development in areas served by transportation infrastructure, including at I-77 exits.

Policy5.7: Develop Wildwood Commerce Park at I-77 Exit 19.

Policy5.8: Support aggressive marketing of commercial/industrial sites to encourage companies to locate in Carroll County to aid in job creation.

Policy5.9: Encourage expanded Workforce Development.

Agriculture Goals and Policies

Goal 6: Agriculture contributes to the local economy and local character due to the preservation of agricultural land.

Policy6.1: Preserve agriculture land, forested land and open space for its local economic benefit, scenic beauty, and place in Carroll County's heritage.

- Maintain land use taxation in its current form.
- Phase in the removal of the personal property tax on farm machinery.

Policy6.2: Protect productive agricultural lands from encroachment by incompatible residential, commercial or other intensive development.

Policy6.3: Promote local agricultural production by supporting locally grown food and local food security initiatives.

- Support local producers in obtaining BQA (Beef Quality Assurance) and GAP (Good Agricultural Practices) certifications.

Policy6.4: Support agriculture as a way of life by keeping agriculture in the school curriculum and supporting FFA and 4-H, and encourage the use of the school system agriculture farm for teaching.

Policy6.5: Support agri-tourism.

Policy6.6: Support development of food processing plants, cold storage, and warehousing and distribution infrastructure for value-added and processed foods.

Policy6.7: Encourage new crop processing development.

Policy6.8: Support the role of the Virginia Cooperative Extension and the Food Processing Safety Initiative.

Policy6.9: Encourage producers to become GAP (Good Agriculture Practices) certified.

Policy6.10: Support the role of the Southwest Virginia Farmers' Market, including to:

- Research the feasibility of constructing a forced-air cooling facility.
- Find the best, most stable prices available for locally grown fruit and vegetable crops.
- Complete improvements to the retail building.
- Complete construction of hydro-cooler.
- Receive grants to supplement budget for needed improvement projects.
- Conduct small grower meetings to educate about the need for a diversified crop.

Policy6.11: Encourage local market development and develop non-local markets and marketing programs.

Policy6.12: Protect farms and agricultural facilities from uses that affect operations and security by minimizing encroachment of incompatible uses while allowing complementary activities.

Policy6.13: Support site plan flexibility to allow for security of the site and encourage consideration of emergency preparedness training and plans.

Policy6.14: Encourage and promote private and community gardens.

Policy6.15: Protect and preserve factors of production through land and natural resource conservation measures.

Chapter 5. Economic Development

Continued Opportunity

Carroll County has taken an economic hit with the demise of the textile industry, but with the continued emphasis on tourism, infrastructure and regional partnerships the economic base is being rebuilt and the county has a promising economic future.

The completion of I-77 through the County has had a tremendous impact on the development of the County's economy. The availability of interstate transportation has been and is an advantage not to be taken lightly by County leaders as they attempt to attract desirable jobs to the county.

The County has other stimulants to development on the horizon, which will add to the County's ability to compete for jobs in the future. These are the completion of U. S. Route 58 as a 4-lane highway, the construction of natural gas distribution lines thru Hillsville to Galax, and the construction of a fiber-optic backbone thru the county. The many opportunities for the County include:

Create a tourist-friendly environment

Tourist-based business could be enhanced through creating a more tourist-friendly environment by, in addition to addressing the code enforcement and crime issues addressed above, developing signs to guide tourists, creating a more walkable streetscape connected to an areawide system of bike, pedestrian and hiking trails, and developing a concentrated mix of specialty retail and service businesses that support tourism. These efforts will require a collaborative effort between public and private interests. Encouraging and supporting a role for local businesses, similar to the budding Fancy Gap experience, to identify their needs and expectations, will make the County a stronger player in the regional economy.

Increase employment opportunities

The County has areas planned for commercial and industrial development, primarily at the highway interchanges. While most of these areas are currently served by adequate facilities, many of the sites have constraints, such as slope and drainage problems, proximity to identified habitat areas and potential incompatibility with existing development (including use and design). By proactively addressing some of these constraints, the County could increase the attractiveness of these sites as employment centers.

Capture a greater share of sales taxes

Carroll County loses a significant share of sales tax revenues because of the limited shopping opportunities within the County, along I-77 and the Blue Ridge Parkway. The County could better capitalize on the regional market through the establishment of appropriately located large-scale retail centers, particularly in areas with better access to traffic along the Interstate and Parkway. Additionally, with the surge in local development, the County must determine the best locations for transportation corridor commercial centers that will serve the needs of future residents and visitors. Once the County has determined the best locations for community and regional scale retail centers, it must ensure that these sites are protected from incompatible development that would displace needed retail uses opportunities.

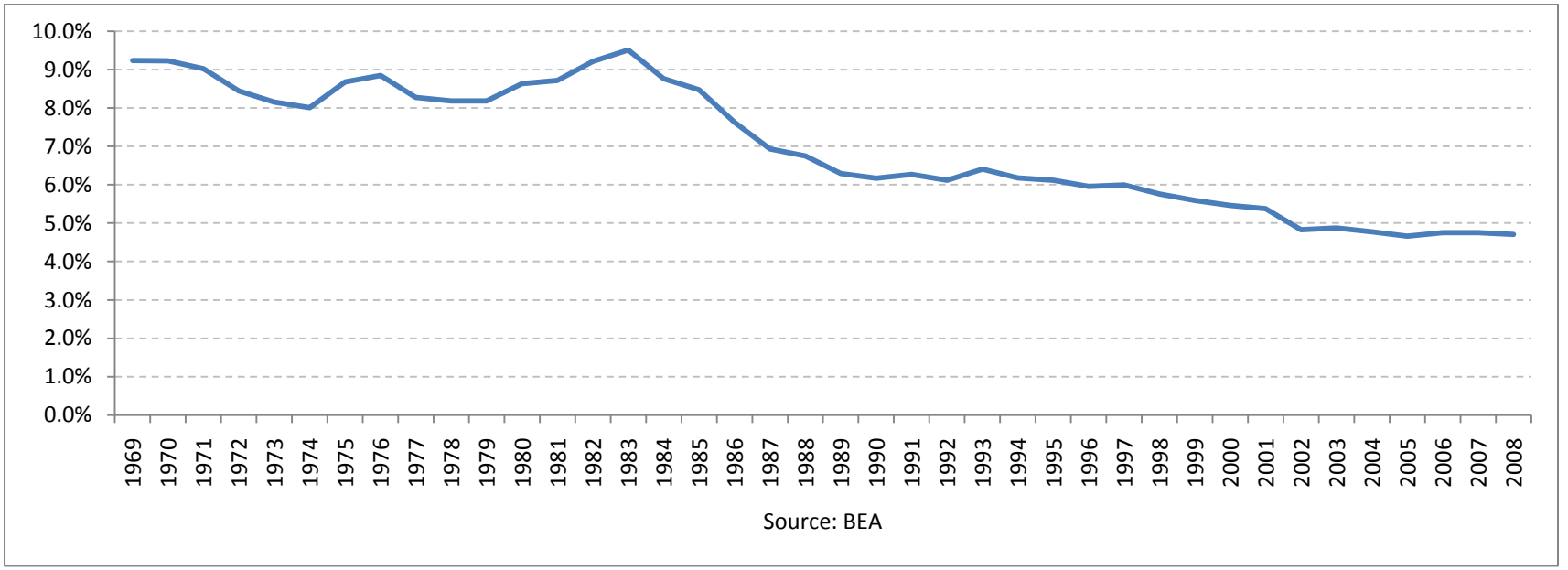
Existing Conditions

Employment

Carroll County, like the Nation as a whole, is experiencing a shifting economic base. Historically, agriculture was the primary economic activity that supported a host of businesses in other sectors. Agriculture's influence in the local economy has steadily declined for many decades, as is shown in **Chart 9**, while other sectors have grown. According to Bureau of Economic Analysis (BEA) there has been a steady decline in the% of Carroll County's employment base working in the agricultural sector. Between 1969 and 2008, agricultural employment as a% of the County's workforce peaked at 9.5% IN 1983. In 2008 that% dropped to 4.7% of the workforce employed in the agricultural sector.

Agriculture's influence in the local economy has steadily declined for many decades while other sectors have experienced growth. In 1983, agricultural employment as a percentage of the County's workforce peaked at 9.5%. In 2008 that percentage dropped to 4.7%.

Chart 9: Percent Agricultural Employment by Year



Recent trends indicate that Carroll County's work force is being employed increasingly in service classifications. According to the Quarterly Census of Employment and Wages (QCEW) published by the Bureau of Labor Statistics (BLS) and republished by the VEC, manufacturing employment has plummeted from 39.3% in 1999 to 21% in 2008 a decline over 46%. From 2003 - 2008 employment gains (as a percentage of total employment) occurred in the construction (3.2%), wholesale trade (0.8%), retail trade (0.6%), FIRE (Finance, insurance and real estate, 0.2%), and services (2.8%). The most significant percentage change from 2003 - 2008 in a single sector occurred in the Construction sector which increased employment from 468 in 2003 to 661 in 2008 a gain of over 41%. The following **Table 19** shows employment per sector by year according to the QCEW. It should be noted that BLS datasets exclude a number of potential workers within Carroll County, most importantly the self-employed.

Construction sector employment increased by over 41% from 2003 - 2008.

Table 19: Carroll County Employment by Industry; 3rd Qtr 2009

Industry	1999		2003		2006		2008		2003 - 2008
	Persons	Percent	Persons	Percent	Persons	Percent	Persons	Percent	Change in%
Construction	450	9.0%	468	8.8%	631	11.5%	661	12.0%	3.2%
Manufacturing	1,964	39.3%	1,397	26.4%	1,315	23.9%	1,154	21.0%	-5.4%
Wholesale Trade	59	1.2%	72	1.4%	120	2.2%	117	2.1%	0.8%
Retail Trade	925	18.5%	707	13.4%	692	12.6%	767	13.9%	0.6%
Transportation and Warehousing	285	5.7%	319	6.0%	299	5.4%	240	4.4%	-1.7%
Information	40	0.8%	38	0.7%	34	0.6%	31	0.6%	-0.2%
Finance and Insurance	74	1.5%	75	1.4%	96	1.7%	82	1.5%	0.1%
Real Estate, Rental, and Leasing	30	0.6%	27	0.5%	33	0.6%	31	0.6%	0.1%
Professional and Technical Services	73	1.5%	73	1.4%	80	1.5%	98	1.8%	0.4%
Administrative and Waste Services	37	0.7%	47	0.9%	83	1.5%	68	1.2%	0.3%
Health Care and Social Assistance	336	6.7%	1,032	19.5%	1,015	18.5%	1,181	21.5%	2.0%
Arts, Entertainment, and Recreation	47	0.9%	36	0.7%	76	1.4%	75	1.4%	0.7%
Accommodation and Food Services	573	11.5%	640	12.1%	665	12.1%	610	11.1%	-1.0%
Other Services (except Public Administration)	108	2.2%	97	1.8%	91	1.7%	90	1.6%	-0.2%
Agriculture, Forestry, Fishing & Hunting	N/A	N/A	38	0.7%	32	0.6%	41	0.7%	0.0%
Public Admin	N/A	N/A	224	4.2%	229	4.2%	256	4.7%	0.4%
Total	5,001	100.0%	5,290	100.0%	5,491	100.0%	5,502		

Source: Virginia Employment Commission, Quarterly Census of Employment and Wages

To supplement the VEC/BLS table, the BEA provides a measure of employment by industry that includes estimated self-employed as well as other employed persons not captured within the BLS universe. It should be noted that another major difference between the datasets is that BEA includes the City of Galax for historical continuity. **Table 20** provides the BEA estimates of employment in North American Industry Classification sectors.

Each table should be given merit and used as complimentary data points as opposed to conflicting data points. The VEC/BLS table shows an employment pattern specific to the County only and is more current for the slice of unemployment-insured wage earners, while the BEA tables indicate the amount of entrepreneurial spirit within the area.

Table 20: Annual Employment by Sector for Carroll County and Galax City

	2001	2002	2003	2004	2005	2006	2007	2008
Total employment	20,362	20,819	20,598	20,555	20,800	20,238	20,494	20,586
Wage and salary employment	15,634	15,410	15,397	15,142	14,882	14,118	14,021	13,835
Proprietors employment	4,728	5,409	5,201	5,413	5,918	6,120	6,473	6,751
Farm proprietors employment	1,017	920	901	893	892	881	895	889
Nonfarm proprietors employment (2)	3,711	4,489	4,300	4,520	5,026	5,239	5,578	5,862
Farm employment	1,094	1,005	1,004	981	969	961	974	968
Nonfarm employment	19,268	19,814	19,594	19,574	19,831	19,277	19,520	19,618
Private employment	16,640	17,112	16,847	16,849	17,135	16,593	16,781	16,823
Forestry, fishing, and related activities	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Mining	(D)	(D)	(D)	(L)	(L)	10	11	14
Utilities	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Construction	(D)	1,353	(D)	(D)	(D)	(D)	(D)	(D)
Manufacturing	5,434	5,231	4,828	4,491	4,119	3,466	3,154	2,856
Wholesale trade	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Retail Trade	2,831	3,034	2,877	2,776	2,840	2,765	2,740	2,752
Transportation and warehousing	(D)	(D)	(D)	608	582	540	503	501
Information	192	197	201	193	195	194	202	200
Finance and insurance	327	320	329	358	389	407	454	475
Real estate and rental and leasing	356	401	426	449	479	476	482	517
Professional and technical services	(D)	(D)	460	484	514	(D)	637	672
Management of companies and enterprises	(D)	(D)	17	12	13	(D)	(D)	(D)
Administrative and waste services	376	(D)	525	(D)	564	531	(D)	(D)
Educational services	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Health care and social assistance	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Arts, entertainment, and recreation	171	(D)	(D)	223	232	228	(D)	252
Accommodation and food services	1,143	(D)	(D)	1,236	1,339	1,391	(D)	1,363
Other services, except public administration	926	1,060	1,022	1,094	1,183	1,230	1,297	1,330
Government and government enterprises	2,628	2,702	2,747	2,725	2,696	2,684	2,739	2,795
Federal, civilian	104	106	106	105	102	107	105	104
Military	136	136	134	130	123	119	118	125
State and local	2,388	2,460	2,507	2,490	2,471	2,458	2,516	2,566
State government	699	715	719	710	756	694	694	708
Local government	1,689	1,745	1,788	1,780	1,715	1,764	1,822	1,858

Source: Bureau of Economic Analysis

(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

(L) Less than 10 jobs but the estimates are included in totals.

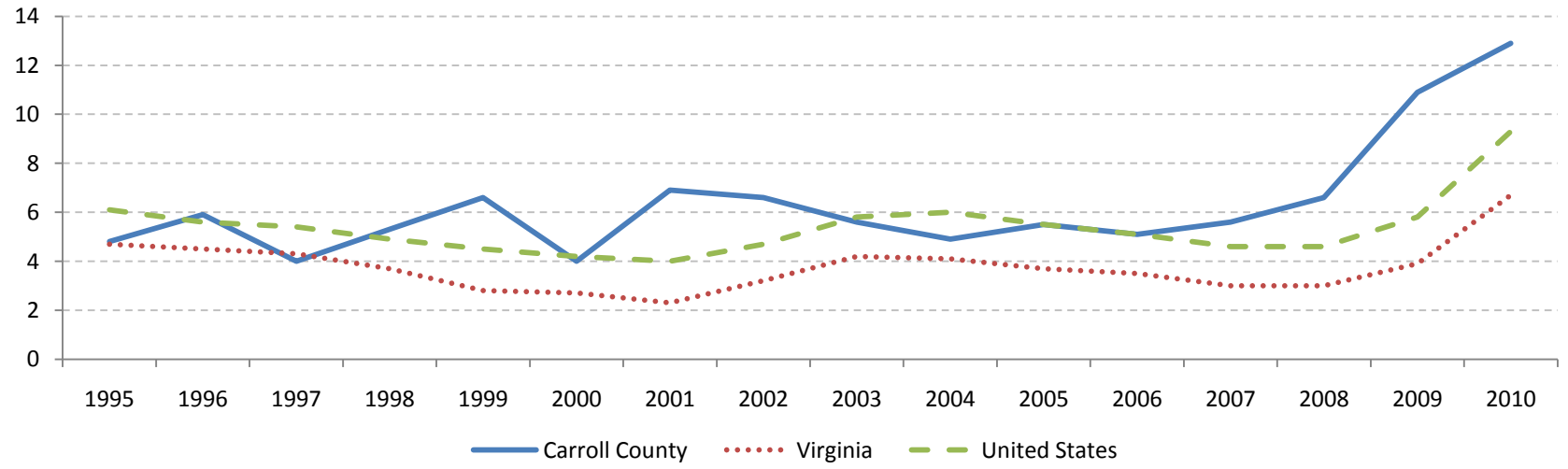
(2) Excludes limited partners.

Carroll County has been faced with periods of unemployment in excess of the state and national unemployment rates. In the fifteen-year span between 1995 and 2010, the unemployment rate peaked at 13.7%. While Carroll County generally fluctuates around the national unemployment rate, unemployment is consistently above that of the state. The current unemployment rate exceeds the state and national averages. The increase in unemployment during the early 2000s is largely due to the relocation of textile industries out of the United States while the current recession has driven unemployment rates to their highest in 70 years. **Chart 10** depicts annual smoothed unemployment rates for the County, State, and Nation.

A detailed analysis of employment trends over the past fifteen years, shown in **Chart 11** above, shows the rather dramatic fluctuation of unemployment in Carroll County with a fairly sharp decline in the county's annual unemployment rate between mid-2001 and mid-2004. From 2004 until the beginning of the Mortgage Crisis of 2008 unemployment remained steady within the 4% and 6% range generally. Post crisis, reflecting the state of the nation's economy, unemployment drastically rose to multi-decade highs.

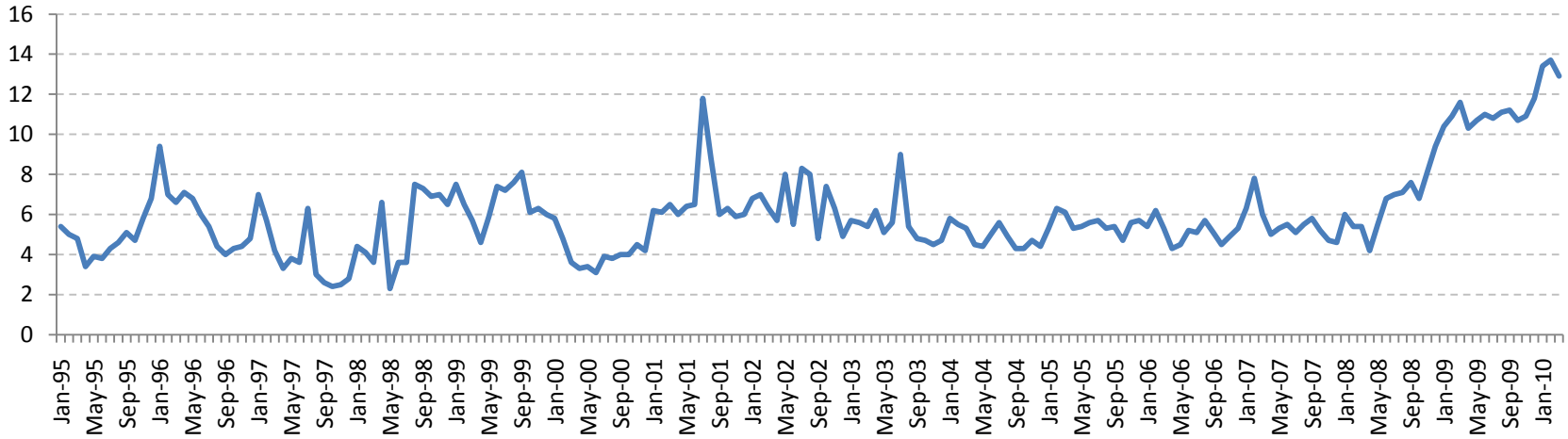
Carroll County's civilian labor force has not grown at the same rate as population growth and has actually declined since 2000.

Chart 10: Annual Unemployment Rate; 1995-2010



Source: Virginia Workforce Commission, based on data from the BLS

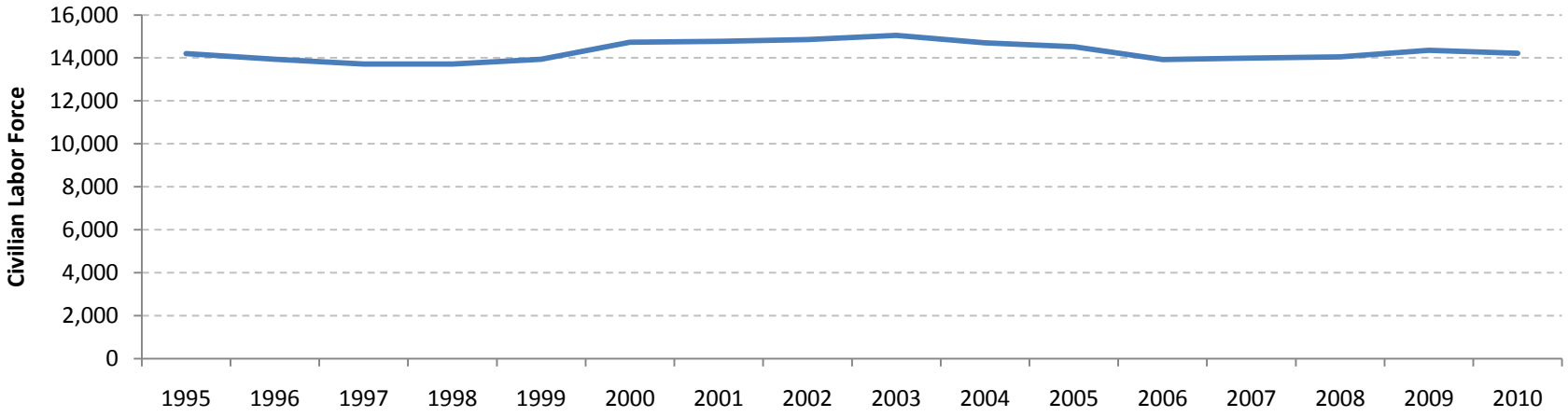
Chart 11: Monthly Unemployment Rate; Jan. 1995 – March 2010



Source: VEC

According to data from the VEC, the County's civilian labor force has not grown at the same rate as population growth, declining by 506 persons since 2000. Factors that can be attributed to the decline include the current recession, retirement aged persons diluting the labor force and farmers still working but not considered part of the labor force due to age. From 1995 – 2010 the labor force has grown 0.01% as illustrated in **Chart 12**.

Chart 12: Civilian Labor Force by Year



Source: VEC

The shifts in economic activity within Carroll County mirror the national trend towards retail, service and information based activities. **Table 21** lists the 50 largest employers within the County and is consistent with the Employment by Industry table above with publicly owned health care services and social services (education) the top two employers.

Table 21: Major Employers

Rank	Employer	Employment Type	Owner Type	Size
1	Carroll County School Board	Educational Services	Local Government	500 to 999 employees
2	SW Virginia Training Center	Nursing and Residential Care Facilities	State Government	500 to 999 employees
3	Parkdale Mills Inc	Textile Mills	Private	250 to 499 employees
4	D.L.B., Inc.	Heavy and Civil Engineering Construction	Private	100 to 249 employees
5	County of Carroll	Executive, Legislative, and Other General Gov	Local Government	100 to 249 employees
6	Mohawk Esv Incorporated	Textile Product Mills	Private	100 to 249 employees
7	Cockerham's Fuel Center	Gasoline Stations	Private	100 to 249 employees

Rank	Employer	Employment Type	Owner Type	Size
8	Lowes' Home Centers, Inc.	Building Material and Garden Equipment and Su	Private	100 to 249 employees
9	Barker Microfarads	Computer and Electronic Product Manufacturing	Private	100 to 249 employees
10	Hills Trucking Company	Truck Transportation	Private	50 to 99 employees
11	McDonald's	Food Services and Drinking Places	Private	50 to 99 employees
12	Trinity Mission of Hillsville	Nursing and Residential Care Facilities	Private	50 to 99 employees
13	Heritage Hall	Nursing and Residential Care Facilities	Private	50 to 99 employees
14	MT. Rog. Com. Men. Hlh. Ret. Svc. Bd.	Social Assistance	Local Government	50 to 99 employees
15	Turman Sawmill	Wood Product Manufacturing	Private	50 to 99 employees
16	VDOT	Heavy and Civil Engineering Construction	State Government	50 to 99 employees
17	Tri-Area Health Clinic	Ambulatory Health Care Services	Private	50 to 99 employees
18	Bucyrus America, Inc.	Machinery Manufacturing	Private	50 to 99 employees
19	M G Golf Facilities LLC	Amusement, Gambling, and Recreation Industries	Private	50 to 99 employees
20	Food Lion	Food and Beverage Stores	Private	50 to 99 employees
21	Shoney's	Food Services and Drinking Places	Private	50 to 99 employees
22	South West Virginia Home Health Care	Ambulatory Health Care Services	Private	20 to 49 employees
23	Sowers Construction Company	Heavy and Civil Engineering Construction	Private	20 to 49 employees
24	Parkdale America	Textile Mills	Private	20 to 49 employees
25	Postal Service	Postal Service	Federal Government	20 to 49 employees
26	Johnson Management Service	Motor Vehicle and Parts Dealers	Private	20 to 49 employees
27	Zip Mart	Gasoline Stations	Private	20 to 49 employees
28	Wheatland Hillsville	Nursing and Residential Care Facilities	Private	20 to 49 employees
29	Exceptional Personnel Inc	Food Services and Drinking Places	Private	20 to 49 employees
30	Town of Hillsville	Executive, Legislative, and Other General Gov	Local Government	20 to 49 employees
31	Virginia Produce Co LLC	Merchant Wholesalers, Nondurable Goods	Private	20 to 49 employees
32	Carroll County Department of Social Services	Social Assistance	Local Government	20 to 49 employees

Rank	Employer	Employment Type	Owner Type	Size
33	Wendnoke Corporation	Food Services and Drinking Places	Private	20 to 49 employees
34	Bryant Management Company	Accommodation	Private	20 to 49 employees
35	Eagle Carports	Fabricated Metal Product Manufacturing	Private	20 to 49 employees
36	Hardee's	Food Services and Drinking Places	Private	20 to 49 employees
37	Appalachian Power Company	Utilities	Private	20 to 49 employees
38	Dugspur Deli Mart Inc	Gasoline Stations	Private	20 to 49 employees
39	Kidz World Learning Center Inc	Social Assistance	Private	20 to 49 employees
40	Flying J Transportation L	Truck Transportation	Private	20 to 49 employees
41	H & M Motor Company	Clothing and Clothing Accessories Stores	Private	20 to 49 employees
42	Blue Ridge Concrete Prod. Inc	Nonmetallic Mineral Product Manufacturing	Private	20 to 49 employees
43	Berrier Farms Inc	Crop Production	Private	20 to 49 employees
44	Burger King	Food Services and Drinking Places	Private	20 to 49 employees
45	Revco	Health and Personal Care Stores	Private	20 to 49 employees
46	The Hungry Farmer	Food Services and Drinking Places	Private	20 to 49 employees
47	Sundram Corporation	Accommodation	Private	20 to 49 employees
48	Twin County Ford Mercury	Motor Vehicle and Parts Dealers	Private	20 to 49 employees
49	Virginia State Department of Health	Administration of Human Resource Programs	State Government	20 to 49 employees
50	Clark Gas and Oil Company Inc.	Gasoline Stations	Private	10 to 19 employees
51	Holiday Inn Express	Accommodation	Private	10 to 19 employees
52	Joy Ranch	Nursing and Residential Care Facilities	Private	10 to 19 employees

Source: VEC 3rd Quarter 2009

Many of the jobs held by Carroll County residents are in neighboring Galax City and Surry County, not reflected in the above tables. According to the 2006 – 2008 Census ACS, 82% of Carroll County workers drove to work alone, 13% carpooled, less than 0.5% took public transportation, and 2% used other means. The remaining 3% worked at home. Among those who commuted to work, it took them on average 25.3 minutes to get to work.

In 2000, nearly half (49.4%) of employed Carroll residents worked in other counties with 16.3% working in City of Galax. Of those employed in Carroll County, 3,314 live in other counties. The 2000 decennial Census describes the commuting pattern of Carroll County residents as shown in **Table 22**.

Table 22: Community Patterns

Out-Commuters to:	Number	In-Commuters from:	Number
City of Galax	2,189	Grayson County	1,172
Surry County, NC	1,827	City of Galax	783
Wythe County	627	Wythe County	403
Pulaski County	469	Surry County, NC	249
Patrick County	229	Floyd County	169
Forsyth County, NC	218	Patrick County	132
Grayson County	173	Pulaski County	107
Montgomery County	94	Alleghany County, NC	57
Floyd County	85	Mercer County, WV	30
Alleghany County, NC	75	Wilkes County, NC	20
Work Elsewhere	655	From Elsewhere	192
Total Out-Commuters	6,641	Total In-Commuters	3,314
Net In-Commuting			-3,327
People who live and work in the county			6,806

Source: U.S. Census Bureau, 2000 Census

In 2000, one-half of all employed Carroll County residents worked in other counties.

The average travel time to workplace in the year 2000 was 26.5 minutes. By 2008, average travel time to work had declined to 25.3 minutes. Greater separation between home and work increases the number of vehicle miles traveled, which equates to greater demands on public funded road construction and maintenance. It also means greater commute times and less family time.

Economy

As shown in **Table 23**, median income values in Carroll County are much lower than median values in the state. In fact, 2008 values in the county are lower than 1999 state values. The rate of change in Carroll County has declined against the state, bucking the historical trend.

Table 23: Estimated Median Income

Income Type	Carroll County			Virginia		
	1999	2008	Percent Change	1999	2008	Percent Change
Median Household Income	$30,597	$35,823	14.59%	$46,677	$61,044	23.54%
Median Family Income	$36,755	$45,761	19.68%	$54,169	$72,733	25.52%

Source: U.S. Census Bureau, Decennial Census, 2006 - 2008 ACS

In 2008, according to the BEA, Carroll County (plus Galax) had an average per capita personal income (PCPI) of $28,415. This PCPI ranked 86th in the state and was 64.5% of the state average ($44,075) and 70.7% of the national average ($40,166). The county's average annual PCPI growth rate over the past 8 years has accelerated to 4.3% from 3.6%, while the average annual growth rate for Virginia has declined somewhat to 4.2% from 4.5%. Southwest Virginia has a tradition of income below the state average, and these figures indicate that Carroll County is gaining somewhat versus the state average.

According to the Census 2006 – 2008 ACS, 8.3% of households had incomes less than $10,000, down from 13.9% in 2000. Just over a quarter of the households had annual incomes ranging from $10,000 to $24,999 in 2000 a number that has declined to 21% in 2008. A significant rise has occurred between 2000 and 2008 in the number of households with income over $50,000, rising from 22.8% to 28.9%. **Table 24** provides data on household income in the county.

Carroll County's average annual per capita personal income growth rate over the past 8 years has accelerated to 4.3% from 3.6%. Additionally, a significant rise has occurred between 2000 and 2008 in the number of households with income over $50,000, rising from 22.8% to 28.9%.

Table 24: Household Income

Income Category	2000	2008	Percent Change	2000	2008
Less than $10,000	1,693	1,222	-38.5%	13.9%	8.3%
$10,000 to $14,999	1,068	1,075	0.7%	8.8%	7.3%
$15,000 to $24,999	2,258	2,027	-11.4%	18.5%	13.8%
$25,000 to $34,999	1,912	1,517	-26.0%	15.7%	10.3%
$35,000 to $49,999	2,479	2,610	5.0%	20.3%	17.7%
$50,000 to $74,999	1,882	2,589	27.3%	15.4%	17.6%
$75,000 to $99,999	473	1,074	56.0%	3.9%	7.3%
$100,000 or greater	423	585	27.7%	3.5%	4.0%
Total	12,188	14,707	17.1%	100%	100%

Source: U.S. Census Bureau, 2000 Census, 2006 - 2008 ACS

The overall "poverty rate" in Carroll County is higher than the rate in the Commonwealth. Female householder families with children under eighteen is the family group with the highest poverty rate.

Another indicator of income distribution is poverty status of the population. As shown by the data in **Table 25**, the overall "poverty rate" in Carroll County is higher than the rate in the Commonwealth. The disparity is particularly strong when one looks at the groups with persons age 65 and over and families with female householder. Female householder families with children under eighteen is the family group with the highest poverty rate, with 47.2% living in poverty, a significant increase from 1999. Data published by the U.S. Census Bureau ACS for 2008, shows the rate of families living in poverty increased by 0.8% since 2000. A similar upward trend can be seen for families living in poverty with related children under eighteen. The rate of poverty for this family group is similar to the statewide average.

Table 25: Poverty Status (Percent Below poverty level)

By Population Group	1999		2008	
	Carroll County	Virginia	Carroll County	Virginia
All Persons	12.5%	9.6%	13.7%	9.9%
Persons 65 & up	14.1%	9.5%	14.2%	8.9%
All Families	8.7%	7.0%	9.5%	7.0%
Families with children under eighteen	13.3%	11.4%	11.7%	10.8%
Families with female householder	32.0%	23.0%	37.6%	22.5%
Female householder with children under 18	41.5%	29.8%	47.2%	29.1%

Source: U.S. Census Bureau, 2000 Census, 2006 - 2008 ACS

Table 26 indicates the change in average weekly wage rates between 1997, 2000, 2003 and 2008. Carroll County's wage rate remained well below the state average and only slightly lower than the average for the Mount Rogers Planning District. By 2008, the average weekly wage had climbed to 56.4% of the state average, compared to 88.7% for the planning district. Carroll County has had a consistently lower weekly wage than the planning district for the entire period.

Table 26: Annual Average Weekly Wage (All Occupations)

Locality	1997	2000	2003	2008
Carroll County	$346	$394	$419	$506
MRPD	$399	$450	$496	$570
Virginia	$568	$676	$741	$897

Source: Virginia Employment Commission

Table 27 shows the average weekly wages per worker by industry sector and locality during the third quarter of 2009, the latest data available during the planning process. Carroll County's

average wage for all industries was the second lowest in the planning district. Furthermore, the City of Galax and Carroll County have the lowest average weekly wages in the manufacturing sector in the entire planning district.

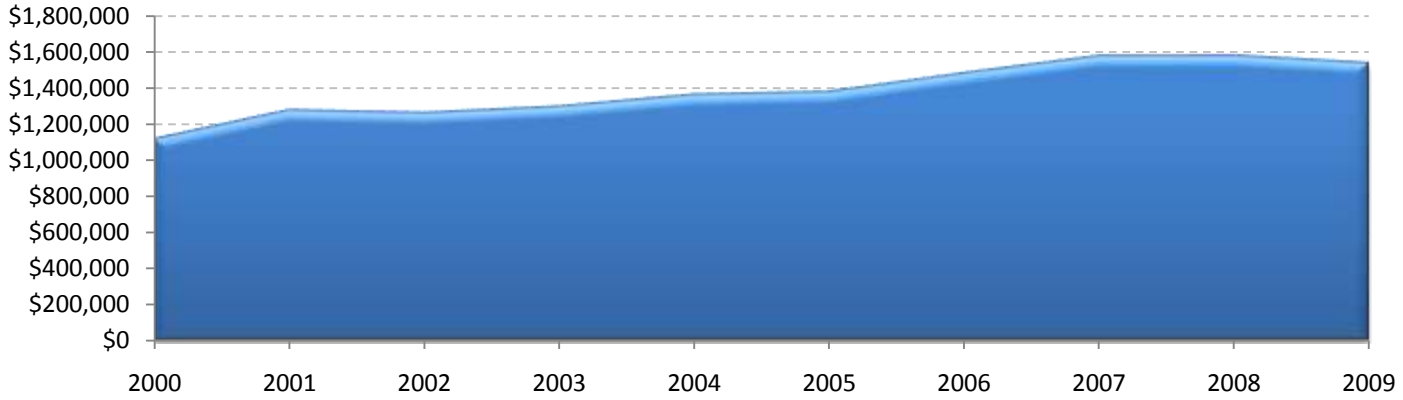
Table 27: Average Weekly Wage; 3rd Qtr 2009

Area Name	All Industries	Percent	Manufacturing	Percent	Retail	Percent
Bland County	$662	74%	$848	91%	$319	66%
Carroll County	$492	55%	$553	60%	$387	80%
Grayson County	$465	52%	$621	67%	$303	63%
Smyth County	$587	65%	$715	77%	$358	74%
Washington County	$645	72%	$708	76%	$403	83%
Wythe County	$530	59%	$712	77%	$404	83%
Bristol city	$575	64%	$709	76%	$378	78%
Galax city	$513	57%	$539	58%	$397	82%
Virginia	$897	100%	$929	100%	$484	100%

Source: Virginia Workforce Connection

Real estate and personal property in Carroll County represent the two major sources of income available to the county. These two indicators provide a good measure of the overall economic base and relative wealth of the county's citizens. **Chart 13** illustrates tax revenues for each year since 2000. As can be seen in the in the chart, tax revenues enjoyed a steady increase until the 2008 recession when revenues began to decline.

Chart 13: Tax Revenues ($) by Fiscal Year



Source: Virginia Workforce Commision

Sectors

Economic activity is commonly categorized for analysis into business type and functions called sectors. Sector delineation varies, but for purposes of the Plan, data is based on the following sectors: agricultural; manufacturing; retail trade; services; and tourism. Through the use of location quotients based on employment figures it can be determined if a region has "specialization" in a sector. Specialization occurs based on macro employment distribution, where the local jurisdiction employs more people than needed to meet local demands. A local economy that employs a higher percentage of one sector than the national percentage generates activity that is used outside of the jurisdiction and thereby exports goods and imports payment for those goods.

Employment that generates exports is often referred to as "base employment" that brings monetary assets into the community. However, employment that does not produce a level of goods and services sufficient to meet local demand creates a net import sector. A net import sector is a "lost opportunity" - it leaks monetary value to providers outside of the jurisdiction. Understanding the dynamics of base employment through location quotients provides guidance for targeted diversification of businesses to minimize leaking dollars to businesses outside the jurisdiction. Employment sectors with a location quotient of 1.00 meet local needs. A location

Over the last approximately 20 years there has been an increase in the amount of land allocated to farming within the County.

quotient less than 1.00 is a net importer while quotients over 1.00 are net exporters. Employment tables obtained from the BEA and BLS generate a location quotient as well as other metrics to determine sector specialties. Again, it should be noted the differences between the two metrics as well as the inclusion of Galax within the BEA data.

Virginia, as well as the Nation, is experiencing a greater rate of decline in the agriculture employment sector compared to Carroll County.

Farm

Carroll County's farming sector represents an area of specialization for the County, as shown in **Table 28.** Although agriculture sector employment has been declining consistently for a number of years, the sector is increasingly becoming a point of specialization for the County. This is due to the fact that the national rate of agricultural sector employment decline is greater than that of the County's. It's interesting to note that Virginia as a whole has a declining agricultural specialization which would indicate that specialization is also increasing compared to the State level.

Table 28: Agricultural Location Quotient; 2001-2008

Year	Carroll County			Virginia			United States	
	Sector Employment	Total Employment	Location Quotient	Sector Employment	Total Employment	Location Quotient	Sector Employment	Total Employment
2001	1,094	20,362	2.91	60,149	4,410,040	0.74	3,060,000	165,510,200
2002	1,005	20,819	2.75	57,785	4,403,066	0.75	2,902,000	165,063,100
2003	1,004	20,598	2.85	57,818	4,452,669	0.76	2,838,000	166,019,500
2004	981	20,555	2.97	54,244	4,574,960	0.74	2,719,000	169,026,700
2005	969	20,800	3.03	51,742	4,693,310	0.72	2,655,000	172,551,400
2006	961	20,238	3.24	50,804	4,771,956	0.73	2,579,000	176,124,600
2007	974	20,494	3.21	50,483	4,865,718	0.70	2,663,000	179,871,700
2008	968	20,586	3.23	50,131	4,916,428	0.70	2,642,000	181,755,100

Source: BEA

The United States Department of Agriculture collects farming data every 5 years in its Census of Agriculture program. Over the last approximately 20 years there has been an increase in the amount of land allocated to farming within the County, as well as the

number of farms. The gap between average and median size indicates there is a wide variation in the size of farms with the County, as shown in **Table 29.**

Table 29: Size and Number of Farms

Year	Number of Farms	Land Area (Acres)	Average Size (Acres)	Median Size (acres)	Total Value of Products (Revenue) Sold	Average Revenue per Farm
1992	884	113,165	128	N/A	$19,743,000	$22,333
1997	913	110,201	121	76	$18,358,000	$20,108
2002	953	121,910	128	90	$25,912,000	$27,190
2007	1,001	123,678	124	67	$34,447,000	$34,413

Source: USDA Census of Agriculture; 1992, 1997, 2002, 2007

Manufacturing

Despite manufacturing employment decreasing significantly recently, Carroll County still maintains a positive, although declining, location quotient, while the State has remained relatively steady during the same time period. The County has experienced drastic swings in manufacturing employment in the past. A relatively steady location quotient indicates this sector's decline is a national phenomenon, as shown in **Table 30.**

Table 30: Manufacturing Quotient; 2001-2008

Year	Carroll County			Virginia			United States	
	Sector Employment	Total Employment	Location Quotient	Sector Employment	Total Employment	Location Quotient	Sector Employment	Total Employment
2001	5,434	20,362	2.61	351,192	4,410,040	0.78	16,913,600	165,510,200
2002	5,231	20,819	2.63	329,606	4,403,066	0.78	15,745,700	165,063,100
2003	4,828	20,598	2.60	312,890	4,452,669	0.78	14,974,000	166,019,500
2004	4,491	20,555	2.50	306,861	4,574,960	0.77	14,791,900	169,026,700
2005	4,119	20,800	2.32	303,401	4,693,310	0.76	14,729,200	172,551,400
2006	3,466	20,238	2.05	294,791	4,771,956	0.74	14,688,200	176,124,600
2007	3,154	20,494	1.91	286,836	4,865,718	0.73	14,477,800	179,871,700
2008	2,856	20,586	1.79	276,097	4,916,428	0.72	14,090,900	181,755,100

Source: BEA

Retail Trade

Carroll County's and Virginia's retail trade sectors are comparable to that of the nation, therefore no significant specialization currently exists in the two jurisdictions, as shown in **Table 31**. This indicates that local needs are being sufficiently met by local economic activity within Carroll County.

All "other service" sectors are significantly below the national location average which indicates services are being imported or residents are obtaining services outside of the County.

Table 31: Retail Quotient; 2001-2008

Year	Carroll County			Virginia			United States	
	Sector Employment	Total Employment	Location Quotient	Sector Employment	Total Employment	Location Quotient	Sector Employment	Total Employment
2001	2,831	20,362	1.26	478,453	4,410,040	0.98	18,256,800	165,510,200
2002	3,034	20,819	1.32	479,415	4,403,066	0.99	18,193,100	165,063,100
2003	2,877	20,598	1.27	481,529	4,452,669	0.98	18,233,100	166,019,500
2004	2,776	20,555	1.24	491,098	4,574,960	0.99	18,385,500	169,026,700
2005	2,840	20,800	1.26	500,382	4,693,310	0.98	18,697,800	172,551,400
2006	2,765	20,238	1.28	505,366	4,771,956	0.99	18,846,800	176,124,600
2007	2,740	20,494	1.26	510,670	4,865,718	0.99	19,024,300	179,871,700
2008	2,752	20,586	1.29	504,680	4,916,428	0.99	18,862,200	181,755,100
Source: BEA								

Services

Although recent gains in service sector employment have been made within the County, the sector's location quotients have for the most part declined, as shown in **Table 32**. This is likely due to the overall National economy becoming more service sector oriented. One area of increase within the County has been the "Other Services" category. All other service sectors are significantly below the national location average which indicates services are being imported or more likely residents are obtaining services outside of the County.

Table 32: Service Industries Location Quotient; 2001-2008

Industry	2001	2002	2003	2004	2005	2006	2007	2008
Transportation and warehousing	-	-	-	0.92	0.86	0.82	0.74	0.73
Information	0.39	0.42	0.45	0.45	0.45	0.48	0.50	0.50
Finance and insurance	0.34	0.32	0.33	0.37	0.39	0.42	0.45	0.46
Real estate and rental and leasing	0.52	0.56	0.57	0.57	0.56	0.56	0.54	0.55
Professional and technical services	-	-	0.36	0.37	0.39	-	0.47	0.48
Management of companies and enterprises	-	-	0.08	0.05	0.06	-	-	-
Administrative and waste services	0.32	-	0.43	-	0.45	0.43	-	-
Educational services	-	-	-	-	-	-	-	-
Health care and social assistance	-	-	-	-	-	-	-	-
Arts, entertainment, and recreation	0.44	-	-	0.54	0.56	0.56	-	0.58
Accommodation and food services	0.86	-	-	0.89	0.95	1.01	-	0.98
Other services, except public administration	0.83	0.89	0.86	0.92	1.00	1.07	1.11	1.14

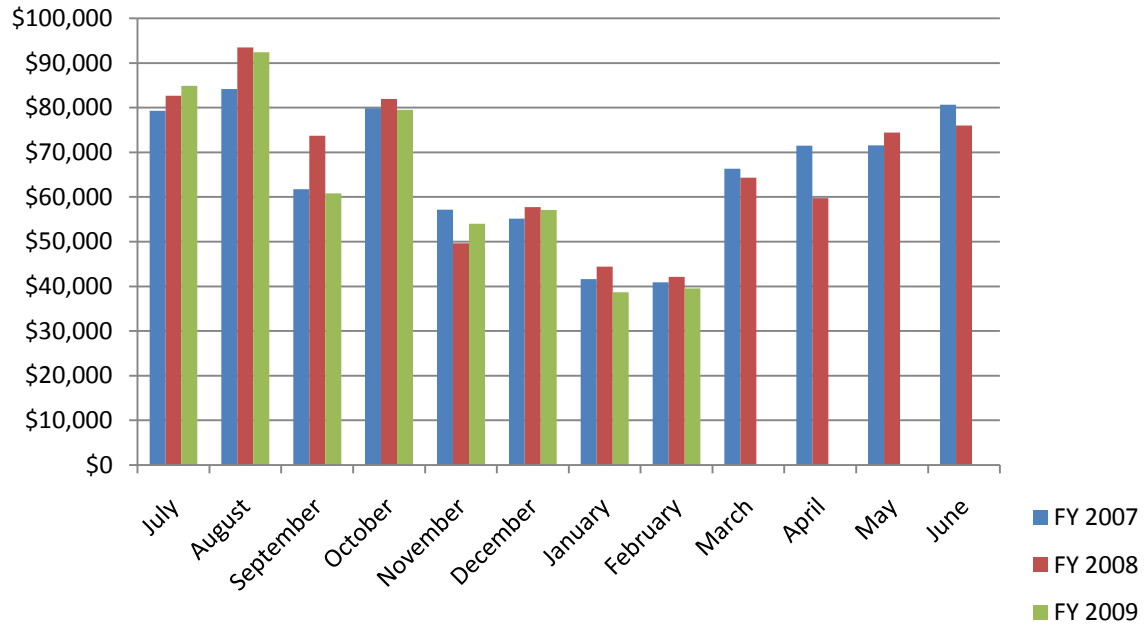
Source: BEA

Tourism

Carroll County has recently begun to push and market tourism activity within the County guided by the recently created Carroll County Tourism Strategic Plan. Tourism is a significant source of revenue for the County; **Chart 14** depicts the amount of tax revenue generated by lodging and meals taxes. While only fiscal year 2007, 2008 and the first half of fiscal year 2009 were provided, it appears the revenue stream has been flat and thus not significantly affected by the recent economic downturn.

Tourism is a significant source of revenue for Carroll County. The summer months are the most active for tourism related activities.

Chart 14: Lodging and Meals Tax Revenues



Source: Carroll County Tourism Strategic Plan

Supporting Economic Expansion

The Economic Development Department exists to promote entrepreneurial and new business activity that will result in incremental jobs for Carroll County residents. The department's primary responsibility is to assist existing and potential businesses in developing business plans and locating both public and private sources of funding. The department will also recruit new businesses to the area and participate in whatever local and regional collaboration is necessary to help ensure the economic vitality of the region.

Jobs / Housing Balance

The jobs / housing balance within the County has implications for residents and employers as well as for service providers. Balanced County development has employment options for residents, so that they can live and work in the same community; and an educated workforce for employers, so that they are able to hire employees who are vested in their community and in their job. Communities with an imbalanced ratio of jobs to housing are unsustainable for both residents and employers. Commercial uses generate more revenues for jurisdictions than residential uses, and therefore an imbalanced land use mix can also negatively impact the ability of service providers to maintain levels of service.

There is an opportunity for planned growth areas to develop with a balanced jobs to housing ratio from the outset to reduce traffic congestion, support revenue generation and provide a high quality of life for residents. While the build-out land use mix is ultimately most important, it will also be important to encourage jobs / housing balance during the phasing of development in growth areas.

Critical to the achievement of jobs / housing balance is the designation of appropriate sites for non-residential development. The availability of appropriate sites, while necessary, isn't likely to induce economic growth on its own. However, the lack of appropriate sites is certain to limit economic growth.

Infrastructure Development to Support Economic Development

Like other rural localities in Southwest Virginia, Carroll County's economic base has evolved from predominantly agricultural to a diversification of employment in the manufacturing, service, and trade sectors. The unemployment rate has generally been a problem in the Mount Rogers region since the national economic downturn in 1991-92 and appears to have been exasperated by the current downward trend. The lack of infrastructure (water and sewer) and limited industrial recruitment have been limiting factors to job growth. Until Carroll County can expand its industrial base, much of the county's labor force will continue to look for opportunities in the City of Galax, Wythe County, Surry County, North Carolina and other locations.

A key to attracting and keeping both existing industries and the target industries described above is the development of twenty-first century infrastructure within the County. Without adequate infrastructure, other community and economic activities are weakened and increasingly difficult to support. In assessing current strengths and weaknesses related to infrastructure, the County has identified regional infrastructure development in broadband, renewable energy and agriculture infrastructure as key to advancing the local economy into the future.

The County, in its effort to aid the attraction, expansion and retention of economic investment, has identified several key structural components necessary to develop a sustainable local economy. These components include:

- Economic infrastructure that is sensitive to environmental and community needs, addressing both current deficiencies and developing new capacity as necessary. Specific examples include the expansion of broadband service, the local generation and distribution of renewable energy, and the enhancement of transportation systems.
- A viable, educated, trained and skilled labor force, including the development of a green workforce and support of the local youth workforce. Specific examples include offering supportive services and opportunities to allow workers to transition from outdated to

currently marketable skills and enabling local youth to develop skills at an early age to lead to meaningful employment later on.

- Adequate economic development services. Specific examples include promoting entrepreneurial and small business capacities and supporting key cluster industries.
- The strategic development of cluster industries such as the “green” industry, agriculture, outdoor recreation and ecotourism.
- Stronger local and regional community participation and organization. Partnering with other governmental agencies and non-profit organizations allows for coordination and cooperation on a regional basis, strengthening economic development outreach and ensuring future economic activity is diversified and appropriate to area communities and regions/supported by these groups. Partnerships create a stronger front, allowing more targeted approaches and a greater ability to seek out desired businesses.

Initiatives to Promote Agricultural Economic Development

The same approach to growing and attracting new commercial and industrial businesses applies to supporting and encouraging the agricultural economy, which means a supporting infrastructure for a local food industry needs to be in place. One of our biggest challenges is to "jump start" this industry by developing local markets for locally grown food. Opportunities for immediate expansion include sales to local institutions such as schools, hospitals, food assistance agencies, restaurants and locally-managed stores capable of sourcing their food locally. Other areas of consideration for the short-term include local food networks (partnerships between farmers, buyers and consumers) and ethanol plants.

Virginia Cooperative Extension

The Virginia Cooperative Extension responds to the needs of individuals, families, groups and organizations in the three broad areas of Agriculture & Natural Resources, Family & Consumer Sciences, and 4H Youth Development. Virginia residents can participate in Carroll County programs through the local extension office. Agriculture and Natural Resources programs help sustain profitability of agricultural and forestry production, while protecting and enhancing the quality of our land and water resources. Family and Consumer Sciences programs improve the

CARROLL COUNTY FARMERS ARE “PLOWING NEW FIELDS”

- ***By 2010, there were three broccoli farms on 90 acres***
- ***By 2007, there were 13 pumpkin farms on 518 acres***
- ***By 2010, there were six cilantro farms on 60 acres***

quality of life for individuals, families, and communities, and support economic self-sufficiency and family stability and emphasize appropriate and safe food and nutrition choices, encourage physical activity, and improve health literacy. 4-H is the comprehensive youth development program of Virginia Cooperative Extension. Young people from ages 5 to 18 engage in hands-on learning experiences under the guidance of 4-H agents and trained adult or teen 4-H volunteers.

Southwest Virginia Farmers' Market

The Southwest Virginia Farmers' Market is responsible for the operation and maintenance of wholesale and retail fruit and vegetable market buildings. In addition, they provide a location for local farmers to learn about and participate in innovative ways of marketing, packaging and cooling their crops. The Farmers' Market:

- Buys, sells, packages and cools vegetable and fruit crops grown by Southwest Virginia farmers.
- Provides a location for retail vendors to operate their business.
- Provides a location for wholesale vendors to operate their business.
- Is a regional leader in promoting crop diversification.
- Assists local farmers in marketing their crop.

In FY 2009, the accomplishments of the Farmers' Market included:

- Leading a regional effort to increase pumpkin production.
- Receiving grant funding to build a hydro-cooling facility.
- Securing an additional retail vendor.
- Increasing the number of cases of broccoli supplied to Food City by three fold.
- Forming a small cooperative of farmers to grow, hydrocool and market corn together.
- Receiving grant funding to make improvements to the parking lot of the retail building.

Initiatives to Support Tourism

Successful tourist venues tell the story of a place to visitors and inspire them to become a part of a place's future history, encouraging repeat visits, purchases of vacation homes and priceless word-of-mouth advertising. Carroll County is a product of its history, location, regional attributes and development trends. It has enjoyed the impacts of tourism over the years, but the challenge of the future is to re-tell the story and maintain and increase the tourist appeal, while remaining committed to providing services to permanent residents. One key challenge for Carroll County will be to bring people off the main highway to stop at destinations inside the County, and the opportunity will be to provide a higher quality of shopping, dining and recreational experiences to meet the demands of an increasingly sophisticated tourist market.

The qualities that make Carroll County an attractive place to live are much the same as the qualities that make it an attractive place to visit. Year round residents as well as part time residents and visitors demand basic amenities such as clean air and water, reliable emergency services, efficient transportation and retail options. Residents and visitors alike value the natural beauty of Carroll County and the surrounding environs in addition to the many recreational amenities and facilities available. Recognizing that tourism has a profound effect on the local economy and government, including employment, revenues, infrastructure and service demand, the environment and overall quality of life factors, the goals and policies for tourism aim to promote tourism within a sustainable framework for the entire Carroll County community.

According to the Virginia Tourism Corporation, the economic impact of tourism in Carroll County has steadily increased in recent years. Estimated expenditures increased from $41 million in 2003 to an estimated $54 million in 2007. To increase the benefits and revenues of tourism-related activities, the County adopted a Five-Year Strategic Plan drafted by the Carroll County Tourism Advisory Committee and County Staff in early 2010. The Visitor Center became a state certified local/regional visitor center on March 1st 2008.

The Tourism Mission Statement for Carroll County is:

To promote and develop tourism in Carroll County while preserving its natural resources. Ensuring and preserving a high quality of life, by including community involvement, economic development, and meeting the needs of our visitors through regional and corporate partnerships.

Heritage Tourism

The historic and cultural resources in Carroll County draw visitors to the area, making historic preservation an element of the County's economy. Historic preservation aims to identify, preserve, and protect sites, buildings, and structures that have significant cultural, social,

economic, political, archaeological, or architectural history. The social and cultural benefits to historic preservation are numerous; it can revitalize neighborhoods and instill pride in the community. Preservation is also associated with sustainability, as it encourages the use of existing buildings and sites as well as their infrastructure, rather than building new structures in greenfields. By taking advantage of existing infrastructure through adaptive reuse (using historic buildings for new purposes), preservation reduces the environmental toll of growth.

Historic preservation also increases and encourages heritage tourism. The National Park Service identifies heritage tourism as "traveling to experience the places, artifacts, and activities that authentically represent the stories and people of the past and present." From an economic perspective, a study by the Travel Industry Association of America found that people who engage in historic and cultural activities do more, spend more, and stay longer than other types of U.S. travelers[i]. While on vacation, visiting historic and cultural sites ranks second only to shopping, which underscores the economic importance of preservation.

Scenic Routes and Heritage Sites

A small portion of the Jefferson National Forest (the Mount Rogers National Recreation Area) lies within the northwestern corner of Carroll County, and thirty miles of the Blue Ridge Parkway is located within the county. The Blue Ridge Parkway, completed in 1977, is a 469-mile scenic route through Virginia and North Carolina. According to Blue Ridge Parkway Superintendent Daniel Brown, the Blue Ridge Parkway is consistently one of the most visited national park areas administered by the National Parks Service. Approximately 20 million tourists travel the Blue Ridge Parkway annually, causing a great economic impact for the counties in which the parkway lies. The economic impact can be as great as two million dollars per year for the 29 counties of Virginia and North Carolina. The Blue Ridge Parkway not only provides Carroll County residents with recreational opportunities, but with the possibility of substantial economic growth.[5]

Heritage tourism in Carroll County is also supported by *The Crooked Road: Virginia's Heritage Music Trail*. *The Crooked Road* is a driving route through the coalfields, Appalachian Mountains, and the Blue Ridge Mountains of Virginia. Carroll County is home

The Tourism Vision Statement for Carroll County is:

To be a premier world-class destination known for our nationally recognized natural scenic beauty, recreational, agricultural, and cultural/heritage assets. Because of our superior hospitality and opportunities for a unique experience, our tourism development efforts, and our expansion of entrepreneurship opportunities, tourism will be a positive economic asset.

[5] Brown, Daniel. "An Into from the Superintendent of the Blue Ridge Parkway: Parkway Marks 70th Anniversary—Three Score and ten." www.blueridgeparkway.org

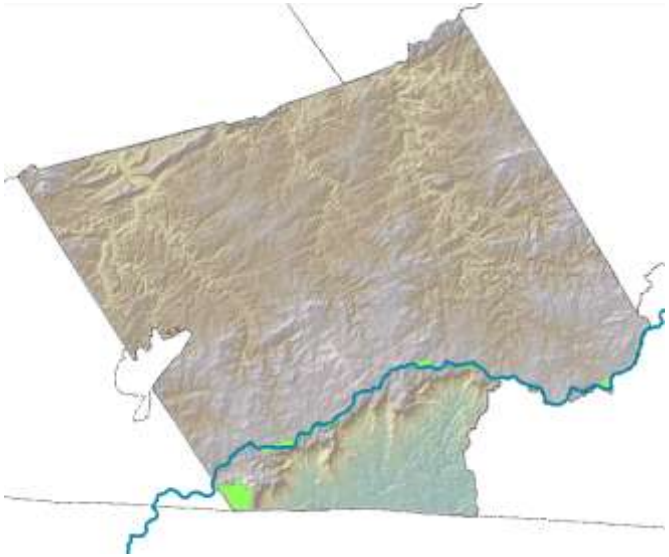
to two stops on the trail: the Blue Ridge Music Center and the Rex Theatre. The Blue Ridge Music Center is located near mile marker 213 on the Blue Ridge Parkway in both Carroll and Grayson Counties. Phase I of the music center opened in 2001, which includes an outdoor amphitheatre with seating capacity for 2,000 people, picnic areas, and a gift shop. Phase II, now underway, will feature a 17,000 square foot facility with interpretive center, exhibit gallery, music sales and information area, an indoor auditorium, a listening library and a classroom area to accommodate visiting school groups.

The second stop on *The Crooked Road* is the Rex Theatre, located in the City of Galax. Every Friday night since 1999, WBRF-FM 98.1 has broadcast "Blue Ridge Backroads" live from the Rex Theatre. Listeners in four states are able to enjoy the sounds of "Old Time Mountain Music."[6]

Visitors to the area are encouraged to visit the Blue Ridge Plateau Visitors Center located in Hillsville. The visitor center is situated off Interstate 77 Exit 14. The center provides visitor information for the entire state of Virginia, as well as, emphasizing information on Carroll, Grayson, Patrick, and Floyd Counties, and the City of Galax.

Heritage Events

The Annual Old Fiddler's Convention is held annually in August in Galax. Originating in the spring of 1935, the Convention was dedicated to "Keeping alive the memories and sentiments of days gone by and make it possible for people of today to hear and enjoy the tunes of yesterday". The contest attracts thousands of musicians and fans every year, attracting over 1,900 musicians in 2009.



The Blue Ridge Parkway in Carroll County.

Ecotourism

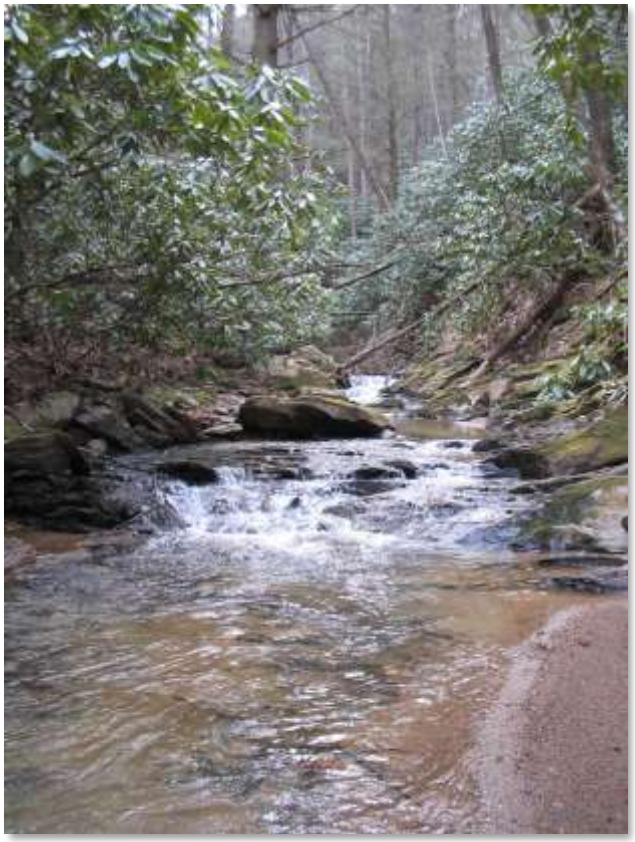
Conservation of open space and environmentally sensitive areas can increase revenues because businesses and residents are drawn to areas with a high quality of life, which includes high percentage of protected lands and open spaces in and near to urban areas and prime research and educational facilities. According to the Trust for Public Land, "economic advantage will go to communities that are able to guide growth through land conservation and other smart growth measures…. One 1998 real estate industry study predicts that over the next 25 years, real

[6] www.thecrookedroad.org

estate values will rise fastest in the smart communities that incorporate the traditional characteristics of successful cities: a concentration of amenities, an integration of residential and commercial districts, and a "pedestrian friendly configuration."[ii] Further, businesses in the Sierra Nevada Region of California, where urban areas are close to mountains, wildlife preserves and open landscapes identified these amenities as drivers of the region's successful economy.[iii]

Within Carroll County, tourism is a significant and clean industry with great influence over the County and regional economy. Visitors are attracted to Carroll County's cultural assets and natural beauty. Protection of these unique environmental and cultural resources will ensure that our competitive advantage in tourism is preserved and enhanced to ensure the viability of tourism.

Ecotourism is the fastest growing market in the United States' $699 billion dollar tourism industry, and a significant amount of tourist activity in Carroll County can be regarded as "ecotourism." Ecotourism includes all tourist activities that have a reduced impact on the natural environment, encourage education awareness of the environment and culture of a place, and improve the welfare of the local people. These types of activities usually include scenic trips, such as visiting National parks and wildlife preserves, educational and awareness trips, such as guided tours, and volunteer trips, as well as canoeing, hiking, and other outdoor adventures. Ecotourism is increasing in popularity in concert with the growing popularity of green products, sustainable development and environmentally friendly alternatives to conventional standards of the past. Ecotourism can be a fast growing and important economic development component for the County in the near future, provided that it "fits" with the environmental and community constraints.



It is important to note that promoting developing ecotourism is only one component of a successful ecotourism development program. First and foremost, a healthy environment with connected, protected and accessible natural areas is critical. For the County to protect its ecotourism assets, it must prevent development from infringing on a critical mass of natural preserves. Carroll County has several natural trails that should be protected and promoted as key ecotourism assets, including Stewarts Creek Wildlife Management Are, Crooked Creek Wildlife Management Area/Fee Fishing/Birding Trail, Devil's Den Nature Preserve and Beaver Dam Creek Wildlife and Birding Trail.

Economic Development

Goal 7: Tourism is a foundation for the local economy, with enhanced amenities and attractions for residents and visitors.

Policy7.1: Support development of cultural and recreational attractions.

Policy7.2: Support development of eco-tourism and protect the natural resources that contribute to the viability of ecotourism and outdoor recreation.

Policy7.3: Promote and protect the scenic beauty of the Blue Ridge Parkway.

Policy7.4: Enhance quality lodging options for visitors.

Policy7.5: Encourage expanded dining options for visitors.

Policy7.6: Support implementation actions from the Tourism Development Plan.

Policy7.7: Support the development and programming of the Crooked Road: Virginia's Heritage Music Trail.

Policy7.8: Support the role of the Office of Tourism, including to:

- Coordinate with the Tourism Advisory Board to implement the five year strategic plan.
- Help build and sustain our regional tourism marketing groups.
- Continue to work on tourism related infrastructure.

Goal 8: A sustainable local economy provides employment opportunities and supports a high quality of life.

Policy8.1: Support agricultural-based economic development and maintain the viability of the agricultural sector of the County's

economy through developing and supporting new, local and enhanced markets for locally grown food and local products.

Policy8.2: Promote a diversified regional economy with more high-tech industry.

Policy8.3: Support workforce training opportunities.

Policy8.4: Encourage small business development.

Policy8.5: Support the use of economic development incentives to create employment opportunities, establish public-private partnerships, and encourage development that provides public benefits and amenities.

Policy8.6: Promote, encourage, and support Blue Ridge Crossroads Economic Development Authority (BRCEDA), which is a regional authority of Carroll, Grayson, and Galax that promotes regional efforts.

Policy8.7: Support the Crossroads Institute, which serves as an off-campus site for WCC and workforce training, houses the Carroll Economic Development Department, the Small Business Institute, and BRCEDA.

Policy8.8: Encourage wind turbines/farms and other green energy options.

Policy8.9: Encourage job creation.

Policy8.10: Encourage development of manufacturing and distribution centers.

Policy8.11: Support facilities and services that contribute to quality of life to attract new businesses.

Policy8.12: Support and finance County acquisition of land for business and industrial development.

Policy8.13: Support the role of the Carroll County Industrial Development Authority to promote Carroll County as a rising center for commercial and industrial development.

Policy8.14: Support the role of the Economic Development Department, including to:

- Assist new clients seeking Economic Development Services.
- Locate and secure funding for new and existing Carroll County businesses.
- Generate new capital investment in Carroll County.
- Generate new business activity that stimulates new jobs for the Carroll, Galax, and Grayson area.

Chapter 6. Housing

Provision of adequate and attainable housing is a vital foundation for supporting sustainable community and economic development. Demographic factors such as an aging population and changing economic conditions play a role in the development of policies and actions related to housing needs and demand. Unique community characteristics and diverse development patterns in different parts of the County impact policy and implementation strategies.

Sustainable communities provide housing options for all residents, so that people can stay vested and participating within their community though their housing needs may change over time. In terms of housing, social sustainability means that housing is available for people of all racial, ethnic and socioeconomic backgrounds, as well as all household types (families, singles, un-related individuals, elderly, etc.). Sustainable neighborhoods provide a mixture of housing forms, sizes, prices and densities, as well as opportunities for social interaction, such as neighborhood parks or neighborhood-based schools. Conventional subdivisions are often designed and marketed to separate housing products based on small pricing increments, for instance, homes with two bedrooms priced very closely to one another are all located in one pod, while slightly larger homes with three bedrooms priced just higher are located in a different pod. While this is presented as a way to maintain property values, it really serves to isolate people based on very small economic factors and matters of preference.

From an economic perspective, adequate workforce housing should be available to support a high-quality employment base for local and regional employers. Workforce housing is necessary if the County is to maintain and enhance its economic health and vitality. Additionally, the provision of adequate, attainable housing helps to prevent neighborhood deterioration and a declining tax base. It is normal in Carroll County and many other regions of the country for workers to seek housing in other more affordable communities, forcing them to commute long distances to work. This economic factor influences social and personal health aspects of people's lives as well as the environment, as long-distance commutes have huge impacts on local and global air quality.

Finally, from an environmental perspective, housing should be sustainable in terms of energy efficiency and its ecological footprint. The design of neighborhoods should support alternative transportation methods and public health goals through the integration of pedestrian facilities and proximity to employment opportunities.

Terminology

Providing a balance of housing types within the community can be a challenging endeavor. Local housing issues often involve a broad range of considerations and terminology. Before any meaningful discussion can occur on housing policy, it is important to clarify specific definitions frequently used by those who are addressing local housing issues in the community.

National definitions housing are created by the U.S. Department of Housing and Urban Development (HUD). According to HUD, the term *affordable* refers to the ability of a person or household to pay no more than 30% of their (gross) income for housing. *Low/Mod income* household is HUD's definition for families earning 80% or less of Area Median Income (AMI). The majority of federal and state subsidy programs are geared to assist Low/Mod income households.

However, in many communities, households earning more than 80% of the Area Median Income are also in need of some form of housing assistance, due to locally unsustainable wage levels or high housing prices. A*ttainable* is a term that Carroll County may use to refer to households earning between 80% and 125% of AMI. Housing programs to meet the needs of both low/mod income households as well as families earning above 80% of AMI can contribute to the social and economic sustainability of growth.

An umbrella term used to refer to both target populations is *workforce housing*. This term refers to the concept of providing programs that meet the County's diverse workforce housing needs, consisting of both owner- and renter-occupied housing that is affordable to the local workforce and carefully located to meet their needs. Lack of housing that is affordable to the local workforce causes increased commuting times, increased pollution, increased roadway congestion and less time at home with family. Quality of life suffers and the social balance of the community is disrupted.

