Region 2000 Hazard Mitigation Plan

Participating Jurisdictions:

Altavista, Town of	Appomattox, Town of	Campbell County
Amherst County	Bedford County	Lynchburg City
Amherst, Town of	Bedford City	Pamplin City, Town of
Appomattox County	Brookneal, Town of	

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Developed and published by Region 2000 Staff.

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Executive Summary

This plan is an update of the Region 2000 Hazard Mitigation Plan. The original Hazard Mitigation Plan for Region 2000 was written in 2006. Although it is an update, this document has been redesigned so that it looks, feels, and reads differently than the original. This is due to several factors: new hazard information has become available that drives new definitions of risk, the region has matured and new capabilities are now available that drive new definitions of risk, the region has matured and new capabilities are now available, and the new format will allow readers to more easily understand the content. In addition, the original Hazard Mitigation Plan included several action items that have been completed, creating an opportunity for developing new mitigation strategies.

Mitigation is defined in the English language as “the action of lessening in severity or intensity”. Hazard mitigation focuses on lessening the severity and intensity of identified hazards as well as protecting life and property. A hazard mitigation plan produces specific measures to be taken by a community to reduce the vulnerability from hazards of future events and reducing the recovery time from damages incurred. Such a plan is created through a planning process with input from citizens, business owners, public safety officials, and other stakeholders.

This plan update includes an updated list of identified natural hazards what are considered to be a threat to each county, an update to the evaluation and analysis of the risks of exposure each jurisdiction in Region 2000 has, an update to the strategy for long and short mitigation of identified natural hazards and a plan for on-going review and maintenance of the Region 2000 Hazard Mitigation Plan. With these updated items, the plan follows the requirements for local mitigation planning as required under Section 322 of the Stafford Act (42U.S.C. 5165) and 44 CFR Part 201 as the necessary components of a local hazard mitigation plan and the new regulations for the program per.

The Project Management Team reviewed each section of the plan to make sure the protocols adequately served the purpose of the plan. The plan maintenance section was reviewed and confirmed. The mitigation strategies section was reviewed and updated to include new mitigation strategies and update the ones in the existing plan.

In 2006, the Center for Geospatial Information Technology at Virginia Tech was contracted by Region 2000 to carry out the original Hazard Mitigation Plan. This update process was carried out in house by Region 2000 staff. Funding for the project was provided through a grant from the Virginia Department of Emergency Management with the appropriate match made by each local government in Region 2000.

Authority

Section 209 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-228, as amended), Title 44 of the Code of Federal Regulations (CFR), as amended by Section 201 of the Disaster Mitigation Act of 2000, outlines the steps for state and local governments to assess and mitigate all hazards as a requirement of receiving federal disaster assistance. A key requirement of the law is the creation of a local hazard mitigation plan.

The adoption of the Region 2000 Hazard Mitigation Plan Update 2013 by the participating jurisdictions assures continuing entitlement for Federal Emergency Management Agency (FEMA) grant assistance through the Hazard Mitigation Grant Program, the Pre-Disaster Mitigation Grant Program, the Flood Mitigation Assistance Program, and other federally-funded programs.

Jurisdictions

The Region 2000 Hazard Mitigation Plan is multi-jurisdictional in scope, covering the following jurisdictions:

The area covered by this plan includes:

Participating Communities	
Counties	**Towns**
Amherst County	Town of Altavista
Appomattox County	Town of Appomattox
Bedford County	Town of Amherst
Campbell County	Town of Brookneal
	Town of Pamplin City

Cities
City of Bedford
City of Lynchburg

The Region 2000 Hazard mitigation Plan and its 2013 update fulfills the requirements of the Sections 201.6(a)(3) and 201.6(c)(5) of the Disaster Mitigation Act of 2000 as administered by the Virginia Department of Emergency Management (VDEM) and FEMA, for multi-jurisdictional planning participation and adoption. This plan is awaiting evaluation and approval from FEMA before it can be evaluated and adopted by the eleven participating local governments. (Resolutions have not yet been adopted. Resolutions will become available upon approval by FEMA).

Participation

All jurisdictions listed in the above section of the Region 2000 Hazard Mitigation Plan participated in the creation of the original plan and this update to the plan. Representatives who were unable to attend planning meetings were given the opportunity to participate through meeting minutes and the review of draft material. Each jurisdiction will have participated through a formal resolution to be adopted, approving the plan update.

Participation in the Region 2000 hazard mitigation planning update process included a project management team and public participation. The project management team was made up of local officials from each jurisdiction, setting a meeting schedule and tracking participation and follow-up measures. The public participation side of the planning process included building awareness of the plan through public workshops and giving opportunities for plan review and comments. Region 2000 staff and the PMT oversaw the public education process and agreed that it was integral to the update.

Participation in the update included a series of four PMT meetings to review and update the plan. In addition, two public hearings were administered by Region 2000 staff and the PMT before the draft was provided to the participating localities' governing bodies. Dates and times of public meetings were available through the Region 2000 Hazard Mitigation Plan Update webpage.

Each of the jurisdictions in this plan was represented by either elected officials and/or staff from the locality with knowledge of local safety and emergency response. The membership of the PMT is in accordance with the requirements of Section 44 CFR 201.6(b)(2) for a multi-jurisdictional plan and the members are listed on the following page.

Table 1.1 Project Management Team Members

Name	Jurisdiction
Gary Roakes	Amherst County
Kelvin Brown	Amherst, Town of
Freddie Godsey	Appomattox County
Johnnie Roark	Appomattox County
Roxanne Paulette	Appomattox, Town of
Bob Mitchell	Pamplin City, Town of
Bart Warner	Bedford City
Seth Mowles	Bedford County
Marci Stone	Bedford County
Jack Jones	Bedford County
Tracy Fairchild	Campbell County
Randall Johnson	Campbell County
Dan Witt	Altavista, Town of
Mike Crews	Brookneal, Town of
Bill Aldridge	Lynchburg City
Todd Styles	Volunteer Firefighter
Philipp Gabathuler	Region 2000
Bob White	Region 2000

Introduction

The purpose of the Region 2000 Multi-Jurisdiction Hazard Mitigation Plan Update is to identify areas of concern from natural hazards in the region and describe how these concerns will be addressed through the implementation of mitigation actions. This plan satisfies section 322 requirements for local hazard mitigation planning.

The appendix for this sections contains the Disaster Mitigation Act of 2000 (DMA2K) requirements. Hazard mitigation is any sustained action taken to reduce or eliminate long term risk to life, property and the economy from a hazard event. In the past, federal legislation has provided primarily post-disaster funding for disaster relief, recovery, and some hazard mitigation planning. DMA2K is the latest legislation to address this planning process. DMA2K was enacted on October 10, 2000, when President Clinton signed the Act (Public Law 106-390). The new legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. As such, this Act establishes a pre-disaster hazard mitigation program and new requirements for the national Hazard Mitigation Grant Program (HMGP). States and local governments are required to adopt hazard mitigation plans to maintain eligibility for pre-disaster and post-disaster federal hazard mitigation funding.

In accordance with the requirements of the DMA2K, a multi-hazard mitigation plan was prepared for Region 2000. By having the mitigation plan in place, jurisdictions in Region 2000 will be able to better understand local hazards and the risks posed by them. During plan development, the project management team—made up of local emergency response officials—developed mitigation activities to lessen the impacts, and to acquire disaster-related grants in the aftermath of a disaster.

Region 2000, on behalf of its member jurisdictions, has developed this plan to serve as a guide to its jurisdictions when assessing potential vulnerabilities to natural hazards. When developing this plan, every effort was made to gather input from all aspects of the project area communities to assure that the results of this analysis will be as complete as possible. The planning area for this study includes the four counties, two cities, and five towns that make up Region 2000. The hazard mitigation plan only addresses natural hazards at this time, with a brief description of terrorism concerns in the region. Future updates of this plan will address these concerns.

Region 2000 was awarded a planning grant from Hurricane Isabel FEMA Hazard Mitigation Grant Program (HMGP) Virginia funds to update this plan. The grant application process was led by the Virginia Department of Emergency Management (VDEM), which provided valuable assistance to throughout the planning process.

A project management team was established to provide input to the planning process. The committee was made up of public representatives, private citizens, businesses, and organizations. Efforts to involve local and county departments, as well as other regional and community organizations that might have a role in the implementation of the mitigation actions or policies, included invitations to attend meetings and serve on the committee, e-mails of minutes and updates, and opportunities for input and comment on all draft deliverables.

The development of this plan is the collaboration of the efforts of state and local governments, emergency responders and public input. The members of the project management team were able to provide feedback on the development of the mitigation plan. This effort pulls together many community initiated actions and serves as a sounding board for all the jurisdictions within Region 2000.

Plan Organization

The Region 2000 Hazard Mitigation Plan is organized into six main sections. These sections being:

Section	Description
Community Descriptions	The Community Descriptions provides information on the geography and demographics of the region.
Planning Process	The *Planning Process* provides information on the makeup of the steering committee members, meetings for the committee members and public, and the steps taken to complete and adopt the mitigation plan.
Hazard Identification and Risk Assessment (HIRA)	The *HIRA* provides detailed descriptions and maps on how the region is impacted by various natural and man-made hazards.
Capability and Mitigation	The *Capability and Mitigation* section provides information on each community's rankings of mitigation actions and the capability to implement individual mitigation actions.
Plan Maintenance	The *Plan Maintenance* provides information on the region's ability to maintain and update the plan.
References	The *References* provides a listing of the different resources used in the development of this plan.
Appendices	The *Appendices* provides the figures, tables and reports that are referenced in the body of the plan.

Community Profiles

Summary of changes

The community profiles section underwent several changes in the plan update process. All demographic and economic data was updated according to US 2010 data or American Community Survey Data from 2006-2011. Since higher education has also become a strong contributing factor to the region, student enrollment numbers were closely monitored since the last plan and updated according to the academic institutions' numbers.

Updated National Flood Insurance Policy data was obtained from the Department of Conservation and Recreation and inserted into the National Flood Insurance Program section of each jurisdiction's profile.

The land use and geography described for each jurisdiction remains intact since no substantive change has occurred in either since the original plan was written in 2006.

Region 2000

Region 2000 is a business-friendly region in the heart of Virginia, just three hours south of the Washington DC metro area. Communities that make up the region include Amherst County, Bedford County, Appomattox County, Campbell County, Bedford City, Lynchburg City, and the towns of Altavista, Appomattox, Amherst, Brookneal and Pamplin City. The total population in 2010 of these communities was 252,634—up 14% from the 2000 Census.

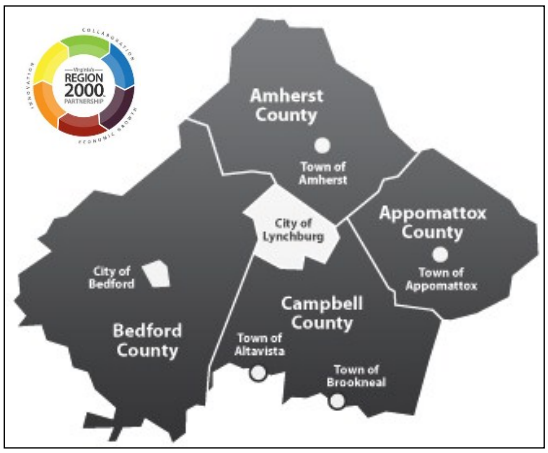


Figure 3.1 details the jurisdictions participating in the mitigation planning efforts.

Virginia Planning District Commissions (PDCs) were formed in 1968 through the Code of Virginia. Title §15.2, labeled Counties, Cities and Towns of title §15.2 chapter 42 labeled Regional Cooperation Act (§15.2-4200 through §15.2-4222). The PDCs serve as a network in providing the Commonwealth with complete statewide coverage. PDCs were developed to provide both technical and service programs to the governments they serve. In January 2001 the Central Virginia PDC was transformed into the Region 2000 and has recently become known simply as Region 2000.

The main purpose of the commission is to provide economic competitiveness on a regional scale, reduce redundancies in government, improve efficiency, enhance services, and improve implementation time for regional projects. The region's two major U.S. highways are 29 and 460. The highways have become corridors for most of the industrial, commercial, and residential development.

Primary economic categories in the region include higher education, wireless technology, manufacturing automation, nuclear energy, plastics, pharmaceuticals, and health care. Region 2000 belongs to one of the technology councils making up the Virginia Technology Alliance.

The region is rich in civil war history, with battlefields, historical parks, and museums found throughout. Climate in the region is mild, with average January and July temperatures at 35°F and 71°F and annual rainfall and snowfall at 40" and 21" respectively.

Amherst County

Amherst County is located near the geographic center of Virginia just north of the city of Lynchburg. The county was created in 1761 from Albemarle County and is named for Major General Jeffery Amherst, a hero of the battle of Ticonderoga. It is bounded on the northwest by Rockbridge County, to the south and southwest by Bedford County, Campbell County and the City of Lynchburg and on the northeast by Nelson County. The James River borders the county on the south and east with the crest of the Blue Ridge Mountains forming the western Boundary. According to the US Census, Amherst County had a 2010 population of 32,353. Half the population is located in the south central portion of the county near the City of Lynchburg and around Madison Heights. The Town of Amherst was incorporated in 1910 and is situated on the topographic divide separating Tribulation Creek and Rutledge Creek. The Town of Amherst serves as the county seat. As of the 2010 US census, the town had a total population of 2,231. Sweet Briar College, a private women's liberal arts and science college, enrolls approximately 700 students. The college, founded in 1901, encompasses 3,250 acres located in the foothills of the Blue Ridge Mountains. Elevations ranging from 500 feet to 4,000 feet provide the County with spectacular rolling countryside.

National Flood Insurance Program

Amherst County entered into the National Flood Insurance Program (NFIP) on July 17, 1978 with emergency entry on March 1, 1974. The current effective date for the FIRMs is September 19, 2007. They are currently in good participating standing with the program. The county has 46 flood policies in force with $9,848,800 losses paid. Amherst County plans to continue NFIP compliance. The Town of Amherst entered into the NFIP November 2, 1977 with emergency entry on February 7, 1974. The current effective date for the FIRMs is also September 19, 2007. They are currently in good participating standing with the program. The town has 2 flood policies in force with $128,029 losses paid. The Town of Amherst plans to continue NFIP compliance.

Land Use

Woodlands cover approximately three-fourths of the land, and most of the northwestern portion of the county is part of the George Washington National Forest. The US highway 29 corridor in the eastern region of the county has become the focal point for most commercial, industrial and residential development, especially near Lynchburg City.

Appomattox County

Appomattox County is located at the geographic center of Virginia. The lack of efficient intra-state communication and the need for localized service initiated the formation of the county by an act passed on February 8, 1845. This act designated that Buckingham, Prince Edward, Charlotte and Campbell counties each would give portions of their lands as of May 1, 1845. The county consists of 343 square miles of gently rolling terrain indicative of Virginia's Piedmont Region. Appomattox County is perhaps best known in history as the site of the end of the Civil War at Appomattox Court House. The county is bordered to the north by Amherst County, Buckingham County and Nelson County, to the south by Charlotte County, to the east by Prince Edward County and Campbell County to the west. The James River serves as the northwest border. The towns of Pamplin and Appomattox are within the county, with the Town of Appomattox being the county seat. The 2010 population of Appomattox County was 14,973, up 8.2% from the 2000 US Census.

Elevations range from 460 feet to 1,151 feet above sea level. Drainage is provided by the James River, Appomattox River, Roanoke River Drainage Area and Bent and Wreck Island Creeks.

National Flood Insurance Program

Appomattox County entered into the NFIP on July 17, 1978 with emergency entry on February 11, 1974. The current effective date for the FIRMs is January 2, 2008. They are currently in good participating standing with the program. The county has 8 flood policies in force with $253,216 losses paid. Appomattox County plans to continue NFIP compliance.

The Town of Appomattox entered into the NFIP on May 25, 1984 with emergency entry on February 22, 1974. The current effective date for the FIRMs is January 2, 2008. They are currently in good participating standing with the program. The town has 0 flood policies in force. The Town of Appomattox plans to continue NFIP compliance.

The Town of Pamplin City entered into the NFIP on February 12, 1976 with emergency entry on November 11, 1974. The current effective date for the FIRMs is October 2, 2009. They are currently in good participating standing with the program. The town has 0 flood policies in force. The Town of Pamplin City plans to continue NFIP compliance.

Land Use

Commercial forestland comprises more than half of the county's land area and a large portion of the rest of the county is crop and pasture lands. This natural resource base has helped foster a significant forestry, wood products, and furniture industry. Most of the commercial, industrial, and residential development exists along US 460 in central and southeastern portions of the county between Lynchburg City and the Town of Appomattox.

Bedford City

In 1782 the Town of Liberty was incorporated into Bedford County, and in 1890 changed its name to the Town of Bedford. In 1912, the town became known as Bedford City. The city is situated on U.S. Route 460 in the center of Bedford County and serves as the county seat. According to the 2010 U.S. Census, Bedford City is populated by 6,222 residents. The residents of this small City enjoy living in a small city with the convenience of being strategically located between the cities of Lynchburg and Roanoke, the largest cities in Central Virginia. The cities most popular attraction is the National D-day Memorial, in honor of the 19 "Bedford Boys" who died in the first minutes of the Normandy landings at Omaha Beach.

National Flood Insurance Program

Bedford City entered into the NFIP on June 1, 1978 with emergency entry on March 12, 1974. The current effective date for the FIRMs is September 29, 2010. They are currently in good participating standing with the program. The county has 2 flood policies in force with $0 losses paid. Bedford City plans to continue NFIP compliance.

Land Use

The city includes 6.77 square miles in Virginia's Western Piedmont area, surrounded by mountains and beautiful Smith Mountain Lake to the South. Most of the land use is low intensity residential, pastures, and forest, with commercial and industrial development stretching along the 460 corridors in central and southern portions of the city.

Bedford County

Bedford County consists of 764 square miles located in west-central Virginia just east of the Roanoke metropolitan area. Bedford County was formed in 1754 and named for the Fourth Duke of Bedford, a British Government official. In 1839, the Town of Liberty (now City of Bedford) was established within the county limits. The scenic Blue Ridge Mountains make up the county's western border. The James River forms the northeast boundary. The 23,400-acre Smith Mountain Lake is situated to the south on the Roanoke River. Communities bordering Bedford include Rockbridge County to the northwest, Amherst County to the north and northeast, Campbell County to the east, Pittsylvania County to the south and Franklin, Roanoke and Botetourt Counties to the west.

According to the 2010 U.S. Census, the population of Bedford County is 68,676—up 9.5% from the 2004 U.S. Census American Community Survey. The area has a rolling to hilly terrain with elevations from 800 feet to 4,200 feet above sea level, including the famous Peaks of Otter, Sharp Top and Flat Top, along the Blue Ridge Parkway on the county's western border.

National Flood Insurance Program

Bedford County entered into the NFIP on September 29, 1978 with emergency entry on January 16, 1974. The current effective date for the FIRMs is September 29, 2010. They are currently in good participating standing with the program. The county has 145 flood policies in force with $206,583 losses paid. Bedford County plans to continue NFIP compliance.

Land Use

The majority of Bedford County land use is forest and pastures, with commercial, industrial, and residential development focused in Bedford City and along Routes 460 and 221. Strategically located between the metropolitan areas of Lynchburg and Roanoke, the county is home to a diversified industrial base and displays an appealing quality of life. The good mix of industry, commerce and agriculture ensures a strong, diversified economy and a positive business climate. Most of the residential growth occurs near Smith Mountain Lake and Lynchburg City.

Campbell County

Campbell County is located in the south-central Piedmont Region of Virginia, in the foothills of the Blue Ridge Mountains. From its beginnings in 1781 as a frontier settlement, to its emergence as a tobacco producer and then a center for industrial manufacturing, Campbell County has continually evolved and grown with national and world changes. The county is bordered on the north by the city of Lynchburg and the James River and in the South by the Roanoke (Staunton) River. Campbell County is 115 miles west of Richmond, the state capital; 200 miles southwest of Washington, DC; and 200 miles west of Norfolk.

The Town of Brookneal, near Phelps Creek and Falling River, has been a center for commerce for the surrounding counties of Campbell, Charlotte, and Halifax since its founding in 1802. The unincorporated Town of Rustburg serves as the county seat.

Altavista is a relatively new town in southern Campbell County, incorporated in 1912. Residential and industrial growth occurred within the town boundaries until around 1960, after which the concentration of new development took place outside the boundaries. According to the 2010 U.S. Census, Campbell County has a population of 54,842.

National Flood Insurance Program

Campbell County entered into the NFIP on October 17, 1978 with emergency entry on December 27, 1973. The current effective date for the FIRMs is August 28, 2008. They are currently in good participating standing with the program. The county has 28 flood policies in force with $7,078,900 losses paid. Campbell County plans to continue NFIP compliance.

Town of Altavista entered into the NFIP on August 1, 1978 with emergency entry on February 19, 1974. The current effective date for the FIRMs is August 28, 2008. They are currently in good participating standing with the program. The town has 12 flood policies in force with $79,561 losses paid. Town of Altavista plans to continue NFIP compliance.

Town of Brookneal entered into the NFIP on March 1, 1978 with emergency entry on January 15, 1974. The current effective date for the FIRMs is August 28, 2008. They are currently in good participating standing with the program. The Town of Brookneal has 3 flood policies in force with $0 losses paid. Town of Brookneal plans to continue NFIP compliance.

Land Use

The majority of the county land use is a combination of forest, pastures, and farmland. Commercial and residential development is found near Lynchburg, in the towns of Brookneal and Altavista, and along Routes 29 and 501. Four-lane primary highways and rail service provide access to markets in the eastern portion of the county. Industrial activity in the county has concentrated around the towns of Brookneal and Altavista and the northern portion of the county close to Lynchburg.

Lynchburg City

The city of Lynchburg is located near the geographic center of Virginia. In 1757, John Lynch established a ferry service on the James. The ferry service remained profitable for many years, and by the end of the American Revolution, the village at Lynch's Ferry had itself become an important center of trade. Lynch saw the possibilities of establishing a town on the hill overlooking the ferry site, and in late 1784 petitioned the General Assembly of Virginia for a town charter. In October, 1786, the charter was granted, founding the town of Lynchburg.

