2696 - Galax Floodplain Modeling

Application Details

Funding Opportunity:	2337-Virginia Community Flood Preparedness Fund - Study Grants - CY24 Round 5
Funding Opportunity Due Date:	Jan 24, 2025 11:59 PM
Program Area:	Virginia Community Flood Preparedness Fund
Status:	Under Review
Stage:	Final Application
Initial Submit Date:	Jan 22, 2025 3:27 PM
Initially Submitted By:	Gavin Blevins
Last Submit Date:	
Last Submitted By:	

Contact Information

Primary Contact Information

Active User*:	Yes
Type:	External User
Name*:	Mr. (Salutation) Gavin (First Name) N (Middle Name) Blevins (Last Name)
Title:	Planning Director
Email*:	gblevins@mrpdc.org
Address*:	1021 Terrace Drive
	Marion (City) Virginia (State/Province) 24354 (Postal Code/Zip)
Phone*:	(276) 783-5103 (Phone) 315 (Ext.) ###-###-####
Fax:	###-###-####
Comments:	

Organization Information

Status*:	Approved
Name*:	City of Galax
Organization Type*:	Local Government
Tax ID*:	54-6001300
Unique Entity Identifier (UEI)*:	C96DL9152583
Organization Website:	http://galaxva.com

Address*: 111 E Grayson STreet

Galax Virginia 24333-
City State/Province Postal Code/Zip

Phone*: 276-236-2131 Ext.
###-###-####

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

Benefactor:

Vendor ID:

Comments:

VCFPF Applicant Information

Project Description

Name of Local Government*: City of Galax

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

NFIP/DCR Community Identification Number (CID)*: 510066

If a state or federally recognized Indian tribe,

Name of Tribe:

Authorized Individual*: Michael Burnette
First Name Last Name

Mailing Address*: 111 E Grayson St
Address Line 1

Address Line 2

Galax Virginia 24333
City State Zip Code

Telephone Number*: 276-236-5776

Cell Phone Number*: 276-233-3231

Email*: mburnette@galaxva.com

Is the contact person different than the authorized individual?

Contact Person*: Yes

Contact: Gavin Blevins
First Name Last Name

1021 Terrace Drive
Address Line 1

Address Line 2

Marion Virginia 24354
City State Zip Code

Telephone Number: 276-783-5103

Cell Phone Number: 276-685-9791

Email Address: gblevins@mrpdc.org

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

Project Description*:

The City of Galax was awarded a capacity building grant in round 4 to complete a resilience plan, and is considering joining the NFIP. The city needs to complete floodplain modelling and preliminary engineering to make progress toward NFIP compliance and prepare for new regulatory

mapping from FEMA. The city no longer has a engineer on staff to assist with this process.

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*: 701.01, 701.02

Is Project Located in an NFIP Participating Community?*: No

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

Flood Zone(s) (if applicable): A/E zones

Flood Insurance Rate Map Number(s) (if applicable): 5100660016D, 5100660018D

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*: N/A

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

Scope of Work - Studies - Round 4

Scope of Work

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*: 510066_City of Galax_CFPF_R5_Scope_Narrative.pdf

Comments:

Expand risk and vulnerability assessment, create new field data, complete pilot 2D modeling studies, integrate flood modeling data into public GIS interface.

Budget Narrative

Budget Narrative Attachment*: 510066_City of Galax_CFPF_R5_Budget_Narrative.pdf

Comments:

Requesting $50,000 for professional services to complete study alongside resilience plan; match waiver requested since match was included in resilience plan.

Scoring Criteria for Studies - Round 4

Scoring

Revising floodplain ordinances to maintain compliance with the NFIP or to incorporate higher standards that may reduce the risk of flood damage. This must include establishing processes for implementing the ordinance, including but not limited to, permitting, record retention, violations, and variances. This may include revising a floodplain ordinance when the community is getting new Flood Insurance Rate Maps (FIRMs), updating a floodplain ordinance to include floodplain setbacks or freeboard, or correcting issues identified in a Corrective Action Plan.

Revising Floodplain Ordinances*: No
Select

Creating tools or applications to identify, aggregate, or display information on flood risk or creating a crowd-sourced mapping platform that gathers data points about real-time flooding. This could include a locally or regionally based web-based mapping product that allows local residents to better understand their flood risk.

Mapping Platform*: No
Select

Conducting hydrologic and hydraulic studies of floodplains. Applicants who create new maps must apply for a Letter of Map Revision or a Physical Map Revision through the Federal Emergency Management Agency (FEMA).

Hydrologic and Hydraulic Studies*: Yes
Select

Studies and Data Collection of Statewide and Regional Significance. Funding of studies of statewide and regional significance and proposals will be considered for the following types of studies:
Updating precipitation data and IDF information (rain intensity, duration, frequency estimates) including such data at a sub-state or regional scale on a periodic basis.

Updating Precipitation Data and IDF Information*: Yes
Select

Regional relative sea level rise projections for use in determining future impacts.

Projections*: No
Select

Vulnerability analysis either statewide or regionally to state transportation, water supply, water treatment, impounding structures, or other significant and vital infrastructure from flooding.

Vulnerability Analysis*: No
Select

Flash flood studies and modeling in riverine regions of the state.

Flash Flood Studies*: Yes
Select

Statewide or regional stream gauge monitoring to include expansion of existing gauge networks.

Stream Gauge Monitoring*: Yes
Select

New or updated delineations of areas of recurrent flooding, stormwater flooding, and storm surge vulnerability in coastal areas that include projections for future conditions based on sea level rise, more intense rainfall events, or other relevant flood risk factors.

Delineations of Areas of Recurrent Flooding*: Yes
Select

Regional flood studies in riverine communities that may include watershed-scale evaluation, updated estimates of rainfall intensity, or other information.

Regional Flood Studies*: No
Select

Regional Hydrologic and Hydraulic Studies of Floodplains

Regional Hydrologic and Hydraulic Studies of Floodplains*: No
Select

Studies of potential land use strategies that could be implemented by a local government to reduce or mitigate damage from coastal or riverine flooding.

Potential Land Use Strategies*: Yes
Select

Pluvial Studies

Pluvial Studies*: Yes
Select

Other proposals that will significantly improve protection from flooding on a statewide or regional basis.

Other Proposals*: Yes
Select

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*: High Social Vulnerability (1.0 to 1.5)

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

Projects eligible for funding may also reduce nutrient and sediment pollution to local waters and the Chesapeake Bay and assist the Commonwealth in achieving local and/or Chesapeake Bay TMDLs.
Does the proposed project include implementation of one or more best management practices with a nitrogen, phosphorus, or sediment reduction efficiency established by the Virginia Department of Environmental Quality or the Chesapeake Bay Program Partnership in support of the Chesapeake Bay TMDL Phase III Watershed Implementation Plan?

Reduction of Nutrient and Sediment Pollution*: Yes

Comments:

This study follows and compliments a resilience planning process as part of rejoining the NFIP, completing flood mitigation activities, correcting mapping information, and completing initial preliminary engineering to initiate mitigation projects

Scope of Work Supporting Information - Studies

Scope of Work Supporting Information

Is the proposed study a new study or updates on a prior study?

New or Updated Study*: New Study

Describe the relationship of the study to the local government's needs for flood prevention and protection, equity, community improvement, identification of nature-based solutions or other priorities contained in this manual

Relationship of Study to Priorities Contained in this Manual*:

As the city continues to work toward flood preparedness and exploring joining the NFIP, new flood modeling is necessary to to establish existing conditions and update the FEMA FIRM. The city also experiences considerable pluvial flooding from stormwater as Chestnut Creek rises, even though the creek does not leave its banks. Older infrastructure and historic development patterns need to be studied to model basic storm impacts to develop action steps. The city currently utilizes no nature-base infrastructure, and needs to model areas of recurrent flooding to develop solutions and establish impacts of developments/solutions.

Describe the qualifications of the individuals or organizations charged with conducting the study or the elements of any request for proposal that define those qualifications

Qualifications of Individuals Conducting Study*:

The city will work with the Mount Rogers Planning District Commission and its procured engineering firm to complete the study. The Commission is retaining multiple firms for work across the planning district, and will be working with the same selected firm to complete the city's resilience plan awarded in CFPF Round 4.

Describe the expected use of the study results in the context of the local resilience plan or, in the case of regional plans, how the study improves any regional approach

Expected use of Study Results*:

Study results will be utilized in conjunction with the city's resilience plan, during the upcoming FEMA FIRM update process, during the process of exploring rejoining the NFIP, as part of public GIS interface, and for future development planning.

If applicable, describe how the study may improve Virginia's flood protection and prevention abilities in a statewide context (type N/A if not applicable)

Statewide Improvements*:

Flood modeling will be made available to DCR and FEMA.

Provide a list of repetitive and/or severe repetitive loss properties. Do not provide the addresses for the properties, but include an exact number of repetitive and/or severe repetitive loss structures within the project area

Repetitive Loss and/or Severe Repetitive Loss Properties*: 510066_City of Galax_CFPF_Repetitive Loss.pdf

Describe the residential and commercial structures impacted by this project, including how they contribute to the community such as historic, economic, or social value. Provide an exact number of these structures in the project area

Residential and/or Commercial Structures*:

There are approximately 66 commercial structures in the study area around the downtown, and 52 residential structures beyond the commercial around, also surrounding the floodplain. Reviewing the Fathom mapping layer in VFRIS also illuminates issues that the city is already aware of related to pluvial flooding which does not appear on the effective FIRM. This pluvial flooding brings in approximately 3x more residential structures located much further from the SFHA.

Many of these structure are within the historic district, within the enterprise zone, and within the Creekside Small Area Plan, for redevelopment of old industrial buildings. These areas are critical for the economic regeneration of the city's core commercial area.

If there are critical facilities/infrastructure within the project area, describe each facility

Critical Facilities/Infrastructure*:

The city's water treatment plant is located within the effective SFHA, though the Fathom data illustrates that the WTP is outside the 1% chance flood zone, similar to the Galax Carroll Grayson Animal Shelter, which is also located within the effective SFHA and the project area, but the Fathom flood layers don't match the NFHL.

Budget

Budget Summary

Grant Matching Requirement*: LOW INCOME - Flood Prevention and Protection Studies - Fund 90%/Match 10%

Is a match waiver being requested?

Match Waiver Request*: Yes

Note: Only low-income communities are eligible for a match waiver

I certify that my project is in a low-income geographic area: Yes

Total Project Amount (Request + Match)*: $50,000.00

**This amount should equal the sum of your request and match figures

REQUIRED Match Percentage Amount: $5,000.00

BUDGET TOTALS

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

Match Percentage: 9.09%

Verify that your match percentage matches your required match percentage amount above.

Total Requested Fund Amount: $50,000.00

Total Match Amount: $5,000.00

TOTAL: $55,000.00

Personnel

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

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
Professional services (A/E)	$50,000.00	$5,000.00	Waiver Requested
	$50,000.00	**$5,000.00**	

Pre-Award and Startup Costs

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

Other Direct Costs

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

Supporting Documentation

Supporting Documentation

Named Attachment	Required	Description	File Name	Type	Size	Upload Date
Detailed map of the project area(s) (Projects/Studies)		Area map of floodplain	510066_City of Galax_CFPF_Area Map.pdf	pdf	3 MB	01/06/2025 12:41 PM

FIRMette of the project area(s) (Projects/Studies)	Firmette(s)	510066_City of Galax_CFPF_FIRMETTE.pdf	pdf	1 MB	01/06/2025 11:58 AM
Historic flood damage data and/or images (Projects/Studies)	Flood photos	510066_City of Galax_CFPF_Flood_Photos.pdf	pdf	6 MB	01/06/2025 12:08 PM
A link to or a copy of the current floodplain ordinance					
Maintenance and management plan for project					
A link to or a copy of the current hazard mitigation plan	Approved by FEMA in 2019; current 2025 update is in final review with FEMA	510066_City of Galax_CFPF_2019 Hazard Mitigation Plan.pdf	pdf	2 MB	01/08/2025 10:46 AM
A link to or a copy of the current comprehensive plan	Originally adopted in 2022 and amended in January 2024	510066_City of Galax_CFPF_Comprehensive Plan.pdf	pdf	3 MB	01/08/2025 10:42 AM
Social vulnerability index score(s) for the project area	High and very high social vulnerability (701.01, 701.02)	510066_City of Galax _CFPF_Social_ Vulnerability.pdf	pdf	1 MB	01/06/2025 12:07 PM
Authorization to request funding from the Fund from governing body or chief executive of the local government	Authorization letter; match waiver requested	510066_City of Galax_CFPF_R5 Authorization_to_Request_Funds.pdf	pdf	210 KB	01/15/2025 02:22 PM
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

Letters of Support

Description	File Name	Type	Size	Upload Date
No files attached.				

Budget Narrative

510066 – City of Galax – CFPF Round 5 – "Studies" (Galax Flood Modeling)

Needs:

The city's initial Flood Insurance Aate Map (FIRM) and Flood Insurance Study (FIS) are from 1978, and the city received revisions to that FIRM in 1981 and 2008; however, the city disputed the FIRM issued on the basis that the Army Corps of Engineers 1950 flood control project had not been considered in the mapping. The city has since resigned from the National Flood Insurance Program (NFIP) but is exploring the option to rejoin. Due to historic mapping controversies and more modern climate change threats, the city needs to study its existing floodplain maps and study the pluvial flooding issues that it faces. The current FIRM utilizes antiquated 1D modeling, and does not utilize the newest LiDaR data available, and it therefore very limited in its capability to address pluvial flooding – not to mention other inaccuracies.

Beyond the issues with the current FIRM, the city suffers regularly from pluvial flooding, backups from creeks and stormwater infrastructure that cannot drain due to rising levels within Chestnut Creek – even though Chestnut Creek remains within its banks. The newest data provided from DCR by Fathom illuminates many concerns regarding the city's current flood hazard areas, specifically concerning pluvial flooding outside of the mapped Chestnut Creek floodplain. It is due to these issues that the city needs to study and prepare for flood mitigation strategies and projects.

Though this project is localized within Galax, it compliments the resilience planning initiative and comes just on the tail-end of the 2025 Mount Rogers Planning District's Pre-disaster Hazard Mitigation Plan (HMP). Data collected through the resilience planning and floodplain modeling will certainly be utilized in updates to the HMP. This study will utilize the vulnerability assessment completed during the resilience planning process. Now is the opportune time to complete new floodplain modeling and have the data available to incorporate into a new/revised FIRM, though it is unknown when FEMA will issue updated FIRMs for the region. This modeling will also be necessary to implement the mitigation actions that are revealed in the resilience plan.

This effort should allow the city to rejoin the NFIP, implement accurate floodplain maps, implement mitigation strategies based on the best data possible, provide a mechanism to reduce flood insurance premiums, and provide a framework to implement nature-based solutions in areas of highest ROI.

Goals and Objectives:

Goal: The city has a comprehensive understanding of its flood risk areas, including riverine and pluvial flood-prone areas, and has the data to take actions to regulate development and mitigate risk to loss of life and property in areas vulnerable to flood damage.

Objectives:

1. Complete an assessment of existing flood modeling studies to determine deficiencies and vulnerabilities.
2. Establish risk maps for areas at significant risk of pluvial flooding.
3. Complete 2D modeling for high-priority areas based on vulnerability analyses.
4. Compile data into the city's public GIS interface as visible layers.

Work Plan:

Procurement will have already been completed by MRPDC prior to beginning the resilience plan.

Timeline: The 2D modeling study will begin mid-way through the resilience plan process, following completion of the Risk and Vulnerability Assessment (estimated September-October 2025), and during the Resilience Action Plan development stage of the resilience plan.

Who: The MRPDC will coordinate the study with the resilience plan and consulting engineering services.
The MRPDC, consulting engineers, city staff, Flood Management Resilience Commission, and state and federal agencies involved in the resilience plan will coordinate to complete the additional study scope to compliment the resilience planning process and provide critical information for the Resilience Action Plan. Additional partners would include VDEMS, FEMA, NRCS, ACE, VDOF, DFWS, and Washington County (contacts identified following the Hurricane Helene emergency).

Tasks: The consulting engineers would build upon the Risk & Vulnerability Assessment to identify priority areas for 2D mapping, identify areas where a pilot study can be completed and areas to conduct new field survey and data collection prior to modeling.

- Expand vulnerability assessment
- Data collection
- Pilot 2D modeling studies
- Survey (field data)
- Mapping integration into public GIS

Deliverables: 2D Modeling Study of High Priority Areas (including pluvial flood-risk areas)

Budget Narrative

510066 – City of Galax – CFPF Round 5 – "Studies" (Galax Flood Modeling)

The estimated minimum cost to complete the project is $50,000, reduced due to savings/work completed as part of the city's resilience plan and flexible procurement of the consultants. The project costs will be 100% contractual for professional services.

Though the City of Galax is requesting a match waiver, the City of Galax's household median income level is less than 60% of the National Average, meeting the CFPF definition of a low-income community. Typically, this project would require a 10% match, however, the city has already pledged $20,000 (10%) to the resilience plan funded in Round 4 of the CFPF program. Due to the needs of the city – exploring joining the NFIP and addressing the pluvial and riverine flooding issues – the approach requires additional study funding. This city believes this is the opportune time to complete the necessary planning and studies to rejoin the NFIP, address mapping, and develop the resilience plan.

This project will compliment the resilience planning process that is just beginning, by expanding the research to be conducted during the resilience planning process and doing the necessary floodplain modeling to adapt future projects and to potentially update the FIRM. The study may reveal that the city's existing FIRM is substantially acceptable, but if not, the study will finalize by submitting new data to FEMA to update the FIRM.

The project budget was derived from the estimates utilized during the resilience plan project estimations; the city anticipates that the study cost should be reduced due to the project overlap with the resilience planning process. The same consultant for the resilience plan will be retained for the study, in accordance with the VPPA, for the purpose of reducing costs.

Applicant Name: City of Galax (510066)
Community Flood Preparedness Fund & Resilient Virginia Revolving Loan Fund

Detailed Budget Narrative
Period of Performance: September 30, 2025, through December 30, 2026
Submission Date: January 24, 2025

Grand Total State Funding Request	
Grand Total Local Share of Project	$0
Federal Funding (if applicable)	$0
Project Grand Total	$50,000
Locality Cost Match	0%

** City of Galax respectfully requests a match waiver

Breakout By Cost Type	Personnel	Fringe	Travel	Equipment	Supplies	Contracts	Indirect Costs	Other Costs	Total
Federal Share (if applicable)									
Local Share									
State Share – CFPF Grant						$50,000			
State Share – RVRF Match Loan									
Pre-Award/Startup									
Maintenance									
Total	$	$	$	$	$	$50,000	$	$	$

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 fall of 2023 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
5-21-20	Carroll County	This flood caused $150,000 in damage
4-13-20	Smyth County	This flood caused $47,000 in damage
4-13-20	Grayson County	This flood caused $186,000 in damage
4-13-20	Wythe County	This flood caused $160,000 in damage
10-11-18	Galax	This flood caused $455,000 in damage
9-18-18	Galax	This flood caused $2,000,000 in damage
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

Major Flooding Events in Mount Rogers Planning District		
Date	Affected Localities	Description
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)
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 2001-2023 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 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 March 2023

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	46	505,058	10,979.54
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	20	86,551	4,327.55
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 28 such properties in the Mount Rogers Region. The breakdown by locality follows in the table:

Repetitive Loss Properties for Mount Rogers Planning District, as of 2023	
Locality	Number of Properties
Town of Abingdon	1
Bland County	6
City of Bristol	2
Carroll County	2
Town of Chilhowie	4
Smyth County	7
Washington County	5
Wythe County	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.

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.

Floodplain Maps

The following pages include floodplain maps for all localities within the Mount Rogers Planning District.

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.

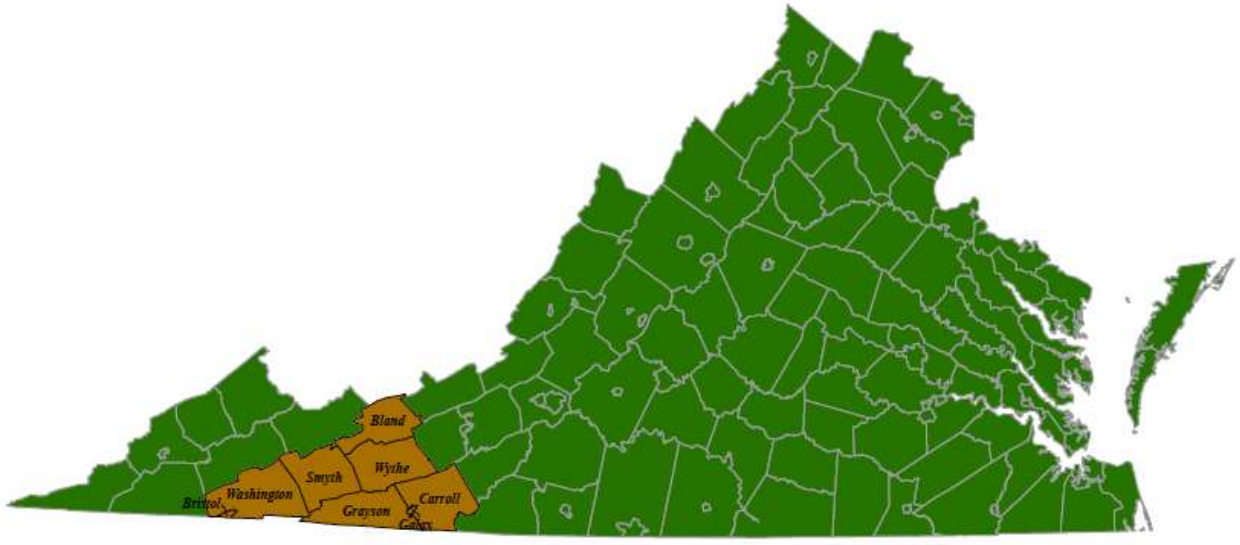
Funding through the Virginia Department of Emergency Management and the Federal Emergency Management Agency.

SWVA *A different side of Virginia*

TABLE OF CONTENTS

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.

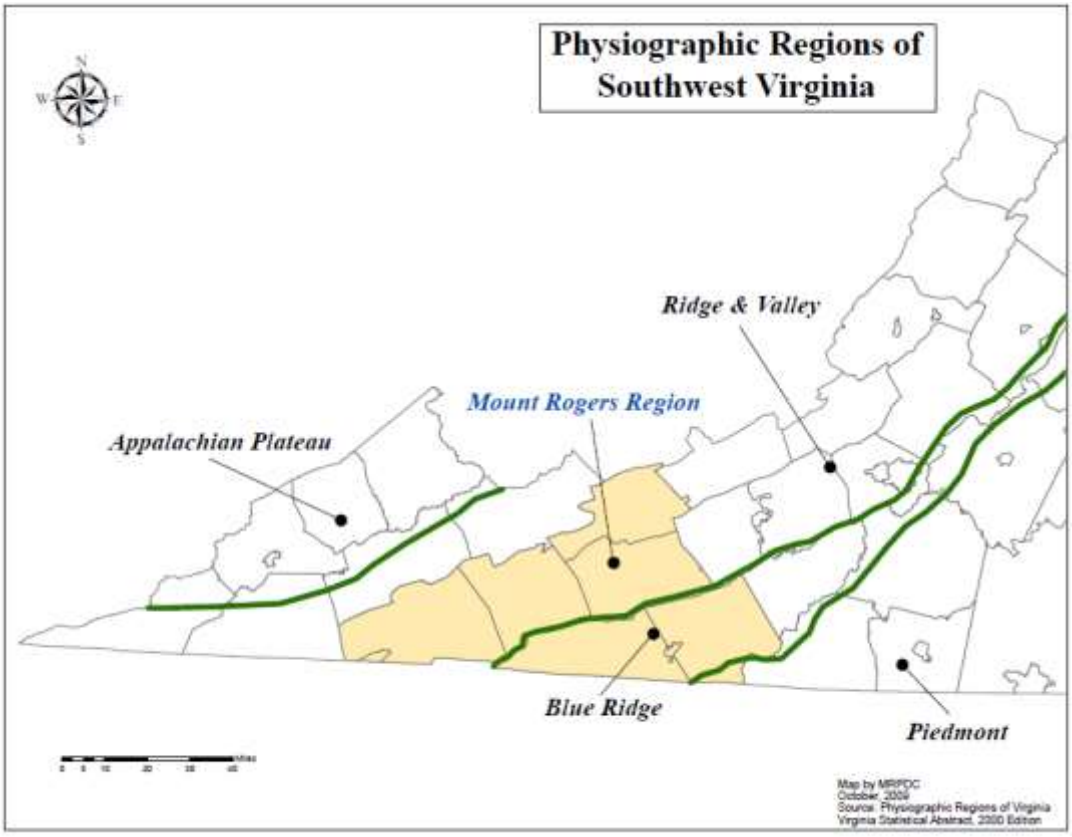
Implementation of mitigation strategies is the final step of these planning efforts. Mitigation strategies can take many forms, most commonly directed towards flooding, hurricanes, and

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.

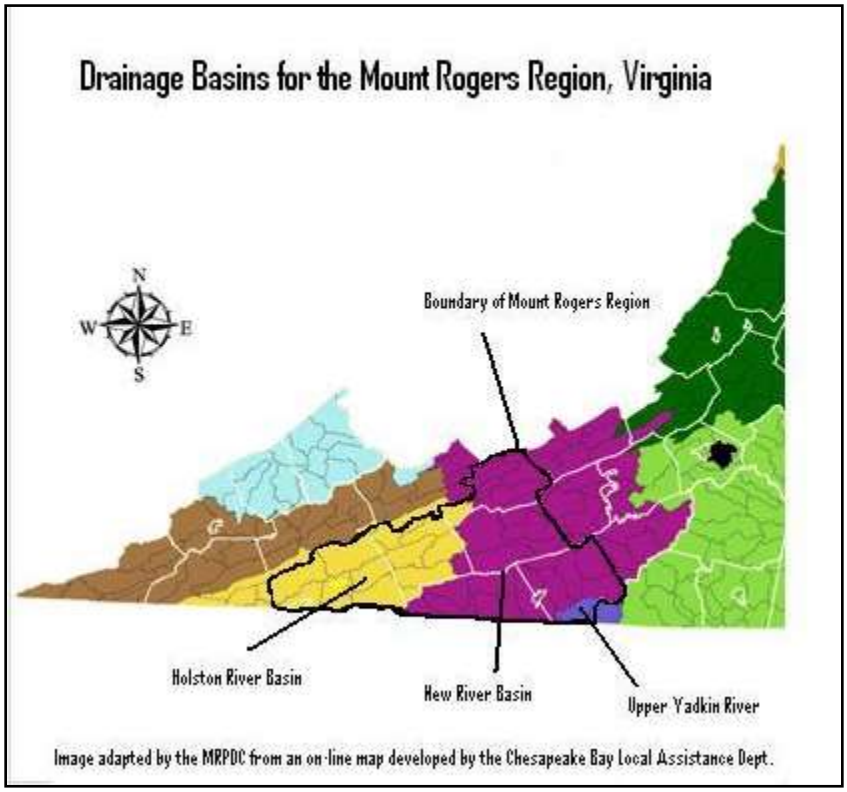


In the Ridge & Valley section, the land is characterized by valleys with low to moderate slopes underlain by carbonate rocks; this area starts in Bristol and runs in a northeasterly direction through Washington, Smyth and Wythe counties in a track toward Roanoke. Elevations generally range between 1,200 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	GRADE SPRING FRIES, TROUTDALE	TOWN MGR	BMARTIN@MRPDC.ORG
Brian Reed	RR	"	breed
Jenna Dunn	Bland County	Alt/Emer. Sr. Coord	jdunn@blandcova.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	Rdr Coordinator	mayers@galaxva.com
Gavin M. Blevins	Pamplin	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@etsu.edu
Jimmy Mabes	Grayson Co.	EM Coordinator	jmabes@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 Basick	Wythe County	EM Coordinator ES Director	jbbusick@wytheco.org
Justin Haga	VDEM	DRRO	justin.haga@vdem.virginia.gov
Sara Harrington	VDEM	Asst. 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 Lead	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

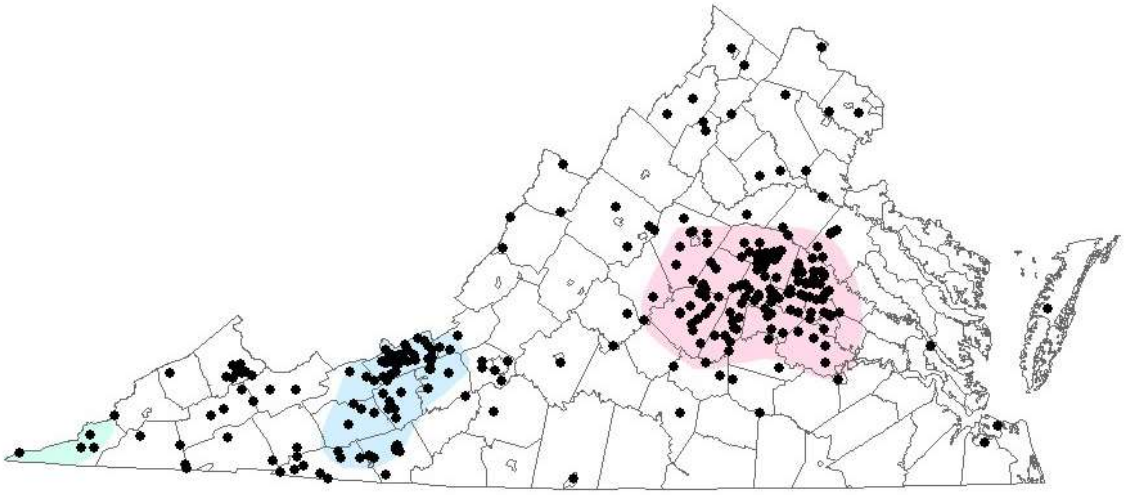
Description

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.

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 below:

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.

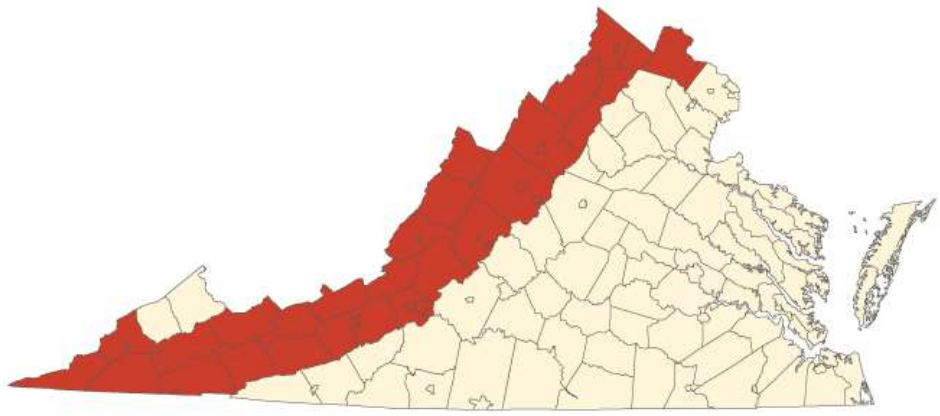
In Virginia, the principal area affected by sinkholes is the Valley and Ridge province, an extensive karst terrain underlain by limestone and dolomite, but the narrow marble belts in the Piedmont and some shelly beds in the Coastal Plain are also pocked with sinkholes. Dramatic collapses that swallow 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).

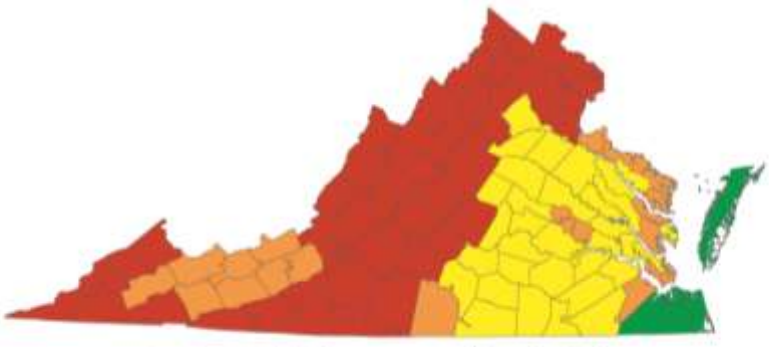
Moderate Risk

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.

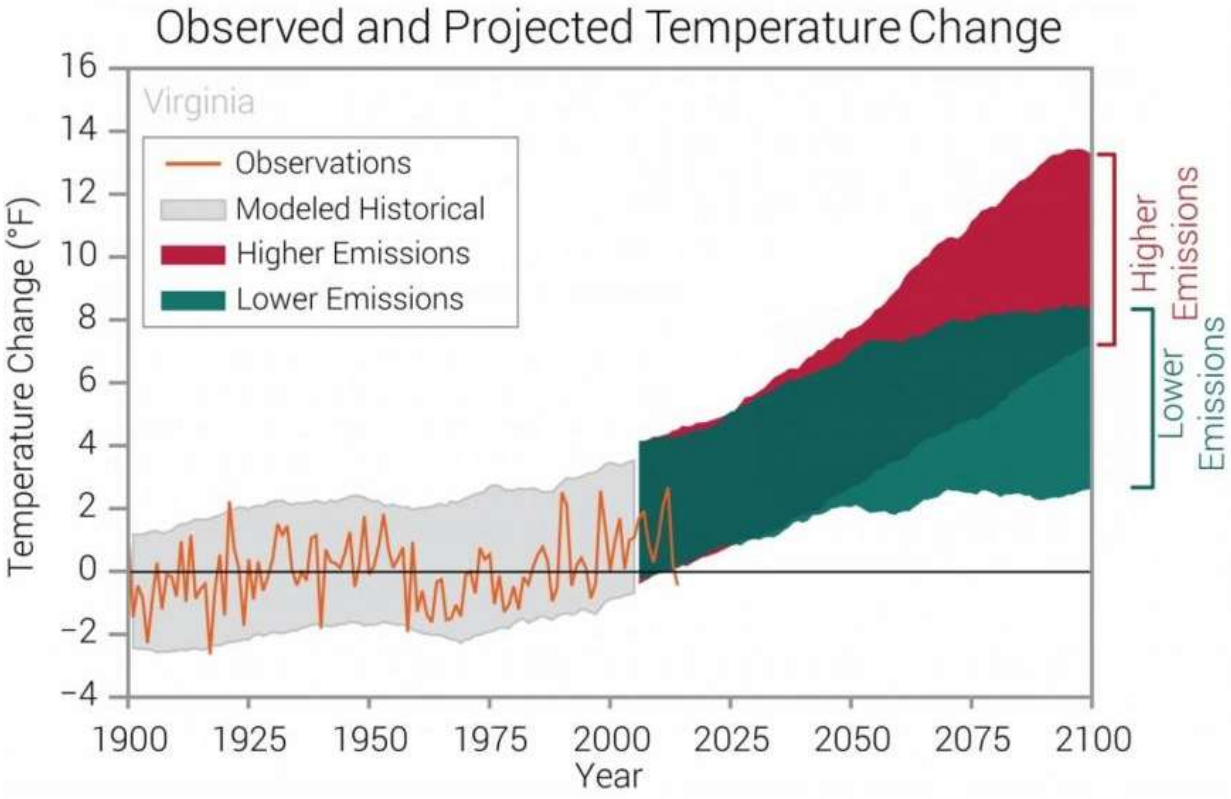
Climate Change

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 coldest years being about as warm as the hottest year in the historical record; green shading) and more warming under a high 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

Figure 2: The observed (a) number of very hot days (maximum temperature above 95°F), (b) number of very warm nights (minimum temperature above 75°F), (c) annual precipitation, and (d) summer precipitation, averaged over 5-year periods. The values in Figures 2a and 2b are from nine long-term reporting stations. The values in Figures 2c and 2d are from NCEI's version 2 climate division dataset. The dark horizontal lines represent the long-term average. The number of very hot days and very warm nights peaked in the 1930s and has subsequently remained near to below the long-term average. There is no overall trend in average annual precipitation; summer precipitation has been below or near average during the most recent decade (2005–2014). Source: CICS-NC and NOAA NCEI.