There are also ***special needs*** populations outside of the workforce who need housing assistance. These groups include military families, seniors, persons with disabilities and the homeless.

Workforce Housing

The availability of workforce housing has real impacts on the regional economy. Employers in the region will find it increasingly difficult to attract and retain employees due to the lack of affordable quality housing, exacerbated by skyrocketing real estate values, which impacts economic development efforts and the very fabric of the community.

The persons and families that need affordable workforce housing are, for the most part, 'working people'. This is a particular hardship for those who work in entry level jobs that are vital to sustaining a good economy and a good quality of life for everyone, and also includes essential workers (police, fire, health care, utilities, teachers and child care workers) retail, industrial, office and service industry workers, entry- and mid-level professionals and public sector (government and non-profit community organizations) employees. The relationship between commercial enterprises and workforce housing is key to employment supply and demand factors, focusing location of residence, business location and transportation and accessibility.

Senior Households

Retired people often have smaller household sizes, reduced incomes, and can suffer impaired abilities and mobility as they age. Without housing choices, long-time residents may be forced to leave the community they have always lived in to find appropriate housing as they age. It is expected that senior housing will be a growing concern as baby boomers age.

Senior housing is generally based on market-rate rents, and provides a community for seniors to live in that provides for their increasing needs. Communities that are designed for those 55 years of age and older are increasingly committed to an "active lifestyle" for seniors and cater to the increased health and vitality of today's seniors. Community input has indicated that there are seniors living within the community that are interested in market rate, senior-specific housing. Many middle-income seniors that are looking for housing do not qualify financially for

the available government-subsidized senior housing. The preference of many seniors is to obtain modestly-sized residences where they can live near to their children and grandchildren.

Special Populations

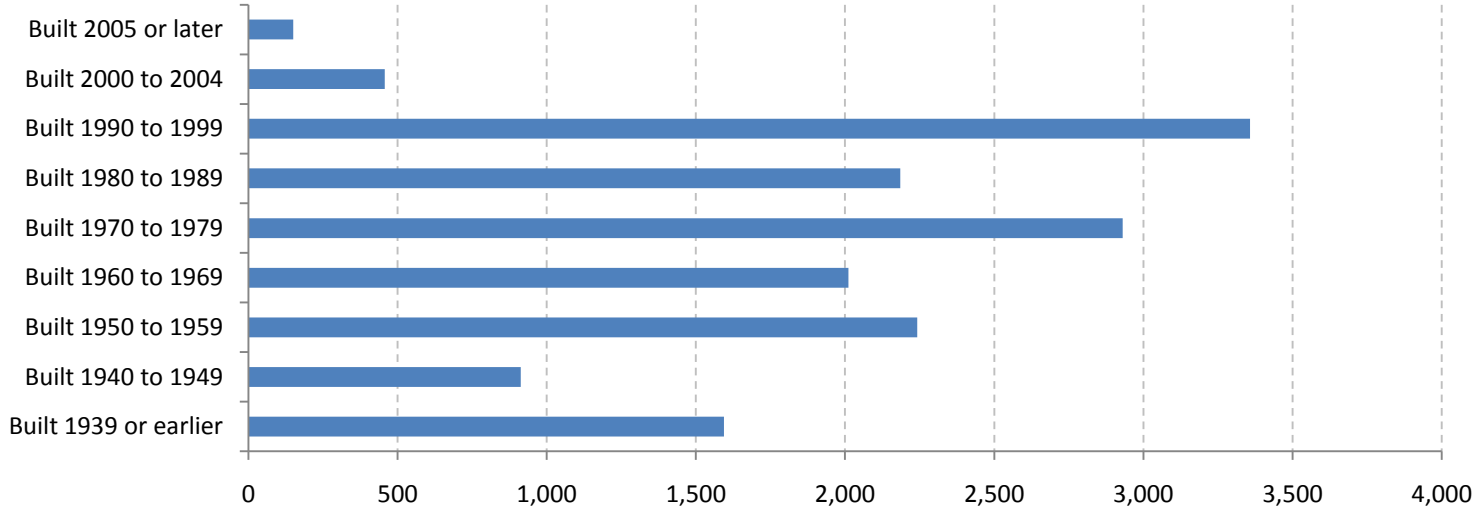
Special populations, seniors, developmentally and physically disabled, large families, single parents, the homeless or near homeless and ex-offenders. Various program strategies can be implemented to meet the needs of special populations, such as property tax abatement for lower income home owners, developing more group homes or shared living for the disabled, increasing emergency shelter options and offering transitional housing.

Existing Conditions

Households and Families

The housing stock in Carroll County grew by 20.2 (1.9% annual growth rate) between 1990 and 2000 for a total of 14,680 housing units. This rate declined to an annual rate of 1% between 2000 and 2008 despite the housing boom of the early and mid 2000s, as shown in **Chart 15**. Twenty-five% of the housing units within the County were built within the past twenty years.

Chart 15: Year Structure Built



Source: U.S. Census ACS 2006 – 2008

According to the Census 2006 – 2008 ACS, Carroll County had 16,000 housing units, 20% of which were vacant, as shown in **Table 33**. The majority of occupied homes are owner occupied (75%). Of the total housing units, 69% was in single-unit structures, 4% was in multi-unit structures, and 27% was mobile homes, shown in **Table 34.**

Like neighboring Grayson County, much of the increase in vacant housing units can be attributed to the development of recreational homes. Housing units identified as seasonal, recreational, or occasional use in the 2000 Census numbered 1,380, an increase of 502 units compared to Census year 1990. The growth in Carroll County's recreational housing is a function of the County's natural beauty and the presence of the Blue Ridge Parkway. Recreational or second home reporting is not available in the 2006 – 2008 Census ACS.

Table 33: Housing Tenure

Tenure	Number
Total Housing Units	15,841
Occupied housing units	12,699
Percent Vacant	19.8%
Owner-occupied	9,524
Renter-occupied	3,175
Avg hh size of owner-occupied unit	2.25
Avg hh size of renter-occupied unit	2.3

Source: U.S. Census ACS 2006 - 2008

Table 34: Units in Structure

Unit Type	Number
Total housing units	15,841
1-unit, detached	10,874
1-unit, attached	127
2 units	133
3 or 4 units	163
5 to 9 units	136
10 to 19 units	82
20 or more units	58
Mobile home	4,268

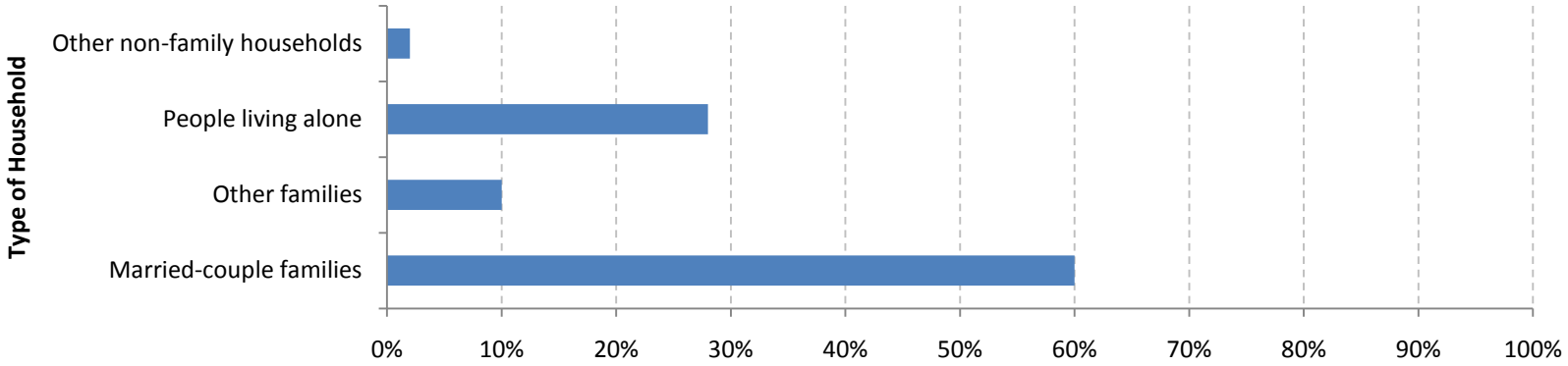
Source: U.S. Census ACS 2006 - 2008

In 2006-2008 families made up 70% of the households in Carroll County.

In 2006 – 2008 there were approximately 13,000 households in Carroll County. The average household size was 2.3 people. Families made up 70% of the households in Carroll County. **Chart 16** includes both married-couple families (60%) and other families (10%). Nonfamily households constitute 30% of all households in Carroll County. A non-family household consists either of one person living alone or of two or more persons who share a dwelling, but do not constitute a

family (such as college roommates). Most of the nonfamily households feature people living alone.

Chart 16: Household Type



Source: U.S. Census ACS 2006 - 2008

Addressing Housing Needs

Programs exist in Carroll County to help eligible recipients with home purchase, emergency housing needs, weatherization, heating costs, and rehabilitation of low-income housing. Available programs and services for Carroll County include the following:

- ***District III Senior Services*:** This agency provides services to people aged 55 and over in Bland, Carroll, Grayson, Smyth, Washington, and Wythe counties, and the cities of Bristol and Galax. Services include a limited range of home repairs. The agency is based at 4453 Lee Highway outside of Marion. For more information call 276-783-8157.
- ***Carroll County Department of Social Services*:** This agency, located in the Carroll County Governmental Complex, provides rental assistance to eligible recipients (276-728-9186).

- ***Hostel of the Good Sheppard*:** This is a 20-bed emergency shelter for the homeless located at 405 West Center Street in Galax. Call 276-236-7573 for more information.
- ***Mountain Shelter, Inc.*:** This nonprofit agency is based at 170 East Main Street in Wytheville. It develops low-income housing in Smyth, Wythe, Bland, Carroll, and Grayson counties, and the City of Galax. Call 276-228-6280 for more information.
- ***Rooftop of Virginia Community Action Agency*:** This nonprofit agency, serving Carroll County, Grayson County, and the City of Galax, stands at 205 North Main Street in Galax. Its services include a weatherization program to insulate homes and reduce high utility costs. Call 276-236-7131 for more information.

Housing Goals and Policies

Goal 9: **High quality residential neighborhoods and workforce housing with a variety of healthy and compatible housing types serve the various needs of Carroll County residents.**

Policy9.1: Promote the construction of a broad range of housing types to accommodate the varied needs and incomes of the County's residents.

Policy9.2: Direct "clustering" of residential development to provide community services efficiently and economically.

Policy9.3: Encourage residential development in or adjacent to the Town of Hillsville and other existing higher density neighborhoods and communities with available services.

Policy9.4: Encourage multi-family developments that are compatible with surrounding land uses and located in areas with available or planned public facilities and services, including water, sewer and transportation.

Policy9.5: Encourage the development of mobile home parks that are served by available or planned public facilities and services and include amenities for residents.

Policy9.6: Direct the location of singular mobile homes to reduce conflicts with permanent residential structures and development.

Policy9.7: Ensure that multi-family and mobile home parks contribute to quality of life and community character through improvement and design standards.

Policy9.8: Encourage development of housing for elderly and disabled populations.

Policy9.9: Encourage development of workforce housing.

Chapter 7. Natural & Community Resources

Physical Conditions

Physiographic Provinces and Geology

The majority of the Carroll County area lies in the Blue Ridge Physiographic Province. A small portion of the county's northwestern corner is in the Ridge and Valley Province and a part of the Piedmont Province occupies a section in south central Carroll County.

- Blue Ridge Province - This is mountain plateau characterized by moderate to steeply rolling land with much of the area having a slope in excess of 20%. Within the county, the most prominent features of the province are the northwest and southeast slopes. The pre-Cambrian rocks of the Blue Ridge Province are igneous and metamorphic. The lava flows, gneissic and schistose rock have been moved (faulted) with respect to one another; and with the work of erosion a plateau-like region has resulted.
- Ridge and Valley Province - This region consists of parallel valleys and ridges oriented in a roughly northeast to southwest direction. Several of these ridges form the northwest border of Carroll County. These ridges consist of Paleozoic-Cambrian dolomite, shale, and sandstone.
- Piedmont Province - Part of the southeastern corner of the county extends into the Piedmont Province. This province is underlain by Triassic sedimentary rocks and sporadic basaltic sills and dikes. The Piedmont Province consists generally of gently

rolling low hills, dropping gradually toward the Coastal Plains and the Atlantic Ocean.

Relief

Elevations in Carroll County vary from a maximum of 3,570 feet at Fisher Peak to a low of 1,100 feet above sea level in the southeast near Cana—where Lovills Creek flows into North Carolina. It is in the southern portion of the county that the most striking changes in elevation occur. Stretching northeast from Fisher Peak, the Blue Ridge Escarpment separates the lowlands of North Carolina from the Blue Ridge Plateau. Northward from the escarpment, the land slowly drops toward the New River with long, low parallel ridges. To the west of the New River, Chestnut Knob (a point on Ewing Mountain—the eastern extremity of Iron Mountain), rises to an elevation of 3,374 feet. In the northeast corner of the county, Bear Knob (near the Carroll-Pulaski County line), a peak on Macks Mountain reaches 3,390 feet.

Slightly more than half of the total land area has a slope in excess of 20%.

Climatology

Carroll County has a moderate continental climate. The maximum average temperature occurs in July and is about 75.1 degrees Fahrenheit with the average minimum temperature in January being about 34.6 degrees Fahrenheit. The growing season averages about 180 days.

Average annual rainfall in Carroll County is about 44.7 inches. Precipitation during the six warm months, April through September, ranges from an average of 28 inches in the southeast to less than 24 inches in the northwest. Snowfall averages about 20 inches annually.

The prevailing winds in the county are from the west with southern and northern winds occurring infrequently. The mountains, along with the westerly wind flow, tend to isolate the county from the effects of severe storms originating over the Atlantic Ocean.

Hydrology

Surface Water

Carroll County is situated in two major watersheds. The eastern continental divide runs through the county, roughly along the Blue Ridge Parkway. To the south, the headwaters of

the Yadkin River drain to the Atlantic Ocean. To the north, tributaries of the New River drain to the Gulf of Mexico.

The major streams of the Yadkin River Basin in Carroll County include Stewarts Creek, Paul's Creek, and Lovills Creek. All drain south into North Carolina. The largest, Lovills Creek, is a water source for Mount Airy, North Carolina.

The New River, with headwaters in North Carolina, flows through the northeastern portion of the county northward to the Ohio River. In Carroll County, it has a gradient (defined as drop in feet per stream mile) of 14 feet per mile and ranges from 300 to 800 feet in width with numerous rapids and shallows.

The Carroll County tributaries of the New River are Chestnut Creek, Crooked Creek, Little Reed Island Creek, and Big Reed Creek. All are shallow, relatively fast moving streams with gradients between 10 and 20 feet.

There are two dams on the New River in Carroll County—the Byllesby and Buck. They are 54 feet and 32 feet high, respectively, and are owned and operated by the Appalachian Power Company.

Groundwater

Except for a small area along the northwestern boundary, igneous and metamorphic rocks underlie Carroll County. These rocks have been deeply weathered and have sufficient permeability to absorb and hold groundwater. However, recharge to full storage, except in aquifers near streams and below the elevation of their beds, is slow because of the steep land surface and low absorption rate of most soils. These conditions produce a few low springs.

The range of estimated potential well yield is 20 to 100 gallons per minute. It is possible that a series of shallow wells would provide sufficient water for moderate demands in some of the larger stream valleys.

In the northwestern portion of the county, the New River crosses folded and faulted dolomite, limestone, and shale formations. The groundwater recharge capability in the area

is not known, but conditions seem to be favorable for obtaining large quantities of groundwater at properly located sites.

Soils

The soils of Carroll County have been mapped and delineated into 11 soil associations. A soil association is a region that has a distinctive proportional patter of soils—that is, each association has a certain repeating pattern of soils and other features that give it a characteristic landscape. The soils in one association may occur in another, but in a different patter. An association normally consists of one or more major soils and one or more minor soils, and is named for the major soil.

The following are descriptions of the soil associations in Carroll County:

- Manor-Talladega-Watauga Association: Shallow to moderately deep, well-drained to excessively drained, micaceous, sloping to very steep soils on strongly dissected uplands.
- Ramsey-Wiekert-Hazel association: Shallow to moderately deep, excessively drained, very stony and channery, sloping to very steep soils on strongly dissected uplands.
- Hazel-Manor-Gilpin association: Shallow to moderately deep, well-drained to excessively drained, sloping to very steep, soils on dissected uplands.
- Madison-Wickham-Talladega association: Deep, well drained and excessively drained, gently sloping to steep soils on uplands.
- Madison-Talladega association: Deep to shallow, well-drained and excessively drained, gently sloping to steep soils and uplands.
- Chester-Glenelg-Manor association: Deep and moderately deep, well-drained or somewhat excessively drained soils on dissected uplands.
- Porters-Chester-Glenelg-Manor: Deep to shallow, well-drained or somewhat excessively drained, gently sloping to very steep soils on strongly dissected uplands.
- Chester-Glenelg-Manor-Porters association: Deep and moderately deep, well- drained to excessively drained soils on uplands.

- Stony land-Manor-Rock land association: Moderately deep and deep, well-drained, gently sloping to steep soils on uplands.
- Myersville-Chester-Glenelg association: Deep and moderately deep, well-drained, gently sloping to very steep soils on uplands.

Soil and Water Conservation

The New River Soil and Water Conservation District comprises the counties of Grayson and Carroll and the City of Galax. The District's overall objective is to see that every acre of land be treated according to its capabilities. This not only includes farm uses, but urban and industrial as well. These objectives are carried out by encouraging every farm to have a conservation plan, and every county and town to adopt and carry out Virginia's Erosion and Sediment Control Program. The New River Soil and Water Conservation District works toward these objectives through education, evaluation of Erosion and Sediment Control plans, farm planning and the Best Management Practices (BMP) Cost-share Program. Their goal is to improve the environment and the conservation of our natural resources. The District strives to achieve this goal by educating residents about environmental assessment, data collection, watersheds, lake ecology, wildlife and soils.

The mission of the New River-Highlands Resource Conservation and Development Area is to promote the management of natural resources for the enhancement of the quality of life and environment in the New River-Highlands Resource Conservation and Development Area.

Carroll County boasts many fine trout streams, and has over 50 combined miles of trout waters, the most famous being Crooked Creek. The County must preserve the natural watershed to maintain the sustainability of these natural assets. A watershed is the area of land where all of the water drains to the same area. To protect the streams, land within the watershed must be managed to protect the waters from pollution and sedimentation that accumulates due to stormwater runoff.

The Plan supports protection of the Crooked Creek watershed from development. The Plan recommends policies and strategies to direct inappropriate development away from sensitive areas in the watershed. Property owners are encouraged to seek the use of Land Trust and

Conservation easement vehicles that are available to them, as well as to use soil and water conservation strategies in the management of their property to increase the stewardship of the County's natural resources.

Historic Preservation

In order to preserve and enhance the heritage of the Carroll County, it is essential to preserve historic and cultural sites, landmarks and buildings. Such sites, landmarks and buildings include, but are not limited to, structures which either are designated by the official register of cultural properties maintained by the Virginia Department of Historic Resources, or are properties which may contain historic or pre-historic structures, ruins, sites or objects. Desecration or destruction of these resources would result in an irreplaceable loss to the public of their scientific, educational, informational, or economic interest or value.

Carroll County Character and Design

This Plan includes policies and strategies for improving the aesthetic quality of Carroll County's gateways, corridors and other public spaces to reflect the high quality of life and pride of community. Above all, local and regional styles and preferences should be celebrated! Residents and visitors entering the community should know that have reached a unique destination based on the visual cues they see in the built environment and landscape. Guidelines for landscaping, signs, lighting and open space should ensure an aesthetically pleasing environment that residents are proud to call home. These standards are especially important along key corridors and gateways that serve as the public "face" of the County.

The design of public and private places, including street, sidewalks, buildings and open spaces influences how we interact with our environment. Whether we walk or drive, linger or hurry, feel safe or look over our shoulder, is directly influenced by the quality and design of our surroundings. A public space can invite you to sit and relax, or can make you feel open and exposed. The following section describes various techniques and programs that can be implemented in Carroll County to maintain and enhance the high quality public realm and private development. These techniques can be modified to apply to the County's rural areas, small communities and development in planned growth areas.

Source: Carroll County Office of Tourism

Form-based regulations and design guidelines are one potential implementation tool that can be used to achieve desired development patterns and design elements. Form-based regulations regulate the design of a structure rather than the use of that structure, which is what traditional ordinances are meant to accomplish. The use of a structure still plays a role, but its role is subservient to that of development character and intensity. It is often noted in thriving urban areas (whether they be walkable small towns or larger cities) that many buildings change their use repeatedly over time, or contain a variety of uses, but they still fit within the larger context of the area because of their design characteristics. Architectural design standards and/or form-based codes can be applied to a community as a whole, or to a specific area, such as a community, corridor or historic neighborhood.

The key to creating successful design guidelines is to communicate clearly and concisely to address the community's individual issues – a one-size fits all approach will not suffice. Any new standards should encourage creativity and individuality, while fitting in with the broader context of Carroll County. Preventing monotony and lowest-cost options for new construction, including franchise design, should be a priority, while special care should be taken to prevent property owners from avoiding the review process due to unattainable improvement standards.

In new and infill development, building architecture and materials should reflect the character of surrounding development. The Plan recommends that development reflect regional and historic building styles. New development should be designed with architecture and quality, climate-appropriate materials in mind. A key to sustainability is that buildings are of high quality and timeless design so that they encourage maintenance and reinvestment to remain in service for many years, with adaptive re-use in mind for future uses.

Site Design

Site design plays the most significant role in assuring land use compatibility. Factors must include transitioning between land use types, intensities, and densities using buffers and floor area ratios; conserving environmental assets using standards to preserve open space and to limit impervious surfaces; providing adequate vehicular and pedestrian traffic circulation and connectivity; mitigating potential nuisances, such as signage, excessive noise, smoke, heat, light, vibration or odors detectable to human senses off the premise; and, designing for public safety.

Signage

Signs are an integral part of the built environment. The manner in which a community regulates signs impacts the character and quality of development, ultimately influencing economic development opportunities and quality of life. Commercial signs, political signs, traffic and public safety signs, temporary signs and wayfinding signs are but some of the types of signage that one encounters on a major County corridor. While the negative visual impacts of uncontrolled signage are obvious to any visitor driving into a new place, signs are a very necessary tool for businesses and visitors. An ongoing concern in Carroll County is the design and character of the major gateways and corridors that lead into the County, on scenic byways, rural corridors, near and through communities and scenic sites. Revising the sign standards to limit the size and number of signs on a given property, and to regulate the materials, lighting, colors, orientation, height and other design considerations will enhance the visual appeal and first impressions of the community.

Walkability

The physical condition of streets, sidewalks, utilities, public spaces and other infrastructure often provides visitors with their first impression of a place and sets the tone for the level of maintenance of private property. High quality streetscapes enhance the community identity and encourage pedestrian activity, adding vitality to commercial and residential areas. Pedestrian amenities make walking and biking attractive for recreation and travel. Such amenities include:

- Sidewalks and bike lanes;
- Street furniture: benches, trash receptacles, bicycle racks, etc.;
- Street trees and street lights;
- Other public spaces, such as plazas and squares;
- Dedicated public access easements; and
- Public art.

Obesity and related health problems, such as diabetes and heart disease are a widespread public health issue that dominate media and public health campaigns across the nation.

Obesity-related health problems result in increased health care costs and reduced productivity, as well as a possible decline in quality of life. Walking has been touted as one of the easiest, most affordable and accessible strategies for improving public health. Provision of adequate infrastructure and destinations to support walkability is key to achieving public health benefits.

Handicap Accessibility and Visitability

As of 2006, approximately 15% of Americans had a disability status,[iv] yet the majority of American homes and communities are neither welcoming nor safe for physically handicapped people to visit. Communities and homes that are inaccessible to so many create social barriers, increase the number of institutionalized individuals, and increase the chance of injury for handicapped individuals[v]. As the baby boomers reach retirement age, the need for accessible housing increases.

Currently there are limited federal mandates that affect the way a new home is constructed in regard to handicap accessibility, but these do not apply to single-family housing. Title II of the Americans with Disabilities Act (ADA), as well as many state laws require homes built with public funding to be accessible[vi]. However, more and more states are mandating or adopting incentives for homes built accessible for a growing number of disabled Americans.

Universal design, accessible design and "visitability" are related concepts that address the design of homes to accommodate individuals with all levels of abilities, as well as the ability of physically handicapped individuals to visit a home or community without needing assistance. Since the cost of converting a built home to accessible standards is much greater than that of building accessible homes initially, the following minimum requirements for new homes are recommended:

- 32 inch wide passage doors and hallways;
- At least a half bath room on the main floor large enough to accommodate a wheel chair; and
- At least one zero-step entrance approached by an accessible route where feasible due to flood zone requirements.

The County is home to persons with various special needs, including an aging baby boomer population that will require accessible housing. With the natural increase and immigration of retirement aged people into Carroll County, accessible housing will become a more sought-after housing product. Standards should be different to reflect topography, development and character, but by considering these needs in the planning and development review process, the County can set itself apart as a place with a high quality of life for all its citizens and a progressive view of inclusiveness.

Complete Streets

Complete Streets, context sensitive design and green streets are similar concepts that promote a more comprehensive approach to the design and function of roadways. The key premise is that roadways should be designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and bus riders of all ages and abilities. Streets should be engineered to meet the demands placed on the roadway, but should be done so in a way that minimizes negative impacts and recognizes the character and function of the surrounding area. For instance, even though a downtown street may be heavily travelled, it should not be designed to function like a high speed arterial.

Consideration should include:

- Consider the needs of all users, including pedestrians, bicyclists, transit vehicles and users, and motorists, of all ages and abilities;
- Create a comprehensive, integrated, connected network;
- Recognize the need for flexibility in design dependent upon the context of the roadway and the character and design of surrounding development;
- Consider exceptions to established standards to enhance safety, promote traffic calming and walkability or achieve other objectives;
- Seek opportunities to involve the community in the design of roadways;
- Direct the use of the latest and best design standards; and
- Ensure that streets fit in with context of the community.

Safe Routes to School

According to the Federal Highway Administration, the number of school children that walk or ride a bike to school has dropped from 50% in 1969 to less than 15% today. This is particularly alarming in consideration of the rising rates of childhood obesity and the associated chronic health disorders, including Type II diabetes and asthma. Aside from the public health concerns of a less physically active school-age population, the number of children who cannot walk to school due to safety concerns is problematic in terms of the increasing costs of fuel for cars and busses. An additional concern is that as more children are driven to school, the increased traffic and air pollution around schools makes it more challenging for the remaining walkers and bike riders to travel safely.

Parents repeatedly identify safety as the number one reason their children ride in vehicles. Safe Routes to School (SRTS) is a national program that addresses the issues that prevent students and parents from utilizing transportation alternatives. Schools provide a unique opportunity to educate students as well as provide school-based walking programs where students can walk safely in supervised groups. The SRTS Program is having success in communities around the nation and is expected to continue to grow.

"Any town that doesn't have sidewalks doesn't love its children."

- Margaret Mead

While children in rural communities are not necessarily within safe walking distance from school, development in planned growth areas and communities should incorporate safe route concepts. To promote safe routes to school and the quality of the overall pedestrian environment, the County should include specific design components for new and existing facilities, parks, schools and other community gathering places, such as pedestrian crosswalks, sidewalks and bike trails, signage, schools near to neighborhoods, traffic calming measures, pedestrian refuges and other techniques, including community education.

Crime Prevention Through Environmental Design

Proper design of the physical environment can be used to reduce opportunities for criminal activity to occur and improve public perceptions of safety and well-being. When residents feel safe in their community, they experience a higher quality of life and the community becomes more attractive for investment of all types. Crime Prevention Through Environmental Design (CPTED) uses four physical design strategies, as described below, to create safer neighborhoods, shopping, recreation and business areas, as well as public spaces. Encouraging these principles

through the development review process may contribute to great comfort and perceptions of safety.

Four Strategies of Crime Prevention Through Environmental Design[1]

- **Natural Surveillance -** A design concept directed primarily at keeping intruders easily observable. Promoted by features that maximize visibility of people, parking areas and building entrances: doors and windows that look out on to streets and parking areas; pedestrian-friendly sidewalks and streets; front porches; adequate nighttime lighting.
- **Territorial Reinforcement -** Physical design can create or extend a sphere of influence. Users then develop a sense of territorial control while potential offenders, perceiving this control, are discouraged. Promoted by features that define property lines and distinguish private spaces from public spaces using landscape plantings, pavement designs, gateway treatments, and "CPTED" fences.
- **Natural Access Control -** A design concept directed primarily at decreasing crime opportunity by denying access to crime targets and creating in offenders a perception of risk. Gained by designing streets, sidewalks, building entrances and neighborhood gateways to clearly indicate public routes and discouraging access to private areas with structural elements.
- **Target Hardening** - Accomplished by features that prohibit entry or access: window locks, dead bolts for doors, interior door hinges.

Open Space, Trails and Recreation

Open Space

While sustainability in terms of open space preservation is a simple and appealing concept, it is difficult to measure. Incremental losses of open space or habitat rarely have measurable or predictable impacts -- it is the cumulative impact of many decisions over time that has more profound effects. This, combined with the fact that developed land is rarely redeveloped as open space, increases the importance of ensuring that adequate land is set aside to maintain the community's environmental integrity.

While all undeveloped land can be considered "open space," this discussion centers on land that is desirable as permanently protected open space because it has certain characteristics that the community values over and above its development potential. For instance, its visual appeal, such as scenic vistas; public safety features, such as steep slopes or fire and flood protection; or cultural or environmental features, such as historic areas or wildlife habitat. As with other facets of planning, balancing the value of development with the value of open space preservation to the community is central to the design and implementation of an open space preservation program. Prioritization of important parcels for preservation should be monitored on an on-going basis.

Open Space is usually considered to be:

- **In a natural or primarily natural state.** Some development of limited intensity is appropriate in specific open space areas such as trailheads and access points for passive recreation or wildlife management purposes.
- **Containing significant features that warrant protection.** Such features should be determined by community values, but may include environmentally sensitive areas, wildlife habitat, migration corridors cultural/historical areas, scenic vistas, visual open space, important recreational areas, water re-charge areas, drainageways or other locally-determined features.
- **Permanently protected from development.** Undeveloped land is not open space unless it is permanently protected from development. The community must understand that private and publically-owned lands may be subject to development unless it takes steps to properly protect important land from development.

Varying degrees of protection apply to existing open space depending on the physical and regulatory development constraints effective on each parcel. For instance, while a parcel in a floodway may be permanently protected from development, some federally-owned lands are not permanently protected. Federal lands may be subject to certain kinds of development, such as mining or access roads, or may be transferred or sold in certain instances. A comprehensive plan to preserve open space in the County should identify the level of protection for existing open spaces, identify and prioritize desired open space, authorize potential tools for open space preservation and implement strategies to achieve multiple open space objectives.

As Open Space is incorporated into the land use plan, the County must assume a variety of responsibilities for the management of that land, potentially including property negotiation/acquisition, construction and maintenance of improvements, environmental stewardship, and public safety/education. There are many tools and techniques that may be used to acquire and fund open space and trails, such as conservation easement, cluster development, deed restrictions/covenants, reserved life estate, cash purchase, donation or gift, land exchange, purchase of development rights (PDR), transferable development rights (TDR), estate planning, conservation subdivision development, and intergovernmental agreements (IGAs).

Carroll County's assets include abundant natural and cultural resources as well as incredible outdoor recreational opportunities. The public lands, parks, trails, and scenic vistas and landscapes enhance the quality of life and economic value in the County. Open land and trails attract businesses and tourism and help strengthen communities by providing opportunities for residents to recreate and connect with the landscape and nature.

Population growth and continuing urbanization threaten the County's distinctive landscapes and increase public demand for additional recreation opportunities. Increased population and land consumption can result in conflicts between development and land conservation, including increased demand from residents of growing urban areas for access to recreation and trails.

Recreational Opportunities

Parks, recreation and open space are an important part of the quality of life element for any community and an important aspect of the Comprehensive Plan. Recreational opportunities are abundant in Carroll County, including hiking, biking, canoeing, fishing, and golfing.

Hiking and biking locations include Beaver Dam Creek Walking Trail, Granite Quarry Overlook, Agricultural Lease Interpretative Overlook, and Carter Pines Community Park. The major canoeing locations in Carroll County are the Fries to Byllesby New River Route and Lovill's Creek Lake Recreation Area. Some of the prime fishing areas are the Crooked Creek Wildlife Management Area and Stewart's Creek Wildlife Management Area. There are three golf course located within the county - Olde Mill Golf Resort, Skyland Lakes Golf Club, and the Blue Ridge Golf Course. Other competitive sports, such as baseball, basketball, and football, are available through the county recreation program; these sports are also available through the public

school system. New River Trail State Park is a key location for outdoor recreation, providing opportunities for hiking, biking, canoeing, horseback riding, fishing, and wildlife observing. Camping is available at the New River Trail State Park, the Fox Trail Campground, the Carrollwood Campground and Fish Lakes, R-J Ranch RV Resort, and Utt's Campground.

The Carroll County Recreation Department was created in February 1975 to provide a well rounded recreation program for citizens of all ages in Carroll County. The Recreation Department offers year-round recreational activities such as Dixie League Baseball/Softball and Church League softball.

In Fiscal Year 2009, Parks and Recreation served 2,024 participants in organized sports, as shown in **Table 35.** Accomplishments for the year included raising $3000 via raffle for new cheerleading uniforms, building new dugouts for both ball fields, sponsoring an Atlanta Braves Trip, and providing children with adequate means to participate in basketball, softball, baseball, football and cheerleading.

Table 35: Parks and Recreation Organized Sports Participation

Sport	Participants		
	2007	2008	2009
Basketball	359	449	545
Dixie Ball	550	582	800
Football	163	186	254
Cheerleading	124	120	75
Church League Basketball (Adults)	120	120	175
Church League Softball (Adults)	100	120	175

The Carroll County Parks and Recreation Department has identified a number of specific needs to ensure that adequate facilities and services are available to accommodate projected growth. Currently the County lacks adequate gym space, ball fields, and a public swimming pool. Additionally, the County is in serious need of more parking spaces. In order to accommodate the County residents, the construction of multiple new sports complexes has been proposed.

One complex should be devoted to baseball and softball. At least four lighted baseball/softball fields would be required. The baseball and softball complex should contain the following: locker rooms, bathrooms, dugouts, concession stands, scoreboards as well as necessary fencing and bleachers. Adequate parking adjacent to the baseball and softball sports complex would also be required.

An additional complex should be devoted to soccer and football. At least two full sized lighted football/soccer fields would be required. This complex should contain the following: bathrooms, concession stands, scoreboards as well as necessary fencing and bleachers. Adequate parking adjacent to the soccer and football complex should allow for future expansion.

The Parks and Recreation Department has prepared components of a desired recreation fitness center. The center would be home to a variety of programs, services and equipment to meet the recreational and fitness needs of the Carroll County Community. The center should contain the following: locker rooms, a swimming pool, three full sized gymnasiums, an indoor walking track, cardiovascular and resistance training equipment, offices, multipurpose rooms, storage areas, and a kitchen for cooking classes.

Additional proposed facilities include a new fair ground as well as a playground area, picnic shelters, and walking trails. The picnic shelters would consists of two large picnic shelters and four small picnic shelters. Both would be equipped with electricity, storage capacity, and restrooms. Preferably the walking trails would be paved and lighted. A family sports area would consist of volley ball courts, a basketball court, an area for horse shoes, and a general area for family activities. Future needs identified by the Parks and Recreation Department include tennis courts and a water park, to provide opportunities for recreation for both residents and visitors.

Trails

Trails are an important community asset, providing both recreational and transportation opportunities for a variety of users. Understanding the types of trail users and their needs and preferences is key to designing a system that is well-used for both practical and recreational purposes. The sidewalks, walking trails, equestrian trails, bike lanes and informal pathways that make up a trail system connect residents to the places they go, such as work, school or a

neighborhood business, as well as to their neighbors, as one resident meeting another on a community trail is more likely to spark a personal connection than passing each other on a congested freeway. The social, environmental and public health benefits of a well-designed trail system contribute to a high quality of life and associated economic benefits for the community.

New trails should be connected to new and existing trails, creating opportunities for pedestrians, cyclists and equestrians to travel to destinations including schools, parks, natural areas and community gathering places. Unique aspects of the climate and terrain should be taken into consideration when designing and building trails. Features such as shaded arbors and drinking water stations should be included when appropriate. Public education and outreach regarding trail safety should be incorporated into the design of trailheads and other high-use areas. There is an opportunity with the trails system to focus on the ecology and heritage of Carroll County, incorporating design elements and educational components that reference the natural setting.

Three basic considerations to understand when discussing a trail system include:

- **Trail Users.** Children, adults, residents and visitors, who might be walking, jogging, biking or rollerblading, or equestrians.
- **Trail Routes.** Trails connect homes, parks, shopping areas, businesses, schools and public lands and other transportation modes. Direct routes are preferable to reach practical destinations, such as schools or shopping, while scenic routes are preferable for recreational users.
- **Design.** Surface materials, width, grades, signage and lighting are some of the design issues to consider when thinking about the trail users and their needs.

Trail Users

- **Commuters.** Commuters use the trail system to access specific destinations, such as work, school, shopping and parks. Travelling efficiently and safely from place to place is of key concern, with safety being of greater importance when considering the needs of children walking to and from school. Trails and sidewalks surrounding schools should be clearly marked with safe crossings planned whenever the route intersects a street.

- **Recreational Users.** Recreational use is a very broad category including everything from adult cyclists to young children. The trail system should be designed to minimize the potential for conflict among trail users and be built wide enough in high traffic areas to allow for multiple users and user types. Maximum grades and trail side hazards (such as steep drops) are among the many considerations. Trail-side attractions, such as fitness stations, educational displays/nature areas, park equipment, benches and other amenities can enhance the trail experience. Different surfaces appeal to different users, for instance, in-line skaters preferring smooth, hard surfaces while casual walkers might like a natural surface.
- **People with Disabilities.** People with disabilities are a sometimes overlooked population of trail users, especially those without access to or ability to drive. While not every portion of a trail system is accessible to those with certain disabilities, especially those using walkers or wheelchairs, neighborhood trails and other high use areas can be designed to accommodate many levels of users at little or no additional cost. Considerations should include: smooth, consistent surfaces, wheelchair ramps at curbs, appropriate railings and gentle grades. ADA guidelines should be considered.
- **Active Adult (55+).** Active adult and retirement housing is expected to increase due to the aging of the population and influx of retirees into Carroll County. Active adults run the same spectrum of ability and preferences as the general population of trail users, but it is likely that active adults will be heavy users of a comprehensive trails system, using it recreationally and as commuters to work, shopping and social events. As for other user groups, integrating aspects that will appeal to the active adult population, such as benches, lighting, appropriate railings, grades and crossings should be considered.

Types of Trails

- **Neighborhood Trails.** Neighborhood trails connect homes to schools, parks, and businesses. They also provide recreational “escapes” for walkers and cyclists as well as safe routes to school for children. Neighborhood trails may act as feeder trails to the larger community trail system.

- **Natural Surface Trails.** These trails are for less intensive use and are primarily for recreational use, maintained in a more natural state and suitable for hiking or mountain biking, as well as possible equestrian use. Natural surface trails may also connect to public lands.
- **Bike Trails.** Bike trails can be incorporated into the design of streets in the County. A bike trail system can consist of both bike lanes and bike routes. Bike *lanes* are striped on streets and marked with signage, while bike *routes* are low traffic streets suitable for use by cyclists and designated by signage.
- **Drainageway Trails.** Trails can be incorporated into the design of natural or man-made creeks, streams and other waterways. With the incorporation of trails, these natural features can serve multiple functions as both drainageways and linear parks. Due to the drainage function of these areas, this land is unsuitable for more intense development and the dual use of the land for recreation will be a net benefit to the community.
- **Rails-To-Trails.** Rails-To-Trails turn abandoned railroad tracks into community assets by re-purposing these areas of vacated right-of-way as public trails. In Carroll County, the Norfolk and Southern Railway track area has been turned into the New River Trail for walking, biking, horseback riding.

Resource Protection Goals and Policies

Goal 10: Natural resources, rural character and historic resources are protected and preserved.

Policy10.1: Preserve and promote the heritage of County life for succeeding generations.

Policy10.2: Protect surface and ground water quality and quantity.

Policy10.3: Direct development away from stream valleys, floodways, sensitive waterways and other areas that are at high risk of water pollution.

Policy10.4: Require erosion and sedimentation control best management practices.

Policy10.5: Protect open space, viewsheds and environmental features that contribute to the visual beauty and natural aesthetic of Carroll County.

Policy10.6: Preserve current natural areas, including Crooked Creek WMA, Stewarts Creek WMA, Poplar Knob Area NPS, Blue Ridge Parkway, Beaverdam trail, Devils Den Nature Preserve, Jefferson National Forest, and New River Trail State Park.

Policy10.7: Limit development activities on environmentally sensitive lands, including areas with high slopes and poor soil suitability. Depending upon the fragility of the resource, restrictions should limit or prohibit construction, grading, and vegetative clearing. Constrained land should be subtracted from land acreage on which development density is calculated.

Policy10.8: Require new development to preserve on-site natural features critical to healthy watersheds and ecosystems, including trees, vegetation, drainageways and other features.

Policy10.9: Require new development to capture storm water to enhance aquifer recharge and minimize erosion.

Policy10.10: Prevent light pollution.

Policy10.11: Support the mission of the New River Soil and Water Conservation District.

Policy10.12: Support the mission of the New River-Highlands Resource Conservation and Development Area.

Historic Preservation Goals and Policies

Goal 11: Cultural, historic and archaeological sites that contribute to the heritage of Carroll County are preserved.

Policy11.1: Support identification of cultural, historic and archeological sites and development of a plan for their preservation.

Policy11.2: Protect cultural and historical landmarks against encroachment from incompatible land uses.

Policy11.3: Encourage the active use and adaptive reuse of historic sites so that they may become or remain an integral function of County life.

Policy11.4: Support preservation of historic sites and buildings including the Allen House, the Carter House and the Courthouse. Support preservation of sites of Quaker history, including meeting house sites such as Burke's Fork, the "Old Quaker graveyard" (site of the Mount Pleasant Friends Meeting) and the Wards Gap Meeting.

Parks and Recreation Goals and Policies

Goal 12: Trails and recreational areas establish the County as a destination for outdoor recreation.

Policy12.1: Enhance and expand County parks and recreation areas.

Policy12.2: Provide trails for hiking, biking, walking and equestrian, including trails along the river.

Policy12.3: Support reservation of parks, recreation areas, trails and sidewalks by reserving right-of-way and establishing mechanisms for acquisition.

Policy12.4: Support inclusion of bike lanes, walking paths and sidewalks into road improvement projects.

Policy12.5: Provide safe areas for walking.

Policy12.6: Provide more opportunities for adult and youth recreation.

Policy12.7: Support development of additional recreation facilities or community centers (with amenities such as swimming pool, walking track, senior citizens activities, tennis courts, hiking trails, etc.).

Policy12.8: Maintain and bring recreational facilities up to standards to support provision of adequate recreational activities.

Chapter 8. Facilities and Financing

Providing Public Facilities

Levels of Service

Levels of service ("LOS") standards define the County's role as a service provider, and in partnership with other service providers, define public and private responsibilities for the provision of facilities. Qualitatively, levels of service are indicators of the attractiveness of a community to existing and future residents and businesses. Adequate public safety provision, air quality, environmental preservation, recreational and cultural opportunities and accessible open space are just a few of the elements that the County influences that make Carroll County a desirable place to live. Counties that provide a high level of services project an image that attracts new residents and maintains property values, ensuring their ability to continue a high level of service provision.

The quantitative aspect of the relationship between levels of service and quality of life can be described in fiscal terms that can be proven empirically. For instance, levels of service for roadways would be described by traffic flow and measurable delays due to congestion. Traffic delays that make it difficult for employees to get to their jobs can result in a loss of productivity, making the region less desirable for workers and businesses alike.

Level of service standards for community facilities and services are most commonly presented in terms of the resident population served. Initially, LOS is determined by comparing the existing levels of service that are provided to the existing resident population. Level of service indicators can be evaluated based on a service provider's LOS goals, performance data provided by other communities and/or professional standards. Levels of service typically are measured and projected in terms of service area population (*e.g.*, two police officers per 1,000 population). LOS also may be based on responses to calls for service. This measure frequently is used for

police, fire and EMS services. Based on the level of service standards and the projected population to be served, costs can be projected for facility levels of service.

This concept applies to schools, public facilities, transportation networks, water and sewer, surface water discharge, police, fire, emergency response, parks and recreation, libraries, social services and any other public service provided by local governments.

Defining Adequacy

A number of regulatory, fiscal and administrative techniques exist that, if properly employed, allow communities to ensure that development projects are timed, located, designed and financed without negatively impacting the community. "Adequate public facilities" and "concurrency" are two similar techniques that tie development pace and location to the availability of public facilities and services. Both terms refer to land use regulations that are designed to ensure that the necessary public facilities and services, at adopted levels of service required to support new development, are available and adequate at the time that development occurs.

Concurrency and adequate public facilities regulations ensure that the service levels enjoyed by existing development are not diluted below the adopted LOS due to new development. Such regulations control the timing of new development; if adequate infrastructure is not available at adopted levels of service, as shown in the CIP, the application for discretionary development approval will be denied or conditionally approved through phasing of the development until the CIP facilities are available. The major objectives are:

- To link the provision of needed public facilities and services to the type, amount, location, density, rate and timing of new development;
- To ensure that new growth and development do not outpace the ability of service providers to accommodate such development at established level of service standards; and
- To coordinate public facility and service capacity with the demands created by new development.

The provision of adequate public facilities in a timely manner is a necessary precondition to development approval in order to prevent sprawl, assure a positive fiscal impact for the County, provide a high quality of life through infrastructure and service provision, achieve the goals of this Plan, and protect the public health, safety and general welfare of the community.

Fiscal Balance and Responsibility

A key component of growth management techniques is maintaining fiscal responsibility and fiscal health. Fiscal stability is a cornerstone of a sustainable community. Existing residents should not suffer a decline in the quality of their services or be unduly burdened by costs of new growth. New residents and business should pay their fair share of the costs associated with extending infrastructure and urban services to new growth areas.

The quality of life in Carroll County is contingent on the County's continued ability to provide quality services at a reasonable cost to taxpayers. If development projects go forward without a plan for recouping increased service provider expenses, existing tax payers subsidize those expenses. To achieve equity and fairness in the funding and provision of public facilities and services, this Plan recommends strategies to:

- Enhance the local property and sales tax bases more rapidly than the fiscal obligations for capital facilities, operations and maintenance;
- Ensure that new development funds the costs of capital facilities and services required to serve that new development; and
- Ensure that facilities and services are planned in a way that allows ongoing operations without significant increases in the costs to residents and businesses.
- Achieving fiscal balance is an important aspect of planning for the provision of adequate public services and facilities. The County should consider mechanisms to equitably finance necessary improvements to serve development.

Costs of Growth

Low-density, dispersed sprawl development is expensive to serve because of the cost to expand facilities, including water/sewer and road infrastructure. Not only is infrastructure expensive to

construct, but maintenance costs are an increasing proportion of County expenses. As fuel and materials costs rise, costs to serve also increase. Personal transportation costs also increase with escalating fuel costs, resulting in reduced discretionary spending, especially for commuters who drive to more urban areas for employment. While living in rural areas may seem more affordable initially, due to lower housing costs, increased transportation costs erode this savings in the long term. If septic systems fail in rural areas, it is costly to provide sewer service to dispersed development. In areas with clustered or compact development, provision of sewer service is more economical and has less potentially negative impacts to the environment.

A balanced, vigorous economy in combination with fiscally responsible policies ensures the long-term fiscal health of the County and its residents and businesses. The negative fiscal impacts of residential development must be minimized to maintain long-term fiscal sustainability, through increasing service efficiencies, maintaining balanced land uses and shifting growth-related development costs to new development.

New development necessitates public facilities and services, and if proportional improvements are not made to serve new development, the overall level of service declines for County taxpayers. New development, under existing regulations, fails to contribute equitably to the funding of facilities and services necessitated by such development.

Non-residential development, which provides economic opportunity for residents and typically is a net fiscal gain for local jurisdiction, is dependent upon the adequacy of emergency services, law enforcement, fire protection, water, sewer and transportation. Such facilities and services, if provided at appropriate levels of service, attract economic investment.

Significant public savings can be realized when growth takes place where infrastructure already exists or in mixed-use centers where infrastructure can be provided efficiently and external trip generation can be minimized. Incentivizing and directing growth to primary growth areas, if coordinated with other service providers with respect to the timing and location of installation or replacement of utilities, maximizes infrastructure investment and minimizes long-term operating and maintenance costs.

While Carroll County has engaged in an aggressive expansion of water and sewer facilities in the past several years, this expansion must be curtailed in areas inappropriate for more intensive urban development due to the long term costs of maintenance and operations.

Financing Tools

Special Assessments and Improvement Districts

Special assessments are revenue-raising devices designed to recover the cost of capital improvements that directly benefit properties within a designated "benefit area". Fees are collected from property owners for tangible public infrastructure improvements that a local government provides and that benefit the properties being charged. Unlike impact fees and mandatory dedications imposed under a County's police and land use control powers, special assessments may be used to pay for improving existing infrastructure deficiencies.

A wide variety of assessments and improvement districts may be created to fund infrastructure improvements or construction. These include transportation improvement districts, community facility districts, utility districts, neighborhood improvement districts, business improvement districts, special road districts, transportation corporations and special road and bridge taxes. All of these special districts and techniques involve the designation of a geographic area and use of statutory powers to raise revenue or impose charges for facilities and services within the defined geographic area to fund infrastructure improvements and construction. Tax exempt bonds are generally issued to pay the costs of the improvements, which would be secured by the real property in the area that is benefited by the improvement. Properties benefiting from the improvements are assessed a fee to pay the principal and interest on the bonds.

Mitigation Fees

"Pay-as-you-grow" programs help protect existing residents from growth-related costs. These programs include a variety of techniques that allocate the public costs of development fairly and do not unduly burden existing residents, such as development impact fees and exactions, or provisions for financing infrastructure and services in development agreements.

Communities across the country have adopted some form of development impact fees pursuant to statute to mitigate the impacts of new growth and maintain consistent levels of service for both existing and future residents. Development impact fees are one-time charges against new development to raise new revenues to pay for new or expanded public facilities necessitated by new development.

Exactions and Dedications

Before approving development projects, the County may required the developer to dedicate land for public purposes. Typically, exactions are imposed at the time of development approval. Courts have required that municipalities document the need for development exactions with studies that link the public purpose to be achieved with the nature and extent of the conditions imposed. This is most easily undertaken for on-site exactions, such as subdivision fee requirements and land dedications. The goal of providing adequate public facilities to serve a new development is a recognized valid purpose, and if the exactions will mitigate development impacts proportionally caused by the developer upon whom the exaction is levied, the legal requirements will be met.

Where exactions are meant to fund off-site facilities called for by several development projects, the legal tests must be satisfied by studies 1) showing the future scope of growth, 2) naming the needed facilities, 3) defining facility costs allocated to new growth, and 4) specifying service units and service areas. The results of these studies are then inserted into a funded capital improvements plan.

Development Agreements

A development agreement is a contract between the County and a developer, whereby the developer promises to pay for certain on-site or off-site improvements or to perform certain obligations in exchange for the vesting of discretionary approval. A voluntary development agreement may be sought by a developer to avoid denial, or timing and phasing of the project by reason of failure to meet the adequate public facilities requirements of the Plan. Development agreements differ from other public contracts because they are executed in conjunction with police power actions regulating the zoning, subdivision or development of private property. A development agreement may require payment or advancement of public road improvements or construction or obligate the developer to perform those

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improvements at its expense. Development agreements are useful tools for a community because they:

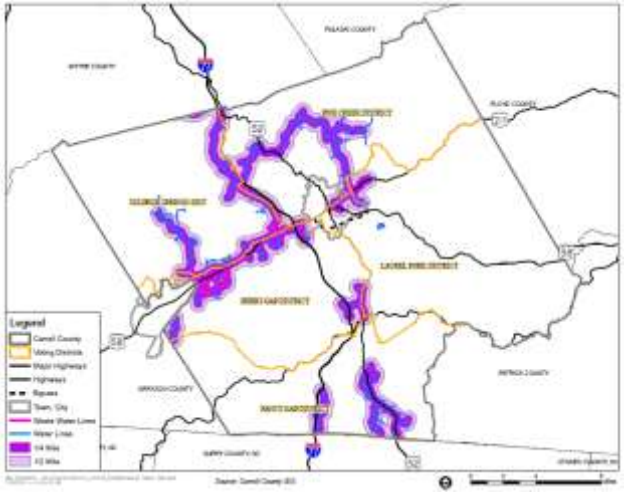
- Provide a mechanism for the County and developers to form agreements, binding on all parties, regarding development, financing and land use of the development project;
- Promote land development regulation by allowing the County to adopt development agreements that include terms, conditions, and other provisions that may not otherwise be able to be mitigated or implemented without the use of a development agreement;
- Promote stability and certainty in development project regulation by providing for the full enforceability of such agreements by all parties;
- Provide a procedure for the adoption of such agreements that ensures the participation and comment of the public and elected officials; and
- Provide mechanisms for establishment of public improvement districts and public infrastructure zones for the financing of capital facilities and public services as provided for in the Comprehensive Plan and/or Capital Improvements Plan and/or other adopted plans.

General Obligation and Revenue Bonds

General obligation bonds (GOBs) pledge the full faith and credit of the County for General Fund improvements. GOBs are primarily used for the non-revenue-producing and the non-development generated share of major capital improvement projects, including the County's share of state, regional and county-wide roads and highways, correctional facilities, storm water management facilities, parks, recreational areas, trails, scenic vistas, governmental facilities, structures and buildings, and repair and replacement of deficient facilities. GOBs can also be used for land purchases for rights-of way and other public facility sites on the Official Map. GOBs can fund equipment purchases in the form of large public safety or public works apparatus, central computer systems, and correctional facilities. Each GOB funded project may have a component portion financed by development fees, dedications and exactions, PID funds, revenue bonds, or state and federal grants and tax distributions.

Water and Sewer

Water Supply and Treatment



The Carroll County PSA operates eight water systems in the county: Route 100, Woodlawn, Gladeville/Cranberry, Tower Road, Cana, Fancy Gap, Industrial Park, and Hillcrest. The Route 100 system is located along Route 58 East in Hillsville, Route 221 North in Hillsville and beyond, Route 100 North, Lovell Road, Whitetown Road, Little Vine Road, Double Cabin Road, Hardscuffle, and Spring Willow Road. The Woodlawn system is located within the Woodlawn section of Carroll County. The Gladeville/Cranberry system is located along Route 58 West, Cranberry Road, Glendale Road, Hebron Road, and Riverhill Road. Tower Road system provides water along Tower and Bedsaul Roads, and also a small section of Pipers Gap Road. The Cana system water supply runs North and South along Route 52. Fancy Gap system provides water to the area surrounding U.S. Interstate 77 Exit 8. The Industrial Park system provides water to the area surrounding U.S. Interstate 77 Exit 14. The Hillcrest subdivision off of Route 666 is served by a stand alone system.

Carroll County PSA operates 27 wells and purchases water from the Town of Hillsville for the Industrial Park water system and from the City of Galax for the Tower Road water system. The gallons per minute (GPM) for the wells range from 12 GPM to 145 GPM, with the average being 28.6 GPM. The wells range from three to 40 years old and are all located in the vicinity of their respective water systems. The county wells, the Town of Hillsville, and the City of Galax treat 669,340 gallons per day (GPD). The plants for the 27 wells are capable of treating 1,111,200 GPD. The City of Galax is capable of treating 48,960 GPD, and the Town of Hillsville can treat up to 125,000 GPD.

The Long-Range Water system is currently under construction and is scheduled to be completed in November of 2010. This system will power all of Carroll County's water systems with the exception of Tower Road, Cana, and Fancy Gap. The Long-Range Water system has 110,200 linear feet of 14" lines and smaller. The water is transported from the New River Regional Water Plant. The New River Regional Water Plant has a capacity of 4 MGD; Carroll County shares one-third of this total with Wythe County and the Town of Wytheville.

The Fancy Gap water and sewer project is scheduled to begin construction in June 2011 and will be completed in March 2012. This system will have 69,400 LF of 8" or smaller water lines, 26,800 LF of 8" gravity sewer and 53,700 LF of 6" or smaller sewage force main. The water system will be powered by ground water wells and the sewer will be pumped into the Exit 14 pump station to Galax. This will add approximately 190 water customers and 65 sewer customers and support the development of the Fancy Gap Highway 52, Blue Ridge Parkway and Interstate 77 Exit 8.

Wastewater Transport and Treatment

Carroll County PSA operates five sewer systems and maintains two sewage treatment plants, both of which furnish primary and secondary treatment and disinfection of the effluent. One sewer treatment plant is located southwest of the Town of Hillsville near Fancy Gap/U.S. Interstate 77 Exit 8 and serves this area. This plant consists of an Imhoff tank, trickling filter, and final clarification tank. The effluent is discharged into Little Reed Island Creek. The other wastewater treatment plant is located at Exit 1, Interstate 77 in Lambsburg to serve the Loves Travel Stops, Subway and McDonald's. It is a 20,000 GPD package plant.

Sewage from the collection sites located at the Carroll County Industrial Park/U.S. Interstate 77 Exit 14 area, the Hillsville East area and the Route 58 and Gladeville/Cranberry areas are pumped to the City of Galax for treatment.

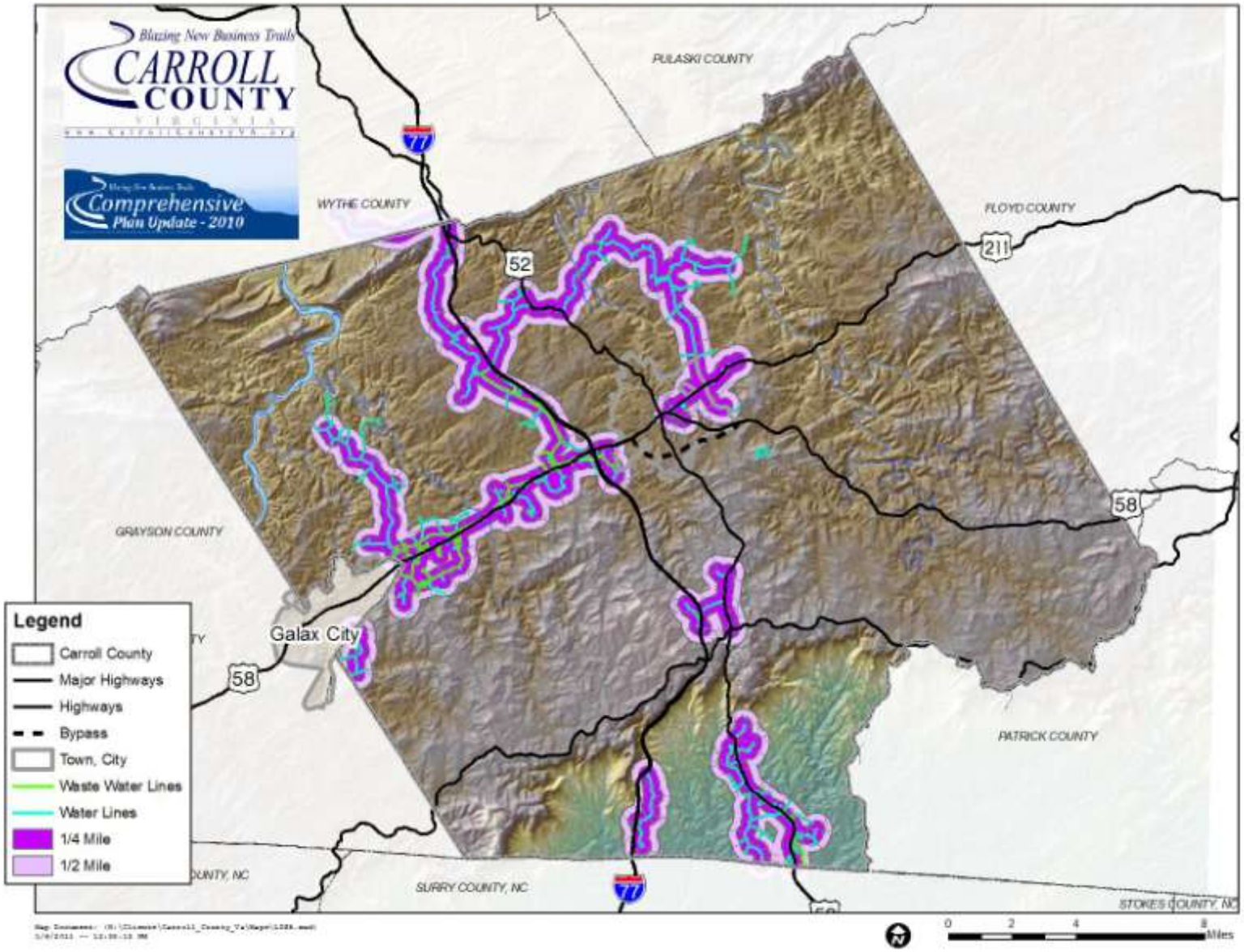
The five sewage systems are capable of treating the waste from approximately 30,000 households; however, on a daily basis, the systems only treat the waste from approximately 13,209 households.

The Fancy Gap system consists of 1,000 feet of eight-inch gravity sewer line and a plant capable of treating 30,000 gallons per day. The Hillsville East system is comprised of 3,000 feet of gravity sewer line, 3,000 feet four-inch pump line, and one sewer pump station. The Industrial Park system includes 1,000 feet of ten-inch gravity sewer line, 4,000 feet of eight-inch gravity sewer line, 6,000 feet of six-inch pump line, and two sewer pump stations. The Gladeville/Cranberry system is comprised of approximately 100,000 feet of eight-inch gravity sewer line, 7,000 feet of six-inch pump line, and two sewer pump stations. The Woodlawn system consists of 7,581 feet of 10" gravity sewer line, 21,429 linear feet of force main, and two pump stations, located on Woodlawn and Senior Road. This system connects the Industrial Park system and the

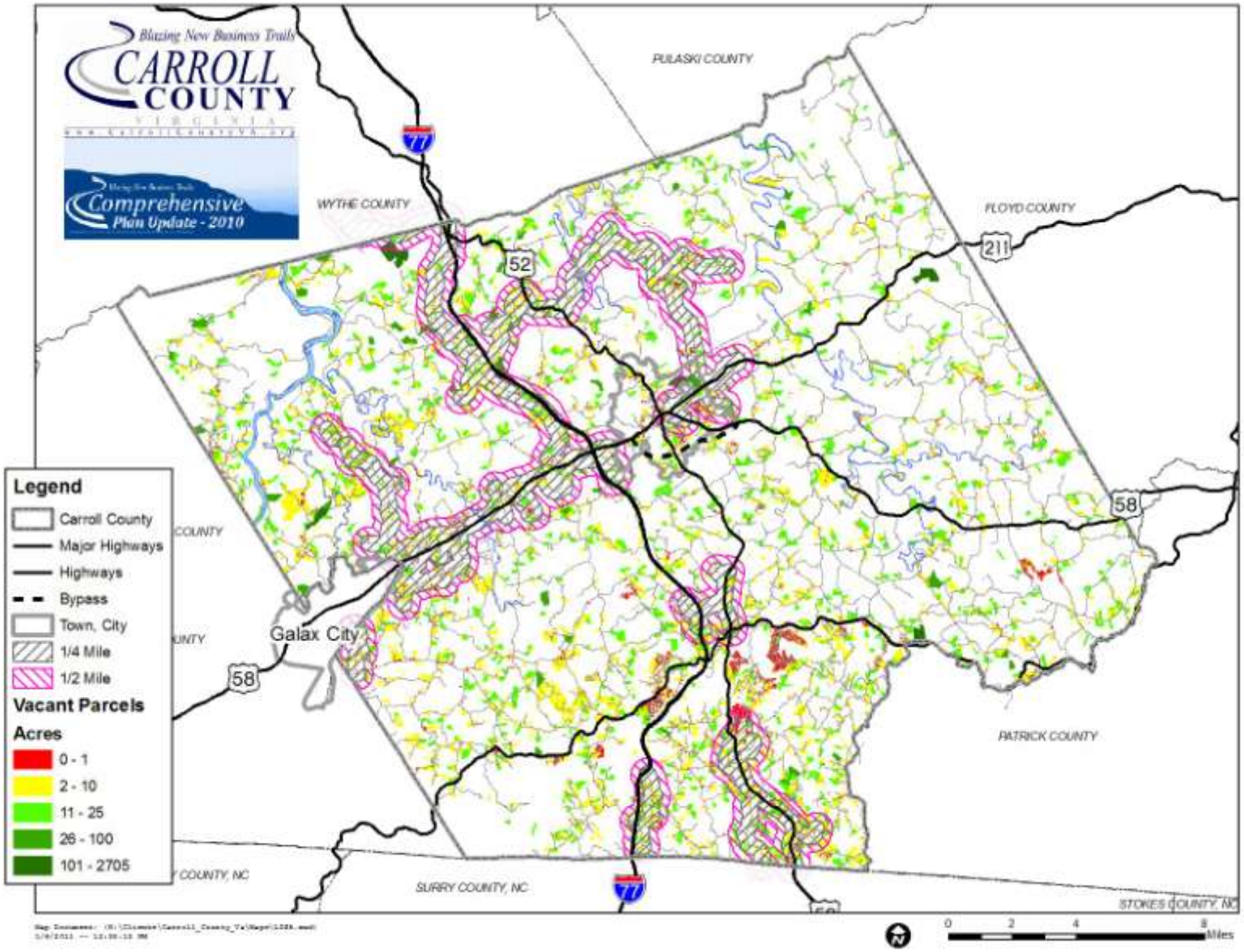
Gladeville/Cranberry system. The Exit 1 system consists of 350 linear feet of gravity sewer and a 20,000 GPD plant.

Water and sewer proximity are shown on **Map 11.** Vacant parcels in relation to water and sewer proximity are shown in **Map 12.** Considering the wide distribution of vacant parcels, limiting existing and planned publically-funded infrastructure to specifically defined areas will be critical to the County's fiscal sustainability.

Map 11: Water and Sewer Proximity



Map 12: Vacant Parcels



Solid Waste

Currently, only one landfill is available in Carroll County. Carroll and Grayson Counties and the City of Galax operate the landfill as a regional landfill. Due to the annexation on June 30, 2001, the landfill is now entirely located within the Town of Hillsville. Originally, this landfill contained 70 acres, with a majority of the land usable. The Carroll/Grayson/Galax Solid Waste Authority purchased 153 additional acres for the landfill, but only approximately 35 acres are currently usable.

The City of Galax and the Town of Hillsville provide pick-up for their residents. Collection services for the county residents are provided by Waste Industries. Commercial collection services are provided from Cooke Rental and Waste Industries.

Carroll County also provides a convenience collection site in Cana on Epworth Church Road. This location is for residential trash only.

Public Utilities

Power

Appalachian Electric Power system provides electricity for Carroll County. AEP has hydroelectric generating plants in the Northwestern portion of the county on the New River. Natural gas for Carroll County is provided through Duke Energy transmission lines. Currently, there is no distributor for the natural gas.

Telephone and Broadband

Telephone services for the county are provided by Sprint and Citizens Cable. Cellular phone services are available through U.S. Cellular, Nextell, and Verizon. Adelphia, Time-Warner, and Citizens Cable provide cable television. The four primary broadband Internet providers are Adelphia, Sitestar, Sprint, and Time Warner. Carroll County also has two wireless providers: Trificient Technologies and Crossroads Technologies, Inc.

Carroll County has worked with regional partners to expand access to high speed internet services. The Wired Road[vii] is a collaboration of Carroll and Grayson counties and the City of

Galax. The goal is to provide the businesses and residents of the region with access to world class broadband services using a fully integrated fiber and wireless network. The local governments of the Twin Counties region will not sell broadband services, but will operate the broadband network as a regional broadband authority. As with conventional transportation roadways, the authority will build and maintain these new digital roads, but private businesses will use the system to deliver broadband services. This is consistent with the Commonwealth's view that municipalities should not compete with the private sector. This approach creates unlimited opportunities for Internet service providers, who can offer a wide variety of services on the network for very low cost.

Map 13 shows the location of fiber availability in Galax. Each of the points on **Map 14** represents a wireless location that customers can connect to. With a clear line of site a customer can connect to one of these locations from as far as four miles away, sometimes even more.

Map 13: Fiber Locations

Map 14: Wireless Locations

Transportation

Transportation planning is vital to any community and should be an integral part of countywide comprehensive planning. Transportation systems should seek to provide for the efficient movement of people and goods within and between the County and other areas. Transportation planning additionally influences economic activity and patterns of growth by providing access to land. Planning of this type should be accomplished with a view towards safe and convenient access to and from specific sites as well as to and from major collector streets and arterial roadways.

Carroll County is bisected east to west by U.S. Routes 58 and 221 and north and south by U.S. Route 52 and U.S. Interstate 77. Interstate 77 was completed in 1977 and significantly improved traffic congestion along U.S. Route 52. Interstate 77 averages 38,000 vehicles per day.

In December 2003, VDOT signed a public-private partnership agreement to develop and widen 36 miles of the Route 58 Corridor from Hillsville to Stuart as funding becomes available. The corridor begins southwest of Hillsville and continues east through Carroll, Floyd, and Patrick counties to approximately one mile west of Stuart. The Route 58 Corridor from Hillsville to Stuart is the last remaining section to complete the widening of Route 58 from Virginia Beach to I-77. Once connected with I-77, the long anticipated benefits of the 1989 General Assembly legislated "U.S. Route 58 Corridor Development Program" will greatly be enhanced throughout the entire region.

The first phase of widening Route 58 under this agreement was a three-mile Blue Ridge Parkway crossing at Meadows of Dan. Phase 1 was completed in May 2006. Construction is currently underway on the second portion of Route 58, the Hillsville Bypass. A ground breaking ceremony was held in October 2007 on the $83 million bypass, which is expected to be completed in late 2011, with sections opening in October 2010.