Located on the James River, the city has a land area of 48 square miles and is bordered on the west by the Blue Ridge Mountains and Bedford County, to the south by Campbell County, and to the North by Amherst County. According to the 2010 U.S. Census, the city has a population of 75,568 and is a major highway and transportation hub that has contributed to its status as a broadly diversified manufacturing center. Lynchburg is 115 miles west of Richmond, the state capital; 52 miles east of Roanoke; 180 miles southwest of Washington, D. C.; and 200 miles west of the Port of Hampton Roads. Lynchburg is the central city of the Lynchburg Metropolitan Statistical Area (MSA), which—according to the 2010 U.S. Census—has a total population of 252,634. Liberty University, a private coeducational Christian university, enrolls over 7,000 students residentially and over 10,000 students in distance learning. The university, founded in 1971, encompasses 4,400 acres located in the foothills of the Blue Ridge Mountains and south of the James River.

National Flood Insurance Program

Lynchburg City entered into the NFIP on September 1, 1978 with emergency entry on September 18, 1973. The current effective date for the FIRMs is June 6, 2010. They are currently in good participating standing with the program. The city has 96 flood policies in force with $3,247,935 losses paid. Lynchburg City plans to continue NFIP compliance.

Land Use

Most of the city is low intensity residential, with commercial and industrial development focused in eastern portions of the city in the downtown region and along US Highways 460 and 501. The region's overall quality of life is tied directly to the health of the city's economy. The city keeps pace with changes in technology and telecommunications, attracting national and international businesses and fusing the local and regional market with the nation and the world.

Plan Linkage

Region 2000 encompasses a unique combination of both rural and urban life. This distinctive mix lent itself nicely in establishing the Region 2000 project management team in the update process for the Hazard Mitigation Plan. The following section outlines the development of the project management team and meetings held during the plan development.

Planning Process

Region 2000 applied for and was successful in obtaining FEMA Hazard Mitigation Grant Program (HMGP) planning funds that were made available from FEMA's Pre-Disaster Mitigation Program of 2010 for the Hazard Mitigation Update Process. The preparation of this plan update at the regional level was decided as the most cost and time effective solution for consistent and full coverage of the localities in Region 2000. The Appendix for this section includes the memorandums and letters from VDEM regarding funding and guidance for the region.

In 2010, Region 2000 began coordination with the counties of Amherst, Appomattox, Bedford, cities of Bedford and Lynchburg and the towns of Altavista, Brookneal, Amherst and Pamplin City to develop and implement the hazard mitigation update planning process. The appendix -2 contains the Letters of Intent that were signed by the participating localities.

Summary of Changes

The project management team reviewed this section of the plan as a part of the plan update and agreed upon the following changes. The public input methods were beefed up a bit in order to garner input from larger institutions within the region as well as neighboring planning districts. The methods in which the plan was incorporated into other major plans such as the comprehensive plan and the land use plan remained the same. The majority of changes in this section were geared toward raising public and institutional awareness for the plan.

Project Management Team

This planning process began by developing the Hazard Mitigation Plan "project management team" which was composed of representatives from the 11 jurisdictions (Table 4.1). Deputy Director for Region 2000 Core and Planning Services, Robert White, presided over of the planning efforts for the region. An important component to the beginning stages of this plan was to determine support from external sources, engaging public support and involvement, and evaluating the resources needed to develop and carry out the plan. Participating affiliates for this process included Region 2000 partnerships, local government officials, public representatives, businesses, citizens, and organizations.

Table 4.1 Project Management Team Members

Name	Jurisdiction
Gary Roakes	Amherst County
Kelvin Brown	Amherst, Town of
Freddie Godsey	Appomattox County
Johnnie Roark	Appomattox County
Roxanne Paulette	Appomattox, Town of
Bob Mitchell	Pamplin City, Town of
Bart Warner	Bedford City
Seth Mowles	Bedford County
Marci Stone	Bedford County
Jack Jones	Bedford County
Tracy Fairchild	Campbell County
Randall Johnson	Campbell County
Dan Witt	Altavista, Town of
Mike Crews	Brookneal, Town of
Bill Aldridge	Lynchburg City
Todd Styles	Volunteer Firefighter
Philipp Gabathuler	Region 2000
Bob White	Region 2000

Timetable of meetings

Three formal meetings were held throughout the planning process and about 25 meetings were held with individual localities in the update process. The formal meetings were held at the Region 2000 offices located in Lynchburg, the central location of Region 2000. The individual meetings were usually held by teleconference. All of the formal meetings were open to the public and advertised through the Region 2000 agency website as well as through the newspaper. Newspaper ads can be viewed in the appendix.

The Appendices for this section provide the agendas, dates and jurisdictions represented at the various project management team meetings. Every locality involved provided feedback and helped to mold the plan update into what they needed.

Project management team meetings

The three formal project management team meetings provided a forum for exchanging ideas and receiving feedback from the different localities. The first meeting held in May 2010 was held to re-educate the project management team on the goals and objectives of the original hazard mitigation plan and to scope the process out. The second meeting was held to discuss the HIRA portion of the update, with project management team member providing feedback on what information was still viable and what information needed to be updated. The third project management team meeting was held in order to update the Mitigation Goals and Strategies section.

Public Input

Public input was received in a variety of methods. The public was encouraged to attend the formal project management team meetings through the Region 2000 agency website and newspaper advertisements. The newspaper advertisement for public comment was placed in the News and Advance—a newspaper with expansive reach that goes beyond the boundary of Region 2000. The newspaper reaches businesses, academia, nonprofits, and other important community voices in the region. According to News and Advance Staff, the newspaper is circulated to all the jurisdictions in Region 2000 and beyond upon request. Region 2000 jurisdictions include the counties of Amherst, Appomattox, Bedford, and Campbell as well as the Cities of Lynchburg and Bedford and the towns of Appomattox, Amherst, Pamplin City, and Brookneal. The newspaper is circulated heavily to the area universities—including Liberty University, Sweet Briar College, Randolph College, and Lynchburg College. The newspaper is also available worldwide via their website: www2.newsadvance.com.

There was also a section on the website where comments on the update process could be posted and answered. Sections of the plan were made available online to the public as they were being updated.

Letters were also sent out to neighboring PDCs to inform them of our planning process as well as to gather input. The letter—included in the appendix for this section—was sent to the Roanoke Valley Alleghany Regional Commission, the Central Virginia Shenandoah Planning District Commission, the Thomas Jefferson Planning District Commission, the Commonwealth Regional Council, and the Southside Planning District Commission.

Development of the Plan

The next section required performing assessments of natural and manmade hazard vulnerabilities within the Region 2000 boundaries. Data for critical hazards within the region was collected and analyzed to identify the relative ranking of each hazard and delineate areas of highest concern.

Evaluation of each hazard involved assessing the risks and vulnerabilities of public and private buildings, facilities, utilities, communications, transportation systems, and other critical infrastructure, and determining estimated losses that would occur if the given hazard were to impact the region.

The comprehensive plans, budgets, and emergency operations plans were researched in the development of the Hazard Mitigation Plan update. Information from these existing plans that were reviewed as part of the update process were included where appropriate.

Upon completion of hazard assessments, hazard mitigation plans and strategies were developed for the region with an emphasis on developing disaster prevention and preparedness programs and actions to reduce the impact of natural and manmade disasters. This involved determining hazard mitigation priorities and developing mitigation strategies to avoid or minimize substantial human and economic costs of each disaster. In the development of the mitigation plan many resources were used to develop the actions for the various regions. The project management team members were able to provide Region 2000 staff with information obtained from Emergency Operations Plans (EOPs), Zoning, Jurisdictional manuals and capital improvement plans. The information provided by the communities was used in the development of the HIRA and mitigation actions.

Comprehensive Plans

A community's comprehensive plan provides the future vision for the community regarding growth and development. Hazard mitigation planning is not specifically addressed as a goal or objective in any of the comprehensive plans in the study area. Only one comprehensive plan includes a hazard mitigation strategy. However, many of the plans include land use or environmental protection goals that could support future mitigation efforts. These goals generally address flood-prone areas. There also may be opportunities to include hazard mitigation in revisions to the comprehensive plans and to link to existing goals. For example, limiting development in the floodplain (which can be considered mitigation) also may help meet open space goals laid out in a plan.

Stormwater Management Plans

Currently, the Environmental Protection Agency is requiring localities to update their stormwater regulations to meet new and heightened standards. This process will require significant funding to clean up existing and future sources of water runoff. The plan will be updated with new regulations when they become available.

Emergency Operations Plans

A comprehensive Emergency Operations Plan (EOP) typically predetermines actions to be taken by government agencies and private organizations in response to an emergency or disaster event. The plan describes the jurisdiction's capabilities to respond to emergencies and establishes the responsibilities and procedures for responding effectively to the actual occurrence of a disaster. Hazard mitigation is incorporated into the various operational phases of these plans.

Hazard mitigation is included as a functional annex to the Emergency Operations Plans developed by many jurisdictions. Generally, the annex describes the responsibilities of various departments and agencies, private businesses, and the public. The annex outlines a concept of operations that explains what activities will be undertaken before and after a disaster. Specific tasks are assigned to the Board of Supervisors/City Council (or other local governing body), Department of Emergency Services, Department of Health, Building Officials/County Engineer/Planning and Zoning, Law Enforcement, Fire Department and Emergency Crew, Superintendent of Schools, and Public Information Officer.

Multi-Jurisdictional Plan Adoption

In order to receive plan approval, each jurisdiction must formally adopt the hazard mitigation plan. Plan adoption is in the form of a resolution and has been adopted at each community's board meetings (local governing body).

Plan Linkage

The *Planning Process* should not be seen as an independent step in the development of the updated Hazard Mitigation Plan, but as a continual process that is integral in the entire plan.

The planning process documents the steps taken in establishing the FEMA grant and project management team through to the adoption.

The following section on the *Hazard Identification and Risk Assessment (HIRA)* uses the information gathered at the project management team meetings, jurisdictional meetings and public input. The information and data that was provided was then supplemented to create the HIRA for Region 2000. The updated HIRA outlines the hazards and vulnerabilities that impact the region.

Hazard Identification and Risk Assessment (HIRA)

Summary of Changes:

The following changes were made to the HIRA in the Hazard Mitigation Plan Update Process. The planning management team met on September 15th, 2011 and arrived at a ranking system for hazards in Region 2000 through a survey. The ranking system and survey results are located in the planning process sections and the Appendix. Winter storms, flood, drought, wind, wildfire, landslide and land subsistence and terrorism received the same rankings as in the original Hazard Mitigation Plan so they will be examined in much the same way.

Updated information from the 2010 Census was used *when available* in this update. The population data in Table 5.1 was updated using 2010 census data. The median value of housing units was recorded from the American Community Survey's 3 year estimates from 2007-2009.

The critical facilities layer was updated to reflect current conditions. The updated list includes airports, police stations, hospitals, fire stations, dams, schools, churches, select industrial sites, select industrial and manufacturing buildings, and large shopping centers. The updated list in its entirety can be found in the appendix. Local officials had an opportunity to comment on what critical facilities to include in the plan during the 9/15/11 project management team meeting.

The loss estimates from the original Hazard Mitigation Plan were produced through HAZUS analysis which used 2000 Census data for its calculations. The newest version of HAZUS is also running on 2000 Census Data so the numbers in the HAZUS section are consistent from the original plan to the 2011 update. FEMA stresses the use of best available data for the plan and the tables will be updated in subsequent updates as new data becomes available.

The federal emergency declarations table (Table 5.3) was updated with information from the FEMA website. There have been two additional federal emergency declarations for the area in Region 2000 since the original hazard mitigation plan was created in 2006. Both declarations were in response to the severe winter weather the Region felt in January and February of 2010.

The severe repetitive loss properties were updated with information from the Department of Conservation and Recreation.

FEMA State and Local Mitigation Planning how-to guides defines the risk assessment as "the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards by assessing the vulnerability of people, buildings, and infrastructure to natural hazards."

Purpose of HIRA

1. Identify the hazards that could affect the jurisdictions in Region 2000.

2. Profile hazard events and determine what areas and community assets are the most vulnerable to damage from these hazards

3. Estimate losses and prioritize the potential risks to the community

The first step—identifying hazards—will determine all the natural hazards that might affect the area. The hazards will be ranked to determine what hazards are most likely to impact the communities of Region 2000. Hazards that are determined to have significant impact (a ranking of 4 or 5 according to the survey completed by Region 2000 jurisdictions for the 2013 update) will be analyzed in the greatest detail to determine the magnitude of future events and the vulnerability for the community and the critical facilities. Hazards that receive a moderate impact ranking (a ranking of 3 according to the survey completed by Region 2000 jurisdictions for the 2013 update) will be analyzed with available data to determine the risk and vulnerability to the specified hazard. The limited impact hazards (those hazards with a ranking of 1 according to the survey completed by Region 2000 jurisdictions for the 2011 update) will be briefly outlined in the HIRA.

Regional Information

Table 5-1 and Figure 5-1 illustrate the land area of each of the communities in Region 2000, as well as the population in the communities and number of households. This information will prove to be a key component in determining the risk to communities from natural hazards.

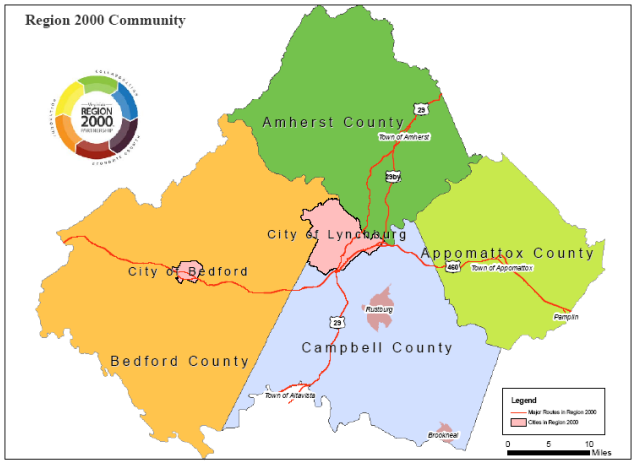


Figure 5.1 Region 2000 Partnership Jurisdictions, Source: Region 2000

Table 5.1 Breakdown of Region 2000 Jurisdictions, Source 2010 US Census, ACS 2007-2009

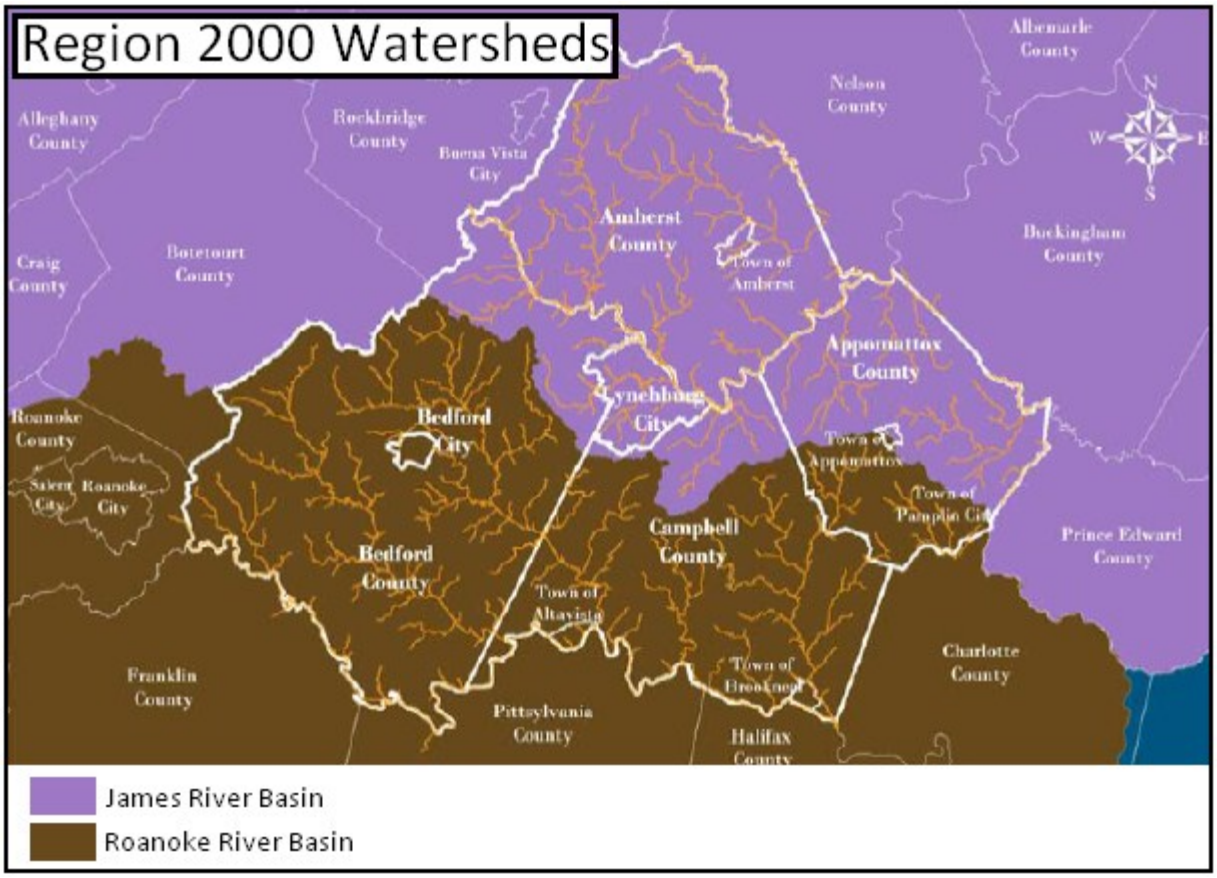
NAME	Area (Sq Mile)	2010 Pop	2010 Pop per Sq Mile	Median Home Value**	Total Housing Units
Amherst County	471.17	32,353	68.7	$149,700	13,976
Amherst, Town of	4.9	2,231	455.3	DATA N/A	1,032
Appomattox County	329.41	14,973	45.5	DATA N/A	6,921
Appomattox, Town of	2.1	1,733	825.2	DATA N/A	849
Pamplin City, Town of	0.25	219	876.0	DATA N/A	104
Bedford City	6.79	6,222	916.3	DATA N/A	2,920
Bedford County	757.02	68,676	90.7	$188,300	31,937
Campbell County	499.2	54,842	109.9	$138,400	24,769
Altavista, Town of	4.8	3,450	718.8	DATA N/A	1,669
Brookneal, Town of	3.6	1,112	308.9	DATA N/A	567
Lynchburg City	48.97	75,568	1543.1	$134,900	31,992

All data taken from the 2010 US Census except for **Median Home Value—taken from ACS2007-2009

Watersheds

The major watersheds for Region 2000 jurisdictions include the James River Basin and the Roanoke River Basin. The following Figure 5-2 illustrates the location of the major watershed boundaries for the jurisdictions in Region 2000. The region is separated by two major watersheds, the James River Basin to the north and the Roanoke River Basin to the south.

Figure 5-2. Region 2000 Watersheds, Source: VA-DCR



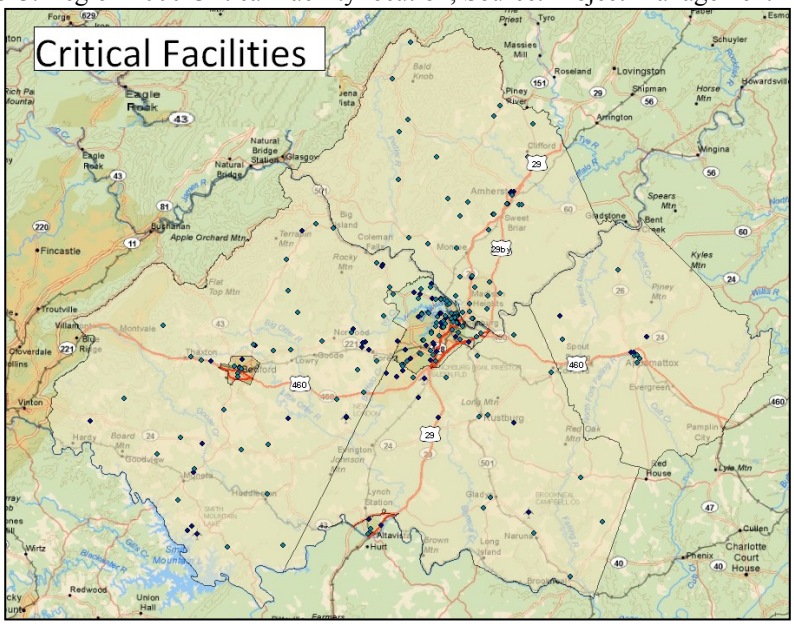
Critical Facilities

According to the FEMA State and Local Plan Interim Criteria, a critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the County, or fulfills important public safety, emergency response, and/or disaster recovery functions.

Critical facilities for Region 2000 were derived from a variety of sources. Information provided by the communities for the original Hazard Mitigation Plan was supplemented with ESRI data, FEMA HAZUS-MH location data. In this update, a list of critical facilities was given to each project management team member for review. Many of the critical facilities from the original plan are included in the update. Critical facilities in this plan update include all airports, police stations, hospitals, fire stations, dams, schools, churches, select industrial sites, select industrial and manufacturing buildings, and large shopping centers. This list was supported at the September 15th, 2011 meeting of the project management team. Please see the appendix for a full list of critical facilities and their locations.

Critical facilities, residential and industrial buildings within the 100 year floodplain were identified for flood analysis and wildfire analysis. The HAZUS-MH model was used to estimate damage from hurricanes in the region and is detailed in the hurricane section. Terrorism was addressed through consulting community Emergency Operations Plans, if available, for more detailed information.

Figure 5-3. Region 2000 Critical Facility location, Source: Project Management Team



Data Limitations

Inadequate information posed a problem for developing loss estimates for most of the identified hazards. The limiting factor for the data was that the hazard mapping precision is only at the county or jurisdiction level. Many of the hazards do not have defined damage estimate criteria.

Analysis for the region was completed using the best available data. The detail level of the data received from the communities drove the specifics of the vulnerability analysis. When detailed building footprint data was available, it was used to assess the vulnerability at a building specific level. When building specific data was not available, census blocks were used to assess the areas vulnerability to specific hazards. Flooding analysis was conducted using two main methods.

When communities provided real estate property values and building footprints, a detailed analysis was completed to determine the percent of property at risk. When real estate values were not readily available, 2000 Census data for average structure value per block was used as a replacement cost in the event of a disaster. In the case of the update, census data from 2000 will still be used since values from the 2010 Census have not been included in the HAZUS-MH datasets yet. This value can serve as a guide in assessing the impacts of various hazards. Dams or hazmat locations, when available, were included in with critical facilities and analysis preformed.