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

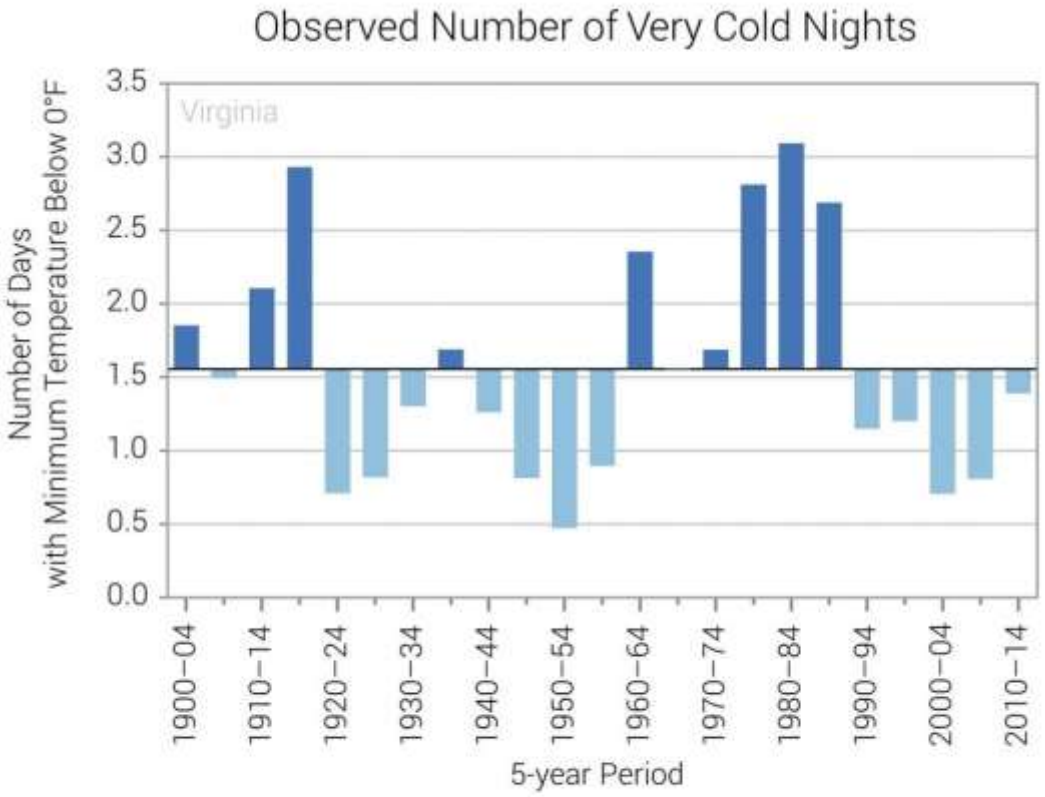


Figure 3: The observed number of very cold nights (minimum temperature below 0°F) for 1900–2014, averaged over 5-year periods. These values are averages from nine long-term reporting stations. The number of very cold nights dropped below the long-term average between the 1920s and 1960s, followed by 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

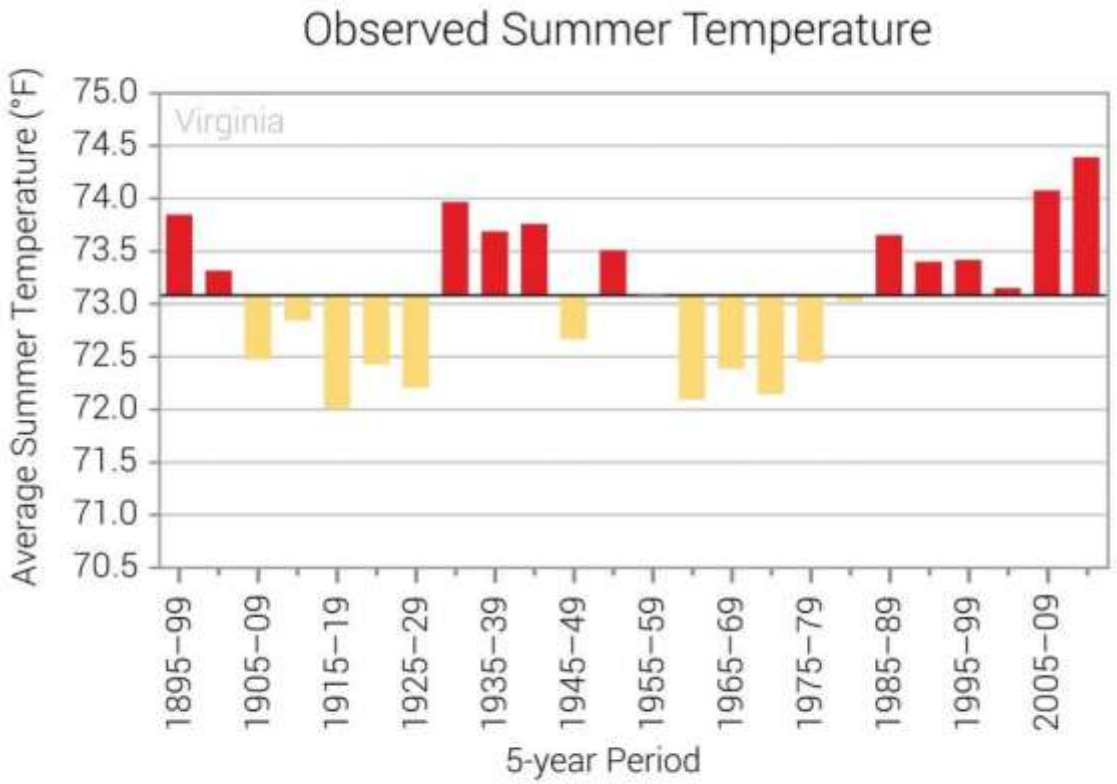


Figure 4: The observed annual summer temperature for 1900–2014, averaged over 5-year periods; these values are averages from NCEI's version 2 climate division dataset. Average annual summer temperature has been the warmest on record over the last decade (2005–2014). The dark horizontal line is the long-term 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

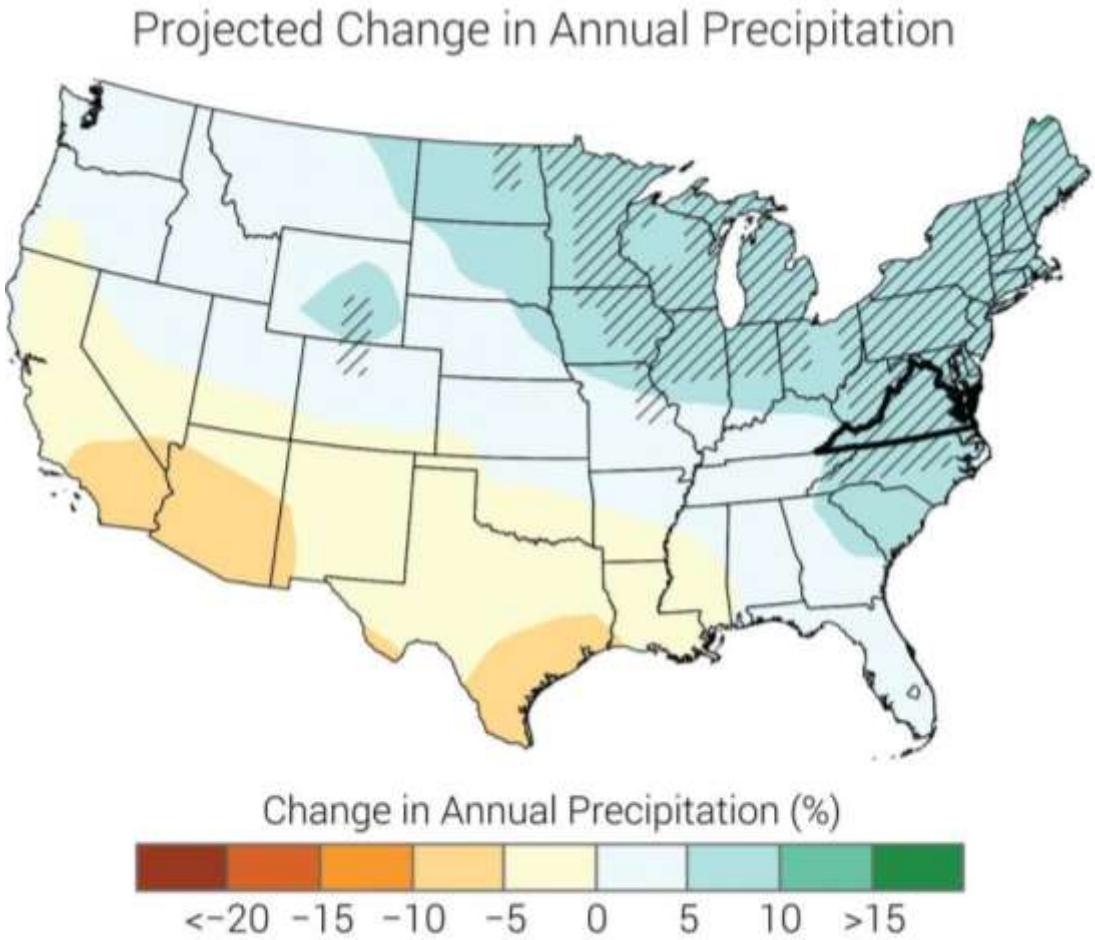
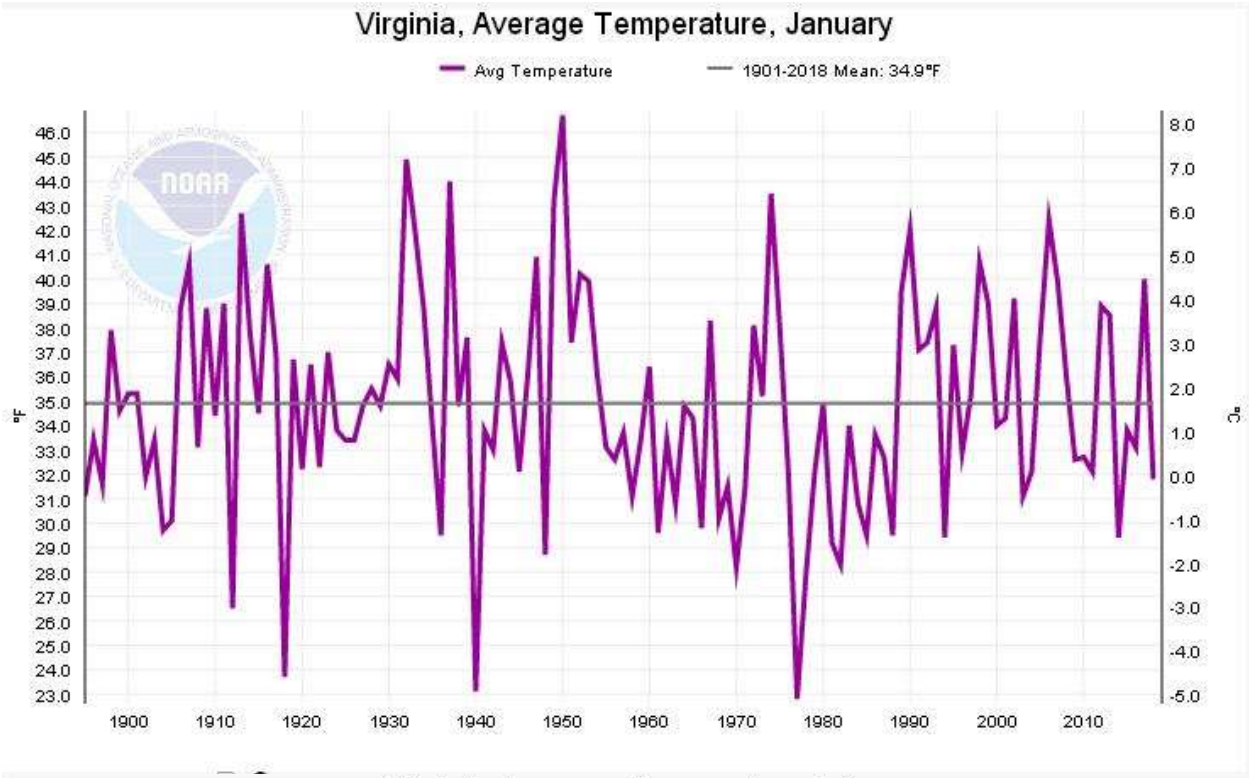


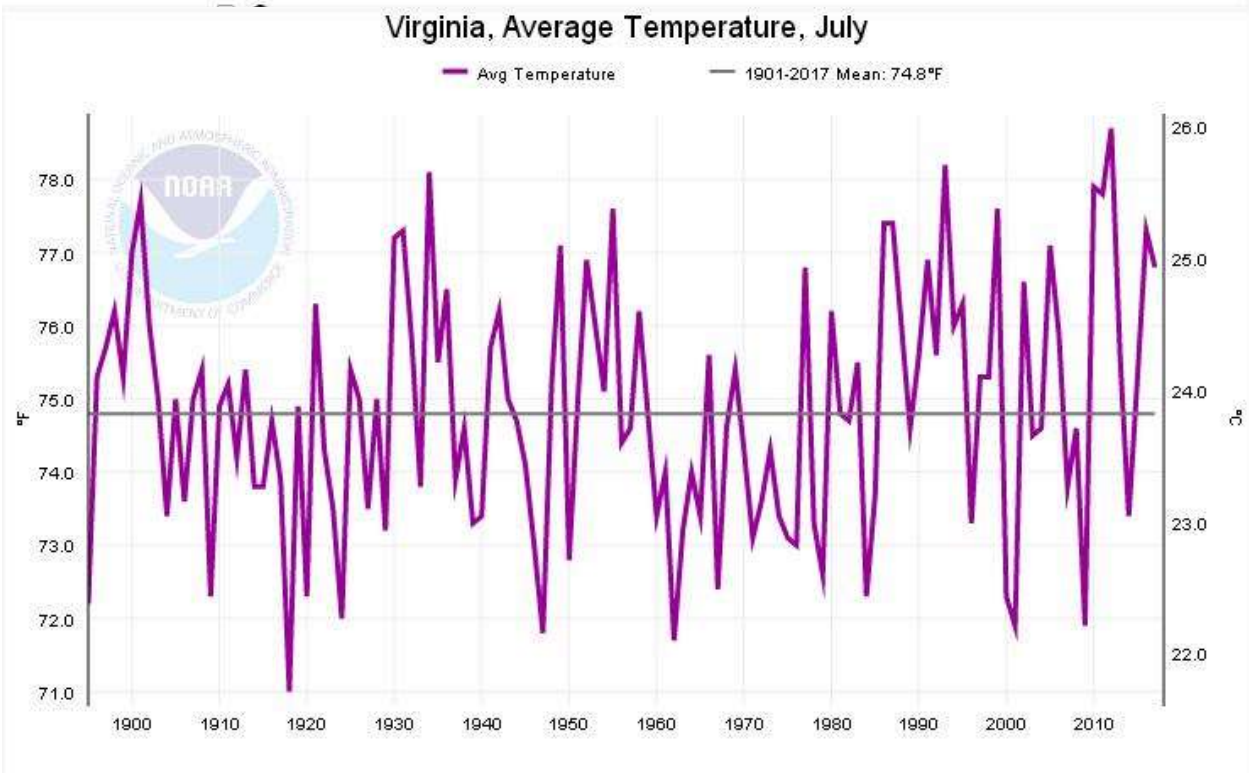
Figure 6: Projected change in annual precipitation (%) for the middle of the 21st century compared to the late 20th century under a higher emissions pathway. Hatching represents areas where the majority of climate models indicate a statistically significant change. Virginia is part of a large area of 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
46.0
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/Sinkholes	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

[5] The total amount of damage included the 75 damaged vehicles

TOTAL	3	25	$580,000		

Recommended Mitigations: Carroll County and Hillsville

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
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
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	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

[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	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
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

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
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	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
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
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	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
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

Rank	Activity	Hazard Addressed	Responsible Party	Timeline/ Status	Comments
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, but this was not in the city budget at this time. 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 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 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	Addition of a Nexedge System or the RIOS-Comlinc system for Twin County Region (counties of Carroll and Grayson and the City of Galax).	All hazards	City of Galax, MRPDC, VDEM, DCR	3-5 Years/ Not Started	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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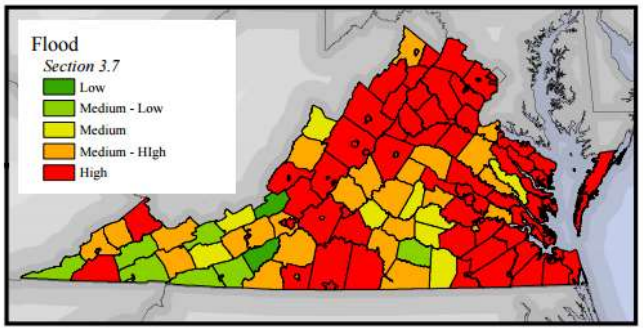
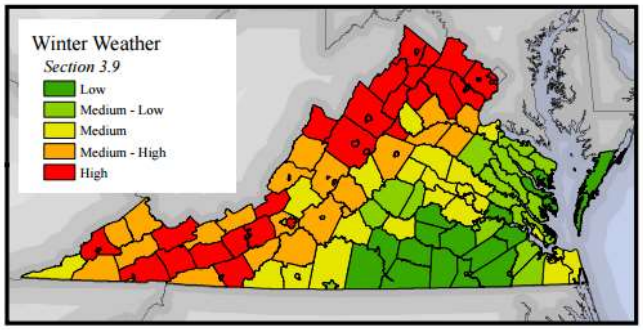
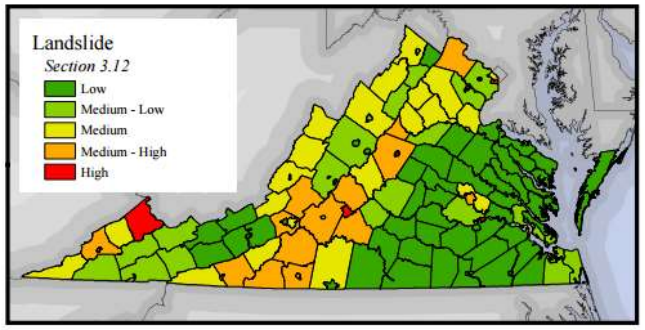
Emergency Management Personnel Contact Information

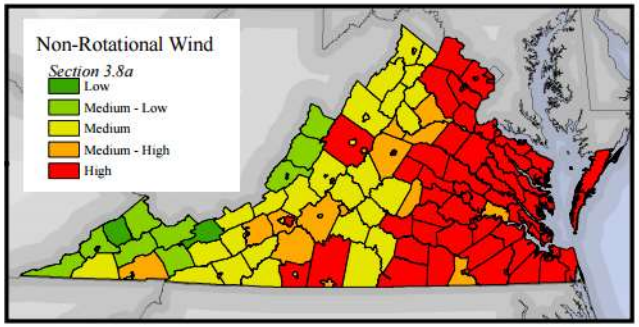
Jurisdiction Name	Plan POC	Mailing Address	Email	Phone
Bland County	Jenna Dunn	612 Main St. Bland VA24315	jdunn@bland.org	276-688-4641
Carroll County	Everett Lineberry	605-2 Pine St, Hillsville, VA 24343	elineberry@carrollcountyVAorg	276-730-3012
Grayson County	Jimmy Moss	129 Davis St. Independence VA 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

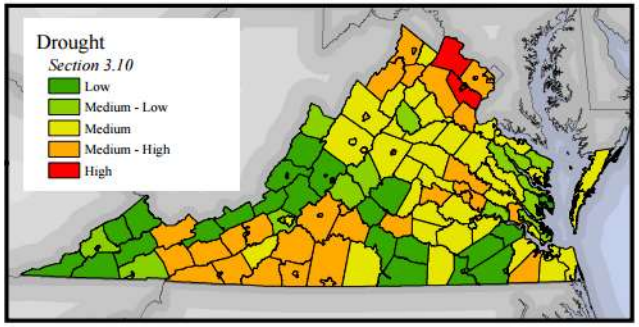
Hazard Ranking Risk Maps

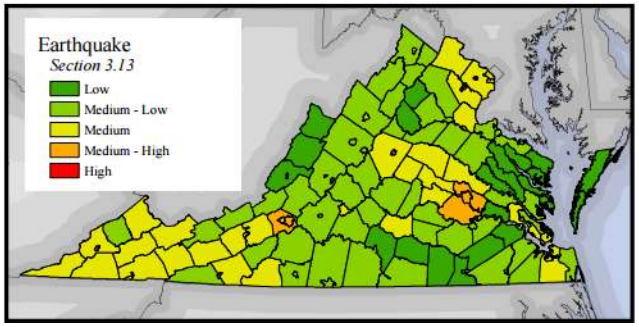


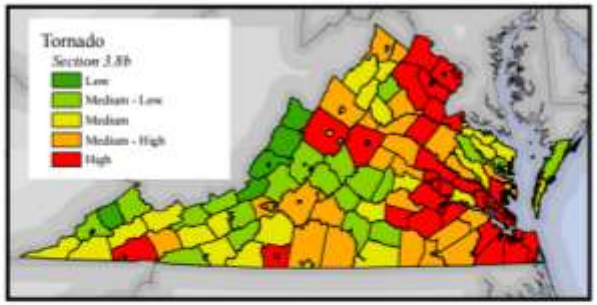


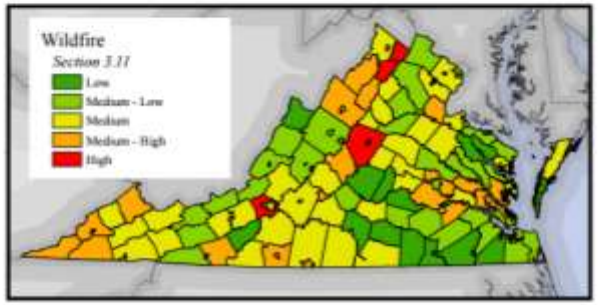


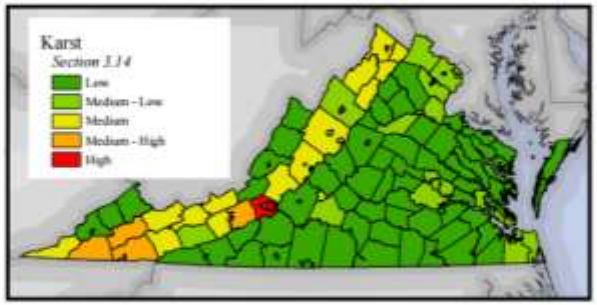

Non-Rotational Wind
Section 3.8a
Low
Medium - Low
Medium
Medium - High
High


Drought
Section 3.10
Low
Medium - Low
Medium
Medium - High
High


Earthquake
Section 3.13
Low
Medium - Low
Medium
Medium - High
High







HAZARD RANKING

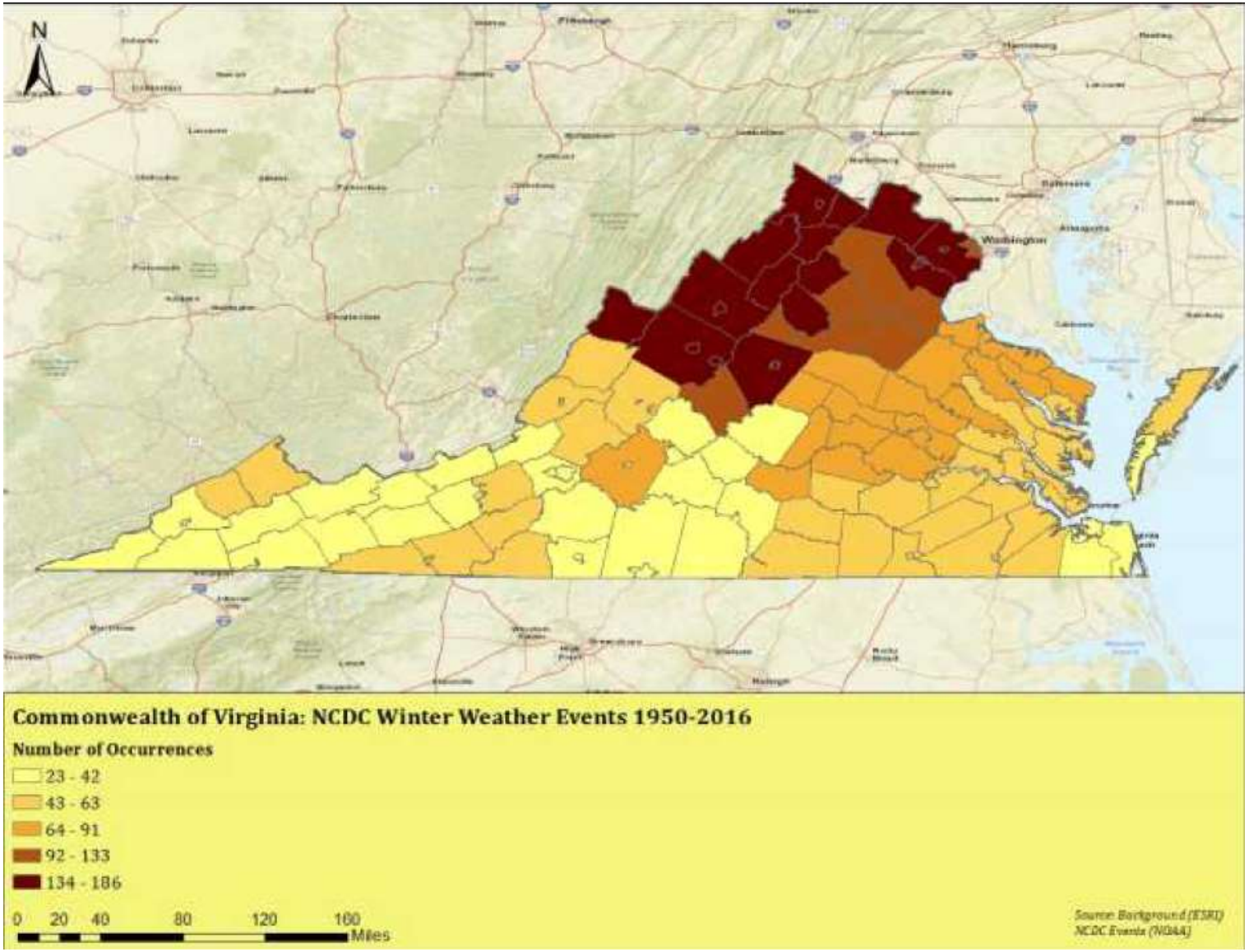
This is a summary of the individual hazard risk maps found in Section 3.7 through Section 3.14. The parameters used to create the Hazard Ranking Parameters and Risk Maps are explained in Section 3.5.

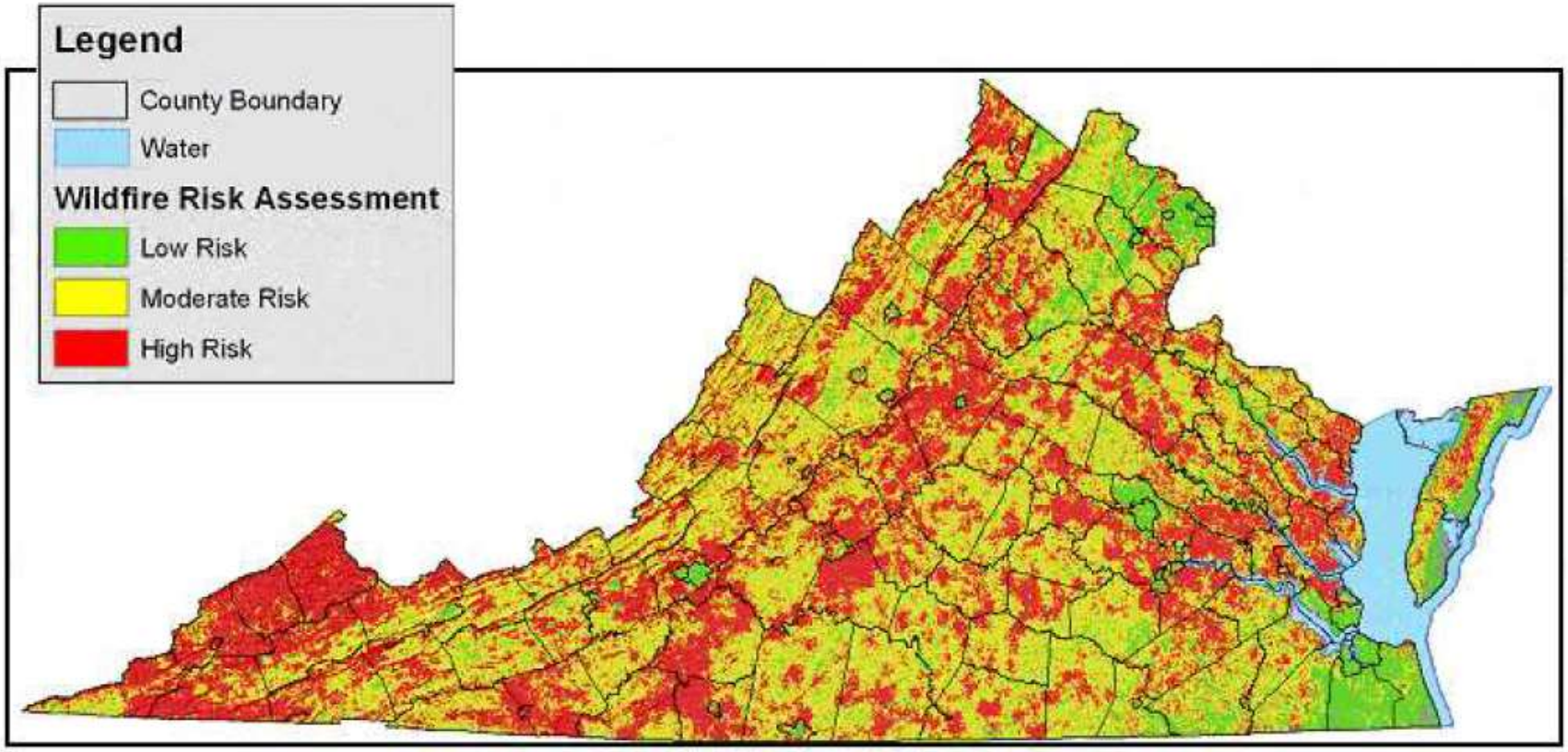
DATA SOURCES

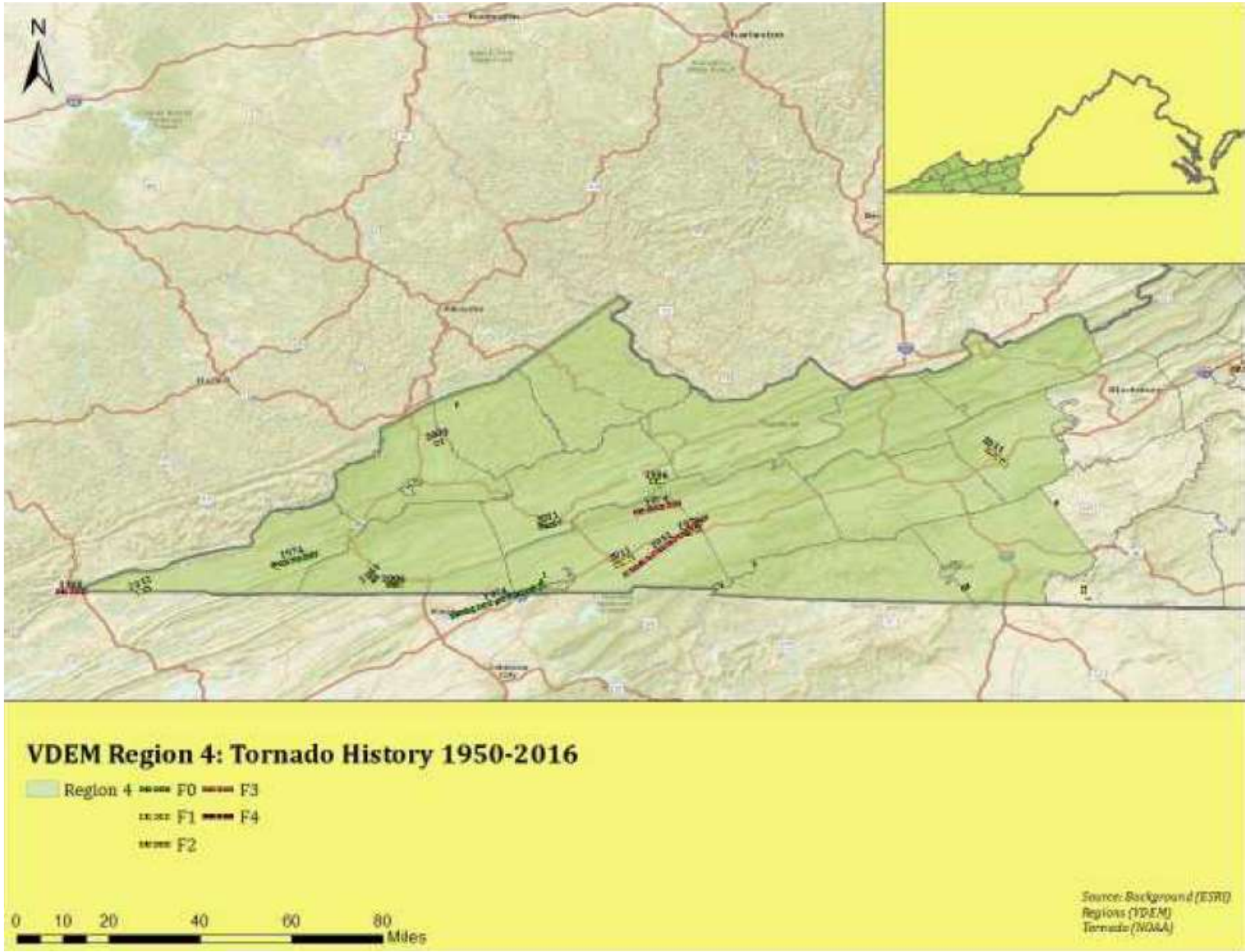
CGIT Ranking Methodology
VGIN Jurisdictional Boundaries
ESRI State Boundaries

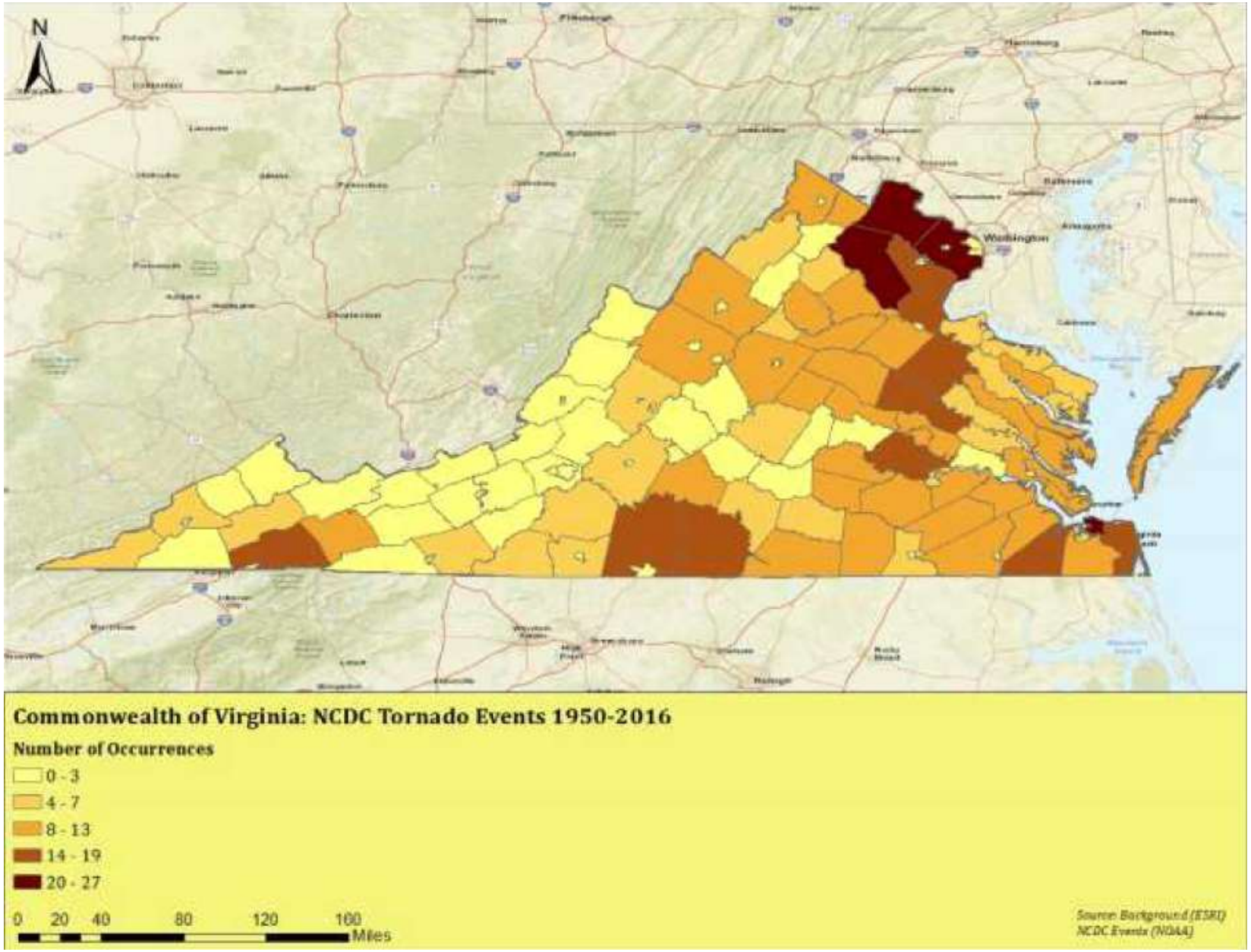
Hazard Identification Maps

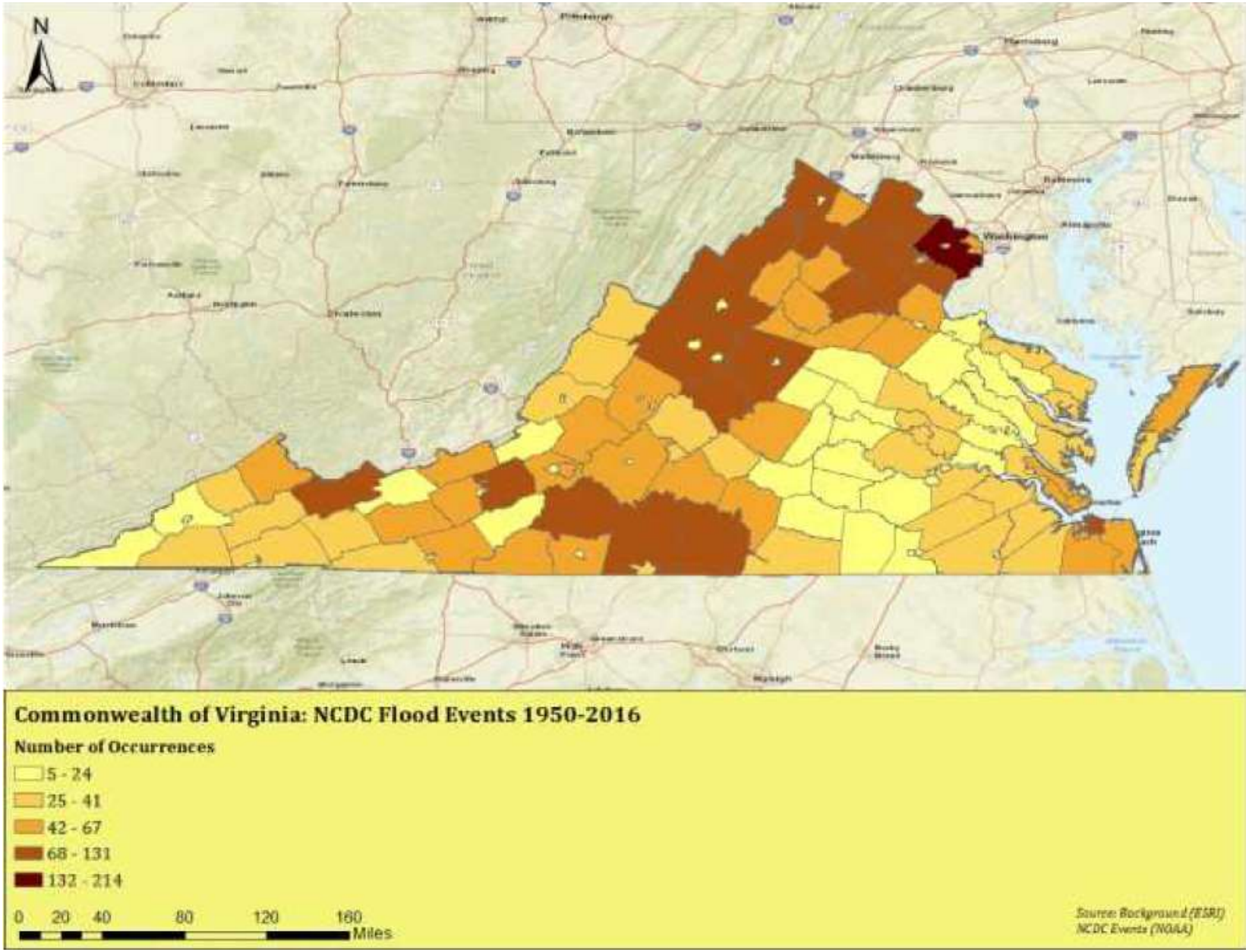
The following maps are sourced from the Virginia Hazard Mitigation Plan.