The Route 58 Hillsville Bypass is a new 5.2-mile section of four-lane divided highway being built in Carroll County around the Town of Hillsville. Three new interchanges will be constructed as part of the project: one at each end of the new bypass to connect to Route 58 Business and one at Route 52. The interchange with Route 52 will be located just south of Hillsville and will provide a direct connection for commercial vehicles from Route 52 to I-77 to minimize current congestion in Hillsville. The project also includes building eight new bridges including one to carry Route 780 (Howlett Street) over the new bypass and a pair to carry Route 58 over Route 670 (Snake Creek Road)[viii].

The existing routes all have dangerous sections, primarily two-lane highways with inadequate turnoff lanes. Route 58 between Galax and Hillsville is the most heavily traveled road in Carroll County. An average traffic volume of 16,000 vehicles use Route 58 every day. Residential and commercial growth along this road is creating increasingly dangerous traffic conditions. Hopefully, the entire length of Route 58 will be constructed into a four-lane

highway. Converting Route 58 into a four-lane highway would provide better traffic flow for Carroll County and would be an outlet for Interstate 81 traffic. The creation of a four-lane highway would also result in an increase of east/west commercial and tourism traffic and provide the opportunity for more economic growth.

In December 2004, The Virginia Department of Transportation (VDOT) released a long-term planning document known as VTRANS 2025. The public and stakeholder groups participated in the development of the plan. Numerous focus groups as well as a series of 40 forums were held around the state. An increasing investment in transportation was supported by Virginians, as long as they had more involvement in transportation planning and assurances that revenues generated for transportation would be used solely for transportation purposes.

The Commonwealth Transportation Board (CTB) creates and maintains the transportation system in Virginia. The CTB uses a Six-Year Improvement Program to allocate funds for transportation projects proposed for development, construction or study in the next six years. The program is updated on an annual basis. The Six-Year Improvement Program includes expanding Route 620 to 4-lanes connecting to I-77 at Exit 19.

Functional Classification

The roads in the county perform different functions according to their size and location. The Virginia Department of Transportation (VDOT) classifies roads in the following manner.

Principal Arterials -Roads serving as high speed connecting links in interstate travel between the county's major population centers and for statewide travel between the larger cities and towns in the Commonwealth. The two categories of principal arterials are:

Interstate, Freeways, and Expressways. These routes have the very highest design standards possible, including control of access. Full control of access is required on interstate routes and freeways, but expressways may be constructed with partial control.

Other Principal Arterials. These routes have lower design standards than interstate or freeways. Except for unusual circumstances, access control will be limited to bypasses and major relocations.

Minor Arterials - The function of these roads is to link urban areas with towns not situated on principal arterial routes and to form a network providing interstate and inter-county service. This system is designed to provide relatively high-speed travel, even though in many cases multi-lane facilities will not be required.

Collectors - This system consists of those routes that, regardless of traffic volume, primarily are of intra-county rather than statewide importance. Since trip lengths will be much shorter than on arterial routes, design standards provide for moderate travel speeds. Although some collector corridors may run through several counties, trip lengths within the corridor are usually relatively short. Collectors are also subdivided into two categories:

Major Collectors. These routes have three main functions; to connect the locally important travel generators, to link travel generators to nearby towns on higher-class roads, and to serve the more important intra-county travel corridors.

Minor Collectors. These routes form a network bringing all remaining developed areas within reasonable distance from a major collecting route. There are a number of minor collectors in the county.

Local Roads . The local road system serves primarily to provide direct access to adjacent land parcels. These roads are designed for low travel speeds.

Access Management

The County should take an active role in access management to ensure access to key development at critical intersections and on major corridors while preserving the flow of traffic on the surrounding road system in terms of safety, capacity, and speed. Access management is important as the County strives to maximize the economic impact of its highway interchanges and increase tourism.

The spacing, location, and design of entrances, traffic signals, street intersections and median openings are all important aspects of an access management program. Each one of these produces conflict points where vehicles have to slow down or stop, interrupting the flow of traffic. The increasing number of conflict points correlates with traffic congestion and crashes. Reducing conflict points can be realized through managing the location and design of median openings, driveways and other points of access to state highways and other corridors.

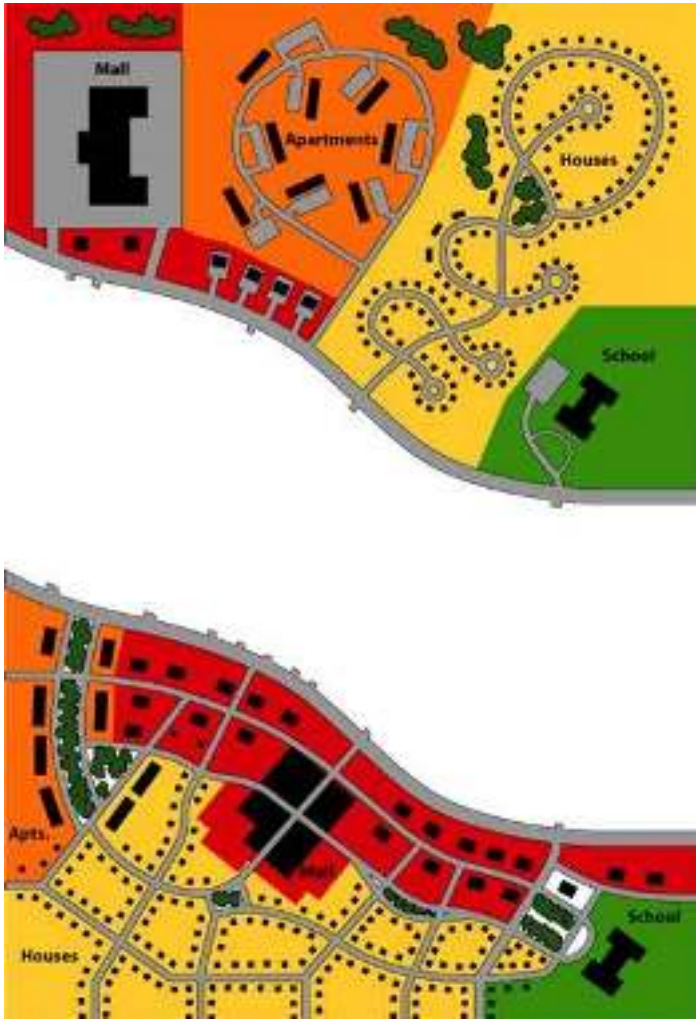
Land Use / Transportation Linkage

Transportation is an important and costly component of a community's infrastructure base that has a profound influence on its land use patterns and rate of growth. Consideration of traffic demands is a critical aspect of an overall smart growth framework. Impacts to both local streets and neighborhoods and the region's arterials and highway system should be considered. Traffic congestion increases the costs of doing business in the region, potentially discouraging new businesses from locating in the area. Pollution and congestion have harmful effects on the quality of the natural environment and the area's quality of life if necessary transportation improvements are not funded as needed.

Transportation is inextricably linked to land use. Countywide development patterns and site specific lot design influence the availability and efficiency of various transportation modes. Development intensity/density, street lay-out, connectivity and access, and public improvement requirements are some of the many components that contribute to the viability of transportation options.

Moderate to high-density mixed use development is widely regarded as a land use that maximizes transportation options. The benefit of mixed use development and higher density residential include land conservation and increased mobility options, such as car pooling, biking/walking, bus or fixed-route transit since uses aren't artificially separated and population densities support viable ridership. Mixed uses allow people to live, work and shop in the same neighborhood, reducing their need to travel long distances in the course of daily living. Increased mobility options can reduce household transportation costs, reduce pollution and traffic congestion and increase interaction between neighbors.

Given increasing congestion and the likelihood of escalating energy costs, there will be an increased incentive to use modes other than single occupancy vehicles. It is important to avoid



Source: MARC/RTA

development typologies that would preclude transit options as they become more necessary in the future, such as large-lot residential development, non-contiguous growth and leap-frog development. Transit is neither cost effective nor convenient to use in very low-density neighborhoods. Generally, residential areas must be at a density of 8 or more units per acre to make transit a viable option.

Airport

Carroll County is home to the Twin County Airport, located just west of I-77 near Exit 19, approximately six miles northwest of the Town of Hillsville. The Twin County Airport Commission was chartered in 1964 by an Act of the General Assembly of the Commonwealth of Virginia. The Airport Commission consists of two appointed representative from Galax, Carroll County and Grayson County. The Airport Commission establishes policy for airport matters, authorizes project submittals, and approves the annual operating budget. Future improvement plans for the Twin County Airport include a new terminal with a conference room, offices, and a pilots' lounge, additional T-Hangars, and a runway extension to 5,000 feet. The airport's hours of operation are Monday thru Friday 8:00AM to 5:00PM.

On January 8, 1992, Carroll County adopted an Airport Safety Ordinance as required by Virginia Code Section 15.1-491.02 (the code number at that time). The County also recognizes certain criteria, as outlined by the Virginia Department of Aviation, for airport zoning: To implement effective land use planning and control measures around airports, it is necessary to identify specific planning boundaries. These boundaries will identify airport environments for land-use planning purposes. Federal and state airport design criteria, safety of flight requirements and land use provisions unique to the community should be incorporated in the zoning process. Airport safety zones, standard aircraft traffic patterns, over flight areas, noise contours, and FAR Part 77 height restriction criteria should be considered by land use planners as central elements when developing zoning ordinances, airport overlay districts, and comprehensive land use plans for the community. All of these factors should be considered for airport-compatible land uses. In general, land use for residences, schools, churches, hospitals, daycare centers, nursing homes, uses resulting in large open-air assemblies of people, such as amphitheaters and stadiums in over flight areas should be discouraged. Compatible uses include commercial, industrial,

agricultural, golf courses, parks, and other similar uses. Carroll County follows these criteria, the Airport Safety Ordinance, and any regulations specified by the FAA.[7]

Law Enforcement

The Carroll County Sheriff's Department is the primary law enforcement agency in the County, headquartered in Hillsville at the Carroll County Governmental Center. In addition to the Sheriff, the Carroll County Sheriff's Office consists of thirty-six employees to meet every aspect of the law enforcement needs of the county. These employees include law enforcement/patrol officers, investigators, school resource officers, civil process deputies, court security officers, dispatchers and office staff.

The Sheriff's Department consists of seventeen full-time deputies, one part-time deputy, five dispatchers, three investigators, three civil processors, two school resource officers, one secretary, one clerk, one search and drug dog, and the sheriff. See **Table36.**

The Hillsville Police Department also protects and serves Carroll County. The Police Department is comprised of twelve personnel: seven full-time police officers, two sergeants, one lieutenant, one chief, and one office manager. Fourteen Virginia State Police officers are assigned to Carroll County.

All communications for local law enforcement agencies are handled through the central dispatch in the Sheriff's office. Communications with the FBI, State Police, and other outside law enforcement agencies are also handled through the central dispatch.

The Sheriff's Department is currently working to maintain its services despite equipment and staffing deficiencies. The Virginia Compensation Board sets staffing standards for the Sheriff's Office. The standard for law enforcement is one deputy per 1,500 population, as set out in §15.2-1609.1, Code of Virginia. The existing level of service per 1,000 population is shown in **Table 37.**

[7] Virginia Department of Aviation, 2005; Carroll County Chair of Airport Commission, 2005

By the population-based staffing standards, the Carroll County Sheriff's Office is short at least two law enforcement positions which were not be funded due to the current state financial shortfall. The shortfall for the 2 law enforcement positions was funded by local funding through Highway Safety Funds. In addition, special services such as School Resource Officer and Court Security are provided through specific funding. There is a need for additional personnel at the Carroll County Communications office, which has five dispatchers with only one dispatcher for shift. With the volume of calls received, a second dispatcher is needed for high volume shifts (evening and weekend).

Carroll County has recently installed a new microwave communications system which allows for better communications for police, fire, and rescue.

The Sheriff's Department responded to 15,958 calls for service in 2009.

Table 36: Law Enforcement Facilities and Personnel

Capital Item / Personnel	Number	Approx. Cost per Unit
Vehicles:		
Patrol Vehicles	23	$20,000
Administrative Vehicles – Civil Process and Prisoner Transport	2	$20,000
Investigative Vehicles-purchased used	3	$15,000
Other: Spare Vehicles- 2 Jeeps, 2 cars	4	$20,000
Other: New Vehicles – received but not assigned	3	$22,000
Other: Camaro from Drug Seizure-used for undercover work	1	0
Total Vehicles	**36**	**-**
Major Equipment:		
LIVESCAN-CCRE fingerprinting	1	$50,000
Communications-Base Station Radio	2	$100,000
File Server	1	$15,000
Facility:		
Governmental Building		
Personnel Type:		**Approx. Annual Cost (per Person)**
Commissioned Officers	29	$50,000
Administrative	6	$35,000
Other: Part-time Commissioned Officer	1	$10,000
Total Personnel	**36**	**-**

Table 37: Law Enforcement Levels of Service

Level of Service	LOS per 1,000 Population
Vehicles	1.16
Facility	n/a
Officers	0.95
Deputies	.82 per 1,500 pop.

Fire Protection/EMS

The Emergency Services Department is responsible for reducing the loss of life and property from fire, medical and environmental emergencies. The Emergency Services Department consists of, both paid and volunteer Fire and Rescue departments throughout Carroll County, which provide 24-hour protection and response to Carroll County's residents and visitors. The Emergency Services Director is responsible for coordinating the development of the County's strategic emergency management system and plan for preparedness, response and recovery phases of a wide range of emergencies and disasters. The Emergency Services Department is responsible for the Emergency Radio System in Carroll County.

Fire protection, suppression and emergency response service are integral public safety services provided to the Carroll County residents. Fire coverage areas are shown in **Map 15.** Carroll County has three volunteer fire departments: Hillsville, Cana, and Laurel Fork. The Hillsville and Cana departments have three stations. The Hillsville Fire Department consists of 14 volunteers; Cana Fire Department-32 volunteers; and Laurel Fork Fire Department-39 volunteers. The three volunteer fire departments combined provide Carroll County with 5 pumper trucks, 5 tanker trucks, and 22 auxiliary vehicles of varying types. Calls for service and levels of service are shown in **Tables 38-40**.

Carroll County is served by six rescue squads: Dugspur Rescue Squad, Laurel Fork Rescue Squad, Carroll Fire and Rescue, Cana Rescue Squad, Pipers Gap Rescue Squad, and Laurel Rescue Squad. Rescue squad coverage areas are shown in **Map 16**. Fire and rescue dispatch are also available through the Twin County Hospital dispatch. The membership for each squad is as

follows: Dugspur-12, Laurel Fork-15, Carroll Fire and Rescue-17, Cana-35, Pipers Gap-27, and Laurel-15. There are 40 rescue vehicles available for residents of Carroll County.

As per the Fire and Rescue CIP, fire districts are rated by the Insurance Service Office (ISO) for insurance purposes on a scale of 1 to 10 with 1 being the highest and 10 the lowest. A district rating of 1 indicates an urban area with a sound municipal water system and ample vehicles and stations to accommodate the district population; a rating of 10 indicates a rural area with no community water system, inadequate equipment, and no stations. In 2009, the Cana Fire department improved their rating from 9/9 to 6/9. The Laurel Fork Fire District is Class 9/10. The Hillsville Fire Department is Class 6/9.

The County's fire departments and rescue squads completely depend on volunteers. One of the on-going challenges shared by each department serving Carroll County involves the need for more trained volunteers. Recruitment programs and continuing community education are necessary for every department. Additionally, many of the departments are in need of equipment updates. More personnel and updated equipment will allow the various departments to provide quicker and more efficient services to the city. Thus, improving the insurance rating for a particular department and consequently affecting the cost of insurance for citizens. Equipment, training, and other needs are being reviewed and planned for by the Emergency Services Coordinator, Administration, and the Board of Supervisors.

Fire and rescue services are dispatched by Twin County E-911, which is a regional 911 Commission that includes Galax, Carroll County and Grayson County. It is located in the Harold Snead Safety Building in Galax, and each locality has two representatives to the Commission.

Table 38: Emergency Calls for Service

	Number of Calls Per Service for 2009
Cana Rescue	497
Cana Fire	263
Hillsville Fire	269
Laurel Fork Rescue	322
Laurel Fork Fire	66
Dugspur Rescue	37
Carroll Fire & Rescue	1,786
Pipers Gap Rescue	743
Laurel Rescue	301

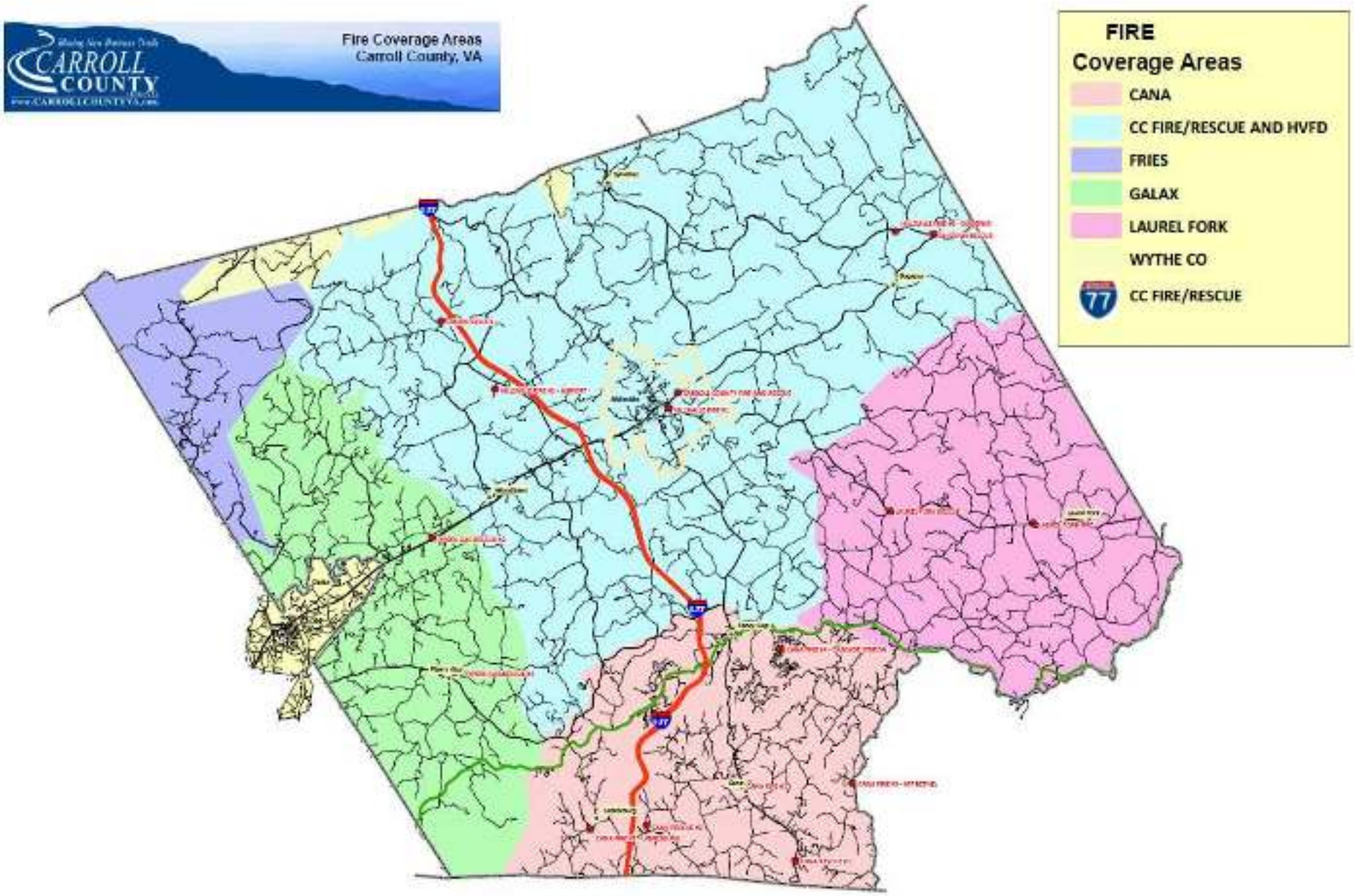
Table 39: Emergency Response Facilities, Vehicles and Personnel

	Building 1 (SF GRA)	Building 2 (SF GRA)	Building 3 (SF GRA)	Vehicles	Personnel
Cana Rescue	6,000			5	35
Cana Fire	1,716	9,484		11	32
Hillsville Fire	8,540	4,800	9,556	14	14
Laurel Fork Rescue	4,800			4	15
Laurel Fork Fire	12,400			7	39
Dugspur Rescue	6,000			1	12
Carroll Fire & Rescue	11,550			8	17
Pipers Gap Rescue	6,696	1,680		17	27
Laurel Rescue	10,360			5	13

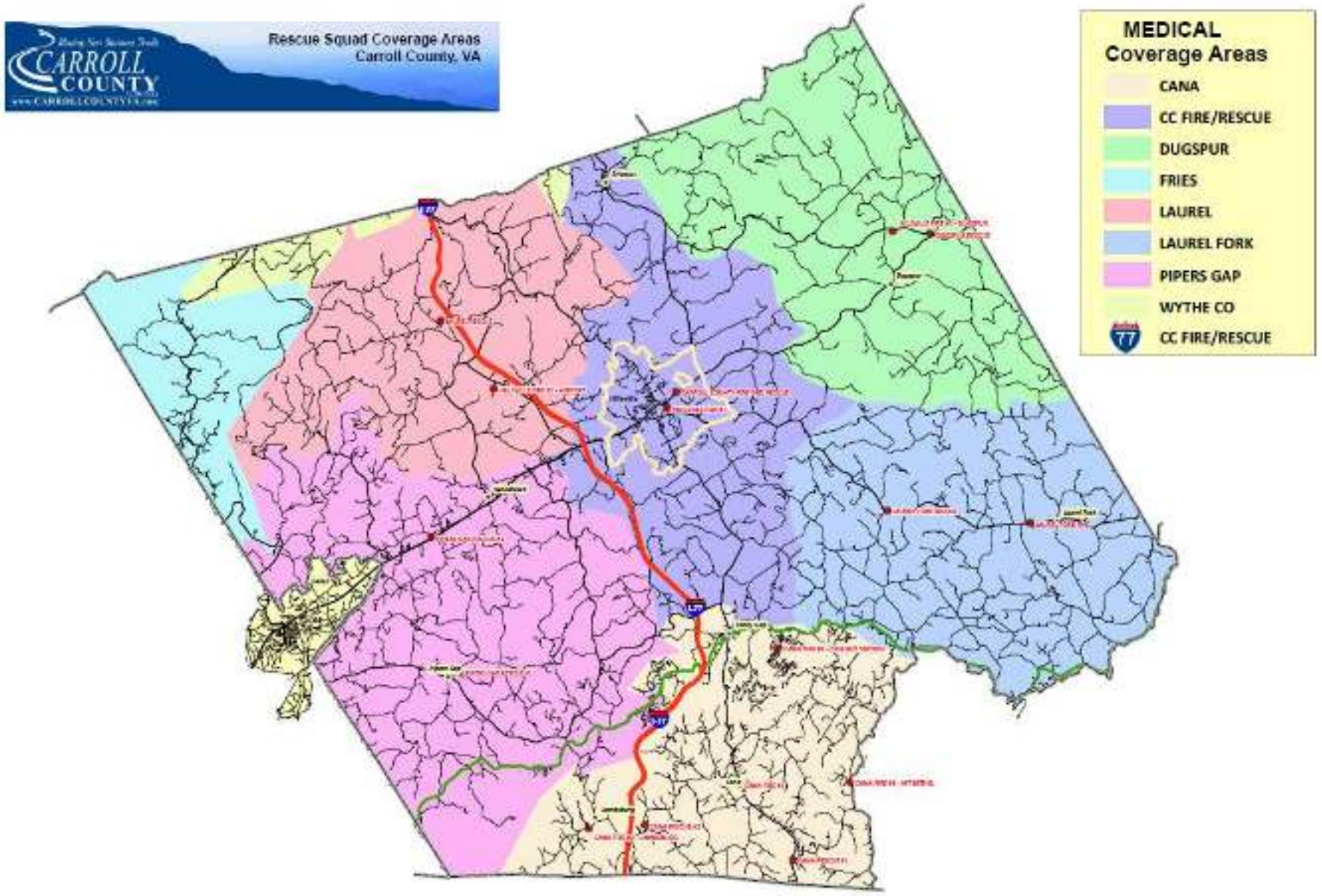
Table 40: Fire and Rescue Levels of Service

Level of Service	LOS per 1,000 Population
Vehicles	2.32
Facility	3,019
Personnel	6.58
Deputies	.82 per 1,500 pop.

Map 15: Fire Coverage Areas



Map 16: Rescue Squad Coverage Areas



Emergency Operations Plan

Carroll County has an Emergency Operations Plan in order to establish the legal and organizational basis for operations in the County to effectively respond to and recover from all-hazards disasters and/or emergency situations. It assigns broad responsibilities to local government agencies and support organizations for disaster prevention, preparedness, response, and recovery. These responsibilities are generally extensions of normal, day-to-day functions involving the same personnel and material resources. Supporting plans for all-hazards disasters set forth the concepts and procedures whereby the county can effectively apply available resources to insure that casualties and property damage will be minimized and that essential services will be restored as soon as possible following an emergency or disaster situation.

During an emergency situation the County has many priorities. The top priorities for Carroll County include saving lives and protecting the health and safety of the public, responders, and recovery workers. Another priority is to ensure security of the jurisdiction and prevent an imminent incident from occurring. An additional priority is to protect and restore critical infrastructure and key resources, as well as to ensure the local government continues to function throughout the incident. The protection of property and the mitigation of damages as well as impacts to individuals, communities, and the environment, are all important priorities of Carroll County during an emergency situation. Finally, the County wants to be able to facilitate the recovery of individuals, families, businesses, government, and the environment.

Ongoing plan management and maintenance are important elements for successful implementation. Carroll County should conduct training exercises, plan review and revision prior to formal adoption every four years in order to maintain plan currency. The plan should also be updated and reviewed following training exercises. Carroll County also has adopted a specific Oil and Hazardous Materials Response Plan.

Education

The Carroll County public school system operates one high school, two intermediate, and seven elementary schools. Carroll County High serves grades 10-12, Carroll County Intermediate serves grades 8-9, and Woodlawn Middle serves grades 6-7. The Elementary schools serve Pre

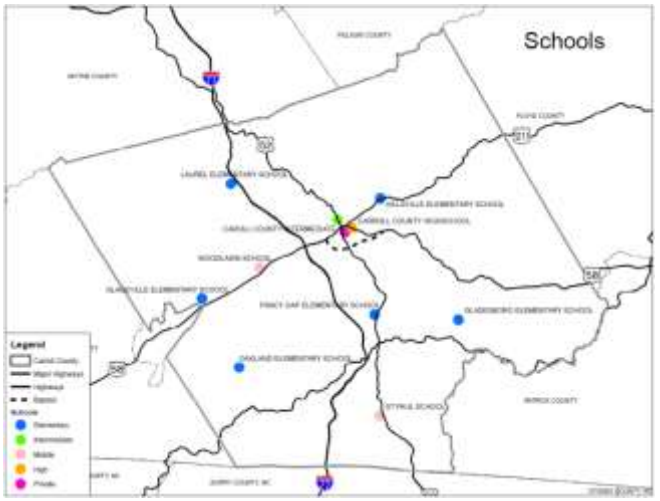
K-5th grade, with the exception of St. Paul School which serves Pre K-7th grade. The Carroll County Adult Education Center provides training for adults to increase their skills in reading, math, literature, social studies, science, spelling, writing, measuring, and English.

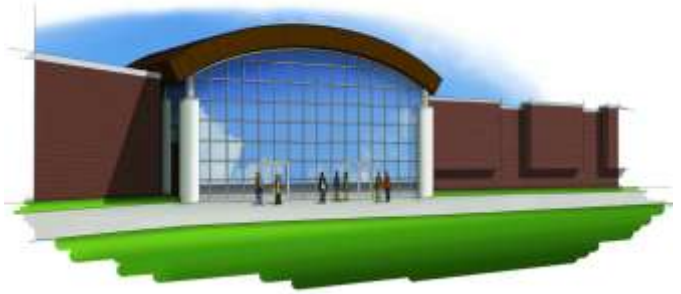
As is shown in **Table 41,** the School District has a total capacity of 5,690 and an enrollment of 4,036. Excluding the capacity of the Adult Education Center, the District has a capacity of 5,250 and an average Student to Teacher ratio of 10.3. The only facility operating above capacity is Carroll County Intermediate, which uses two portable classrooms. The District has stable enrollment rates and capacity is generally not a problem. However, the aging of District's facilities is a factor in its operations, as many factors have changed since the buildings were designed, including programming and technology changes.

In 2008 the District sought recommendations from the Department of Education on the renovation or replacement of its secondary schools, including the facility needs that would be generated by creating a 6-8 middle school and a 9-12 high school grade structure[ix]. The District determined that due to safety concerns due to the historic nature of Woodlawn Middle School and exorbitant rehabilitation costs, the best option is to close Woodlawn Middle School, which will necessitate the major renovation and expansion of Carroll County Intermediate School to house grades 6-8, and Carroll County High School, grades 9-12. Currently, neither of these facilities is adequate to house and educate the larger student populations. Construction costs are estimated at $26.5 million dollars. Federal funding for these facilities was not granted in 2010, therefore the District is currently exploring alternative financing options.

There are no institutions of higher education in Carroll County; however, Carroll County is part of a service area of Wytheville Community College, a two-year multi-purpose institution located in Wytheville, Virginia. The Crossroads Institute is an off-campus site for Wytheville Community College, and 27% of its full-time equivalent attendees are local students.

Rural communities in Virginia will receive more than $18 million in federal stimulus funding for improvements. The American Recovery and Reinvestment Act funds are being distributed though the U.S. Department of Agriculture's rural development community facilities program. Among the projects the grants will provide include six new school buses for the Carroll County Industrial Development Authority.





Rendering of Proposed Renovations; Carroll County School District

Table 41: Carroll County School District Facilities and Personnel

Facility	Location	Year Built; Renovations	Capacity	Current Enrollment	Percent Capacity	Teachers	Permanent Classrooms	Portable Classrooms	Acreage of Site
Carroll County High	Hillsville	1969	1,145	872	76%	85	57	0	74
Carroll County Intermediate	Hillsville	1936; 1947; 1954; 1979; 1980; 1982	560	648	116%	63	42	2	21
Fancy Gap Elementary	Fancy Gap	1957; 2001	280	166	59%	12	18	0	10
Gladesboro Elementary	Hillsville	1955; 1962; 2001	258	127	49%	11	16	0	8
Gladeville Elementary	Galax	1962; 2001	334	334	100%	29	30	0	15
Hillsville Elementary	Hillsville	2005	653	477	73%	51	37	0	94
Laurel Elementary	Austinville	1955; 1980; 2001	390	270	69%	26	24	0	7
Oakland Elementary	Galax	1953; 1968; 2001	280	222	79%	26	24	0	16
St. Paul School	Cana	1951; 1973; 2007	600	395	66%	44	44	0	26
Woodlawn Middle School	Woodlawn	1908; 1937; 1952; 1962; 1974	750	525	70%	46	50	0	23
Carroll County Adult Education Center	Hillsville	1955; 1968	440	N.A	N.A.	5	6	0	12
Total (K-12)			**5,250**	**4,036**	**77%**	**398**	**348**	**2**	**305**

Libraries

Libraries are an integral community service that enhances quality of life. Libraries are more than repositories of print and electronic media. Modern libraries have outreach programs that perform valuable community services educating, informing and entertaining all segments of the population.

The Galax-Carroll Regional Library provides the community with educational, informational, and recreational library services in an accessible and timely manner. The Carroll County Public Library is a branch of the Galax-Carroll Regional Library System, and is located in Hillsville. Operating hours for the library are Monday 10am-8pm, Tuesday through Friday 10am-6pm, Saturday 10am-2pm, and closed on Sunday. The branch has eight public access computers and free WiFi access during library hours.

The Library's mission statement:

> *The mission of Galax-Carroll Regional Library is to provide and encourage the use of the library resources and services to meet the educational, recreational, informational needs and interests of the public; thus enhancing individual and community life.*

Table 42 sets forth generally-accepted national library standards for a service area population of 10,000 to 35,000 persons.

Table 42: Library Level of Service Guidelines

Book Stock (volumes per capita)	Seats (per 1,000 pop.)	Circulation (volumes per capita)	Building Size (square feet per capita)
2.25 - 3	5	9.5	0.6 - 0.65

Source: Joseph L Wheeler and Herbert Goldhor, Practical Administration of Libraries.

In October 2010, Carroll County received $200,000 in grant funding through the USDA Community Facilities Recovery Act to improve the Carroll County Library, allowing the County to make much needed improvements. Some of the improvements to be made include

replacement the roof and windows, installation of new carpet, replacement of some furniture and fixtures, installation of energy efficient lighting, remodeling the bathrooms, resurfacing the parking lot, and landscaping improvements. There were a total of 129 Library projects funded in 30 states with three projects funded in Virginia.

Health and Social Services

Carroll County residents receive medical attention requiring hospitalization primarily from the Twin County Regional Hospital located in the City of Galax on Carroll County's western border. Located on an 18.76-acre site, the hospital is licensed for 141 beds, as well as 13 beds for the emergency room and 20 beds for ambulatory surgery. Other hospitals include Northern Surry Hospital in Mount Airy, North Carolina and Pulaski Community Hospital in Pulaski, Virginia.

Services provided by the Carroll County Health Department include: family planning, pediatric care, childbirth classes, car seat classes, and maternity clinics. Programs offered or associated with the department include: WIC, Every Woman's Life, Sexually Transmitted Diseases, Children's Care Connection, Immunization, Communicable Diseases, ADAP (HIV positive medication program), and the administering of flu vaccines. The health department also issues permits for wells and septic systems, performs inspections for any facility preparing and selling food, and prepares birth and death certificates.

Carroll County provides several social service agencies to meet the needs of the residents. Agencies located within the Carroll County government complex include: the Carroll County Department of Social Services, Carroll County Health Department, Carroll County Disability Services Board, and the Carroll County Victim-Witness Program. The Carroll County Extension Agent provides services from 205 Oak Street in Hillsville.

Numerous other agencies serve residents of Carroll County, including Mount Rogers Community Services Board—Carroll County Counseling Center, Joy Ranch Home for Children, Golden Harvest Thrift Shop, Willing Partners, Mountain Shelter, Virginia Employment Commission, Southern Carroll County Community Center, Rooftop of VA-CAP, Mountain View Youth and Family Services, and Preserving Safe and Stable Families Program.

These agencies provide programs to assist in improving the quality of life for low-income individuals and families in Carroll County. For example, the programs offered by the Rooftop of Virginia Community Action Program (CAP) include housing, winterization, crafts, childcare, and head start. Preserving Safe and Stable Families Program provides a program for after school tutoring and mentoring.

Governance and County Operations Goals and Policies

Goal 13: Residents and businesses enjoy efficient and responsive governance.

Policy13.1: Support regulatory requirements that are fair, predictable and protect the interest of public and private property owners and the community as a whole.

Policy13.2: Improve government transparency.

Policy13.3: Improve public relations with citizens.

Policy13.4: Promote intergovernmental cooperation and coordination to address regional planning issues and support County goals.

Policy13.5: Support coordination and communication among the County, its communities, municipalities and surrounding municipalities and counties.

Policy13.6: Support the role of the County Administrator, including to:

- Develop and manage strategies to assist each department and Board of Supervisors to achieve their individual departmental goals while serving the public needs in the most effective and efficient manner possible.
- Serve as a key link between the Board of Supervisors, County staff and the public.
- Coordinate County departments.

- Work to expand economic development opportunities for Carroll County citizens and expand the tax base.
- Create the connection between each department's work and job creation.

Policy13.7: Support the role of the Finance Department, including to:

- Implement strategic financial planning in the areas of budget and capital improvement.
- Provide timely and accurate financial services to departments and the Board of Supervisors.
- Participate during development review regarding provision and funding of facilities and services.
- Investigate areas in which more fiscal efficiency may be achieved.

Policy13.8: Support the role of the Office of Information Technology, including to:

- Complete update and redesign of CarrollCountyVA.org website.
- Complete inventory of computer hardware and software.
- Implement a 4 year replacement cycle.
- Install a public access computer on the second floor at the Governmental Complex.
- Establish secure wireless connection for Board of Supervisors' use.
- Continue to support development and maintenance of public access computers and wireless access at County offices.

- Continue to support public access to on-line forms and County documents and information via the County website.

Policy13.9: Support the role of the Maintenance Department, including to:

- Provide repair and maintenance of all County facilities with in-house expertise.
- Maintain all County vehicles, including Sheriff's Department and Carroll EMS, in a timely and cost efficient manner.
- Provide top quality custodial services to all County facilities.

Policy13.10: Support the role of the Resource Development Office, including:

- Decrease taxpayer cost with grants to reduce government and public safety expenses.
- Create new jobs and economic development with grants.
- Rank nationally in professional accreditation.

Facilities and Services Goals and Policies

Goal 14: Residents and businesses enjoy efficiently provided and equitably funded public facilities and services.

Policy14.1: Plan for and equitably fund the efficient provision of public facilities and services.

Policy14.2: Assure that the provision of County services is efficient and does not shift the costs of facilities to serve new residents and businesses to existing residents and businesses.

Policy14.3: Support adequate public facilities to be available or funded prior to approval of new development. The implementation of this policy will be coordinated with the adoption of a Capital Improvements Plan that addresses existing deficiencies and future capacity needs.

Policy14.4: Annually update and prioritize the Capital Improvements Plan (CIP) to ensure that projects are consistent with goals of the Plan and targeted to Developed and Planned Growth Areas. Prioritize County CIP projects, state and federal projects that are located within Developed and Planned Growth Area Tiers.

Policy14.5: Coordinate with other service providers to exchange information about capital improvements projects and to coordinate the timing and capacity of improvements to efficiently provide for demands from planned development.

Policy14.6: Coordinate the provision of new infrastructure and facilities with existing infrastructure and facilities to maximize use of existing capacity.

Policy14.7: Maintain adequate levels of service for county facilities and services, for road capacity, operation and maintenance; law enforcement; fire protection and emergency medical response times; parks, trails and open space; water, sewer and stormwater drainage.

Policy14.8: Maintain adequate levels of service for school district facilities and services including participation during County development review and coordination with short- and long-range CIPs.

Policy14.9: Require adequate public facilities in a timely manner as a required precondition to development approval in order to prevent sprawl, assure a positive fiscal impact for the County, provide a high quality of life through infrastructure and service

provision and protect the health, safety and general welfare of the County.

Policy14.10: Require facilities to be extended through new developments to provide for future growth. Facilities may be required to be over-sized to serve future development with provisions for reimbursement for facilities that benefit other properties.

Policy14.11: Direct public facilities that serve large populations, such as hospitals, schools, and health clinics, to locate near the intersection of major transportation routes.

Policy14.12: Encourage co-location and grouping of community facilities such as libraries, fire stations, rescue centers, public health clinics and other governmental service facilities.

Policy14.13: Encourage acquisition of sites for planned community facilities in advance of need.

Policy14.14: Support provision of broadband telecommunications infrastructure and The Wired Road.

Policy14.15: Plan, support and fund infrastructure development in coordination with the PSA.

Policy14.16: Support the role of Galax-County Regional Library, including to:

- Complete new Five Year Plan for Regional system (Dec.2008), to include a technology plan and revision of library policy and procedure manuals.
- Provide WiFi access for patrons within library for Galax and Carroll.
- Provide download to recorded books through "Overdrive" service via Library's Web page.
- Implement updates and revisions in Library's automated operating system.

- Continue to expand Adult and Youth reading programs and Outreach to Hispanic groups.
- Promote staff development through in-service training and events.

Goal 15: The County enjoys fiscal strength and balance due to use of the full range of financing tools.

Policy15.1: Ensure the fiscal sustainability of the County through the efficient provision and phasing of public facilities and services, the use of fiscal impact assessments, and the use of the full range of revenue-generating tools.

Policy15.2: Establish and assess public improvement districts to finance on-site development public facilities construction, operation, maintenance and repair; and provide incentives for the installation of renewable energy and water recycling infrastructure.

Policy15.3: New development shall fund its proportional share of costs for capital facilities for on- and off-site capital improvements required to serve new development.

Education and Human Services Goals and Policies

Goal 16: Quality healthcare and human development services contribute to sense of community and healthy families.

Policy16.1: Support educational opportunities for all ages, with emphasis on higher education and improved educational facilities.

Policy16.2: Coordinate long-term school planning with the Carroll County and Hillsville Planning Commissions.

Policy16.3: Improve educational opportunities through smaller schools, access to higher education and development of a community college.

Policy16.4: Encourage expansion of Crossroads Institute.

Policy16.5: Increase access to medical care.

Public Safety Goals and Policies

Goal 17: Essential public services including fire protection, rescue operation and law enforcement are available to all County residents.

Policy17.1: Support provision of public safety services at higher levels of service in urban and suburban areas with more intense development and concentrated population, and at lower levels of service in rural areas.

Policy17.2: Improve safety by preventing loose and stray dogs.

Policy17.3: Expand and enhance emergency services.

Solid Waste Disposal Goals and Policies

Goal 18: All sanitary landfills are maintained and operated in the most efficient and sustainable manner possible, with a high percentage of solid waste diverted to recycling centers.

Policy18.1: Require reclamation and conversion of closed sanitary landfills to open space for dispersed use, timber management, recreation areas, or wildlife feeding and breeding areas.

Policy18.2: Encourage recycling, resource recovery and other alternative uses of solid waste.

Water and Sewer Facilities Goals and Policies

Goal 19: Water and sewer service is provided in urban and suburban neighborhoods and communities; rural areas generally rely on well and septic systems.

Policy19.1: Coordinate with the New River Water Authority in order to insure the long-term water needs of the County are met.

Policy19.2: Support the use of the New River as a source of water for both Wythe and Carroll Counties.

Policy19.3: Continue implementation of the recommendations in the County's 604(b) study for the provisions of water and sewer facilities.

Policy19.4: Support use of alternative methods of sewerage treatment and disposal.

Policy19.5: Provide access to water and sewer in Primary Growth Tiers.

Policy19.6: Limit development of water/sewer lines in rural areas, and maintain choice of service in rural areas.

Transportation Goals and Policies

Goal 20: Safe and convenient mobility and a variety of mode choices are available to residents and visitors.

Policy20.1: Encourage plans that minimize through traffic in residential areas and cause the least adverse effect possible on public centers such as schools, parks, and playgrounds.

Policy20.2: Promote the construction of access roads to serve activity centers, including residential areas, parks, playgrounds, industrial parks, and commercial centers.

Policy20.3: Preserve highly productive agriculture areas within the County by encouraging transportation routes to be routed along existing right-of-ways.

Policy20.4: Participate in a coordinated, regional approach to transportation planning and seek adequate funding to support all transportation modes.

Policy20.5: Secure rights-of-way required to serve planned development before development occurs.

Policy20.6: Require subdivision design to coordinate street alignment with existing and future streets to promote a rational and interconnected street system.

Policy20.7: Improve existing high traffic roads and provide more maintenance of roads.

Policy20.8: Identify and support potential opportunities for public transportation, including options for a rail system that ties into other area rail systems.

Chapter 9. Implementation

Carroll County's Comprehensive Plan is intended to be a dynamic document -- one that responds to changing needs and conditions. To assess the Plan's effectiveness in responding to changing conditions, the County will need to monitor actions affecting the Plan and amend the Plan periodically. Decision-makers should consider each proposed amendment carefully to determine whether or not it is consistent with the Plan's goals and policies. The cumulative effect of small, incremental changes may result in a shift in overall policy direction. For this reason, Comprehensive Plan amendments must be evaluated in terms of their significance to overall County policy.

This chapter describes the processes to annually review, monitor and amend the Plan, Plan goals and policies, and the Development Tiers Map. The Map amendment process will be subject to adopted code provisions.

Monitoring and Amendment

Annual Review

Department Directors complete an annual review of Comprehensive Plan related activities prior to the initiation of the budget process each year. The annual review is intended to:

- Measure the County's success in achieving plan goals through the recommended strategies;
- Propose strategies to be pursued under the coming year's budget;
- Identify unlisted strategies that will achieve Plan goals;
- Document growth trends and compare those trends to plan projections;
- List development actions which affect the Plan's provisions; and

- Explain difficulties in implementing the Plan.

This annual review should include statements identifying that respective departments' progress in achieving the goals of the Plan, the impact of the Plan on service provision, and proposed programs to help achieve the Plan's goals. The annual review should be used as a tool to help set budgetary priorities.

Land Use Amendments

The Development Tiers Map is intended to serve as a guide for public and private development and land use decisions. The County should adopt a formal amendment process in the development regulations. Land use amendments are anticipated as growth occurs and market conditions change. While land use amendments may occur more frequently than policy changes, they should not occur more than once per year. By limiting opportunities to amend the future land use plan, the County will reduce the potential for incremental land use changes to result in unintended policy shifts.

Policy Review and Amendment

To ensure that the Comprehensive Plan remains an effective guide for decision-makers, Carroll County should conduct periodic major evaluations of the plan policies and strategies. These evaluations should be conducted every four to six years, depending on the rate of change in the community, and should consider the following:

- Progress in implementing the Plan;
- Changes in community needs and other conditions that form the basis of the Plan;
- Fiscal conditions and the ability to finance public investments recommended by the Plan;
- Community support for the Plan's goals and policies; and
- Changes in county, state or federal laws that affect the County's tools for Plan implementation.

The major review process should encourage input from merchants, neighborhood groups, developers and other community interests through the creation of a Citizen Review Committee. Plan amendments that appear appropriate as a result of this review would be processed according to the adopted Plan amendment process.

Key Implementation Tools

The Plan implementation program identifies a number of tools available to the County that may be employed to bring the goals, policies and strategies of the Plan to fruition. These implementation tools are interrelated and work together providing continuity and breadth to the implementation program.

Development Regulations

On a day-to-day basis, the development regulations (zoning and subdivision regulations) are the most important tools for Plan implementation. The Development Tiers Map and the growth-related goals are achieved through a myriad of incremental decisions about specific development projects. Because the Plan does not carry the force of law, the County must effectuate Plan policies through a variety of actions, including amendments to the County development regulations. Updates to these development regulations should be consistent with the Plan to ensure that incremental actions on development requests support the Plan's goals, policies and recommendations.

Capital Improvements Plan (CIP)

Short- and long-range CIPs are important planning tools to ensure that the County has planned the most cost effective facilities and to determine whether the County will have the capability to fund needed public facilities. The short-range CIP should identify and estimate costs of improvements needed to serve anticipated growth for the next 5 to 10 years; the long-range CIP should identify and estimate costs of improvements needed to serve anticipated growth for the next 10 to 20 years. This Plan is not an engineering document, but should provide enough specificity to determine which costs are required to remedy existing deficiencies and which costs provide new capacity that will be demanded by new development. The short-range CIP should establish the basis for the County's development fees and be updated annually. The long-range CIP should be updated at least once every five years or when significant changes to

the base systems modify the County's long-term capital investment strategies (*e.g.*, changes in service areas, significant changes in the Future Land Use Plan, changes in service demand or delivery patterns). The CIPs should list short-term projects needed to maintain existing levels of service, with each project being assigned a budget and a time frame for completion. The CIP also should delineate the proportion of project costs that is designed to provide new capacity and the proportion that is required to fund existing deficiencies. This delineation will enable the County to quantify the capital costs associated with new development and to monitor the expenditure of development fees.

Intergovernmental Agreements

Intergovernmental agreements (IGAs) are essentially treaties between two or more units of government for the mutual benefit of all parties. Within the context of this plan, an agreement between the County, its communities and other providers could address growth within designated growth areas. Such an agreement could establish each party's rights, responsibilities and recourse within a cooperative growth management process designed to implement the Plan. Items typically addressed in local government IGAs include: development review authority, annexation processes, infrastructure projects, building and related codes, public safety mutual aid agreements and IGA administrative procedures.

Comprehensive Plan

Completion of the Comprehensive Plan is not the end of planning for the future. Other planning projects will build upon the foundation of this plan, whether they are neighborhood plans that provide detailed examinations of needs and conditions or area plans developed in partnership with a developer. As the County continues to plan for the future, these planning efforts should be based on the vision and goals of the Comprehensive Plan and be consistent with the policies established by this document.

Implementation Work Program

Successful implementation of the Plan results from many individual actions by the County, other jurisdictions and service providers, and private decision-makers over the course of many years. The goals and policies describe what the community wants to become and how decision-makers should respond to varied circumstances. To accomplish the plan’s goals and the Community Vision, the County will need to accomplish many tasks throughout the life of the plan. Key

strategies will be used to accomplish the Plan's goals in the initial years of plan implementation. While most of the items on the list will be carried out by the County, some items may require coordination with neighboring cities, other service providers, or economic development entities.

The work program:

- Correlates implementation measures with specific Comprehensive Plan goals and policies;
- Sets a general time frame to carry out each strategy;
- Identifies action tools (*i.e.*, existing and proposed codes, ordinances, regulations, standards, requirements and policies) to implement action items; and
- Assigns responsibility for implementing the action items and lists other entities that should be involved in the process.

The work program is not intended to be an exhaustive list of all strategies that will implement the Plan. The County may pursue different strategies and adjust priorities, depending on changing opportunities and resources. The County should update this work program on an annual basis, adjusting the Short-Term Work Plan and tasks that are included in each year's budgeted work programs.

Implementation Strategies Matrix

The Strategies Matrix, which serves as the long-term work plan, is intended to be the most dynamic component of the Plan. Through annual updates, the County can ensure that the Plan continues to serve the community effectively.

The **Strategies Matrix,** shown as **Table 43**, schedules actions and recommends the initial Short Term Work Program, which should be updated annually to reflect community accomplishments, new approaches to community issues, changing conditions, shifting priorities and new demands. This list is not intended to be exhaustive or all inclusive -- the County and other public and private entities will take numerous actions throughout the life of this plan to achieve the community goals. This list is intended to identify the highest priority tasks to be pursued over the next several years. The table identifies the goals related to each task, the timeframe for task completion, and the entities responsible for

carrying out the tasks. Tasks that are not funded in the recommended years should be evaluated for removal from the list or to be shifted back for later implementation. Programs that are completed should be removed from the list.

The list of implementation strategies provides the following information in each column:

- **Project/Activity** - identifies the task and describes the project, action or document necessary to carry-out the strategy.
- **Priority/Schedule** - a ranking of importance based on its priority relative to other similarly-classed strategies. The ranking abbreviations are labeled in the following manner:

  1 = This is a critical task and should be undertaken as soon as possible. Necessary for immediate implementation of the Plan. To occur in the first three years of Plan implementation

  2 = This is a very important task with a sense of urgency. Necessary to implement the Plan. To occur in years 4-9 of the planning period

  3 = This is an important task but there is no immediate sense of urgency. This task will help implement the Plan. To occur within years 10-20 of the planning period.

  Within the matrix, Priority One and Two strategies are listed in order of importance. Priority Three strategies are in no particular order, since these items will certainly go through additional rounds of review and prioritization prior to implementation.

- **Responsible Party** - the person, department or agency that is primarily responsible for initiating, advocating and/or performing the strategy. Anticipating that some functions currently performed by County staff may be contracted to qualified consultants, references are made to function (*i.e.*, 'Planning' refers to tasks that are the responsibility of the County's planner or planning consultant). When multiple entities are identified, they are presented in order of responsibility for the task.

- **Budgetary Impact** - indicates the relative fiscal impact of the specific strategy on the County's budget. The ranking abbreviations are labeled in the following manner:

  Low = Little or no fiscal impact on the County's budget.

  Mod = Moderate; some fiscal impact, but likely to be funded within one to two fiscal periods.

  High = May be significant fiscal impact, depending on the nature of the capital investment, but may provide opportunities for the use of alternative revenue sources.

Short-Term Work Program

The Short Term Work Program is developed and reviewed on an annual basis to identify the previous year's accomplishments and to modify the work program tasks establishing a reasonable timeline for key plan implementation tasks. The Short-Term Work Program includes all of the Priority One Strategies as shown in **Table 43.**

Table 43: Strategies Matrix

Strategy Number	Strategy	Priority	Responsible Party	Budgetary Impact	Capital Item
PRIORITY ONE (Strategic Plan)					
1	Conduct a Year In Review annual meeting that: • Highlights the year's development activity; • Identifies actions undertaken during the year to implement the Comprehensive Plan; • Evaluates Plan effectiveness and proposes necessary amendments; and • Identifies implementation actions planned to occur for the following year.	1	Administrator, Planning Commission	Low	
2	Develop and maintain a high-level, integrated Geographic Information System that incorporates local, regional, state and federal data, is used to aid all county departments, specifically including Land Use, Economic Development and Public Works and is accessible to the public via internet access.	1	Administrator, Information Technology	Mod	
3	Recruit companies that use local labor and those that provide a living wage.	1	Economic Development	Low	
4	Partner with State and Federal agencies and other funding partners to expand infrastructure and economic development.	1	Economic Development	High	✓
5	Provide the four interchanges in the County with water, sewerage, natural gas, and fiber-optic connection in addition to roads, electric power, and telephone service.	1	PSA	High	✓

Strategy Number	Strategy	Priority	Responsible Party	Budgetary Impact	Capital Item
6	Develop and implement a marketing plan to attract economic development.	1	Economic Development	Low	
7	Collaborate with counties within commuting distance, including Grayson, Wythe, Patrick, Floyd and Surry to develop a regional economic development plan.	1	Economic Development	Low	
8	Develop and implement a strategic Economic Development Plan and work program.	1	Economic Development	Low	
9	Provide necessary infrastructure and market development sites.	1	Economic Development, PSA	High/Mod	✓
10	Continue to coordinate with Entrepreneurship Business Development through BRCEDA, Business Development, and Crossroads Small Business Development Center to open more businesses, encourage capital investment and create jobs.	1	Economic Development	Low	
11	Identify and increase awareness of recreation needs for the community, and the feasibility to create facilities (private versus public venture) to enhance tourism through various events (i.e. sporting events, fairs, festivals, etc.).	1	Economic Development, Recreation Department	Low	
12	Extend water and sewerage services to the I-77 interchange with State Route 620, the interchange at Fancy Gap, and along U. S. Route 58 from Hillsville to Galax.	1	PSA	High	✓
13	Develop an Advanced Technology Center for the region to be used by high schools and the community college.	1	Economic Development, School District	High	✓
14	Support the Blue Ridge Crossroads Economic Development Authority (BRCEDA) in its efforts to secure property for future industrial development.	1	Economic Development	Low	

Strategy Number	Strategy	Priority	Responsible Party	Budgetary Impact	Capital Item
15	Implement the "Wired Road" Plan for the provision of wireless broadband services to the remainder of the county.	1	Economic Development, PSA, Information Technology	Low	
16	Develop a major emphasis on technology education through an Alternative Energy Research Center.	1	Economic Development, School District	Mod	
17	Coordinate with the Town of Hillsville to prepare and implement a plan for the development of the interchange of the U. S. Route 58 interchange with U.S. 52.	1	Planning Commission	Low	
18	Establish a pro-tourism public relations effort (local, state and national outreach) and seek to position Carroll County as the Southern Gateway to Southwest Virginia.	1	Economic Development	Low	
19	Continue County program to extend water lines to low and moderate income neighborhoods.	1	PSA	Mod	
20	Establish a communications plan to effectively communicate with the public.	1	Administration, Information Technology	Low	
21	Strengthen tourism related partnerships and enhance communications through various media (i.e. websites, newsletters, calendars, etc.) while encouraging and strengthening positive regional affiliations.	1	Economic Development, Information Technology	Low	
22	Develop and implement plans and programming to enhance emergency service provision.	1	Emergency Services, Sheriff's Department	Mod	
23	Provide adequate critical care medics.	1	Emergency Services	Mod	
24	Establish standards to require erosion and sedimentation control best management practices.	1	Erosion & Sediment Control, Planning Commission	Low	

Strategy Number	Strategy	Priority	Responsible Party	Budgetary Impact	Capital Item
25	Establish and coordinate partnerships (e.g. Virginia Cooperative Extension, small communities, etc.) to help identify, increase awareness, and promote current assets and homegrown experiences (i.e. simpler way of life, front porch experience).	1	Economic Development, Extension Office	Low	
26	Maintain updates to the Assessment Plan for Emergency Services and Emergency Plan.	1	Emergency Services, Sheriff's Department	Low	
27	Establish regulations to limit most development, including dense, small lot and commercial development to areas with water and sewer service.	1	Planning Commission	Low	
28	Maintain adequate fire vehicles and replace as necessary.	1	Emergency Services	Mod	
29	Adopt revisions to the land development regulations to protect commercial and industrial land from encroachment and incompatible uses.	1	Planning Commission	Low	
30	Continue to cross-train EMS personnel as Firefighters.	1	Emergency Services	Low	
31	Reduce the number of Emergency vehicles in the county by eliminating non-utilized vehicles and replacing them with more efficient multi-task vehicles.	1	Emergency Services	Low	
32	Establish regulations to prohibit development of subdivisions or small lots that lack necessary infrastructure.	1	Planning Commission	Low	
33	Require development to pay for the costs of services beyond established service areas.	1	Planning Commission	Low	
34	Restrict outdoor storage of junk cars and other unsightly materials.	1	Planning Commission	Low	
35	Establish and enforce junk ordinances.	1	Planning Commission	Low	

Strategy Number	Strategy	Priority	Responsible Party	Budgetary Impact	Capital Item
36	Develop a community policing strategy that engages farmers in the protection of agricultural areas, in coordination with the Farm Bureau, health officials and industry personnel.	1	Economic Development, Extension Office	Low	
37	Train public safety and public works personnel on activities, facilities and responses, update emergency preparedness training and plans, identify threats to the local agricultural industry and incorporate key agriculture facilities into emergency response plans.	1	Emergency Services, Sheriff's Department	Mod	
38	Build a coalition of public and private interests to explicitly support efforts to enhance the local food system.	1	Economic Development, Extension Office	Low	
39	Encourage and promote a local food supply by removing barriers to agriculture and food supply businesses, promoting agriculture entrepreneurship and engaging in economic development activities targeted to strengthening and diversifying local agriculture.	1	Planning Commission, Business Development, Extension Office	Low	
40	Identify current and future Ecotourism and Heritage Tourism opportunities in the County and develop a marketing strategy to grow this economic sector based on local desires and natural resource capacities.	1	Tourism Office, Business Development	Low	
41	Support efforts to educate the community on the value of a localized food system through a variety of techniques including school and community based initiatives, community networks, local marketing (and events) and farm-based and web-based education.	1	Extension Office, Business Development	Low	
42	Develop an Agricultural Economic Development Plan that focuses on the value of agriculture to Carroll County and identifies specific policies and strategies to support farms and ag-based business.	1	Economic Development, Business Development, Extension Office	Low	

Strategy Number	Strategy	Priority	Responsible Party	Budgetary Impact	Capital Item
43	Develop a Comprehensive Economic Development Plan that recognizes Carroll County plays a significant regional role and partners with communities in Carroll County and with adjacent counties to better position the region to compete with other areas and enhance local commerce.	1	Economic Development	Low	
44	Develop a series of Economic Activity Plans (EAPs), or business plans, which are limited to defined areas, have available or planned infrastructure to accommodate and incentivize economic development and promotes intergovernmental and public-private partnerships, with initial EAPs for Fancy Gap, Exit 19 (Wildwood), Exit 14 (Carroll County Industrial Park) and the Exit 1 interchange.	1	Economic Development, Business Development, PSA	Low	
45	Initiate cooperative planning efforts with neighboring Counties and municipalities to facilitate implementation of the goals, policies and strategies identified each jurisdictions respective Comprehensive Plan.	1	Administrator, Planning Commission	Low	
46	County staff should regularly communicate with the staff of adjacent jurisdictions and hold quarterly workshops within the region. Meeting locations should be rotated among communities.	1	All County Departments	Low	
47	Use intergovernmental agreements and other cooperative efforts to address and resolve regional intergovernmental issues.	1	Administrator, Planning Commission	Low	
48	Periodically review intergovernmental agreements and discuss implementation of the agreements with each of the affected units of government covered by the agreements to look for opportunities to expand the agreements to cover additional joint ventures, improve cooperation and coordination, including coordinating budgetary expenditures and capital improvement programs, and to discuss opportunities to eliminate inefficiencies and duplication of services.	1	Administrator	Low	

Strategy Number	Strategy	Priority	Responsible Party	Budgetary Impact	Capital Item
49	Participate in the comprehensive and strategic planning processes of other jurisdictions and service providers, and invite their participation in Carroll County's planning processes.	1	Administrator, Planning Commission	Low	
PRIORITY TWO					
50	Prepare an Open Space Plan as an element of the Comprehensive Plan, to include open space requirements for new development.	2	Planning Commission	Low	
51	Conduct special area planning, with local and community-based economic development partners, service providers and VDOT to ensure that new investment in economic development activities has adequate infrastructure and access.	2	Planning Commission, Economic Development, PSA	Low	
52	Provide funding for the farmers' market and cannery.	2	Farmers Market	Mod	
53	Expand high speed internet access.	2	Economic Development, PSA, Information Technology	High	✓
54	Establish industrial sites and parks with adequate infrastructure and services.	2	Economic Development, Industrial Development Authority	High	✓
55	Recruit more EMS volunteers in combination with paid Fire Response personnel.	2	Emergency Services, Human Resources	Low	
56	Develop a plan to establish a Countywide recreation facility or community centers.	2	Recreation Department, PSA	Low	
57	Establish code enforcement programming.	2	Planning Commission	Mod	
58	Develop an effective litter control program that includes sponsoring community clean-up days, increasing trash and recycling collection services, enforcing litter laws, and providing a landfill in Cana.	2	Solid Waste Authority	Mod	

Strategy Number	Strategy	Priority	Responsible Party	Budgetary Impact	Capital Item
59	Establish a parks, recreation and trails plan that identifies existing and planned park, recreation area and trail locations.	2	Recreation Department, PSA	Low	
60	Establish standards to direct development away from stream valleys, floodways, sensitive waterways and other areas that are at high risk of water pollution or flooding.	2	Planning Commission	Low	
61	Pursue the construction of facilities for the distribution of natural gas to the I-77 interchanges and along the Crooked Road.	2	PSA	High	✓
62	Advocate for a full interchange at Exit 1 on I-77.	2	Economic Development, PSA	Low	
63	Continue to implement the recommendations contained in the 604b study for the construction of water and sewerage facilities.	2	PSA	High	✓
64	Provide tax incentives to encourage agriculture by continuing land use taxation in its current form and phasing out the personal property tax on farm machinery.	2	Assessor, Treasurer, Economic Development	Mod	
65	Establish standards and incentives to attract green energy development.	2	Economic Development	Low	
66	Develop and enhance research based advertising and marketing efforts through brand establishment and niche market identification.	2	Economic Development	Low	
67	Expand infrastructure to support tourism including an assessment of current infrastructure and amenities and identification of priorities based on a fiscal impact analysis.	2	Economic Development, PSA	High	✓
68	Continue to participate in the Crooked Road: Virginia's Heritage Music Trail.	2	Economic Development, Recreation Department	Low	
69	Increase tourism funding by identifying and prioritizing all opportunities, and emphasizing the derivative benefits of tourism.	2	Economic Development	Mod	

Strategy Number	Strategy	Priority	Responsible Party	Budgetary Impact	Capital Item
70	Develop a feasibility study for the provision of eldercare facilities as well as childcare for older children.	2	Economic Development, Health Department	Low	
71	Study the viability of developing facilities for sporting competitions and/or development of a major regional theme park to attract visitors.	2	Economic Development, Recreation Department	Low	
72	Support the construction of the Twin County Airport to an all weather facility with a 5,000-foot runway.	2	Economic Development, PSA	Mod	
73	Provide an annual report detailing how tax money is spent in each district.	2	Administrator, Treasurer	Low	
74	Requiring screening of commercial uses, outdoor storage and mechanical areas.	2	Planning Commission	Low	
75	Establish signage standards.	2	Planning Commission	Low	
76	Implement the Regional Hazard Mitigation Plan.	2	Emergency Services, Sheriff's Department	Mod	
77	Seek a productive use of the Carter Building, maintaining its integrity as a Historic Structure.	2	Economic Development	Low	
PRIORITY 3					
78	Establish standards to support development of bed and breakfast inns.	3	Planning Commission, Economic Development	Low	
79	Establish standards to support development of high quality campgrounds for tents and RV's.	3	Planning Commission, Economic Development	Low	
80	Coordinate with Grayson County and the City of Galax to investigate the feasibility of integrating the City School System into each County's system.	3	School District	Low/Mod	

Strategy Number	Strategy	Priority	Responsible Party	Budgetary Impact	Capital Item
81	Seek funding for a program for grant and loan assistance for first time homebuyers.	3	Economic Development	Low/Mod	
82	Coordinate with the Mount Rogers Planning District Commission to study of all the subdivisions in the County that have non- state maintained roads to determine the miles of unpaved streets in the county and the number of housing units in these developments that appear to be occupied permanently.	3	Planning Commission, PSA	Low	
83	Contract with the State to catalogue structures and places of Historical and Archeological significance in the County.	3	Economic Development, Planning Commission	Mod	
84	Develop a plan to address vacant properties by using or razing them.	3	Planning Commission, Health Department	Low	
85	Establish standards for walking paths and sidewalks in subdivision and improvement standards.	3	Planning Commission, Recreation Department	Low	
86	Stripe bike lanes on appropriate existing roads.	3	PSA, Recreation Department	Mod	
87	Map suitable bike routes and include in right-of-way acquisition.	3	Recreation Department, PSA, GIS	Low	
88	Establish and enforce leash laws.	3	Administration, Animal Control	Low	
89	Establish standards and outreach programs to protect the Crooked Creek watershed from inappropriate development.	3	Planning Commission, Extension Office	Low	
90	Establish standards for outdoor lighting to minimize light pollution.	3	Planning Commission	Low	
91	Prepare a plan for the improvement of secondary roads in the county with special emphasis on designation as a scenic by-way, with construction of a bike lane on each shoulder.	3	PSA, Recreation Department	Low	
92	Prepare a plan for the installation of guard rails on secondary roads with special emphasis on safety.	3	PSA	Low	

Strategy Number	Strategy	Priority	Responsible Party	Budgetary Impact	Capital Item
93	Establish a program to pave more gravel roads, especially those near main arteries.	3	PSA	High	✓
94	Provide more buses to transport low income, elderly and disabled residents to critical locations.	3	Administrator	Mod/High	
95	Support (non-financial) the construction of Route 94 from east of Fries to Galax across the low-water bridge.	3	Economic Development, PSA	Low	✓
96	Support (non-financial) the construction of a container loading facility in Wythe County.	3	Economic Development, PSA	Low	✓
97	Purchase land adjacent to the interchanges at Fancy Gap and the airport for future industrial development and construct access roads.	3	Economic Development, PSA, Industrial Development Authority	High	✓
98	Establish a planned right-of-way map	3	PSA, GIS	Low	
99	Pursue funding necessary to complete the construction of U. S. Route 58 from Patrick County to I-77 in Carroll County.	3	Economic Development, PSA	High	✓

[i] Source: Cultural Resource Management, National Park Service, U.S. Department of the Interior
[ii] Trust for Public Land, Economic Benefits of Parks and Open Space 10 (1999) *available at* www.tpl.com.
[iii] *Id.* at 15.
[iv] Source: U.S. Census
[v] Source: Research and Training on Disability in Rural Communities (RTC Rural); University of Montana
[vi] Source: Concrete Change Organization
[vii] Source: http://www.thewiredroad.net/.
[viii] Source: Virginia Department of Transportation; http://www.virginiadot.org/projects/salem/route_58_widening.asp.
[ix] Source: *Facility Survey of Carroll County Secondary Schools*; May 2008.

taken corrective action within 15 days to eliminate the conditions which have caused, or create the probability of causing, damage to his property.

D. In addition to any criminal penalties provided under this chapter, any person who violates any provision of this chapter may be liable to Carroll County in a civil action for damages.

E. Without limiting the remedies which may be obtained in this section, any person violating or failing, neglecting, or refusing to obey any injunction, mandamus or other remedy obtained pursuant to this section shall be subject, in the discretion of the court, to a civil penalty not to exceed $2,000 for each violation. A civil action for such violation or failure may be brought by the County of Carroll. Any civil penalties assessed by a court shall be paid into the treasury of Carroll County, except that where the violator is the locality itself, or its agent, the court shall direct the penalty to be paid into the state treasury.

F. With the consent of any person who has violated or failed, neglected or refused to obey any regulation or condition of a permit or any provision of this chapter, the County of Carroll may provide for the payment of civil charges for violations in specific sums, not to exceed the limit specified in Subsection E of this section. Such civil charges shall be instead of any appropriate civil penalty which could be imposed under Subsection E.

G. The Commonwealth's Attorney shall, upon request of the County of Carroll or the plan-approving authority, take legal action to enforce the provisions of this chapter.

H. Compliance with the provisions of this chapter shall be prima facie evidence in any legal or equitable proceeding for damages caused by erosion, siltation or sedimentation that all requirements of law have been met, and the complaining party must show negligence in order to recover any damages.

§ 120-8. Appeals.

Any applicant under the provision of this chapter who is aggrieved by any final decision of the Carroll County Erosion and Sediment Control Program Administrator may seek review by the Carroll County Circuit Court, in accordance with Code of Virginia, § 62.1-44.15:62(A), provided an appeal is filed within 30 days from the date of any written decision adversely affecting the rights, duties, or privileges of the person engaging in or proposing to engage in land-disturbing activities.

Chapter 126

FLOOD HAZARD REDUCTION

[HISTORY: Adopted by the Board of Supervisors of Carroll County 7-14-2008. Amendments noted where applicable.]

GENERAL REFERENCES

Erosion and sediment control — See Ch. 120.
Sewers — See Ch. 190.
Subdivision of land — See Ch. 216.
Water — See Ch. 235.

§ 126-1. Purpose; applicability.