The FEMA guidelines emphasize using “best available” data for this plan. The impact of these data limitations will be shown through the different vulnerability assessments and loss estimation methods used for hazards. ***In the HIRA sections on each hazard, more detail will be provided on the data and analysis limitations.***

Region 2000 staff, as well as staff in the localities, provided available base map data and building information for the analysis. All other data was derived from existing sources or created by Region 2000 staff.

The FEMA guidelines emphasize using “best available” data for this plan. In the loss estimates section of the HIRA, the “best available” data was from 2000 Census data because the newest version of HAZUS software didn’t include 2010 data yet. Therefore, many of the loss estimates from the original Hazard Mitigation Plan remain in the updated plan.

Hazard Identification

Types of Hazards

While nearly all disasters are possible for any given area in the United States, the most likely hazards to potentially affect the communities in Region 2000 generally include:

- Droughts
- Earthquakes
- Flooding (Hurricanes)
- Hurricanes
- Landslides and Land Subsidence
- Terrorism
- Wildfires
- Wind (Hurricane/Tornado)
- Winter Storms (Ice/Snow)

Probability of Hazards

Hazards were ranked by the project management team to determine what hazards they judged to have the largest impact on their communities. The results are summarized in Table 5-2. The addition of a "Low" ranking by the project management team caused the earthquake hazard to be analyzed a bit further in this update. The earthquake hazard was originally ranked has having no impact on the area, but a recent earthquake in Virginia reminded the project management team that it is a possible threat. The type of analysis that was completed was determined by the type of data available and the scale of data available for the analysis. The project management team also decided that ranking the Region as a whole represented each jurisdiction's vulnerability. Therefore, the rankings in the table below stand true for all jurisdictions in Region 2000.

Table 5.2 Hazard Identification Results, Source: Project Management Team

Hazard Identification Results	
Hazard Type	**Rank**
Winter Storms (Ice/Snow)	High
Flood (Hurricane)	High
Drought	High
Wind (Hurricane/Tornado)	Medium
Wildfire	Medium
Landslide and Land Subsidence	Low
Terrorism	Low
Earthquake	Low

Rankings derived from the September 15th, 2011 meeting. Surveys attached in appendix.

Major Disasters

Table 5-3 lists the major disasters that have occurred in Region 2000 Jurisdictions including Presidential declared disasters. The table shows which hazards impacted each of the communities in Region 2000, as well as the designated federal disaster number. The region has had 9 declared disasters since 1969, with a majority of the disasters being split between flooding and with winter weather. Nine declared disasters have been noted for the time period prior to 1969, when FEMA began to denote disasters with declaration numbers. For a detailed description of the disaster for the region, consult the *Hazard History Tables* located in the appendix. The updated table includes two additional disasters that occurred since the original hazard mitigation plan was written. They both encompass the heavy snowfall that occurred at the beginning of 2010.

Table 5- 3. Region 2000 Federal Disasters, Source: FEMA

Communities Impacted	Date of Declaration	Federal Declaration #	Federal Description
Amherst, Appomattox, Lynchburg	1771	N/A	Severe Storms & Flooding
Amherst, Appomattox, Lynchburg	1870	N/A	Severe Storms & Flooding
Amherst, Appomattox	1877	N/A	Severe Storms & Flooding
Appomattox	1877	N/A	Severe Storms & Flooding
Amherst, Appomattox	1913	N/A	Severe Storms & Flooding
Amherst, Appomattox	1935	N/A	Severe Storms & Flooding
Amherst, Appomattox, Bedford City, Bedford	1936	N/A	Severe Storms & Flooding
Campbell	1937	N/A	Severe Storms & Flooding
Amherst, Appomattox, Bedford City, Campbell, Bedford	1940	N/A	Severe Storms & Flooding
Amherst, Bedford, Bedford City, Campbell, Lynchburg City	8/23/1969	274	Severe Storms & Flooding (Hurricane Camille): This major storm made landfall out of the gulf as a category 5 and weakened to a tropical depression before reaching the state. Precipitation trained over regions many hours, dropping more than 27 inches of rain in Nelson County and over ten inches in the area from Lynchburg to Charlottesville. Flooding and landslides, triggered by saturated soils, resulted in catastrophic damage. More than 150 people died and another 100 were injured. At the time, damage was estimated at more than $113 million.

Amherst, Appomattox, Bedford, Bedford City, Campbell, Lynchburg	6/23/1972	339	Tropical Storm Agnes: This event produced devastating flooding throughout the Mid-Atlantic States. Some areas of eastern Virginia received over 15 inches of rainfall as the storm moved through. The Potomac and James Rivers experienced major flooding, which created 5 to 8 feet flood waters in many locations along the rivers. Richmond was impacted the most by these high water levels. Water supply and sewage treatment plants were inundated, as were electric and gas plants. Only one of the five bridges across the James River was open, while the Downtown area was closed for several days and businesses and industries in the area suffered immense damage. Sixteen people lost their lives in the state and damage was estimated at $222 million. These startling numbers resulted in 63 counties and 23 cities qualifying for disaster relief.
Amherst, Appomattox, Bedford, Campbell	4/11/1994	1021	Severe Winter Ice Storm: This winter storm coated portions of Virginia with 1 to 3 inches of ice from freezing rain and sleet. This led to the loss of approximately 10 to 20 percent trees in some counties, which blocked roads and caused many people to be without power for a week. There were numerous automobile accidents and injuries from people falling on ice. Damages were estimates at $61 million.
Amherst, Bedford, Bedford City, Campbell, Lynchburg City	7/1/1995	1059	Severe Storms & Flooding
Amherst, Appomattox, Bedford, Campbell, Lynchburg City	1/13/1996	1086	Blizzard of 1996 (severe storm): Also known as the "Great Furlough Storm" due to Congressional impasse over the federal budget, the blizzard paralyzed the Interstate 95 corridor, and reached westward into the Appalachians where snow depths of over 48 inches were recorded. Several local governments and schools were closed for more than a week. The blizzard was followed with another storm, which blanketed the entire state with at least one foot of snow. To compound things, heavy snowfall piled on top of this storm's accumulations in the next week, which kept snow pack on the ground for an extended period of time. This snow was eventually thawed by higher temperatures and heavy rain that fell after this thaw resulted in severe flooding. Total damage between the blizzard and subsequent flooding was over $30 million.
Amherst, Appomattox, Bedford, Bedford City, Campbell, Lynchburg	9/6/1996	1135	Hurricane Fran: This hurricane is notable not only for the $350 million in damages, but because of its widespread effects, including a record number of people without power and the closure of 78 primary and 853 secondary roads. Rainfall amounts between 8 and 20 inches fell over the mountains and Shenandoah Valley, leading to record-level flooding in many locations within this region. 100 people had to be rescued from the flood waters and hundreds of homes and buildings were damaged by the flood waters and high winds.
Amherst, Appomattox, Bedford, Campbell, Lynchburg City	2/28/2000	1318	2000 Winter Storms

Bedford, Bedford City, Lynchburg City	5/5/2002	1411	2002 Floods/Tornadoes
Amherst, Appomattox, Bedford, Bedford City, Campbell, Lynchburg	9/18/2003	1491	Hurricane Isabel was the costliest and deadliest hurricane in the 2003 Atlantic hurricane season. Wind and flood damage were reported in Region 2000 jurisdictions.
Amherst, Bedford	2/16/2010	1874	High amounts of snowfall throughout the state of Virginia cause the president to declare a major disaster for the entire state. Eligible local governments received federal funding on a cost sharing basis for emergency work and the repair or replacement of facilities damaged by the severe winter storm.
Amherst, Bedford	4/27/2010	1905	A second presidential disaster declaration was signed in response to the high amounts of snowfall that crippled parts of Virginia in February of 2010.

Mapping Considerations

Level of Hazard Mapping

Table 5-4 provides a breakdown of the natural hazards addressed in this plan. The level of planning consideration given to each hazard was determined by the committee members. Based on the input of committee members, the hazards were broken into three distinct categories which represent the level of consideration they will receive throughout the planning process.

In order to focus on the most critical hazards that may affect Region 2000 communities, the hazards assigned by a level of *High* or *Medium* will receive the most extensive attention in the remainder of the planning analysis, while those with a *Low* planning consideration level will be assessed in more general terms. Those hazards with a planning level of *None* will not be addressed in this plan. The level of *None* should be interpreted as not being critical enough to warrant further evaluation; however, these hazards should not be interpreted as having zero probability of impact.

In the original plan, earthquakes were designated with a hazard level of *None*, and were therefore not included in the analysis. The project management team for the 2011 update deemed earthquakes a viable threat to the region so a *Low* ranking was assigned. An earthquake is the shaking of the ground's surface caused by movements of the plates beneath it. According to the HAZUS analysis, earthquakes generate about $669,000 in annualized losses to the region.

Problem Spot Mapping

Additional areas of impact were noted by the committee members through a problem spot worksheet, as well as indicating what areas were of concern on paper maps for the region which is included in the appendix.

Each locality provided input, to the best of their ability, in determining what areas were concerns or "problems" in their communities. Multiple forums were used to develop a complete list of problem spot areas, including taking comments at two project management team meetings. The areas that the committee members and public indicated were taken into consideration during the analysis phase. The individual community problem spot maps

(Appendix) that were developed, based on community and public input, are:

Flooding
Amherst County
Bedford County
Campbell County
Altavista, Town of
Lynchburg City

Winter Storm
Amherst County
Bedford City
Lynchburg City

Wind
Lynchburg City

Thunderstorms
Bedford County

Landslide
Amherst County
Bedford Country

Hazard	Type	Detail Level	Analysis Level	Data Reference
Blizzards/ Winter Storms	Including winter storms, ice storms, and excessive cold	High	Covered by HIRA blizzards/winter storm analysis	NOAA National Weather Service Records, VirginiaView PRISM, Climate Source
Flooding	Riverine	High	Covered by HIRA flood analysis	FEMA DFIRM, Q3, and FIRM Mapping
Drought	Including excessive heat	High	Covered by HIRA drought analysis	Drought Monitor Task Force, Water Systems
Wind	Hurricane	Medium	Covered by HIRA hurricane analysis	FEMA DFIRM, Q3, and FIRM Mapping and ASCE Design Wind Speed Maps, FEMA HAZUS-MH model
	Tornado	Medium	Description and Regional Maps	NOAA National Weather Service Records
Wildfire	Wildfire	Medium	Covered by HIRA wildfire analysis	Virginia Department of Forestry
Landslide/Land Subsidence	Landslide/Land Subsidence	Low	Description and Regional Maps	USGS
Terrorism	Terrorism	Low	Description	Addressed in community Emergency Operation Plans (EOP)
Earthquake	Earthquake	Low	Description	FEMA HAZUS-MH

Severe Winter Storm (High Ranking)

Hazard History

The appendix includes descriptions of major winter storm events that have occurred in Region 2000. Events have been broken down by the date of occurrence and when available, by individual community descriptions. As Table 5-3 illustrates, a large percentage of the region's federal declared disasters were due to severe winter weather. When no community specific description is available, the general description should be used as representing the entire planning area. A complete winter storm hazard history is included in the appendix.

Hazard Profile

The impacts of winter storms are minimal in terms of property damage and long-term effects. The most notable impact from winter storms is the damage to power distribution networks and utilities. Severe winter storms have the potential to inhibit normal functions of the community. Governmental costs for this type of event are a result of the needed personnel and equipment for clearing streets. Private sector losses are attributed to lost work when employees are unable to travel. Homes and businesses suffer damage when electric service is interrupted for long periods of time. Health threats can become severe when frozen precipitation makes roadways and walkways very slippery, due to prolonged power outages, and if fuel supplies are jeopardized. Occasionally, buildings may be damaged when snow loads exceed the design capacity of their roofs or when trees fall due to excessive ice accumulation on branches. The primary impact of excessive cold is increased potential for frostbite, and potentially death as a result of over-exposure to extreme cold.

Some of the secondary effects presented by extreme/excessive cold are a danger to livestock and pets, and frozen water pipes in homes and businesses.

The maps for the ice and snowfall risks from the original Hazard Mitigation Plan are still viable. There has been no increasing or decreasing trend in snowfall amounts since the original plan was passed.

Predictability and Frequency

Winter storms can be a combination of heavy snowfall, high winds, ice and extreme cold. These are classified as extra-tropical cyclones that originate as mid-latitude depressions. Winter weather impacts the state of Virginia between the months of November and April, with varied intensities from east to west. In order to create a statewide winter weather hazard potential map that captures this variability, gridded climate data was obtained from the Climate Source and through the VirginiaView program. This data was developed by the Oregon State University Spatial Climate Analysis Service (SCAS) using **PRISM** (**P**arameter-elevation **R**egressions on **I**ndependent **S**lopes **M**odel). This climate mapping system is an analytical tool that uses point weather station observation data, a digital elevation model, and other spatial data sets to generate gridded estimates of monthly, yearly, and event-based climatic parameters. The project management team for the 2013 plan update agreed that this analysis would suffice for the update.

PRISM data was selected for this analysis because it is an interpolation system that incorporates elevation fluctuation into the regression equations that are used to predict the gridded variation of each climate parameter. This winter weather risk assessment uses monthly normal precipitation, mean annual days with snowfall greater than 1 inch, and mean monthly snowfall PRISM data to develop snow and ice potential maps for the state.

These datasets have been generated to incorporate topographic effects on precipitation, capture orographic rain shadows, and include coastal and lake effect influences on precipitation and snowfall. The monthly precipitation grid provides a 30-year climatological average of total precipitation in inches. The mean monthly snowfall grid provides a 30-year climatological average depth of freshly fallen snow in inches. The mean annual days map reveals the 30-year average of the number of days that a location will receive greater than 1 inch of snowfall in a 24 hour period in a given year.

A criterion of "greater than 1 inch" was selected for winter snowfall severity assessment because this depth will result in complete road coverage that can create extremely dangerous driving conditions that will require removal by the local community. This amount of snowfall in a 24 hour period can also lead to business closure and school delays or cancellation. Figure 5-4 shows the average number of days with snowfall greater than one inch for the state and Figure 5-5 shows the average number of days with snowfall greater than one inch for Region 2000. These assessments can act as indicators of the likelihood of future occurrences. Average number of days with snowfall greater than one inch increases dramatically near the mountain ranges. In Region 2000 the Blue Ridge Mountains in the northern portions of Amherst and Bedford counties receive the greatest amount of snowfall.

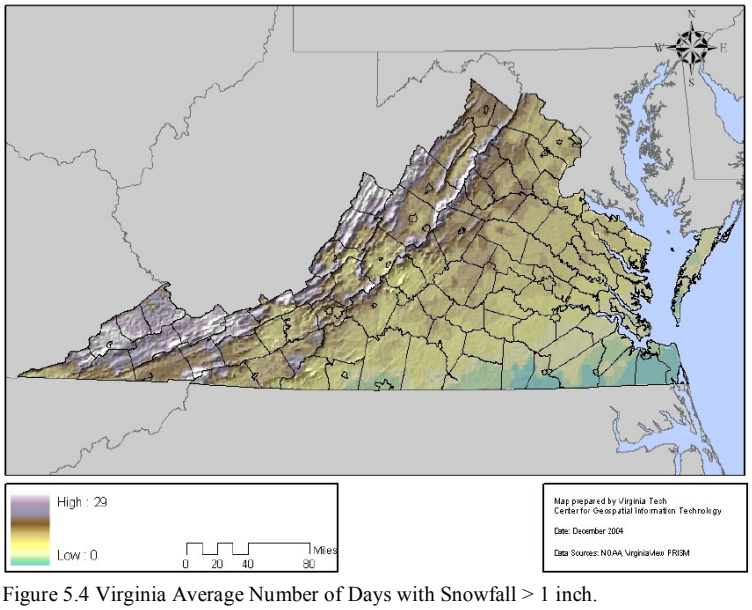
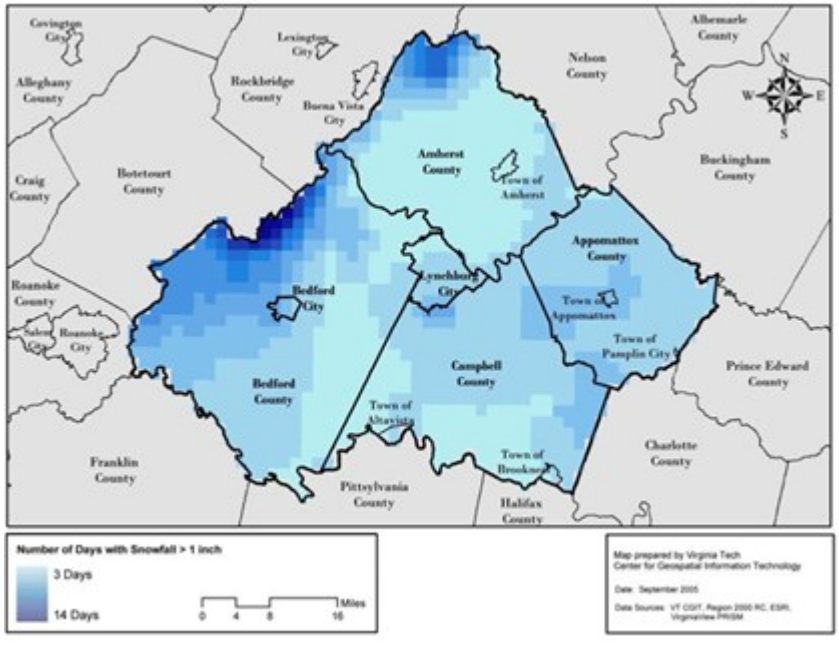


Figure 5.4 Virginia Average Number of Days with Snowfall > 1 inch.

Figure 5.5 Region 2000 Average Number of Days with Snowfall > 1 inch, Source: Virginia Tech CGIT



North Eastern Snowfall Impact Scale (NESIS)

The Northeast Snowfall Impact Scale (NESIS) was developed by members of the National Weather Service in 2004. The scale ranks high-impact snowstorms that impact the northeast corridor. The scale was developed because of the impact Northeast snowstorms can have on the rest of the country. The storms have large areas of 10 inch snowfall accumulations and the scale has five categories: Extreme, Crippling, Major, Significant, and Notable. The index is unique in that it uses population information as well as meteorological measurements. Because of this additional information, the NESIS scale gives an indication of a storm's societal impacts.

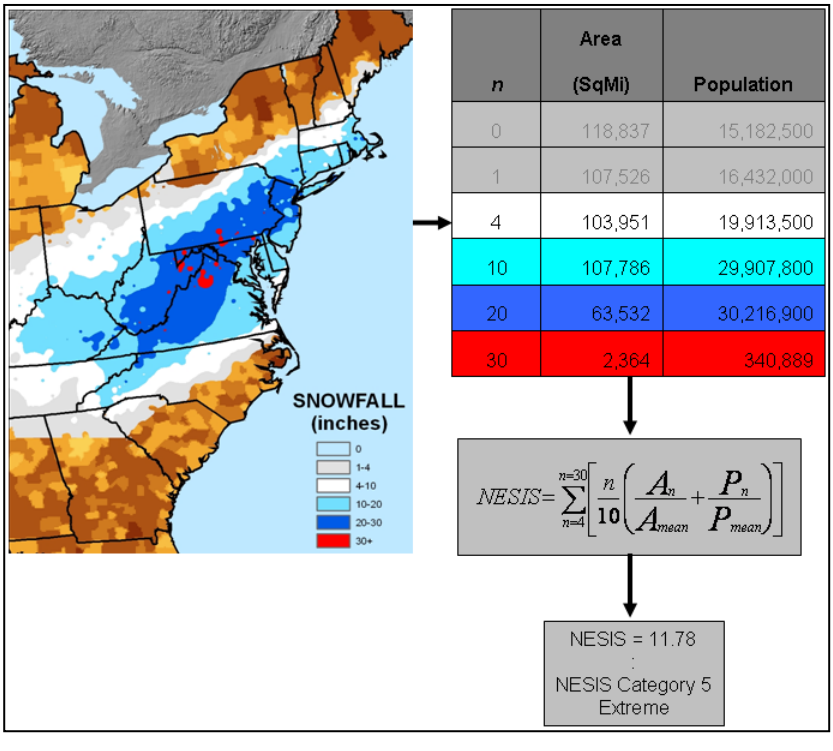


Figure 5.5a North Eastern Snowfall Impact Scale (NESIS)

Region 2000 is part of the Northeast urban corridor and is therefore included in the NESIS ranking system. Please see Squires and Lawrimore (2006) for more information.

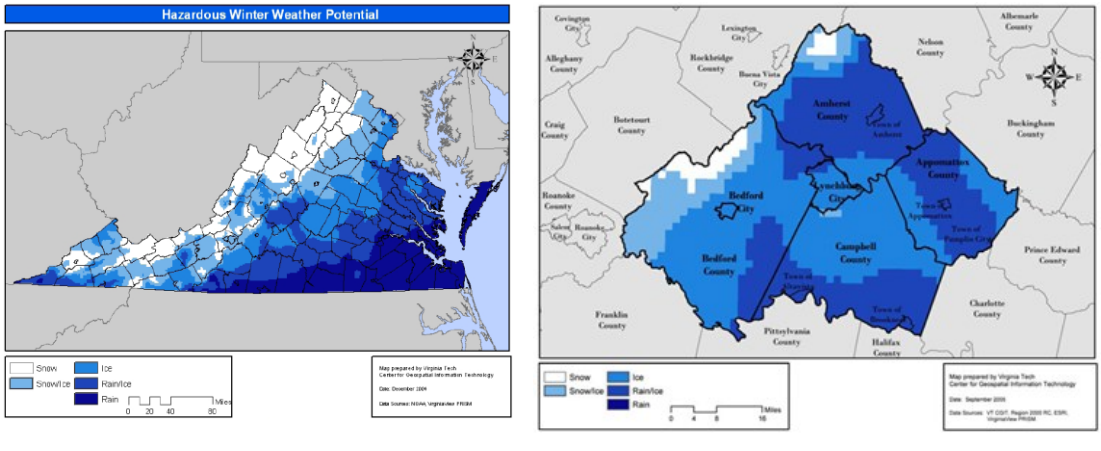
Ice Potential

Another challenge with winter weather in Virginia and in the region is the amount of ice that often comes as part of winter weather. Snowfall and ice potential are generated based on the percentage difference between the total precipitation from November to April and the corresponding liquid equivalent snowfall depth. Since snow falls in a frozen state, it does not accumulate on the surface the same way as rainfall would. In order to account for this difference, there are characteristic snow/rain relationships that have been created.