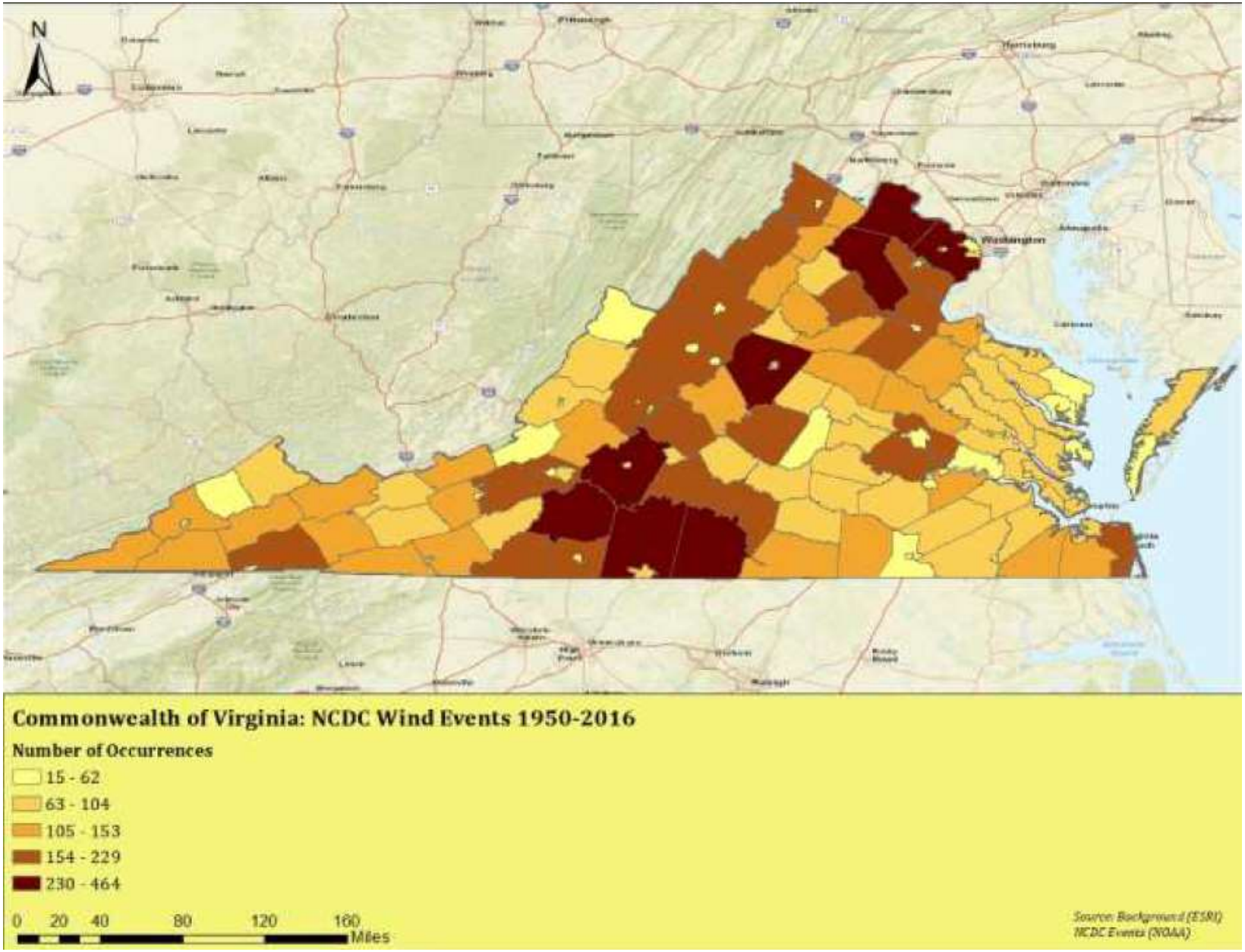

N
Commonwealth of Virginia: NCDC Winter Weather Events 1950-2016
Number of Occurrences
23 - 42
43 - 63
64 - 91
92 - 133
134 - 186
0 20 40 80 120 160
Miles
Source: Background (ESRI)
NCDC Events (NOAA)


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)

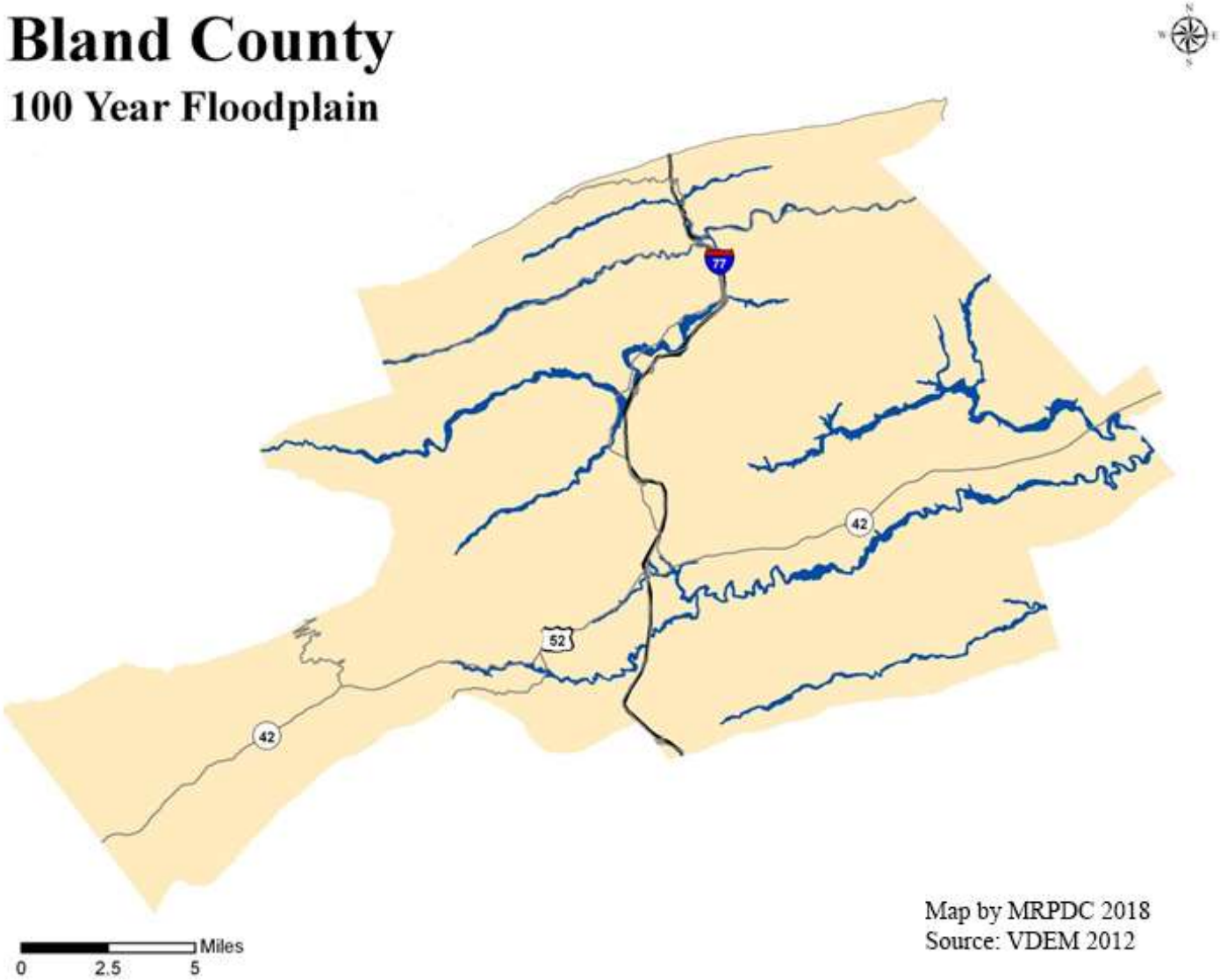

N
Commonwealth of Virginia: NCDC Tornado Events 1950-2016
Number of Occurrences
0 - 3
4 - 7
8 - 13
14 - 19
20 - 27
0 20 40 80 120 160
Miles
Source Background (ESRI)
NCDC Events (NOAA)


N
Commonwealth of Virginia: NCDC Flood Events 1950-2016
Number of Occurrences
5 - 24
25 - 41
42 - 67
68 - 131
132 - 214
0 20 40 80 120 160
Miles
Source: Background (ESRI)
NCDC Events (NOAA)

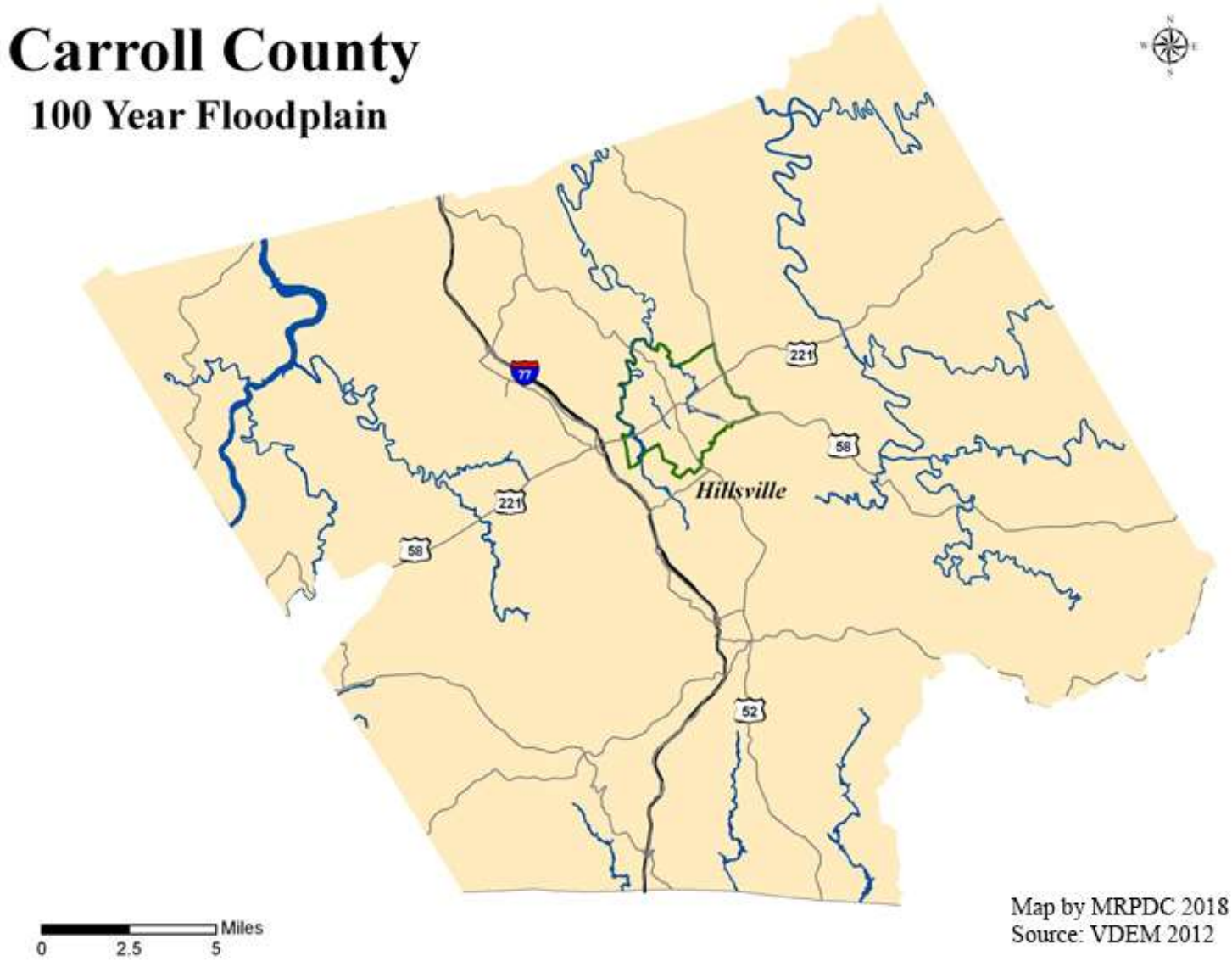

N
Commonwealth of Virginia: NCDC Wind Events 1950-2016
Number of Occurrences
15 - 62
63 - 104
105 - 153
154 - 229
230 - 464
0 20 40 80 120 160
Miles
Source: Background (ESRI)
NCDC Events (NOAA)

Bland County

100 Year Floodplain

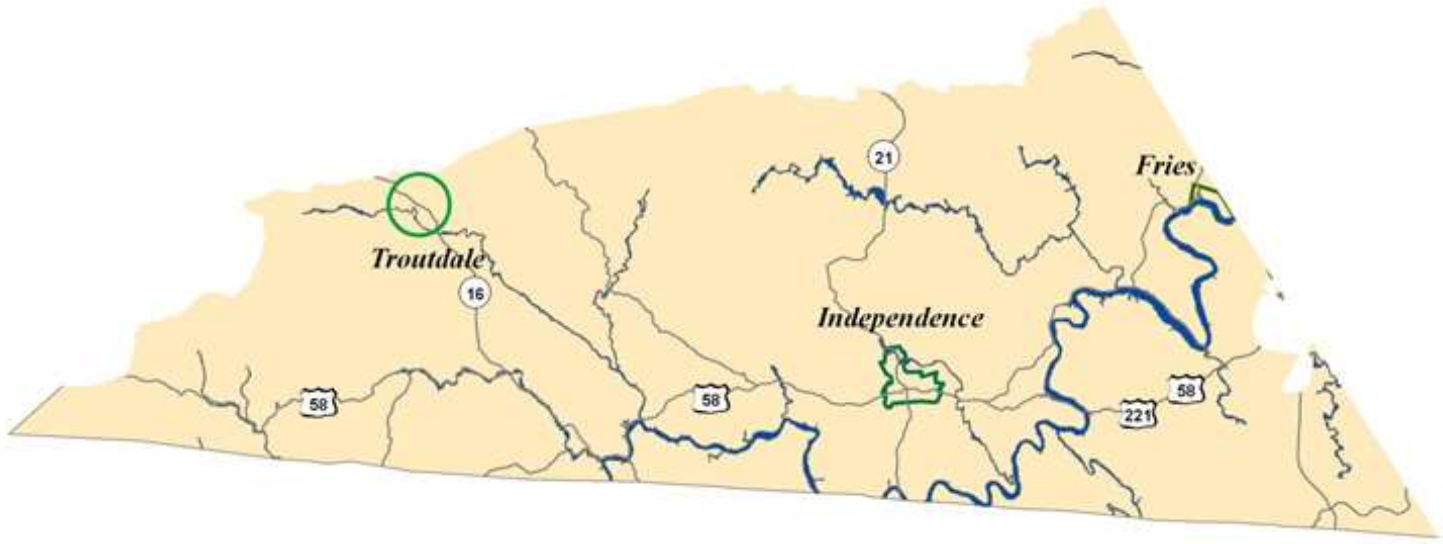


Map by MRPDC 2018
Source: VDEM 2012


Carroll County
100 Year Floodplain
77
221
58
Hillsville
221
58
52
Miles
0
2.5
5
Map by MRPDC 2018
Source: VDEM 2012

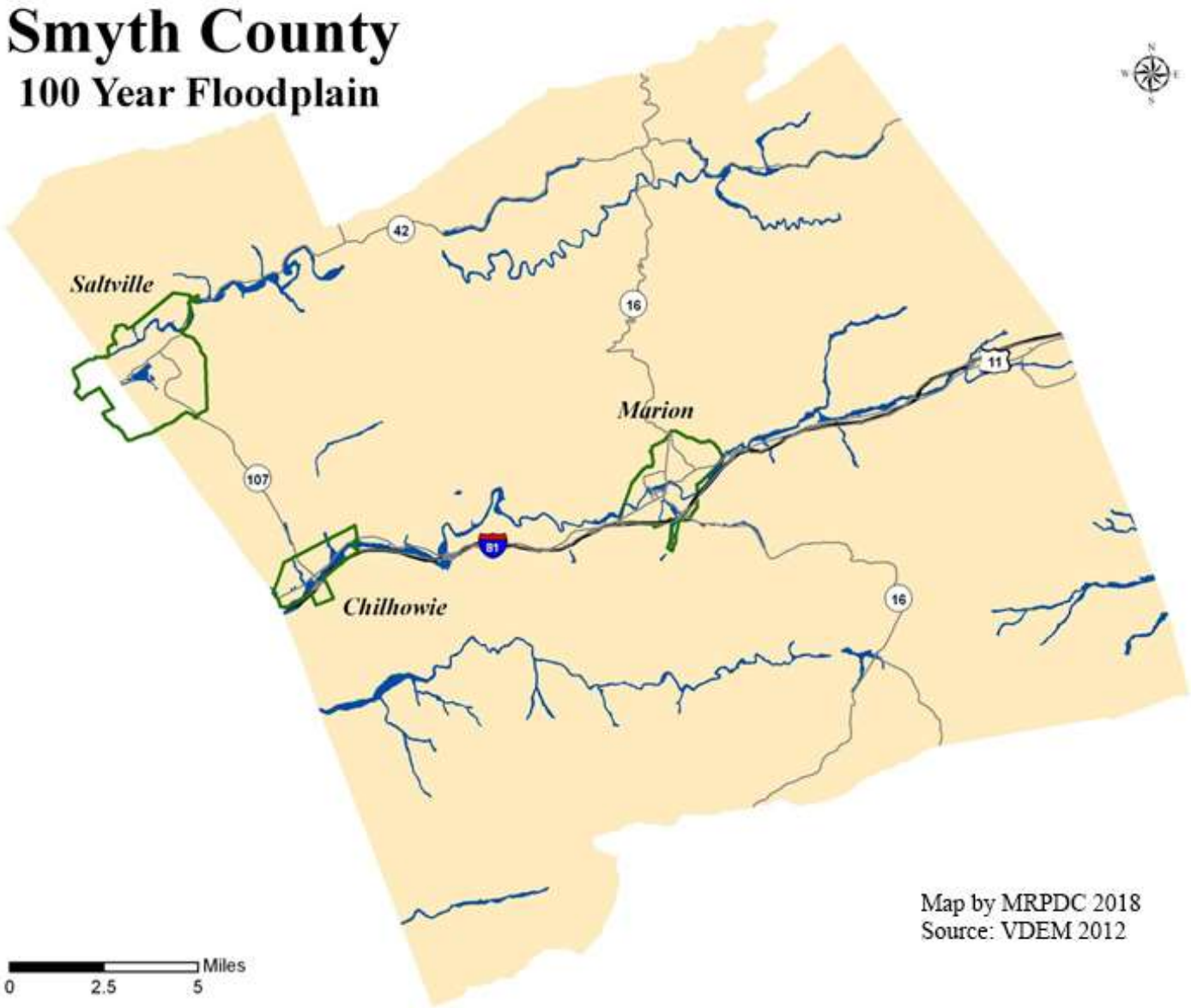
Grayson County

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

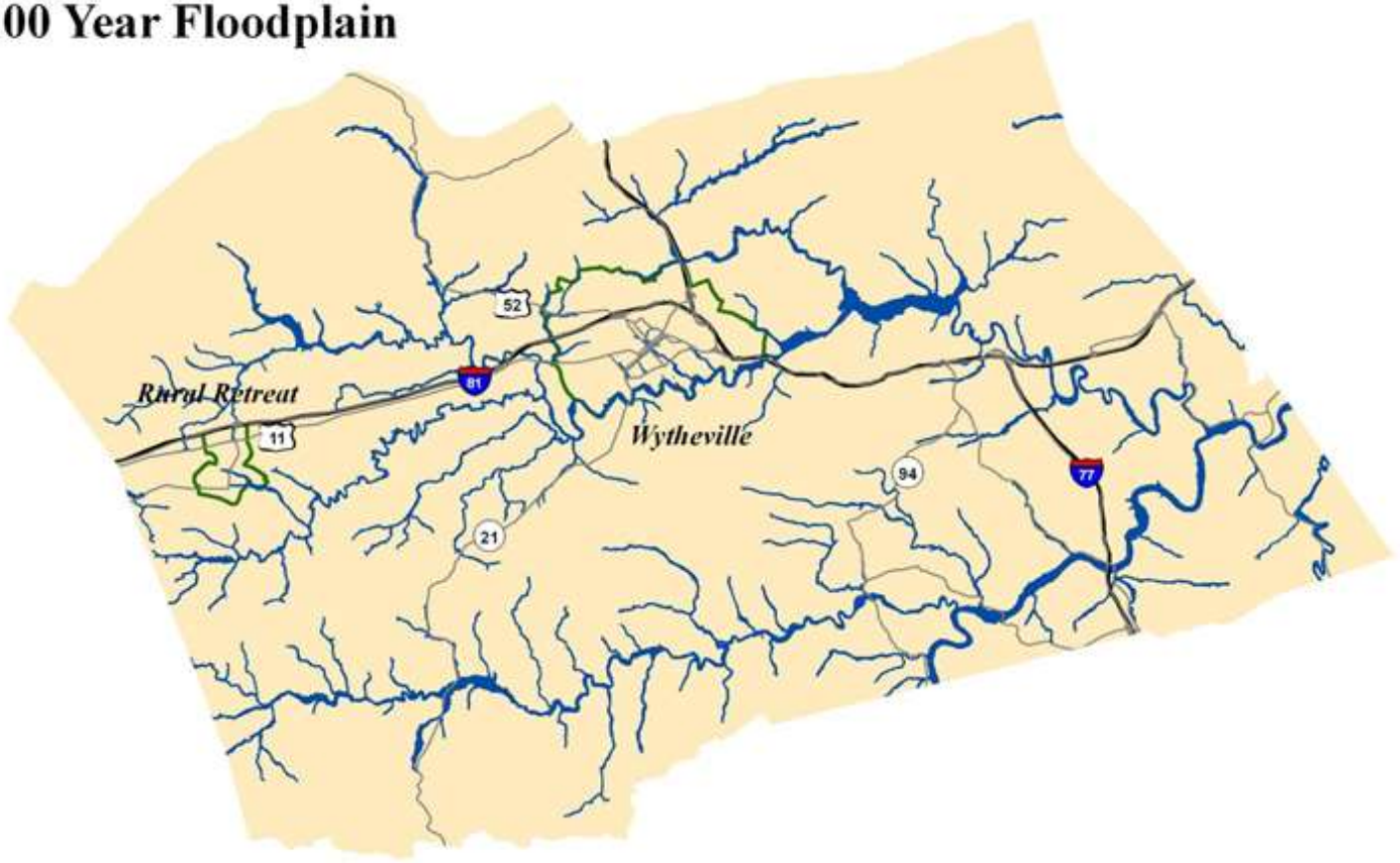
Washington County
100 Year Floodplain

Map by MRPDC 2018
Source: VDEM 2012

Miles
0 2.5 5

Wythe County

100 Year Floodplain



Map by MRPDC 2018
Source: VDEM 2012

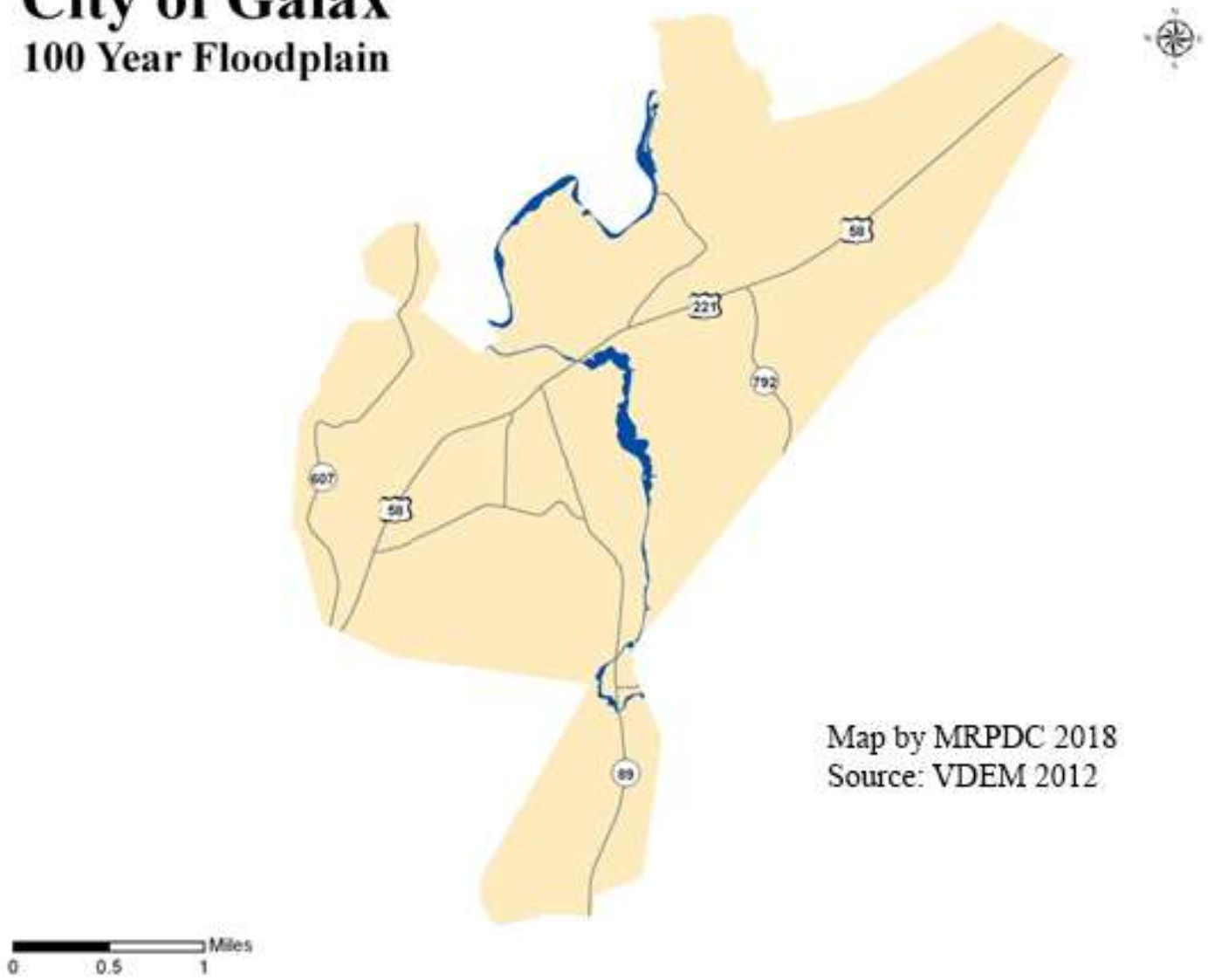
0 2.5 5 Miles

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 by MRPDC 2018
Source: VDEM 2012

VFRIS Exporter

1/6/2025, 12:34:43 PM

1:11,649

0 0.1 0.2 0.4 mi

0 0.17 0.35 0.7 km

CITY OF GALAX, VIRGINIA

Office of the City Manager

January 15, 2025

Angela Davis, CFM
Director of Floodplain Management Division
600 East Main Street, 24th floor
Richmond, VA 23219
Attn: CFPF Round 5 Grant Submittal

Community Flood Preparedness Fund – Round 5
CID#510066 – City of Galax – Floodplain Modeling Study

Dear Ms. Davis,

The City of Galax has struggled for years with an approach to participate in the National Flood Insurance Program (NFIP) and is now initiating a resilience planning process as a critical step toward developing an approach to rejoining the NFIP and increasing the city's overall resilience to flooding and other natural and man-made disasters. As part of this process, the city needs to complete significant floodplain modeling and surveying to address riverine and pluvial flooding threats.

Historically, the city has been concerned with the accuracy of the Flood Insurance Rate Map (FIRM) provided by FEMA utilizing only 1D modeling without the inclusion of mitigation efforts completed by the Army Corps of Engineers on Chestnut Creek. As these concerns persist, the next steps for the city are to study the floodplain, determine the accuracy of the effective FIRM, and update the FIRM as necessary with 2D modeling if possible.

The city hereby requests funding from the Community Flood Preparedness Fund and any other assistance that DCR can spare for our successful flood recovery and flood resilience. Furthermore, this letter serves as authorization for the submission of the city's application for CFPF Round 5.

At your service, I am,

Michael Burnette
City Manager

Michael Burnette
City Manager
City of Galax, Virginia
111 East Grayson Street
Galax, Virginia 24333
(276) 236-5773
mburnette@galaxva.com

National Flood Hazard Layer FIRMette

FEMA

80°57'1"W 36°40'4"N

80°56'24"W 36°39'35"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

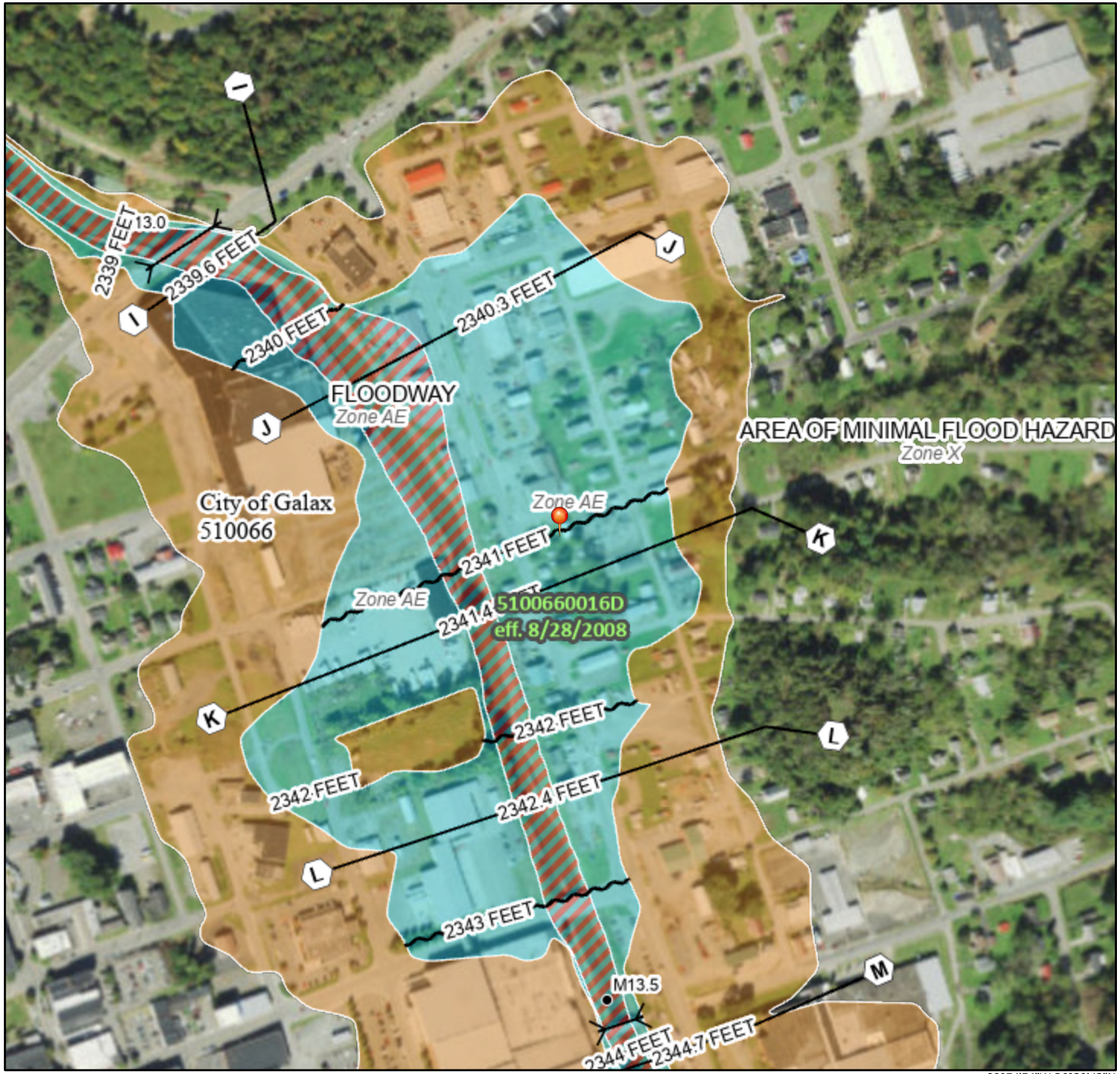
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/7/2023 at 2:26 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

80°55'31"W 36°40'12"N



80°54'54"W 36°39'43"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
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- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

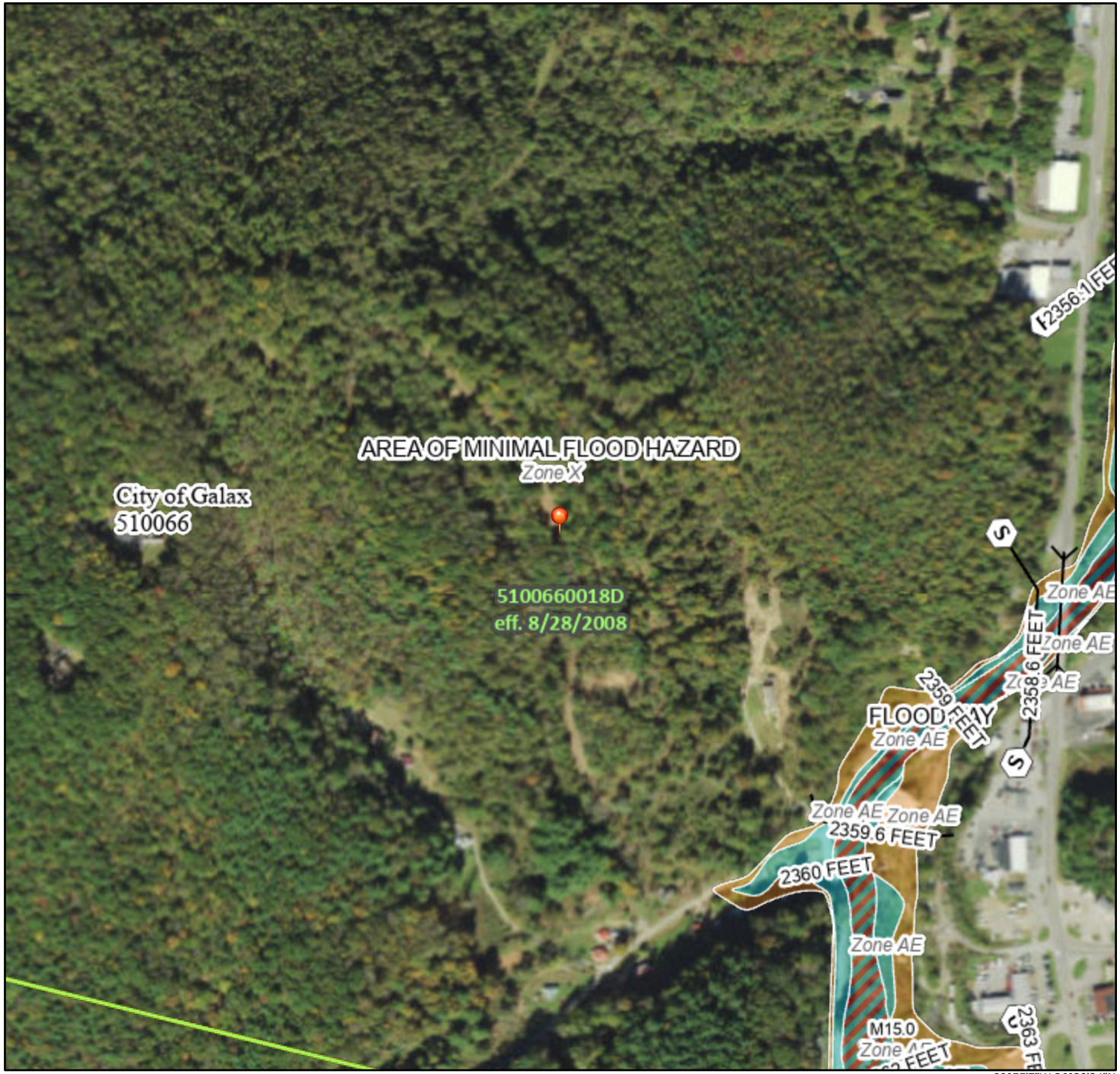
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/7/2023 at 2:27 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

80°55'44"W 36°39'3"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

80°55'7"W 36°38'34"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
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- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
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- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
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- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
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- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/7/2023 at 2:31 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

80°54'59"W 36°41'38"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

80°54'22"W 36°41'9"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

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OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/7/2023 at 2:28 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

80°53'59"W 36°41'44"N

80°53'21"W 36°41'15"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
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GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/7/2023 at 2:29 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

80°53'56"W 36°41'10"N

80°53'18"W 36°40'42"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
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- Channel, Culvert, or Storm Sewer
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- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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Index of Flood Photos

Summary: After the devasting flood of August 1940, the Corp of Engineers straightened and reinforced the Chestnut Creek streambanks along Meadow Street, also known as The Bottom Area. Since then, Chestnut Creek tributaries and storm water run-off has been the cause of flooding across the Galax area. The City of Galax implemented a Storm Water Ordinance in 2013. The Bottom Area storm water system was improved as part of a Department of Housing and Community Development Neighborhood Revitalization Project in 2015. In 2018, the City of Galax procured an engineering study of other stormwater areas, and have several improvement projects in the Capital Plan. Financial and personnel are the primary factors limiting the speed at which the stormwater systems can be improved. The City is actively pursuing grants to supplement funding from the storm water fees.

GALAX GAZETTE

65th Year. GALAX, VIRGINIA, MONDAY, AUGUST 19, 1940. EIGHT PAGES Number 62.

Areas Ravaged by Unprecedented Flood Slowly Returning to Normalcy

brief bulletins ★★★

Britain Strikes Heavy Blows At German Positions

London, Aug. 19 (Monday).—Britain, grasping grimly for the initiative in the greatest air war of all times, struck earth-shaking blows at German positions on the French coast today for the third time since Saturday night. Despite the frenzy of defending their island from the suddenly renewed, massive German attacks of Sunday, the British sent great waves of bombers over the channel, and the Port of Dover was lighted with the glare of echoing bomb blasts from Boulogne and Calais, a score of miles across the sea.

• • •

Draft Foes Claim Strength To Force Compromise

Washington, Aug. 18.—The peacetime draft bill may come to a vote in the senate this week, and tonight its foes claimed sufficient strength to force the administration to compromise the dispute. Basis of the compromise is an amendment by Senator Francis T. Maloney, D., Conn., whose backers insisted they had "votes to spare." Under the pending Burke-Wadsworth bill all men between the ages of 21 and 31 would be required to register for immediate military service. President Roosevelt has endorsed the principles of the legislation. Maloney's amendment would defer the draft until January 1, 1941, and the draftees would be restricted in number to that required to fill quotas not met by voluntary enlistments.

• • •

Nazis Warned Not To Harm U. S. Ship, American Legion

Washington, Aug. 18.—The United States informed Germany in a formal note made public tonight that it expected the army transport American Legion, steaming homeward with nearly 900 Americans from Petsamo, Finland, would not "suffer molestation by any action undertaken by the German armed forces." Publication of the note followed the German government's public statement in Berlin yesterday that it would not be responsible for any harm that might befall the ship if it followed the course outlined by the United States.

Flood Scene At Bridge Site In Galax

Pictured above is a scene at the bridge across Chestnut Creek on Route 58 at the approach to Galax from Hillsville and Woodlawn, when the flood that visited this section last Wednesday was at its height. In the picture is shown something of the havoc that was wrought in the vicinity of this bridge.—(Gazette Photo).

Flood Scene At Vaughan Furniture Factory

In the picture above is shown a view of the Vaughan Furniture Company factory here when the devastating flood of last Wednesday was at its height. The side of the factory shown faces the railroad and the street that passes the plant leading to the East Stuart Drive intersection. Much damage was done to stocks of furniture in the plant by the inundation.—(Gazette Photo).

Flood Rehabilitation Work Here Is Going Forward With The Red Cross Assisting

—in activities, which are making satisfactory progress in alleviating the distress that followed the devastating flood of last Wednesday that wrought untold havoc to property along Chestnut Creek here, and caring for the hundreds of persons living within the scope of the flood waters along the creek who were rendered homeless. Mrs. Grace Wiley, of national Red Cross headquarters, is here working with local Red Cross officials in the work of rehabilitation and of providing food, clothing, etc., for the refugees. The old Galax Hospital building is being used as a refugee station for those made homeless by the flood here.

Two Red Cross case workers are expected to arrive here today or tomorrow to render further assistance in the work.

Enormous flood damages in the Twin Counties

—especially along New River and the larger creeks was wrought by the flood that visited this section Wednesday, August 14. Since the waters have receded, a better view of the ravages of the flood has become available, revealing thousands of tons of wreckage and debris of all kinds. Also to be seen along practically the entire length of New River in Grayson and Carroll Counties are fields of corn and other grains, and fields of grass that had not been mowed, that lie almost flat on the ground as if a heavy roller had run over them.

Also notable along the river is the absence of the many haystacks that dotted the fertile meadows before the flood, practically all of which were swept away with the flood, together with stacks of unthreshed wheat, etc., and many buildings were either swept entirely away or removed from their foundations. Perhaps even an approximate estimate of damage to property and crops in the two counties would be almost impossible, and the extent of the loss to citizens will probably never be known.

At Fries, the home of Bob Baker, near the Fries Ferry, and the Holiness Church, also near the ferry, were swept away, and the home of Cosby Anders, farther up the river, was moved from its foundation.

The storage plant of the Atlantic Refining Company was badly damaged. All of the gasoline tanks were washed from their foundations and men were able to tie cables onto one of the large tanks and saved it. Several hundred tires and hundreds of gallons of oil and gasoline, and also the warehouse of the storage plant was washed away. The loss was estimated at $15,000.

A high flood wall was built on the town side of the river extending the length of the Washington Mills plant and back of the main business section of the town after the flood of 1916. This retaining wall was of inestimable value during this flood. Despite this wall, water submerged the ice plant and water had reached a depth of approximately five feet in the basement of the Washington Inn, Fielder's Restaurant, Washington Mills Store, and the New River Grocery Company building. Approximately 400 tons of coal and 150 cords of wood were carried away.

Dr. William Crossman, director of the State Bureau of Communicable Diseases of the State Board of Health, was sent here by Dr. I. C. Riggin, State Health Commissioner, to examine the situation brought about by the flood from the standpoint of sanitary conditions and public health.

The State Board of Health, working in conjunction with the local board of health, ordered that no houses in the flood area be used for living purposes until they were officially pronounced livable. Several of the houses have already been pronounced suitable for habitation, and a number of families that were rescued from the flood waters moved back into their homes yesterday (Sunday). Water has been piped to practically all the houses in the flood section, as all wells in the area were condemned as being unsafe for use as a source of drinking water.

Five houses in the flood area were condemned and were ordered torn down.

New Galax Pastor

REV. CALVIN L. GREGORY

—new pastor of the Galax Friends Church. The Rev. Mr. Gregory comes to Galax from Winston-Salem, N. C., where he has been pastor of the Friends Church for a number of years.

A series to decide the Galax softball championship

—will begin in Felts Park, under the lights, Monday, August 26, it has been announced here by officials of the Galax softball league. The series was slated to begin tonight (Monday) but due to the recent rains, several regularly scheduled games are yet to be played.

In the series, the winners in the league of first and third places will play a three-games series and the winners of second and fourth places will play a three-game series. The winners of these two preliminary series will play a seven-game series for the championship.