A. Purpose. The purpose of this chapter is to prevent the loss of property and life, the creation of health and safety hazards, the disruption of commerce and governmental services, the extraordinary and unnecessary expenditure of public funds for flood protection and relief, and the impairment of the tax base by:

(1) Regulating uses, activities, and development which, acting alone or in combination with other existing or future uses, activities and development, will cause unacceptable increases in flood heights, velocities and frequencies;

(2) Restricting or prohibiting certain uses, activities and development from locating within areas subject to flooding;

(3) Requiring all such uses, activities and development that do occur in flood-prone areas to be protected and/or floodproofed against flooding and flood damage; and

(4) Protecting individuals from buying land and structures which are unsuited for intended purposes because of flood hazards.

B. Applicability. The provisions of this chapter shall apply to all lands within the unincorporated jurisdiction of the County and identified as being within the one-hundred-year floodplain by the Federal Insurance Administration.

C. Implication. The degree of flood protection sought by the provisions of this chapter is considered reasonable for regulatory purposes and is based on acceptable engineering methods of study. Larger floods may occur on rare occasions. Flood heights may be increased by man-made or natural causes, such as ice jams and bridge openings restricted by debris. This chapter does not imply that areas outside the floodplain, or that uses not prohibited within the floodplain, will be free from flooding or flood damages.

§ 126-2. Word usage; definitions.

A. For the purpose of this chapter, certain words and terms used herein shall be interpreted or defined as follows: Words used in the present tense shall include the future; words in the singular number include the plural number, unless the natural construction of the word indicates otherwise; the word "shall" is mandatory and directory; the word "may" is discretionary; words in the masculine gender include words in the feminine and neuter genders; and references to this chapter include all ordinances amending or supplementing this chapter. **[Amended 11-14-2013]**

B. The following words, terms and phrases, when used in this chapter, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

AGENT — The individual charged with the responsibility to administer and enforce this chapter and to perform the duties outlined in this chapter.

BASE FLOOD — The flood having a one-percent chance of being equaled or exceeded in any given year.

BASE FLOOD ELEVATION — The Federal Emergency Management Agency designated one-hundred-year floodwater surface elevation.

BASEMENT — Any area of the building having its floor subgrade (below ground level) on all sides.

BREAKAWAY WALL — A wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system.

DEVELOPMENT — Any man-made change to improved or unimproved real estate, including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

ELEVATED BUILDINGS — A nonbasement building built to have the lowest floor elevated above the ground level by means of fill, solid foundation perimeter walls, pilings, or columns (posts and piers).

ENCROACHMENT — The advance or infringement of uses, plant growth, fill, excavation, buildings, permanent structures or development into a floodplain, which may impede or alter the flow capacity of a floodplain.

EXISTING MANUFACTURED HOME PARK OR SUBDIVISION — A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the initial floodplain management regulations adopted by the County.

EXPANSION TO AN EXISTING MANUFACTURED HOME PARK OR SUBDIVISION — The preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or pouring of concrete pads).

FLOOD or FLOODING —

(1) A general or temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal water or the unusual and rapid accumulation or runoff of surface waters from any source.

(2) The collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by and unanticipated force of nature such as flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in Subsection (1) of this definition.

FLOODPLAIN or FLOOD-PRONE AREA — Any land area susceptible to being flooded by water from any source.

FLOODWAY — The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

FREEBOARD — A factor of safety usually expressed in feet above a flood level for

purposes of floodplain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization in the watershed.

HISTORIC STRUCTURE — Any structure that is:

(1) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;

(2) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;

(3) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or

(4) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either by an approved state program as determined by the Secretary of the Interior or directly by the Secretary of the Interior in states without approved programs.

LOWEST FLOOR — The lowest floor of the lowest enclosed area (including basement). An unfinished or flood-resistant enclosure usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable nonelevation design requirements of Federal Code 44 CFR 60.3.

MANUFACTURED HOME — A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. For floodplain management purposes, the term "manufactured home" also includes park trailers, travel trailers, and other similar vehicles placed on a site for greater than 180 consecutive days.

MANUFACTURED HOME PARK OR SUBDIVISION — A parcel (or contiguous parcels) of land divided into two or more manufactured home lots for sale or rent.

NEW CONSTRUCTION — For the purposes of determining insurance rates, structures for which the start of construction commenced on or after the effective date of an initial Flood Insurance Rate Map or on or after December 31, 1974, whichever is later, and includes any subsequent improvements to such structures. For floodplain management purposes, "new construction" means structures for which the start of construction commenced on or after the effective date of the initial floodplain management regulation adopted by the County and includes any subsequent improvements to such structures.

NEW MANUFACTURED HOME PARK OR SUBDIVISION — A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of this chapter.

ONE-HUNDRED-YEAR FLOOD — A flood that, on the average, is likely to occur once every 100 years, i.e., has a one-percent chance of occurring in any given year, although the

flood may actually occur in any year.

PLANNING COMMISSION — The Carroll County Planning Commission.

RECREATIONAL VEHICLES — A vehicle which is:

(1) Built on a single chassis;

(2) Four hundred square feet or less when measured at the largest horizontal projection;

(3) Designed to be self-propelled or permanently towable by a light-duty truck; and

(4) Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel or seasonal use.

SHALLOW FLOODING AREA — A special flood hazard with base flood depths from one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and indeterminate, and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

SPECIAL FLOOD HAZARD AREA — The land in the floodplain subject to a one-percent or greater chance of being flooded in any given year.

START OF CONSTRUCTION — The date the building permit was issued, provided that actual start of construction, repair, reconstruction, rehabilitation, addition, placement, substantial improvement or other improvement was within 180 days of the permit date. The "actual start" means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation, or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling, nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the "actual start of the construction" means the first alteration of any wall, ceiling, floor or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

STRUCTURE —

(1) For floodplain management purposes, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home.

(2) For insurance purposes:

(a) A walled and roofed building, other than a gas or liquid storage tank, that is principally above ground and affixed to a permanent site, as well as a manufactured home on a permanent foundation. For insurance purposes, the term includes a building while in the course of construction, alteration or repair, but does not include building materials or supplies intended for use in such construction, alteration or repair, unless such materials or supplies are within an enclosed building on the premises;

(b) A manufactured home. A "manufactured home," also known as a "mobile home," is a structure built on a permanent chassis, transported to its site in one or more sections, and affixed to a permanent foundation; or

(c) A travel trailer without wheels built on a chassis and affixed to a permanent foundation that is regulated under the community's floodplain management and building ordinance or laws.

(3) For the latter purpose, "structure" does not mean a recreational vehicle or a park trailer or other similar vehicle, except as described in Subsection (2)(c) of this definition, or a gas or liquid storage tank.

SUBSTANTIAL DAMAGE — Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50% of the market value of the structure before the damage occurred.

SUBSTANTIAL IMPROVEMENT — Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the start of construction of the improvement. This term includes structures which have incurred substantial damage regardless of the actual repair work performed. The term does not, however, include either:

(1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living; or

(2) Any alteration of an historic structure, provided that the alteration will not preclude the structure's continued designation as an historic structure.

WATERCOURSE — A lake, river, creek, stream, wash, channel or other topographic feature on or over which waters flow at least periodically. "Watercourse" includes specifically designated areas in which substantial flood damage may occur.

§ 126-3. Compliance; liability; severability; violations and penalties; agent.

A. Compliance and liability.

(1) Compliance with chapter. After the effective date of the ordinance from which this chapter is derived, no land shall be developed, and no structure shall be located, relocated, enlarged, or structurally altered, except in full compliance with the terms and provisions of this chapter and of any other applicable ordinances and regulations which apply to uses within the jurisdiction of this chapter.

(2) Liability of County. This chapter shall not create liability on the part of the County or of any officer or employee thereof for any flood damages that result from reliance on this chapter or any administrative decision lawfully made under this chapter.

B. Abrogation and greater restrictions. This chapter supersedes any ordinance currently in effect in flood-prone areas. However, any underlying ordinance shall remain in full force and effect to the extent that its provisions are more restrictive than this chapter.

C. Severability. If any section, subsection, paragraph, sentence, clause or phrase of this chapter shall be declared invalid for any reason whatever, such decision shall not affect the remaining portions of this chapter. The remaining portions shall continue in full force and effect, and for this purpose, the provisions of this chapter are hereby declared to be severable.

D. Violations.

(1) Misdemeanor. A violation of any provision of this chapter or of any lawful order or direction of the agent or any other authorized employee of the County given pursuant to this chapter shall continue a Class 1 misdemeanor.

(2) Other remedies. In addition to the penalties in Subsection D(1) of this section, all other actions are hereby reserved, including an action in equity for the proper enforcement of this chapter. The imposition of a fine or penalty for any violation of, or noncompliance with, this chapter shall not excuse the violation or noncompliance or permit it to continue, and the person responsible therefor shall be required to correct or remedy such violation or noncompliance within a reasonable time. Any structure constructed, reconstructed, enlarged, altered or relocated in noncompliance with this chapter may be declared by the Board of Supervisors to be a public nuisance and abatable as such. Flood insurance may be withheld from structures constructed in violation of this chapter.

E. Agent.

(1) Agent designated. The County Administrator is hereby designated as the agent for purposes of this chapter.

(2) Agent may delegate. The agent may request assistance from any department, agency, or staff member of the County in performing the duties assigned by this chapter and may delegate to them such tasks as the agent deems reasonable to ensure the orderly and timely administration of this chapter. The agent shall in all cases retain final authority in matters granted by this chapter.

§ 126-4. Floodplain districts.

A. Basis of Districts, one-hundred-year floodplain. The various floodplain districts referenced in this section include areas subject to inundation by waters of the one-hundred-year flood. The basis for the delineation of such districts shall be the Flood Insurance Rate Maps (FIRMs) for Carroll County, prepared by the Federal Emergency Management Agency, Federal Insurance Administration, dated August 28, 2008, as amended, in which the boundaries of the floodplain districts are shown on the Flood Insurance Rate Maps which are declared to be part of this chapter and shall be kept on file at the office of the County Administrator.

B. Floodway District. The Floodway District is delineated, for purposes of this chapter, using the criteria that certain areas within the one-hundred-year floodplain must be capable of carrying the waters of the one-hundred-year flood without increasing the water surface elevation of such flood more than one foot at any point. The areas included in this delineation are specially defined in Table 01P on Map No. 51035C0245, Profiles and "Summary of Discharges" table are included on this map panel. No FEMA Flood Insurance Study (FIS) was prepared for Carroll County.

C. Special Floodplain District. The Special Floodplain District shall be those areas identified as an AE Zone on the maps accompanying the Flood Insurance Study for which one-hundred-year-flood elevations have been provided.

D. Approximated Floodplain District. The Approximated Floodplain District shall be that

floodplain area for which no detailed flood profiles or elevations are provided, but where a one-hundred-year floodplain boundary has been approximated. Such areas are shown on the Flood Insurance Rate Map and identified as an A or an A99 Zone.

E. Shallow Flooding District. The Shallow Flooding District shall be those areas identified as Zone AO or AH on the maps accompanying the Flood Insurance Study.

F. Map of floodplain boundaries. The boundaries of the special flood hazard area and the floodplain districts are established as shown on the Flood Boundary and Floodway Map and/or Flood Insurance Rate Map, which is hereby declared to be a part of this chapter. An accurate copy of the map shall be kept on file at the agent's office.

G. District boundary changes. The delineation of any of the floodplain districts may be changed by the Board of Supervisors where natural or man-made changes have occurred and/or where more detailed studies have been conducted or undertaken by the United States Army Corps of Engineers or by another qualified agency or individual. Such studies shall document the need for such change. Prior to any such change, approval must be obtained from the Federal Insurance Administration.

H. Interpretation of district boundaries. Initial interpretations of the boundaries of the floodplain districts shall be made by the agent. Should a dispute arise concerning the boundaries of any of the districts, the Planning Commission shall recommend, and the Board of Supervisors shall make, the necessary determination. The person questioning or contesting the location of the district boundary shall be given a reasonable opportunity to present his case in a hearing before the Planning Commission and the Board of Supervisors and to submit appropriate technical evidence if so desired. The procedure for such hearing shall be the same as that specified for the hearing of exceptions under this chapter.

§ 126-5. Development and use requirements.

A. Floodplain permit required. All uses, activities and development occurring within any floodplain district shall be undertaken only upon the issuance of a floodplain permit.

(1) Criteria for permit. Such permit shall be issued by the agent only upon demonstration that the applicant plans to proceed in strict compliance with the provisions of this chapter and with all other applicable codes and ordinances, such as the Virginia Statewide Uniform Building Code and Chapter 216 of this Code. Prior to the issuance of any such permit, the agent shall require all applications to include evidence of compliance with all applicable state and federal laws.

(2) Information required. All applications for floodplain permits in the floodplain districts shall require the following information to be submitted to the agent:

(a) The elevation of the lowest floor (including basement). For structures that have been elevated, the elevation of the lowest floor (including basement) shall include a two-foot (twenty-four-inch) freeboard elevation above the base flood elevation;

(b) For structures to be floodproofed, or that have been floodproofed (nonresidential only), the elevation to which the structure has been floodproofed. Such floodproofing shall render the building components below the elevation corresponding to the base flood elevation, plus two feet above, watertight with

walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. A registered professional engineer or architect shall certify that the standards of this subsection are satisfied;

(c) The elevation of the base flood at the site;

(d) Topographic information showing existing and proposed ground elevations.

(3) Issuance of permit. Upon demonstration by the applicant that the criteria of this chapter have been complied with, the agent shall issue a floodplain permit. Such permit shall authorize only the specific activities stated in the application for the permit. Any modifications or additions to the permitted activity shall require issuance of a new floodplain permit under the provisions of this chapter.

(4) Time limit for floodplain permits if no development activity authorized by the floodplain permits. If no development activity authorized by the floodplain permit has been commenced within one year from the date of issuance of the permit, such permit shall thereupon be rendered void.

B. Other permits.

(1) State and federal approval required. Prior to any proposed alteration or relocation of any channels or of any watercourse, stream, or the like within the County, approval shall be obtained from the Division of Dam Safety and Floodplain Management (Department of Conservation and Recreation) and the Federal Insurance Administration.

(2) Additional permits may be required. A permit from the United States Army Corps of Engineers and the Marine Resources Commission and certification from the Virginia Department of Environmental Quality may be necessary (a joint permit application is available from any one of these organizations).

(3) Local permits may be required. In addition to the floodplain permit, any applicable additional permit (e.g., a building permit) required by the County shall be obtained prior to commencement of work.

C. Notification of other parties. Further notification of the proposal shall be provided by the property owner or developer to all affected adjacent jurisdictions. Copies of such notifications shall be provided to the Division of Dam Safety and Floodplain Management (Department of Conservation and Recreation) and Federal Insurance Administration.

D. Watercourse carrying capacity not to be impaired. Under no circumstances shall any use, activity or development in a floodplain district adversely affect the capacity of the channels or floodways of any watercourse, drainage ditch or any other drainage facility or system.

E. Manufactured home placement.

(1) When new construction standards applicable. For special flood hazard areas, each and every manufactured home placed, or substantially improved, on individual lots or parcels, in expansions to existing manufactured home parks or subdivisions, in a new manufactured home park or subdivision or in an existing manufactured home park or subdivision on which a manufactured home has incurred substantial damage as the

result of a flood, must meet all the requirements for new construction, including the elevation and anchoring requirements in §§ 126-6 and 126-7 of this chapter, as well as any and all applicable regulations currently in effect or hereafter adopted regulating the use, placement or construction of manufactured homes.

(2) Existing manufactured home parks. In addition to the requirements of any and all applicable regulations currently in effect or hereafter adopted regulating the use, placement or construction of manufactured homes, all manufactured homes placed or substantially improved in an existing manufactured home park or subdivision in which a manufactured home has not incurred substantial damage as the result of a flood shall be elevated so that either the lowest floor of the manufactured home is elevated no lower than two feet above the base flood elevation or the manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and shall be securely anchored to the adequately anchored foundation system to resist flotation, collapse and lateral movement.

(3) Foundation and anchoring required. All manufactured homes to be placed or substantially improved within any floodplain districts shall be placed on a permanent foundation and elevated and anchored in accordance with the Virginia Uniform Statewide Building Code to prevent collapse, flotation or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This standard shall be in addition to and consistent with applicable state requirements for resisting wind forces.

(4) Manufactured home prohibited in floodways. The placement of any manufactured home within any floodway district is specifically prohibited, except in an existing manufactured home park or subdivision. This section shall not be deemed to require the removal of any such manufactured home lawfully constructed or located thereon prior to the enactment of this chapter. A replacement manufactured home may be placed on a lot in an existing manufactured home park or subdivision, provided the anchoring, elevation, and encroachment standards are met.

F. Recreational vehicles. Recreational vehicles shall either be on site for fewer than 180 consecutive days, be fully licensed and ready for highway use, or meet the permit requirement for placement and the elevation and anchoring requirements for manufactured homes as stated above. A replacement vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick-disconnect-type utilities and security devices and has no permanently attached additions.

G. Floodway District development. In the Floodway District, no development shall be permitted except where the effect of such development on flood heights is fully offset by accompanying improvements which have been approved by all appropriate authorities. Encroachments, including fill, new construction, substantial improvements, and other developments are prohibited unless certification (with supporting technical data) by a registered professional engineer is provided demonstrating that encroachments shall not result in any increase in flood levels during occurrence of the base flood. Development activities which increase the water surface elevation of the base flood may be allowed, provided that the applicant first applies, with the County's endorsement, for a conditional Flood Insurance Rate Map and floodway revision and receives the approval of the Federal Emergency Management Agency. All new construction and substantial improvements shall

comply with all applicable flood hazard reduction provisions of this chapter and the applicable provisions of the Virginia Uniform Statewide Building Code.

H. Special Floodplain District development. Until a regulatory floodway is designated, no new construction, substantial improvements, or other development (including fill) shall be permitted within the areas of special flood hazard (Zones A1-30 and AE) on the Flood Insurance Rate Map, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the County. Development activities in Zones A1-30 and AE which increase the water surface elevation of the base flood may be allowed, provided that the applicant applies, with the County's endorsement, for a conditional Flood Insurance Rate Map and floodway revision, and receives the approval of the Federal Emergency Management Agency.

I. Approximated Floodplain District development. In the Approximated Floodplain District, the development and/or use of land shall be permitted in accordance with the provisions of this chapter, provided that all such uses, activities, and/or development shall be undertaken in strict compliance with floodproofing and related provisions contained in the Virginia Uniform Statewide Building Code and all other applicable codes and ordinances.

(1) Applicant to delineate floodway. Within the Approximated Floodplain District, the applicant shall also delineate a floodway area based on the requirement that all existing and anticipated future development not increase the one-hundred-year-flood elevation more than one foot at any given point within the County. The engineering principle "equal reduction of conveyance" shall be used to make the determination of increased flood heights.

(2) Approximated floodway area development. Within the floodway area delineated by the applicant, no development shall be permitted except where the effect of such development on flood heights is fully offset by accompanying improvements which have been approved by all appropriate authorities.

(3) When base flood elevation data or floodway data have not been provided, the agent shall, in administering the provisions of this chapter, obtain and reasonably utilize any base flood elevation and floodway data available from a federal, state, or any other reliable source. When such base flood elevation data is utilized, the agent shall obtain the elevation (in relation to the mean sea level) of the lowest floor (including the basement) of all new and substantially improved structures and, if the structure has been floodproofed in accordance with the requirements of this chapter, the elevation in relation to mean sea level to which the structure has been floodproofed. When the data is not available from any such source, the lowest floor of the structure shall be elevated to no lower than two feet above the highest adjacent grade.

J. Shallow Flooding District development. The following provisions shall apply within the Shallow Flooding District:

(1) All new construction and substantial improvements of residential structures shall have the lowest floor, including basement, elevated to or above the flood depth specified on the Flood Insurance Rate Map, above the highest adjacent grade. If no flood depth number is specified, the lowest floor, including basement, shall be elevated to no less than two feet above the highest adjacent grade or, together with attendant utility and sanitary facilities, be completely floodproofed to the specified flood level so that any

space below that level is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. Adequate drainage paths around structures on slopes shall be provided to guide floodwaters around and away from proposed structures.

K. Standards for subdivision proposals:

(1) All subdivision proposals shall be consistent with the need to minimize flood damage;

(2) All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage;

(3) All subdivision proposals shall have adequate drainage provided to reduce exposure to flood hazards; and

(4) Base flood elevation data shall be provided for subdivision proposals and other proposals for development (including manufactured home parks and subdivisions) that exceed 50 lots or five acres, whichever is the lesser.

§ 126-6. Construction and design standards.

A. Compliance with Statewide Building Code. New construction and substantial improvements shall be according to the Virginia Uniform Statewide Building Code and anchored to prevent flotation, collapse or lateral movement of the structure. Such new construction or substantial improvements shall be constructed with materials and utility equipment resistant to flood damage and shall utilize construction methods and practices that minimize flood damage.

B. Sanitary sewer facilities. All new or replacement sanitary sewer facilities and private package sewage treatment plants (including all pumping stations and collector systems) in any floodplain district shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the systems into the floodwaters. In addition, all such facilities, including on-site waste disposal systems, shall be located and constructed to minimize or eliminate flood damage, contamination and impairment during flooding.

C. Water facilities. All new or replacement water facilities in any floodplain district shall be designed to minimize or eliminate infiltration of floodwaters into the system and shall be located and constructed to minimize or eliminate flood damage and impairment.

D. Drainage facilities. All storm drainage facilities in any floodplain district shall be designed to convey the flow of surface waters away from buildings and on-site waste disposal sites. The Board of Supervisors may require a primarily underground system to accommodate frequent floods and a secondary surface system to accommodate larger, less frequent floods. Drainage plans shall be consistent with any local and regional drainage plans. The facilities shall be designed to prevent the discharge of excess runoff onto adjacent properties.

E. Utilities. All electrical, heating, ventilation, plumbing, and air-conditioning equipment and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

F. Streets and sidewalks. Streets and other thoroughfares and sidewalks shall be designed to

minimize their potential for increasing and aggravating the levels of flood flow. Any drainage openings shall be required to sufficiently discharge flood flows without unduly increasing flood heights.

G. Compliance with standards for new construction. Any alteration, repair, reconstruction or improvements to a building that is in compliance with the provisions of this chapter must meet the requirements of new construction as contained in this chapter. Any alteration, repair, reconstruction or improvements to a building that is not in compliance with the provisions of this chapter shall be undertaken only if said nonconformity is not furthered, extended or replaced.

§ 126-7. Elevation and floodproofing standards.

In all special flood hazard areas where base flood elevations have been provided in the Flood Insurance Study or generated according to § 126-5G of this chapter, the following provisions shall apply:

A. Residential construction. New construction or substantial improvement of any residential structure (including manufactured homes) shall have the lowest floor, including basement, elevated no lower than two feet above the base flood elevation.

B. Nonresidential construction. New construction or substantial improvement of any commercial, industrial, or nonresidential building (or manufactured home) shall have the lowest floor, including basement, elevated to no lower than two feet above the base flood elevation. Buildings located in all A1-30, AE, and AH Zones may be floodproofed in lieu of being elevated, provided that all areas of the building components below the elevation corresponding to the base flood elevation, plus two feet, are watertight, with walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy. A registered professional engineer or architect shall certify that the standards of this subsection are satisfied.

C. Elevated buildings. Enclosed areas of new construction or substantially improved structures which are below the regulatory flood-protection elevation shall:

(1) Not be designed or used for human habitation, but shall only be used for parking of vehicles, building access, or limited storage of maintenance equipment used in connection with the premises. Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage of maintenance equipment (standard exterior door) or entry to the living area (stairway or elevator). The interior portion of such enclosed area shall not be partitioned or finished into separate rooms, except to an enclosed storage area;

(2) Be constructed entirely of flood-resistant materials below the regulatory flood protection elevation;[9]

(3) Include, in Zones A, AO, AE, and A1-30, measures to automatically equalize hydrostatic flood forces in walls by allowing for the entry and exit of floodwaters. To meet this requirement, the openings must be either be certified by a professional

9. **Editor's Note: Original Subsection C(3), pertaining to the Coastal High Hazard District, which immediately followed this subsection, was repealed 11-14-2013.**

engineer or architect or meet the following minimum design criteria:

(a) Provide a minimum of two openings on different sides of each enclosed area subject to flooding.

(b) The total net area of all openings must be at least one square inch for each square foot of enclosed area subject to flooding.

(c) If a building has more than one enclosed area, each area must have openings to allow floodwaters to automatically enter and exit.

(d) The bottom of all required openings shall be no higher than one foot above the adjacent grade.

(e) Openings may be equipped with screens, louvers, or other opening coverings or devices, provided they permit the automatic flow of floodwaters in both directions.

(f) Foundation enclosures made of flexible skirting are not considered enclosures for regulatory purposes and, therefore, do not require openings. Masonry or wood underpinning, regardless of structural status, is considered an enclosure and requires openings as outlined above.

§ 126-8. Appeals; exceptions.

A. Right of appeal or exception. Whenever any person is aggrieved by a decision of the agent with respect to the provisions of this chapter, it shall be the right of that person to appeal to the Planning Commission and the Board. The Planning Commission shall hear such appeal and recommend action to the Board of Supervisors, and the Board of Supervisors shall hear and finally decide such appeal. **[Amended 11-14-2013]**

B. Procedure for exceptions.

(1) Applicant to file appeal. Such appeal shall be filed, in writing, within 30 days after the determination by the agent.

(2) Joint hearing may be held. If all parties to the appeal assent, a joint meeting with both the Planning Commission and the Board of Supervisors may be held to hear the appeal. If one or more parties fail to give such assent, or if the Board of Supervisors and/or Planning Commission fails to agree upon a joint hearing, the separate hearing procedure outlined in Subsection B(3) of this section shall be observed. If a joint meeting is held, the following procedure shall be observed:

(a) Joint hearing procedure. The Board of Supervisors shall set a time and place for the purpose of hearing the appeal jointly with the Planning Commission. Such joint hearing shall not be less than 10 nor more than 65 days from the date of the agent's receipt of the appeal. Notice of the time and place of the hearing shall be given to all parties. Such hearing shall be public, and the appellant, the appellant's representative, the agent, and any other person whose interest may be affected by the matter on appeal shall be given an opportunity to be heard.

(b) Joint hearing decisions. Following the close of the joint hearing, the Planning Commission shall vote to recommend that the Board of Supervisors approve,

approve with specified conditions, or disapprove the exception. Such recommendation may be written or oral. Upon receipt of such recommendation, the Board of Supervisors shall vote to approve with conditions or disapprove the exception as it judges proper according to the criteria outlined in Subsection C of this section. Such decision by the Board of Supervisors shall be written, as provided in this section. Copies of such decision shall be provided to the agent and to the appellant and to other interested parties to the appeal. **[Amended 11-14-2013]**

(c) Timing of joint hearing decisions. The Planning Commission's recommendation and the Board of Supervisors' decision shall both be rendered during the same meeting at which the hearing is held, unless either body votes to delay a decision. If either body votes, not more than 65 days shall elapse before decisions shall be rendered by both the Planning Commission and the Board of Supervisors. Variances may be issued for the repair and rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as an historic structure.

(3) Separate hearings may be held. If the above conditions for a joint hearing are not met, the following procedure for separate hearings shall be observed:

(a) Planning Commission to hear appeal. Upon receipt of the appeal, the Planning Commission shall set a time and place for the purpose of hearing the appeal, which shall be not less than 10 nor more than 35 days from the date of the agent's receipt of the appeal. Notice of the time and place of the hearing shall be given to all parties. Such hearing shall be public, and the appellant, the appellant's representative, the agent, and any other person whose interest may be affected by the manner on appeal shall be given an opportunity to be heard.

(b) Recommendation of Planning Commission. The Planning Commission shall hear the appeal and shall vote to recommend that the Board of Supervisors approve, approve with specified conditions, or disapprove the exception as it judges proper according to the criteria outlined in Subsection C of this section. The Planning Commission shall render such recommendation, in writing, within 45 days following the hearing. Copies of such recommendation shall be provided to the agent and to the appellant and to other interested parties to the appeal.

(c) Board to hear appeal. Upon receipt of the Planning Commission's recommendation, the Board of Supervisors shall set a time and place for the purpose of hearing the appeal, which shall be not less than 10 nor more than 35 days from the date of receipt of the recommendation. Notice of the time and place of the hearing shall be given to all parties. Such hearing shall be public, and the appellant, the appellant's representative, the agent, and any other person whose interest may be affected by the matter on appeal shall be given an opportunity to be heard.

(d) Decision of Board of Supervisors. The Board of Supervisors shall hear the appeal and shall vote to approve, approve with conditions, or disapprove the exception as it judges proper according to the criteria outlined in Subsection C of this section. The Board shall render such hearing. Copies of such decision

shall be provided to the agent and to the appellant and to other interested parties to the appeal. The determination of the Board of Supervisors shall be final.

C. Criteria for decisions on exceptions. In passing upon appeals for exceptions under this chapter, the Planning Commission and the Board of Supervisors shall consider all relevant factors and procedures specified elsewhere in this chapter. In addition, the Planning Commission and the Board of Supervisors shall consider the following factors:

(1) The danger to life and property due to increased flood heights or velocities caused by encroachments;

(2) The danger that materials may be swept onto other lands or downstream to the injury of others;

(3) The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination or unsanitary conditions;

(4) The susceptibility of the proposed facility and its contents to flood damage and the effects of such damage on individual owners;

(5) The importance of the services provided by such facility to the community;

(6) The requirements of the facility for a waterfront location;

(7) The availability of alternative locations not subject to flooding for the proposed use;

(8) The compatibility of the proposed use with existing development and development anticipated in the foreseeable future;

(9) The relationship of the proposed use to the County Comprehensive Plan and to the floodplain management program for the area, if any;

(10) The safety of access by ordinary and emergency vehicles to the property in time of flood;

(11) The expected heights, velocity, duration, rate of rise, and sediment transport of the floodwaters expected at the site;

(12) The repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as an historic structure and the exception is the minimum necessary to preserve the historic character and design of the structure;

(13) The showing of good and sufficient cause for the exception;

(14) Any such other factors which are relevant to the purpose of this chapter.

D. Board may consult expert opinion. The Planning Commission and/or the Board of Supervisors may refer any application and accompanying documentation pertaining to an appeal for exception under this section to any engineer or other qualified person or agency for technical assistance in evaluating the proposed project's impacts on flood heights and velocities, the adequacy of plans for protection, and other related matters.

E. Findings by the Board of Supervisors.

(1) Exceptions under this section shall be issued only upon a finding of the Board of Supervisors that the approval of such exception will not result in:

(a) Unacceptable or prohibited increase in flood heights;

(b) Additional threats to public safety;

(c) Extraordinary public expense;

(d) The creation of nuisances;

(e) Fraud or victimization of the public;

(f) Conflict with local ordinances.

(2) In addition, the Board of Supervisors shall approve only such exception as will be the minimum required to provide relief from hardship to the applicant.

F. Restrictions on floodway exceptions. No exception shall be approved for any proposed use, development or activity within any floodway district, except where the effect of such development on flood heights is fully offset by accompanying improvements which have been approved by all appropriate authorities, as required in Subsection E of this section. Under no circumstances shall an exception be approved for any floodway district which will cause any increase in the one-hundred-year-flood elevation.

G. Applicant to be notified. The Board of Supervisors shall notify the applicant for an exception, in writing, that the issuance of such exception to construct a structure below the one-hundred-year-flood elevation increases risks to life and property and will result increased premium rates for flood insurance. A record of such notification, as well as all actions taken on exceptions by the Board of Supervisors, including reasons for such actions, shall be maintained by the County. Any exceptions issued shall be noted in the annual or biennial report submitted to the Federal Insurance Administrator.

§ 126-9. Existing structures and uses.

A structure or use of a structure or premises which lawfully existed on or before the effective date of the ordinance from which this chapter is derived, but which is not in conformity with the provisions of this chapter, may be continued, subject to the following conditions:

A. Existing structures in the floodway area shall not be expanded or enlarged unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practices that the expansion would not result in any increase in the base flood elevation;

B. Any modification, alteration, repair, reconstruction or improvement of any kind to a structure or use located in any floodplain district, to an extent or amount less than 50% of its market value, shall be elevated and/or floodproofed in conformity with this chapter and the applicable provisions of the Virginia Uniform Statewide Building Code;

C. The modification, alteration, repair, reconstruction, or improvement of any kind to a structure and/or use, regardless of its location in a floodplain area, to an extent or amount of 50% or more of its market value shall be undertaken only in full compliance with this chapter and shall require the entire structure to conform to the applicable provisions of the

Virginia Uniform Statewide Building Code;

D. Uses or adjuncts to uses which are, or become, nuisances shall not continue.

§ 126-10. Fees.

A. The fee for issuance of the floodplain permit under the provisions of this chapter is as set forth in the fee schedule in Appendix A to this chapter.[10]

B. The Board of Supervisors, at its discretion, may waive the fee set forth in the fee schedule in Appendix A to this chapter for the issuance of permits for nonresidential agricultural outbuildings.

Chapter 130

FORTUNE TELLERS

[HISTORY: Adopted by the Board of Supervisors of Carroll County 1-3-1962 (Ch. 95, Art. I, of the 1990 Code). Amendments noted where applicable.]

§ 130-1. License tax. [Amended 8-8-1990]

A license tax of $1,000 is imposed upon every person who, for compensation, shall pretend to tell fortunes, assume to act as a clairvoyant or practice palmistry or phrenology.

§ 130-2. Violations and penalties. [Amended 11-14-2013]

Any person found engaging in any of the above for compensation without a license shall be guilty of a Class 1 misdemeanor.

Chapter 146

LITTER CONTROL

[HISTORY: Adopted by the Board of Supervisors of Carroll County 8-8-2001. Amendments noted where applicable.]

GENERAL REFERENCES

Solid waste — See Ch. 201.

10. Editor's Note: Appendix A is on file in the County offices.

Mount Rogers Planning District's

Pre-Disaster Hazard Mitigation Plan

MOUNT ROGERS
SOUTHWEST VIRGINIA

Prepared by the Mount Rogers Planning District Commission for the Counties of Bland, Carroll, Grayson, Smyth, Washington, and Wythe, the Cities of Bristol and Galax, and the Towns of Abingdon, Chilhowie, Damascus, Fries, Glade Spring, Hillsville, Independence, Marion, Rural Retreat, Saltville, Troutdale, and Wytheville.

Funding through the Virginia Department of Emergency Management and the Federal Emergency Management Agency.

SWVA *A different side of Virginia*

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INTRODUCTION

The Mount Rogers Hazard Mitigation Plan 2017 update is a revision to the region's original plan, adopted and approved by FEMA in December 2005. In this updated plan, new data and analysis has improved the hazard identification and risk assessment used to determine mitigation strategies. All sections of this plan have been updated to include the newest information and data available. In the past five years, the participating local governments (Bland, Carroll, Grayson, Smyth, Washington, and Wythe Counties, the Cities of Bristol and Galax, and the Towns of Abingdon, Chilhowie, Damascus, Fries, Glade Spring, Hillsville, Independence, Marion, Rural Retreat, Saltville, Troutdale, and Wytheville), have participated in a yearly overview and update of the strategies and goals set forth in the original plan.

The Pre- Disaster Hazard Mitigation Update is meant to describe natural hazards and their impacts to people and property; recommend mitigations to reduce or eliminate those hazards; and outline the strategy for maintaining and updating the Plan.

This Plan addresses natural hazards of importance to the Mount Rogers Planning District region of southwest Virginia. This is a rural, mountainous region covering 2,777 square miles that stands within both the Ridge & Valley and Blue Ridge geologic provinces. This plan will focus primarily on natural hazards: dam safety, drought, earthquakes, flooding, karst & sinkholes, landslides, severe winter storms/ice, thunderstorms/lightning, tornadoes/hurricanes, wildfires and windstorms.

HAZARD MITIGATION PLANNING

The purpose of this plan is to meet the requirements set forth in the Disaster Mitigation Act 2000 (DMA 2000). The DMA 2000 requires state and local government to identify hazards, assess their risks and community vulnerability, and to describe actions to mitigate those risks and vulnerabilities. The plan is meant to be a framework for decreasing needs for post disaster funds for recovery and reconstruction through pre-disaster actions.

Adoption of the Hazard Mitigation Plan and approval from FEMA is required for localities to remain eligible to apply for the five Hazard Mitigation Assistance (HMA) Programs. They include the four annual grant programs; Pre-Disaster Mitigation Program (PDM), Flood Mitigation Assistance (FMA), Repetitive Flood Claims (RFC), and Severe Repetitive Loss (SRL) and the post-disaster Hazard Mitigation Grant Program (HMGP). Three of these programs (FMA, RFC, and SRL) are directly linked to the National Flood Insurance Program (NFIP). HMGP and PDM can also be used to fund tornado safe rooms, wildfire mitigation, etc. Adoption of this plan is also required to receive a declaration of a federal major disaster or emergency from FEMA.

There are four basic phases of emergency management: mitigation, preparedness, response, and recovery. Preparedness and mitigation measures occur prior to a disaster event. Preparedness refers to plans and strategies for efficiently handling disasters as they occur. Response and recovery occur during and after a disaster event, respectively, to return the community to normal operations as quickly as possible. Mitigation includes the long-term strategies determined to reduce risk to life and property from a disaster event.

The benefits of planning to mitigate for natural hazards include a systematic approach for identifying hazards, their risks, and strategies for minimizing those risks. In planning prior to a disaster, the high emotions and rushed environment are absent allowing a diverse group of stakeholders to collaborate to develop strategies from which the community derives the most benefits. The opportunities offered by approaching mitigation planning proactively allow local communities to shape not only post-disaster recovery, but also achieve additional community objectives, such as recreation and housing and economic development.

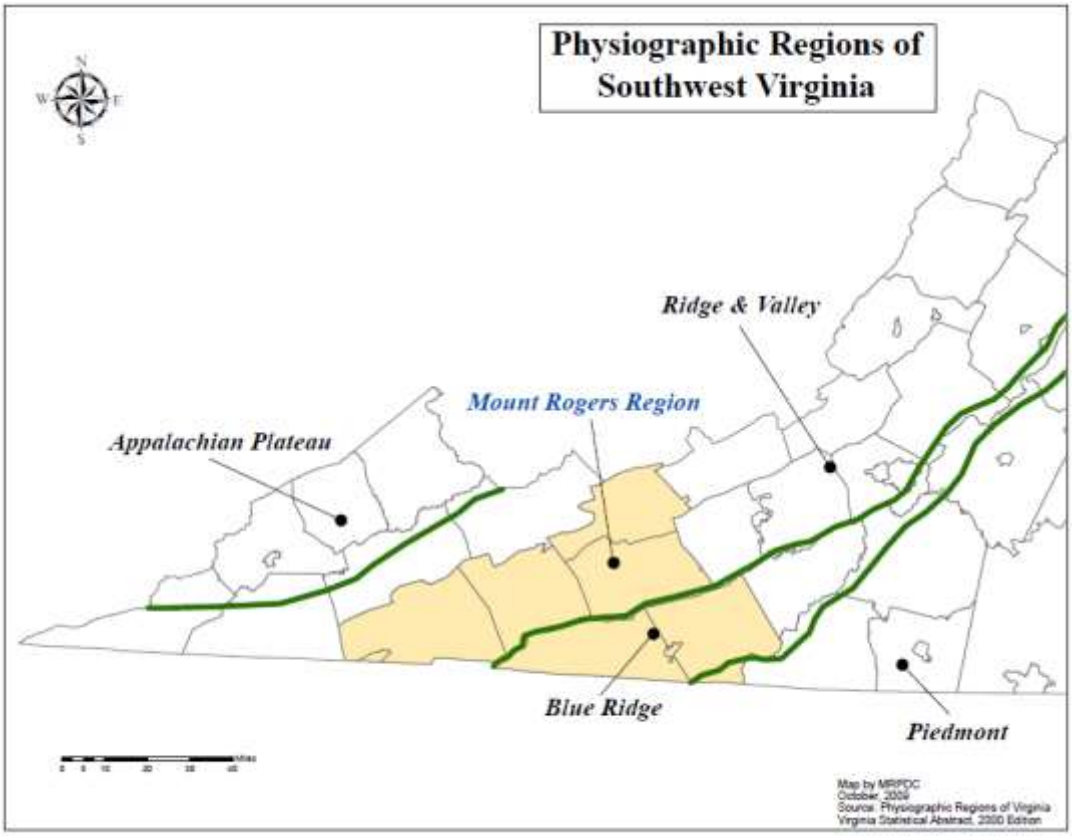
Implementation of mitigation strategies is the final step of these planning efforts. Mitigation strategies can take many forms, most commonly directed towards flooding, hurricanes, and

earthquakes, three historically catastrophic events. The true community benefits of mitigation planning are not realized until the construction or installation of these projects is completed.

Community Profile

Natural Features

The region covers 2,777 square miles and stands within both the Ridge & Valley and the Blue Ridge geologic provinces of Virginia. An image (Physiographic Regions of Southwest Virginia) is shown below.

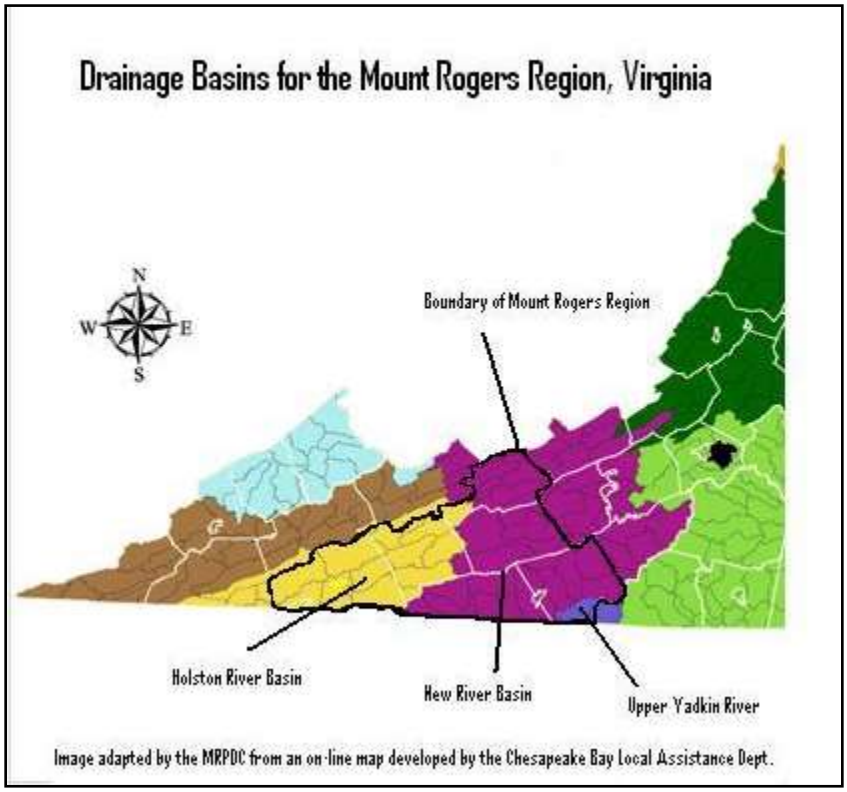


In the Ridge & Valley section, the land is characterized by valleys with low to moderate slopes underlain by carbonate rocks; this area starts in Bristol and runs in a northeasterly direction through Washington, Smyth and Wythe counties in a track toward Roanoke. Elevations generally range between 1,200 and 2,300 feet. The Blue Ridge portion generally includes Grayson and Carroll counties. The land appears as a broad upland plateau with moderate slopes. The elevations are higher, generally ranging from 2,400 to 3,000 feet, and sometimes

much higher. Mount Rogers itself, located near the junction of Grayson, Smyth and Washington counties, stands at more than 5,729 feet.

Natural Resources

The principal watersheds that drain the region include the Holston River system (including the North, South and Middle Forks), the New River, and a small portion of the Upper Yadkin River drainage as shown on the map below.



The Holston River Basin flows in a southwesterly direction to join with the Tennessee River system. The New River flows in a northerly direction into West Virginia, while the Upper Yadkin flows south into North Carolina. Much of the Mount Rogers region contains state and national forest, including the Mount Rogers National Recreation Area. The mountainous terrain generally precludes intensive development other than in the limited valley regions of the district.

Mineral resources of the region include limestone, sandstone, granite, gravel, sand, shale, iron oxide, quartzite and salt. All are actively mined, according to the state Department of Mines, Minerals and Energy. Historically important minerals in the region included coal, iron, lead, zinc,

salt, gold, and gypsum. The richer mineral resources of the west have long since replaced much of the local mining activity in the Mount Rogers region.

Temperatures and Climate

The local region stands within a temperate climate zone influenced by the mountainous nature of southwest Virginia. Temperatures range from average lows of 15° F- 25° F (in January) to average highs of 80° F- 90° F (in July). The differing elevations and lay of the land account for the range of differences in local weather. The MRPDC ranges in elevation from 5,729 feet at its highest point on Mount Rogers in western Grayson County, to 1,110 feet along Lovills Creek on the Carroll Surry County line. Local annual precipitation also is highly variable. It ranges from 62" annually in the highest mountains (Mount Rogers and surrounding area in the Blue Ridge) to 46" annually in other parts of the district. Weather patterns and climate are influenced by the Appalachian and Blue Ridge mountain ranges, the direction of airflow and the effects of the major river valleys. Weather systems typically move from west to east. Cloud systems may pass up and over the mountains. As clouds rise, their moisture content condenses and falls as rain or snow; that often results in heavy precipitation on the western slopes of the mountains and little or no precipitation on the eastern (or rain shadowed) slopes of the mountains. Weather systems and storms also may follow the river valleys, running parallel to the mountain ranges.

Political Boundaries

The Mount Rogers region, as designated by the Virginia General Assembly, includes six counties Bland, Carroll, Grayson, Smyth, Washington, and Wythe, two cities Bristol and Galax, twelve towns Abingdon, Chilhowie, Damascus, Fries, Glade Spring, Hillsville, Independence, Marion, Rural Retreat, Saltville, Troutdale, and Wytheville.

Key transportation systems within the region include the interstate highways (I- 81 and I- 77), U.S. Route 58 and U.S. Route 11, several local airports, some limited public transit service, and service from local taxicabs and Greyhound Bus Lines. The Norfolk Southern Railway is an important private hauler of freight. Passenger rail service presently is lacking in the region.

The region is variable in nature. It ranges from the very rural character of Bland County, with a population of 6,511 (a decrease of 4.6% since the last plan update) to the rapidly urbanizing character of the largest county, Washington, with a growing population of 53,789 (a decrease of 2.0% since the last plan update). Grayson and Carroll counties are known as places for

second home development, especially in areas with views of the New River. The two mid-size counties, Smyth and Wythe, with populations of roughly 30,000 each, serve as centers of commerce and manufacturing. The three largest towns, each with populations greater than 5,000, are Abingdon, Marion and Wytheville.

Population

As of 2017 the region-wide population numbered 188,498, according to the Weldon Cooper Center for Public Service at the University of Virginia. The population of the Mount Rogers Region was 193,595 as of the 2010 Census, up approximately 2.4% from the 2000 level of 188,984. Currently the region wide population has decreased 2.6%since the last census in 2010. The decline is distributed unevenly within the region. Only one locality saw a slight increase in population. This occurred in Grayson County. Bland County, Carroll County, Smyth County, Washington County, Wythe County, and the Cities of Bristol and Galax saw a slight decrease in population in the past five years since the last update of the Hazard Mitigation Plan.

Locality	2017	2012	%Population Change
Bland	6,511	6,824	-4.6%
Carroll County	29,212	30,042	-2.8%
Grayson County	15,669	15,533	0.9%
Smyth County	30,686	32,208	-4.7%
Washington County	53,789	54,876	-2.0%
Wythe County	28,723	29,235	-1.8%
City of Bristol	17,160	17,835	-3.8%
City of Galax	6,748	7,042	-4.2%
Mount Rogers Planning District	188,498	193,595	-2.6%

Source: Weldon Cooper Center for Public Service, 2012 and 2017 Population Estimates

Median family income for the region as of 2016 came to $39,655[1], which lags behind the statewide level of $66,149[1], as reported by the U.S. Census Bureau. This number reflects a 3% decrease in median household income for the Mount Rogers region over the past ten years. Incomes in the Mount Rogers region have traditionally lagged behind statewide averages, along with the region's rate of new job creation. At the same time, unemployment generally runs higher than the statewide average, reflecting disparities between the high job growth rates in northern Virginia compared against job growth rates in southwest Virginia.

[1] U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates

Ethnically, the Mount Rogers region is dominated by whites (95.4%)[2]. Of a total population of 193,595 in the region the largest significant minority populations are African American totaling 2.2%and Hispanics totaling 2.1%

Economy

Manufacturing stands as one of the key employment sectors for the Mount Rogers region, though foreign competition is undermining the sector. From 2000 through 2011, the region lost 10,000 manufacturing jobs, with the total going from 24,274, to 14,106 a decrease of 41%. By end of the third quarter of 2017, the number of manufacturing jobs had stabilized at 13,477[2], a decrease of only 4.5%over the 6-year period. The sector includes production of refrigeration and heating equipment, clothing, truck trailers and motor vehicle parts, glass products, furniture, wood products, hardware, sporting and athletic goods, and mining equipment.

The next largest employment sector falls in the government category, with 13,405[2] jobs in third quarter 2017, 8,944 in local government, 3,963 in state government, and 498 in federal government. The next highest employment by category is retail trade (10,103) and health care and social assistance (8,495).

Agriculture and forestry offer relatively few jobs but remain an important industry to the Mount Rogers region. Chief products include livestock, poultry, with a growing sector raising produce. Christmas trees, raised in the higher elevations, also are important to the region.

Planning Process

Planning Team

Since 2017 the Mount Rogers Planning District staff has been working with its localities to update the Pre-Disaster Hazard Mitigation Plan that was approved by FEMA in 2012. Between the years of 2005-2012 each year VDEM provided us with a spreadsheet outlining the recommended mitigations for each locality. The staff at Mount Rogers facilitated a yearly update of the mitigation strategies. VDEM did not provide/require this after the last plan update in 2012. This process is scheduled to start again after the 2018 adoption of the plan on a biennial basis. The hazard mitigation steering committee was composed of county

[2] Virginia Employment Commission Community Profile, 2018

administrators, town managers, emergency management personnel, local and state personnel, regional governmental employees, members of the business and public utility community, and any interested stakeholders from the public. The steering committee oversaw the plan update process as well as coordinated with local fire, rescue, and police personnel.

Planning Process

The Mount Rogers Planning District Commission initiated the plan update process in the spring of 2017. A regional kick-off meeting was held at the offices of the Mount Rogers Planning District Commission in Marion, Virginia on May 25th, 2017. At this meeting, the MRPDC and the stakeholders from the various localities reviewed the process for updating the plan, as well as outlining how the old plan would be improved upon.

The Mount Rogers staff met with the steering committee members weekly or monthly in small groups or on a one on one basis throughout the rest of the year. All members were also contacted through telephone conversations or emails. A second meeting at the Mount Rogers PDC was called on November 30th, 2017. After that meeting with representatives from VDEM and FEMA some new input was requested to be added into the plan update. Another round of meetings with each locality was conducted in December of 2017 and January of 2018, in addition with meeting with other members of the community outside of local government. Please see the table below for a listing of meetings and conversations with stakeholders.

Meetings/Conversations with Stakeholders	
Month	Stakeholder (Day of Month)
May 2017	Kickoff Meeting (25), All localities (31)
June 2017	Town of Chilhowie (1), Smyth County (2), Town of Abingdon (7), Bland County (21)
July 2017	Bland County (5), Town of Damascus (20), Bland County (24)
August 2017	Town of Damascus (10), City of Galax (24), All localities (29), Town of Marion (30)
September 2017	Grayson County (1), Town of Chilhowie (1), Town of Marion (1), Smyth County (1), Washington County (11), Smyth County (18)
October 2017	Wythe County (24), Town of Wytheville (24), Bland County (24)
November 2017	VDEM (1, 2), FEMA (2), All localities (8), FEMA (16), Washington County (27), Town of Chilhowie (27), Grayson County (28), Meeting at MRPDC (30)
December 2017	Town of Saltville (1), FEMA (4), Washington County (6), All localities (6), FEMA (11), NOAA (14, 15)
January 2018	VDEM (3), Appalachian Power (4), DCR (9, 10), City of Bristol (23), Town of Glade Spring (24)
February 2018	Emory & Henry College (7)
March 2018	VDEM (8), All localities (28), Town of Abingdon (30)

April 2018	Wythe County (2), Town of Wytheville (2), Town of Rural Retreat (2), Washington County (3), Grayson County (12)
August 2018	All localities (6)

Sign-In Sheet

Hazard Mitigation Kick-Off Meeting **May 25, 2017**

Print Name	Locality	Title	Email
BRIAN MARTIN	GLADE SPRING FRIES, TROUTDALE	TOWN MGR	BMARTIN@MRPDC.ORG
Brian Reed	RR	"	breed
Jenna Dunn	Bland County	911/Emer. Ser. Coord	jdunn@blandco.org
Everett Lineberry	Carroll Co.	EM Coordinator	elineberry@carrollcountyva.org
Retta Jackson	Hillsville	Town Manager	hillsville@townofhillsville.com
Jason Busick	Wythe CO	EM Coordinator	jbbusick@wytheco.org
Tim Estes, Sr	WASH. Co.	EM Coordinator	timestes@washcova.com
Mike Ayers	Galax	R4R Coordinator	mayers@galaxva.com
Gavin N. Blevins	Damascus	Town Manager	gblevins@mrpdc.org
Aaron T. Smith	Chilhowie	Lieutenant PD	chilhowie.smith@chilhowie.org
Brandon Moore	Bristol, VA	Lieutenant	brandon.moore@bristolva.org
Mike Armstrong	Bristol, VA	Fire Chief-EM	mike.armstrong@bristolva.org
Aaron Sizemore	MRPDC	Director	asizemore@MRPDC.org
Rocky Warren	MRPDC	Planner	RWARREN@mrpdc.org
Scott McCoy	MRPDC	Intern	smccoy14@ehc.edu
Jimmy Moss	Grayson Co.	EM Coordinator	jmoss@graysoncova.gov
James Dillon	MRPDC	GIS Dir	jdillon@mrpdc.org

Sign-In Sheet

Hazard Mitigation Meeting **November 30, 2017**

Print Name	Locality	Title	Email
[illegible]	Smyth County	EM Coordinator	CHarrington@SmythCountyVa.gov
TYLER YENCILL	ABINGDON	TOWN ENGINEER	tyencill@abingdon-va.gov
DAVE HAYNES	CHILHOWIE	FIRE CHIEF	cdhaynes2201@gmail.com
Jason Busick	Wythe County	EM Coordinator ES Director	jbbusick@wytheco.org
Justin Haga	VDEM	DRRO	justin.haga@vdem.virginia.gov
Sara Harrington	VDEM	Ast. Hazards Planner	Sara.harrington@vdem.virginia.gov
John Clark	Chilhowie	Town Manager	chilhowie.townmgr@chilhowie.org
Aaron Sizemore	MRPDC	Executive Dir	asizemore@MRPDC.org
Rocky Warren	MRPDC	Planner	RWARREN@mrpdc.org
Mari Radford	FEMA	Comp. Planning	mari.radford@fema.dhs.gov

The committee members first reviewed the existing data that was included in the last Hazard Mitigation Plan update. Throughout the 2017 Hazard Mitigation Plan Update process the materials from each section of the original plan as well as any new changes were looked over. For the most part in the past five years there were few changes the committee felt needed to be added to the updated plan due to the fact that little has changed in our region in the past five years. Focus and discussion was placed on each hazard identified to be a potential threat to the district. The committee brought in their own knowledge of any disasters that had happened in their districts within the past five years since the plan's original adoption. The committee took these ideas back to their localities and met with their local representatives in the emergency services field and gathered any additional information they could find concerning how natural disasters are dealt with, as well as any areas where the localities had vulnerabilities or difficulties in responding to disasters. All meetings were open to the public.

Following any reviews of the data gathered, the group then brainstormed mitigation objectives and strategies to include in the plan update. The final component of the committee meetings

was a capabilities and vulnerability assessment. Each member of the committee was encouraged to discuss with any person or group, or with an agency or the public that may have valuable input to add to the plan update. This cast a wider net enabling the steering committee members to consult with many people outside of local government.

Plan Participation

Below are two tables, the first outlining the localities and agencies that had input in developing the Hazard Mitigation Plan update. Some participated on the steering committee that met at the Mount Rogers PDC offices. Others participated by personal visits, phone calls, or through email. The second outlines the localities that participated in the plan update as well as the original drafting of the Hazard Mitigation Plan.

Planning Committee Member	Representing	Title/ Department
Tyler Vencill	Abingdon	Civil Engineer Public Works
Jenna Dunn	Bland County	911 Emergency Services Coordinator
Mike Armstrong Brandon Moore	Bristol	Fire Chief Lieutenant
Everett Lineberry	Carroll County	Emergency Services Coordinator
John Clark Dave Haynes	Chilhowie	Town Manager Fire Chief
Gavin Blevins	Damascus	Town Manager, Planner
Scott McCoy	Fries	Town Manager
Mike Ayers	Galax	R&R Director Fire Department
Aaron Sizemore	Glade Spring	Town Manager
Jimmy Moss	Grayson County	Emergency Services Coordinator
Retta Jackson	Hillsville	Town Manager
Jimmy Moss	Independence	Emergency Services Coordinator
Bill Rush	Marion	Town Manager
Jason Childers	Rural Retreat	Town Manager
Brian Martin	Saltville	Town Manager, Planner
Charles Harrington	Smyth County	Housing Authority
Brian Martin	Troutdale	Town Manager, Planner
Tim Estes	Washington County	Emergency Management Coordinator
Jason Busick	Wythe County	Emergency Management Coordinator
Al Newberry	Wytheville	Director of Public Safety
Sara Harrington	VDEM	All Hazards Planner
Justin Haga	VDEM	DRRO
Brian Reed	MRPDC	Planner

James Dillon	MRPDC	GIS Director
Rocky Warren	MRPDC	Planner
Phil Hysell	NOAA	Warning Coordination Meteorologist
Donny Necessary	VDOT	Bristol District Planner
Tony Miller	APCO	Distribution Systems Supervisor
Steve Gibson	LENWISCO PDC	GIS Analyst
Tom Roberts	DCR	Regional Dam Safety Engineer
Angela Beavers	Cumberland Plateau PDC	GIS Internet Technology
Patrick Wilson	NOAA	Meteorologist Intern

Locality Participation 2005, 2011, & 2017

Locality	2005 Participation	2011 Participation	2017 Participation
Abingdon	X	X	X
Bland County	X	X	X
Bristol	X	X	X
Carroll County	X	X	X
Chilhowie	X	X	X
Damascus	X	X	X
Fries	X	X	X
Galax	X	X	X
Glade Spring	X	X	X
Grayson County	X	X	X
Hillsville	X	X	X
Independence	X	X	X
Marion	X	X	X
Rural Retreat	X	X	X
Saltville	X	X	X
Smyth County	X	X	X
Troutdale	X	X	X
Washington County	X	X	X
Wythe County	X	X	X
Wytheville	X	X	X

Plan Update

For the five-year update for the Mount Rogers Hazard Mitigation Plan, the planning team and steering committee reviewed and updated each chapter of the plan. Each of the Hazard Identification and Risk Assessment (HIRA) sections were revised based on current information and the updated analysis conducted by the Mount Rogers Staff. The committee discussed both historical information focused on each hazard as well as brainstorming new mitigation objectives and strategies. These new strategies are included in each hazard section and in the

mitigation strategy chapter. The Community Summaries chapter was updated through discussions with each community's representative to the steering committee. Information was also gathered by the staff from emergency management personnel as well as interest individuals in the public. Through these discussions, new information was added where necessary and specific mitigation projects identified by the localities were included. The planning team reviewed numerous local documents to include in various sections of the updated plan, including but not limited to local comprehensive plans, emergency operations plans, and capital improvement plans. In some cases, the 2005 original Hazard Mitigation plan was included in discussions and updates of these plans. For example, in the 2011 update process for the Town of Marion comprehensive plan, the Mount Rogers Hazard Mitigation Plan was referred to specifically in reference to the developed floodplain along the Middle Fork of the Holston River. The 2017 Plan was referenced in the updates of the comprehensive plans of Town of Saltville, Grayson, County, and the Town of Chilhowie. The information gathered from these sources was included as data in the HIRA chapter, as well as providing some of the basis of the capabilities assessment section.

Public Involvement

Public input was solicited throughout the planning process. All committee members were asked to go to their localities and solicit input from their citizens. All meeting at the Mount Rogers PDC were open to the public as well. A project website was created so the public could review the original Hazard Mitigation plan and provide input toward sections of the plan update they were interested in. The website allowed the public to view the plan and share input if they could not attend the called meetings. The plan was also advertised on social media to make it easier for the public to be involved. Also at least one public meeting will be held during the adoption process to give anyone an opportunity to comment on the entire plan before its official adoption by each locality.

Other Involvement

Mount Rogers also discussed update ideas with our neighboring regional government offices Cumberland Plateau, and the LENWISCO Planning District Commissions. Emory and Henry College, Appalachian Power, the Department of Conservation and Recreation, the National Weather Service, and the Virginia Department of Transportation, and the Mount Rogers Health District were also invited to give their input into the plan update. In our meetings with our local officials we stressed to not limit data gathering and input to local governments, fire and rescue.

We asked them to talk to anyone in their community as well as local business owners and land owners to make the fact-finding process as thorough as possible.

HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA)

Introduction

The Mount Rogers Region is susceptible to a wide range of natural hazards. Fortunately, the inland and mountainous setting of the Mount Rogers region protects it from most coastal phenomena such as hurricanes and tropical storms. This also shelters us from the brunt of most tornados. However, the parts of the region suffered severe damage in the spring of 2011 from an F3 tornado. We also suffered minor damage from an F1 tornado in fall of 2017. The mountains, steep slopes, forests, and other geographic factors subject the region to many kinds of other natural hazards. These include:

- Dam Safety
- Karst & Sinkholes
- Tornadoes/Hurricanes
- Drought
- Landslides
- Wildfires
- Earthquakes
- Severe Winter Storms/Ice
- Flooding
- Windstorms
- Thunderstorms/Lightning
- Hazardous Material Spills (HAZMAT)

This section discusses each of the natural hazards possible in the region, including history, risk assessment and vulnerability, and past or existing mitigation. The hazard risk assessment and vulnerability looks specifically at two criteria: locations where the hazard is most likely to have negative impacts and the probability and severity of the hazard should it occur. When information is available, the specific impacts of a hazard is discussed, sometimes based on the

usual impact in the region. These sections haven been completely revised since the 2005 plan to include additional, more helpful information.

Risk Assessment and Vulnerability

Risk assessment seeks to define the probability of events and the likely consequences of events. In the past five years, the Mount Rogers Planning District has experienced a population declines, which will also decrease our risk of potential disaster. Also, as our population declines the probability of loss of life and injuries will decrease.

The risk assessment and vulnerability presented herein is a result of an extensive analysis of historic event data, scholarly research and field work.

Mitigation

Many times, mitigation seeks to prevent the impacts of hazards on life and property. The primary goal of mitigation is to learn to live within the natural environment. This plan reviews past mitigation efforts in the Mount Rogers Region and identifies both strategies and specific projects that could further mitigate these impacts.

Mitigation options fall generally into six categories: prevention, property protection, natural resource protection, emergency services, structural projects and public information. Prevention projects are those activities that keep hazard areas from getting worse through effective regulatory planning efforts, such as comprehensive planning, building code update and enforcement, burying utility lines and water source planning. Property protection activities are usually undertaken on individual properties or parcels with coordination of the property owner, such as elevation, relocation and acquisition of frequently flooded or damaged structures, eliminating fuel sources surrounding the property, installing rain catchment systems and purchasing additional insurance. Natural resource protection activities seek to preserve or restore natural areas or natural functions of floodplain and watershed areas. They are often implemented by parks, recreation, or conservation agencies or organizations. Emergency services measures are taken during a hazard event to minimize its impact. These measures can include response planning, regional coordination and collaboration and critical facilities protection. Structural projects include activities associated with building new or additional infrastructure or features to minimize impacts from a hazard. The final category of public information is possibly the most important, empowering residents to take action to protect

themselves and their property in the event of a hazard event. This category can include additional information available to the public, such as maps, brochures, and workshops.

Overview of Assessments

The following section describes each of these hazards, their history, severity and impact, and likelihood of causing damage. Describing the hazards separately is problematic because natural hazards often combine. Flooding often follows severe winter storms. Thunderstorms contain lightning, high winds, and, rarely, tornadoes. Heavy rain can cause flooding and landslides. These descriptions, however, will provide detailed information and a basis for further analysis.

Dam Safety

Description

Dams exist to serve various functions within the Mount Rogers region. These include farm use, recreation, hydroelectric power generation, flood and stormwater control, navigation, water supply, fish or wildlife ponds, debris control, and tailings (from mining operations). In some cases, a single dam structure can serve multiple functions, such as generating hydroelectric power and providing recreational opportunities to boaters and fishermen.

State and federal governments regulate dam construction, maintenance and repair. On the state level, the Virginia Dam Safety Act of 1982 serves as the guiding legislation. With certain exceptions, dams that must abide by this statute fall under one of two categories:

- Dams 25 feet tall or higher, with a maximum storage capacity of 15 acre-feet or more.
- Dams 6 feet tall or higher, with a maximum storage capacity of 50 acre-feet or more.

Dams not regulated by the state include those with an agricultural exemption (95 statewide), a federal license (114 statewide), a mining exemption (20 statewide), or a size exemption (879 in the state). Spillways are channels designed to keep water from overflowing the top of the dam and to prevent erosion at the bottom, or toe, of the dam. State law regulates spillway construction based on the dam's hazard classification and site classification. The federal government maintains an inventory of dams through the National Dam Inspection Act of 1972 and, more recently, the Water Resources Development Act of 1996. Maintained by the U.S. Army Corps of Engineers, the inventory has been available on-line since January 1999. It is called the National Inventory of Dams, and its database covers roughly 77,000 dams, including

several in the Mount Rogers region. A map showing the location of all dams in the Mount Rogers Region is located in the section titled Appendix I at the end of the document.

Dam Hazard Classification

The state and federal governments have adopted slightly different methods of classifying dam hazard potential. For the federal national inventory, dams are grouped into one of three categories, based on two criteria: the potential for loss of human life and the potential to cause economic, environmental and lifeline losses, in the event of a dam failure.

Virginia's dam classification system varies in that it classifies the state-regulated dams into one of four categories. 1.) Loss of human life probable with excessive economic impact, 2.) loss of human life possible with appreciable economic impact, 3.) no loss of human life expected with minimal economic impact, and 4.) no loss of human life expected with no economic impact.

Under the state system, dam operation and maintenance plans, as well as inventory reports, must be completed every six years. Re-inspection reports, performed by professional engineers, must be made at 2-year intervals for Class I dams and 3-year intervals for Class II dams. In addition, dam owners must inspect their own dams and submit annual reports in years when professional inspections are not required.

Dam Hazard History

In the Mount Rogers region there has been some history of dam failures over the years, although obtaining a complete record has proven difficult for the purposes of this Hazard Mitigation report. Regulatory agencies at the state and federal governments are reluctant to release full information on dams, inspection histories, and known hazards. Hazard classifications, in and of themselves, serve as a bureaucratic indicator of potential hazard in the event of dam failure, but the classification does not reflect the present physical condition or status of any given dam.

In Bland County, a failure in the Crab Orchard Creek Dam at about noon on January 29, 1957 flooded the community of Bland as a result of three days and nights of continuous rains. The water went through a crack that opened when a slate hillside on one side gave way. While no one was hurt, the flooding destroyed or severely damaged many homes and also swept away outbuildings, cars, fences, machinery, livestock, and household equipment. The flooding also

damaged several downtown businesses. One house floated a mile downstream and came to rest against a bridge and other wreckage. One home was tilted on edge and carried 200 yards downstream to come to rest against a concrete bridge in the community. Estimated damages came to $500,000. The local unit of the American Red Cross provided $30,363 in emergency aid, with nearly $22,395 going for structural repairs. This photo shows the tilted home (see far right of image) that was swept 200 yards downstream during the Crab Orchard dam failure and flood of 1957.

Some now believe that Interstate 77, which passes between the dam and the community, will protect Bland from a similar occurrence in the event the dam should fail again. However, the state's hazard rating on the dam was upgraded in 2004 from significant hazard (Class II) to high-hazard status (Class I). The dam owner hired an engineer as part of an effort to show why the Crab Orchard Creek Dam does not deserve a Class I rating. Another locally known dam failure occurred on Christmas Eve in 1924, when the muck dam at Saltville broke and flooded the community of Palmertown, killing 19 people and dislodging several homes from their foundations. According to at least one news account at the time, the dam failure occurred due to human intervention; police accused a 27-year-old man named Roy Patrick of using dynamite to blow up the dam.

Risk Assessment and Vulnerability

For the purposes of hazard mitigation, this report takes note of dams classified with a potential for high or significant hazard in the event of failure, as defined under the National Inventory of Dams. Those dams classified with a low hazard potential were not considered.

High-hazard and significant-hazard dams (14 total) in the Mount Rogers region primarily consist of earthen structures built for recreational use. Four of the dams are used to generate hydroelectric power, although three of those also offer recreational uses. Several of the dams combine recreational uses with flood or stormwater control. Clear Creek Dam in Washington County, near the City of Bristol, serves multiple uses. These include flood and stormwater control, recreation, water supply, and other uses.

Of the 14 previously mentioned dams, six come under federal regulations. These include the Byllesby Dam and Buck Dam on the New River in Carroll County, Hale Lake Dam in Grayson County, and Beaver Creek Dam, Clear Creek Dam and Edmondson Dam (which has been breached), all located in Washington County. These dams mainly serve to provide hydroelectric power or flood control.

Due to recent changes in state dam safety regulations, two more of the region's dams – Laurel Creek Dam and Fields Dam, both in Grayson County – will be required to prepare Emergency Action Plans. EAPs, contained in county emergency operations plans to govern emergency response for natural and man-made disasters, define roles by dam owners and emergency services personnel for monitoring of dams' physical condition and notification of downstream communities in the event of flooding or potential dam failure. For more details on all the region's dams classified as High Hazard and Significant Hazard, please see the table found at the end of this section.

There is no way to predict the likelihood of a dam failure, since failures relate to the structure, condition, age, maintenance, and natural forces (and storm events) that can affect the integrity of the dam. A well-maintained dam classified as a High Hazard structure may in fact pose little risk to downstream community.