For example a value of 1 would mean that all of the precipitation at the location falls as liquid rainfall, and a value of 0.5 would mean that half of the precipitation falls as liquid rainfall and half falls as frozen precipitation. It is assumed that the lower the percentage the greater potential that precipitation within these months is falling as snow. The values in the middle of the two extremes would represent regions that favor ice conditions over rain and snow. A five quintile distribution was applied to the output statewide grid to split the percentages into five characteristic climatological winter weather categories (snow, snow/ice, ice, rain/ice, and rain). Figure 5.6 shows the statewide map and Figure 5.7 shows the Region 2000 map; for likelihood of future occurrences. The project management team agreed that these maps accurately depicted the level of risk of future events for their respective localities. The trend of ice potential in Virginia is highest in the area between the eastern edge of the Blue Ridge Mountains and the piedmont plateau since it usually snows in the mountains and rains on the coast.

Region 2000 receives a winter mix of snow, ice and rain/ice. As Figure 5.5 illustrates, the mountains in Amherst and Bedford Counties get a majority of the snow, while the southeast portion of the region receives a winter sleet mix.

Figure 5.7. Region 2000 Hazardous Winter Weather Potential Based on LEQ Precipitation, Source: Virginia Tech CGIT



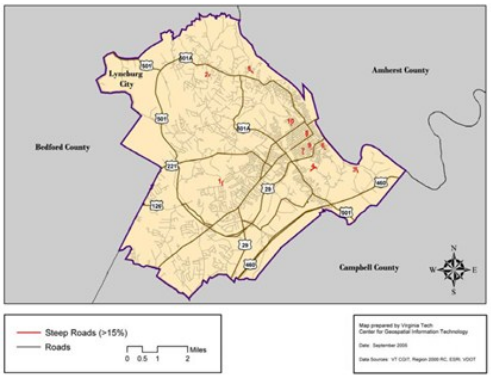
Steep Slopes

Lack of extensive GIS data throughout the region limited any other additional winter storm vulnerability assessment except in Lynchburg. The Lynchburg City GIS department was able to provide detailed streets and terrain data that could be used to identify streets that would be of a higher risk during ice storm events. A GIS analysis was performed to identify streets throughout with slopes greater than 15%, which would have vehicle traction issues during ice storms. Table 5.6 and Figure 5.8 illustrate selected roadways in the City of Lynchburg that have a slope greater than a 15%. These areas should be focused on as having a higher potential for accidents. The eastern portion of the city has a large amount of roads with greater than 15% slope.

Table 5.6 Lynchburg City Steep Slope Locations **(>15%), Source: VT CGIT**

1	500 Sandusky Dr. 15%
2	1700 Clayton Ave. 15%
3	130 Rockwell Rd. 15.3%
4	1400 Augusta St. 15.8%
5	N/A Paxton Ave. 16.8%
6	2000 Rose St. 17.3%
7	1220 17th St. 18.3%
8	600 11th St. 18.5%
9	1700 Locust St. 18.6%
10	200 Polk St. 19.2%

Figure 5.8 Lynchburg City Steep Slope Locations (>15%), Source: VT CGIT



Vulnerability Analysis

Figures 5.6 and 5.7 illustrate the overall winter weather and ice potential for the region. Figures 5.9 and 5.10 show the relative risk or vulnerability based on these previous maps. These were developed by assigning a high risk to those census blocks within the regions with the greatest potential for snowy days (> 1 in of snow) or ice. Division into high, medium and low were based on the levels predicted from potential maps. Tables 5.7 and 5.8 show the population in each locality impacted by the overall snowfall and ice risks.

Note Tables 5.7 and 5.8 indicate the town populations impacted; the county totals include the populations of the towns. Future revision of this plan will need to develop a method to calculate the potential loss from these winter storms. Areas of high susceptibility for snowfall (Figure 5.9) are centralized around the foothills of the Blue Ridge Mountains, with the highest snowfall risk around the Peaks of Otter in Bedford County. Relative ice potential (Figure 5.10) for the region has a slightly different trend of potential risk. The northern portion of Amherst County follows a

similar pattern as the snowfall risk. There is a band of high ice potential starting in Lynchburg City south into the majority of Campbell County and a southwest band of ice risk in Bedford County and City.

The winter weather mapping resolution does not support town based analysis, since most towns in Region 2000 would be represented by one or two pixels at this resolution. *As weather data has better spatial resolution in the future, the ability to create practical town based analysis will be improved.* While Tables 5.7 and 5.8 show town based vulnerability, the analysis method was designed to derive broad regional vulnerability comparisons, not pinpoint location comparisons. Also, the nature of winter storm preparedness and impact cannot be represented with snow or ice potential maps. Even though Bedford County may receive more snow than other localities, they may have more VDOT and power companies resources prepared to address winter weather than other communities.

The appendix contains the zoom-in maps for relative snowfall potential and relative ice potential for each of the localities in the region. The appendix contains a full size map for the region, followed by the subsequent locality maps. The northern portion of Bedford County has the highest relative snowfall risk for the region. Relative ice risk for the region is scattered in each of the localities, with high potential being in the northern portion of Amherst County, Lynchburg City, northern Campbell County, southeast Bedford County and Bedford City. These maps were consulted during the mitigation action development for potential sites of future actions

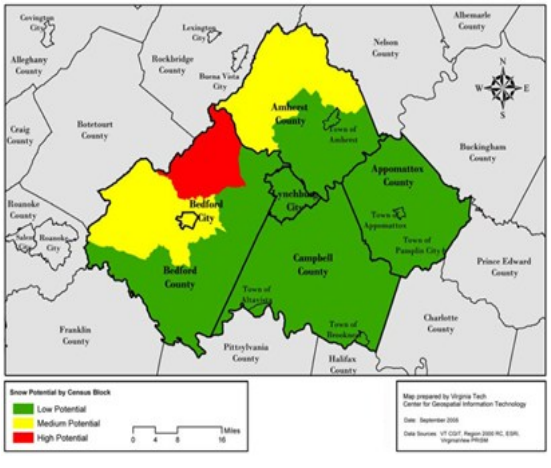


Figure 5.9. Region 2000 Snowfall Relative Risk, Source: VT CGIT

Table 5.7. Region 2000 Population Snowfall Relative Risk (from 2000 Census). *denotes town values that are also included in totals for the perspective County. 2000 Census information is the "best available" dataset for this section because the 2010 data isn't included in HAZUS software yet.

Community	Low	Medium	High	Total
Amherst	27,741	5,061	0	**32,802**
**Amherst, Town of*	*2,251*	*0*	*0*	***2,251***
Appomattox	14,068	0	0	**14,068**
**Appomattox, Town of*	*1,761*	*0*	*0*	***1,761***
**Pamplin City, Town of*	*199*	*0*	*0*	***199***
Bedford City	0	6,386	0	**6,386**
Bedford County	41,612	18,356	3,756	**63,724**
Campbell	51,078	0	0	**51,078**
**Altavista, Town of*	*3,425*	*0*	*0*	***3,425***
**Brookneal, Town of*	*1,259*	*0*	*0*	***1,259***
Lynchburg City	65,013	0	0	**65,013**
Total	**200,382**	**29,803**	**3,756**	**233,941**

Figure 5.10. Region 2000 Ice Relative Risk, Source: VT CGIT

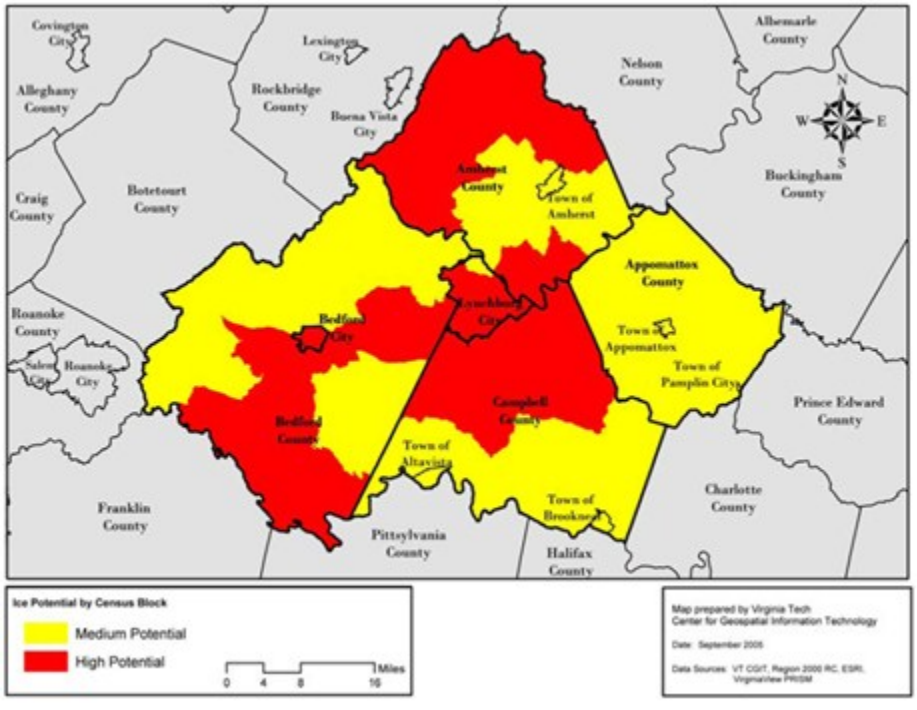


Table 5.8. Region 2000 Population Ice Relative Risk (from 2000 Census). *denotes town values that are also included in totals for the perspective County. 2000 Census information is the "best available" dataset for this section because the 2010 data isn't included in HAZUS software yet.

Community	Low	Medium	High	Total
Amherst County	0	14,257	18,545	**32,802**
**Amherst, Town of*	*0*	*2,251*	*0*	***2,251***
Appomattox County	0	14,068	0	**14,068**
**Appomattox, Town of*	*0*	*1,761*	*0*	***1,761***
**Pamplin City, Town of*	*0*	*199*	*0*	***199***
Bedford City	0	0	6,386	**6,386**
Bedford County	0	30,110	33,614	**63,724**
Campbell County	0	14,773	36,305	**51,078**
**Altavista, Town of*	*0*	*3,425*	*0*	***3,425***
**Brookneal, Town of*	*0*	*1,259*	*0*	***1,259***
Lynchburg City	0	4,774	60,239	**65,013**
Total	**0**	**77,982**	**155,959**	**233,941**

Flooding (High Ranking)

Hazard History

A table of all the major flood events that have occurred in Region 2000 is included in the appendix. Events have been broken down by the date of occurrence and when available, by individual community descriptions. When no community specific description is available, the general description should be used as representing the entire planning area. As Table 5.3 demonstrates, a large percentage of the region's declared disasters were due to flooding.

Hazard Profile

A flood occurs when an area that is normally dry becomes inundated with water. Floods may result from the overflow of surface waters, overflow of inland and tidal waters, dam breaks or mudflows. Flooding can occur at any time of the year, with peak hazards in the late winter and early spring. Snowmelt and ice jam breakaway contribute to winter flooding; seasonal rain patterns and torrential rains from hurricanes and tropical systems contribute to flooding. Development of flood-prone areas tends to increase the frequency and degree of flooding.

Floods are typically characterized by frequency. For example, the "1%-annual chance flood" is commonly referred to as the "100-year" flood. The 1%-percent annual chance flood is used for most regulatory and hazard identification purposes. While more frequent floods do occur, as well as larger events that has lower probabilities of occurrence.

Floods pick up chemicals, sewage, and toxins from roads, factories and farms. Therefore any property affected by the flood may be contaminated with hazardous materials. Debris from vegetation and man-made structures may also be hazardous following the occurrence of a flood. In addition, floods may threaten water supplies and water quality, as well as initiate power outages.

Flooding can pose some significant secondary impacts to the area where the event has taken place. Some of the impacts to consider include infrastructure and utility failure, impacts to roadways, water service and wastewater treatment. These impacts can affect the entire planning district, making the area vulnerable to limited emergency services.

Flood Maps

More detailed data was available as "Q3 flood maps" for a majority of the counties in the region. The Q3 flood maps are digital versions of the FEMA paper FIRMs that have been georectified and digitized. When a digital version of the floodplains was not available, digital paper copies of the FEMA Flood Insurance Rate Maps (FIRMs) were utilized. To be able to conduct analysis, the digital paper FIRMs were georectified and digitized. Bedford City was able to provide detailed data for Big Otter and Ivy Creek reaches.

These maps were used to determine the risk and vulnerability of flooding to the planning district. Figure 5.11 shows the extent of the FEMA mapped floodplain in the region.

Digital Q3 FEMA FIRMS maps were available for the following counties and are included in the appendix:

- Amherst County
- Appomattox County
- Bedford County
- Campbell County
- City of Lynchburg
- City of Bedford

Vulnerability Analysis

The project management team and data focus groups helped to document specific areas that are susceptible to flooding based on their local knowledge. These areas were taken into account when completing the hazard identification and risk assessment. Flooding problem spot maps and tables can be found in the appendix for section 5.

Many factors contribute to the relative vulnerabilities of areas within the floodplain. Some of these factors include development or the presence of people and property in the floodplain, flood depth, velocity, elevation, construction type, and flood duration.

Table 5.9 Total Value in Losses Paid by NFIP, Source: VDEM, DCR

	Entry in NFIP	FIRM Current Effective Date	Flood Insurance Policies	Insured Value	Claims	Total Value in Losses Paid
Cities:						
Lynchburg	9/1/1978	6/6/2010	96	$29,150,600.00	80	$3,247,935.56
Bedford	6/1/1978	9/29/2010	2	$78,000.00	0	$0.00
Counties:						
Amherst	7/17/1978	9/19/2007	46	$9,848,800.00	38	$9,848,800.00
Campbell	10/17/1978	8/28/2008	28	$7,078,900.00	12	$7,078,900.00
Bedford	9/29/1978	9/29/2010	145	$36,887,300.00	20	$206,583.05
Appomattox	7/17/1978	1/2/2008	10	$1,839,200.00	8	$253,216.06
Towns:						
Amherst	11/2/1977	9/19/2007	2	$450,800.00	29	$128,029.19
Pamplin	2/12/1976	2/12/1976	0	$0.00	0	$0.00
Appomattox	5/25/1984	5/25/1984	0	$0.00	0	$0.00
Brookneal	3/1/1978	8/28/2008	3	$589,400.00	0	$0.00
Altavista	8/1/1978	8/28/2008	12	$2,688,800.00	5	$79,561.38

FEMA-Designated Repetitive Loss Properties

Within a 10 year timeframe dating back to 1978, FEMA has provided a Repetitive Loss List of the properties in communities that have received two or more flood insurance claims greater than $1,000, from the National Flood Insurance Program (NFIP) within a 10 year timeframe. The Repetitive Loss list includes pertinent information regarding the property address, dates of claims, amounts received and owner information. Some of this information has been withheld from Table 5.10; see your local NFIP coordinator for specific information.

There are 25 repetitive loss properties in Region 2000, with an average payment of $32,461 per structure (Table 5.10). A majority of the repetitive loss structures for the region are non-residential properties. Note that FEMA designates counties, cities and towns separately in the

table. This table provides a listing of the houses that have repetitive loss; this list does not include all of the houses that have had damage due to flooding.

Table 5.10a Region 2000 Severe Repetitive Loss Structures, Source: FEMA

Locality	As of date	Mitigation Efforts and by what means?
LYNCHBURG	2/28/2011	Berm built by owners without FEMA/State funds.

Table 5.10b Region 2000 Repetitive Loss Structures, Source: FEMA

Locaility	Residential	Non-Residential	# of Claims	Total Losses
Amherst County	1	0	3	$74,723.03
Amherst, Town of	0	1	22	$122,011.86
Appomattox County	2	0	7	$246,937.00
Bedford County	2	1	20	$291,620.00
Lynchburg, City of	7	11	50	$1,978,130.00

Structures at Risk-Vulnerability

In general, when tax parcel level information on property value existed, then they were used in the flood loss analysis. When they were not available, average structural value per census block from HAZUS-MH was used (Table 5.11). Information from table 5.11 has not changed since the original plan. The "best available data" is represented in the table.

Table 5.11 Structural and Property Data Availability in Region 2000 Jurisdictions

Community	Structural and Property Data
Amherst County	GIS tax parcels without values; Average building value per census block from HAZUS-MH.
Amherst, Town of	GIS tax parcels without values; Average building value per census block from HAZUS-MH.
Appomattox County	Average building value per census block from FEMA HAZUS-MH
Appomattox, Town of	GIS tax parcels without values; Average building value per census block from HAZUS-MH.
Pamplin City, Town of	GIS tax parcels without values; Average building value per census block from HAZUS-MH.
Bedford City	GIS building footprints without values; Average building value derived from HAZUS-MH census blocks
Bedford County	GIS tax parcels with values
Campbell County	GIS tax parcels with values and building footprints
Altavista, Town of	GIS tax parcels with values and building footprints
Brookneal, Town of	GIS tax parcels with values and building footprints
Lynchburg City	GIS building footprints without values; Average building value derived from HAZUS-MH census block

The flood vulnerability was determined for each locality based on the intersection of floodplain mapping and structure value mapping. This varied by community based on the data availability. In communities like Bedford City, Campbell County and Lynchburg City where building footprints for structures were known, the intersection analysis showed which structures were entirely or partially within the floodplain. If a community only had parcel mapping, the mapping intersection determined which parcels were partially or entirely in the floodplain. When only census block mapping was available, the mapping intersection showed which census blocks where partially or entirely within the floodplain. Based on the mapping intersection and the number of households and housing units in the census block, an estimate was determined of the total structures flooded in each the census block.

Table 5.12 lists the total replacement value of structures vulnerable to flooding (both partially and entirely within the floodplain) in each community. These replacement values for structures were calculated as 10% greater than the assessed improvement values from community parcel data or from the HAZUS-MH census block average values. For communities without parcel level property values, these values are underestimates, especially for any non-residential structures in the floodplain.

Table 5.12 Structure Value Vulnerability, Source: HAZUS, US Census 2000

Community	Total Structure Value Vulnerability
Amherst County	$37,592,830
** Amherst, Town of*	*$2,788,170*
Appomattox County	$14,547,720
** Appomattox, Town of*	*$745,800*
**Pamplin City, Town of*	*$0*
Bedford City	$3,551,350
Bedford County	$206,103,700
Campbell County	$57,723,356
**Altavista, Town of*	*$2,384,820*
**Brookneal, Town of*	*$241,340*
Lynchburg City	$20,764,480
Total	**$346,443,566**

*denotes town values that are also included in totals for the perspective County.

Estimating Losses

Using the property values from Table 5.1 and 5.2, an estimate of the potential flood loss for each community was developed. Losses included structure and contents damage using a method based on FEMA Benefit Cost Analysis. Contents values were estimated as 30% of the structural replacement value. Structural damage percentages were based on the portion of the footprint, parcel, or census block that was in the floodplain. Table 5.13 shows the basis for these damage percentages and how they were assigned depending on the mapping detail. Contents damages were estimated as 50% greater than the structural damage percentage. These values were used to predict the damage from a 100-yr flood event for the structure.

To calculate an annualized flood damage estimate, it was assumed for each structure damages began with a 25-yr event. A percentage of the 100-yr flood damage value was used for events less frequent than the 100-yr event. For example, a parcel with 45% in the floodplain is estimated to have a structure worth

$100,000 based on the community parcel database. The replacement value of the structure would be $110,000 and the contents value $33,000. Based on 45% of the parcel in the floodplain, the structure would be in flood damage class 2, with 20% 100-yr structure damage and the 30% contents damage. The final 100-yr flood damage equals $22,000 structural plus $9,900 contents or $31,900 from a 100-yr flood event. Figure 5.12 shows the probability assumptions are used to estimate the annualized loss at $797.50.

Table 5.13. Flood Damage Classes, Source: HAZUS

Flood Damage Class	100-yr % Structural Damage	Representative Flood Depth Range	Mapped Footprints in Floodplain	Mapped Parcels in Floodplain	Mapped Census Blocks in Floodplain
1	11%	0 to +1 ft		< 33%	< 33%
2	20%	+1 to + 3 ft	Partial	33% - 66%	33% - 66%
3	28%	> 3 ft	Entire	> 66 %	> 66 %

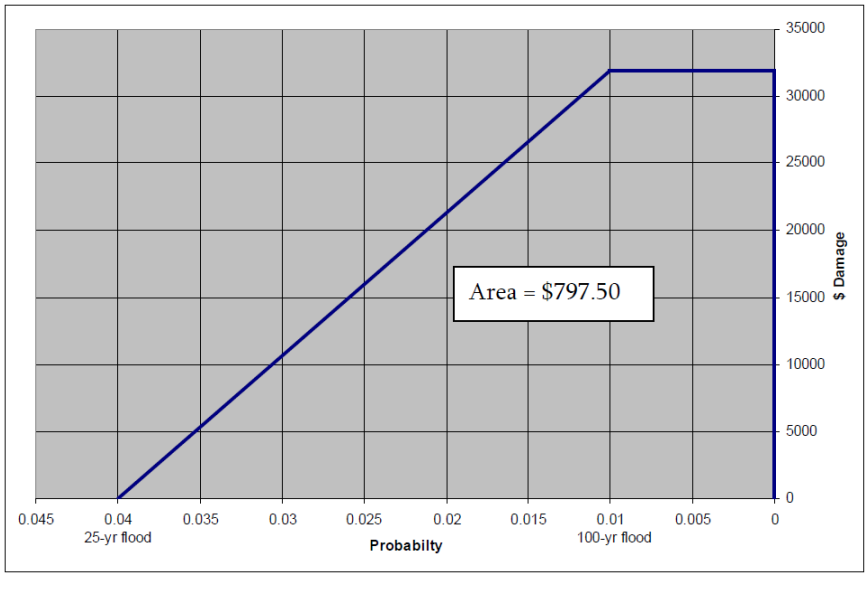


Figure 5.12. Example of Flood Loss Estimate Technique, Source: HAZUS

Table 5.14 provides the total flood loss estimates for each flood class and county. Figure 5.13 shows the census blocks where these losses occur. While most of the flood prone census blocks have less than $20,000 annual flood losses, there are a select number of locations in Bedford County with over $40,000 in one census block. Table 5.14 shows the annualized loss estimate for damage to structures and contents, broken down by community. From the table, Bedford County makes up 63% of the total estimated damage amounts followed by Amherst County with 15% of the total estimated damage amount. Figure 5.13 illustrates the distribution of annualized

flood damage for Region 2000. A large majority of the flood damage is within the "less than $20,000 annually" category, categorized by census blocks.