A loving cup has been obtained and will be presented to the winning team by A. G. Pless, president of the league.

Teams in the Galax softball league will resume playing

—rained out games in Felts Park tonight (Monday). All of last week's games were rained out and if weather permits all remaining games scheduled for the season will be played this week.

The games have been scheduled tentatively as follows:

Monday—Moose vs. Galax Knitting Company at 5:30 p. m., and Lions vs. Mirror Company at 8:00 p. m.; Tuesday—Lions vs. Galax Knitting Company at 5:30 p. m., and Weavers vs. Texas Company at 8:00 p. m.; Thursday—Weavers vs. Moose at 8:00 p. m., and Friday—Merita vs. White Chevrolet at 8:00 p. m.

AN INFORMAL PIANO RECITAL WAS GIVEN

—by pupils of Mrs. William Kyle, at her home in Independence, on Tuesday night, August 13.

Those present were served refreshments by Mrs. Kyle.

"AUNT SAMANTHY RULES THE ROOST" WILL BE GIVEN

—at pleasant Hill School building on Saturday night, August 24, at eight o'clock, and proceeds will be used for the benefit of Pleasant Hill Church.

The public is cordially invited to attend and see this humorous play.

Much damage to Galax industries by the flood

—of last Wednesday was wrought when the waters from Chestnut Creek surrounded some of them. The brunt of this damage, it seems, was borne by the Vaughan Furniture Company plant, which was flooded by 46 inches of water, although considerable damage was inflicted by the flood at the plants of the Vaughan-Bassett Furniture Company, the Webb Furniture Company, the Galax Furniture Company and the Carnation Company's milk condensing plant. No approximate estimate as to the damage to most of these plants has been announced. The damage to the Galax Furniture Company plant, however, has been estimated to reach from $5,000 to $7,000.

Sites of a number of other business establishments was reached by the water, but not in sufficient volume to inflict an appreciable amount of damage.

In regard to the Vaughan-Bassett plant, B. C. Vaughan, president of the Vaughan-Bassett Furniture Company, stated today that actual damage to the plant was very light, but that the main factor is the inconvenience caused by the necessity of copying all records in the office, which was flooded.

Flood losses may be registered with the Red Cross

—in the court room of the Municipal Building, and all families wishing to register such losses, both in Galax and other sections of Grayson and Carroll Counties, are requested to report at the place mentioned above between 9:00 a. m. and 5:00 p. m., with the beginning of registrations having been scheduled for today (Monday).

Wendell Willkie delivered his acceptance speech

—Saturday afternoon in Elwood, Ind., his home town, before a wildly cheering crowd in a circus-day set-ting, and proposed in "dead earnest" that President Roosevelt, who is seeking a third term in the presidency on the Democratic ticket, meet him in a series of public debates on major campaign issues.

A sweltering crowd, estimated by Police Chief Mike Morrissey of Indianapolis at 150,000 and by Homer Capehart, general chairman, at 250,000, packed Callaway Park—once a cow pasture in which Willkie played as a boy—for the ceremonies and interrupted the perspiring nominee repeatedly with shouts, whistles and handclapping.

Willkie said he favored some form of selective military service as "the only democratic way in which to secure the trained and competent manpower we need for national defense."

He criticized the administration's foreign policy and asserted that the President "has courted a war for which the country is hopelessly unprepared—and which it emphatically does not want."

His listeners, many of whom had slept in Callaway Park overnight in order to obtain choice seats, were scattered through clumps of trees. But the burning Indiana sun brought perspiration to every brow.

Willkie made it plain he believes that the United States is

(Turn to page 4, please

Three NYA workers are helping in the recreation program

—under way in Felts Park, under the direction of W. James Sessoms, park recreational director. They are Miss Aletha Manus, Miss Iris Martin and Denny Jones.

The playgrounds in the park are under supervision this week from nine to twelve o'clock, and one to eight o'clock.

Activities include horseshoe pitching and skipping the rope, and croquet for girls.

A horseshoe tournament for the town championship is to be held in about two weeks.

Carroll County schools will open on September 3

—for the 1940-41 term, it has been announced by the county board in Hillsville. At a recent meeting of the board in Hillsville, teaching vacancies in the county school system were filled as follows: M. J. Ingerson, teacher of Mathematics in Hillsville High School; E. J. Cooley, Oak Hill; Miss Emma Sutphin, Climax, and Miss Lake Smith, Silver Leaf.

A new school bus has been purchased to transport pupils from sections adjacent to the Floyd and Wythe county lines to Hillsville High School. This bus will be driven by Henry Alford.

The annual Carroll County Teachers Institute is to be held on Friday and Saturday, September 13 and 14, in the Hillsville High School auditorium.

Joe O. Galbraith has resigned as Scout Executive

—for field work in the Roanoke Area Council No. 600, Boy Scouts of America, which position he has held since July, 1938, and has returned to his home in Texas, where he expects to continue in Boy Scout work. The resignation was effective Thursday.

The resignation of Mr. Galbraith, who has been in and around Galax many times and is well known here, coincides with the beginning of his summer vacation and, in a letter to volunteer Scout leaders, throughout the territory of the Council, Scout Executive H. Travis Thompson, of Roanoke, said that "for sometime Mr. and Mrs. Galbraith have been hoping it would work out for them and their young son to locate in Texas, nearer the home of their people.

A successor has not yet been selected, but a Council committee has selected one from among several men recommended by the national council, and has asked him to meet the committee in Roanoke, at his earliest convenience. Appointment of a successor will await the October meeting of the council's executive board.

THE BURCHAMS WILL HOLD A REUNION ON SUNDAY

—September 1, at Crooked Creek Church in Carroll County, six miles south of Woodlawn and two miles from the Pipers Gap road.

Dinner will be served on the grounds, and everybody is invited to attend.

The Wytheville District Woman's Missionary Society

—organization will hold a meeting at Camp Moxley, Elk Creek, on Friday, August 23, from 10:00 a. m. to 3:00 p. m.

Conference officers will be present, and plans for the new organization, to be known as "The Woman's Society of Christian Service," will be explained.

The funeral of Mrs. J. W. Stacy was held Friday

—afternoon, at three o'clock, in the First Baptist Church here, in charge of the pastor, Rev. Herbert R. Carlton, who was assisted by Rev. D. Sidney McCarty, pastor of the First Presbyterian Church; Rev. W. M. Bunts, pastor of the First Methodist Church, and Elder J. D. Vass, of Fancy Gap, Primitive Baptist minister.

The services were begun with an appropriate hymn by the choir, after which the Rev. Mr. McCarty read the 23rd Psalm, and the Rev. Mr. Bunts then read a very tender and comforting poem. Elder Vass gave a talk, and a male Chorus sang "When They Ring Those Golden Bells."

The Rev. Mr. Carlton then gave a talk, and offered a prayer.

"Sometime We'll Understand" was sung, as the services were concluded.

Mrs. Stacy, the former Miss Beulah Porter, daughter of Mr. and Mrs. W. L. Porter, Galax, is survived by her husband, J. W. Stacy; two children, Joan and Joe Bill; her parents, and a brother, Robert T. Porter, Galax. She passed away early Wednesday night, August 14, in Martin Memorial Hospital, Mount Airy, N. C., where she had been a patient since the Monday night previous. The deceased was 33 years of age at the time of her death, and was a very popular and well-liked young woman.

Active pallbearers were: Johnnie Richardson, Benford Hurd, Ted Pedigo, P. M. Cato, Paul Wilson and Munsey Atkins.

Honorary pallbearers, most of whom were members of the Young Men's Bible Class of the First Baptist Church, were: Joe Goldstein, Peter Xenos, Paul G. Cox, H. O. Stone, P. M. Cato, Elmore Kennedy, R. J. Knisely, C. A. Boggs, Jimmie Stultz, John Reid Smith, L. H. Lawrence, J. W. McGee, Marcus Dalton, E. L.

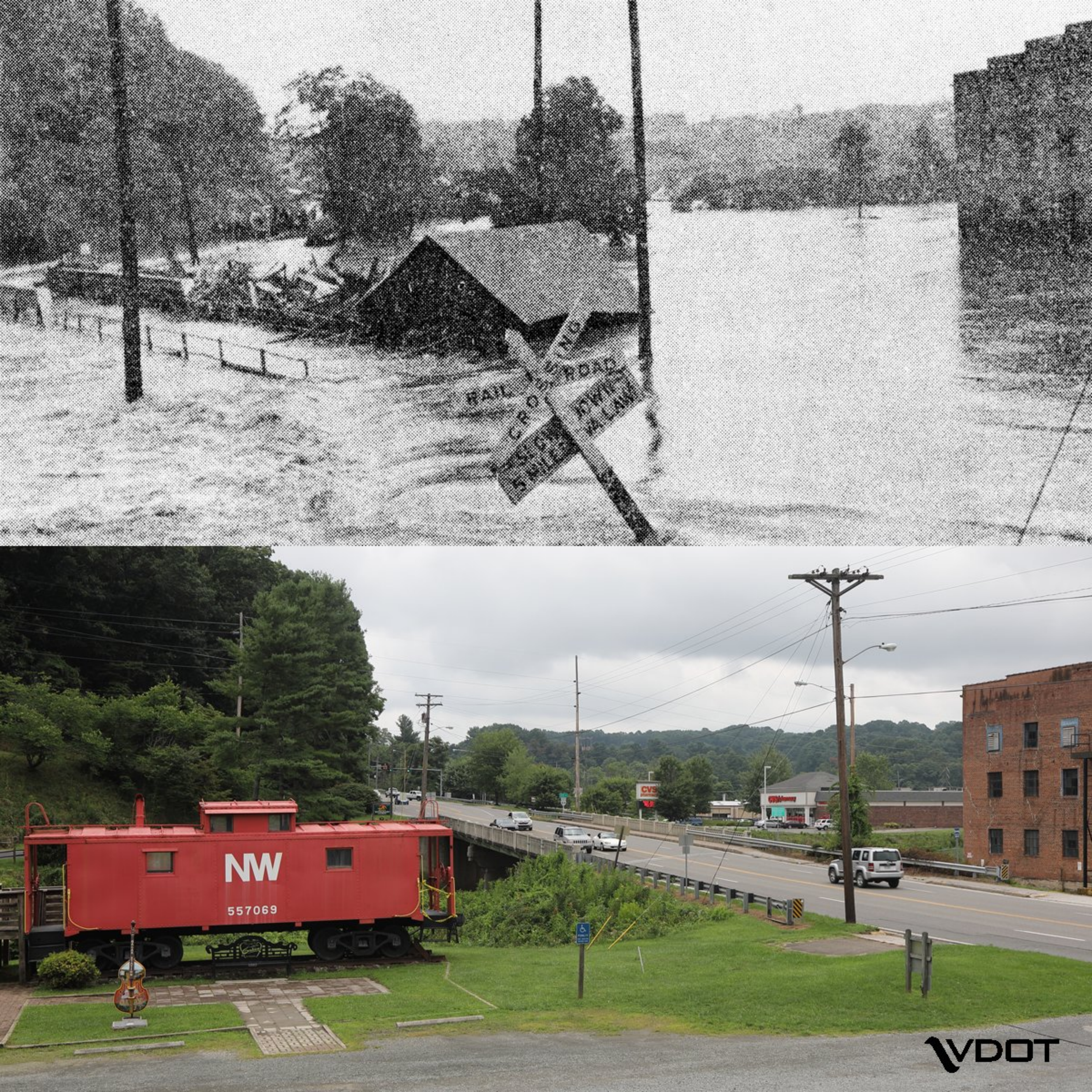
(turn to page eight, please)

Coming Events

In The Twin Counties

Tuesday, August 20.—Regular meeting of Galax Town Council in Municipal Building, at 7:30 p. m.

Friday, August 23.—Presentation of comedy play, "Once Upon a Time," by Barter Theatre group, in Abingdon, in Hillsville High School auditorium, at 8:00 p. m.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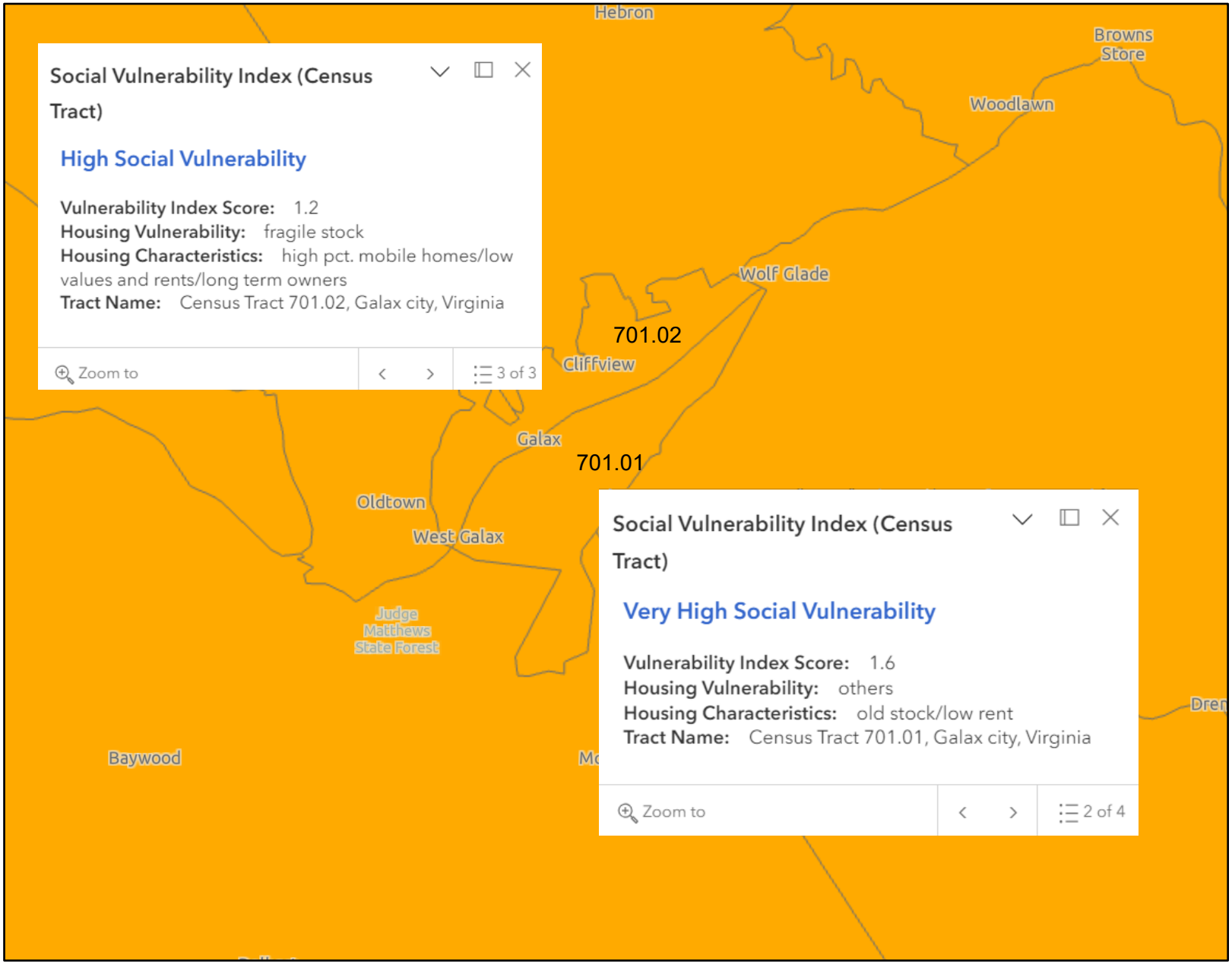
Soon after the town was formed, J.P. Carico and T.C. Felts promoted the “Great Galax Fair.” Together with about 90 citizens, they formed the Galax Fair Association. A 22-acre tract of land, which is now Felts Park, was purchased and a fairground was built. In 1948, a group of citizens went to Washington, D.C. seeking federal assistance to alleviate the flooding issues along Chestnut Creek. The most severe flood had occurred in 1940, causing several million dollars in total damages. Their efforts were successful and by 1950 the Army Corps of Engineers had completed improvements necessary to relieve the problems. Chestnut Creek has not flooded since.


SOUTHERN STATES


SEPTEMBER


SOUTH
89

City of Galax Social Vulnerability 701.01, 701.02



November 7, 2023

Scale: 1:138,429

0 0.75 1.5 3 mi

0 1.25 2.5 5 km

William & Mary, Center for Coastal Resources Management (CCRM) at Virginia Institute of Marine Science (VIMS)
VGIN, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA

VIMS | William & Mary
Virginia Institute of Marine Science
Center for Coastal Resources Management

ADAPT VA

City of Galax, Virginia
Comprehensive Plan

Adopted: 13 June 2022

Amended: *08 January 2024*

Acknowledgments

This planning document was prepared by the Galax Planning Commission, the Galax City Council, and the Citizens of the City of Galax. The background research, writing, and assembly of the document were completed by staff of the Mount Rogers Planning District Commission. The preparation of this document was financed by the City of Galax. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration or the Virginia Department of Transportation. This report does not constitute a standard, specification, or regulation.

Galax Planning Commission

Russell Austin
Josepha Bolling-Thompson
Brandon Boyles
Janett Nuckolls
Rita Reeves
Sharon Ritchie
Dana Sworsy

Galax City Council

Willie Greene – Mayor
Beth White – Vice Mayor
Sharon Ritchie
Martin Warr
Evan Henck
Hunter Bowers
Kathy Burnett

City Staff

Michael Burnett – City Manager

Technical Assistance

Mount Rogers Planning District Commission

Executive Summary

Update

In 2023, staff and the Galax Planning Commission were been directed to undertake review and amendment of necessary plans and ordinances to move the city forward for a more competitive and resilient approach toward higher economic vitality and quality of life. Planning commission reviewed the Creekside Small Area Plan (Creekside SAP) through the lens of a city-wide approach, treating the process as a catalyst, part of a transition toward a more walkable, inclusionary city plan. The potential for the Creekside SAP to change the trajectory of the city was considered carefully at multiple levels of city governance, and, ultimately, the principals underpinning the Creekside SAP are appealing to the commission and staff – speaking in the general sense of urban planning. The requirements of establishing an urban development area were also explored with the intent to be incorporated into the comprehensive plan, which contains much of the same planning principals as the Creekside SAP. The components below illustrate the simplified parts of the proposed minor amendment:

- Land Use
    - Allow for mixed-use/adaptive mixed-use
    - Promote the viability of the downtown
    - Promote more inclusionary land use policies
        - Increase overall resiliency
- Transportation
    - Establishment of an Urban Development Area(s)
        - Creekside (SAP), downtown, historic district – all overlapping
    - Incorporating traditional neighborhood design
    - Avoid patterns of induced demand
    - More focus on long-term feasibility of transportation network
    - Increased focus on bicycle and pedestrian

Schedule

The Galax Planning Commission and staff began in-depth review of the 2022 Galax Comprehensive Plan and Creekside (SAP) in September 2023, focusing on incorporation of current city initiatives into public service, joining the Virginia Main Street program, City Council's 2020 strategic plan, the Chestnut Creek School of the Arts programming, and much more. The Planning Commission ultimately determined that the City needed to incorporate new urban planning principles into its policies, proposing the following comprehensive plan amendment. Understandably, this is not the end for the City's future planning process, just one more step forward.

Action

City Council approved staff request to advertise for a joint public hearing on January 8th, 2024 to consider approval of the proposed Galax Comprehensive Plan amendment.

City of Galax Virginia

Table of Contents

Chapter 1: Introduction

Purpose

The purpose of the Galax Comprehensive Plan is to provide a guide or a "vision" for the future development of the city. Planning is an organized way of determining a community's challenges and opportunities, then setting goals, objectives, and strategies to address those challenges and opportunities. Planning is a forward-looking process that bridges the gap between where we are today and where we want to go in the future. A comprehensive plan by its very name addresses a variety of often-interrelated public facilities and services, quality of life, economy, and transportation – just to call out a few.

A comprehensive plan is a tool to guide local government decisions pertaining to the provision of a better environment and efficient public services, both now and in the future. To accomplish these purposes the plan must be comprehensive, general, and long-range. A comprehensive plan should include surveys of existing conditions, an analysis of those conditions to determine what changes are anticipated to take place, and recommendations for action on strategies that will improve existing conditions in order to prepare for the future.

Relationship to Other Plans

The comprehensive plan is a general plan and is not designed to stand alone as the sole guide for the development of a locality. However, the plan fulfills a number of specific purposes. It is the basis for a city zoning ordinance and serves as a sounding board for the examination of a rezoning application. It provides a comprehensive frame of reference for the review and evaluation of conditional use permits, subdivision plats, site plans, and developmental proposals. It gives official recognition to areas of natural, historical, geological, or archeological significance, thus ensuring their conservation and protection. The plan serves as a guide for efficient and coordinated improvements in public services. It identifies the assets of the city and outlines ways to preserve and leverage those assets.

The comprehensive plan may be implemented by zoning ordinances, subdivision ordinances, and capital improvements programs. Other plans of importance to the Town in the development of this plan include the previous City of Galax Comprehensive Plans, the Mount Rogers Comprehensive Economic Development Plan, the Mount Rogers National Recreation Area Unit Plan, the City of Galax strategic plan, the Mount Rogers Hazard Mitigation Plan, and other plans of similar or relevant scope. Additional studies, reports, plans, policies, and initiatives would be built upon the adaptive framework of the comprehensive plan, complimenting the progress of each toward implementing the City's vision.

Definitions

"Comprehensive" means that the plan must include all the land within the city as well as be cognizant of all decisions which may have an impact on the land.

“General” means that the plan does not dictate specific locations or include the ordinances which are needed to put the plan into effect; rather a general plan provides the goals, objectives, and strategies to which decisions and ordinances of the local government can be directed.

“Long Range” means that the plan, while addressing current problems, also considers future situations and the impact of changes 10 to 15 years from now.

“Goals” are general statements or future conditions considered desirable to the city; they are ends toward which actions are aimed.

“Objectives” are statements of measurable activities to be accomplished in pursuit of the goals; they refer to some specific aspirations which are reasonably attainable.

“Strategies” or “recommendations” are specific proposals that directly relate to accomplishing the objective; they are the actions recommended to implement the plan. Strategies or sometimes called “policies” are recommendations which represent the “how we are going to get there” component of the Plan.

Description of the Planning Area

Galax is an independent city situated between Carroll and Grayson Counties in Southwest Virginia. Approximately nine miles west of Exit 14 on Interstate 77, Galax is easily accessible via U.S. Highway 58. Galax is located 82 miles southwest of Roanoke, Virginia, and 64 miles northwest of Winston-Salem, North Carolina.

The City of Galax encompasses an area of approximately 8.2 square miles or about 5,262 acres with a 2010 population of 7,042 persons. The density of the population of Galax is 1.34 persons per acre or approximately 859 persons per square mile.

Historical Background

Galax has a long tradition of organized planning and active citizen involvement in civic affairs. Galax had its origins in the late 19th century when J.P. Carico and J.B. Waugh formed a land development company to purchase land from Major George Curin, one of the earliest settlers in the area. They wanted to build a town near the proposed site of the Norfolk and Western Railroad crossing. They contracted with Mr. Arnold and Mr. DeMot, engineers from Lynchburg, to layout the land into streets and lots in what is now Downtown Galax, on the company-owned land along the banks of Chestnut Creek. The first lots were sold in 1903, marking the beginning of the new town, which they called Bonaparte.

The community grew quickly with many businesses moving in from the nearby settlements of Blair and Oldtown. Many of the early settlers in the area were Quakers who had come from North Carolina after the Battle of Alamance in 1771. Soon after the railroad was built, in 1904, the name of the town was changed to Galax, after the name of an evergreen plant often used in floral arrangements, which grew in abundance in the area. In 1906, a town charter was established with a mayor-council form of government, and Galax was incorporated as a town. This was changed to a town manager form of government in 1922.

By the mid-1920s, the town was firmly established. Water and sewer had been installed in 1916, the volunteer fire department had been established in 1922, and a school system had been built on the land set aside for this purpose in the original layout of the town. In 1925, Dr. J.K. Caldwell initiated the building of the first hospital in Galax. Each improvement resulted from the local citizens uniting to initiate the facilities and services.

Soon after the town was formed, J.P. Carico and T.C. Felts promoted the “Great Galax Fair.” Together with about 90 citizens, they formed the Galax Fair Association. A 22-acre tract of land, which is now Felts Park, was purchased and a fairground was built. In 1948, a group of citizens went to Washington, D.C. seeking federal assistance to alleviate the flooding issues along Chestnut Creek. The most severe flood had occurred in 1940, causing several million dollars in total damages. Their efforts were successful and by 1950 the Army Corps of Engineers had completed improvements necessary to relieve the problems. Chestnut Creek has not flooded since.

The city’s early industrial base also resulted in part from local citizen efforts. J.S. Waugh, S.E. Wilkerson, and Creed Hawks established the first factory located on Virginia Street. Fire destroyed the building in 1907 and it was never rebuilt. No large-scale industrial growth occurred until after World War I. Soon after the war, local civic leaders met with John D. Bassett, another noted industrialist. The Vaughan-Bassett Furniture Company resulted from their meeting. In 1923, the Vaughan Furniture Company was formed.

Industrial growth was rapid through the 1940s. During this period, Webb Furniture Company, the Galax Knitting Company, Dixon Furniture Company, the Galax Mirror Company, the Carnation Company, Dixon Lumber Company, Old Dominion Knitting Company (which became the Penry Manufacturing Company), and the Galax Weaving Plant of Burlington Industries was opened.

Early in 1952, Wonderknit Corporation, one of the city’s largest industries, was established. By 1954, Galax had grown to a sufficient size to become a city, independent of the two surrounding counties. In 1955, Galax citizens raised over a million dollars in just 30 days to provide incentives for the Hanes Corporation to be located in their city.
For years, Galax was a leading center for the furniture manufacturing and knitting industries in Southwest Virginia. This was due in large part to the interested citizens who took the initiative using their own time and money to pursue and support industrial development and investment in Galax from the city’s earliest days.

Legal Status of the Plan

Section 15.2-2223 of the Code of Virginia requires that every governing body in the Commonwealth to adopt a comprehensive plan for the territory under its jurisdiction.

Section 15.2-2230 requires the local Planning Commission to review that plan at least once every five years to determine whether it is advisable to amend the plan.

Section 15.2-2200 of the Code of Virginia establishes the legislative intent of planning and zoning enabling authority. In summary, the State’s intent is to encourage local governments to:

- improve the public health, safety, convenience, and welfare of the citizens;

- plan for future development with adequate highway, utility, health, educational,
- recreational, and other facilities;
- recognize the needs of agriculture, industry, and business in future growth;
- preserve agricultural and forestal land;
- provide a healthy surrounding for family life in residential areas; and
- provide that community growth be consonant with the efficient and economic use of public funds.

Section 15.2-2223 specifically states that “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 probably future needs and resources, best promote the health, safety, morals, order, convenience, prosperity, and general welfare of the inhabitants, including the elderly and persons with disabilities.”

It further states that the comprehensive plan shall be general in nature in that it shall:

- designate the general or approximate location, character, and extent of features shown on the plan, including where existing lands or facilities are proposed to be extended, removed, or changed; and
- show the long-range recommendations for the general development of the territory and may include such items as the designation of areas for various kinds of public and private land use, a system of transportation facilities, a system of community service facilities, historical areas, and areas for the implementation of groundwater protection measures.

In Virginia, the local comprehensive plan is a guide for making community development decisions and thus the governing body can exercise some discretion in how strictly it interprets and adheres to the plan. However, the Code provides that the construction of streets or other public facilities be subject to review and the extent of the proposed facility be in substantial accord with the adopted Comprehensive Plan.

Chapter 2: Population and Trends

Introduction

Galax is in close proximity to two of Virginia's most prominent highways: I-81 and I-77. I-81 provides access to over half of the east coast of the United States in a relatively direct line while I-77 connects SWVA to the Carolinas and is used heavily for interstate commerce travel. Despite the City's strategic location within a short distance of Virginia's most well-traveled highways, Galax is facing a problem that many small communities and towns around SWVA are facing, a declining population.

Demographic Profile

The population in Galax City, Virginia was 6,517 per American Community Survey data for 2015-2019. The region has a civilian labor force of 2,839 with a participation rate of 54.8%. Of individuals 25 to 64 in Galax City, Virginia, 15.7% have a bachelor's degree or higher which compares with 33.5% in the nation. The median household income in Galax City, Virginia is $33,575 and the median house value is $96,600.

Table 2.1 shows a breakdown of various demographics as well as current populations and future predicted growth:

Table 2.1

	Percent			Value		
	Galax City, Virginia	Southwest Virginia nonmetro area	Virginia	Galax City, Virginia	Southwest Virginia nonmetro area	Virginia
Demographics						
Population (ACS)	—	—	—	6,517	371,659	8,454,463
Male	47.4%	49.8%	49.2%	3,090	185,253	4,159,173
Female	52.6%	50.2%	50.8%	3,427	186,406	4,295,290
Median Age[2]	—	—	—	45.0	45.5	38.2
Under 18 Years	21.7%	19.2%	22.1%	1,414	71,532	1,865,699
18 to 24 Years	5.4%	7.1%	9.6%	349	26,402	811,878
25 to 34 Years	9.1%	11.2%	13.9%	593	41,561	1,174,091
35 to 44 Years	13.9%	11.6%	13.0%	908	43,122	1,100,460

45 to 54 Years	13.2%	13.9%	13.5%	859	51,701	1,139,236
55 to 64 Years	14.4%	15.4%	12.9%	936	57,081	1,091,153
65 to 74 Years	11.7%	12.4%	9.0%	760	46,038	756,712
75 Years, and Over	10.7%	9.2%	6.1%	698	34,222	515,234
Race: White	89.6%	90.0%	67.6%	5,842	334,399	5,717,617
Race: Black or African American	7.5%	7.4%	19.2%	491	27,377	1,621,592
Race: American Indian and Alaska Native	0.0%	0.2%	0.3%	0	741	23,873
Race: Asian	0.6%	0.5%	6.4%	42	1,891	541,133
Race: Native Hawaiian and Other Pacific Islander	0.2%	0.0%	0.1%	16	128	6,179
Race: Some Other Race	1.7%	0.6%	2.6%	109	2,229	223,794
Race: Two or More Races	0.3%	1.3%	3.8%	17	4,894	320,275
Hispanic or Latino (of any race)	14.5%	2.6%	9.4%	945	9,666	792,001
Population Growth						
Population (Pop Estimates)[4]	—	—	—	6,347	364,765	8,535,519
Population Annual Average Growth[4]	-0.9%	-0.7%	0.7%	-62	-2,842	60,958
People per Square Mile	—	—	—	770.3	63.5	216.1

As depicted in the chart above, the City of Galax has a rapidly aging population. Compared to the median age of 38.2 for the entirety of the state of Virginia, Galax has a median age of 45.5. Based on population growth, this trend suggests that the source of the city's population growth is the in-migration of working-age and older residents.

Throughout the City of Galax, the Hispanic and Latino population make up 14.5% of the city's population while Black or African Americans comprise 7.6% of the populace.

Education Levels

Expected growth rates for occupations vary by the education and training required. While all employment in the City of Galax, Virginia is projected to decline 0.6% annually over the next ten years, occupations typically requiring a postgraduate degree are expected to grow 0.8% per year. Careers requiring a bachelor's degree are forecast to grow 0.0% per year, and

occupations typically needing a 2-year degree or certificate are expected to contract 0.4% per year.

Graph 2.2

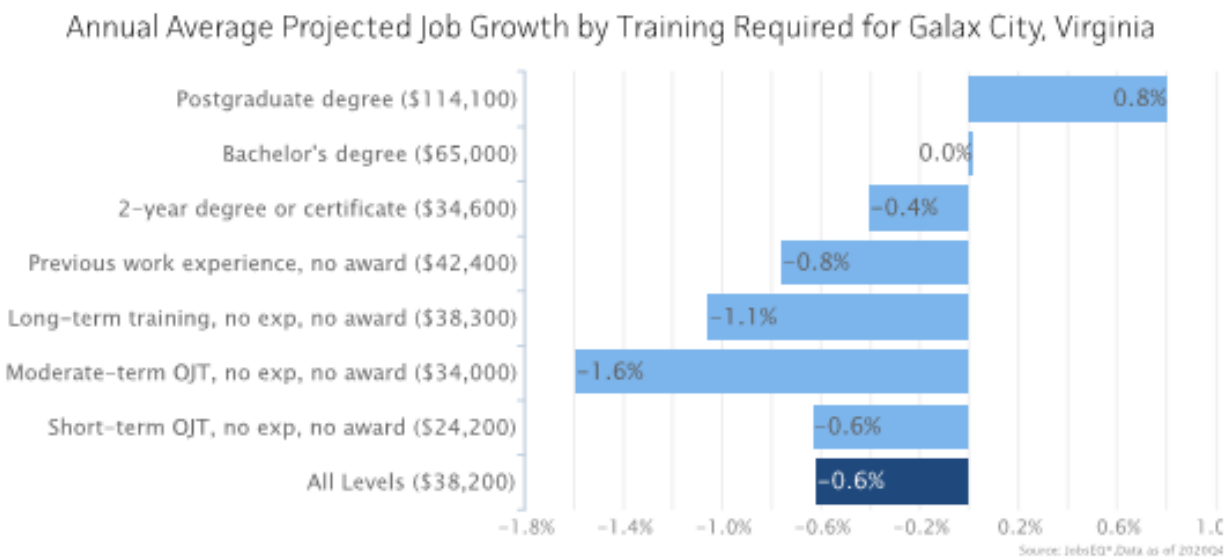


Table 2.3 depicts the breakdown of labor inventory by sector for the City of Galax

Chart 2.3

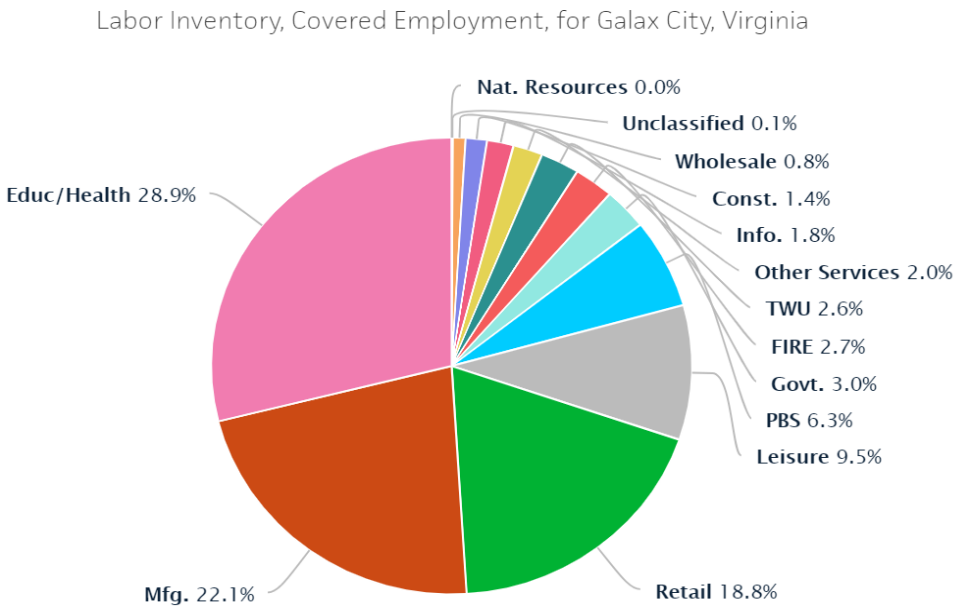


Table 2.4 shows a breakdown of social distribution for the City of Galax in comparison to the surrounding areas, as well as the state of Virginia.

Table 2.4

	Galax	SWVA Nonmetro*	VA	Galax	SWVA Nonmetro*	VA
Social						
Poverty Level (of all people)	23.8%	19.7%	10.6%	1,490	70,750	865,691
Households Receiving Food Stamps/SNAP	19.2%	17.0%	8.2%	510	25,578	259,639
Enrolled in Grade 12 (% of the total population)	0.4%	1.0%	1.4%	25	3,756	114,768
Disconnected Youth[3]	0.0%	2.1%	1.5%	0	325	6,725
Children in Single-Parent Families (% of all children)	38.8%	38.4%	31.0%	529	24,949	549,076
Uninsured	16.2%	10.4%	8.6%	1,019	37,613	707,960
With a Disability, Age 18-64	23.2%	20.6%	9.5%	838	43,473	486,156
With a Disability, Age 18-64, Labor Force Participation Rate and Size	37.4%	25.7%	45.0%	313	11,171	218,843
Foreign Born	6.5%	1.6%	12.4%	426	6,039	1,051,559
Speak English Less Than Very Well (population 5 yrs and over)	4.9%	1.0%	5.9%	304	3,484	471,645

**Non-Metro SWVA refers to Bland County, Russell County, Buchanan County, Smyth County, Carroll County, Tazewell County, Dickenson County, Wise County, Grayson County, Wythe County, Henry County, Lee County, Martinsville City, Patrick County, Norton City*

Compared to the rest of the state and other communities throughout Southwest Virginia, Galax has a significantly higher poverty level as well as a slightly higher percentage of households that receive food stamps/SNAP. There is also a six percent higher rate of uninsured individuals throughout the city when compared to the rest of the surrounding region and that number rises when compared to the rest of the state.

Cost of Living Index

The Cost-of-Living Index estimates the relative price levels for consumer goods and services. When applied to wages and salaries, the result is a measure of relative purchasing power. The cost of living is 14.4% lower in Galax City, Virginia than the U.S. average.

Table 2.5
Cost of Living Information

	Annual Average Salary	Cost of Living Index (Base US)	US Purchasing Power
Galax City, Virginia	$32,841	85.6	$38,361
Southwest Virginia nonmetropolitan area	$35,588	85.4	$41,656
Virginia	$61,837	115.4	$53,598
USA	$60,761	100.0	$60,761

Source: JobsEQ®

Data as of 2020Q4

Cost of Living per C2ER, data as of 2020q4, imputed by Chmura where necessary.

As with many of the communities throughout Southwest Virginia, the residents of the City of Galax experience a much lower cost of living which in turn allows for the population to have more spending power despite having significantly lower average annual salaries. The lower cost of living within the region should be promoted as a recruiting tactic to bring more employers to the region as well as a way to recruit remote workers to the area.

Skill Gaps

As illustrated in the chart below, there is a significant gap in the trained candidates for specific jobs with specialized and required skills. There is an increasing number of specialized jobs that require more training and education than is currently available in potential job applicants. This information displays that there is a significant gap between the employers and the candidates applying for more highly specialized jobs. Moving forward, it will be a necessity to continue to develop and attract a workforce that has the education and training that will allow these sectors to fill vacant positions as well as facilitate future growth opportunities.

Table 2.6

Skill Gaps: Galax City, Virginia

Skill	CANDIDATES #	OPENINGS #	GAP #
Caregiving	4	8	-4
Patient Care	2	6	-4
Bilingual	1	5	-4
Personal Computers (PC)	7	10	-3
Medication Administration	4	7	-3
Spanish	5	8	-3
Lead Generation	0	3	-3
Woodworking	3	5	-2
Hospitality	3	6	-2
Electronic Medical Record System (EMR System)	1	3	-2
Licensed Professional Counselor (LPC)	3	1	2
Keyboarding/Typing	13	11	2
Serving	4	2	2
Certified Nursing Assistant (CNA)	15	12	2
First Aid Certification	6	4	3
Calculators	7	5	3
Licensed Practical Nurse (LPN)	8	4	4
Cash Registers	13	8	4
Certification in Cardiopulmonary Resuscitation (CPR)	15	8	7
Cash Handling (Cashier)	30	17	13

Source: JobsEQ®
Data as of 2021Q1; openings and candidate sample compiled in January 2021.
Note: Figures may not sum due to rounding.

Chapter 3: Housing

Introduction

The City of Galax has 3,327 total housing units. There has been a slight decline in housing over the last 5 years, with a reduction of approximately 200 housing units. As with many of the other communities in Southwest Virginia, limited housing resources have become a challenge in the City. An adequate supply of proper housing for an aging population as well as meeting the needs of those currently in the workforce is necessary for the City of Galax to remain sustainable.