Dam regulation first began in this country due to failures of poorly built dams in the early part of the 20th century. More regulations came following a series of dam failures in the 1970s. Legally, dam owners hold the responsibility for the safety, upkeep, and maintenance of dam structures. Of the 75,000 dams listed by the National Inventory of Dams, 95%fall to the regulation of state governments

The possibility of failure generally increases with age, with many dams designed for an effective life of 50 years. Six of the 14 high-hazard and significant-hazard dams in the Mount

Rogers region are at least 50 years old. Dams with known structural problems can be given conditional operating permits, which point to the need to make improvements. There are 30 such dams in Virginia, with none located in the Mount Rogers region.

Property Exposure Data for Downstream Communities

Legally dam owners must properly monitor and maintain their dams, while state and federal regulators act as overseers and enforcers. But the Association of State Dam Safety Officials and others point out that the effectiveness of regulation vary among states and dam owners often lack the financial resources necessary to undertake costly repairs.

Events that can lead to dam failures include the following: overtopping, structural failure, loss of stability in the dam's foundation, cracking in the dam structure from natural settling, poor upkeep, and piping (resulting from improper filtration in the dam structure, allowing seepage and passing of soil particles to gradually create sinkholes in the dam). The vulnerability of structures and homes at risk of dam failure has not changed since the drafting of the original Hazard Mitigation Plan, and no dam failures have occurred in that time.

High-Hazard and Significant-Hazard Dams
Mount Rogers Region, Virginia

Dam and Location	Nearest Downstream Community	Dam Height and Max. Capacity*	Drainage Area (Sq. Miles)	Year Done	Hazard Potential**	Emergency Action Plan in Place***	Owner Type	Main Use	Structures at Risk	Notes
Crab Orchard Creek Dam (Bland County)	Bland	51 ft high 550 acre-ft	4.98	1953	High (recent upgrade)	Yes	Private	Recreation	19 occupied homes, 18 businesses	Based on 1995 Emergency Operations Plan for Bland County. The state now regulates this as a Class I dam.
Byllesby Dam (New River, Carroll County)	Ivanhoe Austinville	63 ft. high 2034 acre-ft	1,310	1912	High	Federal Regs	Public Utility (AEP)	Hydroelectric	N/A	Data not available. This is a federally regulated hydroelectric dam.
Buck Dam (New River, Carroll County)	Ivanhoe Austinville	45 ft. high 708 acre-ft	1,320	1912	High	Federal Regs	Public Utility (AEP)	Hydroelectric	N/A	Data not available. This is a federally regulated hydroelectric dam.
Stewarts Ck-Lovills Ck Dam #9 (Carroll County)	Mt. Airy, NC	88 ft. high 7415 acre-ft	20.92	1990	High	Yes	Local Govt (Carroll County)	Recreation	N/A	
Hidden Valley Estates Dam (Grayson County)	Not given	29.4 ft. high 77 acre-ft	0.2	1989	Significant	Yes	Private	Recreation	N/A	
Laurel Creek Dam (Laurel Creek, Grayson County)	Fox Creek	24 ft. high 60 acre-ft	0	1974	Significant	Not Yet (formerly size exempt)	Private	Recreation	N/A	Downstream risks have not yet been assessed due to prior size exemption for this dam. The state will require an EAP under new rules adopted in 2002.

Dam and Location	Nearest Downstream Community	Dam Height and Max. Capacity*	Drainage Area (Sq. Miles)	Year Done	Hazard Potential**	Emergency Action Plan in Place***	Owner Type	Main Use	Structures at Risk	Notes
Fields Dam (New River, Grayson County)	Fries	14 ft. high 2000 acre-ft	0	1930	Significant	Not Yet (formerly size exempt)	Private	Hydroelectric	N/A	Downstream risks have not yet been assessed due to prior size exemption for this dam. The state will require an EAP under new rules adopted in 2002.
Hale Lake Dam (Wolf Pen Branch, Grayson County)	Comers Rock	30 ft. high 53 acre-ft	0	1965	Significant	Federal Regs	Federal (U.S. Forest Service)	Fish & wildlife	N/A	Data not available. This is a federally regulated fish & wildlife dam.
Hungry Mother Dam (Smyth County)	Marion	45 ft. high 2500 acre-ft	12.9	1934	High	Yes	State (DCR)	Recreation	Campground A few houses	
Beaver Creek Dam (Washington County)	Bristol	85 ft. high 5020 acre-ft	13.7	1965	High	Federal Regs	Federal (TVA)	Flood control	N/A	Data not available. This is a federally regulated flood control dam owned by TVA.
Clear Creek Dam (Washington County)	Bristol	51 ft. high 2825 acre-ft	5.75	1965	High	Federal Regs	Federal (TVA)	Flood control	N/A	Data not available. This is a federally regulated flood control dam owned by TVA.
Edmondson Dam (Middle Fork Holston River, Washington County)	Mock Mill	47 ft. high 2620 acre-ft	0	1921	Significant	Federal Regs	AEPSCO	Hydroelectric	N/A	Data not available. This is a federally regulated hydroelectric dam.

Dam and Location	Nearest Downstream Community	Dam Height and Max. Capacity*	Drainage Area (Sq. Miles)	Year Done	Hazard Potential**	Emergency Action Plan in Place***	Owner Type	Main Use	Structures at Risk	Notes
Hidden Valley Lake Dam (Brumley Creek, Washington County)	Duncanville	40 ft. high 1975 acre-ft	1.67	1964	Significant	Yes	State (VDGIF)	Recreation	N/A	
Rural Retreat Dam (S. Fork Reed Creek, Wythe County)	State Rt. 749	41 ft. high 2266 acre-ft	3.34	1967	High	Yes	State (VDGIF)	Recreation	N/A	

Sources: National Inventory of Dams maintained by the U.S. Army Corps of Engineers; consultations with local emergency services coordinators; consultations with Virginia state dam safety officials.

Mount Rogers PDC

High-risk and Significant Hazard Dams

List of All Known Dams in Mount Rogers Region

County	Name Dam
Bland County	Hunting Camp Dam
Bland County	Crab Orchard Creek Dam
Bland County	Bland County Farm Dam
Carroll County	Russell Dam
Carroll County	Byllesby Dam
Carroll County	Buck Dam
Carroll County	Olde Mill Golf Club Dam
Carroll County	Patch Inc. Dam
Carroll County	West Dam
Carroll County	Stewarts Creek - Lovills Creek Dam #9
Carroll County	Ernest Golding Dam
Carroll County	Carol Cox Dam
Carroll County	Richard Webb Dam
Carroll County	Lakeside POA Dam
Carroll County	Grassy Creek Farm LLC Dam
Carroll County	Caviness Dam
Carroll County	Vannoy Family Farms LLC Dan
Carroll County	Bruce Bryant Dam
Grayson County	Parker Dam
Grayson County	Hale Dam
Grayson County	Fries Mill Dam
Grayson County	Fields Dam
Grayson County	Hidden Valley Estates Dam
Grayson County	Laurel Creek Dam
Grayson County	Roberts Dam
Grayson County	JoAnn Arey Dam
Grayson County	Cassell Dam
Grayson County	Bolt Dam
Grayson County	Chicago Heritage Farms LLC Dam
Grayson County	Bottomley Evergreen & Farms Inc. Dam
Grayson County	John Hart Dam
Grayson County	Henry Jones Dam
Grayson County	Highlander Dam
Grayson County	Shateley Dam
Smyth County	Glade Mtn Washer Site 3 Dam
Smyth County	Umberger No. 1 Dam
Smyth County	Brushy Mtn No 2 Dam
Smyth County	Glade Mtn Washer Site No. 1 Dam

County	Name Dam
Smyth County	Billings Dam
Smyth County	Johnson Dam
Smyth County	Waddle Dam
Smyth County	Hungry Mother Dam
Smyth County	Smyth County Dam #1
Smyth County	Smyth County Dam #2
Smyth County	Smyth County Dam #3
Washington County	Clear Creek Dam
Washington County	Straight Branch Dam
Washington County	Hidden Valley Lake Dam
Washington County	Beaver Creek Dam
Washington County	Thomas Nichols Dam
Washington County	Kenneth Nicewonder Dam
Washington County	Olde Farm Dam
Washington County	Glenrochie Dam
Washington County	Texas Brine Dam
Wythe County	No. 1 Tailings Pond Dam
Wythe County	Impoundment 173 Dam
Wythe County	Rural Retreat Dam
Wythe County	Butt Dam #1
Wythe County	Harold Leedy Dam
Wythe County	Harold Leedy Horseshoe Pond
Wythe County	Reed Creek Dam
Wythe County	Paul Riefenberg Dam
Wythe County	Talley Farms Dam
Wythe County	ALC Acquisition Dam
Wythe County	Crowder Dam
Wythe County	Wythe County Dam #1
Wythe County	Harold Leedy Dam #1
Wythe County	Harold Leedy Dam #2
Wythe County	Kenneth Tibbs Dam
Wythe County	Butt Dam #2
Wythe County	Sharon Ball Dam
Wythe County	Windy Acres Dam

Drought

Description

In simple terms, drought can be defined as "a condition of moisture deficit sufficient to have an adverse effect on vegetation, animals, and man over a sizeable area." Drought can also be defined in terms of its effects and divided into categories, as suggested by FEMA:

- Meteorological drought: Defined solely on the degree of dryness, expressed as departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
- Hydrologic drought: Related to the effects of precipitation shortfalls on streamflows and reservoir, lake, and groundwater levels.
- Agricultural drought: Defined mainly in terms of soil moisture deficiencies relative to water demands of plant life, usually crops.
- Socioeconomic drought: This occurs when the demand for water exceeds the supply as a result of a weather-related supply shortfall.

Drought occurs as part of the regular climatic regime in virtually all climates, and can occur throughout the entire Mount Rogers Region. Its causes are complex, and not readily predictable, especially in variable climates. Compared to storm events such as hurricanes and floods, drought has a slow onset and can last for months, years or even decades. Estimated dollar losses caused by drought can far exceed those of major storm events.

Some measures of drought, also known as drought indices, include:

- Percent of Normal: Calculated by dividing actual precipitation by normal precipitation (usually defined as the 30-year average) and multiplying by 100%. Effective for a single region or a single season. A disadvantage is the average precipitation is often not the same as the median precipitation.
- Standardized Precipitation Index: Index based on the probability of precipitation for any time scale. This is used by the National Drought Mitigation Center. It can provide early warning of drought, can assess drought severity and is less complex than some indices.
- Palmer Drought Severity Index: This is a measure of soil moisture and was the first comprehensive drought index created in the country, in 1965. It works best in areas of

even topography but is less suitable for mountainous areas or places with frequent climatic extremes. Palmer values may lag emerging droughts by several months.

- Crop Moisture Index: A derivative of the Palmer Index. It reflects moisture supply across major crop-producing regions. It is not intended to assess long-term droughts.
- Deciles: This approach groups monthly precipitation events into deciles so that, by definition, "much lower than normal" weather cannot occur more than 20% of the time. This provides an accurate statistical measurement of precipitation, but its accuracy relies on a long climatic data record.

History

The U.S. Geological Survey has noted four major droughts statewide since the early 1900s. These occurred in 1930-1932 (one of the most severe droughts on record for the state), 1938-1942, 1962-1971 and 1980-1982 (the least severe). Other sources suggest the record is somewhat different for the Mount Rogers region. The table below gives a brief review of the some of the major droughts that have affected southwest Virginia.

Droughts in Southwest Virginia

Date	Location	Details	Impact
September 2007	Carroll, Grayson, Smyth, and Wythe Counties	Primary disaster for Carroll, Grayson, Smyth, and Wythe Counties	$8.0 million in crop damage
2-12-03	Carroll, Grayson, Smyth, large parts of SW VA	USDA disaster declaration due to severe drought for 46 counties. Primary disaster for Carroll, Grayson, Smyth Counties. Contiguous declaration for Galax and Washington County.	Low-interest emergency loans for farmers.
July and August 2002	Statewide	State emergency drought declaration for July and August. USDA disaster declarations for Bland, Carroll, Grayson, Smyth, Wythe Counties.	Significant crop damage. Reduced streamflow and groundwater levels.
9-1-99 (NCDC)	Bland, Carroll, Galax, Grayson, Smyth, Wythe, large parts of SWVA	Dry conditions began in July 1998, subsided for several months, then returned in June 1999 and through early Sept. Drought largely ended due to heavy rain from remnants of Hurricane Dennis on Sept. 4-5, 1999.	$8.25 million in crop damage. Very low water levels in creeks, streams and rivers.

Date	Location	Details	Impact
July to October 1998 (NCDC)	Bland, Carroll, Galax, Grayson, Smyth, Wythe, large parts of SW VA	Dryness began in July, subsided in August, resumed in September. Low water levels in creeks, streams, rivers, lakes and some shallow wells.	Water levels low. $7.7 million crop damage.
9-1-95 (NCDC)	Bland, Carroll, Galax, Grayson, Smyth, Wythe, large parts of SW VA.	A drought that started earlier in the summer peaked in many sections of the state during the first two weeks of Sept. State of emergency declared. Widespread rainfall on Sept. 17 helped to alleviate the dryness.	Crops damaged. Many lakes and rivers with well-below normal water levels.
1988	Mount Rogers region	Drought based on the Palmer Drought Severity Index, with the region in severe drought up to nearly 50%of the time. One of the worst droughts on record for the nation (1988-1989).	
1954-1956	Mount Rogers region	Drought based on the Palmer Drought Severity Index. Region in severe drought up to nearly 40%of the time.	
1928-1934	Mount Rogers region	Drought based on the Palmer Drought Severity Index. Region in severe drought up to nearly 20%of the time.	

For the Mount Rogers region, the worst period came in 1988, with the region in severe drought 40% 49.99%of the time. Over the long-term severe drought conditions in the Mount Rogers region occurred only up to 10%of the time.

Risk Assessment and Vulnerability

In recent years, major agricultural droughts have occurred five times from 1995 through 2003. The historical record is not as well developed for the years prior to 1995, though major droughts are known to have occurred in 1928-1934, 1954-1956 and in 1988.

For the 100-year period from 1895 to 1995, the region has been estimated to experience drought less than 10%of the time. In the five-year time span since the original Hazard Mitigation Plan was written, the region's vulnerability to drought has not changed.

History shows drought conditions reaching disaster proportions can affect the entire Mount Rogers region. For some parts of the region, especially in Carroll County, well development is difficult and often produces a dry hole.

The impacts appear to have the greatest impact for the farming community. In these cases, the U.S. Department of Agriculture makes damage assessments and provides financial aid to qualifying farmers through the local farm service agencies.

Water issues also are a concern for the general public, local governments, business and industry. Several engineering studies from the mid- to late-1990s, as well as a 1996 health department survey, identified issues regarding water quantity, water quality and reliability of supply. In the unincorporated areas, most parts of the region depend upon groundwater supplies. The reported problems include low quantity, poor quality (due to mineral or bacterial content), turbidity, petroleum contamination and dry holes. Limited quantities restrict fire-fighting capabilities. Inadequate or limited water supplies also restrict future growth potential for business and industry. The table on the following page describes in more detail water related problems in the Mount Rogers District.

Water Problems Reported to the Mount Rogers Health District	
Bland County	Complaints
Little Creek area	Bacteria in recently drilled wells.
Hollybrook	Mineral quality/iron bacteria. Cisterns used for some supplies.
Seddon	Appearance of dry wells. Cisterns used for some supplies. Mineral quality.
Waddletown	
Laurel Creek/Dry Fork	Poor quality with some wells and springs. Cisterns used for some supplies.
Ceres	Poor quality in some springs and wells.
	Poor quality in springs and iron bacteria in wells.
Bastian/Hicksville Crandon/Mechanicsburg	Mineral quality/iron bacteria concerns.
Carroll County	Complaints
Paul's Creek (Cana area) Dugspur (Rt. 753) Star (Rt. 1105) Woodlawn Piper's Gap Fancy Gap (Rt. 683) Chestnut Yard Rt. 645 (below Laurel Fork) Short Creek (Rt. 640/I-77)	Iron, turbidity, low-yield wells.
Grayson County	Complaints
Old Town – Fries Hill	High iron levels.
Flatwood Community	Many wells are drilled deep. Many dry holes found.
Helton/Cabin Creek Area	Well construction difficult due to rock formations.
Fairview Community	
Nuckols Curve Area	
Other Comments:	Many springs used as private water supplies, especially in western areas of the county. Many springs have bacteria contamination.
Smyth County	Complaints
Walker Mountain area	High iron/sulphur content.
Washington County	Complaints
Mendota (Rt. 802 area)	High iron/sulphur content in private water supplies.
Rt. 91 (S.F. Holston to Rhea Valley)	Low-yield wells and bacteria contamination.
Wythe County	Complaints
Poplar Camp, Crockett, Gateway Trailer Park (Grahams Forge), Rosenbaum Chapel area	Petroleum contamination.
Sand Mountain area	Dry holes and low-yield wells.
Stony Fork area	High iron/sulphur levels.

Earthquakes

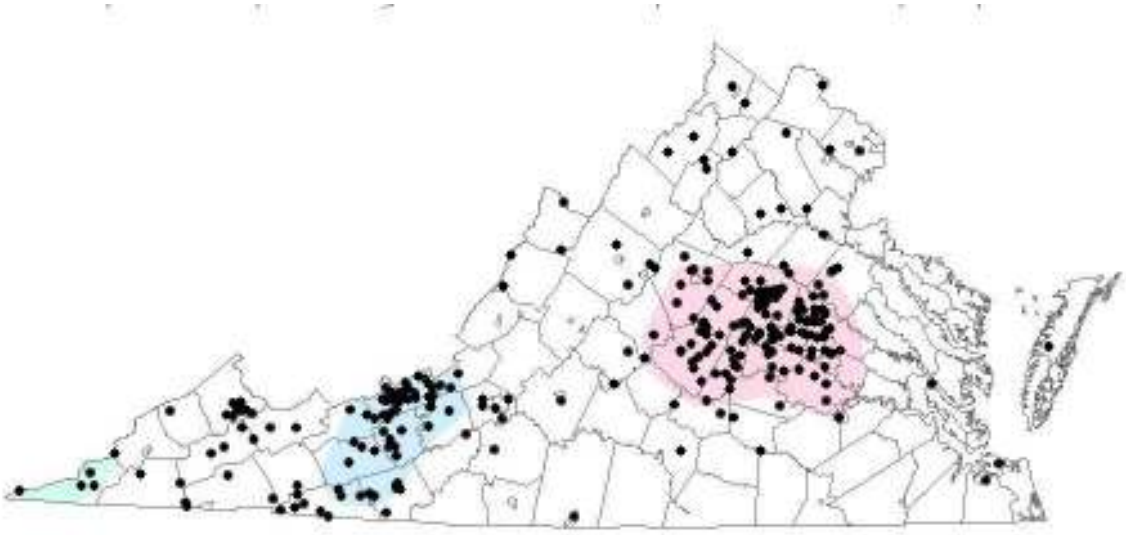
Description

An earthquake can be defined as a sudden motion or trembling caused by an abrupt release of accumulated strain on the tectonic plates that comprise the earth's crust. The theory of plate tectonics has been described since 1967 and is based on the idea the earth's crust is composed of several major plates that move slowly and continuously, at times bumping and grinding against each other and at other times creating separations.

The tectonic plates are thought to bump, slide, catch or hold as they move together. An earthquake happens when faults located near plate boundaries slip when the stress against the rock formations becomes too great. This sudden movement results in surface faulting, ground failure and tsunamis.

Surface faults are thought to occur in various forms, including strike- slip faults, normal faults (with strong vertical movement), and reverse (thrust) faults (mainly horizontal movement). Ground failure is expressed through liquefaction, when coarse soils lose their strength and act like fluids flowing over the landscape. Ground failure created by liquefaction includes lateral spreads, flow failures (the most catastrophic form), and loss of bearing strength (causing buildings to settle and tip). Tsunamis are phenomena associated with the west coast and are not considered further in this report.

Earthquakes are described in various fashions, including by intensity and magnitude. Intensity is defined as a measure of earthquake effects at a particular place on humans, structures or the land. Magnitude is a measure of the strength of an earthquake or the strain energy released by it (originally defined by Charles Richter in 1935).



This map shows the locations of known earthquake epicenters in Virginia. The Eastern Tennessee Seismic Zone is shown in green, the Giles County seismic zone is shown in blue and the Central Virginia seismic zone is shown in pink.

History

Sources such as the Virginia Department of Mines, Minerals and Energy describe the statewide risk of earthquakes as moderate, in keeping with most other states in the eastern seaboard of the United States.

Earthquake activity in Virginia has generally been, with a few exceptions, low-magnitude but persistent. The first documented earthquake in Virginia took place in 1774 near Petersburg, and many others have occurred since then, including an estimated magnitude 5.5 (VII) event in 1897 centered near Pearisburg in Giles County. A Roanoke attorney who was in Pearisburg said that for nearly fifty miles from that place he "saw hardly a sound chimney standing." In his opinion, "If the buildings throughout Giles had been largely of brick, the damage would have been very great, and serious loss of life would have occurred." The largest recorded earthquake in Virginia occurred in Louisa County on August 23, 2011 and had a magnitude of 5.8 (VII). It was felt all along the eastern seaboard by millions of people, causing light to moderate damage in central Virginia, Washington, D.C. and into southern Maryland. Since 1977, more than 195 quakes have been detected as originating beneath Virginia. Of these, at least twenty-nine were large enough to be felt at the Earth's surface. This averages out to about six earthquakes per year, of which one is felt.

Much of Virginia's earthquake activity has been in the southwest and eastern parts of the state. Counties and cities that have experienced earthquakes of intensity VI and higher include Smyth, Washington and Wythe in the local region. Local earthquake history is described by Stover and Coffman and also by the U.S. Geological Survey, through its Earthquake Hazards Program. The table below describes in more detail major recorded earthquakes in the Mount Rogers Region.

Modified Mercalli Scale

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Earthquakes in The Mount Rogers Region by Date/ Location, Intensity, and Description

Date/ Location	Intensity	Description
March 9, 1828 Southwest VA	V (MM)	Felt over 218,000 sq. miles, from Pennsylvania to South Carolina and the Atlantic coastal plain to Ohio. Doors and windows rattled.
April 29, 1852 Wytheville	VI (MM)	Severe earthquake shook down a chimney near Wytheville and shook down tops of chimneys at Buckingham Courthouse. Homes shook in Staunton. A brick fell from a chimney in Davie County, N.C.
Aug. 31, 1861 Southwest VA	VI (MM)	Epicenter in extreme southwest Virginia or western North Carolina. Bricks fell from chimneys at Wilkesboro, NC. Felt from Washington, D.C. to the Midwest and south to Columbus, GA.
Sept. 1, 1886 South Carolina	V (MM)	Epicenter in Charleston, S.C., with estimated intensity of X. Caused minor structural damages in various parts of Virginia (fallen plaster and chimneys, cracked walls, broken windows).
May 3, 1897 Giles County	VII (MM)	Greatest severity at Radford, where some chimneys were destroyed and plaster fell from walls. Felt in most of southwest Virginia and in a region of 89,500 sq. miles.
May 31, 1897 Giles County	VIII (MM)	Largest known earthquake originating in Virginia in history. Felt over 280,000 sq. miles. Largest effects felt from Lynchburg to Bluefield, W. Va. and from Giles County south to Bristol, Tenn. Many downed chimneys, changes in flow springs and appearance of some earth fissures.
Feb. 5, 1898 Wytheville or Pulaski	VI (MM)	Earthquake felt over 34,000 sq. miles. Bricks fell from chimneys and furniture shifted in a few houses. Effect felt throughout southwest Virginia and south to Raleigh, N.C.

Date/ Location	Intensity	Description
April 23, 1959 Giles County	VI (MM)	Several chimneys were damaged, plaster cracked and pictures fell from walls in Eggleston and Pembroke. Felt over 2,900 sq. miles in Southwest Virginia.
Nov. 11, 1975 Giles County	VI (MM)	Windows were broken in Blacksburg and plaster cracked at Poplar Hill (south of Pearisburg, Giles County). Also felt in Pulaski County.
Sept. 13, 1976 Carroll County	VI (MM)	One of the most persistent areas of activity in recent years, with five small earthquakes felt near Hillsville. Effects felt in the Carolinas and West Virginia.
Aug. 23, 2011 Mineral, VA	VIII (MM)	The earthquake was felt in some of the eastern parts of the Mount Rogers Region, but no damage was reported.

One notable earthquake occurred in May 1897 and was based in Giles County. It was the largest Virginia- based earthquake in recorded history. Chimneys were shaken down throughout southwest Virginia, including in Wytheville and as far west as Knoxville, Tenn. Effects of the earthquake were felt from Georgia to Pennsylvania and from the Atlantic Coast to Indiana and Kentucky. The effects were strong at Pearisburg, where brick walls cracked and some earth fissures appeared. The magnitude of this quake has been estimated at VII and VIII on the Modified Mercalli intensity scale. This event, felt over 11 states, is described as the third largest earthquake in the eastern part of the country in the past 200 years.

Risk Assessment and Vulnerability

For the Mount Rogers region, the likelihood of earthquakes appears to be moderate, based on measurements related to maximum ground acceleration and as described by FEMA. This data is incorporated into probabilistic ground motion maps published in the 2015 edition of the National Earthquake Hazards Reduction Program's *NEHRP Recommended Provisions*.

The southwest Virginia region faces a moderate chance of experiencing earthquakes. While recent history shows some part of the region experiences earthquakes roughly once every 18 years, the resulting damage has been relatively minor.

The entire Mount Rogers region is subject to the effects of an earthquake, as shown by the historical record from larger events such as the Giles quake from May 1897.

The Mount Rogers region in total covers 2,786 square miles, with over 68,000 households and a population of 188,498. The region includes 71,000 buildings with an estimated structural replacement value of $7.3 billion. An estimated 98%of the buildings and 78%of the building value is in residential housing.

While earthquakes can create widespread destruction and death, the damages experienced in southwest Virginia are more moderate, based on the historical record. It should be noted that earthquake analysis is tricky, given that the historical record covers a period of less than 175 years. A much better record for earthquakes would cover hundreds, even thousands, of years. The risk assessment in this report is based upon this limited range of data. In the five-year time span since the original Hazard Mitigation Plan was written, the region's vulnerability to earthquakes have not changed.

For the Mount Rogers region, the worst of the earthquakes experienced historically appear to correspond to an intensity of VI on the Modified Mercalli Scale. For purposes of analysis, we assumed an intensity of 6.3 and applied the HAZUS 99-SR2 computer model to reflect the characteristics of the Giles earthquake of May 1897.

At the 6.3 level magnitude, HAZUS predicted moderate damage to 3,902 buildings and slight damage to 7,423 buildings. Only 65 buildings would be completely destroyed. Other estimates by HAZUS were as follows:

- $6.8 million damage to bridges, railways and airports.
- Minor injuries to 47 people, with 9 hospitalized and 1 dead.
- Economic losses of $118 million (or 1% of the total replacement value of the region's buildings).
- $3 million in damages to communication facilities.
- Significant loss of function in several schools, especially in Bland, Carroll and Wythe counties.

Flooding

Description

Flooding is regarded as the most damaging natural hazard in Virginia. Average annual flood damages statewide amount to $100 million. Nationwide, between 1983 and 1997, Virginia ranked 14th with flood damages of $1,507 million.

In the Mount Rogers region, flood damages can cost millions of dollars. In November 1977, flood damages to business and industry in Smyth County was estimated at up to $8.6 million. In the previous flood of April 1977, damages were estimated at $7.8 million for 16 jurisdictions.

More recently, in March 2002, Smyth County alone sustained an estimated $2 million in flood damages, compared to $100,000 in Wythe County and $360,000 in Washington County. Preliminary estimates from the November 2003 flooding came to $485,000 for Bland County, $251,000 for Carroll County and $878,000 for Smyth County.

Flood hazards in the local region include *riverine flooding* and the *flash floods* that result from sudden, violent storms that produce large amounts of rainfall in short amounts of time. *Riverine flooding* involves overflows from rivers and streams. The form of flooding is often more gradual in nature and may allow more time for advance warning. *Flash flooding* – such as occurred in November 2003, resulting in federal disaster declarations for several localities may occur with little warning and yet cause significant damage.

Flood-Related Definitions

Base Flood: Flood with a 1% chance of being equaled or exceeded in any given year. The Base Flood is the standard used by the National Flood Insurance Program.

Base Flood Elevation: The elevation of the water surface resulting from a flood that has a 1%chance of occurring in any given year.

Floodplains: Lowlands, adjacent to rivers, lakes and oceans, subject to recurring floods.

Floodway: The stream channel and that part of the adjacent floodplain that must remain open to permit passage of the Base Flood without raising the water surface elevation by more than one foot. Flooding is the most intense and poses the greatest risk in the floodway area.

History

The Mount Rogers region of Virginia has a long history of flooding. The floods typically result from heavy rains or from melting following a severe winter storm. Heavy rains during thunderstorms can cause flash flooding in localized areas. The data in the chart below only

relates to major flood events through spring of 2018 and does not reflect the full range of flood events that have affected the region over the years.

Major Flooding Events in Mount Rogers Planning District		
Date	Affected Localities	Description
5-24-17	Carroll County	This flood caused $75,000 in damage
5-24-17	Grayson County	This flood caused $150,000 in damage
4-23-17	Smyth County	This flood caused $75,000 in damage
6-27-16	Bland County	This flash flood caused $75,000 in damage
4-19-15	Wythe County	This flood caused $50,000 in damage
6-29-14	Smyth County	This flash flood caused $250,000 in damage
6-9-11	Bland County	This flood cause $250,000 in damage
5-13-11	Grayson County	This flash flood caused $85,000 in damage
2-28-11	Bristol	Severe storms and flooding caused $40,000 in damage
3-4-08	Smyth County	Severe storms and flooding caused $500,000 in damage
6-12-04	Washington County	This flood caused $250,000 in damage
11-18-03	Bland, Smyth, Galax; 12 counties and two cities in SW VA and NE TN	Heavy rains of 1.88" to more than 5" caused heavy flooding Nov. 18-19. Federal disaster declaration for Bland, Smyth, Galax in local region. $12 million damage across entire 12-county region.
2-15-03	Southwest Virginia (Wythe County declared a disaster)	State of emergency declared on 2-17-03 due to snow & ice in northwest VA and more than 4" of rain in southwest VA that caused flooding and mudslides. Federal disaster declared 4-28-03.
2-14-03	Washington, Bristol	Flooding from 4-day rainfall of 2-6" across southwest VA. See state of emergency declaration above.
4-17-02	Smyth, Washington, Wythe	Severe storms and flooding
3-17-02	All counties in Mount Rogers Planning District	State of emergency declared on 3-18-02 due to heavy rainfall and flash flooding.
8-20-01	Washington	Severe storms and flooding
8-9-01	Smyth	Severe storms and flooding
7-26-01	Smyth, Washington	State of emergency declared on 7-29-01 and $4.4 million in state and federal aid. This was part of the same weather pattern causing flooding on 7-8-01.
2-2-96	Bland, Grayson, Washington, Wythe	Flooding (resulting from Blizzard of 1996)

Major Flooding Events in Mount Rogers Planning District		
Date	Affected Localities	Description
5-17-94	Galax	Severe ice storms and flooding
3-28-94	Bristol	Severe ice storms and flooding
3-10-94	Bland, Carroll, Grayson, Smyth, Washington, Wythe	Severe ice storms and flooding
5-19-92	Carroll	Severe storms and flooding
5-29-84	Washington	Severe storms and flooding
5-07-84	Town of Damascus	Flooding on Beaverdam Creek. Town declared a federal disaster area for damage to sewer system, Virginia Creeper Trail and private homes.
11-17-77	Carroll	Severe storms and flooding
11-12-77	Grayson, Smyth, Washington	Severe storms and flooding
10-02-77	Bristol	This 20-year flood caused $3 million in damage in 1977 dollars.
4-21-77	Carroll	Severe storms and flooding
4-7-77	Bland, Grayson, Smyth, Washington, Wythe	Severe storms and flooding
9-8-72	Smyth, Galax	Tropical Storm Agnes (flooding)
March 1867	Bristol	Flood of record for Beaver Creek in Bristol, TN and Bristol, VA. This was a 250-year flood.

For Bristol the flood of record occurred in March 1867. This 250-year flood on Beaver Creek and its tributaries caused $1 million worth of damages (in 1867 dollars). More recently, in October 1977, a 20-year flood caused $3 million worth of damages (in 1977 dollars) on the Bristol, Virginia side alone. The worst and most costly of flood damages on an annual basis occurs along the main stem of Beaver Creek.

For the Mount Rogers region as a whole, the worst flooding within the past 50 years occurred in April and November of 1977. The floods of 1977 later led to engineering reports that encouraged people to move out of the floodplain.

Engineering Studies

Town of Chilhowie

An engineering study in 1978 on flooding in Smyth County eventually led to a special project in Chilhowie that relocated 67 families and created the Chilhowie Recreation Park.

The Middle Fork Holston River Flood Control Improvements Study, completed in March 1978, studied flooding issues in Smyth County, with special focus on the Town of Chilhowie/Seven Mile Ford community and the Town of Marion/Atkins community.

Initial recommendations from that 1978 study carried a total implementation cost of $18 million. Later the study was reduced to three sub-projects, but the price tag still proved very high. The recommendations included channelizing parts of the Middle Fork Holston River, with rip rap or concrete reinforcement, flood-proofing for selected businesses and industries, rebuilding several bridges to accommodate the widened river channel, relocations out of the floodplain, and installing some levees and pump stations. Of all the proposals discussed in the 1978 study, channelizing the river was deemed as a top priority with the potential for making the greatest impact on future flood levels.

The recommendations also included removing obstructions from the Middle Fork (including the breached dam at the old Marion Ice Plant), development of six flood storage reservoirs along six tributaries, and implementation of floodplain ordinances to limit future development in the floodplain area.

Although the 1977 floods had serious impacts for several industries located in the Middle Fork Holston floodplain, the industries declined to implement the recommendations due to the high cost. The local communities felt equally intimidated by the proposed mitigation costs, and there was little hope of major help from among a range of federal agencies to provide the 100%grant funding needed to carry out any of the proposed projects. The Planning District Commission finally decided to try to get the most for the funds available by demolishing the most flood-prone structures in Chilhowie and relocating families out of the floodplain.

The project that eventually emerged was a $2.8 million multi-part proposal to relocate families out of the Middle Fork Holston floodplain in Chilhowie, build replacement housing in a new subdivision created for the relocation, and to provide water treatment improvements for the town of Chilhowie. The project area included 72 homes, three churches, three businesses and one lodge. To succeed at all, the effort had to overcome numerous complications created by the funding agencies, the attitudes of local residents, and the feelings of the town council, which observers felt cared more about the water treatment project than the flood mitigation project.

In the end, 67 families moved out of the floodplain. Of those, 53 families had help from the Tennessee Valley Authority and 14 had help through the Department of Housing and Urban Development. Due to the time it took to form the Chilhowie Redevelopment and Housing Authority (created in July 1979) and the new subdivision, most families relocated elsewhere. Only six families opted to relocate to the subdivision as planned. The town had the abandoned property demolished and built a community recreation park in the floodplain area (between Holston Street and Railroad Avenue). The project took seven years to complete.

Town of Damascus

Building on flood study work begun by the Tennessee Valley Authority in the late 1950s, the Town of Damascus also undertook projects to relocate 34 homes (88 residents) and three businesses out of the floodplain following the 1977 flooding. Historically a flood-prone community due to development along Beaverdam and Laurel Creeks, along with obstructions in the creeks, Damascus suffered three major floods in 1977 (in April, October, and November). Twice in 1977 the community qualified as a federal disaster area. The 1977 flood events 1977 led to a comprehensive flood mitigation study completed in 1979. An initial cost estimate of more than $3.2 million would have built a levee emergency access route, relocated flood-prone homes out of the floodplain, flood-proofed some homes and businesses, removed two abandoned dams from Laurel Creek, installed storm drainage collection systems, and required more control of floodplain development by the town. In 1981, a follow-up flood mitigation program proposed by the town was estimated at $4.3 million.

Image 1: 2003 Flooding in Damascus

Successful efforts by Damascus to mitigate its flooding problems over the years have included the following:

- A $559,000 grant from the HUD in 1981 to install storm sewers along Mock, Surber, and Haney Hollows (finished in 1983).
- State and federal disaster assistance following another major flood in May 1984 helped make repairs to nearly $86,000 worth of damage to the community.

Image 2: Flooding in Marion, VA
View of flooding at Baughman Street Bridge in Marion. The bridge itself becomes a barrier during times of high water

- Grant funding in 1984 ($700,000 from the state CDBG program and $190,000 from the Tennessee Valley Authority) to relocate 34 families (88 people) and three local businesses out of the floodplain (1985 through 1988).

- The town also converted the old Damascus Elementary School for housing under a project funded by the state CDBG program.

Recent Flood Events

The more recent flood events from 2001-2011 were less drastic in extent and damages compared to the floods of 1977. Nonetheless the floods disrupted the lives of those who had to endure them, including the first major flood in several decades for the City of Galax.

The events of 2001 occurred in late July and early August. Heavy rainstorms caused flooding that forced more than 100 Smyth County residents from their homes, according to news accounts. Smyth and Washington counties became federal disaster areas. In all the flooding affected nine counties in southwest Virginia and led to at least $4.4 million in state and federal aid.

The next round of disaster-level flooding occurred March 17-20, 2002. Three to six inches of rain fell in a 36-hour period and led to federal disaster declarations for Smyth, Washington and Wythe counties.

The event affected numerous homes and businesses, with residential evacuations along the North Fork Holston River in Smyth County near the Town of Saltville and in remote parts of eastern Washington County near the Smyth County line. The floods also created overflows for water and sewer plants in the Towns of Saltville, Chilhowie, and Rural Retreat and in Washington County. Additionally, floods ruined some businesses and temporarily stranded some communities, such as Downtown Chilhowie. FEMA disaster aid came to more than $500,000 in the local region as of June 2002, with an estimated $2.5 million total in damages.

For the entire southwest Virginia region, state and federal disaster assistance had reached $8 million.

The 2002 flooding led Chilhowie to undergo a preliminary $100,000 study by the U.S. Army Corps of Engineers on causes of the flooding and potential solutions, including river dredging and use of levees. In March 2004, the Chilhowie Town Manager recommended buy-outs of the 15 properties that flood most often and the decision was made to buy out six homeowners located on River Bottom Circle along the North Fork Holston River.

The flood disasters continued into 2003, with a federal declaration resulting from two back-to-back snowstorms February 15-28, affecting all localities in the Mount Rogers Planning District. In total, the storm cost $37 million in snow removal costs and $71 million in damages to homes, businesses, public facilities, roads and other property. In the local region, Bland and Wythe counties sought federal aid for flood damages to public and private property.

On November 18-19, 2003, heavy rains caused severe flooding across 10 counties in northeast Tennessee and southwest Virginia. In Bland County damages were estimated at $485,000, with $878,000 in damage in Smyth County and $251,000 in damage in Carroll County. This included major damage or destruction of numerous homes, flooded roadways, damage to public and private property, some evacuations and temporary closure of area schools.

The City of Galax suffered its first major flooding since 1940; initial reports to FEMA included damage to 10 businesses and 70 homes in an area that included the city's main business district along Chestnut Creek. Some sinkholes appeared, and there was flooding in several nearby residential communities. Total damages amounted to $100,000, with about half consumed by the cost of cleanup by the city, according to city officials. Because Galax does not participate in the National Flood Insurance Program, the designated floodplain area was not eligible for federal disaster assistance. The city so far has resisted suggestions it consider re-joining the flood insurance program. Damaged properties located out of the designated floodplain were eligible for disaster assistance. City officials have said many flooding problems are caused by undersized and deteriorated stormwater drainage systems.

In the past five years only one flood event in the Town of Fries was recorded. In May of 2011 a flash flood caused minor flooding at the elementary school, damaged approximately 20

vehicles, and caused some minor damage at an RV park. This flood also caused a manure spill that caused some localized water contamination. The town residents were asked by officials at the water treatment plant to conserve water. The town had enough water in reserve until the spill was cleaned.

National Flood Insurance Program

Most communities with flooding issues in the local region participate in the National Flood Insurance program (NFIP). Participation in NFIP allows homeowners and commercial businesses to obtain flood damage protection. For single-family homes, the insurance provides up to $250,000 for structural damages and up to $100,000 for contents damages. Commercial businesses can be covered for up to $500,000 in structural damages and up to $500,000 in contents damages.

Flood insurance helps cover flood damages during minor and major flood events. Insurance coverage through NFIP also covers a larger amount for losses than typically would be available during a federal disaster. Emergency aid that is available following declaration of a federal disaster most often comes in the form of a low-interest loan. FEMA promotes participation in NFIP for all qualifying communities.

Community Participation in NFIP
Mount Rogers Region, Virginia

Jurisdiction	NFIP Status			
	Y	N	N/A	CRS Class
Bland County	X			N/A
Carroll County	X			N/A
Grayson County	X			N/A
Smyth County	X			N/A
Washington County	X			N/A
Wythe County	X			N/A
City of Bristol	X			N/A
City of Galax		X		N/A
Town of Abingdon	X			N/A
Town of Chilhowie	X			N/A
Town of Damascus	X			N/A
Town of Fries	X			N/A
Town of Glade Spring	X			N/A
Town of Hillsville	X			N/A
Town of Independence	X			N/A
Town of Marion	X			N/A
Town of Rural Retreat	X			N/A
Town of Saltville	X			N/A
Town of Troutdale		X		N/A
Town of Wytheville	X			N/A

As shown in table above, most of the localities participate in floodplain management and make NFIP coverage available to property owners. The City of Galax, with Chestnut Creek flowing through the city's downtown industrial district, participated in NFIP for a few years before dropping out. As a result of the November 2003 flood disaster, the city met with state and federal flood program officials. The city has opted to remain a non-participant. Galax recently submitted a request to the US Army Corps of Engineers to look at possible projects upstream of Chestnut Creek through the Flood Damage Reduction Program (Section 205 of the 1948 Flood Control Act). The end result would be a project that would reduce the 100-year flood plain to the Chestnut Creek channel. The Town of Troutdale due to its small size and the fact that relatively little water runs through the town does not find it feasible to participate in the NFIP.

The FEMA floodplain maps available for communities participating in the National Flood Insurance Program (NFIP) depict 100-year floodplains for flood-prone areas. That means, in any given year, the floodplain area faces a 1% chance of having a flood.

One major drawback for the floodplain maps in effect for the Mount Rogers region, as well as for many communities nationwide, is the age and relative inaccuracy of the maps. Although a fine effort has been made by FEMA to update the existing maps digitally, there are still existing accuracy issues, however, FEMA is in the process of rectifying these errors. We expect new data for much of the Mount Rogers Region in the next two years.

In addition, most local floodplains have not been subject to hydrological studies to determine the Base Flood Elevations; the floodplain extent in such cases has been estimated based on the local topography.

Risk Assessment and Vulnerability

The Mount Rogers region has experienced 18 presidential disaster declarations or state-level emergencies related to flooding over 30 years. That does not account for the more minor flooding that may occur from time-to-time due to a brief but severe rainstorm or thunderstorm causing small stream flooding in localized areas.

As shown in the table below, Smyth County has received a relatively large share of payments under the National Flood Insurance Program, due to the frequency and severity of flooding in that county.

NFIP Claims Data as of October 31, 2018			
Community Name	Losses	Total Payments	Average Payments
Bland County	19	177,105	9,321.32
Carroll County	19	136,910	7,205.79
Grayson County	6	14,563	2,427.17
Smyth County	89	841,130	9,450.90
Town of Chilhowie	40	222,697	5,567.43
Town of Marion	32	192,960	6,030.00
Town of Saltville	1	1,271	1,271.00
Washington County	44	499,023	11,341.40
Town of Abingdon	11	158,112	14,373.80
Town of Damascus	10	6,311	631.10
Town of Glade Spring	1	4,347	4,347.00

Wythe County	15	66,077	4,405.13
Town of Wytheville	1	35,472	35,472.00
City of Bristol	19	71,753	3,776.47
City of Galax	2	3,227.00	1,613.50

The NFIP defines Repetitive Loss Properties as those with 2 or more claims of at least $1,000 over a 10-year rolling period. There are 21 such properties in the Mount Rogers Region. The breakdown by locality follows in the table on the next page:

Repetitive Loss Properties for Mount Rogers Planning District, as of 2018	
Locality	Number of Properties
Town of Abingdon	2
Bland County	6
City of Bristol	2
Town of Chilhowie	3
Town of Hillsville	1
Town of Marion	1
Town of Saltville	3
Washington County	1
Wythe County	1
Town of Wytheville	1

The Hazard Mitigation Assistance program defines Repetitive Loss as having incurred flood-related damage on 2 occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structure at the time of each such flood event; and, at the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage.

Flooding causes damages ranging from blocked roadways and flooded basements to severe damage and destruction of homes and businesses. People sometimes die when they attempt to cross flood-swollen creeks that under normal circumstances appear fairly harmless. Severe flooding can take out bridges and sections of roadway. Flooding can also force people out of their homes into emergency shelters as a way to save lives and prevent people in flood-prone areas from becoming stranded. Fortunately, despite the constant threat of flooding for much of the Mount Rogers region, few people have died. Many more have sustained property damage, and some have been relocated out of the floodplain through government-sponsored programs.

A map showing the 100-year floodplain for all localities in the Mount Rogers Region is located in the section titled Appendix I at the end of the document.

The localities in the Mount Rogers Region do not allow construction inside the floodplain unless the structure is elevated above the 100-year floodplain elevation. For this reason, the vulnerability of structures inside the floodplain have either not changed or become less vulnerable since the original writing of the 2005 Hazard Mitigation Plan.

At-risk Structures in the 100-year Flood Plain				
Locality	Number of Structures	%of Total Structures	Total $ Value of Structures*	Estimated Potential Damage (25%of Total Structure $ Value)
Bland County	237	6.25%	$11,376,000	$2,844,000
Carroll County	31	0.16%	$1,488,000	$372,000
Grayson County	48	0.44%	$2,304,000	$576,000
Smyth County	425	2.44%	$20,400,000	$5,100,000
Washington County	216	0.76%	$10,368,000	$2,592,000
Wythe County	226	1.42%	$10,848,000	$2,712,000
City of Bristol	146	1.77%	$7,008,000	$1,752,000
City of Galax	53	1.54%	$2,544,000	$636,000
** Average value of structure in flood plain is $48,000*				

Hazardous Material Spills

Description

Hazardous materials can be found in many forms and quantities that can potentially cause death; serious injury; long-lasting health effects; and damage to buildings, homes, and other property in varying degrees. Such materials are routinely used and stored in many homes and businesses and are also shipped daily on the nation's highways, railroads, waterways, and pipelines. This subsection on the hazardous material hazard is intended to provide a general overview of the hazard, and the threshold for identifying fixed and mobile sources of hazardous materials is limited to general information on rail, highway, and FEMA-identified fixed HAZMAT sites determined to be of greatest significance as appropriate for the purposes of this plan.

Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways, and on the water. Approximately 6,774 HAZMAT events occur each year, 5,517 of which are highway incidents, 991 are railroad incidents, and 266 are due to other causes. In essence, HAZMAT incidents consist of solid, liquid, and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind, and possibly wildlife as well.

HAZMAT incidents can also occur as a result of, or in tandem with, natural hazard events, such as floods, hurricanes, tornadoes, and earthquakes, which in addition to causing incidents can

also hinder response efforts. In the case of Hurricane Floyd in September 1999, communities along the Eastern United States were faced with flooded junkyards, disturbed cemeteries, deceased livestock, floating propane tanks, uncontrolled fertilizer spills, and a variety of other environmental pollutants that caused widespread toxological concern.

Hazardous material incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous material, but exclude:

1) any release which results in exposure to poisons solely within the workplace with respect to claims which such persons may assert against the employer of such persons;
2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel or pipeline pumping station engine;
3) release of source, byproduct, or special nuclear material from a nuclear incident; and
4) the normal application of fertilizer.

Risk Assessment and Vulnerability

The majority of Hazardous events in the Mount Rogers Region are due to fuel/oil releases from motor vehicle crashes. Typically range from a few ounces up to over one hundred gallons of diesel and oil from overturned tractor trailers.

The easiest way to mitigate against these events is early notification and have the appropriate agency (typically the fire department) to perform Hazardous Materials Operations level job functions such as, damming, diking, plugging, placing absorbent pads and/or booms down. Of course, this is for the small fuel spills. If the region has a larger event, then a large-scale HAZMAT team response would be necessary.

Karst and Sinkholes

Description

Sinkholes are bowl-shaped, funnel-shaped, or vertical-sided depressions in the land surface that form over underground voids. These depressions, which can range in size from a few feet to several hundred feet in diameter, usually result from the natural collapse of the roofs of caves eroded in soluble bedrock, but they can also result from man-made activity such as mining, groundwater pumping, or the failure of sewer and storm water drains. Subsidence of the ground is usually gradual, but on occasions it can be sudden and dramatic.

In regions of carbonate bedrock such as limestone or dolomite, slightly acidic rainwater percolating though organic soil dissolves the carbonate minerals as it comes into contact with the bedrock. Over time, this persistent process can create extensive systems of underground fissures and caves. The surface of such a region is often pocked with depressions. This type of topography is called karst terrain. In well-developed karst terrain, chains of sinkholes form what are known as solution valleys and streams frequently disappear underground.

Sinkhole collapse, either slow or dramatic, regularly causes considerable damage to buildings, highways, rails, bridges, pipelines, storm drains, and sewers. In addition, sinkholes provide a pathway for surface water to directly enter groundwater aquifers. The increasing potential for pollution is particularly high due to the minimal filtering of surface water.

A poor understanding of Karst terrain has led to land-use practices that pose significant economic and environmental impacts to households and communities. Sinkhole formation is closely related to local hydrological conditions, and human-induced changes to the local hydrology commonly accelerate the process. Diverting surface water, pumping groundwater, and constructing reservoirs all contribute to sinkhole collapse. An extreme example occurred in Florida on February 25, 1998,when, during the flushing of a newly drilled irrigation well, hundreds of sinkholes up to a hundred and fifty feet across formed over a twenty-acre area within a few hours. Runaway urbanization and development dramatically increases water usage, alters drainage pathways, and overloads the ground surface. According to the Federal Emergency Management Agency, the number of human-induced sinkholes has doubled since 1930, while insurance claims for related damages has increased 1,200 %from 1987 to 1991, costing nearly $100 million. Subsidence is not covered by standard homeowners insurance.

In Virginia, the principal area affected by sinkholes is the Valley and Ridge province, an extensive karst terrain underlain by limestone and dolomite, but the narrow marble belts in the Piedmont and some shelly beds in the Coastal Plain are also pocked with sinkholes. Dramatic collapses that swallow homes or persons have happened in Virginia, but are rare. The most notable incidents occurred in the City of Staunton: on August 11, 1910, parts of several homes and the firehouse were lost in a series of sinkholes on Baldwin Street and Central Avenue, and on October 28, 2001, a 45-feet deep chasm opened up on Lewis Street. In April of 2000, thirty-two sinkholes were reported in the upper Shenandoah Valley after seven inches of rain fell after a long dry spell.

Sinkholes regularly cause problems for transportation infrastructure in the Commonwealth. During the past thirty years, VDOT has recorded approximately 500 sinkholes that have damaged roads throughout the state. In March 2001, a nine-mile stretch of Interstate 81 in Augusta County was closed after the sudden appearance of three sinkholes, the largest measuring 20 feet long, 11 feet wide and 22 feet deep. On October 5, 2004, the right southbound lane of I-81 just north of the Exit 118C ramp in Montgomery County collapsed. Due to the potential for damage to infrastructure and danger to the travelling public, VDOT maintains an emergency contract for sinkhole repair. In general, sinkhole occurrence is unpredictable and the size of a sinkhole cannot be estimated from the surface collapse, so repair costs range from the tens of thousands to the hundreds of thousands of dollars per sinkhole. Research into sinkhole distribution and early prediction is ongoing; however, a true method of early prediction remains elusive.

Groundwater contamination is a common problem in populated areas overlying karst terrain. Karst aquifer contaminants in Virginia have included petroleum products, herbicides, solvents, fertilizers, sheep and cattle dip, sewage, dead livestock, and household garbage. In the late 1800s, a Shenandoah County community was subjected to a cholera outbreak due to the pollution of the local karst aquifer. A significant concern is the vulnerability of karst aquifers to contamination along the I-81 corridor, where hazardous materials are regularly transported and accidents can occur. For some chemicals that do not readily mix with water, contamination can be widespread and remain in the groundwater for many years. Most of Virginia's karst region follows Interstate 81, and twenty-seven of Virginia's counties lie in this zone, where hundreds of thousands of people get their drinking water from wells and springs.

State law prohibits the dumping of waste into sinkholes, and some Virginia counties have implemented ordinances about sinkhole dumping and outfalls. Meanwhile, the Virginia Health Department discourages the use of karst springs as public water supplies and requires periodic testing of those karst springs that are used. The Virginia Department of Conservation and Recreation's Natural Heritage Karst Program is responsible for groundwater and habitat protection in karst areas, supported by EPA Section 319 Clean Water Act Program. The USGS, working with various state agencies, has developed a National Karst Map.

Areas over underground mine workings are also susceptible to subsidence. Mine collapses have resulted in losses of homes, roadways, utilities and other infrastructure. Subsidence is often exacerbated by the extensive pumping of groundwater associated with underground

mining. Abandoned coal mines occur in Buchanan, Dickenson, Lee, Scott, Russell, Tazewell, Wise, Montgomery, and Pulaski counties in southwest Virginia; and Henrico, Chesterfield and Goochland counties in the Richmond coal basin. Other abandoned underground mines occur throughout the state. Information of past mining activity can be obtained from the Virginia Division of Mineral Mining and Division of Mined Land Reclamation.

Virginia counties containing significant karst terrain. Modified from Virginia Natural Heritage Karst Program.

Source: Department of Mines, Minerals, and Energy

History

In the local region, sinkholes suddenly appear from time to time on Interstate 81, which passes through the karst region of Virginia. One recent incident occurred in October 2003, when a sinkhole appeared on I-81 about one mile past the junction with I-77 in Wythe County. Both the Virginia Department of Transportation and Duke Energy said the sinkhole appeared in connection with drilling under the highway in connection with installation of a 24-inch natural gas pipeline. The incident blocked a northbound lane of I-81 for a few days before VDOT completed the needed repairs and the reopened the lane to regular use.

Subsidence also has been a problem for Saltville due to mining for salt and gypsum. Salt mining first began in 1782 and continued until 1972 with the shutdown of Olin Industries, once a major employer in Saltville. Commercial production of salt resumed in 2000 with completion of an evaporator plant by Virginia Gas Company, which was removing brine from the underground caverns to make room for natural gas storage.

Gypsum mining began in 1815 and continued under the U.S. Gypsum Company, starting in the early 1900s. U.S. Gypsum, which has since moved to production of artificial gypsum, closed its Saltville area facilities in 2000.

In 1960 a major collapse occurred in a section of the high-pressure brine field located just southwest of Saltville. The collapse involved four wells spaced closely together and considered shallow, ranging from 450 to 800 feet deep, according to expert testimony. Over time the bottom cavities of the wells appeared to have merged together. The underground collapse moved upwards through the relatively thin rock "roof" layers (themselves 200-316 feet thick) to the surface. This resulted in a crater 400 feet wide and 250 feet deep.

More recently, a section of State Rt. 91 collapsed into a 50-foot wide sinkhole in front of the offices of U.S. Gypsum. In the past gypsum mining had occurred under the collapse site and may have been a contributing factor. Blame was also placed on a leaking water line that had apparently dissolved the underlying limestone, thereby weakening the underground support structure and leading to the collapse. It should be noted these incidents have resulted from human-induced activities, while the focus of this study has been on hazards created by nature.

In the Wythe County community of Ivanhoe an underlying sinkhole eventually caused the floor of the local post office to fall through. A new post office has since been established for Ivanhoe. Karst terrain also is a factor in the Town of Chilhowie, which is investigating why the town water system loses 16 million gallons a month; some is thought to leak into the underlying terrain. Construction workers for Duke Energy Gas Transmission also encountered karst terrain during the recent installation of the Patriot Extension natural gas pipeline near New River Trail State Park (near Foster Falls in Wythe County).

Risk Assessment and Vulnerability

There is no known way to predict when sinkholes might open up or when subsidence might occur. There is only limited data available on karst terrain, its extent, and its importance from an ecological standpoint and as a natural hazard.

The ecological importance of this landform is only beginning to be understood through the efforts of various state and federal agencies and by groups such as the Karst Waters Institute, Cave Conservancy of the Virginias, The Nature Conservancy, and others.

As noted in the section on landslides, detailed basic geology maps are still under development in the state and local region. It is not possible to make any risk assessment other than in a generalized fashion. This task may become possible in the future under a new program on karst and subsidence hazards proposed for the National Cooperative Geologic Mapping

Program. The NCGMP is a digitized mapping effort by the U.S. Geological Survey in coordination with the Association of American State Geologists. The Geologic Mapping Act of 1992 mandated creation of a national geologic database.

The Karst and Subsidence Hazards program has been planned to develop better understanding of groundwater contamination, sinkhole formation, new techniques for karst analysis through remote sensing and geophysics, regional karst issues in the Appalachians, and understanding of karst issues on a national scale through development of a new National Atlas karst map.

Karst terrain is a special concern for Bland, Wythe, Smyth and Washington counties as a feature of the Valley and Ridge geological province. In the five-year time span since the original Hazard Mitigation Plan was written, the region's vulnerability to karst and sinkholes have not changed.

Karst as a natural hazard can be a costly matter for the community. There are the long-term costs associated with environmental pollution and contamination of the groundwater supply. There also are costs associated with damage created by subsidence, such as the collapse of State Rt. 91 into a sinkhole near Saltville in 1977. In 2004 VDOT was nearing completion on relocating 0.5 miles of Rt. 91 at an estimated cost of $2 million.

Due to the lack of mapping of significant karst terrain, incidents involving the sudden appearance of sinkholes and leakage often come as a surprise to local governments. No historical events have occurred since 2005.

Landslides

Description

Landslides can be defined as the downward and outward movement of soils and slope-forming materials reacting under the force of gravity. These movements can be triggered by floods, earthquakes, volcanic eruptions and excessive rain. The three important natural factors include topography, geology and precipitation. Human-caused factors include cut-and-fill highway construction, mining and construction of buildings and railroads.

Types of landslides include slides, flows, falls and topples (which occur rapidly), and lateral spreads (which occur much more slowly).

The Appalachian Highlands, along with other mountainous regions of the United States, are known to be highly susceptible to landslides. These come in the form of earth flows, debris flows and debris avalanches, mainly in areas of weathered bedrock and colluvium. Debris avalanches can occur during period of continual steady rainfall followed by a sudden heavy downpour. Areas prone to landslides include the plateau of the western Appalachian Highlands (especially in Tennessee and Kentucky) and southeast of the Appalachian Plateau, in the flanks of the Appalachian Ridge and the Blue Ridge (which includes the Mount Rogers region). For the most part these movements are comprised of slowly moving debris slides.

On a generalized scale, hazard-prone areas have been mapped by the U.S. Geological Survey. However, this information needs to be evaluated at ground level to more clearly identify the landslide-prone areas of the Mount Rogers region. A map showing landslide incidence and susceptibility in the Mount Rogers Region is located in the section titled Appendix I at the end of the document.

History

Information is limited regarding landslides and debris flows for the Mount Rogers region. While generalized statewide geology maps have been published, detailed maps for the local region are still in development. These will become the basic geology maps that in the future can be used in landslide risk assessment. Geologists with the Virginia Department of Mines, Minerals and Energy were in the process in 2003 of creating basic geology maps in Washington County and were planning to move into Smyth County and other parts of the Interstate 81 corridor. In the past most geologic mapping related to resources of economic value, such as coal.

The record is scant concerning landslide incidents in the Mount Rogers region. A staff review of a comprehensive, nationwide database giving locations of debris flows, debris avalanches, and mud flows revealed no information pertaining to the local region.

Small-scale landslides are known to occur on steep slopes and can sometimes block roadways. The Virginia Department of Transportation makes emergency repairs as needed. On occasion, a major landslide can block a roadway. Heavy rains and the annual freeze-thaw cycle can trigger these landslides.

More recently in March of 2011 a rockslide occurred in Carroll County. The event happened on Interstate 77 at mile marker 3.8 in the left northbound lane. A boulder roughly the size of a car

fell onto the highway. A man struck the boulder with his car killing him instantly. VDOT officials surveyed the cliff above and determined that no other rocks were in danger of falling.

Risk Assessment and Vulnerability

The Mount Rogers region is mountainous in nature, and its steep slopes make parts of the region susceptible to landslides. The hazard-prone areas have been generally mapped by the U.S. Geological Survey, as shown below.

The USGS divides landslide risk into six categories. These six categories were grouped into three, broader categories to be used for the risk analysis and ranking; geographic extent is based off of these groupings. These categories include:

High Risk

1. High susceptibility to landsliding and moderate incidence.
2. High susceptibility to landsliding and low incidence.
3. High landslide incidence (more than 15%of the area is involved in landsliding).

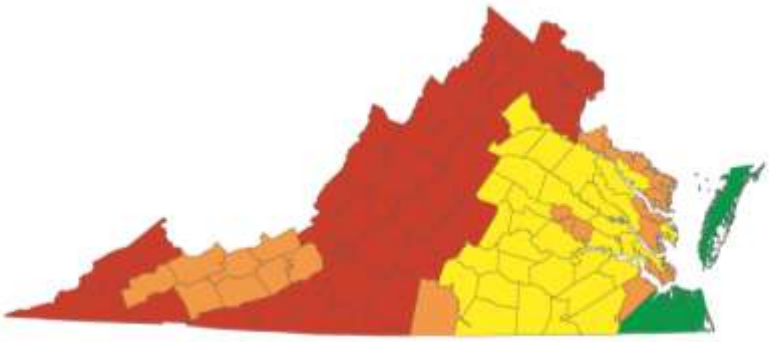
Moderate Risk

4. Moderate susceptibility to landsliding and low incidence.
5. Moderate landslide incidence (1.5 - 15%of the area is involved in landsliding).

Low Risk

6. Low landslide incidence (less than 1.5 %of the area is involved in landsliding).

The six categories were grouped into High (categories 1-3), Medium (categories 4 –5), and Low (category 6) to assess the risk to state faculties, critical facilities and jurisdictions.



Counties in Virginia that are susceptible to landslides.
Red = high potential; orange = moderate potential; yellow = moderate to low potential; green = low potential.

Source: Department of Mines, Minerals, and Energy

Certain types of rocks and geologic conditions, when they occur on slopes, make an area prone to landsliding. These types include fine-grained clastic rocks (those consisting mainly of silt and clay-sized particles), highly sheared rocks and loose slope accumulations of fine-grained surface debris, which give way during times of intense or sustained rainfall. Steep slopes also can add to the likelihood of landslides. Debris flows, for instance, are known to occur mainly on slopes steeper than 25°.

There is no accepted method for determining the likelihood of a landslide in the Mount Rogers region. Given the relative lack of historical data on catastrophic landslides affecting the region, our best guess is a major landslide incident appears to be unlikely.

Landslides are not well understood in the Mount Rogers region. Most geologic studies have been focused on mineral resources (especially coal) of economic importance. Basic geologic mapping is only beginning to get underway in the region. More information will be needed before any detailed risk assessment can be made for localities in the Mount Rogers region.

Please see the image above (Generalized Landslide Image of Southwest Virginia) for a visual depiction of potential landslide risk areas in the local region.

Generally speaking, the areas posing the greatest landslide risk include the pink and red regions. The pink regions include parts of Washington, Smyth and Grayson counties and a corner of Carroll County. The red regions include much of Carroll County and the border area between Washington, Smyth and Grayson counties.

Landslides can damage or destroy roads, railroads, pipelines, utilities and infrastructure, forests, fisheries, parks and farms. Damages can include economic losses to local, state and federal agencies – because of the impacts to public infrastructure – and to the private sector for impacts to land and buildings. When located near communities, sudden landslides also can cause death. In the five-year time span since the original Hazard Mitigation Plan was written, the region's vulnerability to Landslides have not changed.

Severe Winter Storms and Ice

Description

Blizzards represent the worst of the winter season, combining heavy snowfall, high winds, extreme cold and ice storms. Severe winter storms can be characterized by heavy snowfall but

lacking the severity usually associated with blizzards. They often begin as mid- latitude depressions or cyclonic weather systems and sometimes follow the jet stream.

For the Mount Rogers region storm systems travel in from the Midwest and Tennessee Valley, from the Gulf Coast region and sometimes as a result of a major coastal storm that passes inland. On the northern side, extreme cold weather and Arctic cold fronts move in from Canada and are known to sweep into the Mid- Atlantic region. The severity of these storms may result from high snowfall accumulations that lead to major snowdrifts and blizzard conditions or that later melt and cause flooding. Wetter storms may have only limited amounts of snow but are severe due to accumulations of ice. A light covering of ice can easily create numerous traffic accidents. Both ice and heavy snow can tear down tree limbs, trees, power lines and telephone lines, creating major disruptions that sometimes cannot be cleared up for weeks. A map showing the heaviest average snow accumulations in the Mount Rogers Region is located in the section titled Appendix I at the end of the document.

History

The historical record for snowstorms and blizzards in the Mount Rogers regions gives numerous examples of how bad these storms can get. major winter events in the region resulted in seven federal disaster declarations and at least four state emergency declarations. The chart below contains inconsistencies in monetary values and locations of damage due to poor recordkeeping within localities.

Major Winter Storms, Cold and Ice
Mount Rogers Region, Virginia 1993-2017

Date	Localities	Description
01-17-13	Bland, Carroll, Grayson, Smyth, Wythe, Galax	The region was hit by a winter storm that brought heavy snow fall ranging from 12 inches in Rocky Gap (Bland County) to 6.0 inches in Ceres (Bland County). This winter storm brought the interstate to a standstill with accidents and heavy snow fall.
4-28-03	Wythe County	Severe winter storm, near record snowfall, heavy rain, flooding, and mudslide. 39 jurisdictions had disaster declarations. Wythe qualified in April for public assistance as result of the March storm.
3-30-03	Bland, Carroll, Grayson, Smyth, Wythe, Galax	Winter storm with heavy snow that began during the predawn hours of the 30th and continued through the early afternoon. Snow accumulated 6-12", brought down numerous tree limbs and power lines, resulting in more than 50,000 power outages.
2-15-03	Bland, Grayson, Wythe	State emergency declaration due to severe winter storm, impassable roads and flooding. SW Virginia got more than 4" of rain. Evacuations from homes in Bland and Wythe counties.
12-11-02	Carroll, Galax	State emergency declaration due to icy conditions creating massive power outages. Accretions of ¼" of ice. An icy winter storm followed on Dec. 13.
12-04-02	Bland, Carroll, Grayson, Smyth, Washington, Wythe, Galax.	Winter storm affected a wide area of SW Virginia. Snowfall amounted to 5-10" and ice of 1" or more in Carroll and Floyd counties. Numerous traffic accidents.
5-22-02	Bland, Carroll, Wythe, Bristol, Galax	Freeze damage affected Christmas tree growers.
2-28-00	Bland, Carroll, Grayson, Smyth, Washington, Wythe	Severe winter storm. 107 jurisdictions had disaster declarations for winter storm from Jan. 25-30, 2000.
1-25-00	Bland, Carroll, Grayson, Wythe, Galax	State emergency declaration due to winter storm with high winds that dumped up to 18" of snow across much of the state, with drifting and blizzard conditions. Local storm occurred on Jan. 29. Snow mixed with sleet amounting to 4-8" inches, 11" in higher elevations.
3-15-99	Bland, Carroll, Smyth, Wythe, Galax	Winter storm developed with rain and sleet changed to a wet snow early in the morning. Snow amounts of 4-8", with up to 10" in the higher elevations. The snow downed power lines and small trees, resulting in power outages.

Date	Localities	Description
3-03-99	Bland, Carroll, Grayson, Smyth, Wythe, Galax	Winter storm resulted from rain changing to sleet and then snow, with accumulations of 6-12". Numerous motor vehicle accidents. Motorists stranded for 5-6 hours on I-77.
12-23-98	Bland, Carroll, Grayson, Smyth, Wythe, Galax	Ice storm created ice accretions of ½" and sometimes as much as 1". Ice downed tree limbs and power lines and created numerous power outages. Many traffic accidents and some injuries due to ice-covered roads and bridges.
1-28-98	Bland, Carroll, Grayson, Smyth, Wythe, Galax	State emergency declaration for severe winter storm with heavy snowfall in the western part of the state causing riverine flooding. Snowfall of 15-32" closed schools, businesses & church services & stranded people in vehicles & homes. Numerous traffic accidents. A charter bus overturned on I-81 near Marion, injuring 20 people. I-81 was closed for several hours during the height of the storm. Power lines, tree limbs and trees were knocked down.
12-29-97	Bland, Carroll, Grayson, Smyth, Wythe, Galax	Heavy winter snowstorm produced accumulations of 5-10", with 4-7" in Bland County. Bad road conditions resulted in numerous traffic accidents.
3-28-96	Bland, Carroll, Wythe, Galax (Bath County hardest hit)	Ice storm with freezing rain all day created significant ice cover above 1900 feet. Ice downed tree limbs, power lines, telephone lines. Numerous power outages and some traffic accidents.
2-02-96	Bland, Carroll, Grayson, Smyth, Washington, Wythe, Bristol, Galax	State emergency declaration for a winter storm with heavy snow, followed by extreme cold Feb. 3rd - 6th. Burkes Garden in Bland County recorded 22° below zero. Most locations had morning lows on the 5th of zero to 12° below zero. Emergency declaration based on an Arctic air mass moving across state Feb. 1-4, with potential to cause widespread power outages.
1-06-96	Bland, Carroll, Grayson, Smyth, Wythe, Galax	Blizzard of 1996. State emergency declaration for a predicted winter storm with blizzard conditions and snowfall of 12-24" expected. Statewide disaster declaration. Occurred Jan. 6-13.
Winter of 1995-96	VDEM "Virginia Winters" account	Unusually heavy snowfall for the winter. Burkes Garden had 97", while Bland had 62". Some schools lost up to 15 days due to snow.
3-28-94	Bristol	Severe ice storms, flooding
3-10-94	Bland, Carroll, Grayson, Smyth, Washington, Wythe	Severe ice storms, flooding. May be related to the state emergency declaration of March 2, 1994.