Table 5.14. Annualized Structure and Contents Loss Estimates, Source: HAZUS

Community	Total Loss Estimate
Amherst County	$133,471
* *Amherst, Town of*	$10,477
Appomattox County	$51,340
* *Appomattox, Town of*	$2,389
**Pamplin City, Town of*	$0
Bedford City	$31,410
Bedford County	$1,557,077
Campbell County	$162,655
**Altavista, Town of*	$85,893
**Brookneal, Town of*	$773
Lynchburg City	$159,046
Total	**$2,194,531**

*denotes town values that are also included in totals for the perspective County.

The appendix for this section contains the zoom-in maps for the annualized flood damages for each of the localities in the region. The Appendix contains a full size map for the region, followed by the subsequent locality maps. These maps were consulted during the mitigation action development for potential sites of future actions.

Jurisdictional specific annualized flood damage maps have been created for the region in the Appendix. It should be noted that no FEMA floodplain maps exist for the towns of Pamplin City. Each region is unique in their exposure to flooding. The following is a summation of the major trends illustrated on the jurisdictional specific maps:

- Amherst County receives most of its annualized flood damage in the southeastern portion of the county along the James River. The flood damages in the county, by Census block are less than $20,000 annually.
- The Buffalo River, Rutledge Creek, Williams Creek and Higginbotham Creek account for the annual flood damages in the Town of Amherst.
- Appomattox County has a sprinkling of annual flood damages throughout the county. The James River borders the northwest of the county, and Cedar Creek boarders the southeastern portion of the county.
- The Town of Appomattox has very limited annual flood damages. Purdums Branch and the South Fork of the Appomattox River run through the southern tip of the town.

- No FEMA flood plain maps exist of the Town of Pamplin City.
- Bedford County receives a high amount of flood damages as a result of Smith Mountain Lake in the southern tip of the County. Annual damage estimates range from $20,000 to $40,000 per Census block.
- Bedford City receives most of its flood damages from an unnamed tributary to Little Otter River. A majority of flood damages occurs outside of the city limits.
- Campbell County, like Appomattox County, has very limited annualized flood damages. A majority of the present damage occurs along the Roanoke River to the south and along Beaver Creek to the north.
- The majority of the Town of Altavista is within a flood damage area. The Roanoke River to the south accounts for high damages to Census block, with greater than $20,000 annual damage.
- The northern portion of the Town of Brookneal receives all of the annualized flood damages for the town. Falling River and the Brookneal Reservoir account for this damage.
- The City of Lynchburg receives most of its' flood damage from main stream branches. These bodies of water being the James River, Blackwater Creek and Ivy Creek.

Problem Spot Mapping

See the appendix for Figures and Tables summarizing the problem spot locations that were denoted by the project management team during the Sept 15th, 2011 meeting. These are areas of concern that were designated by the project management team and the public. When specific town information was provided it was included on the problem spot maps. If no information was provided by the localities, or they acknowledged there was no need for a specific map, the map was omitted from the Appendix.

Critical Facilities

The impacts of flooding on critical facilities can significantly increase the overall effect of a flood event on a community. It should be noted that these facilities have been determined to be in the floodplain using Geographic Information Systems (GIS) and should be used only as a planning tool. In order to accurately determine if a structure is actually in the floodplain, site-specific information must be available. Twenty critical facilities were denoted as being located within the FEMA designated floodplain (Table 5.15). Mitigation actions address these concerns for critical facilities.

Table 5.15. Critical Facilities in the Floodplain, Source: Project Management Team

Amherst County	Dodd's Store
Amherst County	Early Dam
Amherst County	Elon Water Works Dam
Amherst County	Graham Creek Res. Dam #1
Amherst County	Kick's Store
Amherst County	Holcomb Rock Dam
Amherst County	Midway Church
Amherst County	Pedlar Fire and Rescue
Amherst County	St. Paul's Mission School
Amherst County	St. Paul's Episcopal Mission
Appomattox County	East Fork Falling River #15 Dam
Appomattox County	East Fork Falling River #21 Dam
Bedford County	Bore Auger Church
Bedford County	Coleman's Fall Dam
Bedford County	Pent Holiness Church
Bedford County	Sharon Church
Bedford County	Sharon School (historical)
Bedford County	Steven's Chapel
Campbell County	Hazmat location
Campbell County	Altavista Area YMCA Discovery Place

Dams

Dam failure poses minimal risk as a hazard, but is a large potential threat to areas with large populations surrounding dams. One of the major events in Region 2000 took place on June 22 and 23, 1995 when the Timberlake dam failed. See the Appendix for a more detailed summary of this failure.

Many different scenarios can result in dam failure. Overtopping is one of the most common causes of dam failure, and it occurs when the dam's spillway is inadequate for dealing with excess water. During flood events, too much water to be properly handled by the spillway may

rush to the dam site, and flow over the top of the dam. Improper building construction, including using easily eroded construction materials, also frequently leads to the slow structural failure of dams. This failure can be compounded by underlying geological factors such as porous bedrock that loses structural integrity when saturated. Landslides pose two threats to dams, both upstream from the dam and at the dam site itself. At the dam site, a landslide could completely wipe out the dam from its foundation. A landslide upstream has the potential to send a wave of water surging towards the dam, quite possibly causing an overtopping event. Earthquakes are also a major threat to dams, though it is very rare that a dam will be completely destroyed by an earthquake. In the event of total failure, the most common cause is the liquefaction of fill along the dam wall. Terrorist attacks are also another concern for dam safety.

No matter what the cause of dam failure, the aftermath of such an event can range from moderate to severe. It is likely that the failure of major dams will cause widespread loss of life downstream to humans and animals, as well as extreme environmental stress along the flood path. Water supplies upstream could be left completely dry, while water supplies downstream are overrun or contaminated with debris from the ensuing flood.

The National Inventory of Dams provides information about individual dams. Figure 5.14 illustrates the locations and hazard potential of dams in the region. A large percentage of the dams in Region 2000 have been rated as low or significant potential for failure. The dam inventory also provides information on the downstream hazard potential of a dam failure.

The dam inventory divides the hazard potential into three categories: low, high and significant. The classification is based on two main criteria 1) Loss of human life and 2) Economic, environmental, and lifeline losses. Dams that were assigned a low potential indicate that there is a low potential for failure or miss-operation resulting in no probable human loss or economic and environmental losses. Significant potential for dam failure is often in predominantly rural or agricultural areas but could affect areas with populations and infrastructure. High potential areas are categorized by dam failure that would probably result in the loss of human life. It is important to note that the areas potentially affected if these dams were to fail are not restricted to these counties.

Figure 5.14. Region 2000 Dam Locations and Failure Potential, Source: NID

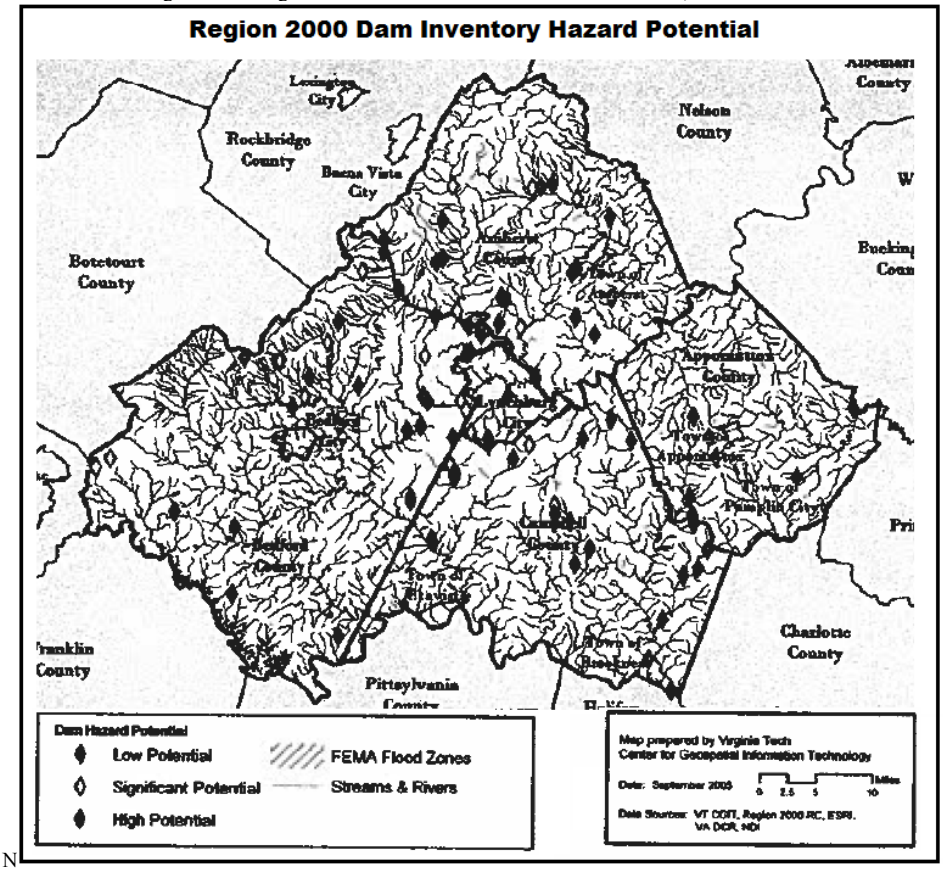


Table 5.16 denotes the classification that VA DCR uses to regulate dams in the Commonwealth. On-going dam inspections and Virginia's participation in the National Dam Safety Program maintained by FEMA and the U.S. Army Corps of Engineers serve as preventative measures against dam failures.

Virginia impounding structure regulations specify that each dam be classified based on potential loss of human life or property damage if it were to fail. Classification is based on a determination of the effects that a dam failure would likely have on people and property in the downstream inundation zone. *Hazard potential classifications* descend in order from *high* to *low*, *high* having the greatest potential for adverse downstream impacts in event of failure. This classification is unrelated to the physical condition of the dam or the probability of its failure. The hazard potential classifications are:

Table 5.16 Dam Classifications, Source: DCR

High	Dams that upon failure would cause probable loss of life or serious economic damage.
Significant	Dams that upon failure might cause loss of life or appreciable economic damage.
Low	Dams that upon failure would lead to no expected loss of life or significant economic damage. Special criteria: This classification includes dams that upon failure would cause damge only to property of the dam owner.

Safety standards become increasingly more stringent as the potential for adverse impact increases. For example, a *high hazard* dam -- that is, one whose failure would cause probable loss of human life -- is required to meet higher standards than a dam whose failure would not be as likely to result in such severe adverse consequences. Classification, however, is not static. Downstream conditions, including land use, can and often do change. Although a dam itself may remain relatively stable, it is subject to reclassification if a change occurs in the *downstream* inundation zone. For example, if new homes are built in the downstream inundation zone of a Class II, III or IV dam, the dam could be reclassified to Class I.

A change in hazard classification can create a dilemma because if a dam is reclassified, it usually does not meet the higher standards of the new hazard classification. To meet the required higher standards, the owner of the dam is often required to make expensive modifications. Any dam that does not meet the most extreme standards of a *high hazard* dam could become deficient in the future if land use in the downstream inundation zone changes.

To avoid the need for some of these expensive modifications, all affected parties -- dam owner, engineer, downstream land owners, and local governments -- need to work together. People should be aware of the impacts development downstream can have on the required standards of a dam. It is better and cheaper to address this potential problem beforehand rather than wait and deal with modifications later.

Drought (High Ranking)

Hazard History

Table 5.17 includes descriptions of major droughts that have occurred in Region 2000 jurisdictions. Events have been broken down by the date of occurrence and when available, by individual community descriptions. When no community specific description is available, the general description should be used as representing the entire planning area.

Table 5.17. Drought Hazard History, Source: FEMA

Date	Damages
1976-1977	Ten months of below average precipitation. The drought began in November of 1976 when rainfall totaled to only 50% to 75% of normal.
1985-1986	Very little rainfall began in December and the trend continued throughout the summer. Total precipitation January and February was 2 inches.
2001-2002	Stream levels were below normal with record lows observed at gages for the York, James, and Roanoke River Basins. By November of 2002 the US Secretary of Agriculture had approved 45 counties for primary disaster designation, while 36 requests remained pending.
2007-2008	Drought conditions were observed by the NOAA drought monitor throughout the commonwealth and remained stable in 2007. Drought conditions showed minor improvement in March of 2008 but statewide precipitation was below normal for the 2 year span (81% of normal).

Hazard Profile

A drought can be characterized in several different ways depending on the impact. The most common form of drought is agricultural. Agricultural droughts are characterized by unusually dry conditions during the growing season. Meteorological drought is an extended period of time (6 or more months) with precipitation less than 75 percent of the normal precipitation. Severity of droughts often depends on the community reliance on a specific water source. Many problems can arise at the onset of a drought, some of which include diminished water supplies and quality, livestock and wildlife becoming undernourished, crop damage, and possible wildfires. Secondary impacts from droughts pose problems to farmers with reductions in income, while food prices and lumber prices could drastically increase.

The impact of excessive heat is most prevalent in urban areas, where urban heat island effects prevent inner-city building from releasing heat built up during the daylight hours.

Secondary impacts of excessive heat are severe strain on the electrical power system and potential brownouts or blackouts.

Table 5.18 provides a summary of drought categories and impacts. Notice that water restrictions start off as voluntary and then become required. For excessive heat, the National Weather Service utilizes heat index thresholds as criteria for the issuance of heat advisories and excessive heat warnings.

Table 5.18 Drought Severity Classification

Drought Severity		
Category	**Description**	**Possible Impacts**
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures; fire risk above average. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.
D1	Moderate Drought	Some damage to crops, pastures; fire risk high; streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested
D2	Severe Drought	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed
D3	Extreme Drought	Major crop/pasture losses; extreme fire danger; widespread water shortages or restrictions

Drought response plans have been prepared for the region, which contain pertinent information on how the region responds on the eve and during drought conditions.

During long periods of drought, each locality imposes restrictions on water use. Some mitigation actions detail voluntary restrictions, community education, and developing and maintaining secondary water supplies on a regional basis.

Vulnerability Analysis

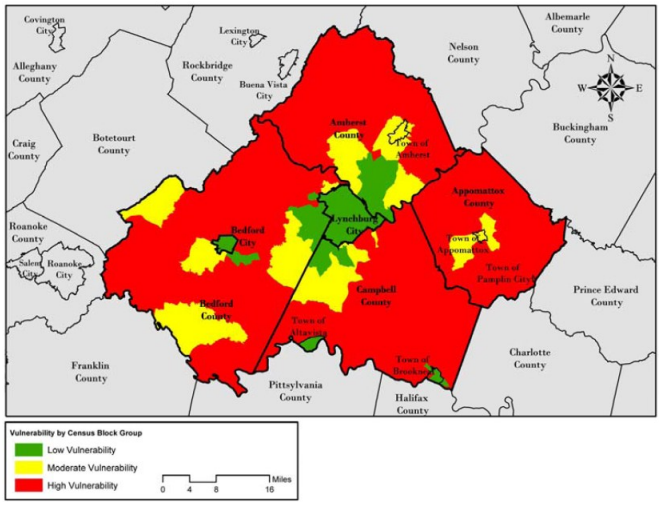
The 1990 U.S. Census data contained detailed information about source of water per census block group. For purposes of this analysis, it was assumed that areas with populations having less than 25% of public/private water systems had a high vulnerability ranking. When a drought occurs, these areas would likely have a larger impact since most homes receive their water from wells, which may dry up during a drought. Low vulnerability was assigned to regions with more than 50% of their population drawing from public or private water systems. Table 5.19 provides a summary of the 1990 population in three categories of drought vulnerability. Note that the table contains information specific to the towns; this information has also been included with the county totals. As a result of using 1990 U.S. Census data, at the tract level, there are some discrepancies with the town boundaries. Boundary adjustments into “high vulnerability” areas are a result of the older census data, which is a data limitation issue and remains an issue in the

2013 plan update. Future updates of this plan will use, if available, the most current census data for water systems. Figure 5.15 shows each of the designated categories for each of the jurisdictions. Most cities and towns are supplied by a public or private water system. Mitigation actions for the region reflect the regions concern for drought and water supply. Although there are areas in Region 2000 that have a "low" drought vulnerability distinction, the entire planning region is susceptible to future drought conditions.

Table 5.19. Region 2000 Population Drought Risk, Source: US Census 1990 *denotes town values that are also included in totals for the perspective County.

Percent Population with Public or Private Water Systems				
Community	**HIGH (< 25%)**	**MEDIUM (25% - 50%)**	**LOW (> 50 %)**	**TOTAL**
Amherst County	6,146	4,259	18,173	**28,578**
**Amherst, Town of*	*0*	*1,060*	*0*	*1,060*
Appomattox County	9,334	2,024	940	**12,298**
**Appomattox, Town of*	**0*	*1,707*	*0*	*1,707*
**Pamplin City, Town of*	*208*	*0*	*0*	*208*
Bedford City	0	0	6,073	**6,073**
Bedford County	27,365	10,116	8,175	**45,656**
Campbell County	21,819	6,337	19,416	**47,572**
**Altavista, Town of*	*0*	*0*	*3,686*	*3,686*
**Brookneal, Town of*	**0*	*0*	*1,344*	*1,344*
Lynchburg City	0	0	66,049	**66,049**
Total	**64,664**	**22,736**	**118,826**	**206,226**

Figure 5. 15. Region 2000 Drought Vulnerability, Source: VDEM



According to the project management team, drought remains of high concern. The data in this section also suggests a high degree of probability for future drought events in Region 2000 jurisdictions.

5.15 b. Drought Monitor for Virginia, Source: NOAA/NESDIS/NCDC

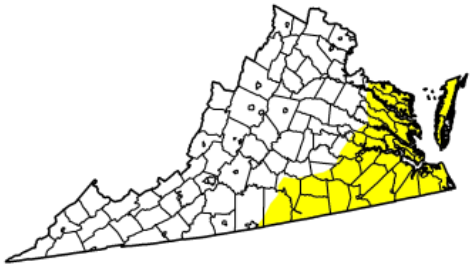
U.S. Drought Monitor

Virginia

February 21, 2012
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	73.77	26.23	0.00	0.00	0.00	0.00
Last Week (02/14/2012 map)	73.77	26.23	0.00	0.00	0.00	0.00
3 Months Ago (11/22/2011 map)	100.00	0.00	0.00	0.00	0.00	0.00
Start of Calendar Year (12/27/2011 map)	98.44	1.56	0.00	0.00	0.00	0.00
Start of Water Year (09/27/2011 map)	95.83	4.17	0.00	0.00	0.00	0.00
One Year Ago (02/15/2011 map)	1.78	98.22	65.28	0.00	0.00	0.00



Intensity:

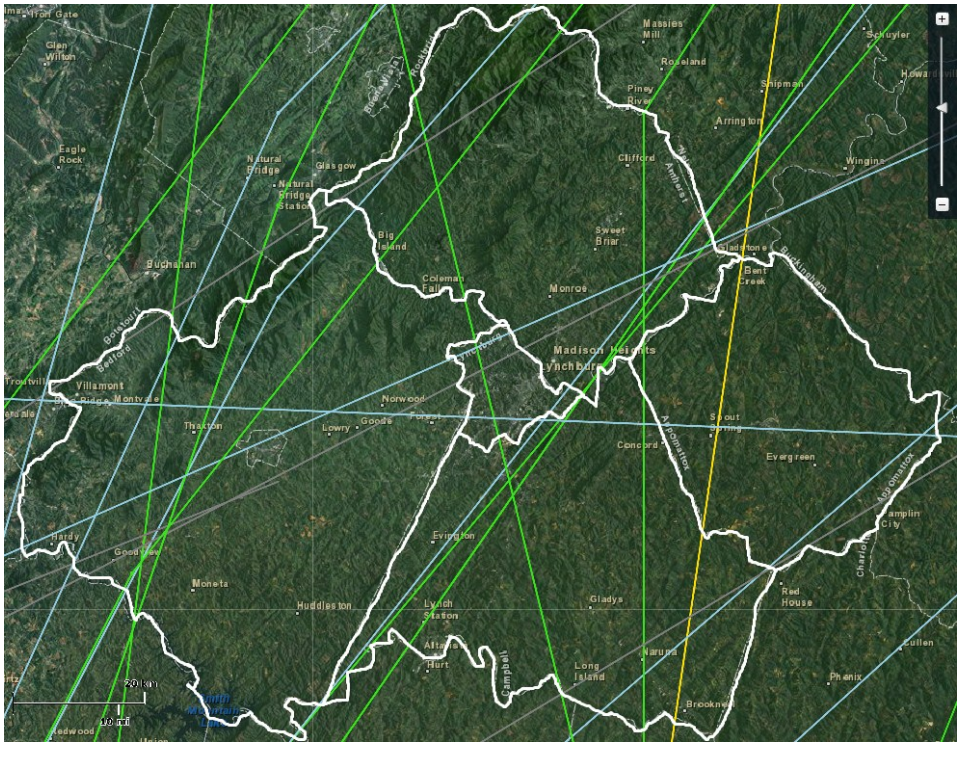
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Hurricane Wind (Medium Ranking)

Hazard History

Events have been broken down by the date of occurrence and when available, by individual community descriptions. When no community specific description is available, the general description should be used as representing the entire planning area.

Figure 5.16 Region 2000 Hurricane Tracks from 1851-2010 Source: National Oceanic and Atmospheric Administration



The National Oceanic and Atmospheric Administration shows historical hurricane tracks from 1851 to 2010 (Figure 5.16). The hurricane track map gives an idea of the historical occurrences in Region 2000. A majority of the hurricanes that have tracked through the region were Category 1(not named in 1893, 1896, and 1893) with Tropical Depression Fran (1996) and Tropical Storm Camille (1969). It should be noted that Figure 5.16 indicates the location of the center of the hurricane. Impacts from hurricanes could span many miles in all directions of the designated track.

Hazard Profile

A tropical cyclone is the generic term for a non-frontal synoptic scale low-pressure system that originates over tropical or sub-tropical waters with organized convection and definite cyclonic surface wind circulation. Depending on strength, they are classified as hurricanes or tropical storms. Tropical cyclones involve both atmospheric and hydrologic characteristics, such as severe winds, storm, surge flooding, high waves, coastal erosion, extreme rainfall, thunderstorms, lightning, and, in some cases, tornadoes. Storm surge flooding can push inland,

and riverine flooding associated with heavy inland rains can be extensive. High winds are associated with hurricanes, with two significant effects: widespread debris due to damaged and downed trees and damaged buildings; and power outages.