Housing Overview

The City of Galax is very comparable to the rest of the region in terms of median home value but is well below that of the state as a whole. This allows those with the goal of owning a home in the area the opportunity to achieve that goal within the City of Galax. A lower median home value than that of the rest of the state allows people of all income brackets the opportunity to participate in homeownership within the limits of Galax.

Moving forward, the City of Galax should continue to focus on providing high-quality, affordable housing to present an attractive environment for new businesses as well as the retention and growth of current businesses. With the opportunity for residents to find quality, affordable housing, there will likely be an increasing number of new long-term residents in the area.

Table 3.1 shows a breakdown of various current housing characteristics for Galax and the surrounding area:

Table 3.1
Housing Characteristics

	Galax City, Virginia	Southwest Virginia nonmetropolitan area	Virginia	Galax City, Virginia	Southwest Virginia nonmetropolitan area	Virginia
Total Housing Units	–	–	–	3,327	191,016	3,514,032
Median House Value (of owner-occupied units)[2]	–	–	–	$96,600	$98,775	$273,100
Homeowner Vacancy	6.2%	2.4%	1.5%	120	2,743	31,732
Rental Vacancy	15.2%	9.1%	5.4%	152	4,073	62,285
Renter-Occupied Housing Units (% of Occupied Units)	31.9%	26.6%	33.7%	849	40,073	1,063,334
Occupied Housing Units with No Vehicle Available (% of Occupied Units)	15.6%	7.9%	6.1%	415	11,829	192,193

The City of Galax has experienced a much higher rate of homeowner vacancy when compared to the surrounding communities, as well as the state. Galax also sees a higher average number of rental vacancies and housing units occupied with no access to a vehicle. The lack of personal transportation as seen by this group hinders them from moving throughout the region and limits their ability to be an involved community member. Providing quality public transportation will be

key to ensuring that residents without transportation have the ability to get around the city efficiently.

Historical Housing Information

The chart below shows housing information starting in 2010 carrying forward until 2019. In 2011 there was a large 300-unit jump in total housing units but since that point, there has been a steady decline leading to today's numbers. The median home value hit a peak in 2013 following the real estate crash that occurred in 2008; since then, values have seen a slight decrease to the current day market.

Table 3.2 shows the housing trends within the City of Galax from 2010 to 2019 :

Table 3.2
Housing Trends

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Housing																				
Total Housing Units	–	–	–	–	–	–	–	–	–	–	3,639	3,940	3,836	3,560	3,559	3,514	3,404	3,484	3,367	3,327
Median House Value (of owner-occupied units)[2]	–	–	–	–	–	–	–	–	–	–	$90,600	$91,700	$107,000	$112,900	$108,300	$91,000	$101,600	$105,500	$101,100	$96,600
Homeowner Vacancy	0.0%	0.0%	0.0%	1.4%	3.0%	3.1%	8.9%	9.3%	7.7%	6.2%	0	0	0	28	55	57	159	172	150	120
Rental Vacancy	11.6%	13.1%	13.4%	15.5%	10.9%	12.5%	13.5%	15.0%	13.9%	15.2%	160	196	184	197	152	173	190	209	152	152
Renter-Occupied Housing Units (% of Occupied Units)	36.7%	36.8%	35.4%	34.9%	40.8%	40.4%	43.5%	41.0%	34.4%	31.9%	1,221	1,298	1,186	1,053	1,211	1,196	1,203	1,163	943	849
Occupied Housing Units with No Vehicle Available (% of Occupied Units)	11.8%	10.4%	11.5%	13.3%	13.6%	17.7%	17.4%	15.3%	13.0%	15.6%	391	365	386	402	405	525	481	433	357	415

Current Housing Programs

Rooftop of Virginia, a private, non-profit organization with the goal of eliminating "poverty in the midst of plenty in this nation by offering to everyone the opportunity for education and training, the opportunity to work, the opportunity to live in decency and dignity." Rooftop manages several housing-related programs that serve low-income families, including Indoor Plumbing Rehabilitation, Emergency Home Repair, Section 8 Rental Assistance Program, and a Weatherization program.

Programs such as this combined with a mindset to eliminate the blight within city limits will provide an opportunity for the revitalization of Galax's more troubled areas. Continuing to partner with groups to aid in this process will be critical moving forward as Galax grows and continues to look forward as a community.

Housing Unit Breakdown

The chart below identifies that the dispersion of housing types has remained constant over the last five years throughout the City of Galax. As with a majority of communities throughout Southwest Virginia, the most prevalent housing type is a single-family residence, labeled as 1-unit Detached above. A large majority of single-family homes within a community can be a positive attribute when trying to attract long-term residents to the city.

Table 3.3
Housing Unit Type

	Galax city, Virginia	
Label	**2015-2019 Estimates**	**2010-2014 Estimates**
⌄ UNITS IN STRUCTURE		
⌄ Total housing units	3,327	3,559
1-unit, detached	70.1%	69.2%
1-unit, attached	0.4%	0.9%
2 units	9.3%	3.1%
3 or 4 units	1.4%	3.8%
5 to 9 units	3.9%	2.3%
10 to 19 units	4.8%	7.1%
20 or more units	1.3%	4.0%
Mobile home	8.7%	9.6%
Boat, RV, van, etc.	0.0%	0.0%

The percentage of 2-Unit buildings has nearly tripled in the most recent five-year grouping, growing from 3.1% to 9.3% in 2019. This number may be an indicator of an upward shift in demand for rentals in the City of Galax as opposed to the traditional single-family detached home. The remainder of the multi-family property types has remained relatively stable throughout the last 5-year reporting period.

Real Estate Taxes

As of July 1, 2020, the real estate tax rate for property owners in the City of Galax is 92¢ per $100 based on a 100% assessment of the real estate value. As of July 2021, the City of Galax released its list of delinquent real estate taxes and it totaled more than $277,000. Communities

must collect on these debts as these dollars are critical to the function of city government and the ability to provide quality services to residents and visitors alike.

Retention of Residents

The chart below shows the percentage of the population and when they moved into the current unit that they are living in. As represented below, many of the households became filled and have remained so since the year 2000. This is a good indication of Galax's ability to retain long-term residents. Throughout the most recent years, there has been a strong increase of individuals finding a home to purchase or rent and remaining in that location for several years.

Table 3.4
Resident Tenure

Label	2015-2019 Estimates	2010-2014 Estimates
YEAR HOUSEHOLDER MOVED INTO UNIT		
Occupied housing units	2,663	2,968
Moved in 2017 or later	7.8%	(X)
Moved in 2015 to 2016	10.2%	(X)
Moved in 2010 to 2014	25.9%	24.8%
Moved in 2000 to 2009	28.1%	38.4%
Moved in 1990 to 1999	14.1%	12.4%
Moved in 1989 and earlier	13.9%	24.4%

Rental Costs

Throughout the last ten years, Galax has been able to retain a very affordable rental market for those within the city limits that are looking to rent. The median monthly rental rate is $574, and there has been an increase in the percentage of units that fall between $500-$999 which should result in an upward shift in of the median monthly rental rate. However, there has been a shrinking supply of units in the rental market with rates ranging from $1,000-$1,499.

Table 3.5 shows the gross rent paid to the landlord, not including utilities (unless included by the landlord in the rent payment):

Table 3.5
Gross Rent

Label	2015-2019 Estimates	2010-2014 Estimates
GROSS RENT		
Occupied units paying rent	792	1,112
Less than $500	27.8%	41.1%
$500 to $999	65.2%	51.5%
$1,000 to $1,499	4.8%	6.4%
$1,500 to $1,999	1.1%	1.0%
$2,000 to $2,499	0.0%	0.0%
$2,500 to $2,999	1.1%	0.0%
$3,000 or more	0.0%	0.0%
Median (dollars)	574	574
No rent paid	57	99

There has also been a shrinking in the number of unpaid rents on a monthly basis. Throughout 2020 there were many efforts made to ensure that property owners had an opportunity to receive partial rental payment during the COVID-19 pandemic; these programs often resulted in assistance but in some instances were unable to provide a solution to those in need.

Mortgage Creation and Payoff

Table 3.6
Homeowner Mortgage Status

Label	2015-2019 Estimates	2010-2014 Estimates
MORTGAGE STATUS		
Owner-occupied units	1,814	1,757
Housing units with a mortgage	52.1%	51.6%
Housing units without a mortgage	47.9%	48.4%

In the last two years, there has been a decrease in interest rates for mortgages throughout the country. This has created an environment where many people are seeking homeownership for the first time, selling their current home to upgrade, or refinancing to get a lower interest rate. This period of time has proven to create a competitive real estate market and the above data shows that there was an increase in housing units with a mortgage.

The most recent data that is available only goes up to 2019, but it is believed that those numbers will have continued to trend towards more mortgages being created than paid off. This is a positive sign for cities that are looking to increase the number of long-term residents.

Age of Homes

Based on the data below there was a very steady distribution of homes being built until 2009. Since 2009, only 1.2% of the current housing units were built, with over 62% of the housing units being built over 42 years ago it will be imperative for Galax to focus on keeping these homes updated and not allowing them to fall into disrepair and become a blight to the city. To ensure a well-maintained and safe housing stock in the city, Galax adopted part three of the Virginia Uniform Statewide Building Code (“USBC”). This portion of the USBC is the Virginia Property Maintenance Code. Galax code officials are working closely with the police department and the department of social services to work toward identifying and addressing serious housing and blight issues.

Table 3.7
Year of Construction

Label	2015-2019 Estimates	2010-2014 Estimates
YEAR STRUCTURE BUILT		
Total housing units	3,327	3,559
Built 2014 or later	0.2%	(X)
Built 2010 to 2013	1.0%	(X)
Built 2000 to 2009	10.4%	5.5%
Built 1990 to 1999	14.8%	11.5%
Built 1980 to 1989	10.9%	13.3%
Built 1970 to 1979	18.1%	22.7%
Built 1960 to 1969	12.4%	11.6%
Built 1950 to 1959	11.5%	15.9%
Built 1940 to 1949	9.7%	11.4%
Built 1939 or earlier	10.9%	7.4%

Housing Affordability

As much of the country is facing increasing home costs and a restriction of housing inventory that makes becoming a homeowner more difficult than it has ever been. Galax has the benefit of being located in a region where individuals can often find affordable homes and in high-quality locations. In the chart above, find the distribution of the percent of homes, many of these homes are located in a price point where the average family has the ability to achieve homeownership.

Table 3.8
Property Value

Label	2015-2019 Estimates	2010-2014 Estimates
VALUE		
Owner-occupied units	1,814	1,757
Less than $50,000	15.3%	21.3%
$50,000 to $99,999	35.2%	23.4%
$100,000 to $149,999	23.5%	23.9%
$150,000 to $199,999	8.6%	16.8%
$200,000 to $299,999	12.0%	8.8%
$300,000 to $499,999	3.7%	4.6%
$500,000 to $999,999	1.5%	0.4%
$1,000,000 or more	0.0%	0.7%
Median (dollars)	96,600	108,300

Chapter 4: Economy

Introduction

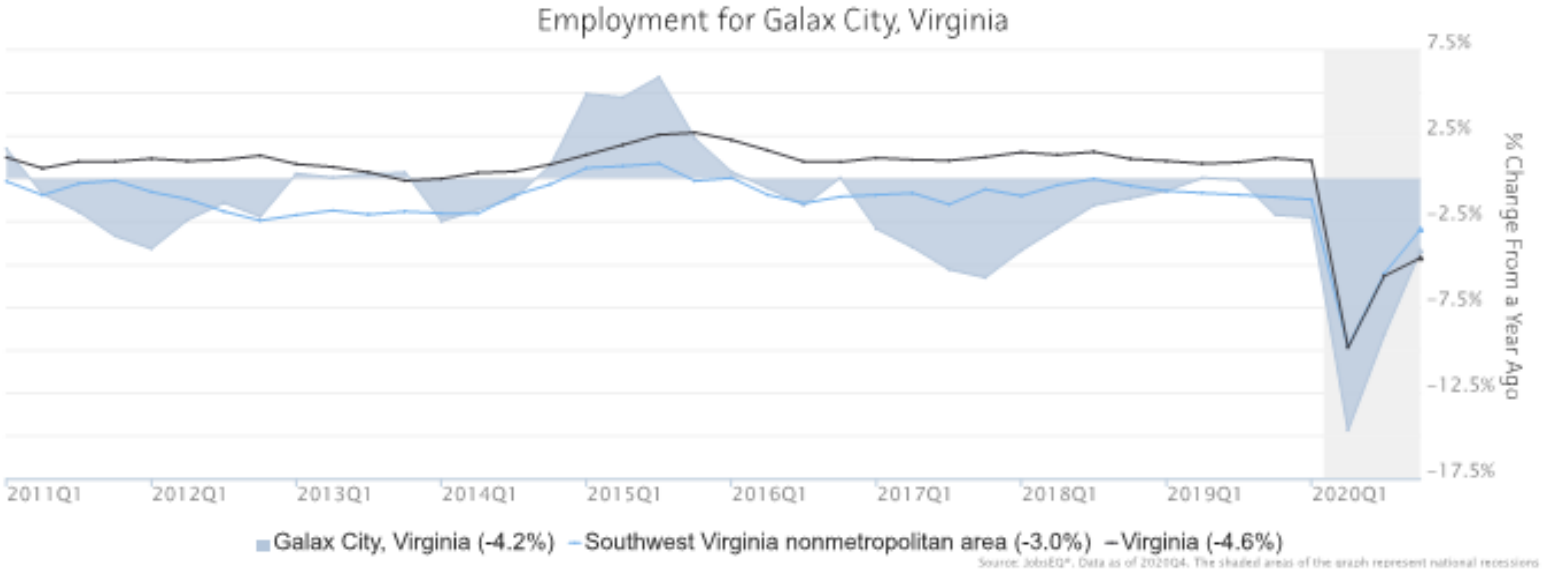
The City of Galax, Virginia has a unique and diverse economic profile that allows the city to appeal to many industries and provides employment opportunities to its residents. This chapter details statistical data and information pertaining to the City of Galax, including employment and unemployment trends, wage trends, and cost of living indexes. This information is essential to illustrate and understand the trends of the past, while also helping to determine how Galax can best position itself to improve its economic outlook moving forward.

Employment Trends

As of 2020 Q4, total employment for Galax City, Virginia was 5,543 (based on a four-quarter moving average). Over the year ending 2020 Q4, employment declined 4.2% in the region. With a total population of 6,517, it is apparent that the City of Galax is an economic engine for the region as it draws employees from the surrounding area into the city.

Employment data is derived from the Quarterly Census of Employment and Wages, provided by the Bureau of Labor Statistics and imputed where necessary. Data was updated through 2020 Q3 with preliminary estimates updated to 2020 Q4.

Graph 4.1

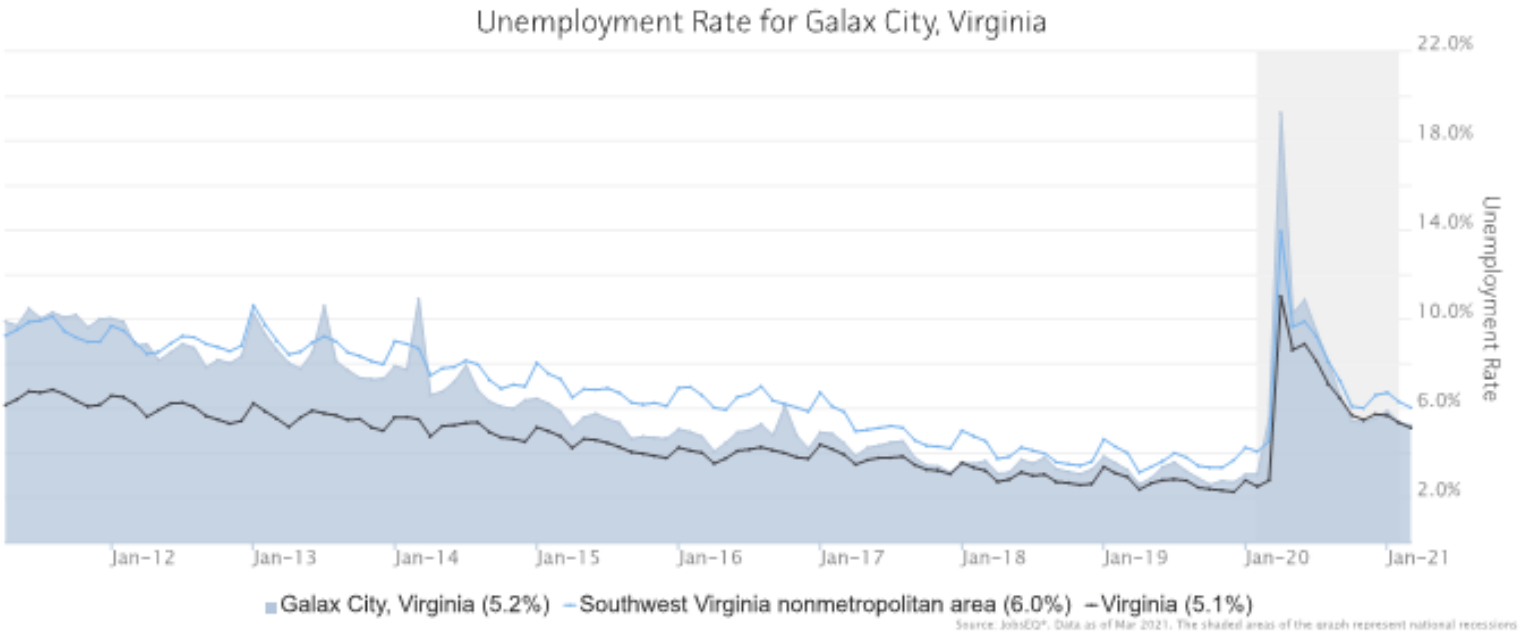


Unemployment Rate

The unemployment rate for Galax City, Virginia was 5.2% as of March 2021. The regional unemployment rate was lower than the national rate of 6.2%. One year earlier, in March 2020, the unemployment rate in Galax City, Virginia was 5.5%.

Unemployment rate data are from the Local Area Unemployment Statistics, provided by the Bureau of Labor Statistics and updated through March 2021.

Graph 4.2



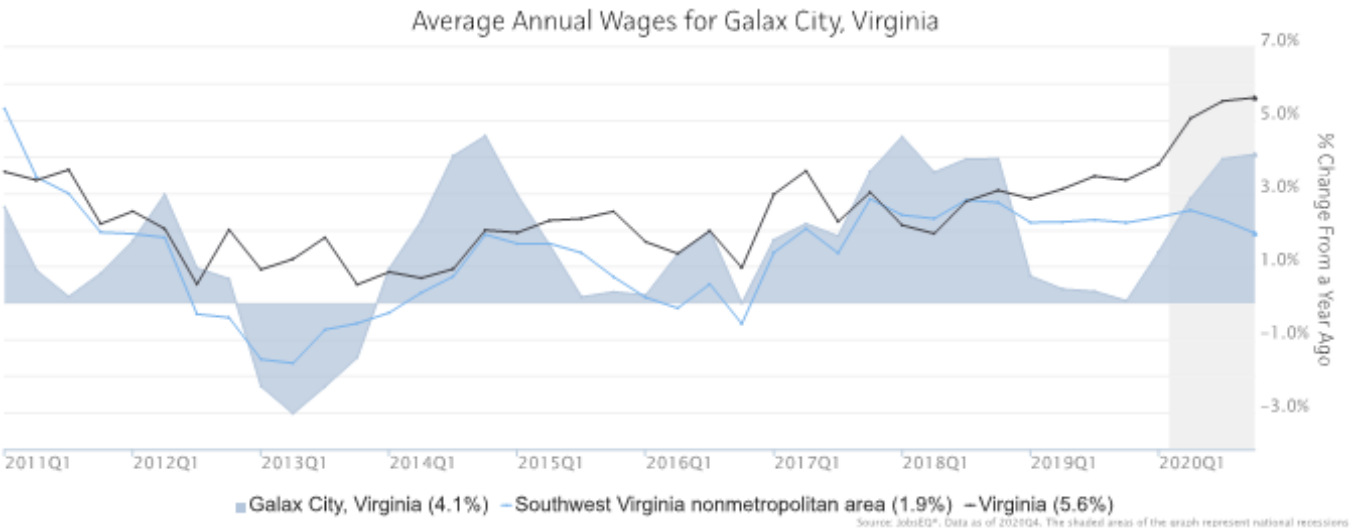
Wage Trends

The average worker in Galax City, Virginia earned annual wages of $32,841 as of 2020Q4. Average annual wages per worker increased 4.1% in the region over the preceding four quarters. For comparison purposes, annual average wages were $60,761 in the nation as of 2020Q4.

Annual average wages per worker data are derived from the Quarterly Census of Employment and Wages, provided by the Bureau of Labor Statistics and imputed where necessary. Data are updated through 2020Q3 with preliminary estimates updated to 2020Q4.

One wage trend that will have a major effect on the local economy is the increase of the State minimum wage. The minimum wage is established by the Code of Virginia § 40.1-28.10. The law establishes $9.50 per hour as the minimum wage effective May 1, 2021. The minimum wage is scheduled to increase to $11.00 per hour on January 1, 2022, with another increase scheduled on January 1, 2023, to $12.00 per hour. There may be additional increases on January 1, 2025, and annually thereafter if passed by the General Assembly.

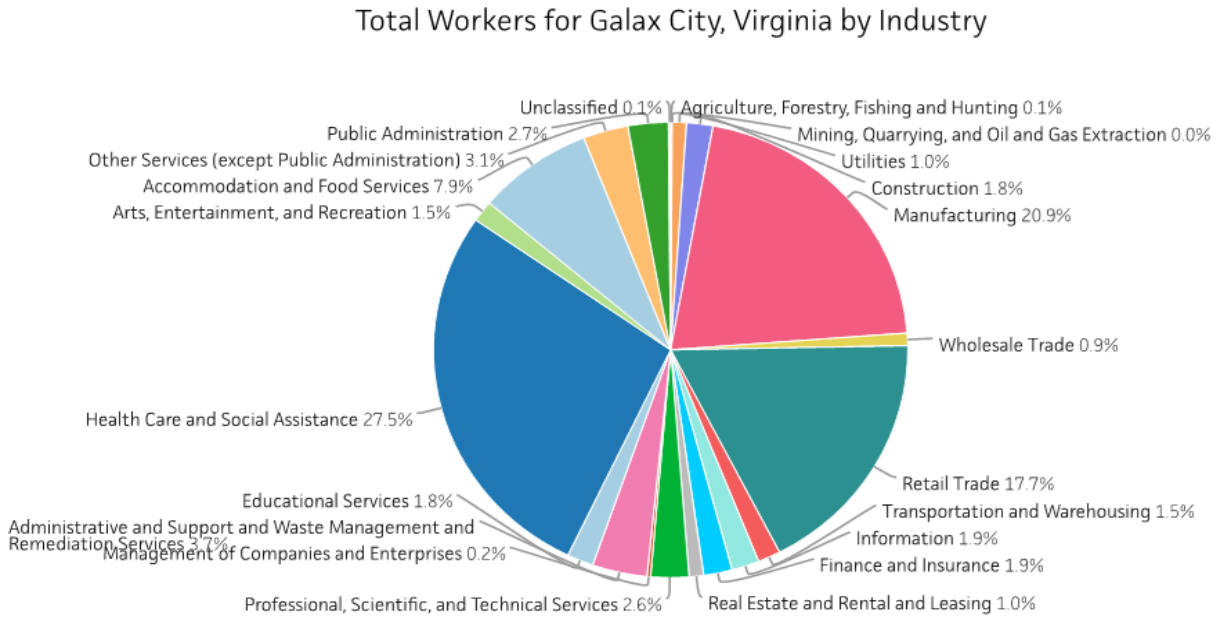
Graph 4.3



Industry Snapshot

The largest sector in Galax City, Virginia is Health Care and Social Assistance, employing 1,527 workers. The next-largest sectors in the region are Manufacturing (1,161 workers) and Retail Trade (981). High location quotients (LQs) indicate sectors in which a region has high concentrations of employment compared to the national average. The sectors with the largest LQs in the region are Manufacturing (LQ = 2.53), Health Care and Social Assistance (1.85), and Utilities (1.80).

Chart 4.4



Employment data are derived from the Quarterly Census of Employment and Wages, provided by the Bureau of Labor Statistics and imputed where necessary. Data are updated through 2020Q3 with preliminary estimates updated to 2020Q4.

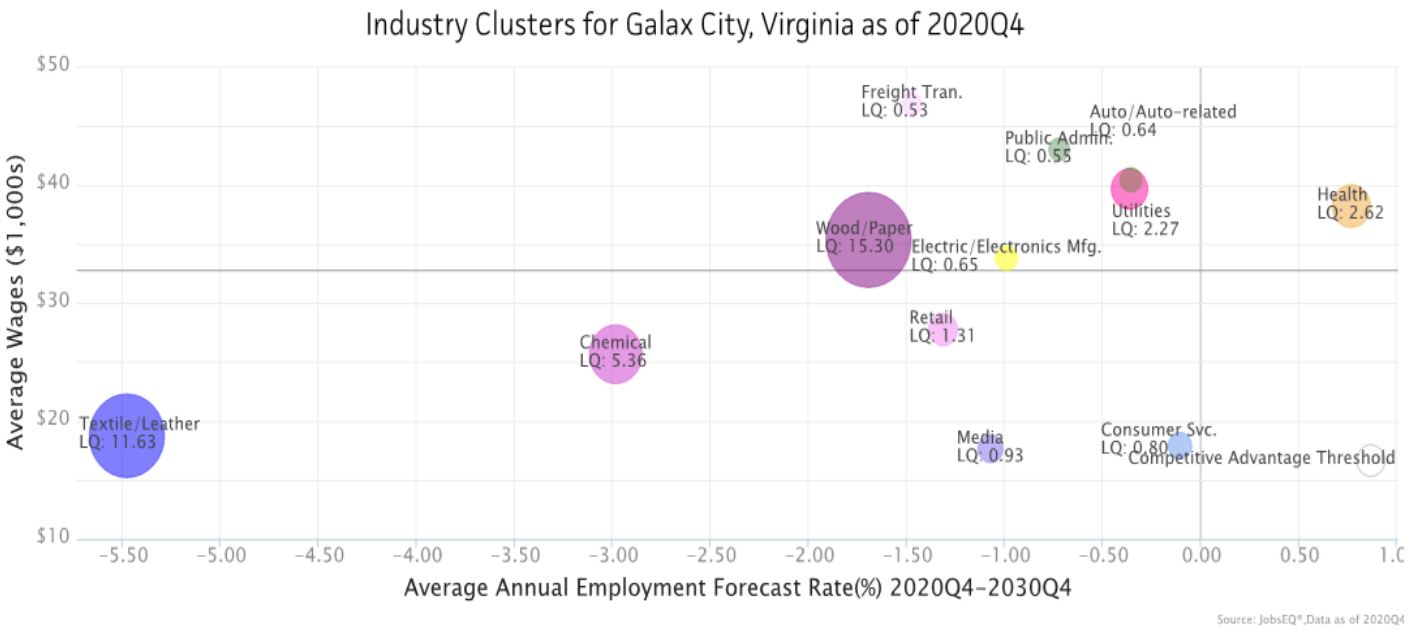
Sectors in Galax City, Virginia with the highest average wages per worker are Management of Companies and Enterprises ($66,103), Wholesale Trade ($53,433), and Professional, Scientific, and Technical Services ($49,719). Regional sectors with the best job growth (or most moderate job losses) over the last 5 years are Wholesale Trade (+5 jobs), Real Estate and Rental and Leasing (-4), and Public Administration (-5).

Over the next 5 years, employment in Galax City, Virginia is projected to contract by 168 jobs. The fastest-growing sector in the region is expected to be Health Care and Social Assistance with a +0.8% year-over-year rate of growth. The strongest forecast by number of jobs over this period is expected for Health Care and Social Assistance (+60 jobs), Administrative and Support and Waste Management and Remediation Services (+2), and Arts, Entertainment, and Recreation (+2).

Industry Clusters

A cluster is a geographic concentration of interrelated industries or occupations. The industry cluster in Galax City, Virginia with the highest relative concentration is Wood/Paper with a location quotient of 15.30. This cluster employs 688 workers in the region with an average wage of $35,364. Employment in the Wood/Paper cluster is projected to contract in the region about 1.7 % per year over the next ten years.

Diagram 4.5



Location quotient and average wage data are derived from the Quarterly Census of Employment and Wages, provided by the Bureau of Labor Statistics, imputed where necessary, and updated through 2020Q3 with preliminary estimates updated to 2020Q4. Forecast employment growth uses national projections from the Bureau of Labor Statistics adapted for regional growth patterns.

Detailed North American Industry Classification System Breakdown

Table 4.6

NAICS	Industry	Current Empl	Current Avg Ann Wages	Current LQ	5-Year History Empl Change	5-Year History Ann %	5-Year Forecast Total Demand	5-Year Forecast Exits	5-Year Forecast Transfers	5-Year Forecast Empl Growth	5-Year Forecast Ann % Growth
62	Health Care and Social Assistance	1,527	$38,170	1.85	-20	-0.3%	791	359	372	60	0.8%
31	Manufacturing	1,161	$33,721	2.53	-300	-4.5%	439	211	360	-132	-2.4%
44	Retail Trade	981	$25,853	1.71	-61	-1.2%	571	280	354	-63	-1.3%
72	Accommodation and Food Services	436	$15,434	1.03	-123	-4.8%	348	155	196	-3	-0.1%
56	Administrative and Support and Waste Management and Remediation Services	207	$25,162	0.60	-191	-12.2%	122	51	69	2	0.2%
81	Other Services (except Public Administration)	170	$29,028	0.71	-27	-2.9%	93	44	52	-3	-0.4%
92	Public Administration	152	$37,732	0.55	-5	-0.6%	63	29	39	-5	-0.7%
54	Professional, Scientific, and Technical Services	144	$49,719	0.37	-27	-3.4%	60	23	38	-1	-0.1%
52	Finance and Insurance	107	$42,713	0.46	-14	-2.4%	44	19	30	-5	-0.9%
51	Information	105	$33,610	0.95	-35	-5.6%	41	18	31	-7	-1.5%
23	Construction	100	$29,585	0.31	-16	-2.9%	46	17	31	-3	-0.6%
61	Educational Services	99	$31,405	0.22	-11	-2.1%	40	22	23	-5	-1.1%
48	Transportation and Warehousing	85	$46,688	0.32	-71	-11.4%	38	19	25	-6	-1.5%
71	Arts, Entertainment, and Recreation	83	$16,605	0.92	-47	-8.6%	61	26	33	2	0.6%
53	Real Estate and Rental and Leasing	55	$38,697	0.56	-4	-1.4%	24	12	15	-3	-1.2%
22	Utilities	54	$40,673	1.80	-6	-2.3%	23	9	15	-1	-0.4%
42	Wholesale Trade	49	$53,433	0.23	5	2.3%	22	9	16	-3	-1.2%
55	Management of Companies and Enterprises	13	$66,103	0.15	-14	-13.7%	6	2	4	0	-0.3%
99	Unclassified	8	$28,284	1.47	7	67.4%	4	2	2	0	-0.6%
11	Agriculture, Forestry, Fishing and Hunting	6	$14,100	0.08	-11	-18.8%	2	1	2	-1	-2.0%
	Total - All Industries	**5,543**	**$32,841**	**1.00**	**-970**	**-3.2%**	**2,805**	**1,271**	**1,702**	**-168**	**-0.6%**

Source: JobsEQ®

Employment data are derived from the Quarterly Census of Employment and Wages, provided by the Bureau of Labor Statistics and imputed where necessary. Data are updated through 2020Q3 with preliminary estimates updated to 2020Q4. Forecast employment growth uses national projections adapted for regional growth patterns.

Occupation Snapshot

The largest major occupation group in Galax City, Virginia is Sales and Related Occupations, employing 719 workers. The next-largest occupation groups in the region are Production Occupations and Office and Administrative Support Occupations. High location quotients (LQs) indicate occupation groups in which a region has high concentrations of employment compared to the national average. The major groups with the largest LQs in the region are Production Occupations, Healthcare Support Occupations, and Community and Social Service Occupations.

Occupation groups in Galax City, Virginia with the highest average wages per worker are Management Occupations ($89,700), Healthcare Practitioners and Technical Occupations ($76,100), and Computer and Mathematical Occupations ($73,900). The unemployment rate in the region varied among the major groups from 2.2% among Community and Social Service Occupations to 14.5% among Food Preparation and Serving Related Occupations.

Over the next 5 years, the fastest-growing occupation group in Galax City, Virginia is expected to be Community and Social Service Occupations with a +1.9% year-over-year rate of growth. The strongest forecast by the number of jobs over this period is expected for Healthcare Support Occupations and Community and Social Service Occupations. Over the same period, the highest separation demand (occupation demand due to retirements and workers moving from one occupation to another) is expected in Sales and Related Occupations and Food Preparation and Serving Related Occupations.

Table 4.7

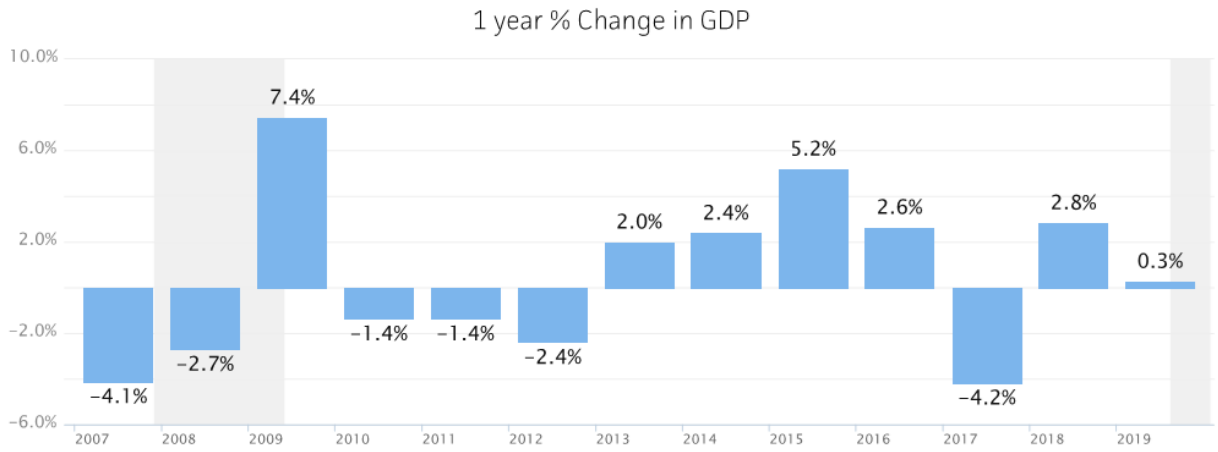
Galax City, Virginia, 2020Q4[1]

		Current						5-Year History		5-Year Forecast				
SOC	Occupation	Empl	Mean Ann Wages[2]	LQ	Unempl	Unempl Rate	Online Job Ads[3]	Empl Change	Ann %	Total Demand	Exits	Transfers	Empl Growth	Ann % Growth
41-0000	Sales and Related	719	$30,900	1.34	26	8.7%	66	-105	-2.7%	460	207	300	-47	-1.3%
51-0000	Production	710	$30,100	2.18	22	7.3%	15	-213	-5.1%	289	136	231	-78	-2.3%
43-0000	Office and Administrative Support	700	$30,600	0.98	17	5.7%	16	-259	-6.1%	350	161	227	-39	-1.1%
31-0000	Healthcare Support	530	$23,100	2.13	11	5.2%	16	87	3.7%	363	162	175	25	0.9%
29-0000	Healthcare Practitioners and Technical	462	$76,100	1.42	5	2.7%	112	-24	-1.0%	140	60	72	8	0.4%
35-0000	Food Preparation and Serving Related	458	$21,700	1.10	35	14.5%	34	-109	-4.2%	389	160	232	-3	-0.1%
53-0000	Transportation and Material Moving	455	$30,600	0.97	17	8.3%	45	-88	-3.5%	242	99	172	-28	-1.3%
11-0000	Management	206	$89,700	0.56	4	3.0%	14	-34	-3.0%	81	24	60	-3	-0.3%
13-0000	Business and Financial Operations	188	$57,300	0.60	3	3.7%	5	-40	-3.7%	85	25	63	-4	-0.4%
49-0000	Installation, Maintenance, and Repair	188	$39,800	0.88	6	5.6%	8	-26	-2.5%	80	28	60	-8	-0.9%
21-0000	Community and Social Service	163	$37,500	1.67	1	2.2%	33	-41	-4.4%	111	31	64	17	1.9%
39-0000	Personal Care and Service	161	$28,600	1.13	12	13.5%	4	-24	-2.8%	127	54	71	2	0.3%
47-0000	Construction and Extraction	131	$37,400	0.50	13	8.4%	3	-31	-4.1%	63	20	48	-6	-0.9%
25-0000	Educational Instruction and Library	103	$40,100	0.33	5	6.8%	7	-8	-1.5%	45	22	25	-2	-0.4%
37-0000	Building and Grounds Cleaning and Maintenance	82	$23,400	0.45	7	8.3%	9	-15	-3.3%	52	23	30	-1	-0.2%
15-0000	Computer and Mathematical	76	$73,900	0.44	1	2.7%	1	-21	-4.8%	28	6	22	0	-0.1%
17-0000	Architecture and Engineering	60	$66,900	0.62	1	4.3%	2	-1	-0.5%	20	7	16	-3	-1.1%

Gross Domestic Product

Gross Domestic Product (GDP) is the total value of goods and services produced by a region. In 2019, nominal GDP in Galax City, Virginia expanded by 0.3%. This follows a growth of 2.8% in 2018. As of 2019, the total GDP in Galax City, Virginia was $367,864,000.

Graph 4.8



Gross Domestic Product data are provided by the Bureau of Economic Analysis, imputed by Chmura where necessary, updated through 2019.

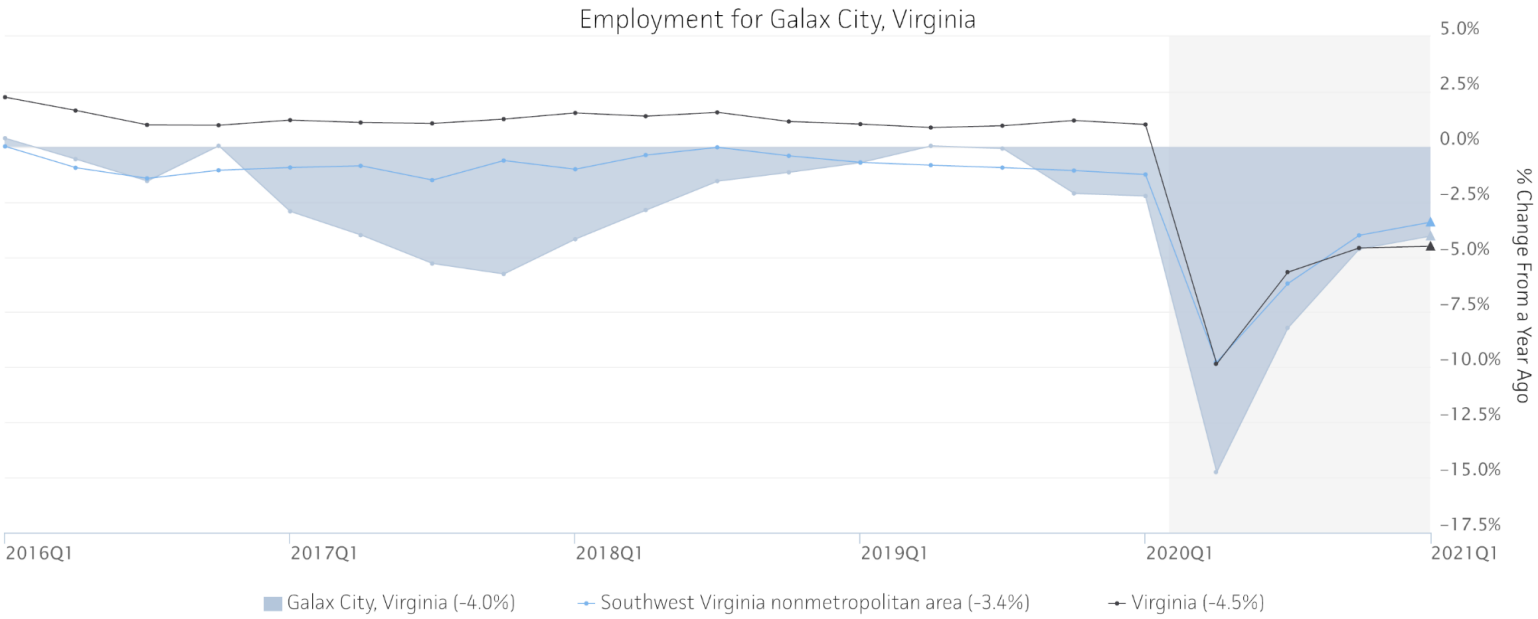
Of the sectors in Galax City, Virginia, Health Care and Social Assistance contributed the largest portion of GDP in 2019, $90,040,000 The next-largest contributions came from Manufacturing ($89,900,000); Retail Trade ($50,558,000); and Real Estate and Rental and Leasing ($35,840,000).