Date	Localities	Description
3-12-93 to 3-13-93	Bland, Carroll, Grayson, Smyth, Wythe, Galax (affected a region from Florida to New England)	Blizzard of 1993. 43 jurisdictions received disaster declarations statewide. Extreme cold and heavy snowfall, along with high winds, sleet and freezing rain left many motorists stranded. $5 million property damage. It was the biggest storm in a decade in Virginia. SW VA got 24-42" of snow. Interstate highways were closed and emergency shelters were opened to house up to 4,000 motorists.
12-18 2009	Grayson, Carroll, Smyth, Washington.	Grayson County received federal assistance. A total of $600,000 of damage was reported

Source: Virginia Department of Emergency Management and National Climatic Data Center.
Note: Items with dates appearing in boldface and shading resulted in presidential disaster declarations.

Major storms such as the Blizzard of 1993 closed down interstate highways, stranded motorists in their vehicles and trapped people in their homes. The event also brought high winds, sleet and freezing rain, adding to the disruptions created by the snowfall. In southwest Virginia, snowfall ranged from 24 to 42 inches in what was the largest snowstorm in a decade for the state. The Blizzard of 1996 (January 6-13) began in the southeastern states and moved into the northeastern states to cover the entire eastern seaboard. Snowfall amounted to one to four feet, with the greatest impacts for Virginia and West Virginia. On a statewide level, Virginia had 48 inches of snow, followed by West Virginia with 43 inches of snow. Much of the same region experienced two more snowstorms that dumped up to 12 inches more within the next 10 days. The National Climatic Data Center listed the storm of December 2009 as the only winter storm since the writing of the original plan that caused major monetary damage.

Below is the Northeast Snowfall Impact Scale (NESIS) that characterizes and ranks high impact winter storms.

Category	NESIS Value	Description
1	1—2.499	Notable
2	2.5—3.99	Significant
3	4—5.99	Major
4	6—9.99	Crippling
5	10.0+	Extreme

Locality	Avg. Annual Total Snowfall
Abingdon	16.3"
Bland	25.5"
Burkes Garden	46.3"
Byllesby	11.4"
Chilhowie	19.2"
Damascus	22.0"
Galax Radio	19.1"
Hillsville	18.9"
Independence	20.2"
Mendota	15.6"
Saltville	13.4"
Troutdale	20.2"
Wytheville	19.9"

Snowstorms pose a threat not only because of dangerous driving conditions and downed power lines, but also due to the melting that can lead to flooding. During the 2002-2003 winter season, severe winter storms later created flooding problems in Bland, Grayson and Wythe counties, with Wythe declared eligible for federal disaster assistance.

Due to variable topography and other factors, average annual snowfall amounts vary greatly throughout the Mount Rogers region, based on available weather records shown in the accompanying table shown at left. The data covers time periods as long as 81 years.

Risk Assessment and Vulnerability

Winter storms are a regular part of the weather regime for the Mount Rogers region. The severity of the season varies from year-to-year and can be highly variable among the localities for any given storm event. The variability can be due to differences in elevation, differences in temperature and the track of given storm systems.

In recent years there have been at least seven federal disaster declarations and four state emergency declarations due to severe winter storms over a 10-year period, as shown in the table on Major Winter Storms, Cold and Ice. Based on this brief time period, it is likely localities in the Mount Rogers region will experience at least one major snow and/or ice storm per year with the potential to become a federal disaster. The winter season typically runs from November to April of each year.

The average winter season in the Mount Rogers region can create annual snowfall amounts ranging from 8 to 46 inches. The average snow season in Roanoke produces 23 inches per year. The average winter season in the Mount Rogers region can create annual snowfall amounts ranging from 8 to 46 inches. The average snow season in Roanoke produces 23 inches per year (over 49 years) and in the Bristol- Johnson City- Kingsport, Tenn. area produces 15.6 inches per year (over 59 years).

Any major winter storm or blizzard is likely to affect the entire Mount Rogers region, with the most direct impacts affecting highways and power lines. Most snow- related deaths result from traffic accidents, overexertion, and exposure. Sometimes also there is damage to buildings from collapsed roofs and other structural damage. In the five- year time span since the original Hazard Mitigation Plan was written, the region's vulnerability to winter storms have not changed. There is no way that we know of to calculate the likely costs of a major winter snow or ice storm. The available data, through the National Climatic Data Center, reports damages by storm event, but this is not broken down by locality.

Severe winter storms and ice can cause death and injury on the highways and trap people in their motor vehicles or in their homes due to impassable roads. Snowstorms also regularly result in the closing of schools; in some years, the local schools have been closed as much as 15 days due to winter conditions. Forecasts of impending snowstorms also regularly result in early school closings to reduce risk from bus and traffic accidents. Likewise, winter conditions can result in temporary disruptions of business activity, with workers advised to remain home until driving conditions improve.

The Virginia Department of Transportation deals directly with the effects of snowstorms. On average in the past five years, VDOT has spent $83 million annually on snow removal. As a general rule, the first priority is to plow interstate highways, major primary roads and secondary roads. Plowing in subdivision and residential areas are the second priority during winter storms. VDOT seeks to get ahead of snow conditions on the roadways through pre-treatments with liquid chloride and close monitoring of storm conditions and incoming storms.

For American Electric Power the main concern is icing, which can tear down overhead power lines. AEP is sometimes hampered in its efforts to restore power during major snowstorms due to the poor condition of the roads. The state's system of highway maintenance, carried out by several private contractors, at times creates uneven results during snow clearing.

Thunderstorms and Lightning

Description

Thunderstorms arise from atmospheric turbulence caused by unstable warm air rising rapidly into the atmosphere, enough moisture to form clouds and rain and an upward lift of air currents caused by colliding warm and cold weather fronts, sea breezes or mountains. Thunderstorms are always accompanied by lightning, but they may also be associated with heavy rains, hail and violent thunderstorm winds.

Thunderstorms occur most often during the spring and summer months and can occur throughout the entire Mount Rogers Region. Nationwide the average storm is 15 miles wide and generally last less than 30 minutes at any given location. Some storm systems have been known to travel more than 600 miles. A map showing the favored high wind areas in the Mount Rogers Region is located in the section titled Appendix I at the end of the document.

History

Storm events reported to the National Climatic Data Center reflect the kind of activity and damages resulting from high winds and thunderstorm winds. Describing the data can be problematic, since storms often travel over wide regions. The reported damages represent those for the entire storm event and are not usually limited to a given locality. The data given in the table below offers a guide to thunderstorm history in the Mount Rogers region.

Storm Event History for Thunderstorm Winds, as of April 2018					
Location	Time Period	No. Of Years	No. Of Events	Avg. Per Year	Reported Damages
Bland County	May 1989- April 2018	28	38	1.4	$334,000
Carroll County	June 1960- April 2018	57	81	1.4	$1,430,000
Grayson County	May 1962- April 2018	55	62	1.1	$672,000
Smyth County	April 1972- April 2018	45	62	1.4	$828,000
Washington County	June 1995- April 2018	22	119	6	$1,570,000
Wythe County	July 1962- April 2018	55	55	1	$705,000
City of Bristol	July 1980- April 2018	37	46	1.3	$252,000
City of Galax	Jan. 1998- April 2018	19	14	0.7	$29,000

Another event, on July 4, 1997, captured in the NCDC data involved a supercell thunderstorm and associated severe thunderstorms affecting a region stretching from Tazewell to Pittsylvania counties. Thunderstorm winds estimated at 60-80 mph and hail the size of golf

balls damaged at least 29 homes, 16 mobile homes, five outbuildings, four businesses and a church in a two-mile path near Wytheville. There was also widespread damage to vehicles, roofs, sidings, satellite dishes, trees and a large sign knocked down by the winds. Wytheville Community College sustained 100 broken windows. Hail drifts amounted to six to eight inches deep in several locations. The event caused an estimated $300,000 in property damage.

A supercell thunderstorm, while rare, is the often the most violent known form of thunderstorm and is associated with tornadoes, damaging straight-line winds and large hail. These events are defined as long-lived thunderstorms with a persistent rotating updraft. They often contain a mesocylone, or storm-scale regions of rotation typically two to six miles in diameter that may produce tornadoes.

Lightning

Thunderstorms are always accompanied by lightning, which can cause fires, injury and death. Florida is known for having the greatest number of thunderstorms and the highest density lightning strikes in the contiguous United States.

Lightning becomes a problem when the discharge of a lightning bolt connects with an object or surface on the ground. Lightning will be considered together with thunderstorms in judging the importance of this hazard for the Mount Rogers region.

Risk Assessment and vulnerability

Southwest Virginia experiences 60-80 thunderstorms on average per year. Most of these occur during the summer months, extending from May through September, with July the peak month for thunderstorms statewide, according to the state climatology office. This is moderate compared to other parts of the country with more than 130 thunderstorms annually. During the peak of the thunderstorm season in the local region, storms may roll through at the rate of three or four per week, which is relatively frequent.

People and property throughout the Mount Rogers region are subject to damages and injuries created by lightning and thunderstorms. But any individual storm is likely to affect only a very limited area. In the five-year time span since the original Hazard Mitigation Plan was written, the region's vulnerability to thunderstorms and lightning has not changed.

Virginia experiences a moderate number of thunderstorms and lightning strikes compared to other parts of the country, according to research cited by FEMA. Thunderstorms in the Mount

Rogers region typically last 70-80 minutes in any given location, which falls in the mid-range for storm duration nationwide. In some areas thunderstorms last 130 minutes or more, based on findings by the National Weather Service for the years 1949-1977.

These storms can cause serious structural damage to buildings, start forest fires and wildfires, blow down trees and power lines, and cause death. On rare occasions, events such as the supercell thunderstorm from July 1997 can cause widespread damage, as previously discussed on the history section.

Nationally, Virginia falls in the mid-range for lightning fatalities, based on the cited research through the National Oceanic and Atmospheric Administration. States such as Florida, North Carolina, New York and Tennessee rank far ahead of Virginia. The lightning that accompanies thunderstorms in the Mount Rogers region averages 4-6 strikes per square kilometer, which is relatively low.

It is not possible based on available data to quantify the impacts of thunderstorms and lightning for localities in the Mount Rogers region. Available data from the National Climatic Data Center, which tracks incidents of thunderstorms and thunderstorm wind damage, is reported on a regionalized basis often covering numerous localities as a storm system moves through. Data resources will have to improve in the future to be able to make these calculations on the local level.

Tornadoes and Hurricanes

Description

A tornado appears as a rapidly spinning vortex or funnel of air extending to the ground from an overhead storm system (usually a thunderstorm). Tornadoes come in many sizes, ranging from several yards to more than a mile wide. The severest tornadoes can achieve wind speeds of more than 300 mph, though most are 100 mph or less. The weakest tornadoes may last only about a minute, while the stronger ones may continue for 30 minutes at a time and travel miles before dissipating. Virginia is said to have an average of seven reported tornadoes per year (1950 through 2006), though the actual number of tornadoes may be higher.

Statistically the peak month for tornadoes in Virginia is July, though the tornado season goes from spring through fall. Tornadoes spring from an estimated 1% of all thunderstorms; of the group that produces tornadoes, only about 2% are considered violent with winds over 200 mph

(categories F3, F4 and F5 on the Fujita scale). Tornadoes also can be associated with hurricanes, though hurricanes are not a significant factor in southwest Virginia.

FUJITA SCALE			DERIVED EF SCALE		OPERATIONAL EF SCALE	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85	0	65-85
1	73-112	79-117	1	86-109	1	86-110
2	113-157	118-161	2	110-137	2	111-135
3	158-207	162-209	3	138-167	3	136-165
4	208-260	210-261	4	168-199	4	166-200
5	261-318	262-317	5	200-234	5	Over 200

As seen in table shown above, tornadoes are measured on the Enhanced Fujita Scale, with categories ranging from F0 to F5. The categories are defined according to wind speed and the types and severity of damage caused. Parts of southwest Virginia show some tendency toward tornadoes in an area that extends from Tennessee into Bristol and Washington County due to the lay of the land and its influence on storm systems. Maps showing tropical cyclone tracts and tornado hazard frequency in the Mount Rogers Region are located in the section titled Appendix I at the end of the document.

History

Between 1950 and 2005, Virginia experienced six tornadoes per year or 1.6 tornadoes annually per 10,000 square miles. Two storms per year on average were rated as strong or violent (F2- F5), with 0.5 such storms per 10,000 square miles per year.

Tornado History: Mount Rogers Region1950 through 2017

Locality	Date	Time	Dead	Hurt	F Scale
Bland Co.	-	-	-	-	-
Carroll Co.	Aug. 1, 1965	0230	0	5	F1
	Aug. 21, 1977	1700	0	0	F2
	July 4, 1979	1620	0	0	F1
	May, 6 2009	2126	0	0	F0
Grayson Co.	July 10, 1959	1500	0	0	F1
	May, 6 2009	2125	0	0	F0
	October 23, 2017	1747	0	0	F1

Locality	Date	Time	Dead	Hurt	F Scale
Smyth Co.	April 4, 1974	0405	0	3	F3
	Jan. 25, 1975	2335	0	2	F2
	June 5, 1975	1815	0	0	F0
	July 13, 1975	1900	0	0	F1
	April 28, 2011	0200	0	1	F2
	April 28,2011	0015	0	0	F2
Washington Co.	April 30, 1953	1845	0	0	F0
	June 10, 1953	1500	0	0	F1
	June 3, 1962	1600	0	0	F2
	April 4, 1974	0400	1	1	F3
	Jan. 25, 1975	2330	0	0	F2
	April 30, 1990	1725	0	0	F0
	April 28, 2011	0100	4	50	F3
Wythe Co.	-	-	-	-	-
City of Bristol	April 4, 1974	0300	0	0	F0
City of Galax	-	-	-	-	-
Totals:	20 events		5	61	

For the Mount Rogers region there have been 20 reported tornadoes from 1950 through April 2011, with 5 people killed and 61 people injured. The highest intensity ever recorded for these storms was F3. See the table above for more details.

On the Fujita scale, an F3 category tornado is considered severe, with winds up to 206 mph. This fits with the FEMA Wind Zone III designation for the region. By definition, Zone III communities are known to experience winds of 160-200 mph.

The tornadoes of April 4, 1974 were part of what is known as the "Super Outbreak," when severe thunderstorms at the leading edge of a cold front moved into southwest Virginia. Eight tornadoes struck statewide, killing one person and hurting 15. The destruction affected more than 200 homes and barns and more than 40 mobile homes and trailers. The storm event in total spawned 148 tornadoes killed 315 people and injured 5,484. "Super Outbreak" created the most tornadoes ever recorded in a 24-hour period and the worst tornado outbreak since Feb. 19, 1884. This was true until the tornado outbreak of April 25-28 of 2011. This outbreak produced at least 336 tornados in 21 states from Texas to New York and even created isolated tornadoes in Canada. The storms caused $10 billion worth of damage and tragically resulted in

346 deaths. In the Mount Rogers Planning District, the storms resulted in 4 fatalities and caused $38.5 million in damages.

One of the tornadoes, rated at F0 to F1, struck near Bristol, demolishing several mobile homes and hurting four people. A stronger F3 tornado hit the Saltville area, traveling up the valley of the North Fork Holston River from Washington County, then following Tumbling Creek into Poor Valley and traveling up the Poor Valley to Cardwell Town. The storms resulted in one dead, one injured and destruction of two houses, two mobile homes, a church and three barns. There was also damage to 42 homes, two mobile homes and the roof of a high school. Wind damage was reported in Bland and Wythe counties.

Hurricanes

Generally speaking, the Mount Rogers region does not have hurricanes and is not considered hurricane-susceptible like communities all along the east coast. Hurricanes become a factor on those rare occasions when the storm systems take an inland route as they pass over the Mid-Atlantic region. Two of the most significant hurricanes in recent decades affecting the Mount Rogers region were *Hurricane Agnes* (June 1972) and *Hurricane Hugo* (September 1989).

Hurricane Agnes, originating off the coast of the Yucatan Peninsula in Mexico, became a tropical storm on June 16, 1972 and then a hurricane in June 19, 1972. It crossed the Florida panhandle on June 19 and passed through Georgia, South Carolina and North Carolina before returning to the Atlantic Ocean to regain strength. The storm made landfall a second time on June 22, 1972 in southeastern New York and moved west across the southern tier of New York and into north-central Pennsylvania, where the $3.1 billion hurricane made its greatest impact.

Though the local record is scanty for this storm, 106 jurisdictions in Virginia qualified for a presidential disaster declaration due to widespread flooding. Those included Smyth County and the City of Galax. Most notable for damage caused by flooding, Agnes dropped an average of 6-10 inches of rain over the Mid-Atlantic region from June 20-25, 1972. The storm in Virginia created an estimated $126 million in damages and resulted in 13 deaths.

Hurricane Hugo began as a cluster of thunderstorms moving west off the coast of Africa. As the storm system passed over the Atlantic Ocean, it gained strength to become a tropical depression and then a hurricane, on Sept. 13, 1989. Once classified as a Category 5 storm

(highest intensity hurricane) on the Saffir- Simpson Scale, Hugo did great damage in the Caribbean and Puerto Rico. By Sept. 19 the storm had weakened and moved back over the Atlantic, where Hugo regained strength and became a Category 4 hurricane with winds up to 135 mph when it made landfall near Charleston, S.C. on Sept. 22, 1989. By the time Hugo passed west of Charlotte, N.C., it had weakened to a tropical storm with peak winds of 87 mph. The storm continued tracking north over southwest Virginia and West Virginia; the Appalachian Mountains helped weaken the storm further as it continued into western New York and passed out of the country. In the end, six Virginians died as a result of Hugo. As the storm passed over the Appalachians, orographic effects were thought to cause locally heavy rainfalls of more than six inches over western North Carolina and southwest Virginia, causing small stream flooding. Orographic effects are defined as those caused by the presence of mountains; most commonly, this occurs when air rises over the mountains and then cools, creating condensation and rainfall. In total Hugo was estimated as a $9 billion storm in damages and economic losses, with $7 billion of that total occurring on the mainland, particularly in the Carolinas.

Risk Assessment and Vulnerability

The Mount Rogers region appears to face a low risk of tornadoes and hurricanes. FEMA classifies the region under Wind Zone III, meaning winds can reach speeds ranging from 160 mph to 200 mph. The region also, based on historical information, experiences less than one tornado per 1,000 square miles. Tornadoes are rare for the Mount Rogers region.

FEMA High Wind Matrix
Tornado and Hurricane Risk

		Wind Zone			
		I	II	III	IV
No. of Tornadoes per 1,000 sq. miles	< 1	Low Risk	Low Risk ✹	Low Risk✹	Moderate Risk
	1-5	Low Risk	Moderate Risk✹	High Risk	High Risk
	6-10	Low Risk	Moderate Risk✹	High Risk	High Risk
	11-15	High Risk	High Risk	High Risk	High Risk
	> 15	High Risk	High Risk	High Risk	High Risk

Saffir-Simpson Scale

Category	Winds	Effects
One	74-95 mph	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal road flooding and minor pier damage
Two	96-110 mph	Some roofing material, door, and window damage to buildings. Considerable damage to vegetation, mobile homes, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of center. Small craft in unprotected anchorages break moorings.
Three	111-130 mph	Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures with larger structures damaged by floating debris. Terrain continuously lower than 5 feet ASL may be flooded inland 8 miles or more.
Four	131-155 mph	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach. Major damage to lower floors of structures near the shore. Terrain continuously lower than 10 feet ASL may be flooded requiring massive evacuation of residential areas inland as far as 6 miles.
Five	greater than 155 mph	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Major damage to lower floors of all structures located less than 15 feet ASL and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5 to 10 miles of the shoreline may be required.

A tool to judge damage potential from tornadoes and hurricanes can be found in a FEMA publication called *Taking Shelter from the Storm: Building a Safe Room Inside Your House*. The tool appears in the table above.

The matrix and the wind zone assignments are based on 40 years of tornado history and more than 100 years of hurricane history in the United States, as well as research by the Wind Engineering Research Center at Texas Tech University. This serves as the basis for a low risk rating for the Mount Rogers region.

Tornadoes, though rare for the Mount Rogers region, have been known to achieve an F3 intensity rating, based on the Fujita scale. These most severe known tornado incidents have occurred in Smyth and Washington counties. An F3 intensity tornado contains sufficient power to tear roofs and walls from well-built homes, uproot most trees, and lift objects such as

automobiles off the ground and send them flying through the air. These storms can generate wind speeds of 158-206 mph.

As for hurricanes, the Mount Rogers region stands far inland and is not part of the coastal zone region where hurricanes cause most of their damage. Generally speaking, the local region experiences the outer effects of hurricanes; this can include high winds and heavy rainfall. Since heavy rainfall mainly results in flooding, hurricane impacts in this plan are covered in the section on flooding. In the five-year time span since the original Hazard Mitigation Plan was written, the region's vulnerability to tornadoes and hurricanes has not changed.

Wildfires

Description

Wildfires occur as a regular part of the natural environment and are fueled by trees, brush and grasses. The three primary factors that influence these fires are topography, fuel and weather. Nationwide, the most frequent and worst of the wildfires occur in the western states, due to the dry climate and the prevalence of conifer and brush fuel types.

Wildfires also occur as a result of human actions, with increasing numbers of people choosing to live in wooded and wildland settings (described as the wildland urban interface), a factor that is also an issue for the eastern states, including the Mount Rogers region.

It is possible to group wildfires into four categories, as follows:

- Wildland fires occur in national forests and parks and are fueled by natural vegetation. Federal agencies typically hold the lead role for fire management and suppression for this group of fires.
- Interface or intermix fires happen at or near the junction between natural vegetation and the built environment.
- Firestorms are high-intensity fire events that are impossible to control or suppress until conditions change or the available fuel is gone. Firestorms have been a particular problem in the western states.

Prescribed fires and prescribed natural fires include those that are intentionally set and those that are allowed to burn as part of a fire management program to help clear out excessive accumulations of vegetative fuels.

A map showing wildfire risk in the Mount Rogers Region is located in the section titled Appendix I at the end of the document.

History

Wildfires in the Mount Rogers region are not as prevalent or as damaging as the massive fire events that occur every year in the western states. But the risks still exist due to the amount of forested land in the region, presence of contributing factors (steep slopes, pine woods, wildfire history), and residential development in remote, wooded areas throughout the region.

From 1995 through 2011 the Mount Rogers region had roughly 505 fires causing an estimated $730,000 in damages as shown in the table below. Total property saved from destruction was estimated at more than $23 million, according to data by the Virginia Department of Forestry (VDOF). The greatest number of fires occurred in Carroll County. Though it had fewer fires during the seven-year period, Washington County sustained fire damage to the largest total land mass.

VDOF data also points to debris burning and incendiary (arson) sources as the most common cause of fires in the Mount Rogers region. Those two sources accounted for 370, or 73%, of the 505 fires occurring between 1995 and 2011. Less frequent fire causes included equipment use, miscellaneous, smoking and children.

On the federal level, catastrophic fire losses in the western states have led to the development of the National Fire Plan and the Healthy Forests Initiative.

The National Fire Plan has resulted in more spending by state and federal agencies for improved prevention of wildfires. In the George Washington and Jefferson National Forests, which include the Mount Rogers region, the added funding supported efforts to reduce levels of fire-prone fuels and to establish a Type I firefighting crew. The National Fire Plan aims to provide sufficient resources for firefighting, rehabilitate fire-damaged ecosystems, reduce levels of fire-prone fuels found in the forests, and reduce fire risk faced by woodland property owners.

The Healthy Forests Initiative is a long-term plan promoted by federal agencies to improve management of federal lands and expedite forest and rangeland restoration projects. This effort is focused on communities near the wildland urban interface, in high-risk municipal watersheds, in watersheds containing habitat for threatened and endangered species, and where ecosystems are being destroyed by insect and disease epidemics and face increased threat of catastrophic wildfire. The wildland urban interface, particularly where rural housing development intermingles with the forest, is a concern for the Mount Rogers region.

Risk Assessment and Vulnerability

The Mount Rogers region covers an estimated 1.77 million acres of land. Of that total, an estimated 1 million acres of land (roughly 58%) is classified as forestland, with nearly all used as timberland. Areas subject to fire risk include the forestlands and places where people are building homes and residential subdivisions in wooded settings.

Virginia Department of Forestry (VDOF) criteria for determining areas of highest risk take into account factors such as density of historical wildfires, nature of the land cover (pines are more flammable than hardwoods), steepness and orientation of slope, population density, distance to roads, road density and developed areas, and presence of railroads. VDOF is incorporating its data into a GIS-based mapping system called ForestRIM to help make wildfire risk assessments and to identify woodlands home communities.

VDOF statistics for the state show most fires occur during the spring fire season (February-May) and on a lesser level during the fall fire season (October-December). More fires occur during these periods due to drier weather conditions, higher winds and the presence of cured fuels that can easily ignite. Causes of fires statewide include: open burning (30%), arson (20%), smokers (14%), miscellaneous (11%), children (9%), equipment use (7%), railroads (5%), lightning (3%), and campfires (1%).

In any given year on average, the Mount Rogers region may experience 70 wildfires, based on the state forestry data over the past 15 years.

Information on wildfire risk was being developed through VDOF and its GIS-based ForestRIM program, which mapped areas of risk into categories of low, moderate and high, based on criteria described above. The VDOF data did not include information on wildfires occurring on

federal lands (which would include the national forests and the Mount Rogers National Recreation Area).

The VDOF wildfire risk data as available in early 2004 showed:

- Carroll and Washington counties contained the largest amount of land subject to high risk of wildfire (more than 100,000 acres for each county).
- Washington County appeared to have the highest number of woodland homes subject to high risk of wildfire, followed by Carroll County.
- Substantial regions of high wildfire risk were also apparent for Smyth County (in its midsection and far northwestern corner, roughly 70,000 acres) and Grayson County (all along its eastern border and generally along the U.S. Rt. 58 corridor, roughly 60,000 acres).
- Areas with lesser acreages subject to high risk of wildfire included Bland (approximately 27,000 acres) and Wythe counties (roughly 20,000 acres).

Loss estimates have been based on the preliminary data available through the ForestRIM program (for housing counts) and estimates (for housing values) as applied by the MRPDC.

The values shown in the table below reflect the estimated value of all woodland homes in the region. In any given wildfire, only a portion of this housing stock would be at risk of destruction. However, any given woodland home that catches on fire faces a high risk of substantial or total destruction in some of the more remote parts of the local region. We have no way of estimating the potential loss for any given wildfire event.

LOSS ESTIMATES FOR WOODLAND HOMES, as of 2018

Locality	Est. Number Homes at Risk	Total Value of Homes at Risk	Est. Total Land Mass at Risk
Bland County	265	$34,430,390	27,000 acres
Carroll County	712	$92,507,312	> 100,000 acres
Grayson County (incl. Galax)	258	$33,520,908	60,000 acres
Smyth County	475	$56,895,500	70,000 acres
Washington County	804	$96,303,120	> 100,000 acres
Wythe County	No data avail.		20,000 acres
City of Bristol	No data avail.		
City of Galax	67	$8,705,042	

People with homes in woodland communities can face a substantial risk of wildfire and catastrophic loss. These homes generally cannot be insured against loss, which places the

entire financial burden on the homeowners. In some cases, private housing developments in wooded settings contain narrow, poorly designed roads that cannot accommodate fire-fighting equipment. Other potentially serious issues include lack of access to a water supply, remote location, unidentified roads, and presence of vegetation (pines, broom sage) that is more prone to catch on fire. Wildfire can result in loss of property, injury and loss of life. In the five- year time span since the original Hazard Mitigation Plan was written, the region's vulnerability to wildfires has not changed. This is due to a lack of development in this short time span, and or lack of historical events.

The table on the following page shows a detailed breakdown the land cover in the Counties of the Mount Rogers Region.

Land Cover Information: Mount Rogers Region

County	All Land	Forest Land				Non-forest Land
		Total	Timberland	Woodland	Reserved	
Bland	229,545	172,214	166,519	na	5,695	57,331
Carroll	308,115	162,291	160,499	na	1,792	144,141
Grayson	285,304	173,873	161,883	na	11,991	111,431
Smyth	289,337	183,428	178,103	na	5,325	105,909
Washington	368,481	192,734	191,190	na	1,544	174,119
Wythe	296,480	153,942	153,610	na	332	142,538
Total	1,777,262	1,038,482	1,011,804	na	26,679	735,469

Windstorms

Description

Wind can be defined as the motion of air relative to the earth's surface. Extreme wind events may come in the form of cyclones, severe thunderstorms, tornadoes, downbursts and microbursts.

Wind speeds may vary from 0 at ground level to 200 mph in the upper atmosphere. Nationwide the mean annual wind speed falls in the 8-12 mph range. Frequently, wind speeds reach 50 mph and sometimes exceed 70 mph. Coastal areas from Texas to Maine may experience tropical cyclone winds with speeds of greater than 100 mph. The Mount Rogers region is located in Wind Zone III, with winds reaching up to 200 mph. A *special wind region* is known to occur in an area reaching from northeast Tennessee into southwest Virginia.

History

High winds in the Mount Rogers region blow down trees and power lines and cause varying amounts of property damage. A wind tunnel effect observed in a *special wind region* reaching from northeast Tennessee into southwest Virginia sometimes blows tractor trailers off I-77 in Carroll County. Some winds have lifted trucks off the highway and deposited them some distance away, like the effects of tornadoes. The image below is of such a storm that occurred in January 2003.

Since the writing of the original Hazard Mitigation Plan in 2005, Virginia Department of Transportation has installed a highway warning system, (overhead signs) designed to alert truck drivers to wind and fog incidents in the Fancy Gap area as well as other areas along the interstate system. The system is intended to help drivers avoid these hazards to the extent possible. In the Mount Rogers region, high winds have been known to tear down trees and power lines, blow in parts of buildings, and cause other kinds of property damage. An accounting of several recent high-wind incidents in the region is shown in the table below.

High Wind Incidents as of 2018

Date	Location	Description	Damages
10-5-95	Entire Mount Rogers region, plus much of SW VA	No description available.	$20,000 property
11-11-95	Bland, Carroll, Galax	Two windstorms occurred on same day.	$8,000 property
1-19-96	Carroll, Galax	No description available.	None reported
9-6-96	Carroll, Galax, Floyd, Franklin, Patrick	No description available.	$175,000 property, $200,000 crops
4-1-97	Carroll, Galax	Tractor-trailer blown over on I-77.	$7,000 property

Date	Location	Description	Damages
2-4-98	Carroll, Galax, Patrick	Winds downed trees and damaged some mobile homes.	$15,000 property
3-3-99	Bland, along with Floyd, Giles, Montgomery, Pulaski	Winds downed trees and power lines.	$11,000 property
4-12-99	Carroll, Galax, Franklin, Patrick	High winds blew over a tractor-trailer on Rte. 58 and a mobile home (Patrick County). Winds blew over two tractor-trailers 5 miles south of Fancy Gap on I-77.	$14,000 property
1-13-00	Entire Mount Rogers region, plus much of SW VA	Winds downed large trees and power lines, caused minor property damage in all counties. Winds at 68 knots in Bland County.	$180,000 property
3-20-00	Smyth, Wythe	Winds downed trees and power lines.	$6,000 property
1-10-01	Carroll, Galax, Bedford	Winds of 65 knots blew over 3 tractor-trailers on I-77. Much damage in Bedford County with shingles and siding stripped off more than 90 homes. Winds also downed power lines, power poles and numerous trees.	$410,000 property
3-6-01	Carroll, Galax, Grayson, Patrick	Winds associated with a snowstorm downed trees and power lines. Winds blew in a wall and partly collapsed a roof on an auto repair shop in Carroll County.	$80,000 property
3-10-02	Carroll, Galax, Grayson	High winds downed trees across Grayson and Carroll counties.	None reported
12-25-02	All of Mount Rogers region, plus wide area of SW VA	Winds downed numerous trees and power lines. A tree fell on a house in Roanoke, damaging the roof and crushing the front porch.	$20,000 property
1-8-03	Carroll, Galax, Grayson, other parts of SW VA	Winds of 50 knots downed trees and power lines. Many downed trees in Grayson County damaged several homes.	$80,000 property
1-9-03	Carroll, Galax, Wythe, plus 6 other SW VA counties	Winds of 60 knots downed trees and power lines.	None reported
1-23-03	Carroll, Galax, Wythe, other parts of SW VA	Winds of 100 knots blew over 6 tractor-trailers on I-77, near Fancy Gap. Trees and power lines downed throughout region.	$50,000 property
2-22-03	All of Mount Rogers region, plus wide reaches of SW VA	Winds of 80 knots downed numerous trees and power lines. Many people lost power across the region. Roof blown off an outbuilding in Tazewell County.	$3,000 property

Date	Location	Description	Damages
5-11-03	Bland County	Winds of 70 knots downed several trees and power lines.	None reported
7-15-05	Grayson County	A small microburst causing winds of 70 knots blew the roof off a vacant hotel, and damaged 10 trees.	None reported
3-06-11	Carroll County	High winds overturned 2 tractor trailers on Interstate 77 at the 2.8 mile marker.	$200,000 property
4-17-14	Carroll County	High winds overturned 2 tractor trailers on Interstate 77 at the between the 2.7 and 2.8 mile marker.	$300,000 property

The details for these high wind events were drawn from the National Climatic Data Center's database, as well as from news reports and emergency management personnel. For some incidents, even when damages are reported, an accompanying description of the event is not always available.

Risk Assessment and Vulnerability

Of the high wind events reported to the National Climatic Data Center, some part of the Mount Rogers region experienced damaging winds at least 15 times in eight years. That amounts to an average of roughly twice a year when winds are known to cause at least some damage.

Though the entire region is subject to high winds, Carroll County and the City of Galax appear to be hit the most often. Given the regionalized nature of the available data, it is not possible to quantify what a typical wind incident might consist of and how much cost it may create for the community or to private individuals.

Damage estimates through the National Climatic Data Center are reported by incident rather than by locality, unless the damages are confined to a small geographic area. Based on the reported incidents, damages may range from zero to up to more than $400,000

The reported damages include downed trees, tree limbs and power lines; shingles, siding and roofs torn away from homes; damage and uprooting of mobile homes; tractor-trailers blown over and sometimes lifted off the highway, particularly near the Fancy Gap area of Interstate 77; and loss of electrical power. High wind events, while they occur frequently, appear to cause only scattered property damage. This hazard does not appear to pose a disaster-level hazard to the Mount Rogers region as a whole, although some localities regularly sustain high winds.

In the five-year time span since the original Hazard Mitigation Plan was written, the region's vulnerability to windstorms has not changed.

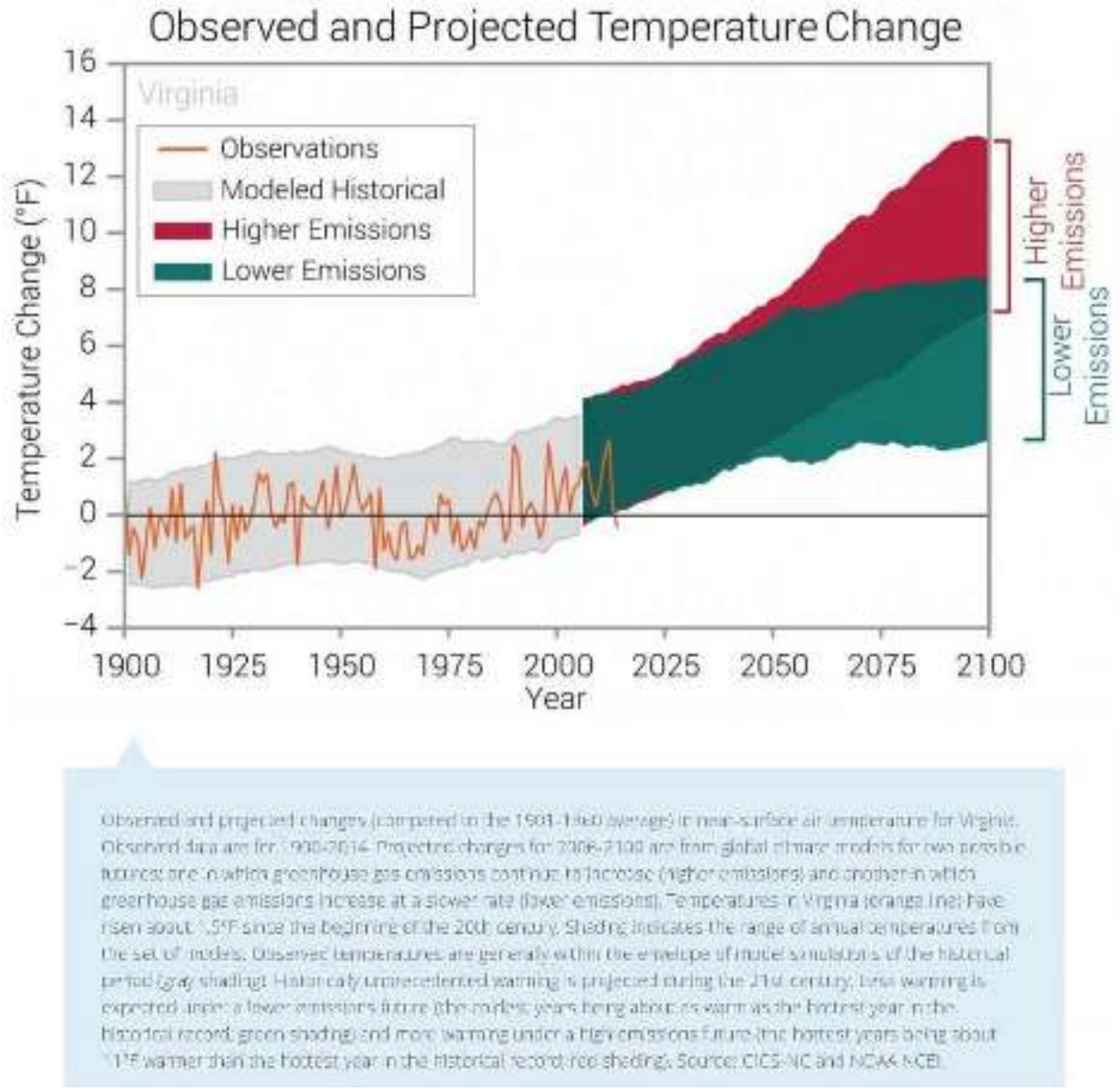
Climate Change

2017 NOAA Technical Report NESDIS[3]

Virginia has a humid climate with very warm summers and moderately cold winters. The climate exhibits substantial regional variation due to the state's diverse geographic elements, which include the Appalachian Mountains and Blue Ridge Mountains in the west and the Atlantic coastal region in the east. Temperature and precipitation patterns are highly influenced by these geographic features with the west and north being cooler and drier than the eastern coastal region. Statewide average temperatures range from 35° F in January to 75° F in July. The amount of rainfall generally decreases toward the west. For example, total annual precipitation is less than 40 inches in parts of the central mountain region of the state compared to around 50 inches along the tidewater coastal region.

[3] Runkle, J, K. Kunkel, L. Stevens, S. Champion, B. Stewart, R. Frankson, and W. Sweet, 2017: Virginia State Summary. *NOAA Technical Report NESDIS*

Figure 1: Observed and Projected Temperature Change



Observed and projected changes (compared to the 1901-1960 average) in near-surface air temperature for Virginia. Observed data are for 1900-2014. Projected changes for 2006-2100 are from global climate models for two possible futures: one in which greenhouse gas emissions continue to increase (higher emissions) and another in which greenhouse gas emissions increase at a slower rate (lower emissions). Temperatures in Virginia (orange line) have risen about 1.5°F since the beginning of the 20th century. Shading indicates the range of annual temperatures from the set of models. Observed temperatures are generally within the envelope of model simulations of the historical period (gray shading). Historically unprecedented warming is projected during the 21st century. Less warming is expected under a lower emissions future (the hottest years being about as warm as the hottest year in the historical record, green shading) and more warming under a higher emissions future (the hottest years being about 11°F warmer than the hottest year in the historical record, red shading). Source: CICS-NC and NOAA NCEI.

Since the beginning of the 20th century, temperatures have risen approximately 1.5° F. The 1930s and 1950s were very warm, followed by a period of generally below average temperatures during the 1960s through early 1980s (Figure 1). Although the 5-year average highest number of very hot days (maximum temperature above 95° F) and corresponding number of very warm nights (minimum temperature above 75° F) occurred in the early 1930s (Figures 2a and 2b), gradual warming has occurred since the early 1990s.

Figure 2: Observed Number of Very Hot Days and Very Warm Nights

There is no overall trend in average annual precipitation in Virginia (Figure 2c), although over the past two decades (1995–2014), annual precipitation has been generally above the long-term average. The driest multi-year periods were in the early 1930s and late 1960s; the wettest period was in the 1970s. The driest 5-year period was 1963-1967 and the wettest was 1971-1975 (Figure 2c). The year 2003 was the wettest on record (statewide average of 62 inches) while 1930 was the driest (25 inches). There is an upward trend in the annual number

of extreme precipitation events (precipitation greater than 2 inches) over the past two decades (1995–2014), with the number of such events in 1995–1999 surpassing record levels of the early 1940s. Average annual summer precipitation (Figure 2d) has been below or near the long-term average during the most recent decade (2005–2014).

Figure 3: Observed Number of Very Cold Nights

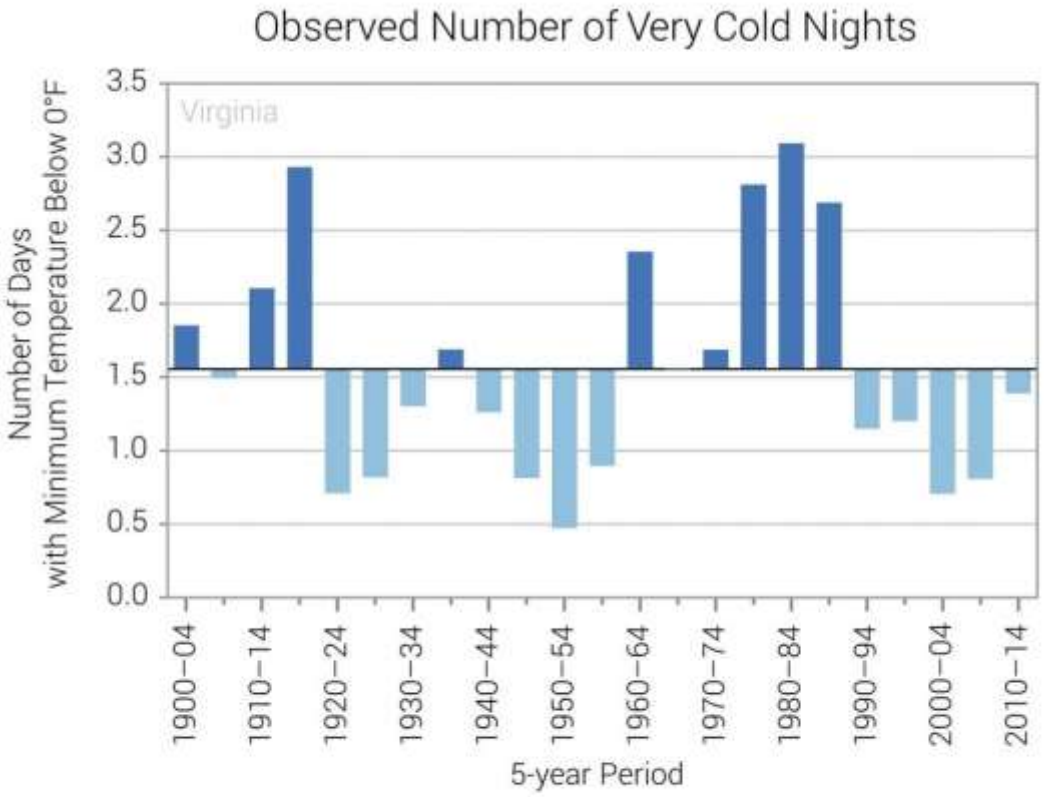


Figure 3: The observed number of very cold nights (minimum temperature below 0°F) for 1900–2014, averaged over 5-year periods; these values are averages from nine long-term reporting stations. The number of very cold nights dropped below the long-term average between the 1920s and 1960s, followed by an above average number of such events until the early 1990s. The number of very cold nights has remained below average for the past two decades (1990–2014). The dark horizontal line is the long-term average (1900–2014) of 1.6 days per year. Source: CICS-NC and NOAA NCEI.

Average annual temperatures during the 21st century (2000–2014) have exceeded the previous highs of the 1930s. A winter warming trend is reflected in the below average number of very cold nights (minimum temperature below 0° F) since 1990 (Figure 3). Average summer temperatures in the most recent decade (2005–2014) exceeded those in the early 1930s (Figure 4).

Figure 4: Observed Summer Temperature

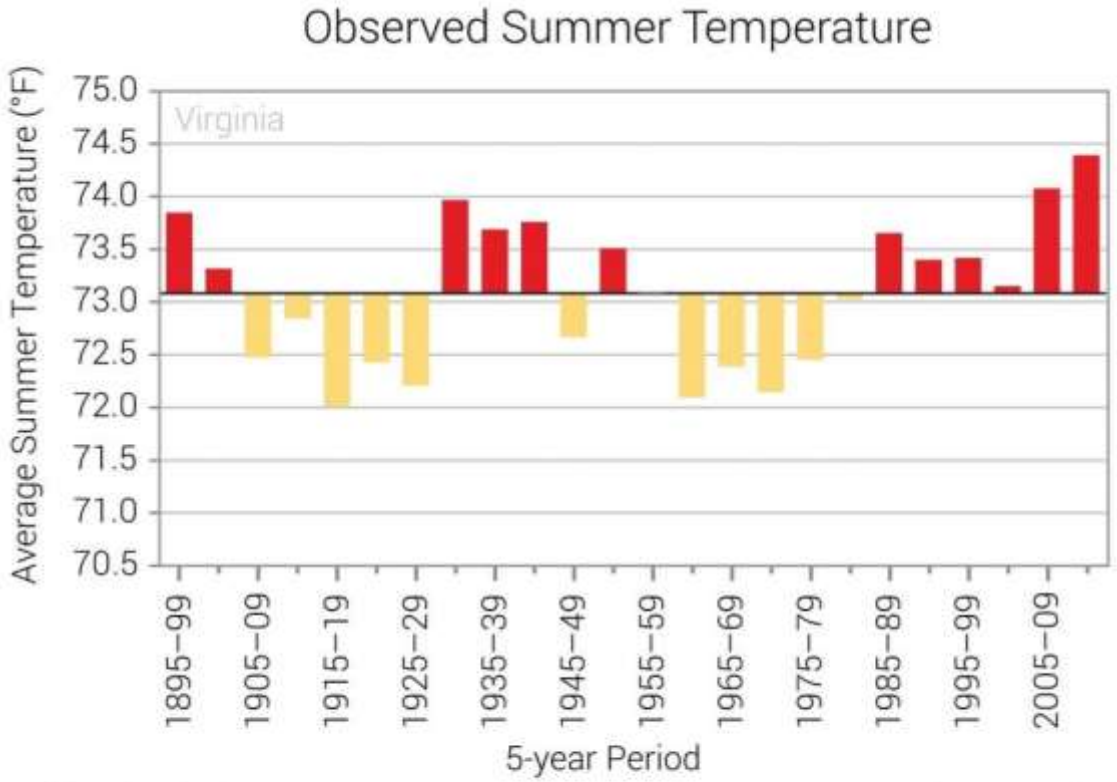


Figure 4: The observed annual summer temperature for 1900–2014, averaged over 5-year periods; these values are averages from NCEI's version 2 climate division dataset. Average annual summer temperature has been the warmest on record over the last decade (2005–2014). The dark horizontal line is the long-term average (1900–2014) of 73.1°F. Source: CICS-NC and NOAA NCEI.

Weather hazards in the state include severe thunderstorms, tornadoes, winter storms, tropical storms, hurricanes, droughts, and heat waves. Virginia was affected by 35 of the 144 U.S. billion-dollar disaster events that occurred between 1980 and 2012. The costliest event to ever affect the state was Superstorm Sandy (a post-tropical storm) in 2012, which caused severe coastal flooding from storm surges. The 2012 North American Derecho, an intense, long-lasting series of thunderstorms characterized by hurricane-force winds, was also very costly to the state, causing $3 billion in total damages. This historic summer derecho event interrupted power for more than 1 million residents in Virginia, Washington D.C., and Maryland. Winds of up to 70 mph were recorded at Reagan National Airport, causing portions of Northern Virginia to be without emergency 911 services. Tropical Storm Lee in 2011 also resulted in total damages of $3 billion, with Washington Dulles International Airport receiving a total of 8.74 inches of rainfall from the storm.

Under a higher emissions pathway, historically unprecedented warming is projected by the end of the 21st century (Figure 1). Even under a pathway of lower greenhouse gas emissions,

average annual temperatures are projected to most likely exceed historical record levels by the middle of the 21st century. However, there is a large range of temperature increases under both pathways, and under the lower pathway, a few projections are only slightly warmer than historical records. If the warming trend continues, future heat waves are likely to be more intense. This will pose human health risks, particularly in the large metropolitan areas. While heat waves are projected to become more intense, cold waves are projected to become less intense.

Figure 5: Projected Change in Annual Precipitation

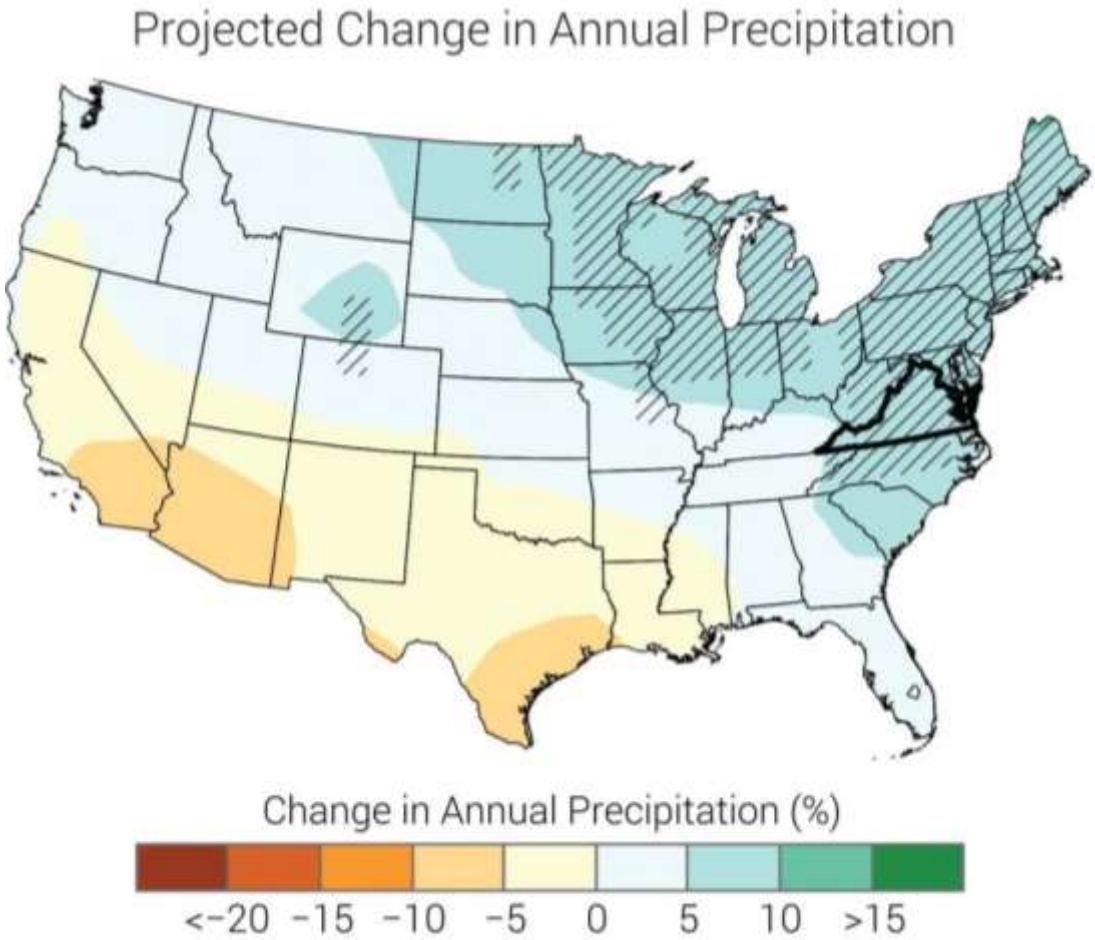
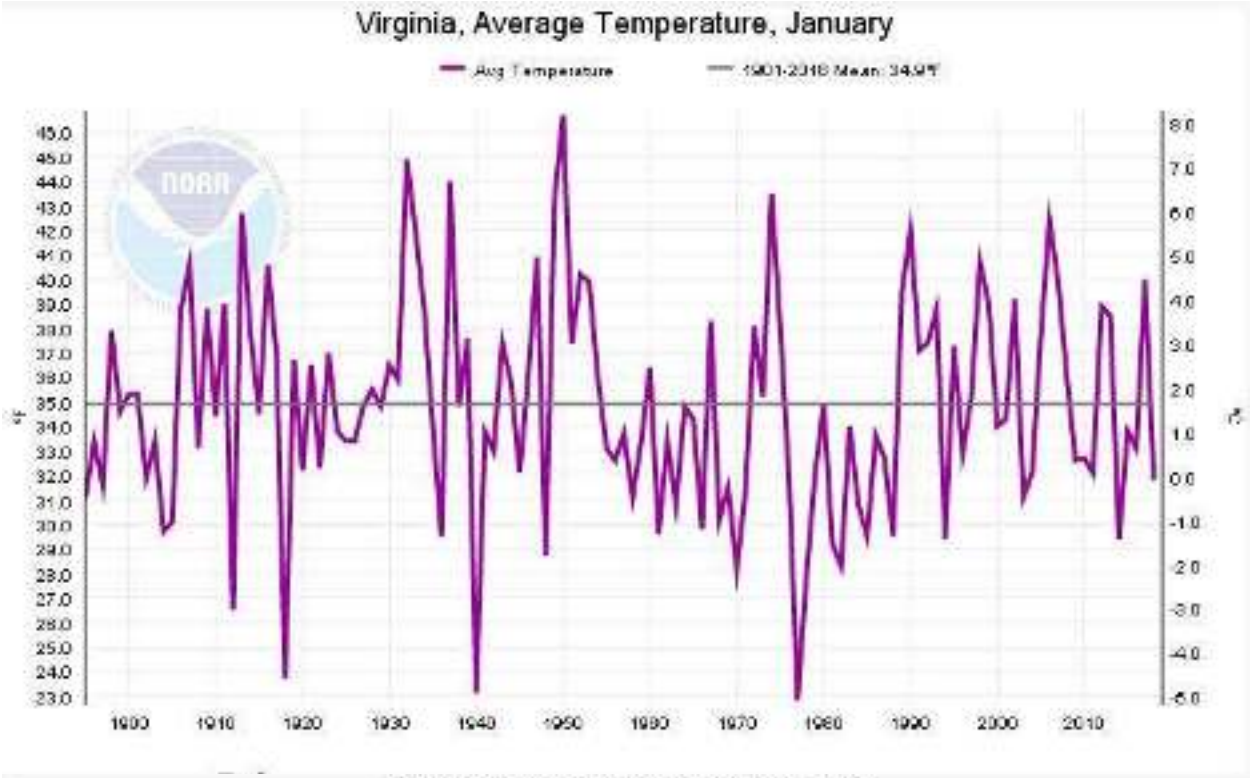


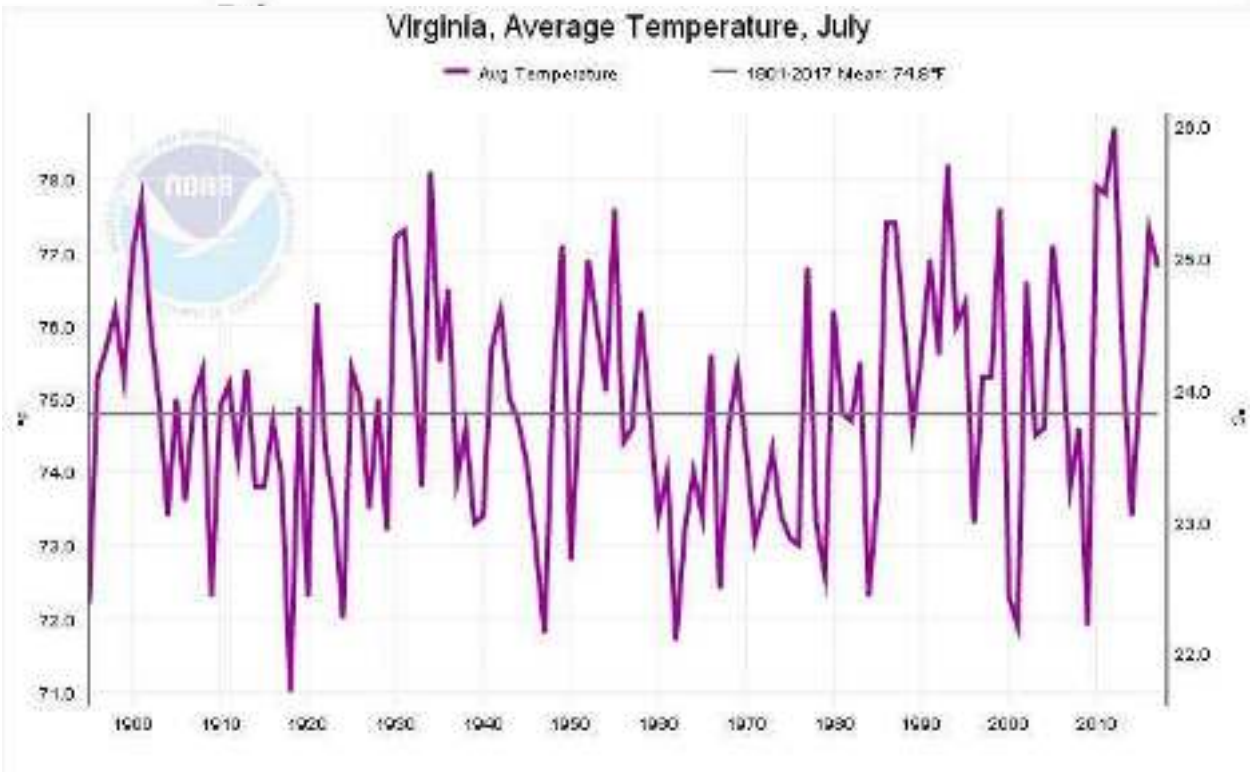
Figure 6: Projected change in annual precipitation (%) for the middle of the 21st century compared to the late 20th century under a higher emissions pathway. Hatching represents areas where the majority of climate models indicate a statistically significant change. Virginia is part of a large area of projected increases that includes all of the northeastern United States. Source: CICS-NC, NOAA NCEI and NEMAC.

Annual precipitation is projected to increase in Virginia (Figure 5). The state is part of a large area of projected increases in precipitation across the northern and central United States by the middle of the 21st century. The number and intensity of heavy precipitation events is also projected to increase, continuing recent trends. Drought is a periodically- occurring natural

phenomenon within the state. Even if overall precipitation increases, naturally occurring droughts are projected to be more intense because higher temperatures will increase the rate of loss of soil moisture during dry spells. During such periods, decreased water availability will likely have important implications for the state's agricultural economy.

Increasing temperatures raise concerns for sea level rise in coastal areas. Since 1880, global sea level has risen by about 8 inches. It has risen even more along the Virginia coast with a rise of 14.5 inches between 1930 and 2010 at Sewell Point, Global sea level is projected to rise another 1 to 4 feet by 2100 as a result of both past and future emissions due to human activities with greater rises possible along the Virginia coast following historical trends. Sea level rise has caused an increase in tidal floods associated with nuisance-level impacts. Nuisance floods are events in which water levels exceed the local threshold (set by NOAA's National Weather Service) for minor impacts. These events can damage infrastructure, cause road closures, and overwhelm storm drains. As sea level has risen along the Virginia coastline, the number of tidal flood days (all days exceeding the nuisance level threshold) has also increased, with the greatest number occurring in 2007.


Virginia, Average Temperature, January
Avg Temperature
1901-2018 Mean: 34.9°F
°F
°C
45.0
44.0
43.0
42.0
41.0
40.0
39.0
38.0
37.0
36.0
35.0
34.0
33.0
32.0
31.0
30.0
29.0
28.0
27.0
26.0
25.0
24.0
23.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010


Virginia, Average Temperature, July
Avg Temperature
1901-2017 Mean: 74.8°F
°F
°C
78.0
77.0
76.0
75.0
74.0
73.0
72.0
71.0
26.0
25.0
24.0
23.0
22.0
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

Other Hazards

Animal-related Damage

Appalachian Power have had a problem in the past 5 years with bears scratching power poles rendering them structurally weakened to the point they need to be replaced. Bears have also been known to climb the poles and electrocute themselves to death causing a localized power outage. This problem has been reported in Washington and Grayson counties in the Mount Rogers District.

Hazard Identification and Risk Assessment: Conclusions

Hazard Risk Matrix

The risk assessment analysis has been used to create the Hazard Risk Matrix shown below to provide a guideline on the relative importance of natural hazards across the entire Mount Rogers region. The rankings for individual localities will differ from the regional matrix due to differences in terrain, impacts from flooding, potential for wildfire, and so on. This plan rates natural disasters as an average over time. It was the view of the steering committee that our risk to various natural hazards in the Mount Rogers Region had changed little since the plan update five years ago. The risk ratings went down slightly for dams and earthquakes. Our rankings do not necessarily reflect the rankings shown the Hazard Rankings Maps in the Appendix, however, we feel confident that these rankings are consistent with the priorities of our region.

Hazard Risk Matrix

Hazard	Frequency	Geographic Extent	Impact	Hazard Risk Index Rating
Dam Safety	2	1	3	6
Drought	2	4	1	7
Earthquakes	1	2	1	4
Flooding	4	2	3	9

Hazard	Frequency	Geographic Extent	Impact	Hazard Risk Index Rating
Karst and Sinkholes	2	1	1	4
Landslides	1	1	2	4
Snow/ Ice	4	4	1	9
Thunderstorms/ Lightning	4	1	1	6
Tornadoes/ Hurricanes	4	1	1	6
Wildfires	4	1	2	7
Winds	4	2	1	7

***Note**: Highest numbers mean highest risk or impact.*

The frequency column is based on likelihood of occurrence: 4=More than once in 10 years 3=More than once in 10-100 years 2=More than once in 100-1,000 years 1=Less than once in 1,000 years	The geographic extent column relates to the extent any given hazard affects the jurisdiction: 4=More than 50%of jurisdiction affected 3=Estimated 25-50%of jurisdiction affected 2=Estimated 10-25%of jurisdiction affected 1=Less than 10%of jurisdiction affected

The impact column relates to the amount of death, injury, destruction and inconvenience created for the affected area, as shown below:
4=Many deaths and injuries possible. More than 50%of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.
3=Multiple injuries possible. More than 25%of property in affected area damaged or destroyed. Complete shutdown of critical facilities more than one week.
2=Minor injuries only. More than 10%of property in affected area damaged or destroyed. Complete shutdown of critical facilities more than one day.
1=Very few injuries, if any. Only minor property damage and minimal disruption of quality of life. Temporary shutdown of critical facilities.

Natural hazards on a regional basis can then be ranked as shown in the table below. As already noted, there will be some variances for some localities.

Hazard Risk Categories

High Risk Hazards (score 8 or higher) ➡	Flooding Severe Winter Storms/ Ice
Moderate Risk Hazards (score of 7) ➡	Drought Wildfires Winds
Low Risk Hazards (score of 6 or less) ➡	Dam Safety Earthquakes Karst and Sinkholes Landslides Thunderstorms/ Lightning Tornadoes/ Hurricanes

Hazard Risk Assessment By Jurisdiction

The main natural hazards faced by the 20 local jurisdictions in the Mount Rogers region are displayed in the matrix shown below. This data has been drawn from the descriptions given in the preceding pages of this section. The table below was reviewed and updated by the steering committee in the Hazard Mitigation Plan Update.

Identified Natural Hazards, By Locality
Mount Rogers Region, Virginia (6 counties, 2 cities, and 12 towns)

Hazard Type	Hazards Identified	Individual Localities																			
		Bland County	Carroll County	Grayson County	Smyth County	Wash. County	Wythe County	City Bristol	City Galax	Abingdon	Chilhowie	Damascus	Fries	Glade Spring	Hillsville	Independence	Marion	Rural Retreat	Saltville	Troutdale	Wytheville
Avalanche																					
Coastal Erosion																					
Coastal Storm																					
Dam Safety	X	X	X	X	X	X	X	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Drought	X	M	M	M	M	M	M	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Earthquake	X	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Expansive Soils																					
Extreme Heat																					
Flood	X	H	L	H	H	H	H	H	H	H	H	H	H	H	L	L	H	L	H	L	M
Hailstorm																					
Hazardous Material Spills	X	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Hurricane (see Tornadoes)																					
Karst and Sinkholes	X	X	na	na	X	X	X	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Landslide	X	L	H	H	H	H	L	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Severe Winter Storm/Ice	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
Tornadoes/Hurricanes	X	L	L	L	M	M	L	L	L	M	M	L	L	M	L	L	L	L	L	L	L
Tsunami																					
Volcano																					
Wildfire	X	M	H	M	H	H	H	na	M	na	na	na	na	na	na	na	na	na	na	na	na
Windstorm	X	M	H	M	M	M	M	M	H	M	M	M	M	M	H	M	M	M	M	M	M
Thunderstorms/Lightning	X	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L

Notes:
The term "na" means the hazard data is not available.
The H, M, and L symbols refer to the relative likelihood and/or relative severity of given hazards, comparing one locality to another. H = highest likelihood, M = moderate likelihood, and L = low likelihood. X indicates the hazard was identified, but further hazard assessment data was lacking.

MITIGATION STRATEGY

Defining Hazard Mitigation

FEMA defines hazard mitigation as "sustained actions taken to reduce or eliminate long-term risk from hazards and their effects."

These sustained actions can come in the form of physical projects (enlargement of drainage culverts, streambank stabilization and restoration, vegetation removal, installation of advance warning systems, etc.) or educational programs designed to help local officials and property owners understand and reduce hazard risk (media campaigns, special mailings, special events, self-help guides, etc.).

For some hazards, these actions could involve simply getting out of the way – such as not building in the floodplain or removing structures from the floodplain, when feasible. For other hazards, such as major weather events that cover large areas of landscape, the mitigations could involve more indirect methods, such as improved building codes to strengthen structures and reduce damages from violent windstorms or major blizzards. Some hazards – such as an F4 or F5 tornado – carry such force that a direct hit means destruction is assured, although properly built "safe rooms" can reduce loss of life.

In the previous section of this study, we have identified and ranked the main natural hazards that can afflict communities in the Mount Rogers region of southwest Virginia. We are now moving on in this next section to describe the following:

- Planning process used to develop the hazard mitigation strategy.
- Goals and objectives for the overall hazard mitigation strategy for the region.
- Recommended hazard mitigations on a locality-by-locality basis.

Process Used to Develop Mitigation Strategy

MRPDC staff, the Hazard Mitigation Advisory Team, and representatives from the local jurisdictions worked together to develop the Hazard Mitigation Strategy for the Mount Rogers region.

Following the guidance found in the FEMA Local Multi-Hazard Mitigation Planning Guidance, MRPDC staff identified the at-risk hazards that affect the region and its 20 local jurisdictions.

This was done based on available data. With the basic data assembled, the MRPDC organized a Hazard Mitigation Steering Committee to review and make comments on the hazard vulnerability assessments. Some of the recommended mitigations emerged from those discussions, such as a suggestion by a representative from Appalachian Power to work to improve coordination among emergency response organizations to improve snow-removal and accelerate restoration of electric power following major snow and ice storms. In addition, the MRPDC mailed out draft copies of the hazard vulnerability assessments to the 20 local jurisdictions and invited comments from local planners, emergency services personnel, and the public.

MRPDC staff moved on to develop the specifics for both the Hazard Mitigation Strategy and proposed mitigations. In some cases, we have followed the advice of experts, such as the applications of Firewise methods to reduce wildfire risks. In other cases, we have proposed mitigation strategies based on limitations of the available data and on long-understood shortcomings, such as the lack of accurate floodplain mapping (as determined by hydrological engineering studies) and the lack of floodplain mapping in some areas known to be flood-prone but passed over by previous mapping efforts.

For flood hazards, which affect much of the population of the Mount Rogers region, MRPDC staff applied the principles of FRED (i.e., Fix and Repair, Elevate, Relocate or Demolish). Staff developed generalized cost estimates based on the experience of the staff and others in the region that had past experience in such matters.

All participants in the process have always recognized that any major undertakings will only be possible with outside funding support (i.e., state and federal grants), since most localities in the Mount Rogers region are sparsely populated, sparsely staffed, and lack the financial means to provide little other than basic government programs and services.

Regional Hazard Mitigation Strategy

The following outline consists of goals and objections for the natural hazard mitigation strategy to be applied in the Mount Rogers region of Virginia. These goals were reviewed by the members of the steering committee as well as other stakeholders during the update process. They were reviewed in our meetings throughout the summer months of 2011, as well as reviewed by participants on an individual basis.

Goal: Addition of a Nexedge System or the RIOS-Comlinc system (radio communications system) for each locality in the Mount Rogers District

Objective: Make communications better across different localities.

Strategy:

- Link counties together for a better coverage of communications and reduce response time in times of natural disasters.

Cost Benefit: Better communications will help reduce the loss of live and property

Responsible Office: Police; Fire; and Rescue.

Goal: Protect Lives and Property from Flooding

Objective: Increase Public Awareness

Strategy:

- Promote and make the public aware of the need for mitigation
- Promote planning as well as membership in the National Flood Insurance Program

Objective: Improve data resources to improve the regional Hazard Mitigation opportunities.

Strategy:

- Further develop local capacity to document the number, size, age and value of the approximately 1,400 (PDC total) structures located in the floodplain.
- Update FEMA flood plain maps throughout the Mount Rogers region. (FEMA/DCR responsible for updating floodplain maps).
- Develop new FEMA floodplain maps for areas not previously mapped.

Objective: Provide opportunities for property owners of flood prone and/or repetitive loss properties to acquire and relocate from the flood plain, elevate structures, acquire and demolish, flood proof their property, or apply for funds to construct minor localized flood control projects.