Secondary hazards from a hurricane event could include high winds, flooding, heavy waves, and tornadoes. Once inland, the hurricane's band of thunderstorms produces torrential rains and sometimes tornadoes. A foot or more of rain may fall in less than a day causing flash floods and mudslides. The rain eventually drains into the large rivers, which may still be flooding for days after the storm has passed. The storm's driving winds can topple trees and utility poles, and damage buildings. Communication and electricity is lost for days and roads are impassable due to fallen trees and debris.

Hurricane Damage Scale

Hurricanes are categorized by the Safer-Simpson Hurricane Damage Scale listed below (Table 5.21). Following the table are detailed descriptions of each category and the potential damage caused by each. The Safer-Simpson Hurricane Damage Scale has changed since the original plan and are noted in Table 5.21.

Table 5.21 Safer-Simpson Hurricane Damage Scale, Source: National Weather Service

Hurricane Category	Sustained Winds (mph)	Summary	Description
1	74-95	Very dangerous winds will produce some damage	People, livestock, and pets struck by flying or falling debris could be injured or killed. Older (mainly pre-1994 construction) mobile homes could be destroyed, especially if they are not anchored properly as they tend to shift or roll off their foundations. Newer mobile homes that are anchored properly can sustain damage involving the removal of shingle or metal roof coverings, and loss of vinyl siding, as well as damage to carports, sunrooms, or lanais. Some poorly constructed frame homes can experience major damage, involving loss of the roof covering and damage to gable ends as well as the removal of porch coverings and awnings. Unprotected windows may break if struck by flying debris. Masonry chimneys can be toppled. Well- constructed frame homes could have damage to roof shingles, vinyl siding, soffit panels, and gutters. Failure of aluminum, screened-in, swimming pool enclosures can occur. Some apartment building and shopping center roof coverings could be partially removed. Industrial buildings can lose roofing and siding especially from windward corners, rakes, and eaves. Failures to overhead doors and unprotected windows will be common. Windows in high- rise buildings can be broken by flying debris. Falling and broken glass will pose a significant danger even after the storm. There will be occasional damage to commercial signage, fences, and canopies. Large branches of trees will snap and shallow rooted trees can be toppled. Extensive damage to power lines and poles will likely result in power outages that could last a few to several days.
2	96-110	Extremely dangerous winds will cause extensive damage	There is a substantial risk of injury or death to people, livestock, and pets due to flying and falling debris. Older (mainly pre-1994 construction) mobile homes have a very high chance of being destroyed and the flying debris generated can shred nearby mobile homes. Newer mobile homes can also be destroyed. Poorly constructed frame homes have a high chance of having their roof structures removed especially if they are not anchored properly. Unprotected windows will have a high probability of being broken by flying debris. Well-constructed frame homes could sustain major roof and siding damage. Failure of aluminum, screened-in, swimming pool enclosures will be common. There will be a substantial percentage of roof and siding damage to apartment buildings and industrial buildings. Unreinforced masonry walls can collapse. Windows in high-rise buildings can be broken by flying debris. Falling and broken glass will pose a significant danger even after the storm. Commercial signage, fences, and canopies will be damaged and often destroyed. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks. Potable water could become scarce as filtration systems begin to fail.
3	111-130	Devastating damage will occur	There is a high risk of injury or death to people, livestock, and pets due to flying and falling debris. Nearly all older (pre-1994) mobile homes will be destroyed. Most newer mobile homes will sustain severe damage with potential for complete roof failure and wall collapse. Poorly constructed frame homes can be destroyed by the removal of the roof and exterior walls. Unprotected windows will be broken by flying debris. Well-built frame homes can experience major damage involving the removal of roof decking and gable ends. There will be a high percentage of roof covering and siding damage to apartment buildings and industrial buildings. Isolated structural damage to wood or steel framing can occur. Complete failure of older metal buildings is possible, and older unreinforced masonry buildings can collapse. Numerous windows will be blown out of high-rise buildings resulting in falling glass, which will pose a threat for days to weeks after the storm. Most commercial signage, fences, and canopies will be destroyed. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to a few weeks after the storm passes.
4	131-155	Catastrophic damage will occur	There is a very high risk of injury or death to people, livestock, and pets due to flying and falling debris. Nearly all older (pre-1994) mobile homes will be destroyed. A high percentage of newer mobile homes also will be destroyed. Poorly constructed homes can sustain complete collapse of all walls as well as the loss of the roof structure. Well-built homes also can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Extensive damage to roof coverings, windows, and doors will occur. Large amounts of windborne debris will be lofted into the air. Windborne debris damage will break most unprotected windows and penetrate some protected windows. There will be a high percentage of structural damage to the top floors of apartment buildings. Steel frames in older industrial buildings can collapse. There will be a high percentage of collapse to older unreinforced masonry buildings. Most windows will be blown out of high-rise buildings resulting in falling glass, which will pose a threat for days to weeks after the storm. Nearly all commercial signage, fences, and canopies will be destroyed. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Long-term water shortages will increase human suffering. Most of the area will be uninhabitable for weeks or months.
5	>155	Catastrophic damage will occur	People, livestock, and pets are at very high risk of injury or death from flying or falling debris, even if indoors in mobile homes or framed homes. Almost complete destruction of all mobile homes will occur, regardless of age or construction. A high percentage of frame homes will be destroyed, with total roof failure and wall collapse. Extensive damage to roof covers, windows, and doors will occur. Large amounts of windborne debris will be lofted into the air. Windborne debris damage will occur to nearly all unprotected windows and many protected windows. Significant damage to wood roof commercial buildings will occur due to loss of roof sheathing. Complete collapse of many older metal buildings can occur. Most unreinforced masonry walls will fail which can lead to the collapse of the buildings. A high percentage of industrial buildings and low-rise apartment buildings will be destroyed. Nearly all windows will be blown out of high-rise buildings resulting in falling glass, which will pose a threat for days to weeks after the storm. Nearly all commercial signage, fences, and canopies will be destroyed. Nearly all trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Long-term water shortages will increase human suffering. Most of the area will be uninhabitable for weeks or months.

Vulnerability Analysis

HAZUS-MH was used to complete the wind analysis for vulnerability and loss estimates. The HAZUS software has been developed by FEMA and the National Institute of Building Sciences. Level 1, with default parameters, was used for the analysis done in this plan. For analysis purposes, the U.S. Census tracks are the smallest extent in which the model runs. The results of this analysis are captured in the vulnerability analysis and loss estimation.

HAZUS-MH uses historical hurricane tracks and computer modeling to identify the probabilistic tracks of a range of hurricane events. The appendix contains the individual wind speed maps (50-yr, 100-yr, and 1,000-yr events) for the jurisdictions in the region.

When a hurricane impacts these areas, these maps can be used to determine what areas will be more impacted than others (at the U.S. Census Track level). Results from the model were used to develop the annualized damages. The impacts of these various events are combined to create a total annualized loss or the expected value of loss in any given year. Figure 5.14 illustrates the annualized damages from hurricane winds. It should be noted that these are climatologically trend tracks, and therefore the specified track, realistically, can vary significantly from what is shown.

Building Types

Table 5.22 illustrates the probabilistic building stock exposure by building type to hurricanes. In Region 2000, wood-frame buildings account for a large percentage of the building stock. Table 5.23 illustrates the building stock exposure broken down by the type of occupancy. From the table, 83% of the building stock for Region 2000 is considered residential, with approximately 14% of the building stock coming from commercial and industrial.

HAZUS-MH hurricane model only conducts analysis at the U.S. Census track level; which is larger than all of the towns in Region 2000. Town exposure has been estimated based on the percentage of the housing units in the County.

Building Stock Exposure by Building Type						
Community	**Wood**	**Masonry**	**Concrete**	**Steel**	**MH**	**TOTAL**
Amherst County	$1,088,291	$466,536	$78,671	$135,504	$55,740	**$1,824,742**
**Amherst, Town of*	*$83,986*	*$36,004*	*$6,071*	*$10,457*	*$4,302*	*$140,820*
Appomattox County	$446,231	$173,247	$12,362	$43,398	$43,019	**$718,257**
**Appomattox, Town of*	*$58,727*	*$22,800*	*$1,627*	*$5,711*	*$5,662*	*$94,527*
**Pamplin City, Town of*	*$6,814*	*$2,646*	*$189*	*$663*	*$657*	*$10,969*
Bedford City	$238,566	$124,589	$27,091	$58,111	$1,090	**$449,447**
Bedford County	$2,513,542	$976,105	$70,447	$206,432	$166,762	**$3,933,288**
Campbell County	$1,649,161	$676,211	$59,213	$233,111	$161,113	**$2,778,809**
**Altavista, Town of*	*$123,194*	*$50,514*	*$4,423*	*$17,414*	*$12,035*	*$207,580*
**Brookneal, Town of*	*$43,305*	*$17,756*	*$1,555*	*$6,121*	*$4,231*	*$72,968*
Lynchburg City	$2,448,010	$1,235,429	$278,580	$565,286	$19,468	**$4,546,773**
Total	**$8,383,801**	**$3,652,117**	**$526,364**	**$1,241,842**	**$447,192**	**$14,251,316**
All values are in thousands of dollars						

Table 5.22. Building Stock Exposure by Building Type (from HAZUS-MH).

*denotes town values that are also included in totals for the perspective County.

Table 5.23. Building Stock Exposure by General Occupancy, Source: HAZUS

Building Stock Exposure By General Occupancy								
Community	**Residential**	**Commercial**	**Industrial**	**Agri.**	**Religion**	**Gov't**	**Ed.**	**Total**
Amherst County	$1,584,986	$142,958	$50,622	$3,360	$28,601	$939	$13,277	**$1,824,743**
**Amherst, Town of*	*$122,317*	*$11,032*	*$3,907*	*$259*	*$2,207*	*$72*	*$1,025*	*$140,820*
Appomattox County	$628,950	$64,068	$10,528	$2,496	$6,902	$2,234	$3,080	**$718,258**
**Appomattox, Town of*	*$82,774*	*$8,432*	*$1,386*	*$328*	*$908*	*$294*	*$405*	*$94,527*
**Pamplin City, Town of*	*$9,605*	*$978*	*$161*	*$38*	*$105*	*$34*	*$47*	*$10,969*
Bedford City	337543	$71,152	$22,262	$1,109	$13,507	$1,471	$2,403	**$449,447**
Bedford County	$3,486,963	$273,431	$88,455	$9,372	$59,213	$2,525	$13,335	**$3,933,294**
Campbell County	$2,306,096	$264,942	$122,837	$8,381	$45,326	$18,791	$12,447	**$2,778,820**
**Altavista, Town of*	*$172,268*	*$19,791*	*$9,176*	*$626*	*$3,386*	*$1,404*	*$930*	*$207,581*
**Brookneal, Town of*	*$60,555*	*$6,957*	*$3,226*	*$220*	*$1,190*	*$493*	*$327*	*$72,968*
Lynchburg City	$3,502,793	$694,372	$196,531	$3,514	$95,804	$5,863	$47,899	**$4,546,776**
Total	**$11,847,331**	**$1,510,923**	**$491,235**	**$28,232**	**$249,353**	**$31,823**	**$92,441**	**$14,251,338**
All values are in thousands of dollars								

*denotes town values that are also included in totals for the perspective County.

Critical Facilities

Vulnerability to critical facilities from hurricane winds is fairly uniform throughout the region. As Figure 5.17 shows, there is only slight variation in the region, with a few "hot spots". Bedford County, Bedford City, Lynchburg City and Campbell County have a slightly larger annualized hurricane loss when compared to Amherst and Appomattox Counties. Table 5.26 illustrates the percentage of critical facilities in the different annualized loss categories. Critical facilities that are located within towns have been included in the county totals. Future updates of this plan will hopefully include a region wide comprehensive database for critical facilities.

Loss Estimation

Table 5.24 provides the loss estimations from HAZUS-MH by building type. As noted earlier, wood structures compose the majority of the structures, and also account for the majority of the losses. Table 5.25 shows the loss by occupancy type. Note the differences between the totals in the tables are due to rounding in the calculations in HAZUS-MH.

HAZUS-MH hurricane model only conducts analysis at the U.S. Census track level; which is larger than all of the towns in Region 2000. Town building stock loss has been estimated based on the percentage of the housing units in the County.

Table 5.24. Building Stock Loss by Building Type, Source: HAZUS

Building Stock Loss by Building Type						
Community	**Wood**	**Masonry**	**Concrete**	**Steel**	**MH**	**TOTAL**
Amherst County	$106.52	$39.52	$2.11	$5.86	$5.86	**$159.87**
**Amherst, Town of*	*$8.22*	*$3.05*	*$0.16*	*$0.45*	*$0.45*	*$12.34*
Appomattox County	$55.77	$17.73	$0.40	$1.87	$5.39	**$81.16**
**Appomattox, Town of*	*$7.34*	*$2.33*	*$0.05*	*$0.25*	*$0.71*	*$10.68*
**Pamplin City, Town of*	*$0.85*	*$0.27*	*$0.01*	*$0.03*	*$0.08*	*$1.24*
Bedford County	$243.01	$81.25	$1.72	$7.68	$19.61	**$353.27**
Bedford City	$29.34	$12.80	$1.01	$3.66	$0.14	**$46.96**
Campbell County	$190.29	$69.36	$2.24	$11.24	$19.18	**$292.32**
**Altavista, Town of*	*$14.21*	*$5.18*	*$0.17*	*$0.84*	*$1.43*	*$21.84*
**Brookneal, Town of*	*$5.00*	*$1.82*	*$0.06*	*$0.30*	*$0.50*	*$7.68*
Lynchburg City	$299.48	$138.05	$10.80	$35.27	$2.55	**$486.15**
Total	**$924.41**	**$358.72**	**$18.28**	**$65.59**	**$52.73**	**$1,419.73**
						**All values are in thousands of dollars*

*denotes town values that are also included in totals for the perspective County

Table 5.25. Building Stock Loss by General Occupancy, Source: HAZUS

Building Stock Loss By General Occupancy								
Community	**Residential**	**Commercial**	**Industrial**	**Agri.**	**Religion**	**Gov't**	**Ed.**	**Total**
Amherst County	**$148.75**	**$6.12**	**$3.03**	**$0.18**	**$1.03**	**$0.04**	**$0.55**	**$159.70**
**Amherst, Town of*	*$11.48*	*$0.47*	*$0.23*	*$0.01*	*$0.08*	*$0.00*	*$0.04*	*$12.32*
Appomattox County	**$77.27**	**$2.71**	**$0.56**	**$0.16**	**$0.26**	**$0.18**	**$0.13**	**$81.27**
**Appomattox, Town of*	*$10.17*	*$0.36*	*$0.07*	*$0.02*	*$0.03*	*$0.02*	*$0.02*	*$10.70*
**Pamplin City, Town of*	*$1.18*	*$0.04*	*$0.01*	*$0.00*	*$0.00*	*$0.00*	*$0.00*	*$1.24*
Bedford County	**$335.38**	**$10.96**	**$4.20**	**$0.57**	**$1.99**	**$0.06**	**$0.50**	**$353.66**
Bedford City	**$40.02**	**$4.40**	**$1.52**	**$0.09**	**$0.68**	**$0.13**	**$0.13**	**$46.97**
Campbell County	**$268.54**	**$12.74**	**$8.04**	**$0.52**	**$1.81**	**$0.88**	**$0.53**	**$293.06**
**Altavista, Town of*	*$20.06*	*$0.95*	*$0.60*	*$0.04*	*$0.14*	*$0.07*	*$0.04*	*$21.89*
**Brookneal, Town of*	*$7.05*	*$0.33*	*$0.21*	*$0.01*	*$0.05*	*$0.02*	*$0.01*	*$7.70*
Lynchburg City	**$418.23**	**$45.11**	**$15.25**	**$0.30**	**$4.72**	**$0.48**	**$2.75**	**$486.84**
Total	**$1,288.19**	**$82.03**	**$32.60**	**$1.82**	**$10.49**	**$1.77**	**$4.60**	**$1,421.50**
								** All values are in thousands of dollars*

*denotes town values that are also included in totals for the perspective County.

Figure 5.17. Region 2000 Annualized Total Hurricane Loss Estimate, Source: VDEM

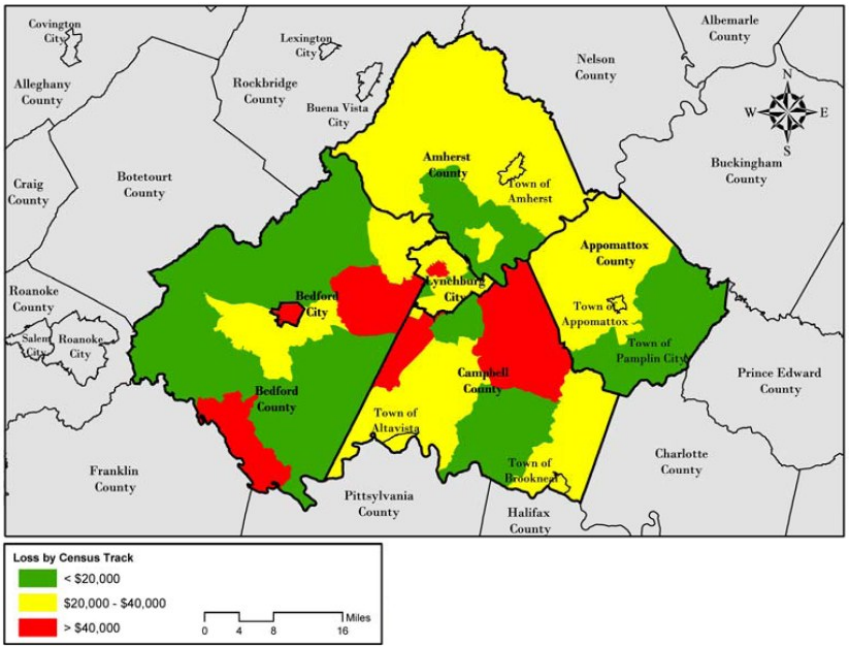


Table 5.26. Region 2000 Percentage of Annual Hurricane Loss by Critical Facility, Source: HAZUS

Community	<$20,000	$20,000 -$40,000	>$40,000
Amherst County	21%	79%	0%
Appomattox County	22%	78%	0%
Bedford County	62%	12%	26%
Bedford City	0%	0%	100%
Campbell County	15%	51%	34%
Lynchburg City	14%	81%	4%

Problem Spot Mapping

The project management team didn't pinpoint any specific areas in Region 2000 that were more susceptible to hurricane damage. This region wide approach mirrored the discussion that the project management team had that the entire region shared the same probability of a future hurricane event. Figure 5.19 shows that hurricane paths over the last 50 years are randomly distributed throughout the region. The region usually gets receives substantial hurricane damage once every 10-15 years.

Tornado Wind (Medium Ranking)

Hazard History

Table 5.27 includes descriptions of major tornado events that have touched down in Region 2000. Events have been broken down by the date of occurrence and when available, by individual community descriptions. When no community specific description is available, the general description should be used as representing the entire planning area.

Hazard Profile

Damaging winds typically are associated with tornadoes or land falling hurricanes. Isolated "downburst" or "straight-line" winds associated with any common thunderstorm can also cause extensive property damage. Tornadoes are classified as a rotating column of wind that extends between a thunderstorm cloud and the earth's surface. Winds are typically less than 100 mph, with severe tornado wind speeds exceeding 250 mph. The rotating column of air often resembles a funnel-shaped cloud. The widths of tornadoes are usually several yards across, with infrequent events being over a mile wide. Tornadoes and their resultant damage can be classified into six categories using the Fujita Scale (see Table 5.28). This scale assigns numerical values for wind speeds inside the tornado according to the type of damage and degree of the tornado. Most tornadoes are F0 and F1, resulting in little widespread damage. Tornado activity normally spans from April through July but tornadoes can occur at any time throughout the year. In Virginia, peak tornado activity is in July. Hot, humid conditions stimulate the tornadoes growth.

Strong tornadoes may be produced by thunderstorms and often are associated with the passage of hurricanes. On average, about seven tornadoes are reported in Virginia each year. The total number may be higher as incidents may occur over areas with sparse populations, or may not cause any property damage.

Tornadic thunderstorms also produce hail. Hailstorms are also outgrowths of severe thunderstorms. During summer months, when the difference between ground and upper level temperatures is significant, hail may develop. The size of the hailstones is directly related to the severity and size of the storm. Hail is described as chunks of ice, often in a spherical or oblong shape, that are produced by thunderstorms. The size of the hail greatly affects the magnitude or severity of damage. Storms can produce hail from as small as ¼ inch in diameter to up to 4 ½ inches. Depending on the size of hail determines the potential damage.

Table 5.28. Enhanced Fujita Tornado Intensity Scale, Source: National Weather Service

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

The classification of the tornado gives an approximate depiction of what the corresponding damage of the tornado will be. A majority of Virginia's tornadoes are F0 and F1 on the Fujita Scale, shown in Table 5.29. These result in minimal extensive damage. Damage that is likely to occur would be damage to trees, shrubbery, signs, antennas, with some damage to roofs and unanchored trailers.

Table 5.29. Virginia Tornado Statistics 1950-2007, Source: VDEM

	Number	% of all Tornadoes	Deaths	Injuries	Property Damages
F/EF0	194	34%	0	2	$5,838,000
F/EF1	242	42%	1	88	$514,508,000
F/EF2	84	14%	3	94	$171,843,000
F/EF3	30	5%	19	104	71,728,000
F/EF4	2	0.03%	4	248	$52,000,000
Unspecified	26	4%	0	3	$899,000
TOTAL	578		27	539	$814,169,000

Vulnerability Analysis

Tornadoes are high-impact, low-probability hazards. There have only been two documented tornado touchdowns in Region 2000 since 2006—one E0 near Brookneal and one E1 near Hixburg. The net impact of a tornado depends on the storm intensity and the vulnerability of development in its path. Many variables would need to be considered in order to establish an intensity-damage relationship.

Table 5.30 and Figure 5.18 show tornado occurrences in the region. Some areas in the region appear to be slightly more prone to tornadoes than others, especially in central Bedford County and Bedford City. It is thought that this is caused by topographical influences on thunderstorms such as the change in low-level wind flow and humidity caused by the orientation of the mountains. The probability of future occurrences of tornados is definite; predicting the potential locations for such events is inappropriate.

Since tornadoes are so infrequent and sporadic for the region, the Hurricane Wind analysis covers more probable high wind occurrences.