Graph 4.9

Gross Domestic Product data are provided by the Bureau of Economic Analysis, imputed by Chmura where necessary, updated through 2019.

Labor and Wage Trends

Graph 4.10



Source: JobsEQ®. Data as of 2021Q1. The shaded areas of the graph represent national recessions.

Over the last five years, in terms of long-term high-paying employment, there has been a stable labor and wage trend throughout the City of Galax, aside from a slight dip from 2017-2018 as seen in the above graph. The state of Virginia and surrounding nonmetropolitan areas in Southwest Virginia followed the same patterns. As of 2020, during the COVID-19 Pandemic, there was a steep decline in labor and wages. The City of Galax, based on data, was impacted approximately five percent more than the surrounding areas and relative to the state.

Regional Commuter Workforce

Table 4.11

	PERCENT			VALUE		
	Galax City, Virginia	Southwest Virginia nonmetropolitan area	Virginia	Galax City, Virginia	Southwest Virginia nonmetropolitan area	Virginia
Commuting						
Total Employed Population	–	–	–	2,443	125,811	3,876,497
Worked in Region of Residence	43.8%	77.0%	91.2%	1,069	96,921	3,533,908
Worked Outside Region of Residence	56.2%	23.0%	8.8%	1,374	28,890	342,589
Worked in State of Residence	93.2%	90.5%	91.2%	2,276	113,865	3,533,908
Worked Outside State of Residence	6.8%	9.5%	8.8%	167	11,946	342,589
In-Commuters	–	–	–	4,422	26,384	286,482
Out-of-State In-Commuters	–	–	–	434	10,028	286,482
Net Commuting	–	–	–	3,048	-2,506	-56,107

The City of Galax has a 43.8% retention rate of their workforce finding employment opportunities within the city. There are 56.2% that work outside of the region and 6.8% that travel outside the state. This information is important because these numbers can be used as a benchmark moving forward and the city can work towards retaining more of the available talent to the region by recruiting and retaining higher-paying opportunities for those that are currently seeking employment elsewhere.

Table 4.12

Union Membership	Galax City, Virginia	Southwest Virginia nonmetropolitan area	Virginia
Total[4]	3.0%	3.2%	4.1%
Private Sector[4]	2.8%	2.9%	2.8%
Manufacturing[4]	7.8%	7.7%	7.8%
Public Sector[4]	4.4%	4.1%	9.9%

Galax City, Virginia Industry Characteristics

Table 4.13

Galax City, Virginia

NAICS	Industry	Employment	AVERAGE PER QUARTER			AVERAGE ANNUAL EARNINGS	
			New Hires	Separations	Turnover	Stable Jobs	New Stable Jobs
22	Utilities	n/a	n/a	n/a	n/a	n/a	n/a
23	Construction	80	15	17	14.6%	$35,998	$44,991
31	Manufacturing	1,305	175	222	7.7%	$29,029	$20,079
42	Wholesale Trade	45	4	2	0.0%	$52,720	$43,721
44	Retail Trade	941	149	156	9.8%	$30,110	$20,109
48	Transportation and Warehousing	87	11	13	10.8%	$44,005	$45,893
51	Information	124	12	18	8.0%	$34,439	$28,429
52	Finance and Insurance	111	8	8	4.9%	$55,297	$38,788
53	Real Estate and Rental and Leasing	47	3	4	9.8%	$49,531	$33,439
54	Professional, Scientific, and Technical Services	140	23	28	6.9%	$39,833	$19,117
55	Management of Companies and Enterprises	n/a	n/a	n/a	n/a	n/a	n/a
56	Administrative and Support and Waste Management and Remediation Services	201	111	130	26.1%	$24,481	$22,516
61	Educational Services	n/a	n/a	n/a	n/a	n/a	n/a
62	Health Care and Social Assistance	1,651	178	214	8.3%	$38,810	$28,475
71	Arts, Entertainment, and Recreation	n/a	n/a	n/a	n/a	n/a	n/a
72	Accommodation and Food Services	493	167	197	16.4%	$15,927	$11,936
81	Other Services (except Public Administration)	117	6	13	6.4%	$30,980	$14,537
92	Public Administration	155	12	16	6.2%	$32,274	$20,898
	Total - All Industries[1]	5,783	955	1,156	9.6%	$32,746	$22,744

Source: JobsEQ®
Data are for the four quarters ending 2020Q1
Note: Figures may not sum due to rounding. Demographic details for NAICS 4851, 4911, 485 and 491 may be severely distorted due to limited source data availability.
1. Total industry figures don't reflect employment in unclassified industries (NAICS 9999).

As illustrated in the above table, the City of Galax has many industries that face significant turnover quarter to quarter. On top of significant turnover, many of these industries do not offer competitive pay as the data above shows based on the average annual earnings reporting. The city should begin to work toward stabilizing the workforce and raising the wages of these more troubled industries within the city limits. Doing so would allow for a stronger economic outlook for the city and bring in more long-term, younger residents. Some of the more stable and higher-paying industries are the wholesale trade, construction, finance, and insurance industries. Telework is also an industry that has had recent growth and affords Galax residents the opportunity for a high-paying job with the benefit of a low cost of living.

Chapter 5: Land Use and Development

Introduction

The guiding principle behind comprehensive land use analysis is creating a balanced community where current and future residents have a wide range of housing choices, employment opportunities, consumer opportunities, and a full range of government and semi-public services. Residential areas should include housing for individuals and families throughout the various life-stages. Employment opportunities should include full and part-time work, provide entry-level positions, and exist in all major sectors of the economy: industrial, office/service, and retail. The consumer needs of the residents should be met by a variety of settings, including retail shops, service-related businesses, and community centers.

Land Use Trends

Major factors that strongly influence the pattern of land use and development in the Galax area include topography, the roadway network, land ownership, real estate markets, utilities, and annexation of territory into the city. As the City of Galax was established, topographical constraints and land ownership interests tended to concentrate development along Chestnut Creek in and around the “old town” area. As road improvements and annexation occurred, development spread to the U.S. Route 58-221 corridor and a north-south corridor paralleling Chestnut Creek. Since then, residential development has filled in much of the available land suitable for development in the city. The U.S. Route 58-221 corridor continues to be the primary commercial zone in Galax.

Residential land uses are located in various areas throughout the city. Most residential development has been low- to medium-density single-family detached houses on lots generally in the range of a quarter acre to an acre in size. Single-family detached homes account for roughly 70% of the housing stock in the city, followed by two-unit housing comprising 9% and mobile homes at 8.5%.

Commercial land uses are concentrated along the U.S. Route 58 corridor and throughout Downtown Galax. Along U.S. Route 58, much of the commercial land has been developed in a “strip” pattern. This pattern is fostered by the desire of businesses to take advantage of the high traffic volumes on the major road corridors; however, strip development tends to create negative impacts on the community, including aesthetic degradation at the entrances to the city, traffic congestion, and safety concerns, and accessibility issues for commercial expansion.

Industrial uses are concentrated in the traditional industrial area paralleling the old railroad bed and Chestnut Creek, near the western border of the city, and along the north side of Glendale Road.

Public and semi-public land uses include recreational and community facilities, including schools, parks, churches, and public rights-of-way. There are small concentrations of these uses throughout the city, but no single major concentration.

Changes in the city’s land use during the period of 1970 to 2021 is shown in the following table, **Table 5.1**. Due to modifications in the categories and methods of surveying land uses during this period, various sub-categories have been consolidated into the larger classifications shown in the table. Further, for purposes of comparison, the changes in the land area are shown as percentages of the overall land area rather than as absolute acres.

Table 5.1
Comparative Land Use Trends
City of Galax
1970 - 2021

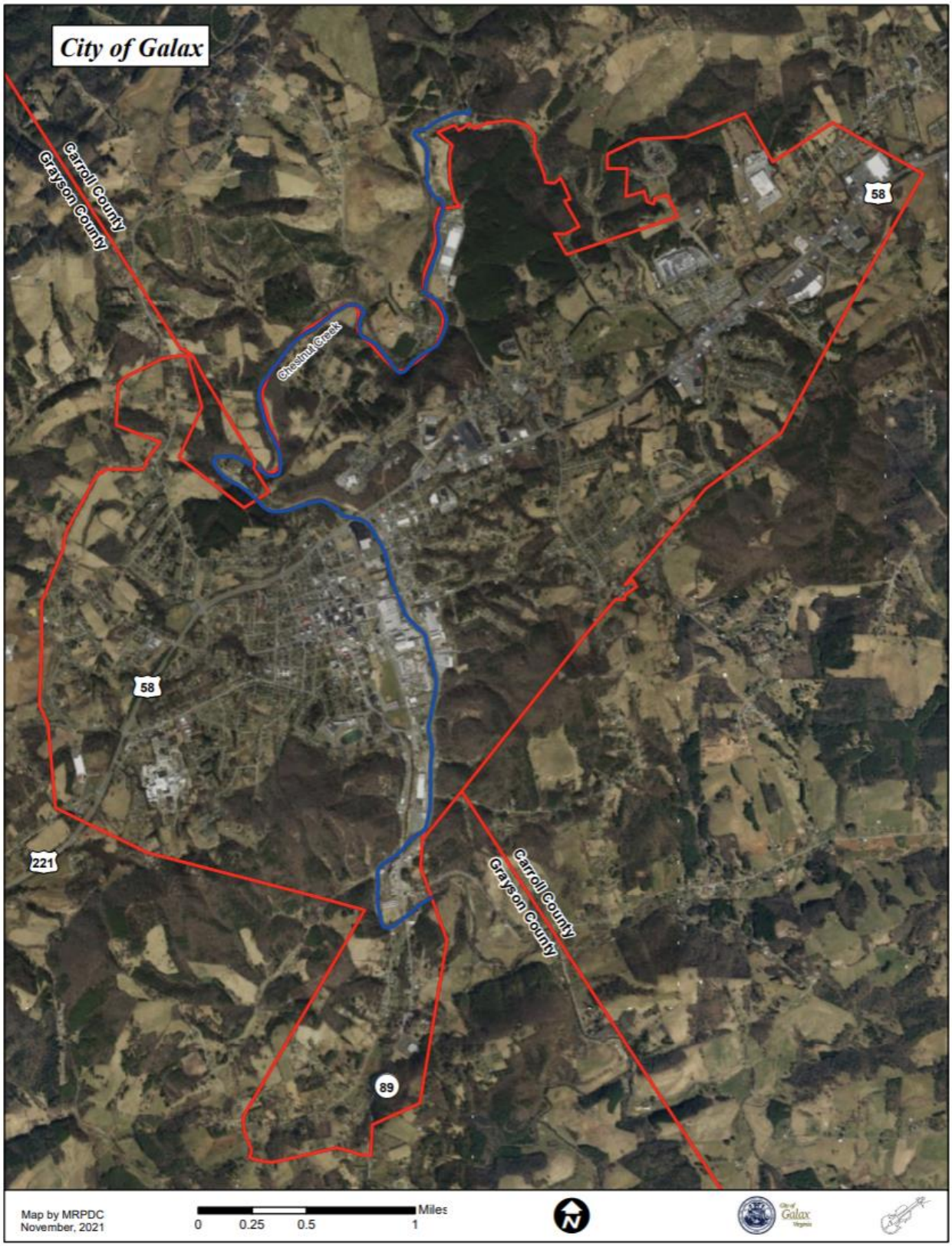
Classification	1970	1983	1994**	2011***	2021***
Residential	22.0%	36.3%	39.0%	39.9%	54.8%
Commercial	3.1%	5.0%	6.0%	7.1%	7.5%
Industrial	5.4%*	4.4%	4.0%	6.3%	7.3%
Public/Semi-Public	10.7%	11.3%	11.0%	9.7%	7.4%
Undeveloped	58.8%	43.0%	40.0%	37.1%	22.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: City of Galax Comprehensive Plan, 1985, 1996; Mount Rogers Planning District Commission
** Due to survey discrepancies, this total is more accurately 4.1%, indicating a small expansion of industrial land between 1970 and 1983.*

*** Estimated and rounded by the Department of Urban Affairs and Planning, Virginia Tech, and Herd Planning & Design. *** Calculated based on current land use GIS layers by Mount Rogers Planning District Commission. Numbers are rounded.*

The above table shows that undeveloped land and residential uses continue to be the dominant land uses in Galax. However, the amount of undeveloped land within City limits continues its rapid decline, dropping by a total of 14.8% from 2011 to 2021. The combined proportion of these two uses appears to have decreased only slightly since 1970 as substantial amounts of vacant or undeveloped land have been converted to residential uses. In addition to the development of residential land in the city, land dedicated to commercial and industrial uses has increased significantly over the past 50 years. From 1983 to 2021, there has been a declining trend in the percentage of Public/Semi-Public land from a high of 11.3% down to 7.4%.

Map 5.2


City of Galax
Carroll County
Grayson County
Chestnut Creek
58
58
221
89
Carroll County
Grayson County
Map by MRPDC
November, 2021
0
0.25
0.5
1
Miles

Current Land Use

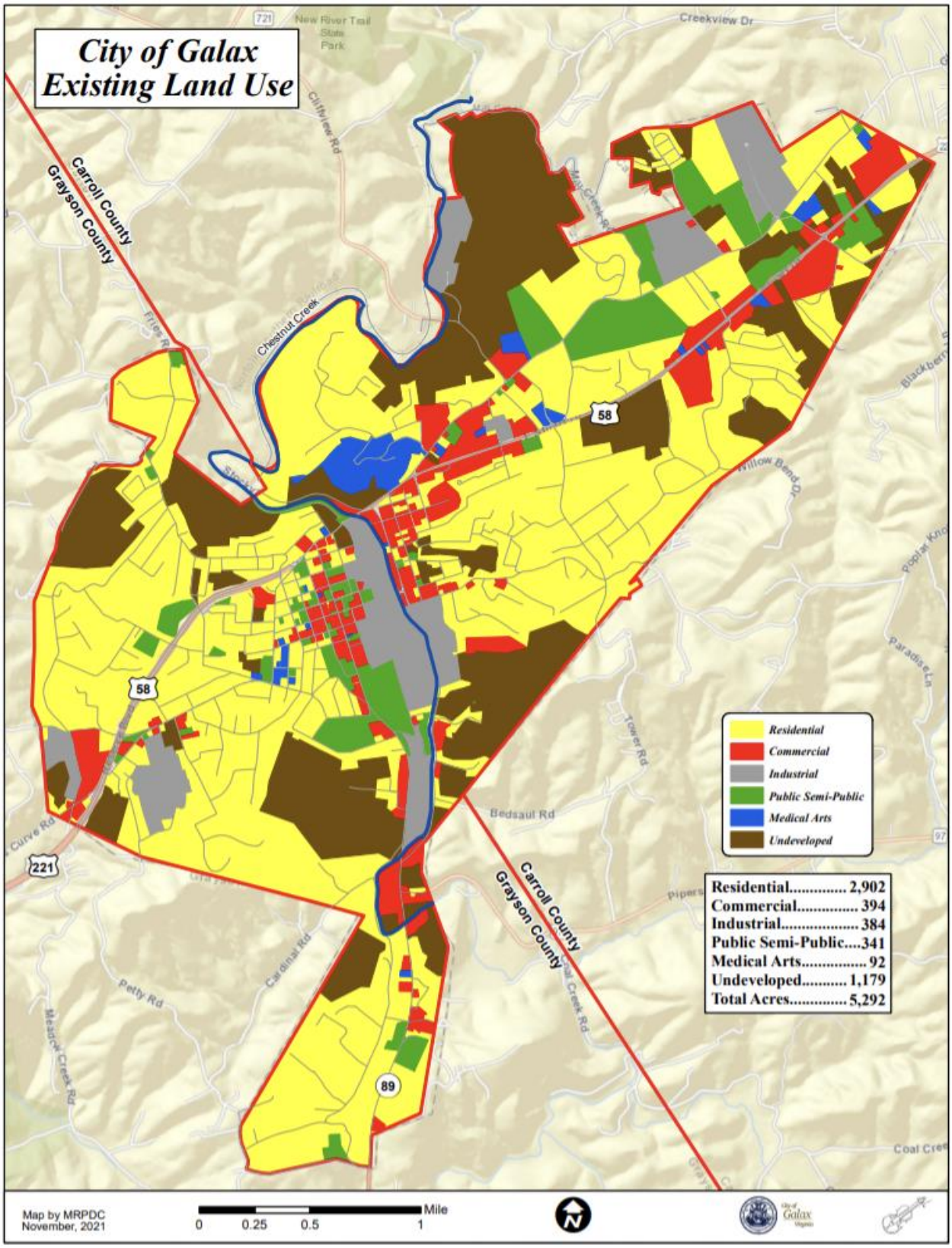
The current distribution of land by type of use is shown in the following table, Table 6.2. This table presents a more detailed classification of land uses, including Residential, Commercial, Industrial, Public Semi-Public, Medical Arts, Undeveloped. Assuming the mixed-use category is mostly in residential and commercial uses, this table supports the estimate that roughly 77 percent of the city's land area is either in residential uses or is undeveloped, with over a third in single-family residential uses. Roughly one-fifth of the total area of the City is undeveloped land which indicates that there is adequate capacity within the city limits to absorb the expected needs for expansion, even though a significant amount (approximately a third) of the undeveloped land has constraints on development due to steep slopes and/or drainage conditions.

Table 5.3
Current Land Use
City of Galax
2021

Classification	Acres*	Percent**
Residential	2902	54.8%
Commercial	394	7.5%
Industrial	384	7.3%
Public Semi-Public	341	6.4%
Medical Arts	92	1.7%
Undeveloped	1,179	22.3%
Total	5,292	100.0%

Source: Mount Rogers Planning District Commission
** Calculated based on current land use GIS layers by Mount Rogers Planning District Commission.*
*** Percentages are rounded.*

Map 5.4


City of Galax
Existing Land Use
Residential
Commercial
Industrial
Public Semi-Public
Medical Arts
Undeveloped
Residential..... 2,902
Commercial..... 394
Industrial..... 384
Public Semi-Public....341
Medical Arts..... 92
Undeveloped..... 1,179
Total Acres..... 5,292
Carroll County
Grayson County
Chestnut Creek
New River Trail State Park
Creekview Dr
Cliffview Rd
Willow Bend Dr
Bedsaul Rd
Tower Rd
Curve Rd
Petty Rd
Cardinal Rd
Meadow Creek Rd
Coal Creek Rd
58
221
89
721
Map by MRPDC
November, 2021
0
0.25
0.5
1
Mile

Current Land Use Controls:

The current City of Galax Zoning Ordinance and Zoning Map was adopted on November 12, 1985, with subsequent amendments. The intent of the city's zoning ordinance is to carefully balance the fundamental property rights and interests of the private citizens with the needs of the community as a whole, as outlined in the City of Galax Comprehensive Plan. Through the zoning ordinance, the City of Galax is authorized to provide for the establishment of districts within the corporate limits, in which the city may regulate, restrict, permit, prohibit, and determine:

1. The use of land, buildings, structures, and other premises for agricultural, business, industrial, residential, flood protection, and other specific uses.
2. The size, height, area, bulk, location, erection, construction, reconstruction, the alteration, repair, maintenance, razing, or removal of structures.
3. The areas and dimensions of land, water, and air space to be occupied by buildings, structures and uses and of courts, yards, and other open spaces to be left unoccupied by uses and structures, including the establishment of minimum lot sizes based on whether a public or community water supply or sewer system is available and used.
4. The excavation or mining of soil or other natural resources.

The Galax Zoning Ordinance would typically be classified as *Euclidean zoning*, and outlines ten unique zones, including:

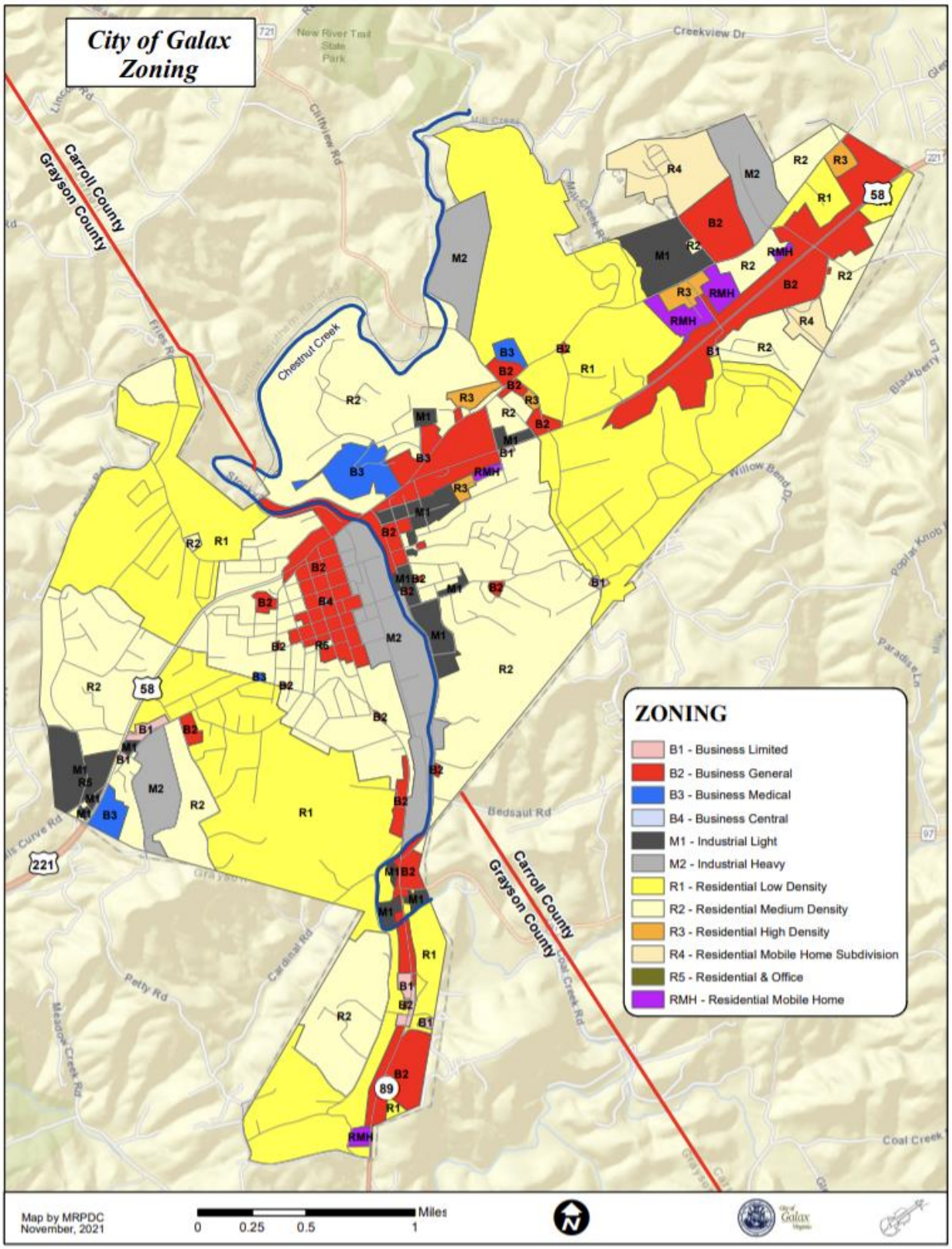
Residential Low-Density (R-1)
Residential Medium-Density (R-2)
Residential High-Density (R-3)
Residential Mobile Home (R-MH)
Residential Mobile Home Subdivision (R-4)
Residential and Office (R-5)

Business Limited (B-1)
Business General (B-2)
Business Medical (B-3)
Business Central (B-4)

Industrial Light (M-1)
Industrial Heavy (M-2)

The purpose, uses, and requirements of these zones are described in the zoning ordinance, which serves as a flexible tool to guide the growth of the City of Galax, in coordination with the city's other regulatory tools.

Map 5.5


City of Galax Zoning
Carroll County
Grayson County
Chestnut Creek
New River Trail State Park
Creekview Dr
Cliffview Rd
Mill Creek
Mail Creek Rd
Willow Bend Dr
Blackberry Ln
Poplar Knob
Paradise Ln
Bedsaul Rd
Coal Creek Rd
Cardinal Rd
Petty Rd
Meadow Creek Rd
Coal Creek
58
221
89
97
ZONING
B1 - Business Limited
B2 - Business General
B3 - Business Medical
B4 - Business Central
M1 - Industrial Light
M2 - Industrial Heavy
R1 - Residential Low Density
R2 - Residential Medium Density
R3 - Residential High Density
R4 - Residential Mobile Home Subdivision
R5 - Residential & Office
RMH - Residential Mobile Home
Map by MRPDC
November, 2021
0 0.25 0.5 1 Miles

Constraints to Development

Slope

The greatest constraint to development in many Southwest Virginia localities, including Galax, is severely sloped terrain. As visible on **Map 5.6**, approximately 11 percent of the land in the city has slopes in excess of 20 percent, and a small portion of this land has been developed. For development purposes, steep slopes present a building challenge with potential environmental consequences. As would be expected where commercial, industrial, and public demands for land have suitable alternatives, practically all of this land is used for residential purposes. Approximately one-third of the undeveloped land in the City of Galax has steep slopes. Clearing, grading, and development of steep slopes can result in extensive erosion and encourage landslides or sloughing of soil and rock, excessive stormwater runoff, increased siltation and sedimentation, and degrading of aesthetic value. Steeply sloped land still has the potential to be developed successfully, however. Residential neighborhoods are one such development that has been of common use for the undeveloped land in the city of Galax. These residential areas can be planned to preserve the aesthetic qualities of the land and avoid unnecessary engineering problems associated with the effects of stormwater run-off from developed slopes.

Floodplain

The Federal Emergency Management Agency (FEMA) flood insurance rate map identifies a 100-year flood plain, as shown in **Map 5.6**, that bisects the City of Galax along Chestnut Creek. The flood plain passes through an area of industrial and mixed uses and has historically been prone to heavy flooding. In the late 1940s and early 1950s, the Army Corps of Engineers installed measures to prevent flooding along Chestnut Creek, and since 1950, no significant flooding has occurred along Chestnut Creek. Although flooding has not been a major concern along Chestnut Creek since the 1950s, development in the area should be limited.

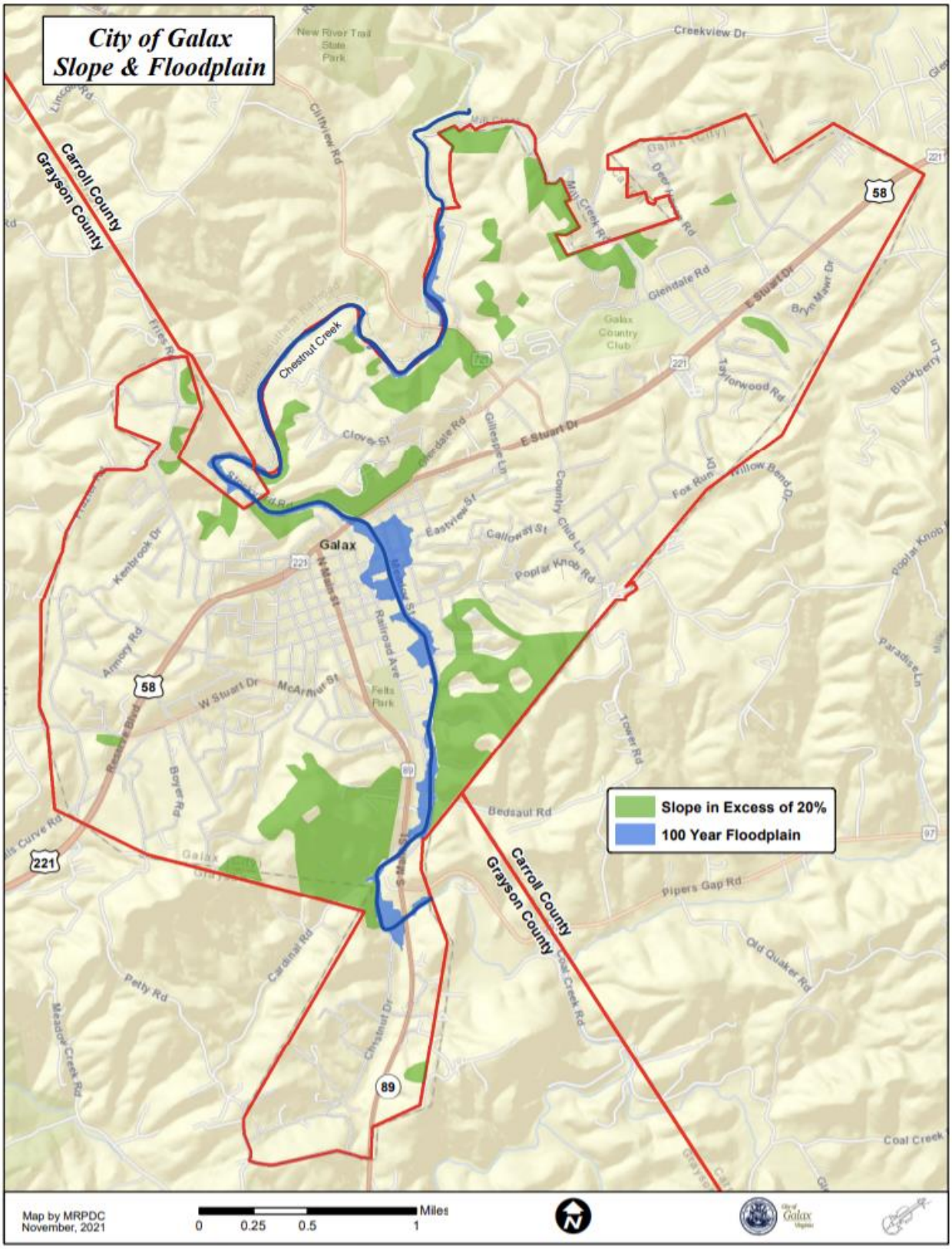
Though the City of Galax regulates building construction in accordance with the Uniform Statewide Building Code (USBC), containing relevant portions of the floodplain management criteria contained in 44 CFR Part 60, and regulates soil erosion and sediment control in accordance with the Virginia Erosion and Sediment Control Law (§ 62.1-44.15:51. Et. Seq.) the City is not currently a participating member of the National Flood Insurance Program (NFIP), and thus is ineligible for certain types of federal assistance. The Act[1] provides that flood insurance shall not be sold under the program (NFIP) unless the community has adopted floodplain management regulations consistent with the minimum criteria. The Department of Conservation and Recreation (DCR) is the state agency in Virginia responsible for coordinating state floodplain programs.

Soil Associations

Certain soils and underlying bedrock may not be suitable for certain intensities and/or types of development. In Galax, the *Chester-Glenelg-Manor Association*, which is commonly found in the southeastern area of the city, can be poor soil for development. This type of soil is generally found on moderate to steep slopes and in some areas, these soils are associated with shallow bedrock. Without unique engineering and design, development on this type of soil can result in seepage, slippage, and other construction issues.

[1] Title 44 of the Code of Federal Regulations – Emergency Management and Assistance

Map 5.6


City of Galax
Slope & Floodplain
Carroll County
Grayson County
Chestnut Creek
Galax
Slope in Excess of 20%
100 Year Floodplain
Map by MRPDC
November, 2021
0 0.25 0.5 1 Miles

Development Opportunities

Though roughly one-fifth of the land area in the city is undeveloped, a significant portion of that is located on the outskirts where conditions of excessive slope limit the feasibility of much development. Areas within the floodplain, however, are heavily developed in most cases. These developments were typically industrial, and many such sites are still in operation. There are opportunities for the City to encourage redevelopment of sites that are no longer in operation in accordance with newer land management “best practices”. As cities like Galax redevelop and adapt to global, regional, and local challenges, new opportunities always exist alongside such challenges.

Small Area Plans

Redevelopment plans focused on relatively small, specifically or otherwise identified areas of the city provide opportunity for the City to guide development patterns, thereby allowing more effective coordination with transportation, broadband, water, sanitary sewer, and stormwater facilities, and the like, with other development/redevelopment initiatives.

For example, the final draft of the **Creekside Small Area Plan (Creekside SAP)** was submitted to the city for review in early 2023; the plan focuses on the redevelopment of a specific structure and the adjoining area. Though the Creekside SAP focuses on a specific property as the largest catalyzing component, transitioning from a large, blighted structure accompanied by significant impermeable surface to the gravitational center of a mixed-use neighborhood that is “original and energetic”. Additionally, this plan is intended to facilitate the creation of a healthy urban environment for the future, more resilient than what came before and which will compliment neighboring identified development areas. The elements of the Creekside SAP are study area, existing conditions, functional use diagrams and future land use, zoning recommendations, connections, and conceptual site plan renderings. Additionally, the Creekside SAP scope included preparation of documents necessary for community partners to solicit a developer(s) capable of implementing private sector portions of the plan.

Small area plans like the Creekside SAP, are designed to efficiently address the needs of the community in a specified, localized area, but also to incorporate connectivity to other plans and initiatives of the community. The City should and does continue to develop plans for the downtown, and initiatives which strengthen complimentary developments, initiatives, programs, and priority investments.

Future Land Use Controls

As new challenges facing cities arise, cities must adapt. Planning for change and implementing those plans go hand-in-hand, but are not the same constructs. Small area plans often require changing zoning, subdivision, or other regulatory ordinances in order to facilitate developments similar to those conceptually envisioned. This Plan identifies implementation strategies necessary for future growth and resiliency. As the vision in the Plan continuously adapts to global, regional, and localized challenges, so to must the land use controls adapt to guide the city towards its vision.

The current zoning ordinance would typically be classified as *Euclidean zoning,* which is more often being referred to as “exclusionary” zoning since it is considered a *flat model*, separating use types into individual zones. Euclidean zoning is still the most common form of zoning practiced nation-wide; however, it is more and more commonly being replaced by *form-based zoning.* Form-based zoning allows for the mixing of uses, and is thereby considered a *hierarchical model* for allowing the layering of compatible uses. Shifting to a more inclusionary zoning type may create more resilient development patterns and correlate with an increase in quality of life for residents. This often creates redundant, more organic communities within the footprint of a locality, leading to numerous quantitative and qualitative benefits.

Examples of amendments to the City of Galax Zoning Ordinance and Map include:

- Incorporating additional zones which are more form-based and less Euclidean, allowing for more flexible, mixed-use developments. This may also include modification of existing zones.
- Adopting overlay zoning districts into the ordinance and map to encourage best practices and mitigate harmful developments in areas which may not be suitable. *Overlay zoning* is a regulatory tool that places a “district” over an existing base zoning designation, introducing additional regulatory provisions to the base district(s).
- More modern solar regulations and open space requirements.
- Considerations for accessory agricultural uses, with specific thought related to small-scale “agritourism” and “agroforestry”.

Examples of amendments to other regulatory codes include:

- Relaxing property maintenance requirements to allow for more resilient land use practices related to lawn maintenance, open space use, groundwater quality and capacity building, encouragement of native landscaping and discouragement of invasive plantings, and similar regulations. Deep-rooted plants provide for better stormwater retention and erosion control. Additionally, encouraging more resilient landscaping options can reduce the need for active enforcement of non-native lawn grasses, as well as open options for better use of undeveloped areas.
- Amend stormwater fee regulations to encourage specific open spaces and stormwater plantings for stormwater fee incentives/discounts.
- Amend environment regulations in accordance with zoning ordinance to more specifically address areas of the urban environment and create unique neighborhoods for which to live, work, play, and raise families.

Enacting, monitoring, and continuously updating special districts, such as enterprise zones, historic districts, special assessment districts, downtown districts, overlay zoning districts (including, but not limited to, conservation districts and floodplain districts), and the like allow communities more refined guidance of resources toward suitable areas and more advanced mitigation measures in areas that require special attention.

Planning for climate change, advancing equity and opportunity, creating new markets, and tackling the challenges of the built environment require active and forward-facing vision. The urban, built environment faces challenges unlike those of more rural areas, but also unique

opportunities. The most resilient communities lead through forward-thinking land use practices which both support new and established business markets, build organic and safe neighborhoods, and strengthen the locality against internal and external threats.

Urban Development Areas

Urban Development Areas (UDA) were originally authorized by the Code of Virginia in 2007 (Virginia Code § 15.2-2223.1.) as a requirement for certain high growth localities to designate areas "sufficient to meet projected residential and commercial growth in the locality for an ensuing period of at least 10 but not more than 20 years." Under the code designation, a UDA is an area designated by a locality in its comprehensive plan for proximity to transportation facilities, redevelopment/infill potential, and higher density development, specifically at least four single-family residences per acre, six townhouses per acre, or 12 apartment-style units per acre, and commercial development densities equivalent to at least a Floor Area Ratio (FAR) of 0.4. In 2012, however, the Code was amended to define UDAs more broadly and make them optional rather than mandatory. In addition, under the House Bill 2 legislation established in 2014, areas designated as UDAs in a local comprehensive plan may have an additional level of potential eligibility for transportation funding from the State.

The Code of Virginia also specifies that UDAs shall incorporate the principles of *Traditional Neighborhood Design* (TND)[2]. TND embodies classic characteristics of traditional communities such as walkable neighborhood centers, interconnected streets and blocks, diversity of land uses and easy access to jobs, housing and recreation by a variety of travel options (auto, bus, walk, bike, etc.). The Code of VA also recommends that the comprehensive plan describe any financial or other incentives for development in the UDAs.

The Code of VA recommends that the UDA(s) be able to accommodate the projected residential and commercial growth for the next 10-20 years. Although projections forecast a slight decline in population during the next 15 years, post-COVID numbers indicate a change in this trajectory. The Weldon Cooper Center showed a 0.9% increase in 2021. Additionally, focused revitalization and development is predicted to result in localized growth. Based on the Mount Rogers Regional Housing Study published by Mount Rogers Regional Planning District, the Twin County region needs 270 housing units.

"It is evident that the Twin County Region's existing housing stock is not meeting current demand. Due to the level of future job growth, the greatest existing housing need is for market rate, rental housing. The analysis also finds that the current new home sales market in the Twin County Region is essentially non-existent and is not providing home prices that are affordable to most prospective homebuyers. Moreover, the senior population is underserved. Thus, the initial recommended housing needs for the Twin County Region are as follows:"

[2] Emina Sendich, & American Planning Association. (2006). *Planning and urban design standards*. Hoboken, N.J. Wiley.

	Units
Market Rate Apartments	100±
Affordable General Occupancy Apartments	50±
Affordable Age-Restricted Apartments	40±
Patio Homes for Sale	40±
Townhomes for Sale	30-40±

Source: Mount Rogers Planning District Commission; Mount Rogers Regional Housing Study (2023)

The City has designated a series of areas as potential UDA candidates based on an analysis of their potential for new development and/or redevelopment through location, existing development patterns, zoning, and access to infrastructure. Two areas, specifically, currently meet and/or are anticipated to be developed to meet the state code provisions for UDA densities. They are the Galax Commercial Historic District (including the downtown) and the Creekside Development Area. A third area, being called the "Public Services Area", may also be considered for UDA designation in the future.