Strategy:

- Pursue funding for such projects from federal and state agencies such as FEMA, VDEM, as well community development block grants.

Cost Benefit: The benefits of flood protection are ongoing. Money should be invested wisely to protect existing structures, as well as to prevent future losses to new structures. This will be a savings to the localities, as well as to the property owners in the form of repair and insurance cost. $100,000 spent today, could save millions of dollars in damage over long periods of time, as well as save lives.

Responsible Office: MRPDC; local Board of Supervisors; Local Emergency Management

Goal: Encourage Public Safety in the Event of Snowstorms, Ice and High Winds, Earthquakes, Landslides, Tornadoes, Hurricanes, and/or Drought

Objective: Increase public awareness of actions before, during, and after such events.

Strategy:

- Educate public on the methods recommended by the American Red Cross to prepare for these events.
- Inform motorist of high wind potential along selected highways.

Cost Benefit: Public awareness is crucial to prevent losses due to natural hazards. Not only prevention, but a large savings of time and money could be seen during and after such adverse weather. $100,000- $500,000 spent on increased road advisories will save money on working traffic accidents, as well as work hours lost in Traffic.

Responsible Office: VDOT; Local Board of Supervisors; Red Cross; VDEM

Goal: Increase Dam Safety for the Mount Rogers Region

Strategy:

- Improve the availability of data resources for dam safety to save lives and property coordinated through agencies such as FEMA and the Department of Conservation and Recreation.

Cost Benefit: Knowledge and being aware of potential hazards plays a key role in their prevention. Due to many recent events, information on dams in the region is hard to come by. Property owners in a high-risk area could benefit from greater knowledge of possible dangers. For a minimal cost, this could save property as well as lives.

Responsible Office: Department of Conservation and Recreation; Corps of Engineers

Goal: Minimize the Impact of Wildfires on Woodland Communities.

Objective: Increase public awareness.

Strategy:

- Educate homeowners on Firewise and Department of Forestry programs on methods to cope with drought.
- Support and encourage the existing education efforts of the American Red Cross in ways homeowners can reduce the risk of wildfires by property maintenance and cleanup.
- Projects creating perimeters around homes, structures, and critical facilities through the removal of reduction of flammable vegetation.
- Projects that apply ignition resistant techniques and/or non-combustible materials on new and existing homes, structures, and critical facilities.
- Projects that remove vegetative fuels proximate to the at-risk structure that, if ignited, pose significant threat to human life and property, epically critical facilities.

Cost Benefit: Education is invaluable to prevent Wildfires. For a minimal cost, educational programs for homeowners in woodland communities will help minimize fire damage to property, and natural resources.

Responsible Office: USDA; VA Dept. of Forestry; American Red Cross; FireWise; Local Fire and Rescue

Goal: Encourage Citizens to Prepare for Possible Damage from Sinkholes and Karst

Objective: Increase public awareness

Strategy:

- Make sure local building codes and zoning ordinances address placement of structures in such areas.
- Educate the public on karst safety through educational efforts such as agencies like the Virginia Cave Board.
- Map areas that are in danger of karst and sinkholes with the state division of mineral resources, and the Virginia Cave Board.

Cost Benefit: Having and making available good data where land is susceptible to karst and sinkholes can pay dividends in the future. Accurate mapping of such areas made available to local officials can greatly reduce the risk of structures and roads being damaged by these hazards.

Responsible Office: Local Building inspector; VDOT, Department of Conservation and Recreation

Goal: Minimize Damage due to Thunderstorms as well as Tornadoes/ Hurricanes

Strategy:

- Support and encourage existing efforts by the American Red Cross to educate homeowners on retrofitting and mitigation.
- Educate citizens on tornado and severe storm safety.

Cost Benefit: Public awareness is crucial to prevent losses due to natural hazards. Not only prevention, but a large savings of time and money could be seen during and after such adverse weather.

Responsible Office: Local emergency management departments

Goal: Reduce the risk of hazards on new buildings and infrastructure

Objective: Encourage continued practice of proper building site construction.

Strategy:

- Incorporate the hazard mitigation plan into comprehensive planning.
- Use the hazard mitigation plan in the permit process for new construction in floodplain or high hazard areas.

Cost Benefit: Proper planning in new construction will result in a large savings after natural disasters.

Responsible Office: Local building inspectors.

Regional Strategic Priorities

This section outlines the top regional priorities for Pre-Disaster Hazard Mitigation in the Mount Rogers region. These have been determined through discussions among MRPDC staff and the members of the Hazard Mitigation Steering Committee. The priorities presented in this section correspond to the objectives listed under the six goal statements given for the regional strategic plan described above. MRPDC staff initially developed the goals-and-objectives outline, and then presented it to the Hazard Mitigation Advisory Team for comment.

The Steering Committee ranked individual objectives as follows, high priority, mid-level priority, and lowest priorities. More than one objective could be assigned to any given priority level. Each marker carried a value of one point, with the highest point scores indicating the objectives of highest importance. The Steering Committee reviewed the table below from the original 2005 Hazard Mitigation Plan and determined that it was still applicable.

Prioritized Listing of Hazard Mitigation Objectives

Objective	Points
Further develop local capacity to document the number, size, age and value of the approximately 1,400 (PDC total) structures located in the floodplain.	12
Promote need for pre-disaster mitigation to prevent future losses.	12
Update FEMA floodplain maps as applicable throughout the Mount Rogers Region.	12
Promote prevention methods homeowners can undertake.	12
Implement in-the-ground projects to reduce natural hazard risks.	9
Provide copies of the Pre-Disaster Hazard Mitigation Plan to the 20 local jurisdictions in the Mount Rogers region.	8
Support projects offering the best benefit/cost ratio.	6
Publicize successful mitigation projects.	5
Support guidelines for flood mitigation:	5
A property is a candidate for relocation if the first-floor floods twice (or more) in 50 years.	5
A property is a candidate for elevation or flood-proofing if flooding occurs below the first floor twice (or more) in 50 years.	5
Meet requirements of the Uniform Relocation Act.	5
The top priorities for federal relocation assistance should be based on need, frequency of flooding, and a favorable benefit/cost ratio.	5
Create project serving multiple objectives (social, community, economic, mitigation).	4
Support educational efforts of existing organizations, such as the American Red Cross.	4
Develop new FEMA floodplain maps for flood-prone areas not previously mapped.	3
Promote useful programs, such as the National Flood Insurance Program.	1

Support state/federal efforts to improve data resources for dam safety, drought, karst and sinkholes, landslides, thunderstorms, and windstorms.	1

Capabilities Assessment

Most localities in the Mount Rogers region are for the most part limited by financial issues and staff size. The capabilities of the localities are largely defined through staff and organizational capacity, technical capacity, and fiscal capacity. Most of our localities, especially the towns, require assistance due to the size of budgets, and number of personal. Many of the strategies from the 2012 plan have not been completed due to the lack of existing resources.

Existing Locality Staffing, as of 2018	
Locality	Number of Staff
Bland Bland	1
Carroll County	1
Grayson County	1
Smyth County	2
Washington County	2
Wythe County	1
City of Galax	1
City of Bristol	1
Hillsville	1
Independence	0
Fries	0
Troutdale	0
Marion	1
Chilhowie	1
Saltville	0
Abingdon	6
Damascus	0
Glade Spring	0
Wytheville	1
Rural Retreat	1

All localities in the Mount Rogers Planning District have little to no staff dedicated to work on natural hazards and mitigation planning. For the counties, cities and larger towns, other departments are available to assist on special projects and in times of emergency. For the six smallest towns, there is no staff dedicated to all hazards planning; in fact, for five of the six smallest towns, MRPDC staff provides town management, due to small populations and lack of funding for full-time staff. The Mount Rogers PDC is the agency that fills this role in almost

100% capacity. The PDC also assists all 20 localities in hazard mitigation planning. Contact information for these departments is listed in the multi-jurisdiction summary sheet in the appendix.

Community Summaries & Recommended Mitigations

The following section provides descriptions, by jurisdiction, of high- and moderate-risk natural hazards, past or ongoing mitigations (if any), and recommended mitigations resulting from this study. For the hazards of floods, wildfire, dam safety, snowstorms/ice, high winds, landslides, sinkholes/karst, drought, hurricanes/tornados, and earthquake mitigation strategies for each locality are included in the recommended mitigations section. The hazard of thunderstorm/lightening did not warrant a local mitigation action due to its low risk. The section is organized in alphabetical order by county and the towns contained within that county, followed by the cities. This includes:

- Bland County
- Carroll County and the Town of Hillsville
- Grayson County and the towns of Fries, Independence, and Troutdale
- Smyth County and the towns of Chilhowie, Marion, and Saltville
- Washington County and the towns of Abingdon, Damascus, and Glade Spring
- Wythe County and the towns of Rural Retreat and Wytheville
- The City of Bristol
- The City of Galax

Regionwide Weather Events in the Past Five Years, As Reported by Localities

Below is a listing of major weather events within the region, for a more detailed list of all weather events see the community hazard profile for each locality. Within the community hazards profiles, there may or may not be more weather events officially recorded, some were omitted due to redundancy in geographic distance or the weather event being too insignificant to list.

7-27-12 Regionwide

The Mount Rogers Region was affected by a Derecho that knocked down road signs, disrupted power, and brought down several trees and limbs. As a result, several power outages were reported.

1-17-13 Bland County

Bland County was hit by a winter storm that brought heavy snow fall ranging from 12 inches in Rocky Gap to 6.0 inches in Ceres. This winter storm brought the interstate to a standstill with accidents and heavy snow fall. A local emergency was declared and a shelter was opened at the Bland County Rescue Squad. The shelter received approximately 40 individuals.

3-31-13 Carroll County

"Excessive fog" in the Fancy Gap Mountain area, near the North Carolina border, caused at least 75 vehicles to crash in the southbound lanes of the I-77. Three people were killed and at least 25 were taken to the hospital after the pile-up.

5-19-13 Saltville, Smyth County

A torrential downpour caused a flood through the streets of Saltville. Drains and ditches overflowed sending rushing water into several businesses and rocks the size of baseballs hurtling down Palmer Avenue. Saltville fire, police, and rescue responded in minutes to the danger. Town employees and VDOT helped clear the town roads. The National Weather Service said that over five inches of rain fell in about an hour.

7-12-13 Galax

July of 2013 saw 600%of the average expected rainfall for the month. On the 12th the streets of downtown Galax were flooded causing damage to cars and businesses. The flooding was due to storm drains not being able to handle the amount of water from the massive downpour.

4-17-14 Carroll County

Estimated Wind gust of 100 miles per hour caused 2 tractor trailers to overturn on I-77 north. Both tractor trailers overturned between the 2.7 and 2.8-mile marker. As the trailers were being overturned the wind blew one 30 feet and fell against the side of a state trooper car and a VDOT truck.

3-5-15 Chilhowie, Smyth County

Heavy rain and melting snow caused the Holston River to overflow its banks. Rt. 604 (Dry Fork Rd) was closed in Chilhowie. A small mud slide on B.F. Buchanan Hwy caused an interruption in one lane of traffic which was cleared by VDOT.

4-19-15 Bland County

Wolf Creek flooded into the road at Shady Branch Circle. The rain left several roads flooded with debris due to clogged culverts. Also, Several Houses had flooded basements. This caused the county roads of West Bluegrass Trail, Suiter Road, Waddletown Road, and White Pine Drive to be closed and schools were also closed for one day.

4-19-15 Wythe County

Between 2.5 and 3.5 inches of Rain fell in one day. The Schools as well as 20 roads were closed in the county due to washouts, flooding, and downed Trees. The hardest hit areas were Max Meadows, the Stony Fork area off of Highway 52, and Ivanhoe along the New River. The trash convenience center in Max Meadows was flooded. A man had to be rescued from a truck in Ivanhoe. According to the U.S. Geological Survey, Reed Creek at Graham's Forge crested at 9.14 feet. That's the highest reading since a level of 10 feet on April 5, 1977.

4-26-17 Marion, Smyth County

The Bridge to the Holston Hills Community Golf Course was critically damaged by flood waters.

4-26-17 Smyth County

A 14-inch sewer line was damaged in Seven Mile Ford. Houses were flooded in the McCready and North Holston communities outside of Saltville.

4-26-17 Chilhowie, Smyth County

Berry Metals along the Holston River received flood damage. A Section of 107 was closed near McDonalds due to high water. Springs serving the town were out of commission for about a week and water had to be purchased from Washington County.

5-22-17 Hillsville, Carroll County

Members of the Carroll County Fire/EMS are reporting several roads are flooded to excessive rain that fell over the county Thursday evening.

Flooding was also reported along Pilgrims Trail, depositing debris along 221. Several mudslides have been reported along Buck Horn Road. Additional reports of flooding in the vicinity of Hillsville and Dugspur.

Water is flowing onto many roadways along creeks and poor drainage areas. A flash flood warning was issued for Carroll County until 8:30 p.m.

10-23-17 Fries, Grayson County

An F-1 Tornado Touched down at 5:47 in the evening of October 23. The tornado traveled about a third of a mile and caused damage about 150 yards wide. The storm caused trees to be uprooted and barns to be damaged. There was also localized flooding in the area.

Recommended Mitigations

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
High	Addition of a Nexedge System or the RIOS-Comlinc system for each locality in the Mount Rogers District.	All hazards	All Localities, MRPDC, VITA	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Further develop local capacity to document the number, size, age and value of the approximately 1,400 (PDC total) structures located in the floodplain.	Floods	All localities, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Funding needed from VDEM/FEMA
Low	Provide public outreach and start an educational campaign to inform citizens of actions to take before, during, and after an earthquake strikes.	Earthquake	All Localities, MRPDC	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Low	Make sure local building codes and zoning ordinances address placement of structures in areas susceptible to karst and sinkholes, and map areas that are in danger of such hazards.	Karst/Sink holes	All Localities, MRPDC	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Low	Make sure local building codes and zoning ordinances address placement of structures in areas susceptible to landslides, and map areas that are in danger of such hazards.	Landslides	All Localities, MRPDC	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Low	Provide public outreach and start an educational campaign to inform citizens of actions to take before, during, and after a tornado or hurricane event strikes.	Tornados/ Hurricanes	All Localities, MRPDC	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Low	Provide public outreach and start an educational campaign to inform citizens of actions to take during a severe drought if water supplies are depleted.	Drought	All Localities, MRPDC	3-5 Years/ Not Started	Funding needed from VDEM/FEMA

Bland County

Community Hazard Profile

Bland County is a rural, lightly populated community of nearly 6,511 (which is a decrease of 4.6% since the last plan update) with Interstate 77 bisecting the county as the highway travels in a north-south direction. There are no incorporated towns, though county administrative functions are centered in the community of Bland, located at the junction of I-77 and State Rt. 42. The Appalachian Trail crosses through parts of the county.

The main natural hazards faced in Bland County are flooding, severe snow and ice storms, wildfire, and potential dam failure. Due to its mountainous terrain, communities are subject to flash flooding caused by heavy rainfalls and snowmelt; this is especially true for Rocky Gap, a small, unincorporated community located almost entirely in the floodplain. Bland County also experiences its share of high-wind conditions, though these have not been known to create natural disasters.

In January 1957, the community of Bland sustained substantial damage from a failure in the Crab Orchard Creek Dam, which had been under development as a privately-owned recreation attraction. The dam break occurred following three days and nights of continuous rain, and the resulting flood caused $500,000 worth of damage to the small community. There is now some thought that, with construction of I-77 (which passes between the dam and the community), a similar event would not happen again, since I-77 and its drainage systems would redirect the flood flows.[4]

Past or Ongoing Mitigations

Bland County centralizes its emergency response system through its E-911 and emergency services coordinator (one individual). Emergency responders include a system of local volunteer fire departments and rescue squads, as well as the sheriff's department and state police. The county's building codes are in line with the most recent statewide revisions known as the Uniform Statewide Building Code, which took effect in 2009.

Bland County has not engaged in pre-disaster mitigation efforts in the past.

For flood hazards, Bland County contains six repetitive loss properties, including four in the community of Rocky Gap.

[4] This information was given to us by an engineer at a hazard mitigation meeting in the early 2000s.

Severe Weather Events

Begin Location	Begin Date	Event Type	Deaths Direct	Injuries Direct	Damage Property Number	Damage Crops Number	Source
	4/4/13	Winter Weather	0	0	$-	0	County Official
Stowersville	5/19/13	Flood	0	0	$-	0	State Official
Point Pleasant	5/22/13	Hail	0	0	$-	0	Public
Ceres	8/12/13	Flash Flood	0	0	$5,000	0	Trained Spotter
	12/8/13	Ice Storm	0	0	$-	0	Trained Spotter
	1/7/14	Cold/Wind Chill	0	0	$-	0	AWOS
	2/12/14	Heavy Snow	0	0	$-	0	Trained Spotter
Bland	6/10/14	Hail	0	0	$-	0	911 Call Center
	11/1/14	Winter Weather	0	0	$-	0	Law Enforcement
	11/26/14	Winter Weather	0	0	$-	0	Public
	1/23/15	Winter Weather	0	0	$-	0	Public
	2/16/15	Winter Storm	0	0	$-	0	Trained Spotter
	2/19/15	Extreme Cold/Wind Chill	0	0	$-	0	Mesonet
	2/21/15	Winter Storm	0	0	$-	0	Public
	2/25/15	Winter Weather	0	0	$-	0	Trained Spotter
Long Spur	4/19/15	Flood	0	0	$-	0	Trained Spotter
Holly Brook	4/20/15	Flood	0	0	$-	0	State Official
	1/22/16	Winter Storm	0	0	$-	0	Trained Spotter
	2/14/16	Winter Storm	0	0	$-	0	Broadcast Media
	4/3/16	Avalanche	0	0	$1,000	0	Law Enforcement
Bastian	6/27/16	Flash Flood	0	0	$75,000	0	Broadcast Media
Rocky Gap	4/23/17	Flood	0	0	$-	0	Public
			0	0	$81,000	0	

Flood Loss Statics, as of 3/31/2017
Total Losses- 56
Closed losses- 42
Open losses- 0
CWOP (Closed without Payment losses- 14
Total Payments $726,016.36

Recommended Mitigations

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
High	Further develop local capacity to document the number, size, age and value of the approximately 1,400 (PDC total) structures located in the floodplain.	Floods	Bland County, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Funding needed from VDEM/FEMA
High	Conduct hydrological/engineering studies to properly determine Base Flood Elevations in those watersheds with estimated floodplains.	Floods	Bland County, MRPDC, DCR, VDEM	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Conduct detailed studies to determine the most cost-effective mitigations for communities with flooding issues, which include Bland, Bastian, and Rocky Gap.	Floods	Bland County, MRPDC, DCR, VDEM	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Use the flood analysis as a basis for consideration of future relocation/demolition and flood-proofing projects.	Floods	Bland County, MRPDC, DCR, VDEM	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Mitigate against future flood losses, with highest priority given to repetitive loss properties.	Floods	Bland County, MRPDC, DCR, VDEM	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Comply with NFIP for floodplain identification and mapping, responsible floodplain management, and the promotion of flood insurance.	Floods	Bland County, MRPDC, DCR, VDEM	1-3 Years/ Ongoing	Done through compliance with NFIP
Medium	Promote the Firewise program for people who live in woodland	Wildfire	Bland County, MRPDC,	3-5 Years/	Funding needed from

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
	communities. An estimated 265 homes fall into this category in various parts of Bland County.		RC&D, DOF	Not Started	VDEM/FEMA
Medium	Work with the New River-Highlands RC&D Council a wildfire strategic plan for Bland County.	Wildfire	Bland County, MRPDC, RC&D, DOF	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Low	Educate residents on methods recommended by the American Red Cross to prepare for various types of natural disaster.	Floods Snowstorms/Ice High Winds	Bland County, MRPDC, DCR, VDEM, American Red Cross	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Low	Continue inspection and enforcement as necessary on the Crab Orchard Creek Dam, rated Class I for hazard potential.	Dam Safety	Bland County, MRPDC, DCR	1-3 Years/ Ongoing/	Done through Federal State and local codes
Low	Verify the geographic location of all NFIP repetitive losses and make inquiries as to whether the properties have been mitigated, and if so, by what means.	Floods	Bland County, MRPDC, DCR, VDEM	1-3 Years/ Not Started	Will start next year

Carroll County and Hillsville

Community Hazard Profile

Carroll County abuts the northern border of North Carolina and includes a section of the Blue Ridge Parkway and the New River Trail State Park. A community of 29,212 (decrease of 2.8% since 2012), the county includes the incorporated Town of Hillsville, which serves as the county seat, and abuts the City of Galax to the west. Elevations vary from 3,570 feet above sea level at Fisher Peak to 1,110 feet above sea level at Cana. The county also is notable for the Blue Ridge Escarpment (steep slope) that separates the piedmont of North Carolina from the Blue Ridge Plateau. More than half of the land area has slopes greater than 20%, which precludes most development.

Carroll County is bisected by Interstate 77 in a north-south direction and by U.S. Rt. 58 in an east-west direction. The county is known for high wind conditions at Fancy Gap, where tractor trailers sometimes get blown over or even lifted away from the highway altogether and dumped into a field some distance away. Carroll County is part of a Special Wind Region, with potential wind speeds up to 200 mph.

Other natural hazards experienced in Carroll County include severe winter storms and ice, wildfires, drought, and undefined risk potential for landslides and impacts from karst terrain. Flood hazards are limited (one repetitive loss property in or near Hillsville). There are two federally regulated hydroelectric dams and one state-regulated dam in Carroll County.

Past or Ongoing Mitigations

A special project by the New River-Highlands RC&D Council has produced a draft strategic plan for wildfire hazard reduction in Carroll County. For emergency response, the area is served by the Twin County E-911 system, volunteer fire departments and rescue squads, a paid EMS, and the sheriff's department and state police.

VDOT has installed a warning system to help truckers get off I-77 and find alternate routes during high-wind conditions and other potentially dangerous conditions, such as fog, another ongoing problem in the Fancy Gap area. Members of the Hazard Mitigation Advisory Team have said the warning system has limited usefulness since there are few exits from the highway.

The county's building codes are in line with the most recent statewide revisions known as the Uniform Statewide Building Code, which took effect in 2009.

Severe Weather Events

Multicar Pileup Due to Dense Fog

On March 31, 2013, at least three people were killed and at least 25 were taken to the hospital after a pile-up involving dozens of cars today on a Virginia interstate.

Virginia State Police said "excessive fog" in the Fancy Gap Mountain area, near the North Carolina border, caused at least 75 vehicles to crash in the southbound lanes of the I-77.

The first emergency calls began coming in at 1:15 p.m. ET, authorities said. The northbound lanes were closed to allow emergency vehicles to quickly reach people needing assistance at the scene, according to a statement from the Virginia State Police.

While the cause of the initial crash remains under investigation, Virginia State Police spokeswoman Corinne Geller said it was a classic pile up.

"[There were] 17 separate traffic crashes, but they all occurred as a chain reaction in that one-mile stretch of Interstate 77," Geller said. "The initial crash, the very first one, we're still investigating obviously what caused that one exactly, that's still under investigation."

After the first crash, she said, other vehicles on the highway were traveling too fast to stop by the time they saw the accidents ahead of them in the thick fog.

"People were traveling too fast for the road conditions and you had the initial crash and then you had a chain reaction, a series of crashes because the fog was so thick, people could not see what was up ahead," she said.

Traffic was re-directed in both directions as authorities worked to clear the scene and investigate the crashes, the Virginia State Police said.

The highway was expected to reopen at around 9 p.m. ET.

Authorities advised travelers, many of whom may be traveling for the Easter holiday, to make alternate travel plans or to expect significant delays.

Begin Location	Begin Date	Event Type	Deaths Direct	Injuries Direct	Damage Property Number	Damage Crops Number	Source
	3/31/13	Dense Fog	3	25	$500,000[5]	0	Newspaper
	4/4/13	Winter Weather	0	0	$-	0	Trained Spotter
Eona	6/7/13	Flash Flood	0	0	$-	0	911 Call Center
Pipers Gap	6/7/13	Flash Flood	0	0	$-	0	911 Call Center
Cliffview	6/7/13	Flash Flood	0	0	$-	0	911 Call Center
Gladeville	6/25/13	Hail	0	0	$-	0	Public
Dugspur	6/25/13	Hail	0	0	$-	0	Public
Hillsville	7/5/13	Flash Flood	0	0	$-	0	Trained Spotter
Fries Jct	8/12/13	Flash Flood	0	0	$-	0	County Official
	12/8/13	Ice Storm	0	0	$-	0	COOP Observer
	1/7/14	Cold/Wind Chill	0	0	$-	0	AWOS
	2/12/14	Heavy Snow	0	0	$-	0	Trained Spotter
	3/6/14	Winter Storm	0	0	$-	0	Public
Hillsville	5/15/14	Flash Flood	0	0	$-	0	911 Call Center
Fries Jct	6/16/14	Hail	0	0	$-	0	Trained Spotter
Hilltown	6/16/14	Hail	0	0	$-	0	Public
	11/1/14	Winter Weather	0	0	$-	0	CoCoRaHS
	11/26/14	Winter Weather	0	0	$-	0	Trained Spotter
	1/23/15	Winter Weather	0	0	$-	0	Trained Spotter
	2/16/15	Winter Storm	0	0	$-	0	Public
	2/19/15	Extreme Cold/ Wind Chill	0	0	$-	0	AWOS
	2/25/15	Winter Storm	0	0	$-	0	Amateur Radio
Cana	4/19/15	Flash Flood	0	0	$-	0	State Official
Hillsville	6/18/15	Hail	0	0	$-	0	Trained Spotter
	1/22/16	Winter Storm	0	0	$-	0	Trained Spotter
	2/14/16	Winter Storm	0	0	$-	0	Trained Spotter
	4/5/16	Frost/Freeze	0	0	$-	0	County Official
	1/6/17	Winter Storm	0	0	$-	0	Trained Spotter
Dugspur	5/18/17	Hail	0	0	$-	0	Public
Dugspur	5/18/17	Heavy Rain	0	0	$-	0	Public
Dugspur	5/18/17	Flash Flood	0	0	$5,000	0	911 Call Center
Cana	5/19/17	Hail	0	0	$-	0	Public
Hilltown	5/24/17	Flood	0	0	$75,000	0	Broadcast Media
Gladeville	7/18/17	Hail	0	0	$-	0	Trained Spotter
		TOTAL	3	25	$580,000		

[5] The total amount of damage included the 75 damaged vehicles

Recommended Mitigations: Carroll County and Hillsville

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
High	Upgrade public safety communication infrastructure from analog to digital, for Twin County Region (counties of Carroll and Grayson and the City of Galax).	All hazards	Carroll County, MRPDC, VDEM, DCR	1 Year/ In Progress	Funding needed from VDEM/FEMA
High	Promote the Firewise program for people who live in woodland communities. An estimated 712 homes fall into this category in various parts of Carroll County. This represents one of the worst natural hazard threats in the region.	Wildfire	Carroll County RC&D, Firewise, MRPDC, DOF	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Educate residents on methods recommended by the American Red Cross to prepare for various types of natural disaster.	Floods Snowstorms/Ice High Winds	Carroll County, MRPDC, VDEM, DCR, American Red Cross	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Medium	Further develop local capacity to document the number, size, age and value of the approximately 1,400 (PDC total) structures located in the floodplain.	Floods	Carroll County, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Funding needed from VDEM/FEMA
Medium	Comply with NFIP for floodplain identification and mapping, responsible floodplain management, and the promotion of flood insurance.	Floods	Carroll County, MRPDC, VDEM, DCR	1-3 Years/ Ongoing	Done through compliance with NFIP
Low	Consider flood-proofing or relocation/demolition for the repetitive loss property near Hillsville.	Floods	Town of Hillsville, MRPDC, VDEM, DCR	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Low	Properly inspect and enforce applicable state and federal dam regulations for high- and significant-hazard dams.	Dam Safety	Carroll County, MRPDC, DCR	1-3 Years/ Ongoing	Done through Federal, State, and Local codes

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
Low	Verify the geographic location of all NFIP repetitive losses and make inquiries as to whether the properties have been mitigated, and if so, by what means.	Floods	Carroll County, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Will be looked at next year

Grayson County and Fries, Independence and Troutdale

Community Hazard Profile

Grayson County is a remote, rural area with a population of 15,669 (increase of 0.9% since 2012). The county is traversed east-west by U.S. Rt. 58, north-south by State Rt. 16 (passing through the Town of Troutdale), and north-south by U.S. Rt. 21 (passing through the Town of Independence). The three incorporated towns include Fries, Independence, and Troutdale. Parts of the county border the independent City of Galax at the county's eastern border. Grayson's mountainous terrain includes Grayson Highlands State Park in the western end and parts of the Mount Rogers National Recreation Area running roughly along the county's northern border.

Chief natural hazards occurring in Grayson County include flooding, severe snow and ice storms, high winds, and risk of wildfire. Flooding affects relatively few properties, and there is no FEMA record of repetitive loss properties. Substantial parts of Grayson, encompassing roughly 60,000 acres, are subject to wildfire risk. Grayson also contains four dams rated for significant hazard potential and has a risk of potential for landslides, especially in the northern part of the county.

Past or Ongoing Mitigations

A special project by the New River-Highlands RC&D Council has produced a draft strategic plan for wildfire hazard reduction in Grayson County. The emergency services system includes the Twin County E-911 center, several volunteer fire departments and rescue squads, the sheriff's department and the state police.

The county's building codes are in line with the most recent statewide revisions known as the Uniform Statewide Building Code, which took effect in 2009.

Grayson County has not participated in the pre-disaster hazard mitigation projects in the past, other than what has already been noted. Like the other localities in the Mount Rogers region, most hazard mitigation efforts are not possible without substantial outside support from state and federal grants.

Severe Weather Events

Begin Location	Begin Date	Event Type	Deaths Direct	Injuries Direct	Damage Property Number	Damage Crops Number	Source
	4/4/13	Winter Weather	0	0	$-	0	Trained Spotter
Reavistown	7/12/13	Flash Flood	0	0	$5,000[6]	0	Trained Spotter
Reavistown	7/19/13	Hail	0	0	$-	0	Public
	12/8/13	Winter Weather	0	0	$-	0	Trained Spotter
	1/7/14	Cold/Wind Chill	0	0	$-	0	AWOS
	2/12/14	Heavy Snow	0	0	$-	0	Public
Independence	5/10/14	Hail	0	0	$-	0	Trained Spotter
	11/1/14	Winter Weather	0	0	$-	0	Trained Spotter
	11/26/14	Winter Storm	0	0	$-	0	Park/Forest Service
	1/23/15	Winter Weather	0	0	$-	0	Trained Spotter
	2/15/15	Extreme Cold/Wind Chill	0	0	$-	0	Mesonet
	2/16/15	Winter Storm	0	0	$-	0	Trained Spotter
	2/19/15	Extreme Cold/Wind Chill	0	0	$-	0	Mesonet
	2/25/15	Winter Storm	0	0	$-	0	Trained Spotter
Reavistown	4/19/15	Flash Flood	0	0	$-	0	State Official
Benington Mills	5/11/15	Flash Flood	0	0	$-	0	Public
Carsonville	5/11/15	Debris Flow	0	0	$-	0	Law Enforcement
	1/22/16	Winter Storm	0	0	$ -	0	Trained Spotter
	2/14/16	Winter Storm	0	0	$ -	0	Trained

[6] Property Damage Totals resulted from septic system damage

Begin Location	Begin Date	Event Type	Deaths Direct	Injuries Direct	Damage Property Number	Damage Crops Number	Source
							Spotter
	1/6/17	Winter Storm	0	0	$ -	0	Trained Spotter
Stevens Creek	4/24/17	Flood	0	0	$ -	0	911 Call Center
Rugby	5/9/17	Hail	0	0	$ -	0	Park/Forest Service
Rugby	5/20/17	Flash Flood	0	0	$ -	0	Public
Oak Hill	5/24/17	Flood	0	0	$150,000 [7]	0	Broadcast Media
Carsonville	6/15/17	Heavy Rain	0	0	$ -	0	Trained Spotter
Carsonville	6/15/17	Heavy Rain	0	0	$-	0	Trained Spotter
Independence	6/15/17	Flash Flood	0	0	$2,000	0	911 Call Center
Riverside	7/12/17	Hail	0	0	$-	0	Public
		TOTAL	0	0	$157,000	$ -	

Recommended Mitigations: Grayson County and Fries, Independence, and Troutdale

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
High	Upgrade public safety communication infrastructure from analog to digital, for Twin County Region (counties of Carroll and Grayson and the City of Galax).	All hazards	Grayson County, MRPDC, VDEM, DCR	1 Year/ In Progress	Funding needed from VDEM/FEMA
High	Make improvements to drainage and runoff issues caused by flash flooding at the Fries School.	Floods	Grayson County, Town of Fries	3-5 Years/ Not Started	Funding needed from VDEM/FEMA

[7] Property Damage Totals resulted from campers and camper covers that sustained flood damage along the New River

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
High	Pursue federal certification of the Base Flood Elevation of the Grayson Highlands Combined School floodwall, as well as funds for possible repairs or additions, as needed, to the floodwall	Floods	Grayson County, MRPDC, VDEM, DCR	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Support implementation of the strategic plan for wildfire hazard reduction in Grayson County.	Wildfire	Grayson County RC&D MRPDC, DOF	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Support educational programs to promote Firewise methods to affected residents of woodland communities. An estimated 258 homes are part of woodland communities in Grayson County.	Wildfire	Grayson County RC&D Firewise, MRPDC, DOF	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Educate residents on methods recommended by the American Red Cross to prepare for various types of natural disaster.	Floods Snowstorms/Ice High Winds	Grayson County, MRPDC, VDEM, DCR, American Red Cross	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Medium	Further develop local capacity to document the number, size, age and value of the approximately 1,400 (PDC total) structures located in the floodplain.	Floods	Grayson County, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Funding needed from VDEM/FEMA
Medium	Conduct hydrological/ engineering studies to properly determine Base Flood Elevations in those watersheds with estimated floodplains.	Floods	Grayson County, MRPDC, VDEM, DCR	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Medium	Conduct hydrological/ engineering studies to determine Base Flood Elevations within the Town of Troutdale, which presently lacks a recognized floodplain.	Floods	Grayson County, MRPDC, VDEM, DCR	Project Complete	Flood mapping has been provided

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
Medium	Identify flood prone properties for potential acquisition/ demolition, elevation, flood proofing, and minor localized flood control projects.	Floods	Grayson County, MRPDC, VDEM, DCR	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Medium	Conduct hydrological/ engineering studies to determine Base Flood Elevations within the Towns of Fries and Independence.	Floods	Town of Independence, Town of Fries, MRPDC, VDEM, DCR	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Medium	Comply with NFIP for floodplain identification and mapping, responsible floodplain management, and the promotion of flood insurance.	Floods	Grayson County, MRPDC, VDEM, DCR	1-3 Years/ Ongoing	Done through compliance with the NFIP
Low	Properly inspect and enforce applicable state and federal dam regulations for high- and significant-hazard dams.	Dam Safety	Grayson County, MRPDC, DCR	1-3 Years/ Ongoing	Done though local and state codes

Smyth County and Chilhowie, Marion, and Saltville

Community Hazard Profile

Smyth County, with a population of 30,686 (decrease of 4.7%since 2012), stands along the east-west path of I-81 and also is part of the Mount Rogers National Recreation Area. Population growth is stagnant, due in part to loss of the traditional industrial base and limited housing development. Despite those drawbacks, the county is traversed by the Appalachian Trail, offers appealing country vistas, and stands within easy reach of many natural resource attractions.

The main natural hazards affecting Smyth County include flooding along the North, Middle, and South Forks of the Holston River, as well as several tributaries; severe winter storms and ice; some potential for dam failure; drought; and undetermined risk from landslides and karst terrain, which appears in an estimated 30% of the county's territory. The county is also part of a Special Wind Region (with wind speed potential of 200 mph), but this problem rarely causes enough damage to be considered a major hazard. Smyth County contains seven repetitive loss properties. The county has the most flood-prone properties in the Mount Rogers Region (see At-risk Structures in the 100-year Flood Plain table in the Flood Risk Assessment and Vulnerability Section). While not a frequent event as defined by our hazard matrix, Smyth and Washington Counties suffered a severe tornado in April of 2011 that resulted in 4 deaths (all in Washington County), and over 50 injuries throughout the two counties.

Past or Ongoing Mitigations

Due to its long history with disaster-level flooding, Smyth County and its communities have participated in special flood mitigation projects. Record-level disasters resulting from the floods of 1977 led to a flood mitigation engineering study for the towns of Chilhowie and Marion, as well as the nearby communities of Atkins and Seven Mile Ford. In Chilhowie, the work resulted in the eventual relocation of 67 families and the creation of the Chilhowie Recreation Park. Other recommended flood mitigations have not been pursued due to lack of funding.

Also, as a result of flooding in 2001 and 2002, Smyth County obtained federal disaster relief funds and relocated five homes out of the floodplain in River Bottom Circle, located near the Broadford community along the North Fork of the Holston River.

More recently the Town of Chilhowie participated in a preliminary flood reduction study by the U.S. Army Corps of Engineers. About 12-15 properties continue to sustain flood damage within town borders. The town has opted against pursuing a more detailed study due to the high cost and instead is advocating for mitigating the most flood-prone structures in the town.

Emergency response is coordinated through Smyth County's centralized E-911 system. The county also creating a modernized countywide communications system for emergency response and direct radio communications among police, fire departments, and rescue squad organizations.

The county's building codes are in line with the most recent statewide revisions known as the Uniform Statewide Building Code, which took effect in 2009.

Severe Weather Events

In April of 2017, the Holston Hills Country Club bridge was critically damaged in a massive flood event, rendering the bridge impassable. Since that time the bridge has been rebuilt and reopened to through traffic.

Begin Location	Begin Date	Event Type	Deaths Direct	Injuries Direct	Damage Property Number	Damage Crops Number	Source
	4/4/13	Winter Weather	0	0	$ -	0	Public
Marion	5/10/13	Heavy Rain	0	0	$ -	0	Public
Saltville	5/19/13	Hail	0	0	$ -	0	Public
Saltville	5/19/13	Flash Flood	0	0	$ -	0	State Official
Groseclose	6/13/13	Lightning	0	0	$5,000	0	State Official
Adwolf	7/10/13	Flood	0	0	$ -	0	Emergency Manager
	1/7/14	Cold/Wind Chill	0	0	$ -	0	AWOS
	1/25/14	Winter Weather	0	1	$50,000	0	911 Call Center
	2/12/14	Heavy Snow	0	0	$ -	0	Trained Spotter

Begin Location	Begin Date	Event Type	Deaths Direct	Injuries Direct	Damage Property Number	Damage Crops Number	Source
Chilhowie	6/29/14	Flash Flood	0	0	$250,000[8]	0	911 Call Center
	11/1/14	Winter Weather	0	0	$ -	0	Trained Spotter
	11/26/14	Winter Weather	0	0	$ -	0	Public
	2/15/15	Extreme Cold/Wind Chill	0	0	$ -	0	AWOS
	2/16/15	Winter Storm	0	0	$ -	0	Trained Spotter
	2/19/15	Extreme Cold/Wind Chill	0	0	$ -	0	AWOS
	2/21/15	Winter Storm	0	0	$ -	0	Trained Spotter
	2/25/15	Winter Weather	0	0	$ -	0	Trained Spotter
Sugar Grove	4/19/15	Flood	0	0	$ -	0	Department of Highways
Thomas Bridge	4/20/15	Flood	0	0	$ -	0	State Official
	1/22/16	Winter Storm	0	0	$ -	0	Trained Spotter
	2/14/16	Winter Storm	0	0	$ -	0	Trained Spotter
Saltville	8/16/16	Hail	0	0	$ -	0	Trained Spotter
Mt Carmel	4/23/17	Flood	0	0	$75,000[9]	0	Newspaper
Mc Mullin	4/23/17	Flash Flood	0	0	$ -	0	County Official
Marion	4/29/17	Hail	0	0	$ -	0	Trained Spotter
Furnace Hill	4/29/17	Hail	0	0	$ -	0	Broadcast Media
Chilhowie	4/29/17	Hail	0	0	$ -	0	Trained

[8] Total Property Damage includes homes damaged in northern parts of the county and in the Town of Saltville.
[9] Property Damage Totals includes flooding in downtown Town of Chilhowie, which caused damage to buildings and vehicles.

Begin Location	Begin Date	Event Type	Deaths Direct	Injuries Direct	Damage Property Number	Damage Crops Number	Source
							Spotter
Saltville	5/27/17	Hail	0	0	$ -	0	Broadcast Media
Saltville	5/27/17	Hail	0	0	$ -	0	Broadcast Media
McCrady	5/27/17	Hail	0	0	$ -	0	Public
Broadford	5/27/17	Hail	0	0	$ -	0	Broadcast Media
Adwolf	5/27/17	Hail	0	0	$ -	0	Public
Sevenmile Ford	5/27/17	Hail	0	0	$ -	0	Broadcast Media
Mc Mullin	5/27/17	Hail	0	0	$ -	0	Amateur Radio
Thomas Bridge	5/27/17	Hail	0	0	$ -	0	Public
Sugar Grove	10/23/17	Flash Flood	0	0	$ -	0	Emergency Manager
		TOTAL	0	1	$380,000	0	

Recommended Mitigations: Smyth County and Chilhowie, Marion, and Saltville

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
High	Install a natural gas-powered backup generator for the Prater pump station, which is critical to the hydraulics of the water system.	All	Marion	1-3 Years/ Not Started	Funding needed from VDEM/FEMA
High	Further develop local capacity to document the number, size, age and value of the approximately 1,400 (PDC total) structures located in the floodplain.	Floods	Smyth County, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Funding needed from VDEM/FEMA
High	Mitigate against future flood losses, with highest priority given to the repetitive loss properties.	Floods	Smyth County, MRPDC, VDEM, DCR	3-5 Years/ Not Started	Funding needed from VDEM/FEMA

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
High	Conduct hydrological/engineering studies to determine Base Flood Elevations in watersheds containing estimated floodplains.	Floods	Smyth County, MRPDC, VDEM, DCR	3 - 5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Comply with NFIP for floodplain identification and mapping, responsible floodplain management, and the promotion of flood insurance.	Floods	Smyth County, MRPDC, VDEM, DCR	1 - 3 Years/ Ongoing	Done through compliance with NFIP
High	Use the flood analysis as a basis for consideration of future relocation/demolition and flood-proofing projects.	Floods	Smyth County, MRPDC, VDEM, DCR	1 - 3 Years/ Ongoing	When this issue arises, flood analysis is used
High	Identify flood prone properties for potential acquisition/demolition, elevation, flood proofing, and minor localized flood control projects.	Floods	Smyth County, MRPDC, VDEM, DCR	3 - 5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Support the continued development of the improved countywide radio communications system to improve emergency response and coordination during major disasters and other emergencies.	All	Smyth County, MRPDC, VDEM	1 - 3 Years/ Ongoing	Worked on when possible
Medium	Support educational programs to promote Firewise methods to affected residents of woodland communities. An estimated 475 homes are located in wooded settings and subject to risk of wildfire.	Wildfire	Smyth County RC&D Firewise MRPDC, DOF	3 - 5 Years/ Not Started	Funding needed from VDEM/FEMA
Low	Educate residents on methods recommended by the American Red Cross to prepare for various types of natural disaster.	Floods Snowstorms/Ice High Winds	Smyth County, MRPDC, VDEM, DCR, American Red Cross	3 - 5 Years/ Not Started	Funding needed from VDEM/FEMA

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
Low	Properly inspect and enforce applicable state and federal dam regulations for high- and significant-hazard dams. Presently Hungry Mother Dam is regulated as a high-risk potential dam in the county.	Dam Safety	Smyth County, MRPDC, DCR	1-3 Years/ Ongoing	Done though federal, state, and local codes
Low	Verify the geographic location of all NFIP repetitive losses and make inquiries as to whether the properties have been mitigated, and if so, by what means.	Floods	Smyth County, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Will be looked at next year

Washington County and Abingdon, Damascus, and Glade Spring

Community Hazard Profile

Washington County is a rapidly developing area located on the west end of the Mount Rogers region and is bisected by Interstate 81 in an east-west direction. Within the past decade the most change and growth has been occurring along the I-81 corridor between the Town of Abingdon and the City of Bristol, with much housing development, as well as burgeoning commercial development at the Exit 7 area. Former communities consisting largely of open space and farming are being converted into residential subdivisions to accommodate the population of 53,789 (decrease of 2.0%since 2012).

The chief natural hazards of concern to Washington County and its localities include flooding, wildfires, severe winter storms and ice, drought, undetermined risk for impacts from landslides and karst terrain (which occurs in 50% of the county's territory), and high winds. While not a frequent event as defined by our hazard matrix, Smyth and Washington Counties suffered a severe tornado in April of 2011 that resulted in 4 deaths (all in Washington County), and over 50 injuries throughout the two counties.

The flooding results from sustained heavy rainfalls, violent thunderstorms, or as the aftermath of a major snowstorm. FEMA records show three repetitive loss properties with an average claim of $10,063.89. Wildfire risks derive from being located in a rural, forested region and development of woodland home communities (encompassing more than 100,000 acres in the county). Severe winter storms and/or ice have been known to lead to disaster declarations, while drought is only an occasional hazard with impacts mainly for the farming community.

Washington County also contains four dams rated for high- or significant-hazard in the event of failure. Two are flood control structures owned by the Tennessee Valley Authority and one is a hydroelectric dam that has been breached and is no longer active. A fourth dam, owned by the state Department of Game and Inland Fisheries, is a recreational area regulated by the state.

Past or Ongoing Mitigations

Washington County operates its own E-911 system for emergency response from among an array of volunteer fire departments and rescue squads, the sheriff's department and the state police.

A long history of disaster-level flooding led to a comprehensive flood mitigation study for the Town of Damascus completed in 1979. In time, with support from outside grant funding, the town relocated 34 families (88 people) and three local businesses out of the floodplain. The town also was able to install storm drainage systems along flood-prone areas in Mock, Surber, and Haney Hollows. Damascus continues to face a serious flood threat due to its location at the confluence of Beaverdam and Laurel creeks and the lack of developable land outside of the floodplain.

As with the flood mitigation studies done for Smyth County, Damascus could not afford the high cost of the comprehensive approach. In addition, some mitigations considered in the 1970s and 1980s – including stream channelization and installation of levees – would not be allowed under modern state and federal regulations.

The Town of Glade Spring obtained funding to install a culvert underneath Grace Street and the Town Square intersection as part of a downtown revitalization effort.

The Town of Abingdon has recently updated some of its floodplain maps but has not been involved in mitigation efforts such as elevations or relocations and demolitions. Currently Abingdon is pursuing funding from FEMA to mitigate against losses associated with flooding in the Country Club Estates and surrounding areas. This area is in the southern portion of the town. Over the past 25 years there have been several rainfall events that have caused localized flooding to several homes in the drainage swale that conveys stormwater from east to west, crossing Fairway Drive, Bogey Drive, and Birdie Drive. After a flooding event in 1992, the Town Council commissioned the "Preliminary Engineering Report, Country Club Estates, Storm Drainage Improvements, Abingdon, Virginia." This study resulted in solution alternatives with associated cost estimates. Very few, if any, of the recommendations in that report were implemented. There have been other flood events in this area, most recently in July of 2009. During that storm, stormwater encroached nearby and even into several of the residences along the drainage path. Another Preliminary Engineering Report has since been commissioned by the Town Council to update the previous study discussed above.

The Town of Abingdon identifies as an ongoing need for the immediate future the review of all streams and creeks within the Town's corporate limits, which includes the Town Creek and Wolf Creek drainage basins and their tributaries and a drainage swale paralleling Hillman Highway that contributes floodwaters to Fifteen Mile Creek.

Flooding issues affecting private and public property specifically identified within the Town Creek Basin are:

1) Tributary #1 to Town Creek – This tributary is in FEMA Special Flood Hazard Zone A from Hillside Drive downstream to Railroad Street
2) Tributary #2 to Town Creek- This tributary is in FEMA Special Flood Hazard Zone A from Thompson Drive downstream to Tanner Street
3) Tributary #3 to Town Creek – This tributary is in FEMA Special Flood Hazard Zone A from Washington County along Whites Mill Road downstream to Town Creek and
4) Town Creek – In FEMA Special Flood Hazard Zones AE and X and experiences localized flooding from Branch Street to Interstate 81.

Flooding issues specifically identified within the Wolf Creek Basin occur within Tributary #2 to Wolf Creek. Portions of this tributary are in FEMA Special Flood Hazard Zone A and flooding affects private and public property along the drainage path from Hill Street to Wolf Creek.

Although not specifically identified on the Town of Abingdon Flood Insurance Rate Map, private properties located within the drainage swale paralleling Hillman Highway experience damage from floodwaters of the drainage basin. The headwaters of this swale begin near East Main Street and discharge into Fifteen Mile Creek. Continued development within the watershed areas, which includes portions of Washington County, has created additional impervious surfaces, such as roofs and pavements that increase storm water runoff. Portions of all of the aforementioned sections within the Town are prone to flooding, property damage, loss and possible harm to residents.

In order to mitigate the conditions as described briefly above, the Town must perform hydrologic and hydraulic analyses of the watershed areas that specifically identify the problem areas and develop solutions and plans that address the problems. The aforementioned practices including analysis, planning, establishing priorities and application for available funds will help enable project work to progress so that all concerned can be protected from flooding.

The county's building codes are in line with the most recent statewide revisions known as the Uniform Statewide Building Code, which took effect in 2009.

Severe Weather Events

The Town recently had to intercede and perform emergency repairs on a property at 341 East Main Street, Abingdon, VA (Tax # 013-1-79) to allow Town Creek to flow properly and eliminate a blockage that was ponding water in East Main Street and became a potential flood hazard for neighboring properties. The Town would like to purchase the property to perform improvements to help alleviate the potential for high water at the intersection of East Main Street and Town Creek and the potential flooding of adjacent properties. The building on the property dates from the 1930s and it would not be cost effective to attempt to renovate or flood proof. Our intent will be to demolish the existing building and pavement, reestablish the stream bank on both sides of Town Creek, and to create a floodplain on the rest of the property for future storm events. This will be a precursor to a larger project to improve the existing drainage under East Main Street and improve pedestrian movement.

Begin Location	Begin Date	Event Type	Deaths Direct	Injuries Direct	Damage Property Number	Damage Crops Number	Source
	3/5/13	Heavy Snow	0	0	$ -	0	Law Enforcement
Damascus	5/22/13	Flash Flood	0	0	$5,000	0	911 Call Center
	2/13/14	Heavy Snow	0	0	$ -	0	Trained Spotter
	2/13/14	Heavy Snow	0	0	$ -	0	Amateur Radio
	2/13/14	Heavy Snow	0	0	$ -	0	Public
	2/13/14	Heavy Snow	0	0	$ -	0	Public
	2/13/14	Heavy Snow	0	0	$ -	0	Public
Shakesville	9/4/14	Flash Flood	0	0	$ -	0	Broadcast Media
	11/1/14	Heavy Snow	0	0	$ -	0	911 Call Center
	11/1/14	Heavy Snow	0	0	$ -	0	911 Call Center
	2/16/15	Heavy Snow	0	0	$ -	0	Trained Spotter
	2/16/15	Heavy Snow	0	0	$ -	0	Public
	2/17/15	Heavy Snow	0	0	$ -	0	Emergency Manager
	2/21/15	Heavy Snow	0	0	$ -	0	Public
	2/26/15	Heavy Snow	0	0	$ -	0	COOP Observer
Saltville	3/5/15	Flood	0	0	$1,000	0	Emergency Manager
Saltville	4/25/15	Hail	0	0	$ -	0	Public
Saltville	4/25/15	Hail	0	0	$ -	0	Public
Damascus	8/14/15	Flash Flood	0	0	$ -	0	911 Call Center
	1/22/16	Heavy Snow	0	0	$ -	0	Public
	1/22/16	Heavy Snow	0	0	$ -	0	Broadcast Media
	2/8/16	Heavy Snow	0	0	$ -	0	911 Call Center

	2/14/16	Heavy Snow	0	0	$ -	0	Public
Watauga	3/14/16	Hail	0	0	$ -	0	Public
Abingdon	6/22/16	Hail	0	0	$ -	0	Post Office
	1/6/17	Heavy Snow	0	0	$ -	0	Public
	1/6/17	Heavy Snow	0	0	$ -	0	Public
			0	0	$6,000	0	

Recommended Mitigations: Washington County and Abingdon, Damascus, and Glade Spring

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
High	Make flood improvements at the intersection of E. Main St. and Town Creek; reestablish the stream bank and create a floodplain.	Floods	Town of Abingdon, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Funding needed from VDEM/FEMA
High	Further develop local capacity to document the number, size, age and value of the approximately 1,400 (PDC total) structures located in the floodplain.	Floods	Washington County, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Funding needed from VDEM/FEMA
High	Conduct hydrological/engineering studies to determine Base Flood Elevations in watersheds containing estimated floodplains.	Floods	Washington County, MRPDC, VDEM, DCR	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Encourage more property owners to insure their homes through the National Flood Insurance Program.	Floods	Washington County, MRPDC, VDEM, DCR	1-3 Years/ Ongoing	Residents are encouraged to do so
High	Consider appropriate mitigation projects for the three repetitive loss properties identified by FEMA data.	Floods	Washington County, MRPDC, VDEM, DCR	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Conduct hydrological/ engineering studies to determine Base Flood Elevations and create new floodplain map for Cedar Creek in the Meadowview community.	Floods	Washington County, MRPDC, VDEM, DCR	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Use the flood analysis as a basis for consideration of future relocation/demolition and flood-proofing projects.	Floods	Washington County, MRPDC, VDEM, DCR	1-3 Years/ Ongoing	When this issue arises flood analysis is used
High	Comply with NFIP for floodplain identification and mapping, responsible floodplain management, and the promotion of flood insurance.	Floods	Washington County, MRPDC, VDEM, DCR	1-3 Years/ Ongoing	Done through compliance with the NFIP

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
High	Support educational programs to promote Firewise methods to affected residents of woodland communities. An estimated 804 homes are located in wooded settings and subject to risk of wildfire.	Wildfire	Washington County, RC&D, Firewise, MRPDC, DOF	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Medium	Educate residents on methods recommended by the American Red Cross to prepare for various types of natural disaster.	Floods Snowstorms/Ice High Winds	Washington County, MRPDC, VDEM, DCR, American Red Cross	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Low	Properly inspect and enforce applicable state and federal dam regulations for high- and significant-hazard dams. There are four such dams in Washington County, one of which has been breached.	Dam Safety	Washington County, MRPDC, DCR	1-3 Years/ Ongoing	Done though federal, state, and local codes
Low	Verify the geographic location of all NFIP repetitive losses, and making inquiries as to whether the properties have been mitigated, and if so, by what means.	Floods	Washington County, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Will be looked at next year

Wythe County and Rural Retreat and Wytheville

Community Hazard Profile

Wythe County is a community of 28,723 that is traversed north-south by Interstate 77 and east-west by Interstate 81, as well as routes 21, 52, and 94. The county includes the incorporated towns of Rural Retreat and Wytheville, which serves as the county seat. The county caters to the trucking industry and also facilitated the construction of a major new Pepsi bottling plant along the I-81 corridor. More than 50%of the county contains slopes of more than 20%, which hinders development in those steep areas.

Chief natural hazards experienced in Wythe County and its localities include flooding, severe winter storms and ice, high winds, drought, and undetermined hazards from karst terrain (which appears in roughly 30% of the county's landscape). There is one high-hazard potential dam (Rural Retreat Dam) owned as a recreational attraction by the Virginia Department of Game and Inland Fisheries.

The flooding results from sustained heavy rainfalls, violent thunderstorms, and melting as the aftermath of a major snowstorm. Flood hazards have been identified for the Town of Wytheville and the community of Max Meadows east of Wytheville. There are two repetitive loss properties in Wythe County.

Past or Ongoing Mitigations

Emergency response is based around the county's E-911 system, the sheriff's department, the state police, and several fire departments and rescue squads, including both paid and volunteer units.

The county's building codes are in line with the most recent statewide revisions known as the Uniform Statewide Building Code, which took effect in 2009. These modern codes help protect against hazard damages, such as those from high winds.

Severe Weather Events

Begin Location	Begin Date	Event Type	Deaths Direct	Injuries Direct	Damage Property Number	Damage Crops Number	Source
	4/4/13	Heavy Snow	0	0	$-	0	Public
Catron	7/10/13	Flash Flood	0	0	$5,000	0	911 Call Center
Lots Gap	7/11/13	Flash Flood	0	0	$16,000	0	Emergency Manager
Blacklick	7/17/13	Lightning	0	0	$1,500	0	911 Call Center
Fort Chiswell	8/12/13	Flash Flood	0	0	$-	0	Law Enforcement
	12/8/13	Winter Weather	0	0	$-	0	Trained Spotter
	1/7/14	Cold/Wind Chill	0	0	$-	0	AWOS
	1/10/14	Winter Weather	0	0	$50,000	0	911 Call Center
	2/12/14	Heavy Snow	0	0	$-	0	Public
	11/1/14	Winter Weather	0	0	$-	0	Public
	11/26/14	Winter Weather	0	0	$-	0	Public
	1/23/15	Winter Weather	0	0	$-	0	COOP Observer
	2/16/15	Winter Storm	0	0	$-	0	Trained Spotter
	2/19/15	Extreme Cold/ Wind Chill	0	0	$-	0	Mesonet
	2/25/15	Winter Weather	0	0	$-	0	Trained Spotter
Cedar Springs	4/19/15	Flood	0	0	$50,000	0	Newspaper
Simmerman	4/19/15	Flood	1	0	$-	0	Broadcast Media
Max Meadows	4/20/15	Flood	0	0	$-	0	Trained Spotter
Wytheville	4/20/15	Hail	0	0	$-	0	Public
Max	4/20/15	Flash Flood	0	0	$-	0	State Official

Begin Location	Begin Date	Event Type	Deaths Direct	Injuries Direct	Damage Property Number	Damage Crops Number	Source
Meadows							
Fort Chiswell	4/20/15	Flash Flood	0	0	$-	0	State Official
	1/22/16	Winter Storm	0	0	$-	0	Trained Spotter
	2/14/16	Winter Storm	0	0	$-	0	Trained Spotter
	1/6/17	Winter Storm	0	0	$-	0	Trained Spotter
Porters Crossroads	4/24/17	Flood	0	0	$-	0	Department of Highways
Favonia	4/24/17	Flood	0	0	$-	0	Newspaper
Max Meadows	4/24/17	Flood	0	0	$-	0	Department of Highways
Rural Retreat	4/29/17	Hail	0	0	$-	0	Broadcast Media
Haven	4/29/17	Hail	0	0	$-	0	Trained Spotter
Rural Retreat	4/29/17	Flash Flood	0	0	$1,000	0	Public
Gunton Park	5/24/17	Flood	0	0	$-	0	Emergency Manager
		TOTAL	1	0	$123,500	0	

Recommended Mitigations: Wythe County and Rural Retreat and Wytheville

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
High	Mitigate against repetitive flooding of main transportation infrastructure in Max Meadows along Reed Creek and Millers Creek. Mitigate against erosion and damage to homes and transportation infrastructure caused by repetitive flooding in Speedwell along Cripple Creek and Dry Run Creek.	Flooding	Wythe County, MRPDC, VDEM, DCR	1-3 Years/ Ongoing	Funding needed from VDEM/FEMA
High	Apply for funding to purchase and install generators at Wythe County's main pumping station.	All hazards	Wythe County, MRPDC, VDEM, DCR	1-3 Years/ Ongoing	Funding needed from VDEM/FEMA
High	Further develop local capacity to document the number, size, age, and value of the approximately 1,400 (PDC total) structures located in the floodplain.	Floods	Wythe County, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Funding needed from VDEM/FEMA
High	Conduct hydrological/ engineering studies to determine Base Flood Elevations in watersheds containing estimated floodplains.	Floods	Wythe County, MRPDC, VDEM, DCR	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Comply with NFIP for floodplain identification and mapping, responsible floodplain management, and the promotion of flood insurance.	Floods	Wythe County, MRPDC, VDEM, DCR	1-3 Years/ Ongoing	Done through compliance with the NFIP
High	Use the flood analysis as a basis for consideration of future relocation/demolition and flood-proofing projects.	Floods	Wythe County, MRPDC, VDEM, DCR	1-3 Years/ Ongoing	Used when these projects are looked at

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
Medium	Support development of strategic wildfire risk reduction plans such as being promoted by the New River-Highlands RC&D Council.	Wildfire	Wythe County, RC&D, MRPDC, DOF	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Medium	Support educational programs to promote Firewise methods to affected residents of woodland communities. An estimated 20,000 acres of land (unknown number of woodland homes) are subject to wildfire risk in Wythe County.	Wildfire	Wythe County, RC&D, Firewise, MRPDC, DOF	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Low	Educate residents on methods recommended by the American Red Cross to prepare for various types of natural disaster.	Floods Snowstorms/Ice High Winds	Wythe County, MRPDC, VDEM, DCR, American Red Cross	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Low	Properly inspect and enforce applicable state and federal dam regulations for high- and significant-hazard dams. Rural Retreat Dam falls into the high-hazard potential category in Wythe County.	Dam Safety	Wythe County, MRPDC, DCR	1-3 Years/ Ongoing	Done through Federal, State, and local codes
Low	Verify the geographic location of all NFIP repetitive losses and make inquiries as to whether the properties have been mitigated, and if so, by what means.	Floods	Wythe County, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Will start next year

City of Bristol

Community Hazard Profile

The City of Bristol, Virginia is a community of 17,160 (decrease of 3.8%since 2012) located along Interstate 81 and abutting the far southwestern reach of Washington County. The city has experienced some transition in some traditional residential areas being converted to commercial uses and some shift toward high-tech industry. Bristol stands in the lowlands of the Valley and Ridge physiographic province, and this area is characterized by karst terrain.

Chief natural hazards experienced in the City of Bristol include flooding, which in the past has caused damages in the millions of dollars according to a study by the U.S. Army Corps of Engineers. Other natural hazards faced in Bristol include severe winter storms and ice, high winds, and undetermined hazard risks from karst terrain and landslides. Two high-hazard potential dams affecting Bristol include Clear Creek Dam and Beaver Creek Dam, both located upstream in Washington County. The City of Bristol contains two repetitive loss properties.

Past or Ongoing Mitigations

Emergency response is based around the city's E-911 system, the Washington County Sheriff's Department, the City of Bristol Police Department, the state police, and fire department and rescue squads.

In the spring of 2015, the City of Bristol installed a new water management device at Sugar Hollow Dam. The 1.1 million Dollar phase was part of a larger $6.9 million project by the U.S. Army Corps of Engineers. The project addresses flood events along Beaver Creek by replacing a water control structure on the upstream side of the dam.

The City of Bristol, Virginia teamed up with the City of Bristol, Tennessee to work with the U.S. Army Corps of Engineers to conduct the "Flood Damage Reduction Feasibility Study" of 2003 to identify ways to reduce continuing flood damage, especially along the main stem of Beaver Creek, which passes through the center of the adjacent cities. The Corps of Engineers recommended the following flood mitigations in July 2003:

- Widening the Beaver Creek channel near 6th Street (in Bristol, Tennessee)
- Replacing a pedestrian bridge and removing the 8th Street Bridge (in Bristol, Tennessee)
- Removing the old Sears commercial building near State Street (in Bristol, Tennessee)

- Replacing the existing outlet structure (a 48-inch diameter pipe) on Beaver Creek Dam with a larger reinforced concrete structure to more effectively hold back flood flows.

The Corps of Engineers estimated the proposed mitigations will reduce total average annual flood damages by 20%and reduce flood levels by nearly one foot in the central business districts of both Bristol, Virginia and Bristol, Tennessee.

The city's building codes are in line with the most recent statewide revisions known as the Uniform Statewide Building Code, which took effect in 2009. These modern building codes help offset damages caused by natural hazards, such as high winds, for new construction.

Severe Weather Events

The City of Bristol, VA experienced flooding conditions due to a heavy rainfall event on August 18, 2018. A small un-named stream that flows from the north side of Interstate 81 through the Briarwood Subdivision (located just south of the interstate) overflowed and flooded basements of several homes specifically along Brookdale Circle, in addition to the parking lot of a neighboring business located on Lee Highway (Rt. 11). The FIRM panel map (510022-0008 D) shows no Special Flood Hazard Area for this area. The City would like to do a flood risk analysis of this area and a mitigation plan for measures that could be done to address future flood events. In addition, Mumpower Creek which is a small tributary to Beaver Creek overflowed its banks with the same event on the 18th, affecting several homes located in the floodplain. If resources are available, the City would like to also do a flood study of this area between Valley Drive and Beaver Creek to address mitigation.

The anticipated cost of the study would be $60,000. The City would provide the required 25% match with in-kind staff time (valued at $15,000 – salary and fringes) from our Engineering staff.

Begin Location	Begin Date	Event Type	Deaths Direct	Injuries Direct	Damage Property Number	Damage Crops Number	Source
	3/5/13	Heavy Snow	0	$-	0	0	Law Enforcement
	2/13/14	Heavy Snow	0	$-	0	0	Trained Spotter
	2/13/14	Heavy Snow	0	$-	0	0	Public
Bristol	7/27/14	Hail	0	$-	0	0	Trained Spotter
	11/1/14	Heavy Snow	0	$-	0	0	911 Call Center
	2/16/15	Heavy Snow	0	$-	0	0	Trained Spotter
	2/17/15	Heavy Snow	0	$-	0	0	Emergency Manager
	2/21/15	Heavy Snow	0	$-	0	0	Public
	2/26/15	Heavy Snow	0	$-	0	0	COOP Observer
	1/22/16	Heavy Snow	0	$-	0	0	Broadcast Media
	2/8/16	Heavy Snow	0	$-	0	0	911 Call Center
	2/14/16	Heavy Snow	0	$-	0	0	Public
	1/6/17	Heavy Snow	0	$-	0	0	Public
		TOTAL	0	$0	0	0	

Recommended Mitigations: City of Bristol

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
High	Perform flood studies at Briarwood Subdivision along Brookdale Circle and along Lee Hwy; also at Mumpower Creek between Valley Drive and Beaver Creek.	Floods	City of Bristol, MRPDC, VDEM, DCR	1-3 Years/ Ongoing	Funded by Bristol, TN/VA
High	Further develop local capacity to document the number, size, age and value of the approximately 1,400 (PDC total) structures located in the floodplain.	Floods	City of Bristol, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Funding needed from VDEM/FEMA
High	Support implementation of the remedies outlined by the U.S. Army Corps of Engineers for the cities of Bristol in Virginia and Tennessee.	Floods	City of Bristol, MRPDC, VDEM, DCR	3-5 Years/ Ongoing	Funded by Bristol, TN/VA
High	Identify flood prone properties for potential acquisition/demolition, elevation, flood proofing, and minor localized flood control projects.	Floods	City of Bristol, MRPDC, VDEM, DCR	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
High	Comply with NFIP for floodplain identification and mapping, responsible floodplain management, and the promotion of flood insurance.	Floods	City of Bristol, MRPDC, VDEM, DCR	1-3 Years/ Ongoing	Done through compliance with the NFIP
Medium	Support educational programs to promote Firewise methods, as appropriate to residents of woodland communities. More specific data for the city was not available at the time this report was written.	Wildfire	City of Bristol, Firewise, MRPDC, VDEM, DCR, DOF	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Low	Educate residents on methods recommended by the American Red Cross to prepare for various types of natural disaster.	Floods Snowstorms/Ice High Winds	City of Bristol, MRPDC, VDEM, DCR, American Red Cross	3-5 Years/ Not Started	Funding needed from VDEM/FEMA

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
Low	Properly inspect and enforce applicable state and federal dam regulations for high- and significant-hazard dams. These include Clear Creek Dam and Beaver Creek Dam.	Dam Safety	City of Bristol, MRPDC, DCR	1-3 Years/ Ongoing	Done through Federal, State, and Local codes
Low	Verify the geographic location of all NFIP repetitive losses and make inquiries as to whether the properties have been mitigated, and if so, by what means.	Floods	City of Bristol, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Will start next year

City of Galax

Community Hazard Profile

The City of Galax, a community of 6,748 (decrease of 4.2% since 2012), is located in a hilly area with above-sea elevations ranging from 2,340 feet to 2,980 feet at Ward Knob.

While the City of Galax contains a defined floodplain along Chestnut Creek, which flows north-south through the city core, Galax does not participate in the National Flood Insurance Program and has resisted suggestions it rejoin the program, despite disaster-level flooding in November 2003 and repeat flooding problems in 2004. For communities that refuse to participate in NFIP, disaster help from FEMA is not available in the defined floodplains. Flooding problems also have been evident recently along the tributary of Mill Creek, which is not part of a recognized FEMA floodplain. Flooding on the tributaries occurs because the city's storm drainage system is aging (50 years old), with parts of the piping collapsing; these problems block storm water drainage and worsen flooding problems in some residential neighborhoods.

Other natural hazards faced by the City of Galax include wildfires and high winds. The city, along with much of the Mount Rogers region, is part of a Special Wind Zone (winds up to 200 mph), although the problems created do not appear to be of disaster level and the city does enforce current building codes.

Past or Ongoing Mitigations

The City of Galax grew up around its industrial district along Chestnut Creek in the core of the city. Due to disastrous flooding problems along Chestnut Creek (especially in 1940), the U.S. Army Corps of Engineers in 1950 channelized the creek through the downtown area and flood-proofed the industrial buildings located there. Following the flood disaster from November 2003, Galax city officials said they had developed a P.E.R. to improve the drainage system to help alleviate flooding problems. The City has completed Bottom Area Project Phase I and is currently underway with the next phase of projects. A new P.E.R. was done after 3 events in 2018. The city is considering methods of grants, financing, or fees to address those identified problems that affect the downtown area. In 2018, the City submitted a request to the US Army Corps of Engineers to look at possible projects upstream of Chestnut Creek through the Flood Damage Reduction Program (Section 205 of the 1948 Flood Control Act). The end result would be a project that would reduce the 100-year flood plain to the Chestnut

Creek channel. It is their understanding that Galax is under consideration for this study, and it may be approved in 2019.