Table 5.30a. Region 2000 Tornado Touchdowns (1950-2007)

Tornadoes by Jurisdiction, 1950-2007	
Amherst County	2
Appomattox County	1
Bedford County	3
Bedford City	3
Campbell County	6
Lynchburg City	3

Table 5.30b. Virginia Tornadoes by Calendar Month (1950-2007)

Virginia Tornadoes by Calendar Month												
Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
F/EF0-F/EF1	13	13	14	36	60	44	72	64	81	21	11	1
F/EF2-F/EF4	4	0	3	16	14	12	9	14	26	12	6	0
Unspec.	0	1	2	2	4	2	9	3	0	2	0	1
TOTAL	17	14	19	54	78	58	90	81	107	35	17	2

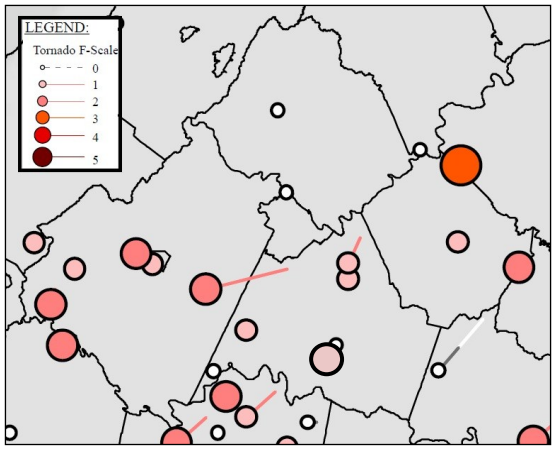


Figure 5.18. Historic Tornado Touchdowns and Tracks: 1950-2010. Sources: (VDEM, NOAA SVRGIS, VGIN, ESRI)

Wildfire (Medium Ranking)

Hazard History

The Virginia Department of Forestry website provided fire incidence data for fire years 1995-2001. The data provided by VDOF was summarized into the following tables.

Note that the tables do not include data for towns or cities; this data was not available through VDOF. Table 5.31 provides information on the breakdown of number of acres burned and the total amount of damage per county. Table 5.32 illustrates the cause of fire broken down by county. It is noted that the largest percentages of wildfires were caused by debris (44%), followed by 22% from miscellaneous causes.

Table 5.31. Wildfire Summary 1995-2001, Source: VDOF

Fire Year	2002		2003		2004		2005		2006	
County	Total Acres	Total Damage	Total Acres	Total Damage	Total Acres	Total Damage	Total Acres	Total Damage	Total Acres	Total Damage
Amherst	447.6	$1,010	25.8	$101,400	36.2	$113,750	18.1	$186,520	34.2	$197,670
Appomatox	55.1	$700	20.2	$0	2.5	$350	12.6	$2,000	88.4	$10,800
Bedford	107.3	$23,040	11	$1,100	47.1	$3,650	41.3	$11,900	219.9	$153,960
Campbell	97.6	$5,200	20.8	$15,750	44.7	$12,650	56.7	$28,350	62.5	$23,735
Total	707.6	$29,950	77.8	$118,250	130.5	$130,400	128.7	$228,770	405	$386,165

Fire Year	2007		2008		2009		2010		2011			
County	Total Acres	Total Damage	Total Acres	Total Damage	Total Acres	Total Damage	Total Acres	Total Damage	Total Acres	Total Damage	Acres Total	Damages Total
Amherst	1444	$92,525	147.8	$7,300	383.3	$422,200	34.7	$31,300	205.2	$100,300	2776.9	$1,253,975
Appomatox	11.6	$102,200	234.8	$279,025	19.5	$150,300	30.2	$101,370	25.7	$40,000	501	$686,745
Bedford	73.5	$183,650	1139.2	$13,500	36.9	$0	1007.7	$300,500	425.3	$0	3,109	$691,300
Campbell	176.4	$203,800	257	$806,200	63.1	$5,700	28.6	$10,306	187.8	$80,360	995	$1,192,051
Total	1705.5	$582,175	1778.8	$1,106,025	502.8	$578,200	1101.2	$443,476	844	$220,660	7381.9	$3,824,071

Table 5.32. Wildfire Causes 2001-2011, Source: VDOF

County	Lightening	Camp Fire	Smoking	Debris	Incendiary	Equip. Use	R&R	Children	Misc.	Total
Amherst	23	1	4	48	9	6	5	5	44	145
Appomattox	15	5	4	52	11	16	5	6	25	139
Bedford	11	2	3	56	8	32	10	5	29	156
Campbell	8	0	3	92	60	27	13	7	87	297

Hazard Profile

Wildfire is a unique hazard in that it can be significantly altered based on efforts to control its course during the event. The Virginia Department of Forestry (VDOF) indicates that there are three principle factors that can lead to the formation of wildfire hazards: topography, fuel, and weather. The environmental conditions that exist during these seasons exacerbate the hazard. When relative humidity is low and high winds are coupled with a dry forest floor (brush, grasses, leaf litter), wildfires may easily ignite.

Figure 5.19a Wildfire Risk Assessment, Source: VDOF

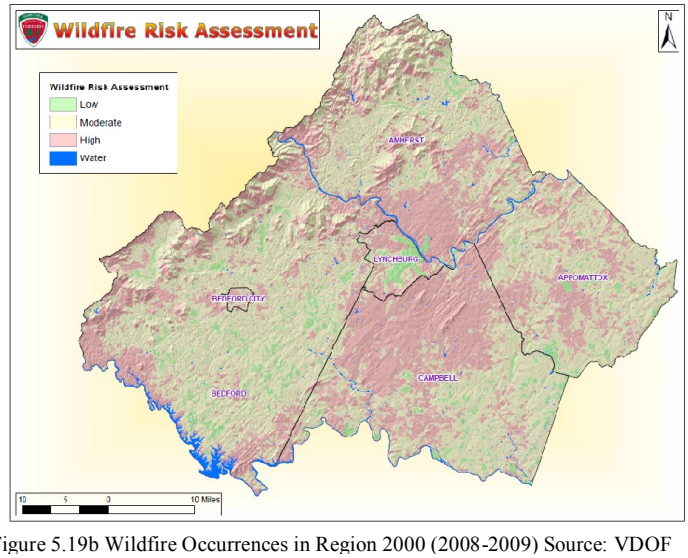
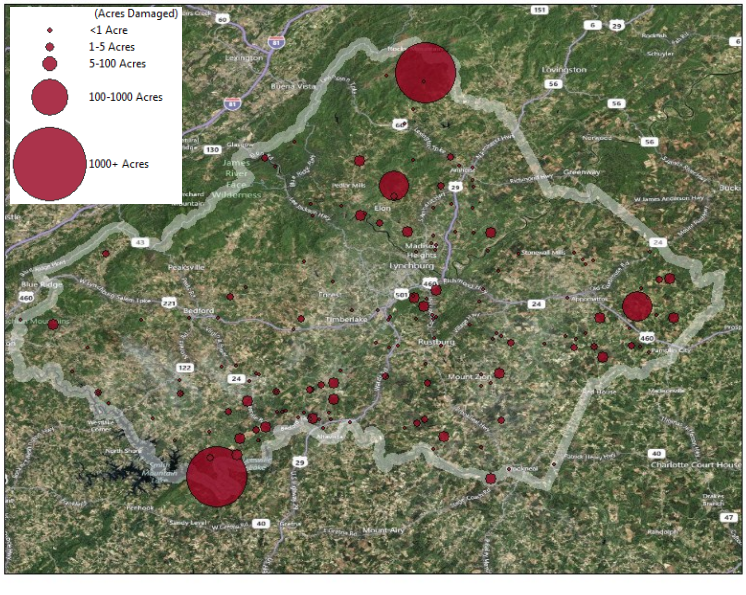


Figure 5.19b Wildfire Occurrences in Region 2000 (2008-2009) Source: VDOF



Years of drought can lead to environmental conditions that promote wildfires. Accidental or intentional setting of fires by humans is the largest contributor to wildfires. Residential areas or "woodland communities" that expand into wild land areas also increase the risk of wildfire threats. Spring (March and April) and fall (October and November) are the two seasons for wildfires.

Secondary effects from wildfires can pose a significant threat to the

communities surrounding the hazard. During a wildfire, the removal of groundcover that serves to stabilize soil can potentially lead to hazards such as landslides, mudslides, and flooding. In addition, the leftover scorched and barren land may take years to recover and the resulting erosion can be problematic.

Vulnerability Analysis

Figure 5.19a shows the wildfire hazard map developed by VDOF. In 2010 and 2011, VDOF examined which factors influence the occurrence and advancement of wildfires and how these factors could be represented in a GIS model. VDOF determined that historical fire incidents, land cover (fuels surrogate), topographic characteristics, population density, and distance to roads were critical variables in a wildfire risk analysis. The resulting high, medium, and low risk category reflect the results of this analysis. Campbell County has a large portion in the high potential category for wildfire risk, followed by Amherst County, Town of Amherst, Bedford County and Appomattox County. The bands of high potential could be a result of the state and national forests and parks located throughout the region. Figure 5.19b shows wildfire occurrences that were reported to the Virginia Department of Forestry in 2008 and 2009. In this two year study span, there were only four fires reported that damaged more than 100 acres of land. Figure 5.19b along with table 5.32 (causes of fire) show that there is no concentrated area of wild fire occurrences and that the risk of a damaging wildfire is equal throughout the wooded areas of Region 2000.

Department of Forestry

Table 33 illustrates the number of homes within woodland communities, as designated by Virginia Department of Forestry, in Region 2000. For Region 2000, 33% of the woodland homes fall into the high potential for a wildfire. Amherst County has the highest relative percentage of homes in areas of high wildfire potential at 63% of homes in the highest risk category. Bedford County has the second highest relative risk for wildfire with 32% of woodland homes at risk. Table 5.34 provides a breakdown of the number of critical facilities in wildfire prone areas. Campbell and Amherst Counties have a relatively high percentage of critical facilities at risk (49%, 44 %) followed by Bedford County (32%). Overall, Region 2000 has a relatively low number of critical facilities at risk to wildfire (37%) events. Figures and tables in Appendix 5.1 summarize the problem spot locations that were denoted by committee members.

Table 5.33. Woodland Homes Wildfire Risk, Source: HAZUS

Number of Woodland Homes by Fire Rank				
County	Medium Potential	High Potential	Grand Total	% High Risk
Amherst County	20	12	**32**	**63%**
Appomattox County	0	2	**2**	**0%**
Bedford County	18	38	**56**	**32%**
Campbell County	1	29	**30**	**3%**
Total	**39**	**81**	**120**	**33%**

Table 5.34. Region 2000 Critical Facilities Wildfire Vulnerability, Source: HAZUS

Number of Critical Facilities by Fire Risk					
Community	Low Potential	Medium Potential	High Potential	Total	% in High Risk
Amherst County	18	182	154	**354**	**44%**
Appomattox County	28	56	27	**111**	**24%**
Bedford County	21	258	130	**409**	**32%**
Bedford City	0	36	11	**47**	**23%**
Campbell County	56	124	173	**353**	**49%**
Lynchburg City	61	14	15	**90**	**17%**
Total	**184**	**670**	**510**	**1364**	**37%**

Landslide and Land Subsidence (Low Ranking)

Hazard History

No detailed hazard history was available for Region 2000. Figures 5.20 and 5.21 illustrate potential risk areas for the Commonwealth of Virginia.

Figure 5.20. Landslide Hazards for Virginia, Source: VDEM

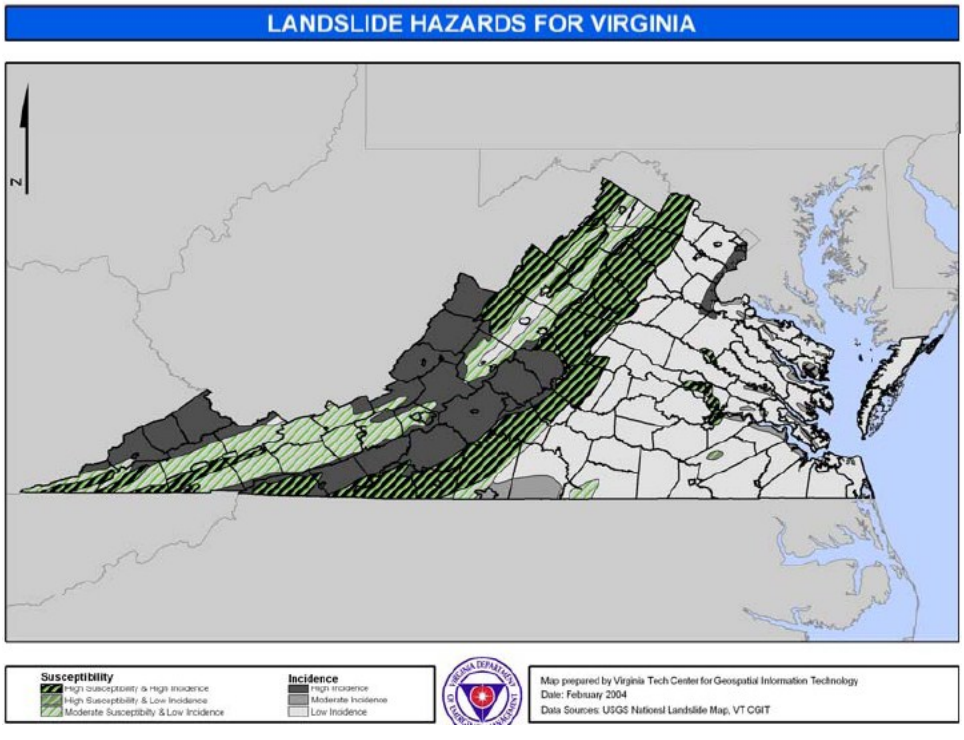


Figure 5.21a. Karst Regions and Historical Subsidence in Virginia, Source: VDEM

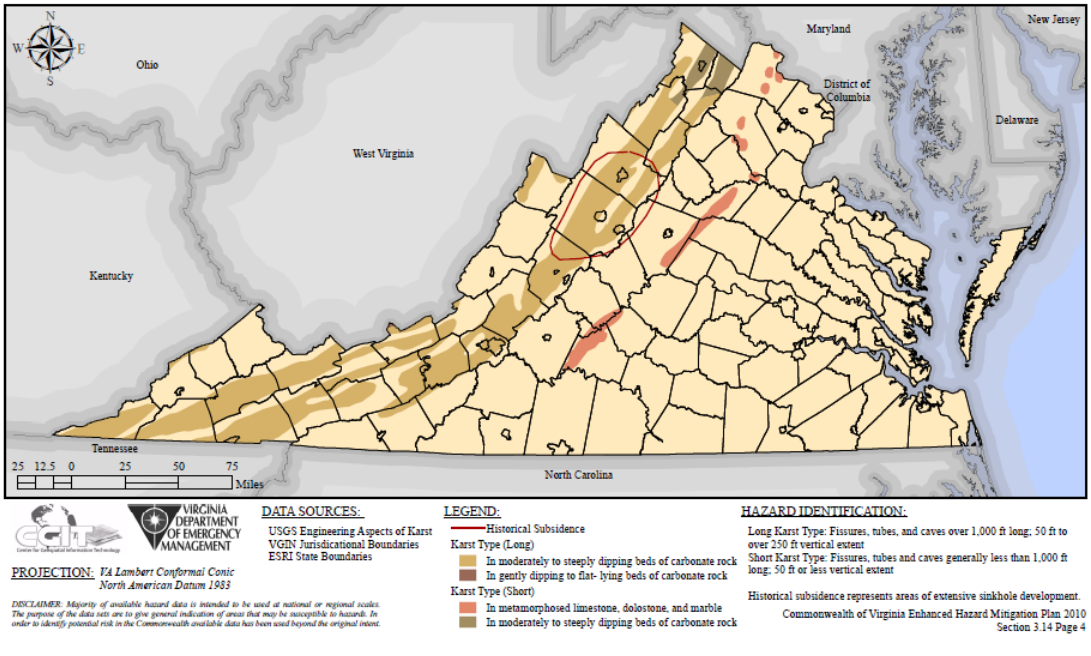
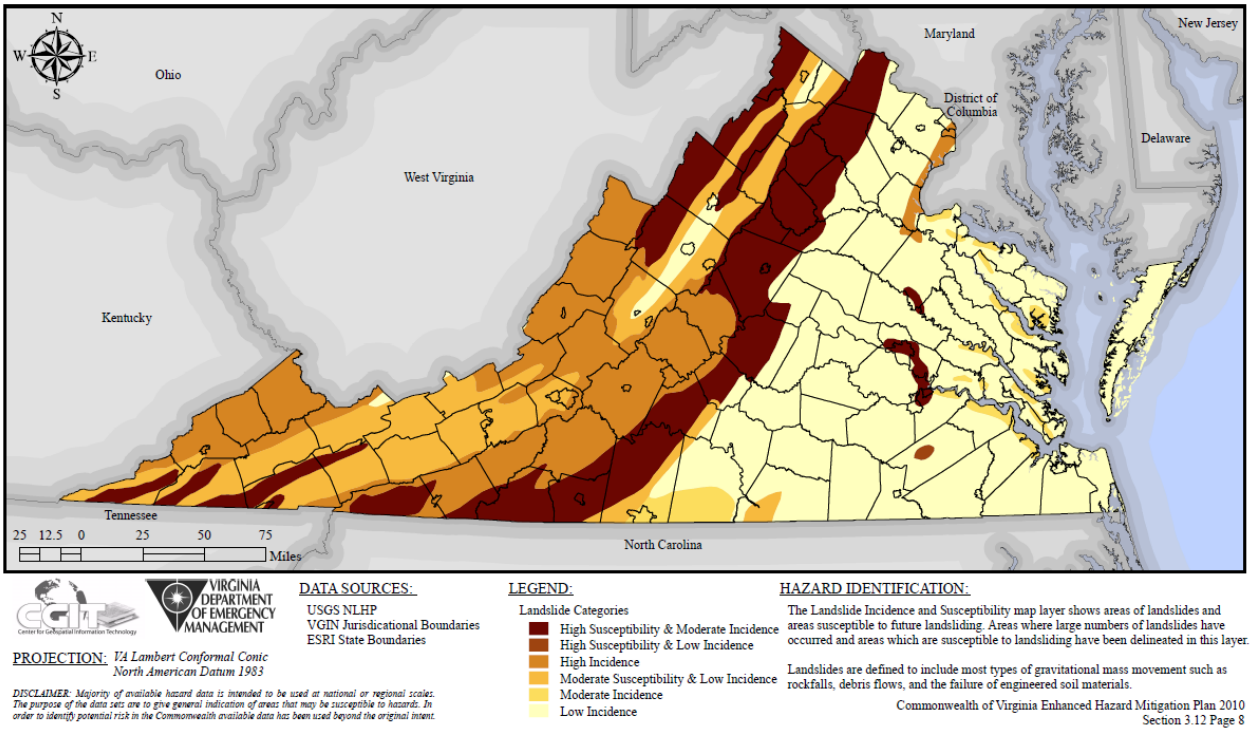


Figure 5.21b. Landslide Incidence and Susceptibility, Source: VDEM



Hazard Profile

Land subsidence is the lowering of surface elevations due to changes made underground. The USGS notes that land subsidence is usually caused by human activity such as pumping of water, oil, or gas from underground reservoirs. Land subsidence often occurs in regions with mildly acidic groundwater and the geology is dominated by limestone, dolostone, marble or gypsum. Karst is the term used to refer to geology dominated by limestone and similar soluble rocks. The acidic groundwater dissolves the surrounding geology creating sinkholes. Sinkholes are classified as natural depressions of the land surface. Areas with large amounts of karst are characterized by the presence of sinkholes, sinking streams, springs, caves and solution valleys.

The term “landslide” is used to describe the downward and outward movement of slope forming materials reacting under the force of gravity. Figure 5.21b gives an indication that the eastern portion of Region 2000 is the most susceptible to future landslide incidents. The term covers a broad category of events, including mudflows, mudslides, debris flows, rock falls, rock slides, debris avalanches, debris slides, and earth flows. These terms vary by the amount of water in the materials that are moving.

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 land sliding and moderate incidence.
2. High susceptibility to land sliding and low incidence.
3. High landslide incidence (more than 15% of the area is involved in land sliding).

Moderate Risk

4. Moderate susceptibility to land sliding and low incidence.
5. Moderate landslide incidence (1.5 – 15% of the area is involved in land sliding).

Low Risk

6. Low landslide incidence (less than 1.5% of the area is involved in land sliding).

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.

Several natural and human factors may contribute to or influence landslides. How these factors interrelate is important in understanding the hazard. The three principal natural factors are topography, geology, and precipitation. The principle human activities are cut-and-fill construction for highways, construction of buildings and railroads, and mining operations.

The USGS recognizes four major impacts caused by land subsidence:

- Changes in elevation and slope of streams, canals, and drains
- Damage to bridges, roads, railroads, storm drains, sanitary sewers, canals, and levees
- Damage to private and public buildings
- Failure of well casings from forces generated by compaction of fine-grained materials in aquifer systems

Landslides can cause serious damage to highways, buildings, homes, and other structures that support a wide range of economies and activities. Landslides commonly coincide with other natural disasters. Expansion of urban development contributes to greater risk of damage by landslides.

Hazard Areas

Region 2000 is located adjacent to the edge of the karst regions in Virginia (Figure 5.21). Campbell and Appomattox Counties have a higher relative susceptibility to landslides comparative to the rest of the region.

Vulnerability Analysis

There is no scientific information that would suggest the probability of a landslide event. The impact and extent of the damage will greatly hinge on where the landslide occurs. The largest danger from landslides and debris flows occurs in area of high relief or abrupt changes in topography, especially areas susceptible to slope failure initiated by sustained and/or heavy rain events.

Problem Spot Mapping

See Appendix 5.1 for Figures and Tables summarizing the problem spot locations that were present in the original Hazard Mitigation Plan and confirmed by the project management team. No new problem areas were noted in the plan update. When specific town information was provided it was included on the problem spot maps. If no information was provided by the localities, or they acknowledged there was no need for a specific map, the map was omitted from the Appendix.

Terrorism (Low Ranking)

Hazard History

No terrorism history was available for Region 2000 at the time of the update. Several of the communities in the region provided information about their Emergency Operation Plans (EOP). These plans are beginning to address terrorism as a concern in operation. Please consult local EOPs for further guidance.

The FEMA risk management series on mitigating potential terrorist attacks against buildings provides information on developing a realistic prioritization of human-caused hazards. The mitigation strategies section on this report should provide projects to address human caused hazard vulnerability. Future concepts to consider include:

I. Communities determine the relative importance of various critical and non-critical facilities and the asset of these systems

II. Determine the vulnerability to the specified hazard

III. Determine what threats are known to exist in the communities

Hazard Profile

Currently there is no universal definition for terrorism. Terror can be exhibited through many different forms. The code of Federal Regulations defines terrorism as “the unlawful use of force and violence against persons or property to intimidate or coerce a government, civilian population, or any segment thereof, in furtherance of political or social objectives.”