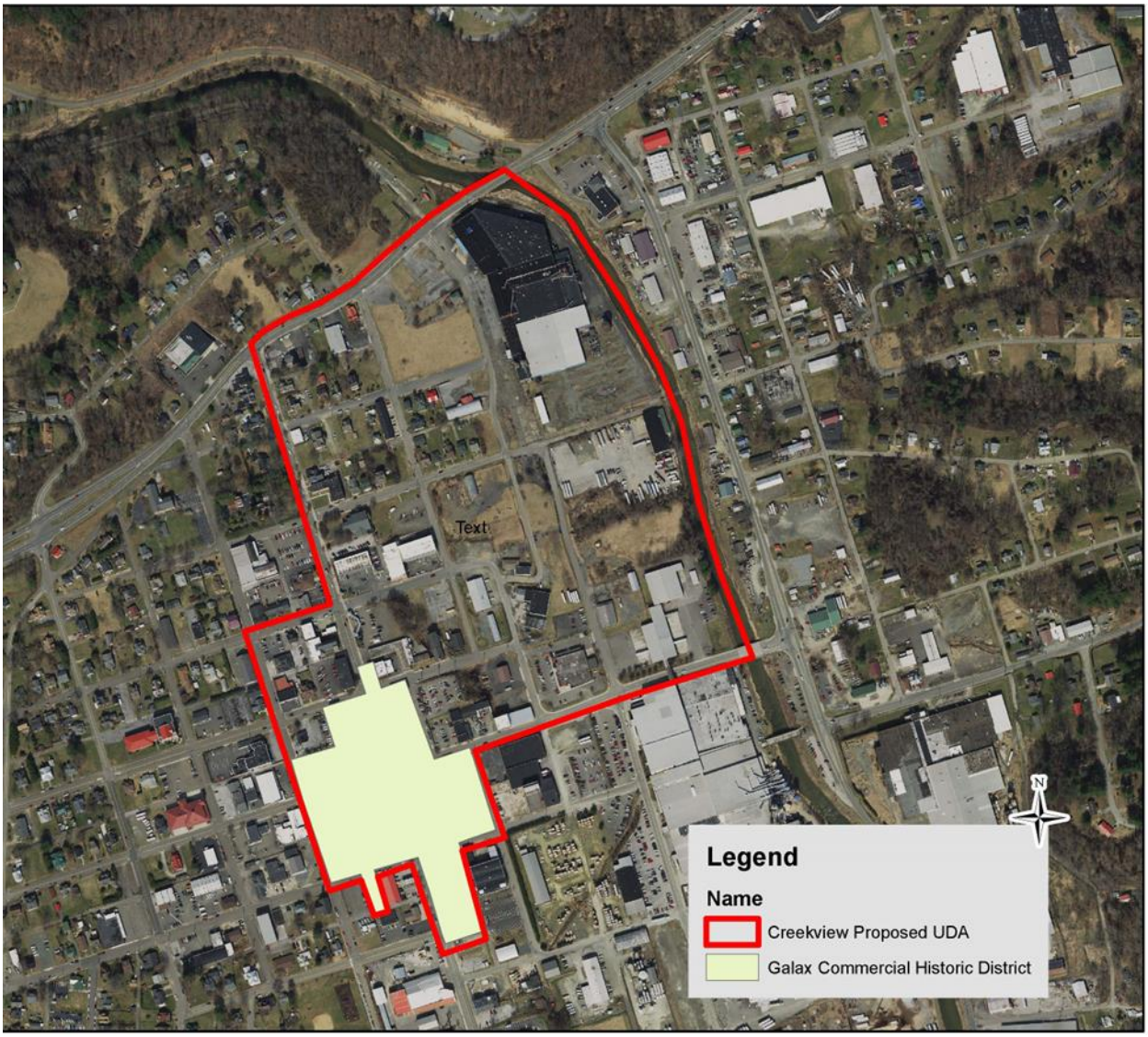
Each potential UDA represents acceptable locations to accommodate targeted growth and/or capacity for adaptive re-use and/or new development – given the community's vision – as well as representing areas readily offering the infrastructure capacity necessary to support successful TND projects. In general, these candidate UDAs have been located based upon enabling state legislation such that they feature:

- Proximity to existing transportation facilities;
- Availability of public water and sewer systems;
- Proximity to areas of existing development; and,
- Opportunities for new development or revitalization of existing development.

UDA Locations

As noted, two initial UDA candidates have been identified – the Downtown area and the Creekside area – to take advantage of existing facilities and infrastructure, and to introduce TND in a way that best promotes the City's vision for its future growth, with designated boundaries as shown on the **UDA Boundary Map**. However, the proposed UDA boundary will actually include both the Downtown and Creekside areas, merging the two and allowing for a unique transitionary zone between both – this is mostly due to the compact nature of the combined area. The UDA shall be periodically reviewed and updated as needed through a public process, in addition to, or as part of the Comprehensive Plan review and amendment process.

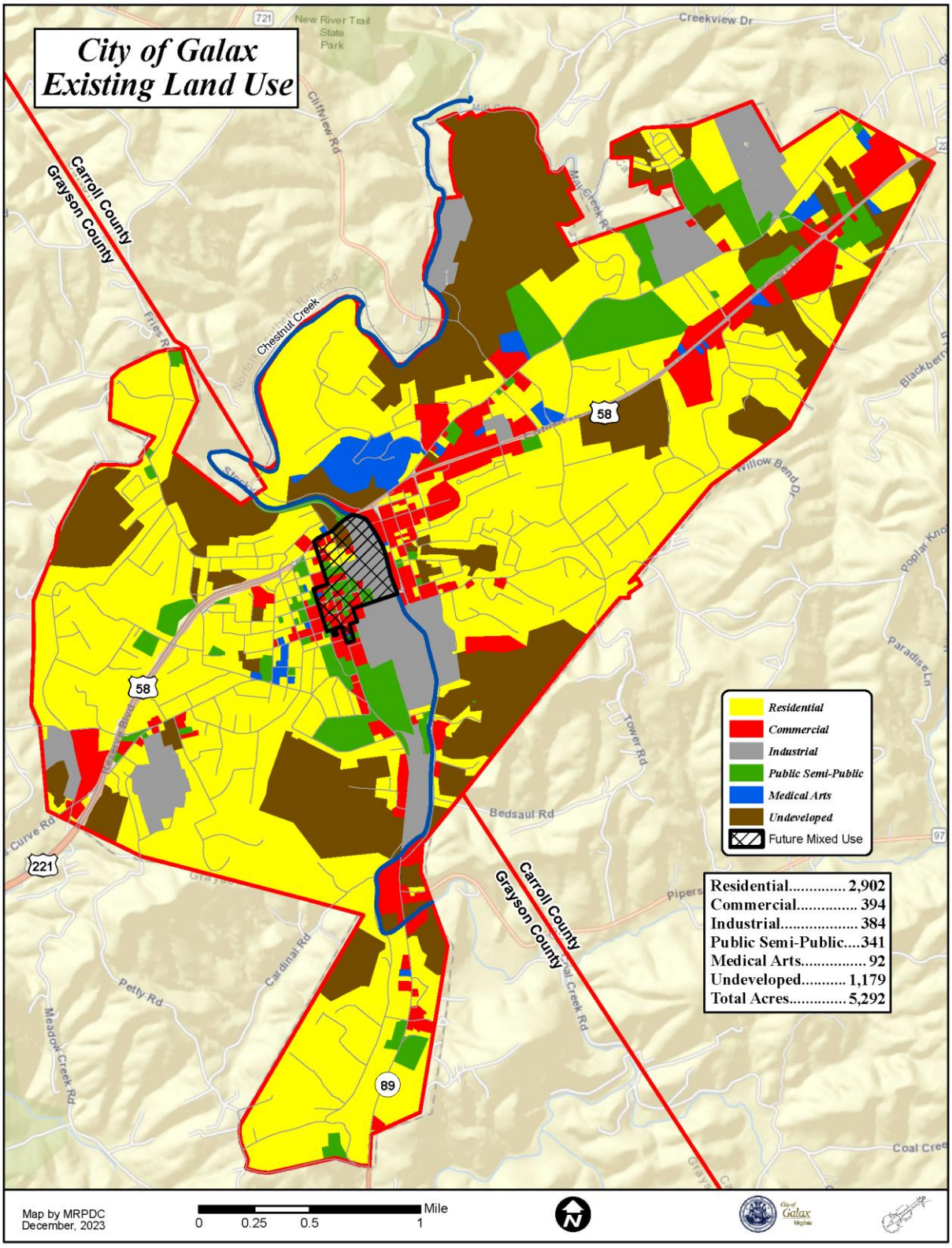
Map 5.7
Urban Development Area (UDA) Boundary



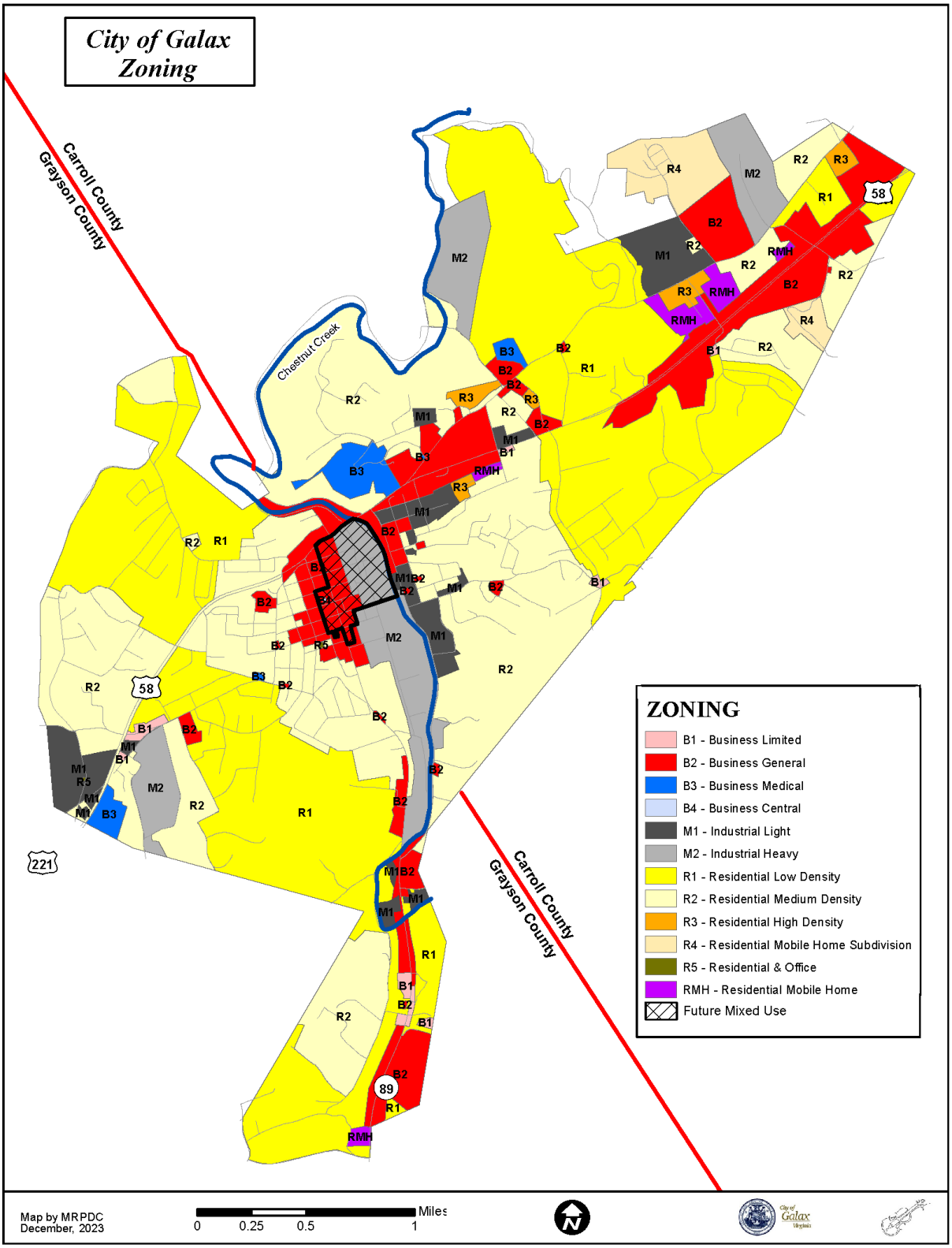
Future Land Use Predictions

Following the implementation of urban development area(s) and more traditional neighborhood design principles, acceptance of mixed-use developments, and encouraging through planning and infrastructure investment more comprehensive bike and pedestrian transportation facilities, the future land use patterns of Galax could shift drastically around the downtown and Creekside areas. The below maps illustrate potential changes to the area based on land use and required zoning changes to be less Euclidean and exclusionary of overlapping uses.

Map 5.8
Galax Future Land Use Map



Map 5.9
Galax Future Zoning Map



Chapter 6: Transportation

Highways and Streets

The pattern, amount, and character of land development and growth in a community are shaped to a large extent by the roadway system that serves that development. The road system provides the framework or “skeleton” around which buildings and other structures are placed. According to the Virginia Department of Transportation, there were approximately 60.39 miles of public roadway within the Galax City Limits.

The road network serves many more functions than simply carrying motor vehicle traffic. It also provides most of the public spaces and viewpoints from which citizens and visitors see and understand the community, and it establishes the visual and functional character of real property.

The direct effects of the road network can include:

- Density of development,
- Visual character of the streets, sidewalks, and open space areas,
- Convenience and safety of the area for driving, parking, bicycling, and walking,
- Efficiency of vehicular and pedestrian movement along with the road network, and
- Quality and character of physical access to a site.

The indirect effects can include:

- Air quality, which can be greatly reduced by excessive traffic congestions,
- The sense of community among residents, which can be affected by the efficiency, safety, and beauty of the streets and adjoining areas, and
- Economic prosperity, which can be affected by the visual attractiveness of the area for tourists and new residents, as well as the efficiency and capacity of business vehicular travel.

The core of the road network in Galax is a traditional grid pattern of interconnected streets, with major roads radiating from Downtown Galax. As with most urban grids, the Galax network is modified and disconnected in some places due to topography, Chestnut Creek, and other natural and man-made features.

While the topography of Galax presents challenges to extending or creating the grid pattern for new developments, the city has the opportunity to preserve the core grid as redevelopment and infill activities occur, and to extend or reestablish the grid in areas of new development when appropriate.

State Highway Planning - VDOT

The Code of Virginia directs the Commonwealth Transportation Board (CTB) to create an inventory of all construction needs for all transportation systems in the commonwealth to be used in the development of Virginia’s Statewide Multimodal Transportation Plan, VTrans. To identify highway needs. VDOT develops the State Highway Plan.

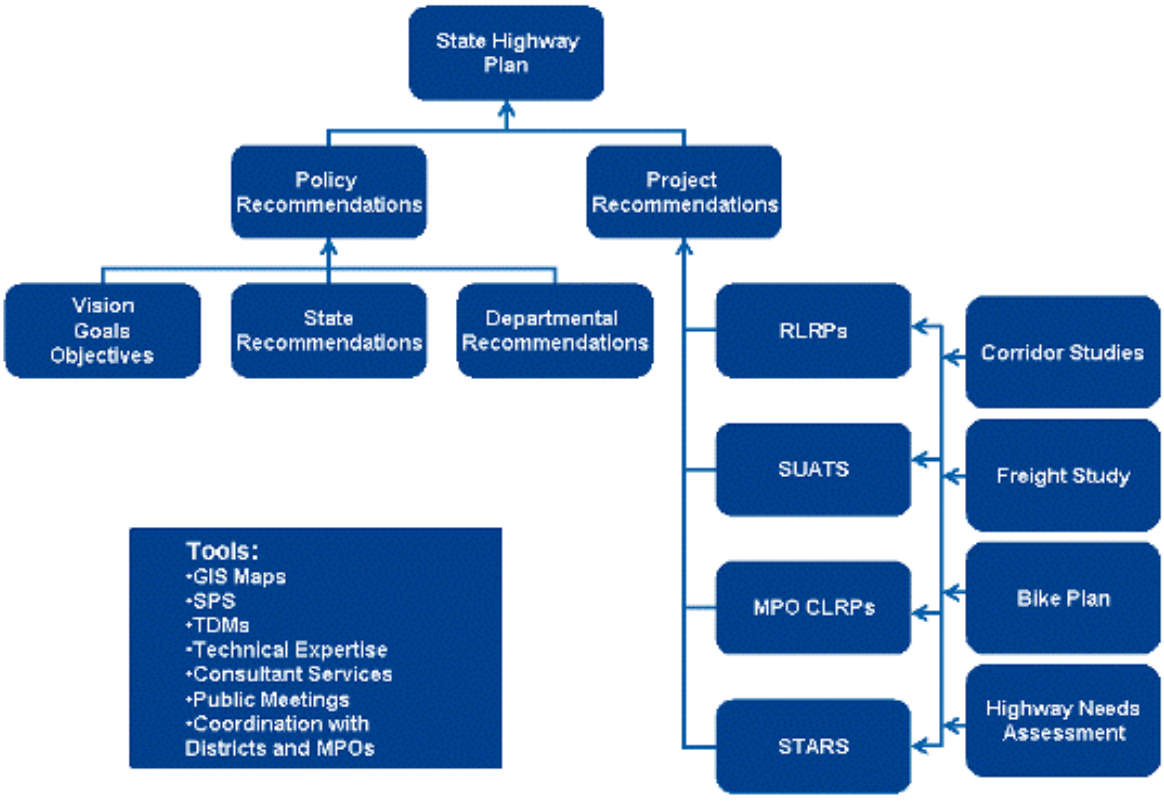
The State Highway Plan is reviewed every five years by VDOT's Transportation and Mobility Planning Division to ensure the plan contains the most up-to-date planning assumptions, analysis techniques, and recommendations.

The State Highway Plan is not a financially constrained plan. It is intended to provide an inventory of recommended improvements needed to address capacity and safety issues on the interstate and primary systems statewide, regardless of whether funding is available.

The State Highway Plan contains a list of recommendations for the interstate and primary highway systems, incorporating recommendations from existing corridor studies, county thoroughfare plans and comprehensive plans, Rural Long Range Plans (RLRPs), Small Urban Area Studies (SUATS), Metropolitan Planning Organization Constrained Long-Range Plans (MPO CLRPs) and the Strategically Targeted Affordable Roadway Solutions program (STARS). The State Highway Plan incorporates pedestrian and bicycle facilities, transit, intermodal connectors, and park and ride lots as essential components of the highway network.

Chart 6.1

State Highway Plan Chart



Methods of Transportation

VDOT Highway Variations

Interstates - Interstate highways are limited access facilities designed for high speed, high volume, long-distance travel, with grade-separated interchanges. They have a minimum of four lanes, divided by a median strip. Galax is served by Interstate 77 (I-77), which passes Galax approximately 10 miles to the northeast, and Interstate 81 (I-81), which intersects I-77 approximately 25 miles north of Galax at Fort Chiswell. I-81 is a major interstate corridor that links Galax to numerous other regions and metropolitan communities to the northeast and southwest.

Arterials - Urban Principle Arterial roadways are designed to move heavy volumes of traffic between major centers of activity. They typically have partial control on access and are usually four-lane, divided roadways. Urban Minor Arterial roadways interconnect with and augment the urban principal arterial roads and are designed to place more emphasis on land access. Arterials tend to be subject to strong pressures for “strip” commercial development due to the high traffic volumes and relatively easy site access. Limitations on access, adequate entrance spacing, and similar controls are essential to preventing the strip pattern that can cause serious safety problems, peak-hour congestion, and lower overall traffic capacities. State Route 89 (Main Street) and U.S. Route 58-221 (Stuart Drive) are the local urban primary arterial roads serving Galax and are the main entrances to the city. Glendale Road, Piper’s Gap Road, Meadow Street, and Grayson Street are the local urban minor arterial roads serving the city.

In December 2009, The Virginia Commonwealth Transportation Board identified U.S. Route 58 as a Corridor of Statewide Significance (CoSS). The CoSS includes major roadways, rail lines, airports, ports, and transit services across Virginia that hold significance in a state-wide, intermodal network of transportation options. U.S. Route 58 was designated the Southside Corridor.

Urban Collectors - Major collector roads are designed to provide land access and traffic circulation within residential, commercial, and industrial areas. They typically have two to four undivided lanes.

Local Streets - All other roadways in Galax are local streets that serve individual sites and collect and distribute traffic to the collector system. Streets within the City of Galax are maintained by the city with partial funding provided by the Virginia Department of Transportation.

Alternative Transportation Methods

Air Travel

Commercial air passenger service is available at Woodrum Field Airport, located 60 miles northeast of Galax in Roanoke, Virginia; Smith Reynolds Airport, located 60 miles southeast of Galax in Winston-Salem, North Carolina; Greensboro Regional Airport, located 80 miles southeast of Galax in Greensboro, North Carolina; and Charlotte Douglas International Airport, located 116 miles southeast of Galax in Charlotte, North Carolina.

General aviation facilities are available at the Twin County Regional Airport, which is located 11 miles northeast of Galax in Carroll County. The airport is owned and operated by the Twin County Regional Airport Commission, and according to the Airport Manager, the facility handles between 8,000 to 10,000 takeoffs and landings per year. The airport serves a large number of both recreational and corporate flights; training flights and “Angel Care” medical flights are also flown out of the airport. Approximately 57 percent of the activity at the airport is transient pilots

and the remaining 43 percent of the activity is local pilots.

Several improvements and upgrades are planned at the Twin County Regional Airport over the next five to ten years, including a new terminal building, a new multi-use hanger, 12 new t-hangars for aircraft storage, and an extension of the runway to 5,100 feet. The Federal Aviation Administration classifies the regional airport as a B-II airport.

Rail Transportation

During most of the twentieth century, a branch of the Norfolk Southern Railway served the City of Galax. The spur was discontinued during the early 1970s and the tracks were removed in 1975. The rail line has since been converted into the New River Trail State Park, a major regional recreation facility that connects Galax with the Town of Fries in Grayson County and the Town of Pulaski in Pulaski County.

Public Transit

The City of Galax is a local government affiliate of the District Three Governmental Cooperative, which provides a range of services to elderly and disabled persons, including a local transit system marketed as *Mountain Lynx Transit*. The Galax Public Transit System is a mini-bus transportation system available to all members of the public. The public transit system operates Monday to Friday from 12:30 to 4:30 with stops in the Downtown area, at shopping centers and apartment complexes, and the Twin County Regional Hospital.

District Three Governmental Coop also operates the Mountain Lynx Tranist system on a regional scale, so it runs between Galax and other towns and communities in the region, with hubs in Abingdon, Galax, Marion, and Wytheville. For residents who need to travel outside the District Three area for shopping or medical appointments, District Three operates a transit system called “New Freedom.”

Pedestrian and Bicycle Transportation

Pedestrian transportation is limited in the City of Galax. Sidewalks are available in the core downtown area; however, there are no sidewalks or bicycle routes along the Stuart Drive-US Route 58-221 commercial corridor. This deficiency causes a disconnect between residential zones and the primary commercial zone along U.S. Route 58-221.

Currently, Galax has no dedicated bicycle facilities within the corporate limits other than the New River Trail (NRT). Although bicycles may be ridden on all streets and highways within Galax, there are no routes or paths designed specifically for bicycles, nor is there currently a designed corridor across E Stuart Drive to connect the NRT to the central business district and adjoining residential neighborhoods, parks, and public facilities. With the rising popularity of e-bikes, there is an ever-growing need for investment in the bicycle transportation network.

Potential bicycle routes are included in the Galax 2020 Transportation Plan. The Galax 2020 Transportation Plan seeks to address the need for basic bicycle transportation facilities between the major tourist, shopping, and employment areas within and adjacent to the City of Galax. The following thoroughfares were identified as the primary bicycle routes for the City of Galax: US 58/221 (East Stuart Drive / Reserve Boulevard), VA 89 (Main Street), and Meadow Street.

VDOT Daily Vehicle Miles Traveled Data

The Traffic Monitoring System produces several reports of Vehicle Miles Traveled (VMT) on the public roads of Virginia. There are many ways to slice and categorize the VMT data, and TMS has expanded its report library as requests have been received. The most prominent difference between families of VMT reports is the nature of the jurisdictions upon which the report is

based. Reports that summarize data by jurisdiction use either the physical jurisdiction or the maintenance jurisdiction. The primary function of the VMT reports is to provide the daily vehicle miles traveled for specific groups of facilities and vehicle types. For convenience, the reports also include the centerline road length in miles. The VMT reports are not the source system of record, nor are they the authority on road length values. The VMT reports road length values should be equal to the source system of record values, but this cannot be guaranteed.

"*Secondary*" includes those routes in the VDOT secondary system, (unnumbered) routes maintained by cities and towns.

"*Primary*" includes those routes designated as 'US', 'SR' (Virginia State Route), and Frontage Roads. "Primary'" also includes the named federal parkways throughout the state.

The City of Galax experiences daily vehicle miles traveled of 56,933 on the secondary roads and a total of 85,539 miles of their primary roads for a total of all vehicle miles traveled of 142,471 miles according to the Virginia Department of Transportation in 2019.

The chart below shows the average annual daily traffic volume estimates by the section of roadway. The data was collected by the traffic engineering division of the Virginia Department of Motor Vehicles. Estimates provided are based on the most recent data collected from 2019.

Table 6.2 identifies key segments of the existing roadway system with current traffic volumes. The key segments listed in the table are anticipated to receive the greatest pressure from traffic increases during the coming years. As development occurs within the City, it will be vital to examine the effects it will have on the existing infrastructure and additional thought will need to be given to maintain the capacity of the key links in the network, particularly the arterial and major collector roads.

Table 6.2
Key Segments of Existing Roadway System with Traffic Volumes
City of Galax

Route Alias	Link Length	Start Label	End Label	AADT
Reserve Blvd	0.47	WCL Galax	Greenville Rd W Stuart Dr	8800
Reserve Blvd; W Stuart Dr	1.10	Greenville Rd W Stuart Dr	Fries Rd	7600
W Stuart Dr	0.20	Fries Rd	SR 89 Main St	11000
E Stuart Dr	0.34	SR 89 Main St	Meadow St	14000
E Stuart Dr	1.81	Meadow St	Haynes Rd	19000
E Stuart Dr	1.10	Haynes Rd	ECL Galax	15000
Main St	1.26	SCL Galax	SR 97 Pipers Gap Rd	6000
Main St	0.90	SR 97 Pipers Gap Rd	Maroon Tide Dr	6200
Main St	0.16	Maroon Tide Dr	Oldtown St	4900
Main St	0.64	Oldtown St	US 58 Stuart Dr	3000
Pipers Gap Rd	0.11	SR 89 Main St	ECL Galax	2500
Reserve Blvd	0.47	WCL Galax	Oldtown Rd	8800
Reserve Blvd; W Stuart Dr	1.10	Oldtown Rd	Fries Rd	7600
W Stuart Dr	0.20	Fries Rd	SR 89 MAIN ST	11000
E Stuart Dr	0.34	SR 89 Main St	Meadow St	14000

E Stuart Dr	1.81	Meadow St	Haynes Rd	19000
E Stuart Dr	1.10	Haynes Rd	ECL Galax	15000
Calhoun St	0.07	Jefferson St	SR 89 Main St	1700
Fries Rd	0.58	US 58 Stuart Dr	Sherry Lane	1000
Fries Rd	1.03	Sherry Lane	NCL Galax	1300
Iron Bridge Rd	0.21	113-3 Fries Rd, Leonard Rd	38-607 NCL Galax	950
Branch St/Chestnut Dr	0.43	SCL Galax	SR 89 Main St	580
Greenville Rd	0.37	WCL Galax	US 58	950
Stuart Dr	0.48	US 58 Bypass	Alderman St	3500
Stuart Dr	0.29	Alderman St	Stanford St	3700
Mac Arthur St	0.19	US 58; W Stuart Dr	Circle Dr	2700
Mac Arthur St	0.31	Circle Dr	SR 89 Main St	2500
Lineberry Rd	1.21	SR 89 Main St	113-4056 Poplar Knob Rd	4700
Meadow St	0.59	Grayson St	US 58 E Stuart Dr	8100
Grayson St	0.38	113-4055 Jefferson St	113-4053 Meadow St	2200
Jefferson St	0.12	Calhoun St	Grayson St	520
Jefferson St	0.29	Grayson St	US 58 Stuart Dr	1000

Poplar Knob Rd	0.14	Meadow St	Oak St	2000
Poplar Knob Rd	1.08	Oak St	ECL Galax	1500
Country Club Lane	0.21	SECL Galax	Poplar Knob Rd	1100
Country Club Lane	0.78	Poplar Knob Rd	US 58 E Stuart Dr	2700
Larkspur Lane	0.32	US 58 E Stuart Dr	Glendale Rd	1300
Glendale Rd	0.62	US 58 E Stuart Dr	Cliffview Rd	7100
Glendale Rd	1.05	Cliffview Rd	Haynes Rd	6500
Glendale Rd	1.02	Haynes Rd	NCL Galax	4000
Cliffview Rd	0.39	Glendale Rd	NCL Galax	4300
Cranberry Rd	0.24	Glendale Rd	US 58 Stuart Dr	3800
Cranberry Rd	0.30	US 58 Stuart Dr	ECL Galax	2100
Calloway St	0.00	Eastview St	Hanks St	240
Clover St	0.00	Stanley Dr	Valley St	1100
Forrest Ave	0.00	Country Club Lane	Burwell St	110
Hospital Dr	0.00	Doctors Park	Valley St	3100
Kenbrook Dr	0.00	Pine Knoll Dr	Scotland Dr	240
Valley St	0.00	113-4058 Glendale Rd	Hospital Dr	4700
Valley St	0.00	Hospital Dr	Clover St	1300

Recently Completed Project

Detailed Project Description

The Cranberry Road project resulted in an improved two-lane facility that extends approximately 0.23 miles from Glendale Road to US Route 58 (East Stuart Drive) in the City of Galax. This is the connector road from Rt. 58 (a Corridor of Statewide Significance) to the Jack Guynn Industrial Park in Galax. The previous roadway consisted of two lanes approximately twelve feet wide with no shoulders. There were sight distance issues in one of the horizontal curves. The completed project provided some realignment, widened the travel lanes to thirteen feet and added curb and gutter on both sides. The connector road serves as the main connector from the industrial park to Rt. 58 and serves three (3) current industries within the park (Guardian/ Consolidated Glass, MOOG, WeldBuilt), as well as two (2) shovel ready parcels that are listed on the VEDP website for potential industrial development. The connector also serves as the main access for the Sheetz store that has received an approved site plan and zoning permit. The connector serves the Cranberry Office Park, a private business park that has one tenant building (housing three (3) medical practices and one (1) financial counselor) and the possibility of two (2) or more additional tenant buildings. The connector also serves a commercial parcel across the street from Sheetz.

U.S. Route 58 Corridor Development Program

Project Description

The Route 58 Corridor Development Program is a construction project that encompasses approximately 680 miles of thoroughfare and finances planning, environmental, and engineering studies. Today, relatively 370 miles of the thoroughfare are four lanes or more, compared to 240 miles when the program was first established. Work began on the east coast and is moving westward at a progressive rate.

Project Origination

The Virginia General Assembly established the Route 58 Corridor Development Program in 1989 to enhance economic development potential across this largely rural portion of the state. Travel is continuously being improved on the predominantly two-lane crooked road. Construction and improvements will soon be completed entirely through Henry County, Virginia.

History

Route 58 is Virginia's longest roadway, stretching from the Atlantic Ocean to the southwest tip of Virginia. It traverses five Virginia Department of Transportation districts - Hampton Roads, Richmond, Lynchburg, Salem, and Bristol. This project will directly impact the City of Galax as U.S. Route 58 directly bisects the city and many of its primary corridors throughout.

Six-Year Improvement Program

The Six-Year Improvement Program (SYIP) is a document that outlines planned spending for transportation projects proposed for construction development or study for the next six years.

The SYIP is updated annually and is how the Commonwealth Transportation Board (CTB) meets its statutory obligation under the Code of Virginia to allocate funds to interstate, primary, secondary, and urban highway systems, public transit, ports, airports, and other programs for the immediate fiscal year. The SYIP also identifies planned program funding for the succeeding five fiscal years. The CTB allocates funds for the first fiscal year of the SYIP, but the remaining five years are estimates of future allocations. Fiscal years start July 1 and end June 30.

Map 6.3

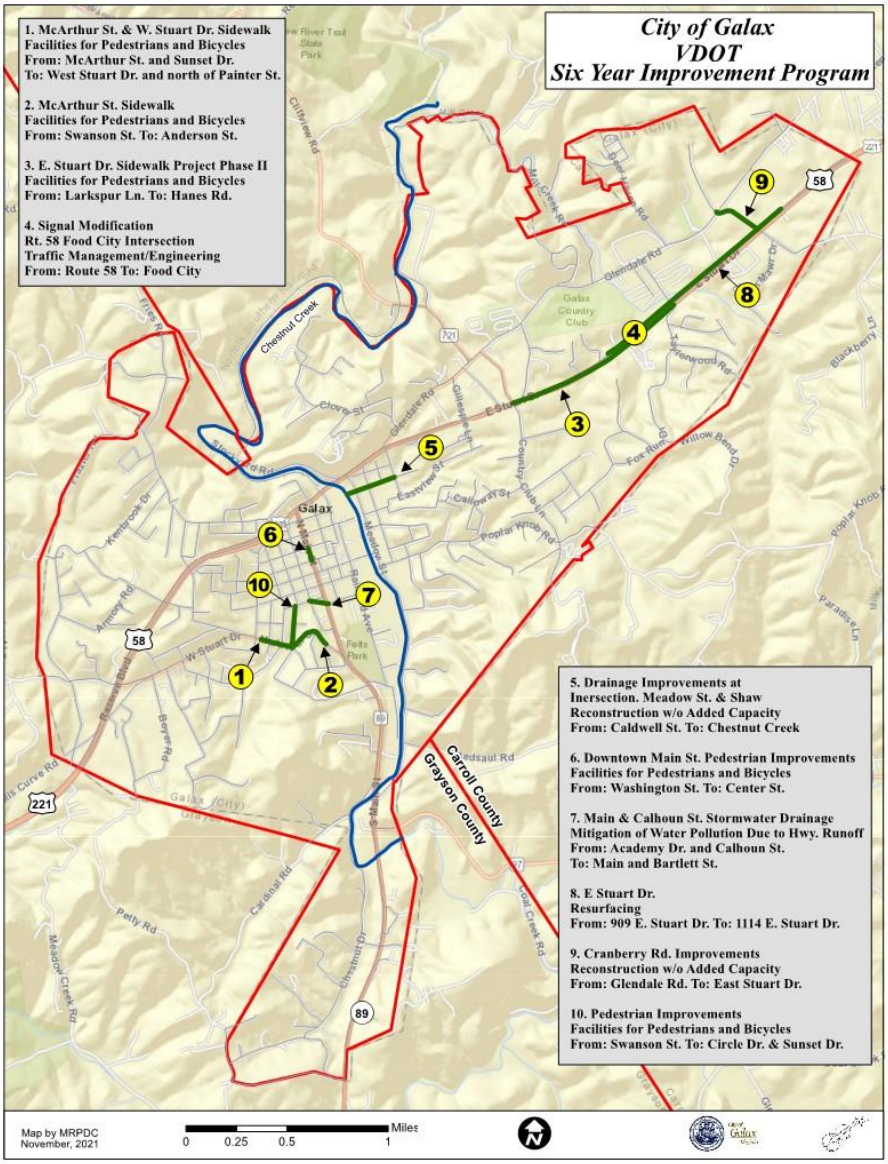


Table 6.4

	Name	Type of Deficiency	Description
1	U.S. 58 (Stuart Dr) from Jefferson St to Main St	Segment Operational Deficiency	Long-term for potential improvements to address congestion issues
2	Grayson St from Jefferson St to Main St	Segment Operational Deficiency	Long-term monitor for potential improvements to address congestion issues
3	Glendale St from Jefferson St to Main St	Segment Operational Deficiency	Long-term widen the roadway to four-lane urban divided standards
4	Iron Ridge Rd from North City Limits to Fries Rd	Segment Safety Deficiency	Long-term reconstruct road to address geometric deficiencies (10" lanes)
5	Cranberry Rd from US 58 (Stuart Dr) to East City Limits	Segment Safety Deficiency	Long-term reconstruct to urban two-lane standards. The project has been completed
6	Poplar Knob Rd from Oak St to East City Limits	Segment Safety Deficiency	Long-term reconstruct to urban two-lane standards
7	Country Club Rd from US 58 (Stuart Dr) to Glendale Rd	Segment Safety Deficiency	Long-term reconstruct road to address geometric deficiencies (11" lanes)
8	VA 89 (Main St)/VA 97 (Pipers Gap Rd)	Intersection Operational Deficiency	Short-term install signal
9	US 58/221 (E Stuart Dr) Fries Rd	Intersection Safety Deficiency	Short-term install flashing beacons to warn drivers of upcoming intersections and install street lighting
10	Poplar Knob Rd / Country Club Ln	Intersection Safety Deficiency	Short-term maintenance and apply access management
11	Glendale Rd / US 58	Intersection Both Deficiencies	Short-term improvement intersection as per VDOT Six-Year Improvement Program
12	VA 89 (Main St) from South City Limits to Meadow St	Segment Operational Deficiency	Short-term widen the roadway to four-lane urban divided standards
13	Meadow St from Poplar Knob Rd to US 58/221 (E Stuart Dr)	Segment Operational Deficiency	Short-term widen the roadway to four-lane urban divided standards
14	Glendale Rd from Cliffview Rd to Cranberry Rd	Segment Operational Deficiency	Long-term widen the roadway to four-lane urban divided standards
15	Cranberry Rd from Glendale Rd to US 58/221 (E Stuart Dr)	Segment Both Deficiencies	Long-term widen the roadway to four-lane urban divided standards

16	Meadow St from VA 89 (Main St) to Poplar Knob Rd	Segment Operational Deficiency	Mid-term widen the roadway to four-lane standards. When the project is completed, re-designate Meadow St to urban principal arterial and demote Main St to urban minor arterial
17	US 58/221 (E Stuart Dr) from VA 89 (Main St) to Meadow St	Segment Safety Deficiency	Short-term implement coordinated signal system and install street lighting and pedestrian facilities
18	US 58/221 (E Stuart Dr) from Meadow St to Cranberry Rd	Segment Both Deficiencies	Short-term install street lighting and pedestrian facilities; Mid-term implement coordinated signal system; Long-term consider widening to six-lane urban standards
19	US 58 (E Stuart Dr) from Cranberry Rd to East City Limits	Segment Safety Deficiency	Short-term install street lighting and pedestrian facilities

Source: Virginia Department of Transportation, Mount Rogers Planning District Commission 2035 Rural Long Range Transportation Plan

On the following page, **Map 6.5** illustrates the known transportation network deficiencies as listed and described in **Table 6.4** (above) and categorizes them into two types, road segments and intersections, color-coded by deficiency type.

Map 6.5


GALAX DEFICIENCIES
Intersection Deficiency
Operation Deficiency
Safety Deficiency
Both Deficiencies
Other Deficiency
Segment Deficiency
Operation Deficiency
Safety Deficiency
Geometric Deficiency
Both Operation & Safety Deficiency
58
89
11
10
9
1
2
3
4
5
6
7
12
13
14
15
16
17
18
19

Urban Development Areas

Urban Development Areas (UDA) were originally authorized by the Code of Virginia in 2007 (Virginia Code § 15.2-2223.1.) as a requirement for certain high growth localities to designate areas "sufficient to meet projected residential and commercial growth in the locality for an ensuing period of at least 10 but not more than 20 years." Under the code designation, a UDA is an area designated by a locality in its comprehensive plan for proximity to transportation facilities, redevelopment/infill potential, and higher density development, specifically at least four single-family residences per acre, six townhouses per acre, or 12 apartment-style units per acre, and commercial development densities equivalent to at least a Floor Area Ratio (FAR) of 0.4. In 2012, however, the Code was amended to define UDAs more broadly and make them optional rather than mandatory. In addition, under the House Bill 2 legislation established in 2014, areas designated as UDAs in a local comprehensive plan may have an additional level of potential eligibility for transportation funding from the Commonwealth.

The City of Galax has identified two unique areas that currently meet and/or are anticipated to be developed to meet the State Code provisions for UDA densities. They are the Galax Commercial Historic District and the Creekside Small Development Area. A third area, the "Public Services Area", may also be considered for UDA designation in the future.

The Code of Virginia also specifies that UDAs shall incorporate the principles of *Traditional Neighborhood Design* (TND)[3]. TND embodies classic characteristics of traditional communities such as walkable neighborhood centers, interconnected streets and blocks, diversity of land uses and easy access to jobs, housing and recreation by a variety of travel options (auto, bus, walk, bike, etc.).

The purpose of implementing a UDA according to the Office of Intermodal Planning & Investment is primarily to improve the future efficiency of the locality's transportation system, thereby enhancing safety, reducing expenditures, and creating a better quality of life. This is accomplished through creation of a distributed road network, arterials free of local traffic, mixed-uses, better routes for emergency services, and bike and pedestrian routes – generally, practicing the concept of *Traditional Neighborhood Design.*

[3] Emina Sendich, & American Planning Association. (2006). *Planning and urban design standards*. Hoboken, N.J. Wiley.