The city's building codes are in line with the most recent statewide revisions known as the Uniform Statewide Building Code, which took effect in 2015. These modern codes help to offset the impacts of natural hazards such as winds for new construction. For emergency response, the City of Galax participates in the Twin County E-911 system, which covers the entire city, along with the adjoining counties of Carroll and Grayson. Responders include fire departments and rescue squads, local police and sheriff's departments, and the state police.

Severe Weather Events

Begin Location	Begin Date	Event Type	Deaths Direct	Injuries Direct	Damage Property Number	Damage Crops Number	Source
	4/4/13	Winter Weather	0	0	$-	0	Trained Spotter
Galax	6/18/13	Heavy Rain	0	0	$-	0	Law Enforcement
Galax	7/3/13	Flood	0	0	$-	0	Trained Spotter
Galax	7/11/13	Heavy Rain	0	0	$-	0	Trained Spotter
Galax	7/12/13	Flash Flood	0	0	$-	0	Trained Spotter
Galax	7/27/13	Flash Flood	0	0	$20,000	0	Trained Spotter
Galax	8/12/13	Flash Flood	0	0	$-	0	Public
	12/8/13	Ice Storm	0	0	$-	0	COOP Observer
	1/7/14	Cold/Wind Chill	0	0	$-	0	AWOS
	2/12/14	Heavy Snow	0	0	$-	0	Trained Spotter
	3/6/14	Winter Storm	0	0	$-	0	Public
Galax	7/3/14	Flood	0	0	$-	0	911 Call Center
	11/1/14	Winter Weather	0	0	$-	0	CoCoRaHS
	11/26/14	Winter Weather	0	0	$-	0	Trained Spotter
	1/23/15	Winter Weather	0	0	$-	0	Trained Spotter
	2/16/15	Winter Storm	0	0	$-	0	Public
	2/19/15	Extreme Cold/Wind Chill	0	0	$-	0	AWOS
	2/25/15	Winter Storm	0	0	$-	0	Amateur Radio
	1/22/16	Winter Storm	0	0	$-	0	Trained Spotter
	2/14/16	Winter Storm	0	0	$-	0	Trained Spotter
	4/5/16	Frost/Freeze	0	0	$-	0	County Official
	1/6/17	Winter Storm	0	0	$-	0	Trained Spotter
			0	0	$20,000	0	

Recommended Mitigations: City of Galax

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
High	Upgrade public safety communication infrastructure from analog to digital, for Twin County Region (counties of Carroll and Grayson and the City of Galax).	All hazards	City of Galax, MRPDC, VDEM, DCR	1 Year/ In Progress	Funding needed from VDEM/FEMA
High	Educate residents on methods recommended by the American Red Cross to prepare for all types of natural disaster.	All hazards	City of Galax, MRPDC, VDEM, DCR, American Red Cross	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Medium	Further develop local capacity to document the number, size, age and value of the approximately 1,400 (PDC total) structures located in the floodplain.	Floods	City of Galax, MRPDC, VDEM, DCR	1-3 Years/ Not Started	Funding needed from VDEM/FEMA
Medium	Support development of strategic wildfire risk reduction plans such as being promoted by the New River- Highlands RC&D Council.	Wildfire	City of Galax, RC&D, MRPDC, DOF	3-5 Years/ Not Started	Funding needed from VDEM/FEMA
Medium	Support educational programs to promote Firewise methods to affected residents of woodland communities. An estimated 67 homes in Galax are in wooded settings and at risk of wildfire.	Wildfire	City of Galax Firewise, RC&D, MRPDC, DOF	3-5 Years/ Not Started	Funding needed from VDEM/FEMA

PLAN MAINTENANCE

Plan Adoption

It is anticipated that the 2018 revision of the Mount Rogers Hazard Mitigation Plan will be adopted in the summer of 2018. All resolutions for adoption of the plan by participating localities will be included in the final document. The plan was available for public comment throughout the update process. The Public will also have an opportunity to view the plan during the final adoption phase by the localities. The MRPDC will assist any locality in guiding the plan through the adoption process with all necessary public hearings and provide the adoption resolutions.

Plan Implementation

The Mount Rogers Hazard Mitigation Plan will be implemented as follows:

1) policy changes that avoid development in hazard areas or that protect buildings from future impacts, and
2) implementation projects that physically change the environment to reduce impacts or educate landowners and residents on how to protect themselves and their property in the case of an event.

The goal of implementing the identified strategies is to reduce the loss of life and/or property due to natural hazard events. Policy changes are an ongoing way to implement the hazard mitigation plan. As local plans are updated, such as comprehensive plans, zoning and subdivision ordinances, or capital improvement plans, strategies for mitigating hazard impacts can be included. Changes to these plans do require some foresight and public involvement but can be a way for localities to make significant progress with little capital investment. The MRPDC works regularly with its member localities as they update these plans and is willing to provide technical assistance for including hazard mitigation specific strategies and language when requested.

Implementing projects require more work and investment from the locality or lead agency. Many of the identified projects are contingent on finding grant funding and partnering with other agencies and organizations to complete the project. Grant funding is especially critical in the current economic situation.

Plan Maintenance

The Mount Rogers Hazard Mitigation Plan will be reviewed annually by the staff of the Mount Rogers Planning District Commission with local government staffs to ensure that the project list stays up-to-date (and completed projects are noted). If necessary, the plan will be reviewed and revised after significant hazard events impacting the region. Cost-effective projects may be added to the locality project list each year, with that local government's approval. This review and potential update may be conducted electronically or through an annual meeting of the Hazard Mitigation Steering Committee. The PDC will ensure that each locality section of the mitigation plan is integrated into the comprehensive plans as updates occur. The method of review will depend on the events of the previous year and the extent of potential revisions to be made. An annual report of the status of mitigation actions will be reviewed and sent to VDEM to reduce the burden of evaluating strategies for the required five-year revision.

In five years, the Mount Rogers PDC will work to find funding from VDEM and/or FEMA to update the Mount Rogers Hazard Mitigation Plan. Any update of the plan will include a public input session or strategy to engage the community in this planning effort. At the time of the next update, the effectiveness of the mitigation strategies will be evaluated by determining any reduction in vulnerability to a particular hazard. New vulnerabilities will be identified by looking at event history in the past five years, as well as development that may have occurred in hazard areas. During the interceding five years, the Mount Rogers PDC will maintain the hazard mitigation website and will update it periodically with grant funding availability and project updates from localities, if available. This will also allow for continued public input throughout the plan implementation phase.

Strengthen public participation by providing more avenues for the public to comment on and ask questions about the Hazard Mitigation Plan and its development. The PDC recommends holding at least two regional public input sessions, one to be held in Wytheville for the Bland, Wythe, Carroll, Galax, areas, and one to be held in Marion for the Grayson, Smyth, Washington, Bristol areas. The PDC will also stress to the localities the importance of educating the public on the Mitigation Plan and the need for community support. This outreach can be done via websites and social media.

APPENDIX I

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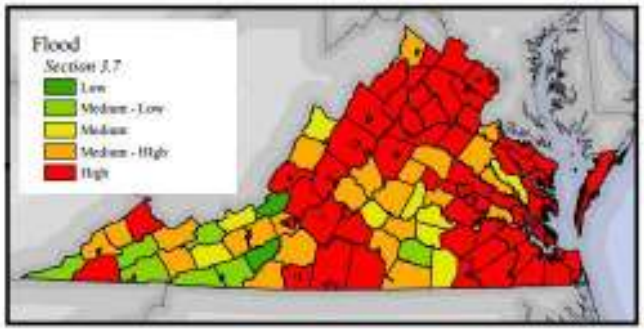
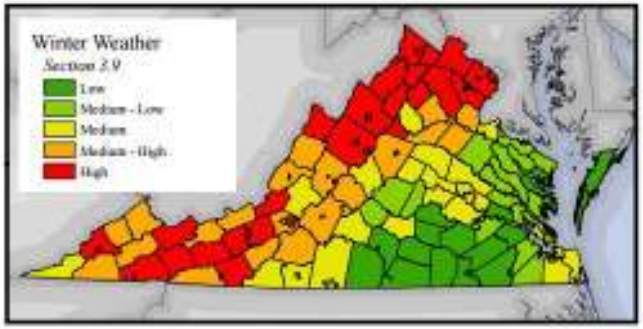
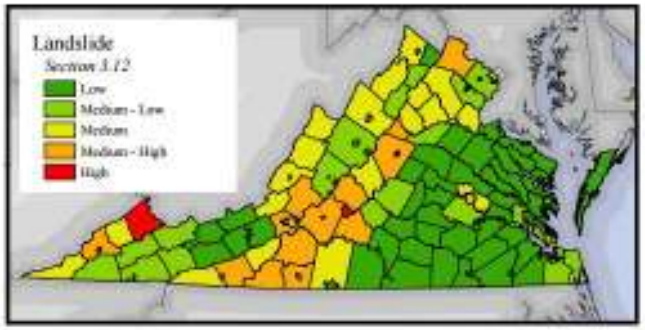
Emergency Management Personnel Contact Information

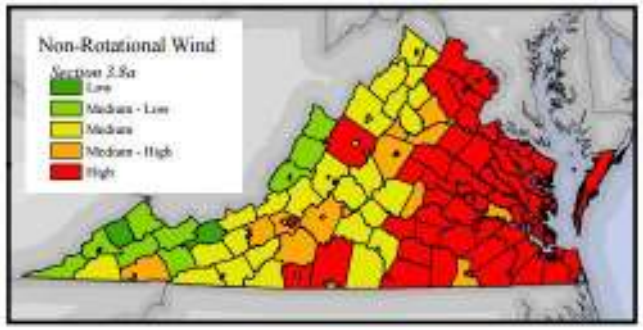
Jurisdiction Name	Plan POC	Mailing Address	Email	Phone
Bland County	Jenna Dunn	612 Main St. Bland VA24315	jdunn@bland.org	276-688-4641
Carroll County	Everett Lineberry	605-2 Pine St, Hillsville, VA 24343	elineberry@carrollcountyVAorg	276-730-3012
Grayson County	Jimmy Moss	129 Davis St. Independence VA 24348	jmoss@graysoncountyVAgov	276-773-3673
Smyth County	Charles Harrington	121 Bagley Circle Suite 100. Marion VA 24354	cph@marionrha.com	276-783-3381
Washington County	Theresa Kingsley	20281 Rustic Ln, Abingdon VA 24210	tkingsley@washcoVAcom	276-525-1330
Wythe County	Curtis Crawford	340 6th Street, Wytheville VA 24382	ccrawford@wytheco.org	276-724-6000
City of Galax	Mike Ayers	300 West Grayson St., Galax VA, 24333	mayers@galaxVAcom	276-235-9580
City of Bristol	Mike Armstrong	211 Lee St. Bristol VA 24201	Mike.armstrong@bristolVAorg	276-645-7303
Town of Hillsville	Retta Jackson	410 N. Main St., P.O. Box 545, Hillsville, VA 24343	hillsville@townofhillsville.com	276-728-2128
Town of Independence	Jimmy Moss	129 Davis St. Independence VA 24348	jmoss@graysoncountyVAgov	276-773-3673
Town of Fries	Scott McCoy	1021 Terrace Drive, Marion, VA 24354	smccoy@mrpdc.org	276-783-5103
Town of Troutdale	Scott McCoy	1021 Terrace Drive, Marion, VA 24354	smccoy@mrpdc.org	276-783-5103
Town of Marion	Bill Rush	138 W. Main Street, Marion VA 24354	brush@marionVAorg	276-783-4113
Town of Chilhowie	John Clark	325 East Lee Highway, PO Box 5012, Chilhowie, VA 24319	chilhowie.townmgr@chilhowie.org	276-646-3232
Town of Saltville	Brian Martin	217 Palmer Ave. Saltville VA 24370	townmanager@saltville.org	276-496-5342
Town of Abingdon	Tyler Vencill	P.O. Box 789, Abingdon VA 24212	tvencill@abingdon-va.gov	276-628-3167
Town of Damascus	Gavin Blevins	1021 Terrace Drive, Marion, VA 24354	gblevins@mrpdc.org	276-783-5103
Town of Glade Spring	Aaron Sizemore	1021 Terrace Drive, Marion, VA 24354	asizemore@mrpdc.org	276-783-5103
Town of Wytheville	Ian Bishop	150 E. Monroe St, Wytheville, VA 24382	iab@wytheville.org	276-223-3302
Town of Rural Retreat	Jason Childers	PO Box 130, Rural Retreat, VA 24368	jasonc@townofruralretreat.com	276-686-4221

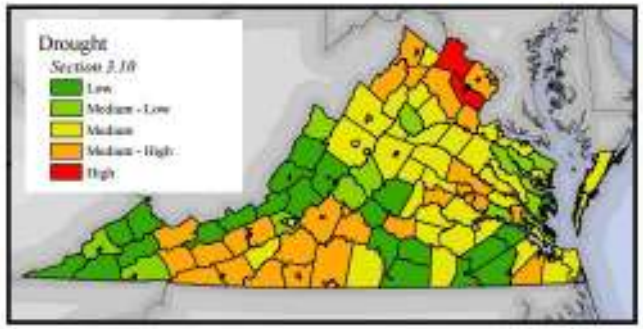
Hazard Ranking Risk Maps

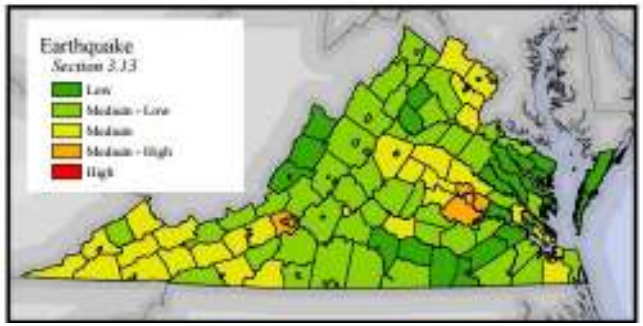


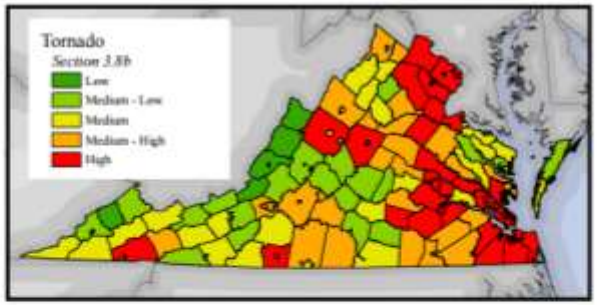


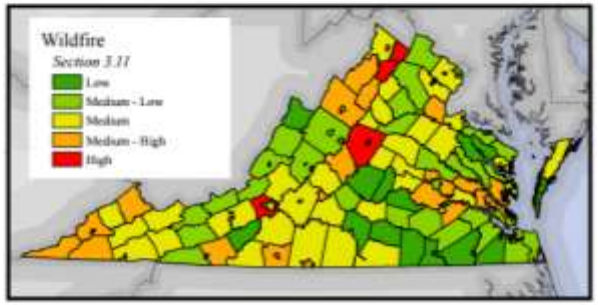


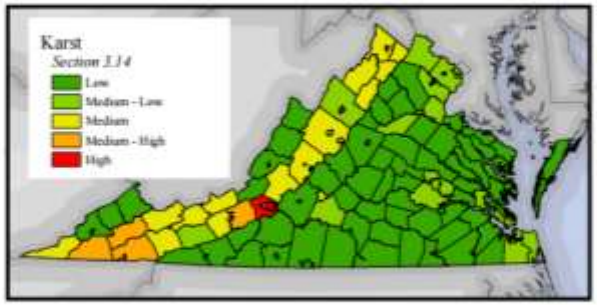

Non-Rotational Wind
Section 3.8a
Low
Medium - Low
Medium
Medium - High
High


Drought
Section 3.10
Low
Medium - Low
Medium
Medium - High
High


Earthquake
Section 3.13
Low
Medium - Low
Medium
Medium - High
High







HAZARD RANKING

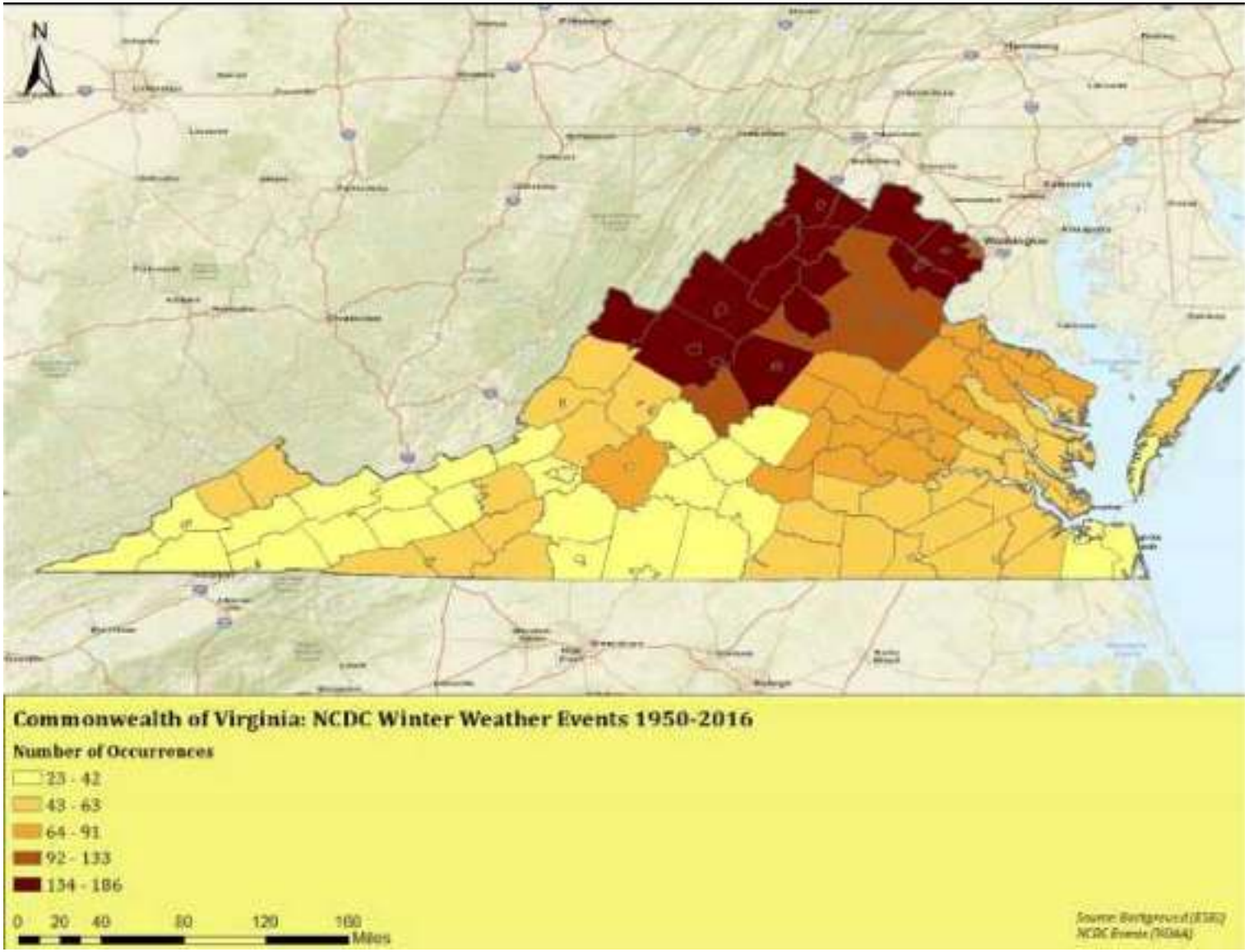
This is a summary of the individual hazard risk maps found in Section 3.7 through Section 3.14. The parameters used to create the Hazard Ranking Parameters and Risk Maps are explained in Section 3.5.

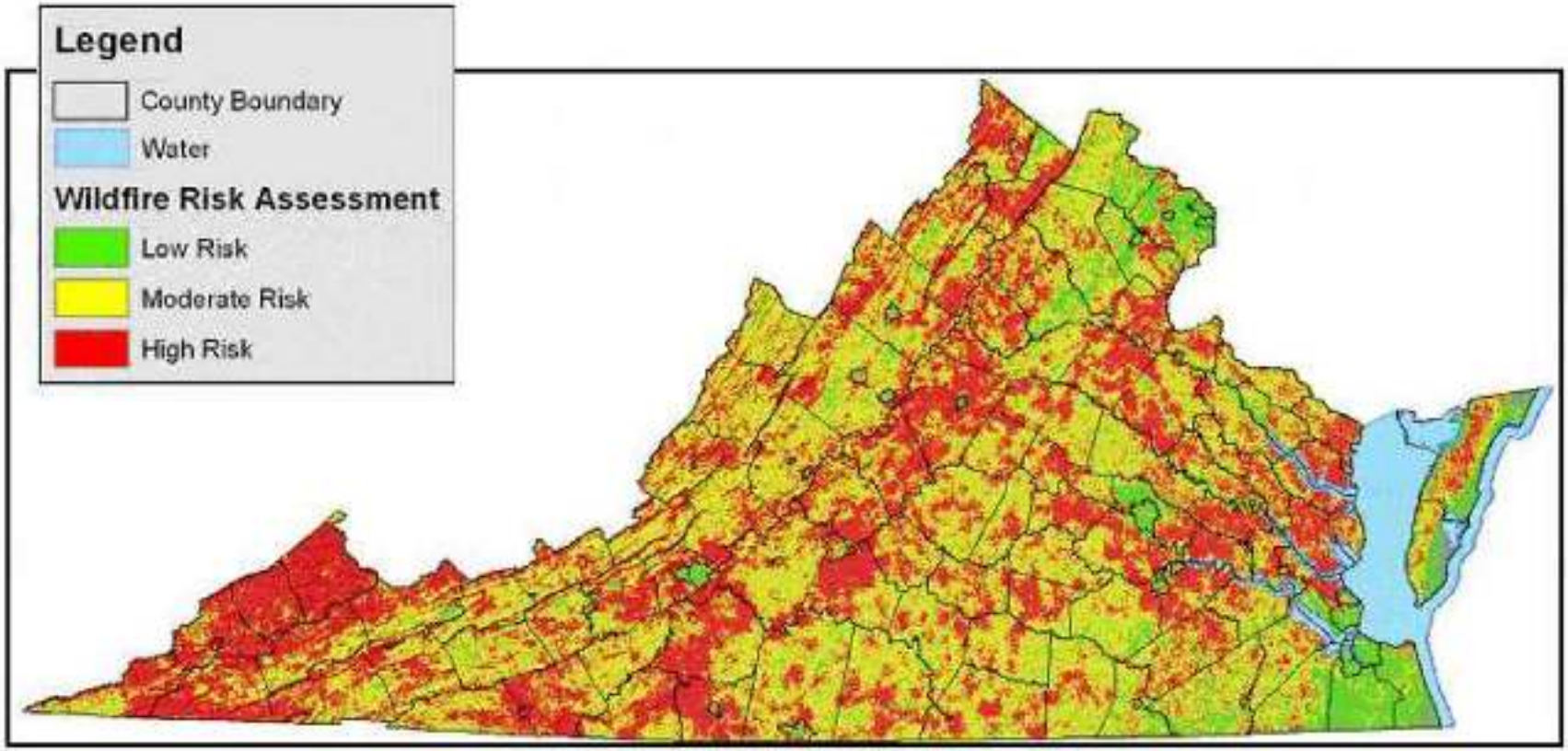
DATA SOURCES

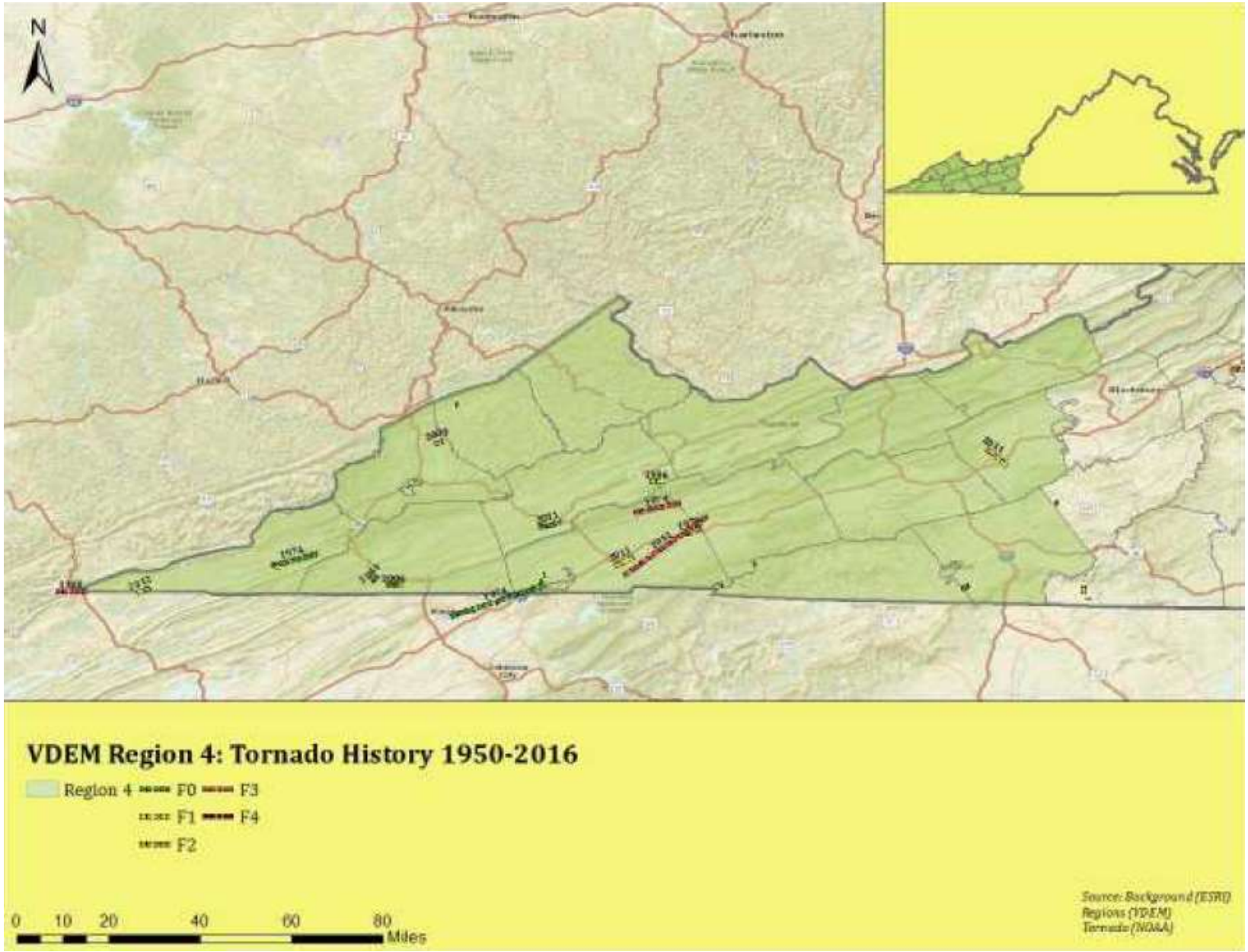
CGIT Ranking Methodology
VGIN Jurisdictional Boundaries
ESRI State Boundaries

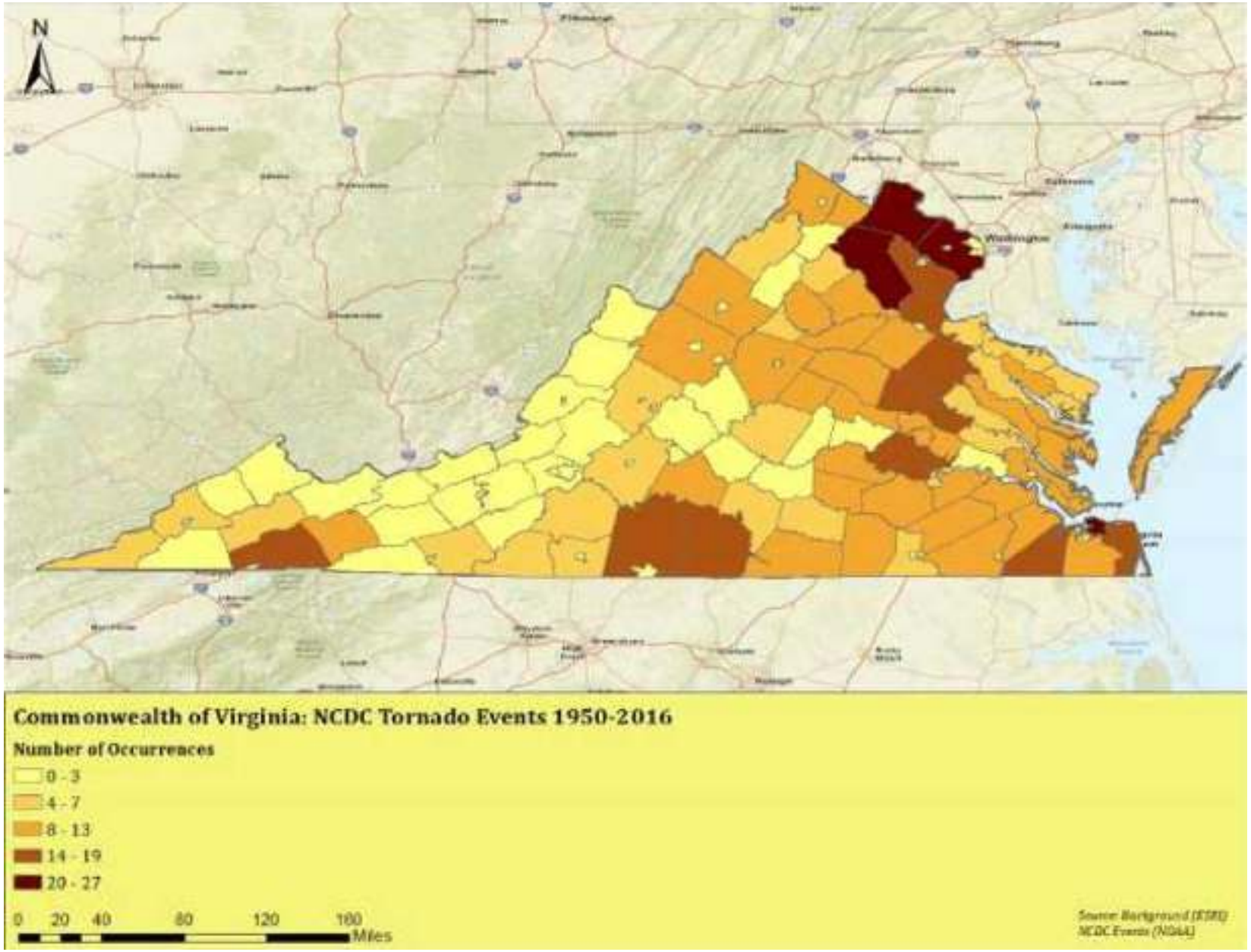
Hazard Identification Maps

The following maps are sourced from the Virginia Hazard Mitigation Plan.


N
Commonwealth of Virginia: NCDC Winter Weather Events 1950-2016
Number of Occurrences
23 - 42
43 - 63
64 - 91
92 - 133
134 - 186
0 20 40 80 120 160
Miles


Legend
County Boundary
Water
Wildfire Risk Assessment
Low Risk
Moderate Risk
High Risk


N
VDEM Region 4: Tornado History 1950-2016
Region 4
F0
F1
F2
F3
F4
0 10 20 40 60 80
Miles
Source: Background (ESRI)
Regions (VDEM)
Tornado (NOAA)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Commonwealth of Virginia: NCDC Tornado Events 1950-2016
Number of Occurrences
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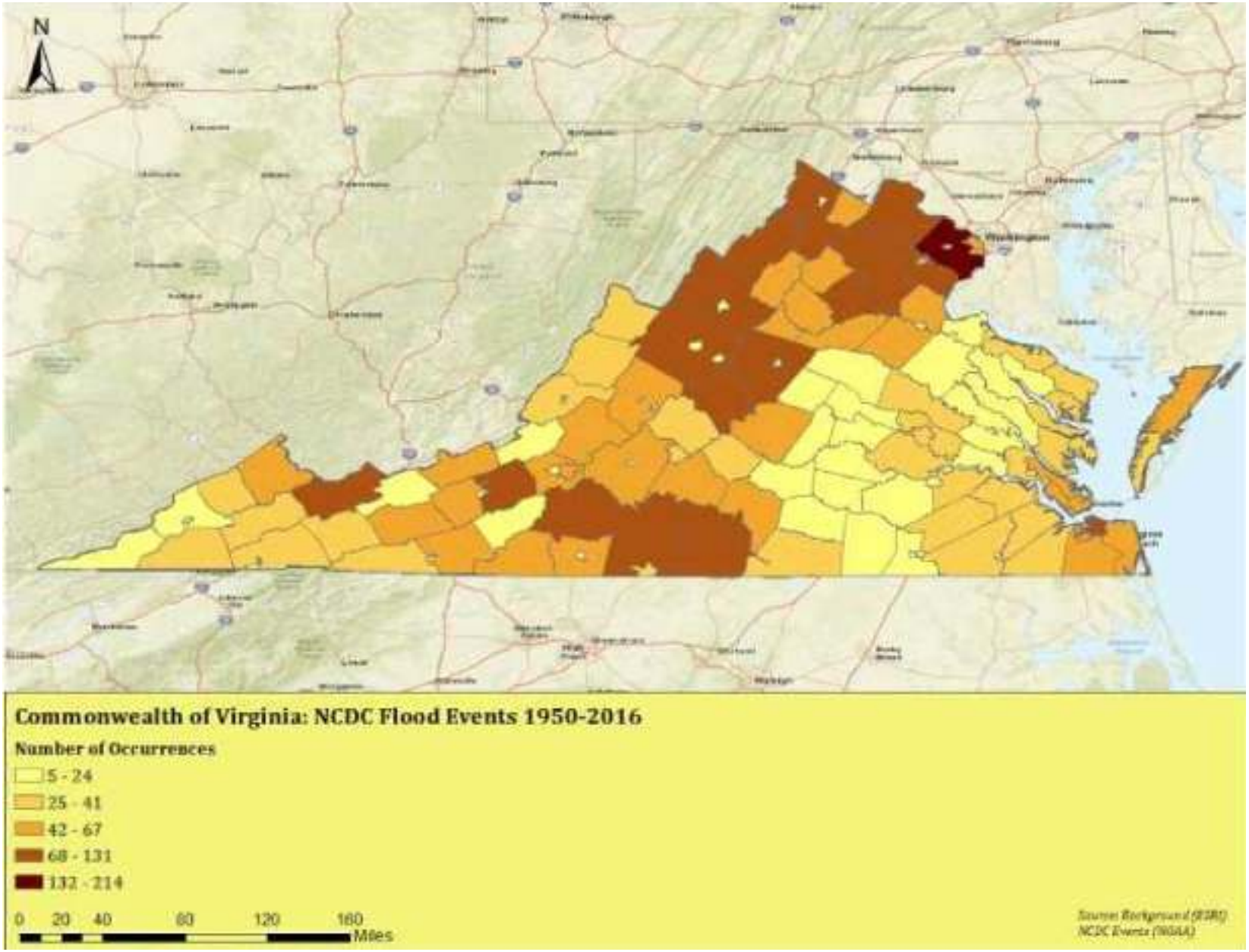
4 - 7
8 - 13
14 - 19
20 - 27
0 20 40 80 120 160
Miles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Commonwealth of Virginia: NCDC Flood Events 1950-2016
Number of Occurrences
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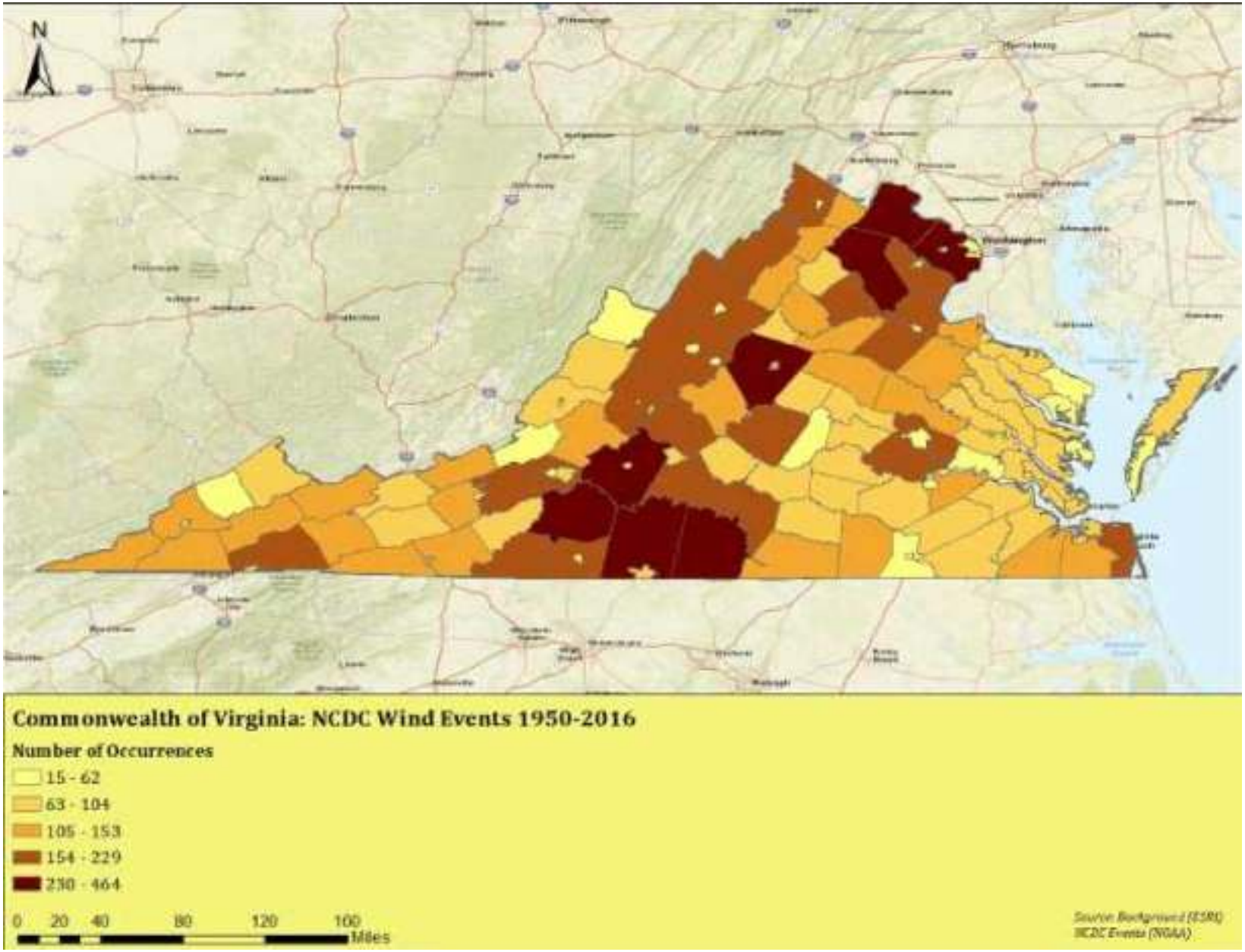
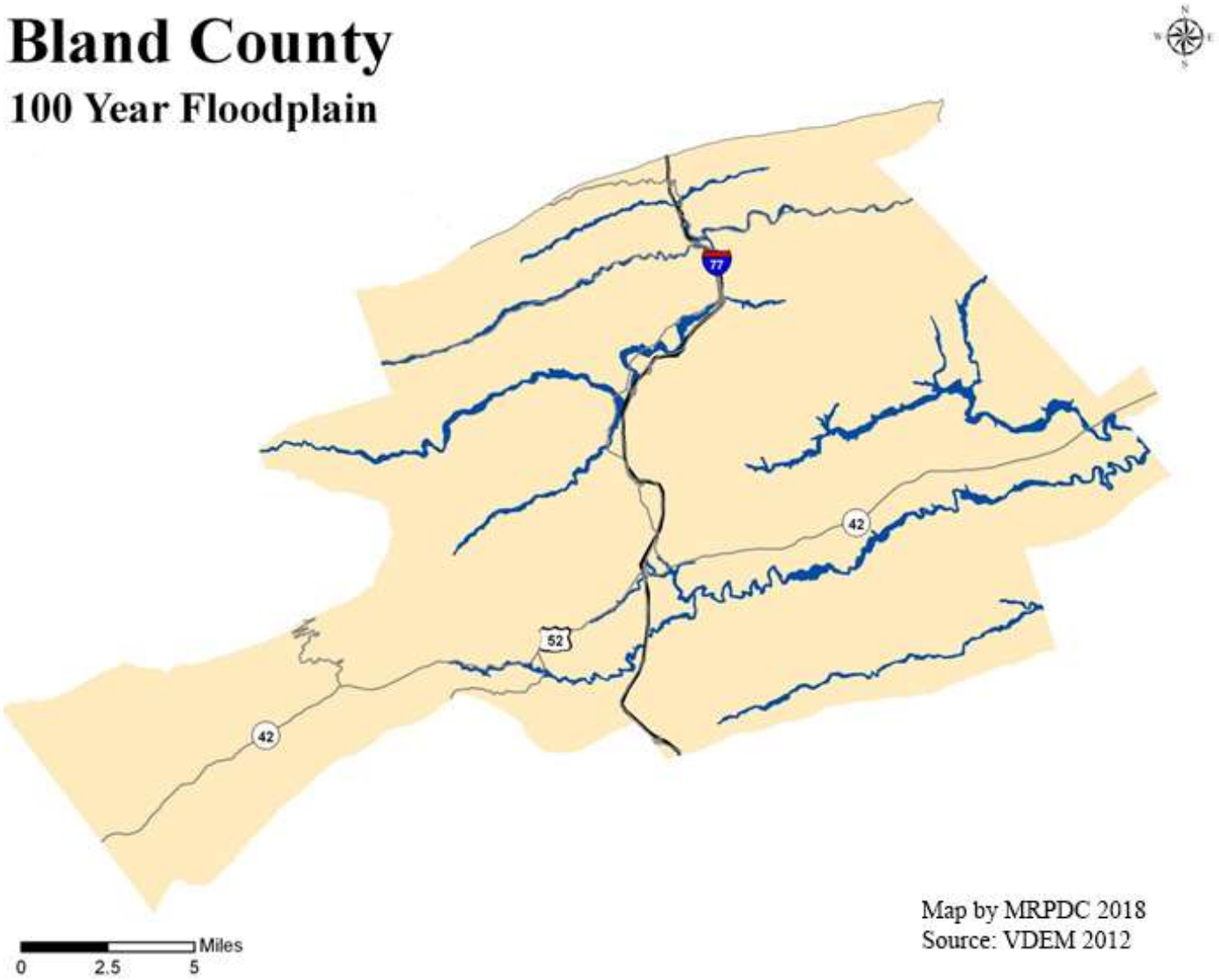
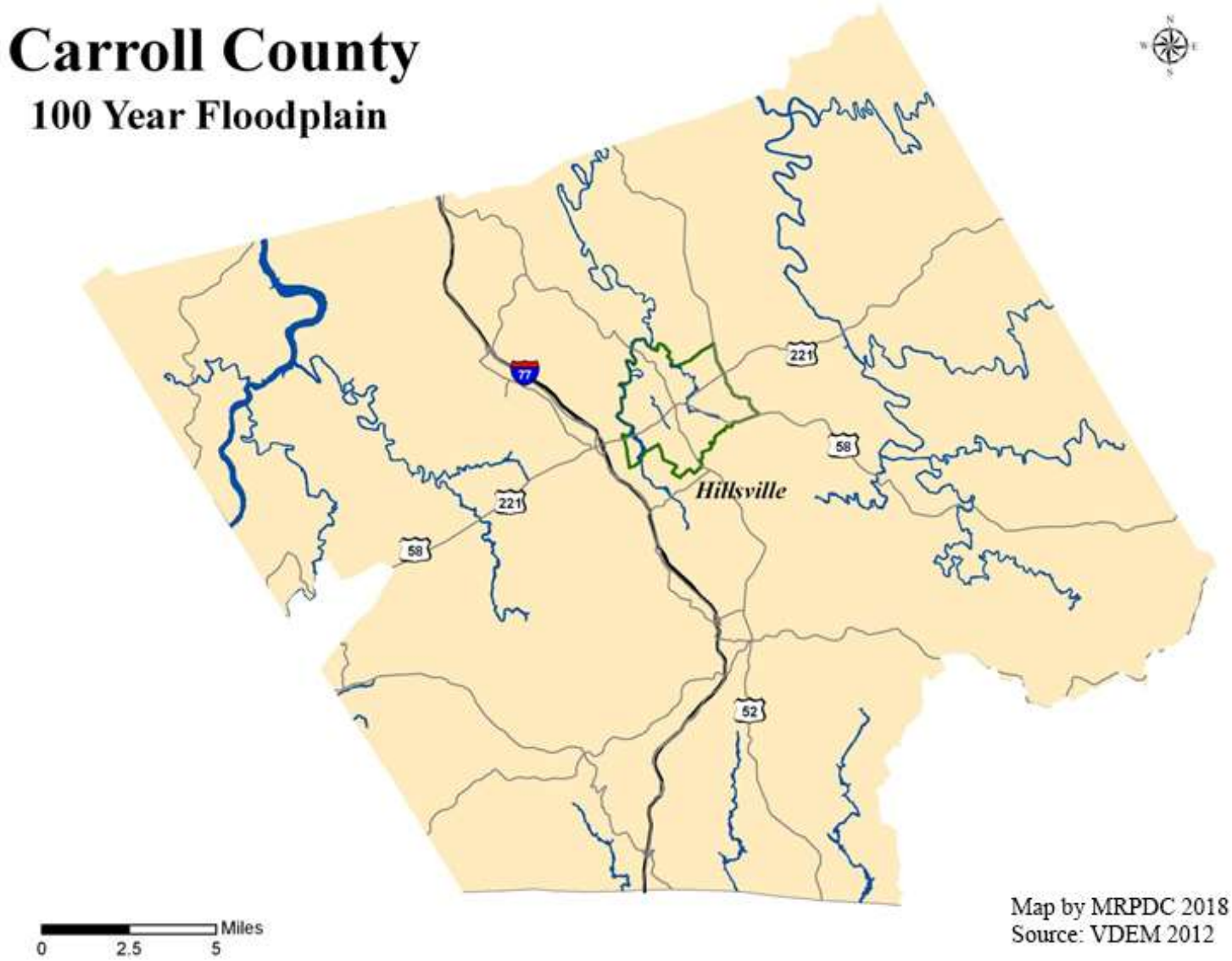
25 - 41
42 - 67
68 - 131
132 - 214
0 20 40 80 120 160
Miles


N
Commonwealth of Virginia: NCDC Wind Events 1950-2016
Number of Occurrences
15 - 62
63 - 104
105 - 153
154 - 229
230 - 464
0 20 40 80 120 160
Miles

Bland County

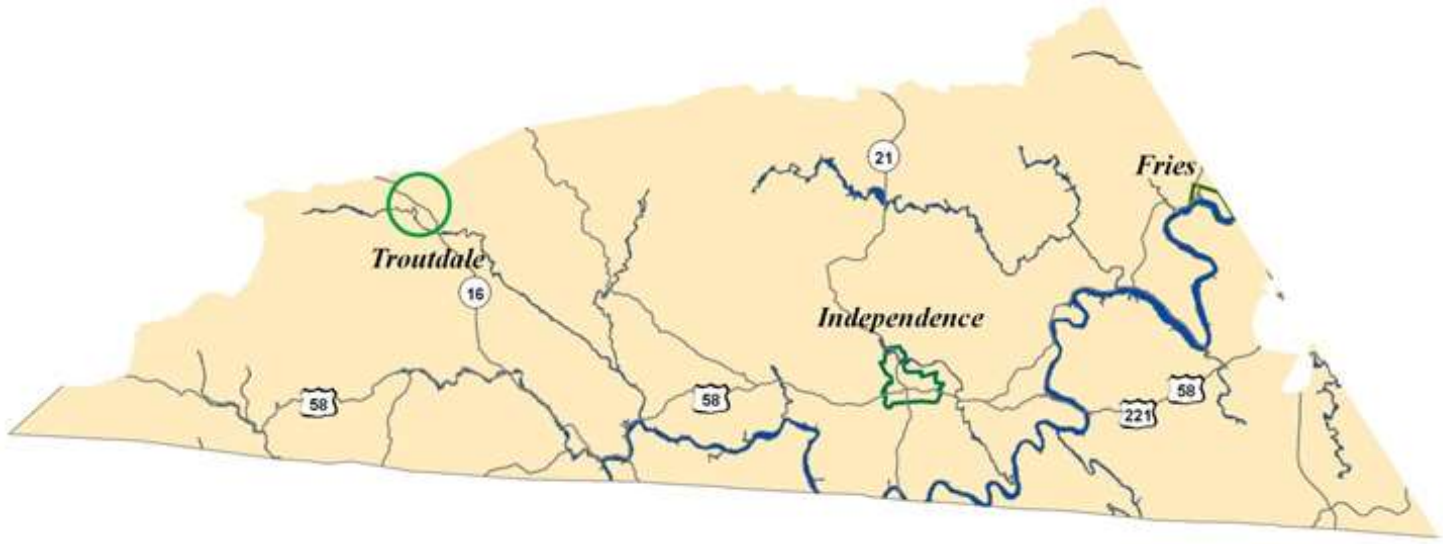
100 Year Floodplain




Carroll County
100 Year Floodplain
77
221
58
Hillsville
221
58
52
Miles
0
2.5
5
Map by MRPDC 2018
Source: VDEM 2012

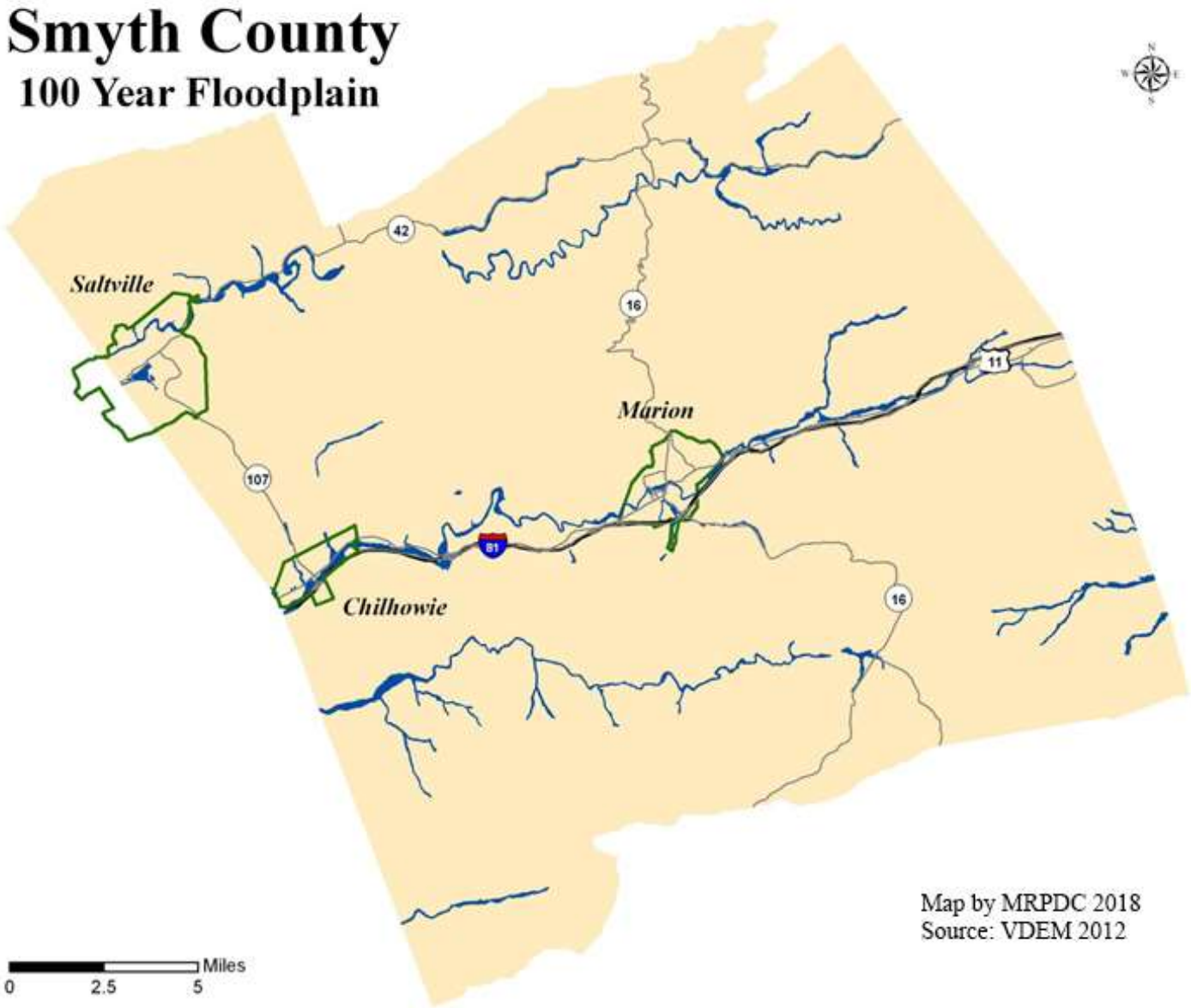
Grayson County

100 Year Floodplain



Map by MRPDC 2018
Source: VDEM 2012

Miles
0 2.5 5


Smyth County
100 Year Floodplain
Saltville
Marion
Chilhowie
42
16
11
107
81
16
Map by MRPDC 2018
Source: VDEM 2012
Miles
0
2.5
5

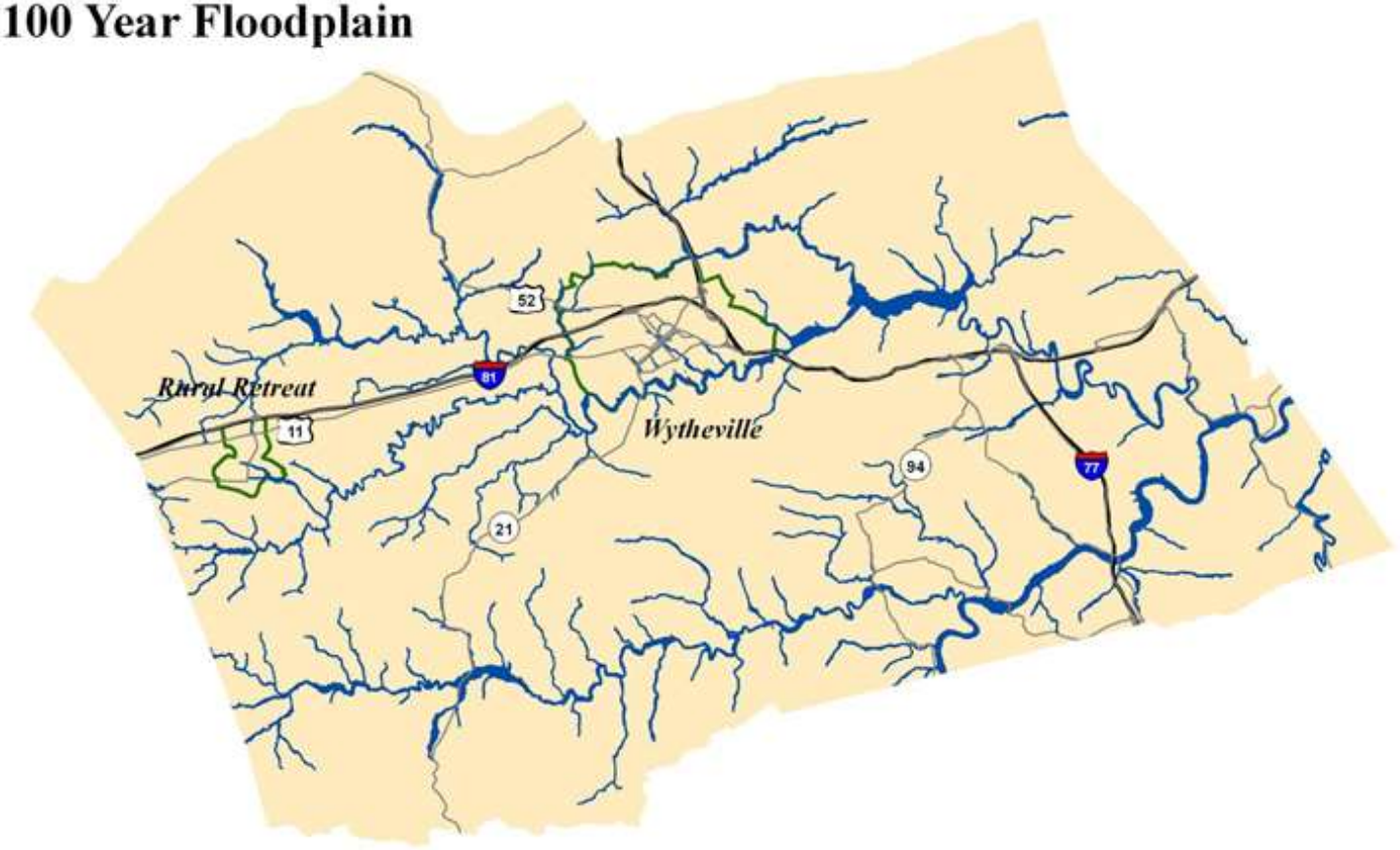
Washington County
100 Year Floodplain

Map by MRPDC 2018
Source: VDEM 2012

Miles
0 2.5 5

Wythe County

100 Year Floodplain



Map by MRPDC 2018
Source: VDEM 2012

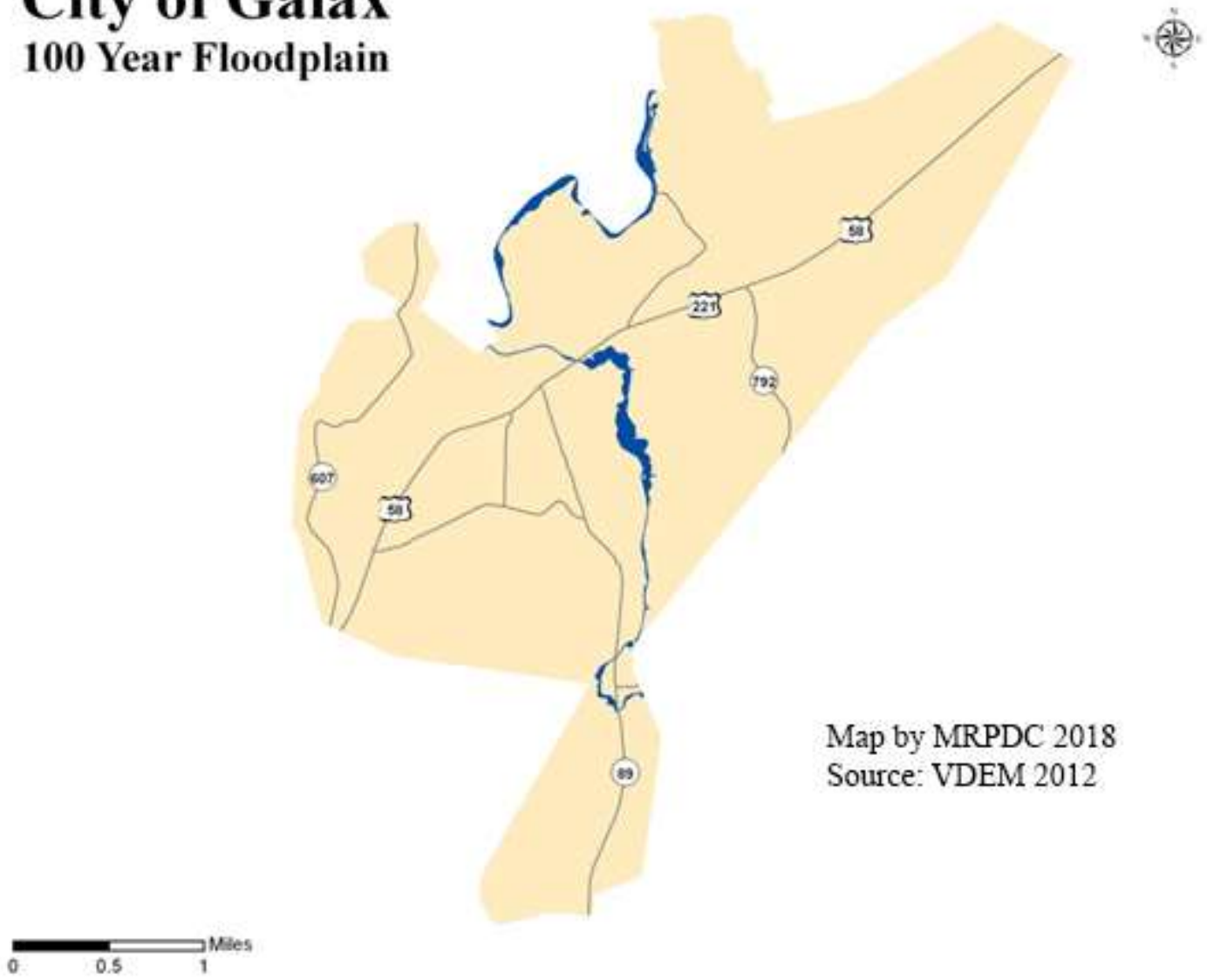
0 2.5 5 Miles

City of Bristol
100 Year Floodplain

Map by MRPDC 2018
Source: VDEM 2012

Miles
0 0.5 1

City of Galax
100 Year Floodplain



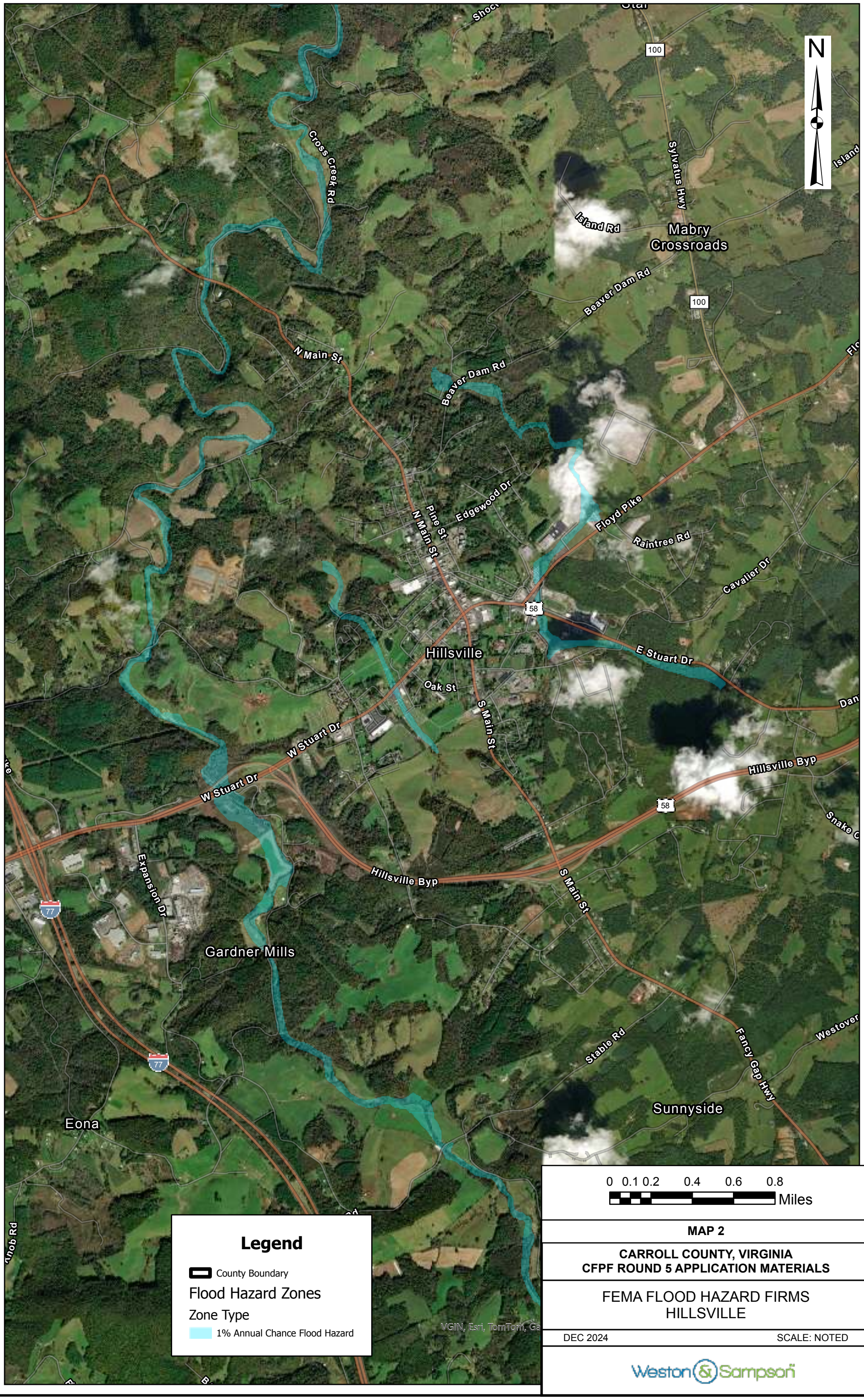
MAP 1

CARROLL COUNTY, VIRGINIA
CFPF ROUND 5 APPLICATION MATERIALS

FEMA FLOOD HAZARD FIRMS
NEW RIVER

DEC 2024 SCALE: NOTED

Weston & Sampson



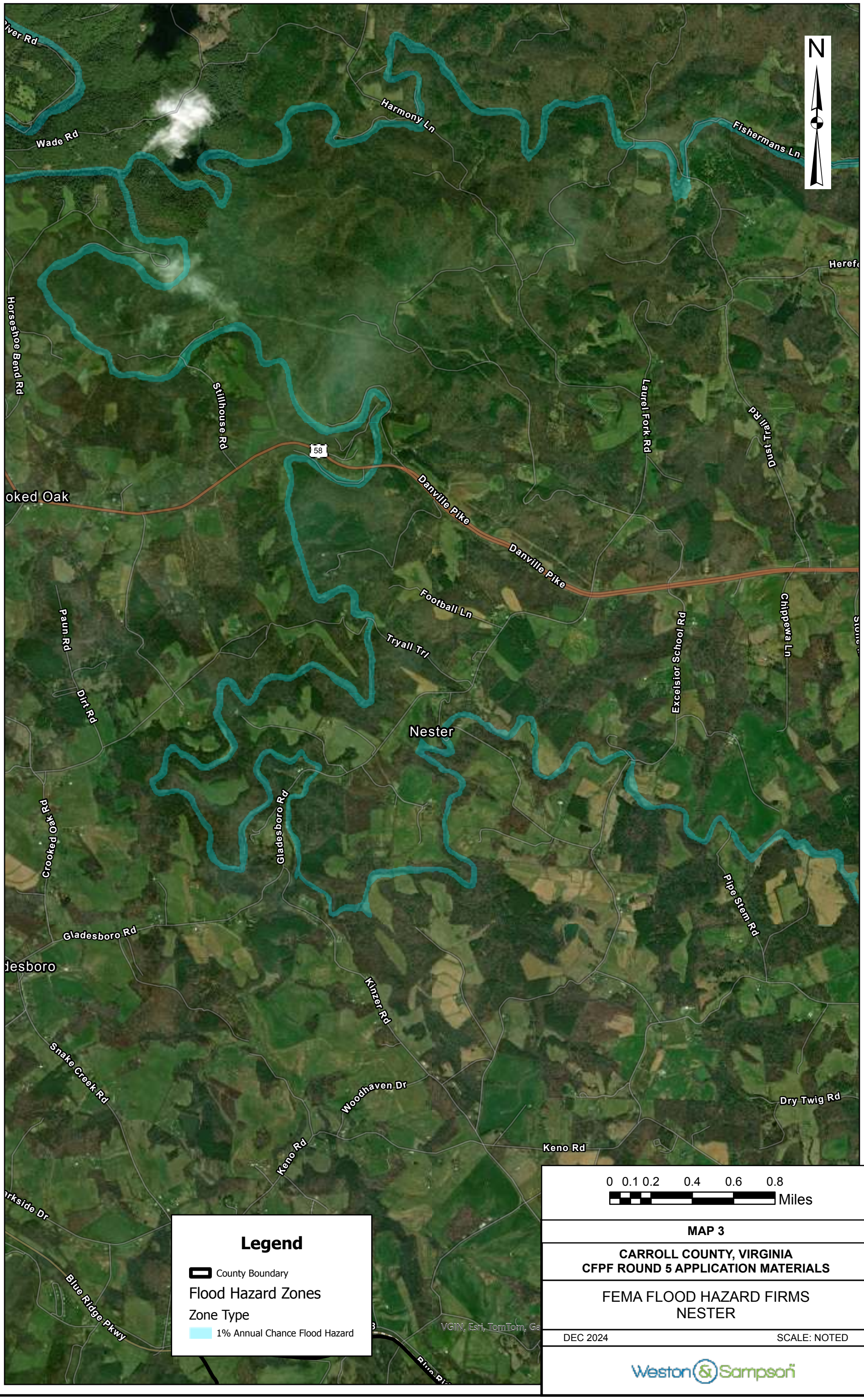
MAP 2

CARROLL COUNTY, VIRGINIA
CFPF ROUND 5 APPLICATION MATERIALS

FEMA FLOOD HAZARD FIRMS
HILLSVILLE

DEC 2024 SCALE: NOTED

Weston & Sampson


N
Harmony Ln
Fishermans Ln
Wade Rd
Horseshoe Bend Rd
Stillhouse Rd
58
Danville Pike
Danville Pike
Laurel Fork Rd
Dust Trail Rd
Football Ln
Tryall Trl
Excelsior School Rd
Chippewa Ln
Paun Rd
Dirt Rd
Nester
Crooked Oak Rd
Gladesboro Rd
Pipe Stem Rd
Gladesboro Rd
Kinzer Rd
Snake Creek Rd
Woodhaven Dr
Dry Twig Rd
Keno Rd
Keno Rd
Blue Ridge Pkwy
Legend
County Boundary
Flood Hazard Zones
Zone Type
1% Annual Chance Flood Hazard
0 0.1 0.2 0.4 0.6 0.8
Miles
MAP 3
CARROLL COUNTY, VIRGINIA
CFPF ROUND 5 APPLICATION MATERIALS
FEMA FLOOD HAZARD FIRMS
NESTER
DEC 2024
SCALE: NOTED
Weston & Sampson