Chapter 7: Community Facilities and Government

Introduction

Community resources include the many facilities, services, and institutions in the community that support public activities and functions. Community resources underpin the overall community health and welfare of the locality. Comprehensive planning policies for community facilities normally focus on the public and quasi-public elements such as public schools, parks, libraries, utilities, and government administration. Strictly speaking, however, community facilities also include private and semi-private institutions that contribute directly to the fabric and structure of community life, including churches, health facilities, private schools, civic organizations, and service clubs. This section focuses on public and semi-public facilities and institutions that make up the City of Galax and depict the importance of a community providing these for their residents.

Public Water and Wastewater

The City of Galax owns and operates a municipal water and wastewater treatment system that serves residents of the city. Service from both of these systems is available to practically all areas within Galax City Limits.

Water Supply and Treatment

Galax owns and operates the municipal water system that serves greater than 95 percent of residents and 100 percent of businesses and industries in the city. Carroll and Grayson Counties are also customers of the Galax Water System, purchasing water to serve the Tower Road water system in Carroll County and the Fairview and Oldtown areas in Grayson County. The water system was originally constructed in 1958 and has been expanded several times since. The Galax water system has a treatment capacity of 4.0 million gallons per day (mgd) and is operating at around 35 percent capacity.

The source of the City's drinking water is surface water as described below: The water source is Chestnut Creek which is made up of several smaller streams. The smaller streams are outflows of springs located in southern Carroll and Grayson Counties. A source water assessment of the system was conducted in 2019 by the Virginia Department of Health. The creek was determined to be of high susceptibility to contamination using the criteria developed by the state in its approved Source Water Assessment Program. The assessment report consists of maps showing the source water assessment area, an inventory of known land use activities of concern, and documentation of any known contamination within the last 5 years.

Table 8.1

WATER QUALITY RESULTS
Regulated Contaminants

Contaminant (units)	MCLG	MCL	Level Detected	Violation (Y/N)	Range	Date of Sample	Typical Source of Contamination
Fluoride (ppm)	4	4	0.59	N	-	2020	Water additive which promotes strong teeth
Nitrate (ppm)	10	10	0.56	N	–	2020	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Barium (ppm)	2	2	0.016	N	-	2020	Discharge of drilling waste; Discharge from metal refineries; Erosion of natural deposits
Chlorine (ppm)	MRDLG = 4	MRDL = 4	1.43	N	1.10 – 1.70	2020	Water additive used to control microbes
Combined Radium (pCi/l)	0	5	0.8	N	-	2014	Erosion of Natural Deposits
Total Organic Carbon	NA	TT, met when ≥1	1.00	N	–	2020	Naturally present in the environment
Haloacetic Acids (ppb)	NA	60	30	N	11 – 38	2020	By-product of drinking water disinfection
TTHMs [Total Trihalomethanes] (ppb)	NA	80	39	N	13 – 66	2020	By-product of drinking water disinfection
Turbidity (NTU)	N/A	TT, 1 NTU Max	0.13	N	0.05 – 0.13	2020	Soil runoff
		TT, ≤0.3 NTU 95% of the time	100%	N	NA		

Table 7.2

Monitoring Results for Sodium (Unregulated-No Limits Designated)			
Level Detected (unit)	Sample Date	Typical Source	Guidance
10.6 (mg/L)	9/9/2020	Naturally Occuring; Addition of treatment chemicals/processes	For individuals on a very low sodium diet (500 mg/day), EPA recommends that drinking-water sodium not exceed 20 mg/L. Should you have a health concern, contact your health care provider.

Table 7.3

Lead and Copper Contaminants

Contaminant (units)	MCLG	Action Level	90th Percentile	Date of Sampling	# of Sampling Sites Exceeding Action Level	Typical Source of Contamination
Lead (ppb)	0	AL = 15	2.09	9/24/2019	0	Corrosion of household plumbing system; Erosion of natural deposits
Copper, ppm	1.3	1.3	0.133	9/24/2019	0	Corrosion of household plumbing systems; Erosion of natural deposits.

Wastewater Collection and Treatment

The Galax wastewater treatment system was constructed in 1958 and serves the vast majority of the city. The collection system has been expanded several times and currently accepts sewer from the Gladeville/Cranberry wastewater system in Carroll County, which was expanded to serve the Woodlawn area, I-77 Exit 14 interchange, Wildwood Commerce Park area, Airport Road, and Fancy Gap. The Galax wastewater treatment plant has a treatment capacity of 3.0 mgd and is operating at just under 50 percent (%) capacity.

Solid Waste Disposal and Recycling

The City of Galax, through a partnership with Carroll and Grayson Counties, uses a regional landfill facility located in the Town of Hillsville. The Carroll-Grayson Galax Solid Waste Authority was formed in 1993 when Galax closed the Bedsaul Hollow Landfill that had been used by the city for years.

Utility Services

The Appalachian Power Company, a member of the American Electric Power System, provides electrical service in the City of Galax. United Cities Gas Company, a division of Atmos Energy, provides natural gas service, while bottled gas, coal, and fuel oil are available from local providers. Local and long-distance telephone service is available from CenturyLink. Comcast provides cable television service, and satellite television is available from DirecTV and Dish Network. Internet services are available from several local providers, including CenturyLink and Comcast. CenturyLink and Comcast offer service bundles that include television, telephone, and Internet service.

The Wired Road Authority is a collaborative effort between private sector service providers, the local governments of Grayson County, Carroll County, and the City of Galax, and the Carroll-Grayson-Galax Regional Industrial Facilities Authority (dba Blue Ridge Crossroads Economic Development Authority). Its purpose is to provide the critical enabling infrastructure to transform the regional economy into a dynamic, small business, and entrepreneurial economy.

The Wired Road network has been in operation for over ten years and is a true public/private partnership with 2 service providers offering last-mile services on the network. The Wired Road is open access, fully integrated fiber and wireless regional broadband network offering "big broadband" 100 megabit and Gigabit fiber connections and multi-megabit wireless connections in Carroll, Grayson, and Galax.

Public Safety

The city’s public safety facilities and services include the Galax Police Department, the Volunteer Fire and Rescue, and the Galax Grayson EMS.

Law Enforcement

The Galax Police Department is located in the Harold Snead Public Safety Building at 353 North Main Street. The Department has a staff of 38 employees in five divisions: uniform enforcement, criminal investigations, community-oriented policing, services, and administration. The Galax Police Department is 1 of 33 departments in Virginia to be accredited by the state. The Galax Police Department received accreditation from the Virginia Department of Criminal Justice Services in April 2001. State Accreditation requires that a department meet or exceed 215 standards that address police services and personnel policies.

Fire Protection

The City of Galax Volunteer Fire and Rescue provides fire protection for the City of Galax and

provides mutual aid to various other agencies in Carroll and Grayson Counties in Virginia and Alleghany and Surry Counties in North Carolina. Galax Fire and Rescue is located at 300 West Grayson Street, which houses a considerable amount of fire and rescue equipment. In October 2021, there were 59 volunteer firefighters with Galax Fire and Rescue.

Emergency Medical Service

Galax Grayson EMS provides E-911 Advanced Life Support (ALS), Emergency Medical Services, and Critical Care hospital to hospital transport services for citizens and visitors to the City of Galax and portions of Grayson County. Galax Grayson EMS also provides ALS support services for Grayson County volunteer rescue squads. Galax Grayson EMS currently utilizes five ambulances and one quick response vehicle, staffed by ALS certified or Nationally Registered EMT-Intermediate or NREMT-Paramedics.

E-911 Service

E-911 services are located in the Galax Police Department communications center, which provides dispatch services for the Galax Police Department and houses the dispatchers who operate Twin County Central Communications, the E-911 center for Galax, Carroll, and Grayson Counties. The Galax Police Department serves as the administrative agent for the Twin County 911 Commission.

Public School System

The City of Galax has two public school facilities, a high school with a middle school attached and an elementary school. All three of the schools have undergone capital improvement projects within the past 5 to 10 years that included route bus purchases, roof replacements, restroom renovations, and other improvements to school property.

Safe Routes to School is a grassroots program funded by VDOT, FHWA, and U.S. DOT. Galax City Safe Routes to School promotes a long-term healthy lifestyle by encouraging students to walk and bike to school. The Safe Routes to School Program offers Pedestrian Safety Training to students, civic and church groups, and anyone who wants to participate.

The high school was built in 1953 and is located on a 25-acre tract to the south of Downtown Galax. Enrollment at the high school during the 2020-2021 school year was 341 students in grades 9 – 12. Galax High School placed in the top 50% of all schools in Virginia for overall test scores (math proficiency is top 50%, and reading proficiency is top 50%) for the 2018-19 school year. The percentage of students achieving proficiency in math is 85-89% (which is higher than the Virginia state average of 82%) for the 2018-19 school year. The percentage of students achieving proficiency in reading/language arts is 80-84% (which is higher than the Virginia state average of 78%) for the 2018-19 school year. The student-to-teacher ratio at the High School is 12:1.

The middle school portion of the facility was constructed in 1974, and it shares athletic facilities with the high school. It is operating at capacity with a 2020- 2021 enrollment of 333 students in grades 6 – 8.

The elementary school is located on an 8.4-acre tract on South Main Street. It was built in 1937

and is operating below capacity with a 2020-2021 enrollment of 594 students in the K – 5-grade levels, and an additional 55 students in preschool programs.

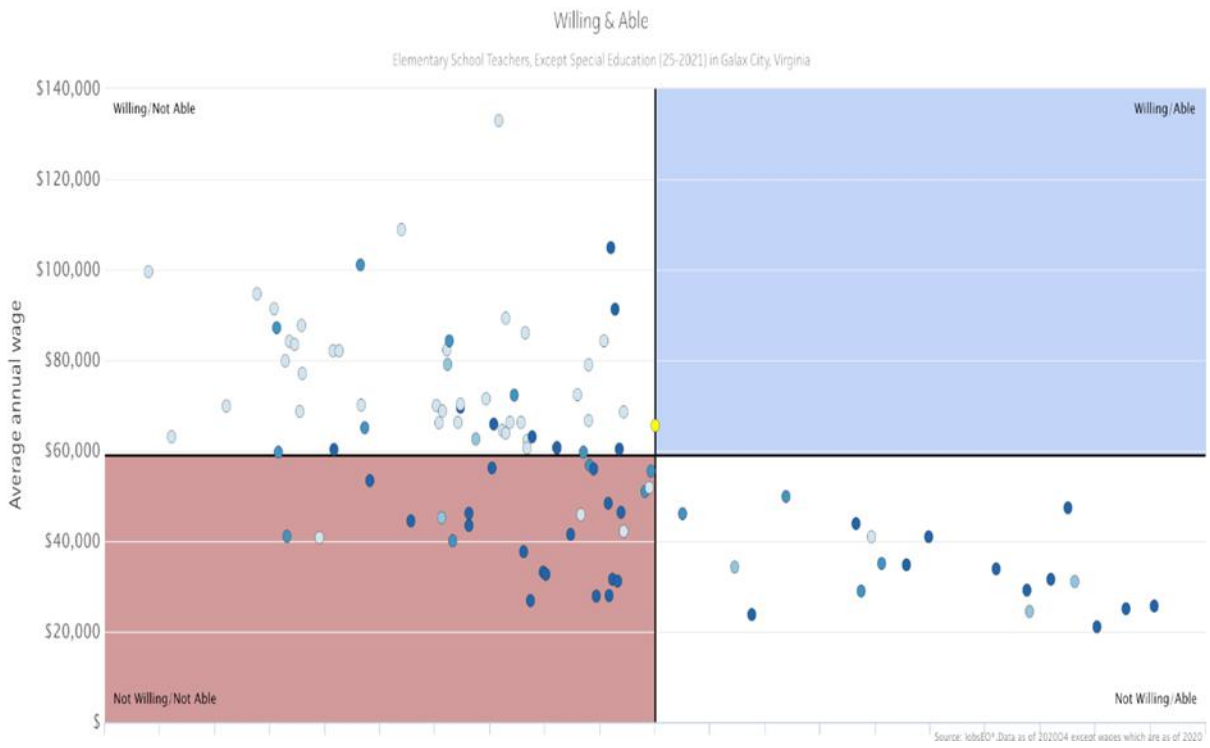
The Galax Public School System offers many special programs for students including a Pre-K Program, Summer Transitional Program for fourth-grade students, Reading Program at the elementary school, and a Summer Feeding Program. Academic indicators from the Virginia Department of Education indicate a passing rate of 83 to 90 percent for all academic categories with an 80 to 84% graduation rate.

Table 7.4 provides the educational attainment level of the primary workforce ages 25 to 64. Galax has a significantly higher percentage of people with no High School Diploma, 22.8%, than the entirety of the state 8.7%. This number is misleading, however, due to Galax's availability of industrial employment that affords the opportunity for those without a traditional education to gain employment. Which has resulted in an influx of workers who fit that demographic.

	PERCENT			VALUE		
Educational Attainment, Age 25-64	Galax City, Virginia	Southwest Virginia nonmetropolitan area	Virginia	Galax City, Virginia	Southwest Virginia nonmetropolitan area	Virginia
No High School Diploma	22.8%	15.4%	8.7%	751	29,759	392,543
High School Graduate	27.5%	35.5%	22.9%	908	68,673	1,029,408
Some College, No Degree	24.9%	22.3%	19.4%	820	43,115	874,977
Associate's Degree	9.1%	11.2%	8.3%	300	21,612	374,819
Bachelor's Degree	9.8%	10.4%	23.6%	324	20,203	1,062,466
Postgraduate Degree	5.9%	5.2%	17.1%	193	10,103	770,727

Table 7.4 The graph below shows a breakdown of employment within the education sector during the time frame of 2016 - 2020Q1. As shown below, 2020 saw a large decrease in employment within the city, however, before that decline, employment rates stayed considerably constant. The large decrease in employment for Q1 of 2020 was likely caused by the COVID-19 Pandemic, as schools across the nation stopped holding classes in person due to safety concerns. And while there is no available data beyond Q1 of 2020, there is a high probability that the employment numbers have recovered since then due to the reinstatement of in-person teaching.

Graph 7.5



Higher Education Availability within Virginia

Galax residents who wish to further their education beyond the high school level may obtain a quality post-secondary education at any of the 38 public and private colleges, universities, vocational/technical, and community colleges located within an approximately two-hour drive of Galax. These are listed in the following table.

Table 7.6

Virginia	
Colleges and Universities	**Miles from Galax***
Averett College (Private), Danville	106
Bluefield College (Private), Bluefield	72
Emory & Henry College (Private), Emory	76
Ferrum College (Private), Ferrum	72
Hollins College (Private), Roanoke	85
Radford University (Public), Radford	57
Roanoke College (Private) Salem	80
Virginia Tech (Public), Blacksburg	70

Vocational/Technical Schools and Community Colleges	
Jefferson College of Health Services (Private), Roanoke	83
National College (Private), Salem	82
New River Community College (Public), Dublin	47
Virginia Western Community College (Public), Roanoke	78
Wytheville Community College (Public), Wytheville	37
North Carolina and Tennessee	
Colleges and Universities	**Miles from Galax***
Appalachian State University (Public), Boone, NC	71
Bennett College (Private), Greensboro, NC	94
Catawba College (Private), Salisbury, NC	88
Davidson College (Private), Davidson, NC	92
Elon College (Private), Elon, NC	108
Greensboro College (Private), Greensboro, NC	92
Guilford College (Private), Greensboro, NC	86
High Point University (Private), High Point, NC	83
Johnson C. Smith University (Private), Charlotte, NC	110
Lees-McRae College (Private), Banner Elk, NC	88
Lenoir-Rhyne College (Private), Hickory, NC	98
Livingstone College (Private), Salisbury, NC	90
North Caroline A&T State University (Public), Greensboro, NC	95
North Carolina School of the Arts (Public), Winston-Salem, NC	65
Queens University of Charlotte (Private), Charlotte, NC	114
Salem College (Private), Winston-Salem, NC	65
University of North Carolina (Public), Charlotte & Greensboro, NC	110 / 90
Wake Forest University (Private), Winston-Salem, NC	60
Winston-Salem State University (Public), Winston-Salem, NC	64
King University (Private), Bristol, TN	102
Vocational/Technical Schools and Community Colleges	
Forsyth Technical Community College (Public), Winston-Salem, NC	68
Guilford Technical Community College (Public), Greensboro, NC	87
Surry Community College (Public), Dobson, NC	32

Source: Mount Rogers Planning District Commission

* Mileage is approximate

Crossroads Rural Entrepreneurial Institute

The Crossroads Rural Entrepreneurial Institute is located at 1117 East Stuart Drive and opened in July 2005 to help improve the lives of people in southwest Virginia and beyond by providing an innovative educational and economic development engine that contributes to the revitalization of the region's economy. The mission statement of the Crossroads Rural Entrepreneurial Institute is to “Contribute to the continuing revitalization of the region's economy and offer a brighter future for our citizens through an innovative center for educational and economic development.”

Throughout Carroll County, Grayson County, and Galax City, people are envisioning ways to improve their lot in life. If in some way, CREI can assist them and help their dreams come to be, CREI will have contributed greatly to the economic fortunes and future of our region.

The Crossroads Rural Entrepreneurial Institute, located in Galax, VA, opened in July 2005 to help improve the lives of people in southwest Virginia and beyond, by providing an innovative educational and economic development engine that will contribute to the revitalization of the region's economy while offering a brighter future for its citizens.

Partnering Entities

Blue Ridge Crossroads Economic Development Authority: Formed in 2008 among Carroll County, the City of Galax, and Grayson County, BRCEDA leverages the leadership capacity of these three localities to deliver coordinated economic development services to the region focused on small business development and related projects.

Wytheville Community College: A technology-enhanced educational center - including high-demand technical curricula and occupational programs for high school and college students, transfer programs, a university center, and a continuing education center for workforce skills including literacy, GED, workforce, and corporate training.

Crossroads Small Business Development Center: A center to assist small business development by providing business plan preparation, one-on-one counseling, financial analysis, sales marketing planning, and access to capital resources.
The Crossroads Institute's Higher Education Center: A facility outfitted with state-of-the-art technology, designed to offer educational and training opportunities to people in Southwest Virginia and beyond.

Library

The City of Galax is served by the Galax Public Library, a branch of the Galax / Carroll Regional Library (GCRL), which is located at 610 West Stuart Drive. The GCRL Vision: to provide the best picks for information, hubs for community interaction, places to learn and grow. The GCRL Mission: providing a gateway to information, reading engagement, cultural enrichment, and lifelong learning.

GCRL adopted a strategic plan approved by the Regional Library Board on November 19, 2018. This plan outlines goals for the library as well as key expansion and development efforts to be

made.

Some of the specific goals set forth are as follows:

- “Support development of early literacy skills in young children through investment in materials, services, and programs for families, childcare providers, and educators. “
- “Invest in more programs and services that advance digital literacy so that customers use technology to enrich their lives.”
- “Enhance strategic partnerships with organizations to better meet the unique needs of the community.”
- “Increase awareness of the library and its benefits through expanded promotion of programs and services.”

Healthcare

Galax is served by the Twin County Regional Hospital, located at 200 Hospital Drive, just north of Downtown Galax. The hospital was constructed in 1973 and opened with 104 beds. A later addition added a fourth floor and increased the number of beds to 149. The hospital currently operates at 141 beds and provides general acute care for inpatient, outpatient, emergency services, and a range of specialized services. The city also has numerous general medical practitioners and medical specialists.

Twin County Regional offers many services to the community including women's services, cardiac rehabilitation, emergency room, urgent care, rehabilitation services, and behavioral health. Twin County offers many other great services to the community that can be found on their website. Public healthcare is offered by the Galax City Health Department located at 703 South Main Street. Alcohol and drug rehabilitation is offered by the Life Center of Galax. The Waddell Nursing and Rehabilitation Center and Galax Health and Rehab Center – Blue Ridge provide certified intermediate care facilities for the elderly, with capacities of 130 and 120 beds respectively. Galax Health and Rehab Center also offer the community another nursing home and rehabilitation option.

Parks and Recreation

The centerpieces of the city’s recreation resources are Felts Park, a 28-acre public recreation facility, and the Galax Recreation Center located adjacent to each other at 601 South Main Street. Felts Park has several amenities, including five tennis courts, a one-half mile paved walking track, a 3,000-seat covered grandstand with a new stage facility, a 25-meter outdoor swimming pool, two multi-use baseball fields, a soccer field, an outdoor basketball court, and an outdoor sand volleyball court. Several events are held year-round at the 3,000-seat grandstand, including the Old Fiddlers Convention, tractor pulls, horse shows, church bazaars, and carnivals.

The City of Galax has the following Park and Recreational amenities:

- Galax Recreation Center specifically offers Indoor Pool, Indoor Rubber Track, Cardio Room, Weight Room, Community Internet Lab, 2 Full-Sized Gymnasiums, Senior Citizen Area & Fitness Room, Multi-Use Activity Room, After School Program Rooms.

- Mountain View Park offers a 9.5 Acre Park, 4/10 Mile Paved Track, 2 Multi-Use Baseball/Softball Fields, Baseball/Softball Batting Cage, and Covered Picnic Area.
- The Downtown Skate Park is open from 8 A.M. to dark and is located at the corner of Bartlett and Main Street, beside Standard Auto Parts. This facility provides participants the opportunity to skate on several different ramps, jumps bars, and boxes that vary in difficulty from novice to the most experienced skater.
- Knob Hill Playground is located off Middleton Street at the start of the Knob Hill Subdivision. The playground is open to the public each day from daylight to dusk.
- Galax Municipal Golf Course is located at 107 Country Club Lane and offers a 65-acre facility, 9-Hole Course, with 20 gas-powered golf carts available, as well as banquet room facilities.

Social Services

The Galax Department of Social Services, located at 105 East Center Street, provides state-supervised, locally administered programs to the citizens of Galax per the Code of Virginia. A variety of services are available to low-income families, including disaster assistance, energy assistance, food and nutrition assistance, medical assistance, child care assistance, and foster care. The Galax Department of Social Services also acts as a referral agency for other available services and resources.

Other social services offered by the Virginia Department of Social Services (VDSS) is a state-supervised and locally administered social services system responsible for administering a variety of programs including Temporary Assistance for Needy Families (TANF), Supplemental Nutrition Assistance Program (SNAP), Medicaid, Adoption, Child Care Assistance, Refugee Resettlement Services, and Child and Adult Protective Services. These services, provided throughout the state, serve as a major key to the success of our communities.

Cultural Amenities

The City of Galax has a plethora of cultural amenities, festivals, and events. Bluegrass and Old-Time Music have been a staple of the city's cultural heritage, and many events and attractions in Galax have roots in this musical tradition. The city has been the home to the annual Old Fiddlers Convention for 85 years. The Old Fiddler's Convention is a weeklong event that draws up to 40,000 visitors each year. Other musical events in the City of Galax include Houston Fest and a plentiful amount of local jam sessions. The historic Rex Theater is a music venue that hosts the live radio show Blue Ridge Backroads. The Galax Downtown Farmer's Market is located at the corner of Washington Street and Main Street and was originally constructed in the 1980s. The farmer's market has become a "place of neighborly interaction" where families and community members gather to buy local goods and participate in seasonal events. The farmer's market is also available for cooking demonstrations, concerts, and annual events. The city is also home to a professional cooking competition named Smoke on the Mountain which is held each year in Galax, VA. This competition, held every third weekend in July, is Virginia's official

state barbecue championship.

Government Administration

The City of Galax is an independent city, incorporated in 1953 as a separate and distinct jurisdiction from its adjoining county governments, under the unique provisions for local government charters in the Commonwealth of Virginia. The city is governed by a City Council composed of seven members who are elected at large with staggered four-year terms.

Galax operates under the council-manager system in which the City Council establishes policies and directs governmental services. The chief administrative officer is the City Manager, who is appointed by the City Council and serves at its pleasure. The City Manager is tasked with the responsibilities of preparing the city budget, directing the operations of the city departments, and implementing the policies of the City Council.

The city shares the circuit court system with Carroll and Grayson Counties, including the constitutional officers of Sheriff, Clerk of the Court, the Commonwealth Attorney, and the Circuit Court Judge. These judicial services are shared within Galax in accord with the original boundary between the two counties. Costs for these judicial activities are also shared between the jurisdictions.

Chapter 8: Summary of Conditions

Introduction

This Summary of Conditions is intended to be used to better outline and understand key action items that have been identified as (1) an important development, and (2) societal goals moving forward for the City of Galax. These goals have been expressed by those from within the local government (elected, appointed, and staff) and community and will be used as a guiding element of city life in Galax. The goals are meant to be long-range, ideal targets for future achievements. Ideally, these goals will be met and adopted in the coming years providing a betterment to the community not available or envisioned in the past.

Mission

The city seeks to preserve its most valued historic and natural features while achieving effective, efficient, sustainable, and diverse economic, community, and land use development, so as to protect the health, safety, and general welfare of all citizens, thereby providing a desirable living environment for this and future generations.

Population Trends and Housing

Situation Summary

The City of Galax, over the last ten years, has experienced a slight but steady decline in population. Dating back to 2014 the City of Galax had a population of 6,981 whereas in 2019 the population was 6,517. Looking to the future, much of the population decline in Galax will likely continue based on Census data and projections from information gathered in 2019. United States Census data for 2020 estimates that the population in the City of Galax is at 6,296. As the population ages and as retirees move to Galax, the demand for services for this population group will continue to increase. This represents a challenge to the city government and private institutions to maintain and expand services and facilities but also represents a potential net economic benefit to the community. In many cases, retirees will be “importing” dollars into the local economy from sources outside the city.

Housing in Galax is predominantly single-family detached, although the proportion of single-family units has steadily declined over the last ten years. These trends reflect escalating housing costs, and housing market competition in surrounding jurisdictions. Beginning in Q1 of 2020 the United States saw an extreme increase in the competitiveness of the housing market based on high demand secondary to record low-interest rates being backed by the federal government. Housing affordability has seen a rapid decline as the cost and value of housing for both owners and renters has increased at a much faster pace than family income over the past decade. Maintaining and improving the affordability of both housing prices and rents requires critical consideration as Galax officials plan for the future. The quantity of the city’s housing stock appears to be low but housing appears to be available in a majority of price ranges. The city should continue to implement housing rehabilitation projects to improve the quality and availability of low to moderate-income units while encouraging the supply and diversity of all housing types.

Economy

Situation Summary

While employment levels have declined dramatically since the late 1990s, the Galax economy has become more diversified by the recruitment of new businesses in various sectors. The city has focused on strengthening its tourism industry and promoting small business and entrepreneurial growth. Going forward, Galax must continue to focus on both traditional and non-traditional industrial recruitment, retain existing industries, continue to develop commercial opportunities city-wide and provide continuing entrepreneurial opportunities. Several of the city's key resources are closely related to industrial recruitment and economic development, including housing. Many communities across the nation have suffered constraints on economic development due to imbalances between their job bases and their housing stock. Such an imbalance would threaten the long-term economic expansion of Galax.

Land Use and Development

Situation Summary

Generally, there is an adequate amount of land zoned for most uses, with the possible exception of high-density residential. The current zoning pattern is in general concurrence with the existing Land Use Map found in this Comprehensive Plan, which reflects a blend of desired growth patterns, traditional or existing patterns, and patterns created inadvertently by the desire for convenient vehicular access to commercial uses.

As with many historic downtowns, Downtown Galax is under continued competitive pressure from automobile-oriented commercial development located along the major road corridors in the city and Carroll County. To remain viable, the city must continue the downtown revitalization efforts that have taken place thus far and work toward making Main Street a pedestrian-friendly attraction. Galax must continue to adapt to the changing economy through a focused marketing effort. Downtown Galax will continue to rely on the expanding tourism economy in Galax and the region, so marketing should be directed toward tourism-related business and attractions. Being able to maintain an appealing visual appearance is important for economic development and the overall quality of life and sense of community pride. Encouraging the maintenance of older housing stock, buffering industrial sites, screening the expansive parking lots associated with "strip" commercial development, and controlling the visual appearance of signs, are among the strategies that the city can initiate to improve its aesthetic quality.

Transportation

Situation Summary

The pattern, amount, and character of land development and growth in a community are shaped to a large extent by the roadway system that serves that development. The road system provides the framework or "skeleton" around which buildings and other structures are placed. According to the Virginia Department of Transportation, there were approximately 60.39 miles of public roadway within the Galax City Limits. The core of the road network in Galax is a traditional grid pattern of interconnected streets, with major roads radiating from Downtown Galax. As with most urban grids, the Galax network is modified and disconnected in some places due to topography, Chestnut Creek, and other natural and man-made features.

The road network serves many more functions other than simply carrying motor vehicle traffic. It also provides most of the public spaces and viewpoints from which citizens and visitors see and understand the community, and it establishes the visual and functional character of real property.

The greatest area of concern in terms of transportation is the effect of strip commercial development, especially along Route 58. Strip commercial development is both a current and long-term concern to the city, both in terms of traffic capacity and safety. It is also a detriment in regard to scenic and visual quality and tourism attraction. Maintaining the traffic capacity on U.S. Route 58 and VA Route 89, especially at peak hours, is linked with the issue of strip commercial development. Ensuring that arterial roads have the maximum possible consolidation of access points will help preserve their critical function. Implementing more modern parking-related regulations and practicing more traditional neighborhood design may prevent further induced demand on the road network.

Community Facilities and Government

Situation Summary

The City of Galax is no different than many of the other communities within Southwest Virginia in regards to the variety of challenges that the city government is facing. These challenges will likely be grounded in the continuing fiscal pressures associated with increasing standards and requirements for public facilities (water quality, education, etc.), an aging and diversifying population, increased economic competitiveness locally, statewide, and nationally as well as internal governmental pressure to better develop and grow their economic footprint across many industries. To achieve the goals set forth by those in local government, the City of Galax will need to provide effective, low-cost services by continuing to work with local and regional partners such as Carroll and Grayson Counties by way of the regional landfill authority and airport authority, Mount Rogers Regional Partnership, Twin County Chamber of Commerce, Mount Rogers Planning District Commission, and the Blue Ridge Crossroads Economic Development Authority. By utilizing these relationships, an economy of scale can be realized and the City of Galax can best provide services to its citizens.

Chapter 9: Goal Implementation

The City of Galax Comprehensive Plan is intended to guide the actions and decision-making of our city's elected and appointed officials, staff, and community stakeholders; to monitor our progress, and to celebrate our success in accomplishing our Plan's goals and vision. Annual reviews will enable City staff and members of the Planning Commission, and City Council to measure our progress, refine our priorities, and ensure adequate funds and other resources are allocated to accomplish our implementation goals during each budget cycle. To assist ongoing monitoring, the Plan's goals and strategies are summarized below in an Implementation Matrix outlining Implementation Priorities, Funding, Timeline, and Responsible Parties.

Definitions and Symbols

PRIORITY - A priority ranking of HIGH, MEDIUM, and LOW is assigned to each strategy, to help guide the allocation of funding and other resources. As community needs or interests change or funding ebbs and flows, the priority of some strategies may also change.

FUNDING - Indication of the financial resources deemed necessary to implement each strategy, using the "$" symbol to represent the relative cost of implementation.

$	≤$25,000
$$	$25,000-$100,000
$$$	$100,000-$500,000
$$$$	>$500,000

TIMELINE - Indication of the amount of time it may take to accomplish each strategic action.

Short-Term	1-2 Years
Intermediate	2-5 Years
Long-Term	5+ Years
Ongoing	Regular on-going efforts required

RESPONSIBLE PARTIES - Indication of key partners needed to accomplish each strategy.

CC	City Council
PC	Planning Commission
CS	City Staff
CG	Citizen Groups
BRCEDA	Regional Economic Development Commission
GTD	Galax Tourism Department
CoC	Twin County Chamber of Commerce
GDA	Galax Downtown Association
MRPDC	Mount Rogers Planning District
DEQ	Virginia Department of Environmental Quality
VDOT	Virginia Department of Transportation
PS	Private Sector Developers, Businesses & Property Owners

Population & Trends Goal

Strive to stabilize current population levels and work toward growth that will ensure support for the city moving into the future while upholding the heritage and historical values of the area.

Objective 1 - Create a community that continues to provide opportunities for younger generations that will incentivize retention and migration to the City of Galax while continuing to appeal as a destination for retirees.				
Strategy	**Priority**	**Funding**	**Timeline**	**Parties**
Strategy 1.1 - Market Galax as an area of opportunity within Southwest Virginia with sustainable and growing career opportunities.	High	$$	Ongoing	GTD, CoC, GDA
Strategy 1.2 - Pursue objectives that create a high quality of life in Galax, such as diversifying the local employment and industrial bases, ensuring educational opportunities for all citizens, developing cultural and recreational amenities, recruiting businesses for improved shopping, dining, and entertainment, and supporting the expansion of healthcare services.	High	$$	Ongoing	CC, CS
Strategy 1.3 - Promote the heritage of Galax through local and regional events.	High	$	Ongoing	GTD, CoC, GDA

Housing Goal

Ensure that the current and future housing stock of the City of Galax is well diversified and affords housing opportunities across all demographic and socioeconomic levels.

Objective 2 - Encourage the expansion of high-quality, affordable, housing, including participation in regional housing efforts.				
Strategy	**Priority**	**Funding**	**Timeline**	**Parties**
Strategy 2.1 - Encourage housing rehabilitation through available grant programs, such as the Community Development Block Grant program, USDA Rural Development, and the Virginia Housing programs.	Medium	$$	Intermediate	CC, CS, MRPDC
Strategy 2.2 - Encourage expanded homeownership among residents by providing incentives and assistance to prospective homeowners; utilizing city-owned property as developable land for housing units.	High	$$	Short-term	CC, CS, MRPDC
Strategy 2.3 - Promote the development of cooperative housing projects targeted at the retired population	High	$$	Short-term	CC, CS, MRPDC

Economy Goal

Encourage an expansion of economic diversity that promotes strong employment opportunities for all residents of the city and allows for those outside the area to find employment within the City of Galax.

Objective 3 - Facilitate new and existing business/industry expansion that provides quality employment opportunities within the city.				
Strategy	**Priority**	**Funding**	**Timeline**	**Parties**
Strategy 3.1 - Participate in the regional economic activities of the Blue Ridge Crossroads Economic Development Authority, including the development of Wildwood Commerce Park.	Medium	$	Ongoing	CC, CS, BRCEDA
Strategy 3.2 -Facilitate workforce development by partnering with the Crossroads Rural Entrepreneurial Institute and the Galax Public School System to implement training strategies.	Low	$	Ongoing	CC, CS
Strategy 3.3 - Continue to market the city's enterprise zone and the incentives available to businesses that locate or expand in the enterprise zone.	High	$	Ongoing	CC, CS

Objective 4 - Promote Galax as a destination location for visitors and new residents.				
Strategy	**Priority**	**Funding**	**Timeline**	**Parties**
Strategy 4.1 - Continue to support tourism, in conjunction with local businesses, on a regional scale with organizations like The Crooked Road: Virginia's Heritage Music Trail and 'Round the Mountain: Southwest Virginia's Artisan Network, in cooperation with the state.	High	$	Ongoing	GTD, GDA
Strategy 4.2 - Advertise the New River Trail State Park as a community asset and capitalize on the benefits the trail provides for residents and as a tourism attraction.	Medium	$	Ongoing	GTD
Strategy 4.3 - Support efforts to market the Chestnut Creek School of the Arts as a regional heritage tourism destination.	Medium	$$	Ongoing	CCSA, GTD, GDA

Strategy 4.4 - Support the continued success of the historic Rex Theater, the Old Fiddler's Convention, Smoke on the Mountain BBQ championship, and other cultural attractions and events.	Medium	$$	Ongoing	GTD, GDA
Strategy 4.5 - Support joining the Virginia Main Street program administered by DHCD and follow the Main Street America Approach.	High	$$	Ongoing	CC, CD, GDA

Land Use & Development Goal

Establish a sustainable development plan to promote reasonable growth while recognizing the importance of historic significance without sacrificing the public health, welfare, and safety of the community.

Objective 5 - Provide opportunities for the effective and responsible development of commercial parcels while ensuring that new developments are well planned, orderly, and attractive.				
Strategy	**Priority**	**Funding**	**Timeline**	**Parties**
Strategy 5.1 - Encourage planned commercial developments to locate in strategic, clustered locations rather than continual strip development along arterial roads.	Medium	$	Short-term	CC, CS, PC
Strategy 5.2 - Ensure that zoning regulations protect neighborhoods from the encroachment or indirect impacts of incompatible land uses.	Medium	$$	Short-term	CC, CS, PC
Strategy 5.3 - Enforce the maintenance of vacant lots and buildings, particularly in the historic downtown area, to enhance the value of all adjacent properties.	High	$$	Ongoing	CC, CS
Strategy 5.4 - Promote infill development as a top priority for small-scale businesses and industries.	Medium	$	Intermediate	CC, CS, PC
Strategy 5.5 - Promote the reuse and redevelopment of existing sites and structures as a higher priority than developing open space.	Medium	$	Short-term	CC, CS, PC
Strategy 5.6 – Encourage development of mixed-use areas, increasing adaptive reuse potential, and reducing infrastructure impacts.	High	$$	Ongoing	CC, PC, CS

Objective 6 - Enhance Galax as a major tourism destination, focusing on its traditional heritage, natural beauty, outdoor recreation, and overall quality of life.				
Strategy	**Priority**	**Funding**	**Timeline**	**Parties**
Strategy 6.1 - Ensure that the entrance corridors to Galax are attractive and harmonious.	High	$$	Ongoing	CC, CS
Strategy 6.2 - Maintain and enhance vehicular and pedestrian access to downtown Galax.	Medium	$$	Intermediate	CC, CS, VDOT

Transportation Goal

Advance existing transportation systems to promote safety and efficiency within the city while ensuring the most effective use of city resources.

Objective 7 - Ensure that all new roadways are designed to balance the multiple functions of the road; serve motor vehicles, pedestrians, and bicycle traffic; and be visually and environmentally compatible with surrounding land uses.				
Strategy	**Priority**	**Funding**	**Timeline**	**Parties**
Strategy 7.1 - Encourage new roads and road extensions that will connect to the existing road network to balance traffic loads and provide alternative routes for traffic flow.	Low	$$$	Long-term	CC, CS, VDOT
Strategy 7.2 - Work with the Virginia Department of Transportation to monitor the traffic flow and safety conditions of the city's roadway system and maintain a list for system improvements.	Low	$$	Short-term	CC, CS, VDOT
Strategy 7.3 - Ensure that new developments are sized and designed to be compatible with the function and capacity of the adjacent roadways that will serve them.	Medium	$	Long-term	CC, CS, PC
Strategy 7.4 - Improve upon existing pedestrian infrastructure, while also expanding sidewalks into residential areas throughout the City.	High	$$	Long-term	CC, CS, PC, VDOT
Strategy 7.5 – Improve the future efficiency of the transportation system through implementation of urban development area(s), incorporating principals of traditional neighborhood design.	High	$	Ongoing	CC, CS, VDOT, GDA

Community Facilities and Government Goal

Maintain and improve the city's infrastructure while continuing to develop a system of open space, recreational facilities, and cultural opportunities for the benefit and enrichment of all citizens.

Objective 8 - Provide an infrastructure of local government facilities and services that is modern and adequate to meet the needs of present and future citizens, while striving to maintain a reasonable and competitive city tax rate.				
Strategy	**Priority**	**Funding**	**Timeline**	**Parties**
Strategy 8.1 - Ensure that infrastructure is modern and adequate to meet the needs of present and future citizens by utilizing green and sustainable means.	High	$$$$	Intermediate	CC, CS, DEQ
Strategy 8.2 - The city should continue to upgrade and expand the water and wastewater systems using federal, state, regional, and local funding sources, such as the Mount Rogers Planning District Commission Water/Wastewater Fund.	High	$$$$	Intermediate	CC, CS, DEQ
Strategy 8.3 - Expand the academic and vocational course offerings of the public schools as required to ensure that all needs are adequately met.	Medium	$$	Long-term	CC, CS
Strategy 8.4 - Maintain and improve the capabilities of the professional police force, professional EMS, and volunteer fire through additional training, modern equipment, and innovative programs.	Medium	$$	Ongoing	CC, CS