Hazard Areas

Local Emergency Operation Plans are beginning to address annexations and terrorism areas of concern. Consult these plans for further information.

Vulnerability Analysis

Vulnerability analysis, when available, has been conducted by the different localities. This information has been addressed in local Emergency Operation Plans.

Earthquakes

Hazard Profile

An earthquake is the motion or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. The damage from earthquakes can span hundreds of thousands of square miles; cause extensive damage into the billions of dollars; and result in tremendous amounts of injuries and death because of their sudden and unpredictable nature. Earthquakes also have extensive ripple effects on the economic and social functioning of the affected area as well.

Hazard History

Though very rare, earthquakes have the potential to affect Region 2000. The table below shows all earthquakes that have been recorded by the USGS in Virginia.

Locality	Date	Magnitude
Giles County, VA	5/31/1897	5.9
Virginia	5/5/2003	3.9
Virginia	12/9/2003	4.5
Louisa County, VA	8/23/2011	5.8

Vulnerability Analysis

The majority of property damage and earthquake related deaths result from the failure and collapse of structures due to ground shaking. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to a number of factors: amplitude, duration of the shaking, distance from the fault, and regional geology. Earthquakes can also cause landslides (the down-slope movement of soil and rock) and liquefaction (in which ground soil loses the ability to resist shear and acts much like quick sand).

The majority of earthquakes are caused by the release of stresses accumulated along fault planes along the Earth's outer crust. None of the major fault lines are located in or near Region 2000. The North American plate follows the continental border with the Pacific Ocean in the west, but follows the mid-Atlantic trench in the east. Earthquakes occurring along the mid-Atlantic trench usually pose little risk to humans. The greatest risk for earthquakes in the United States is along the Pacific Coast.

Earthquakes are measured in terms of their magnitude and intensity. Magnitude is measured using the Richter Scale—described in Table 5.35. The scale is based on an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude. Each unit increase in magnitude on the Richter Scale corresponds to a tenfold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale—described in Table 5.36) based on

direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, with a I corresponding to imperceptible (instrumental) events, IV corresponding to moderate (felt by people awake), to XII for catastrophic (total destruction).

Table 5.35 Description of Richter Scale, Source: North Carolina Division of Emergency Management

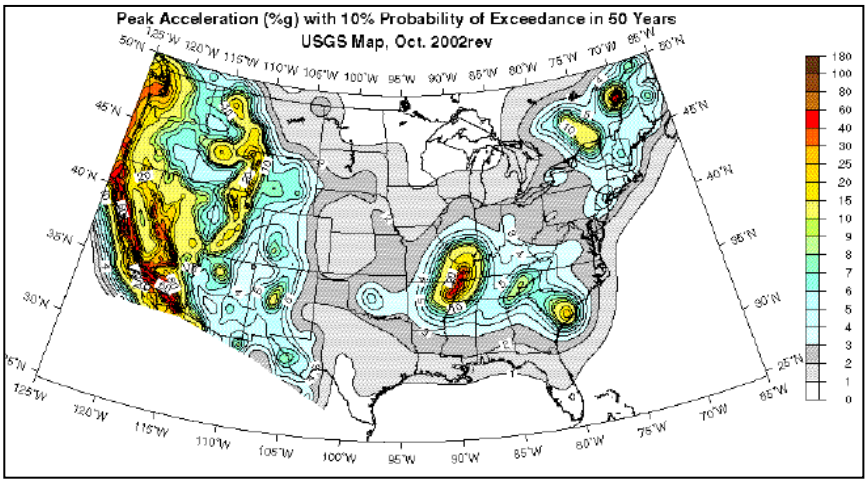
Richter Magnitudes	Earthquake Effects
<3.5	Generally not felt, but recorded.
3.5-5.4	Often felt, but rarely causes damage.
Under 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1-6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0-7.9	Major earthquake. Can cause serious damage over larger areas.
>8	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Table 5.36 Description of Mercalli Intensity Scale, Source: Michigan Tech

Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Detected mainly on seismographs, felt by very few people	1.0 – 2.0
II	Feeble	Some people feel it, especially on upper floors	2.0 – 3.0
III	Slight	Felt by people resting, especially on upper floors; May not be recognized as an earthquake	3.0 – 4.0
IV	Moderate	Felt by many people indoors, a few outdoors; may feel like a large truck rumbling by	4.0
V	Slightly Strong	Felt by almost everyone, some people awakened; small objects moved, trees and poles may shake.	4.0 – 5.0
VI	Strong	Felt by everyone; difficult to stand, some heavy furniture moved, some plaster falls; chimneys may be slightly damaged.	5.0 – 6.0
VII	Very Strong	Slight to moderate damage in well built, ordinary structures, considerable damage to poorly built structures; some walls may fall.	6.0
VIII	Destructive	Little damage in specially built structures, considerable damage to ordinary buildings, severe damage to poorly built structures; some walls collapse.	6.0 – 7.0
IX	Ruinous	Considerable damage to specially built structures, buildings shifted off foundations; ground cracked noticeably; wholesale destruction, landslides.	7.0
X	Disastrous	Most masonry and frame structures and their foundations destroyed; ground badly cracked; landslides, wholesale destruction.	7.0 – 8.0
XI	Very Disastrous	Total damage; few, if any, structures standing; bridges destroyed, wide cracks in ground, waves seen on ground.	8.0
XII	Catastrophic	Total damage; waves seen on ground; objects thrown up into air.	8.0 or greater

Figure 5.22 shows the probability that ground motion will reach a certain level during an earthquake. The data shows the "peak horizontal ground acceleration" which translates to the fastest measured change in speed for a particle at ground level that is moving horizontally due to an earthquake. The map shows that all of the jurisdictions in Region 2000 are located low probability area therefore remains a low future threat.

Figure 5.22 Peak acceleration with 10 percent probability of exceedance in 50 years, Source: USGS



Plan Linkage

The *Hazard Identification and Risk Assessment (HIRA)* takes a hazard specific approach in determining the regions concerns and vulnerabilities are. The information provided should be used as one of its planning tools in mitigating hazards. At this point in time data limitations provide a stumbling block in determining pinpoint locations of hazards.

This HIRA provides broad regional information that the communities should use in developing their mitigation actions.

Section VI on *Mitigation Actions* uses the HIRA findings and applies it to current and potential mitigation actions that will lessen the impacts from the hazards of concern. The Mitigation section bridges the gap of where the "problem spots" are and how they can mitigate them so they become less of a problem

Mitigation

Summary of Changes

The project management team reviewed this section of the plan as part of the plan update and agreed upon the following items. The description of the action goals was agreed upon to still be valid therefore remains in the plan. In regards to action development, the project management team decided it would be a good idea to incorporate new projects into the plan on a quarterly basis. The biggest portion of work for this section was addressing the existing mitigation actions and incorporating new ones. All of the mitigation actions from the original plan were reviewed and updated by the project management team. Most of these updates involved changing timelines and project scopes for specific projects. The various capability assessments were updated according to current budgets.

Purpose of Mitigation

There are many reasons why mitigation is important. The number one reason is for the assurance that the jurisdictions remain eligible for FEMA funding programs in the likelihood that the communities are involved in a disaster. The second reason to participate is to design and develop mitigation projects to be completed within the community. Hazard damage amounts substantially decrease when communities have mitigation projects and strategies in place. By becoming involved in the process it allows the communities to focus their efforts on specific hazard areas by incorporating and setting priorities for mitigation planning efforts.

Vision and Goals

The mitigation methods that were used for the Region 2000 Hazard Mitigation Plan Update mirror the Commonwealth of Virginia's plan. The project management team reviewed the methods used and determined that they are still valid and therefore remain unchanged. As part of the 2013 Hazard Mitigation Plan Update, the Project Management Team reviewed the goals from the original Hazard Mitigation Plan. The Project Management Team determined that all of the goals were still valid and therefore remained unchanged in the Plan Update. The Project Management Team also discussed the need to identify and describe progress towards achieving the goals since the release of the original Plan.

The vision for the Region 2000 Hazard Mitigation Plan Update is to lessen the impacts from natural and manmade hazards, prepare the region to respond to future events, and encourage regional collaboration by pursuing funding and promoting mitigation actions focusing on structural projects, education, information and data development, and policy and planning.

As part of the update process, the project management team reviewed the goals from the original plan and determined they are still valid and therefore remain unchanged. The goals identified below will be periodically reviewed as part of the Plan maintenance and any additional objectives or modifications will be incorporated into the next scheduled update.

These four goals define the four basic action categories for mitigation strategies:

Table 6.1 Description of action goals

Goal	Description
I. Structural Mitigation Projects	Identify and implement physical projects that will directly reduce impacts from hazards.
II. Policy and Planning	Incorporate mitigation concepts and objectives into existing and future policies, plans, regulations and laws in the Commonwealth.
III. Information and Data Development	Build capacity with information and data development to refine hazard identification and assessment, mitigation targeting and funding identification.
IV. Education and Outreach Activities	Through education and training, increase awareness of hazards and potential mitigation strategies.

Action Development

In the original plan, mitigation actions were developed using the Hazard Identification and Risk Assessment results, problem spot maps provided by local officials as well as from public input. General actions were developed for the region as a whole and further sculpted into region specific actions at the individual community action meetings.

During the November 3rd, 2011 meeting for the Hazard Mitigation Plan Update, the project management team was asked to review these mitigation actions and determined that the items were still valid and therefore should not be changed. “Proposed Mitigation Action” packets were also posted to the project website so that members of the project management team could gather suggestions from other voices in their jurisdictions, including planners and trained emergency response personnel. Responses will be processed by Region 2000 Staff and included into the plan on a quarterly basis.

For the original plan creation, the project management team members were responsible for inviting local stakeholders to attend the action meetings and provide input to the plan.

Examples of stakeholders that were invited include emergency responders, zoning officials, and planners. Response and input from the stakeholders was invaluable to this section of the plan. Their feedback helped to mold the actions for their communities and provide information on what types of mitigation is currently being completed. The appendix for this section details the attendance at each of these meetings. The feedback gathered at these meetings was presented to the project management team for the 2011 Update and the team agreed that the feedback still represents the general feelings of the public officials and citizens in their jurisdictions and was therefore not changed.

The "Proposed Mitigation Action" worksheets include a cover page that details the goal type, action name, reference number, and hazards addressed the pages after the table provides detailed information on the action. An example of the action form (Figure 6.1) contains information regarding the communities involved in implementing the action, type of action, hazards addressed, project description, responsible organization, potential funding sources and timeframe for action completion. Additional mitigation actions will be added to the plan as additional action forms are completed. The project management team did not add any projects to the current list of actions from the original plan. This section of the hazard mitigation plan has an update on the current state of mitigation actions from the original plan.

Figure 6.1 Region 2000 Hazard Mitigation Plan: Proposed Mitigation Actions Worksheet

Region 2000 Hazard Mitigation Plan: Proposed Mitigation Actions

Title of Action:

Communities Involved:

Types of Action:

Structural Mitigation	Information & Data Development
Policy & Planning	Education & Outreach

Hazards Addressed in Action:

Severe Winter Weather	Wildfire
Flood	Landslide/Land Subsidence
Drought	Terrorism
Wind	Earthquake

Action Description:

HIRA Reference include section number(s):

Responsible Organizations/Communities:

Action Timeline:

Estimated Cost to Complete Action:

Potential Funding Sources:

Potential Contacts:

Reference Links:

Three different types of actions were developed for the region. The different types of actions were based on the region's and communities needs and capacities for completing the various actions. Mitigation Actions detail the actions that were proposed in the "Proposed Mitigation Action" worksheets handed out to the project management team. During the initial jurisdictional meetings for the original Hazard Mitigation Plan, action packets—similar to the one showed in Figure 6.1) were fleshed out to determine what projects the communities thought were applicable to their regions. The complete "Proposed Mitigation Action" worksheet is available in the appendix. No additional action items were presented by the steering committee in the hazard mitigation plan update.

The second type of action is denoted under the "Regional Actions" section. Regional Actions are the projects that all of the participating jurisdictions are involved in, with Region 2000 often taking the lead on the project.

Jurisdictional Actions are specific to the jurisdiction. These projects were independently proposed by the jurisdictions because of a specific need in their community. Multiple communities may have suggested the same action; these will be completed by the community depending on constraints of available resources.

Mitigation Actions

Community Ranking

For the original Hazard Mitigation Plan, public meetings were held for the participating jurisdictions (see Section 4 on the Planning Process). These meetings led to in-depth discussions about local concerns and ways to address them. Each community prioritized the actions by ability and ease to implement the action, political will, action benefits versus the cost, community need and availability of various funding sources. The STAPLE(E) method listed below was also utilized during prioritization. The general actions were changed and expanded to detail the community specific needs, using the framework developed in 2006.

The public input for the 2011 plan update took place by placing inquiries in the regional newspapers and libraries asking for input on this section. Public input in this section is pivotal in establishing mitigation actions that will have an effective impact on pre disaster planning. The complete advertisement and public awareness material is in the Appendix. No jurisdictional action items were added to the plan update since none were received at the time of this plan being published. Action items will be added to the plan on a quarterly basis or as necessary.

The STAPLE(E) prioritization method takes into account seven criteria:

1. Socially Acceptable

2. Technically feasible

3. Administrative support

4. Politically acceptable

5. Legal

6. Economically justifiable

7. Environmentally responsive

Other considerations when prioritizing will be how well the project reduces future losses, how they further the goals and objectives put forth in this plan, and the cost versus the benefit of the project.

Regional Actions

Once the jurisdictional action meetings were held, the Project Management Team met again to solidify the regional goals that were developed. Most of the regional actions include all of the communities in Region 2000. Outlined below is the listing of the regional goals and what jurisdictions are represented in them. The Appendix outlines the complete action plan. Stakeholders from each of the communities will be involved in the planning and implementation of the regional actions. Region 2000 staff will take the lead role on a number of the regional activities. The Regional Water System Action was ranked high by all of the participating jurisdictions and remained a priority throughout the update process. This action is in the beginning stages, with feasibility studies underway. With the completion of this project, the region will be more capable of dealing with high hazard events such as droughts.

- Regional Water System

Jurisdictional Actions

Community specific actions have been separated based on the scope of the activity. During the project management team meetings, the stakeholders elaborated on what they wanted or felt could be accomplished within their communities' capability. Outlined below are examples of community specific actions. It should be noted that the following projects are in addition to the projects that were developed and ranked in the Community Ranking section. The Appendix for section 6 contains the complete description for all action items and initiatives

Table 6.2 Jurisdictional actions and update status

	Action	Status
Amherst County	GIS System	**Completed**. A fully interactive parcel map is available through the county website.
	Promoting development of Local Emergency Planning Committee (LEPC)	**Completed**. The LEPC Committee Chair can be reached at (434)-946-9307.
Appomattox County	Well site feasibility, scoping and cost for installation	**No action taken**--lack of staff resources. Public works department would be responsible. Completion date dependent on staff resources.
	911 questionnaire	**No action taken**--lack of staff resources. Planning/Emergency Services department would be responsible. Completion date dependent on staff resources.
	GIS System	**No action taken**--lack of staff resources. Planning department would be responsible. Completion date dependent on staff resources.
	Promoting development of Local Emergency Planning Committee (LEPC)	**New action**. Awaiting staff support. Planning/Emergency Services department would be responsible. Completion date dependent on staff resources.
Bedford County	Economic development assessment of James and Roanoke River Interconnectivity	**No action taken**--lack of staff resources. Economic Development department would be responsible. Completion date dependent on staff resources.
	Promoting development of Local Emergency Planning Committee (LEPC)	**No action taken**--lack of staff resources. Planning/Emergency Services department would be responsible. Completion date dependent on staff resources.
	Identify and prioritize road maintenance and development	**No action taken**--lack of staff resources. Metropolitan Planning Organization/Planning department would be responsible. Completion date dependent on staff resources.
	Smith Mountain Lake debris removal maintenance	**No action taken**--lack of staff resources. Planning department would be responsible. Completion date dependent on staff resources.
Campbell County	No additional actions proposed	
	Promoting development of Local Emergency Planning Committee (LEPC)	**Completed**. The LEPC Committee Chair an be reached at (804)-946-9307.
Bedford City	Maintaining water sharing zone understanding	**Ongoing**. The City does this on a yearly basis.
	Promoting development of Local Emergency Planning Committee (LEPC)	**New action**. Awaiting staff support. Planning/Emergency Services department would be responsible. Completion date dependent on staff resources.
City of Lynchburg	Update snow removal plan.	**Completed/Ongoing**. Updated 4/5/2010. Public works and

		Emergency Service's departments are responsible.
	Promoting development of Local Emergency Planning Committee (LEPC)	**Completed**. The LEPC Committee Chair can be reached at (434) 455-4285.
Town of Altavista	No additional actions proposed	
Town of Amherst	Relocate water intake	**Completed**. Authorization to install a raw water intake structure with debris deflector was passed on December 6, 2011.
Town of Appomattox	Well site feasibility, scoping and installation	**No action taken**--lack of staff resources. Public works/planning department would be responsible. Completion date dependent on staff resources.
	911 questionnaire	**No action taken**--lack of staff resources. Planning/emergency services department would be responsible. Completion date dependent on staff resources.
Town of Brookneal	No additional actions proposed	
Town of Pamplin City	Well site feasibility, scoping and installation	**No action taken**--lack of staff resources. Planning/public works department would be responsible. Completion date dependent on staff resources.
	911 questionnaire	**No action taken**--lack of staff resources. Planning/emergency services department would be responsible. Completion date dependent on staff resources.

Mitigation Strategy for Localities with Repetitive Loss Properties

The Counties of Amherst, Bedford, and Appomattox as well as the Town of Amherst and the City of Lynchburg have repetitive loss properties within them defined by FEMA and the NFIP (See Table 5.10a and 5.10b). The project management team agreed that locating the hard addresses of these properties and sending Hazard Mitigation Grant Program information to the property owners on an annual basis would be an adequate action item. The letters will be sent out each February.

Capability Assessment

The capability assessment is a way to quantify the ability of the communities and Region 2000 to carry out actions that have been proposed in the hazard identification and risk assessment and the mitigation actions sections. Some of the jurisdictions already have in place mitigation items that work hand in hand with their ability to respond to event, or help to lessen their

impacts. Smaller jurisdictions, such as Appomattox County, Town of Appomattox, Town of Pamplin City, Amherst and the Town of Amherst, have more of a challenge. These challenges will be explained through the localities capability assessment and their reliance on Region 2000 for additional support. Mitigation actions that already are in place include actions 1-1 Weather Relater Education; 3-3 Drought Mitigation with Voluntary Restrictions; 4-4 Drought Mitigation with Agriculture Watering Locations; and 2 File for Life Forms/911 Questionnaires. Some regional actions are currently in the scoping and assessment phase of development; including Regional Water System – Creating a Secondary Water Supply and the National Weather Service Storm Ready Program. [See the Appendix for this section for complete descriptions on Action Items] With the advancement of proposed actions, (e.g., GIS systems) their governments will increase their ability to mitigate and respond. The availability of state and federal funds will directly drive the capability of the jurisdictions in Region 2000.

This section should serve as a guide to the communities on their limitations in preparedness, current capabilities, and what areas they need to improve to be able to successfully mitigate and recover from disasters that can impact their regions.

Local capability serves as the foundation for designing an effective hazard mitigation plan and action items. It not only helps establish the goals and objectives, but assures that those actions are realistically achievable under given local governing and capability. The jurisdictional assessment should detect any existing gaps, shortfalls, or weaknesses within existing governmental activities that could exacerbate a community's vulnerability. The assessment also will highlight the positive measures already in place or being completed at the local level, which should continue to be supported and enhanced, if possible, through future mitigation efforts.

Assessment was completed on six main areas for Region 2000, similar to the factors involved in the STAPLE(E) ranking criteria. These areas of capability being the following:

- Administrative Capability,
- Technical Capability,
- Fiscal Capability,
- Planning Capability,
- Legal Capability

Administrative Capability

There are three types of jurisdictions included in this Hazard Mitigation Plan: cities, counties, and towns. Cities are independent local government entities from any surrounding counties or

towns and have their own governing councils, constitutional officers, and administrative staffs. Counties also are independent local government entities similar to cities, but may contain incorporated towns within their boundaries. Incorporated towns are semi-independent local government entities, with taxing authority and other limited authority in addition to the surrounding county.

All of the counties in Region 2000 operate under a Traditional Form of government within the Commonwealth of Virginia. Under this form of government, an elected Board holds responsibility for the general legislative and administrative affairs of the jurisdiction. In the counties, a Board of Supervisors is elected, containing five to seven members from different districts within the county with a Chair and Vice Chair. The cities and towns in Region 2000 use a Mayor-Council Form of government. For cities, a City Council are elected, with council members being at large or representing specific wards or regions. Towns have a similar organization with a Town Council, with election of a Mayor and Council members.

For cities and counties, these forms of government also require election of other officers, known as Constitutional Officers, who are responsible for the administration of certain specific aspects of community affairs. This usually includes the clerk of the court, commissioner of revenue, commonwealth's attorney, sheriff, and treasurer. The elected boards can also hire an administrator who oversees daily operations of the community and community staff. In counties, this is the county administrator, while in cities and town this is the city or town manager. In counties and cities, the Board is responsible for establishing community policy via passage of resolutions and ordinances within limitations established by the General Assembly, approving an annual operating budget, setting tax rates, and making appointments to various boards and committees. The Board also approves land use plans and any subsequent amendments via re-zonings. Business is conducted in public meetings, though the Board may elect to enter into a Closed Session to discuss issues that are exempt from the Virginia Freedom of Information Act (FOIA), including personnel or legal issues.

The incorporated towns must have an elected governing body. Under the Mayor Council Form of government, the powers of government are vested in a Town Council. The Town Council is responsible for developing an annual Town budget, amending the Town Code, and developing policy to guide the activities of the Town. Council also has taxing authority and sets tax rates that are in addition to the County's rates for those citizens who live within the Town limits. A Mayor, not considered a member of Town Council, is also elected by all voters within the Town. The Mayor's duties include presiding over Council meetings and voting only in the event of a tie. The Mayor and Council Members are each elected to two-year terms.

The Town Council can choose to employ a Town Manager who is charged with overseeing the daily operations of the Town and carrying out the policy set forth by Council. Other functions of the Town Manager include communicating with the public and media, setting Council agendas

and preparing associated materials, and assisting Council as needed. The Town Manager represents Council at many local, regional, and state functions and directs that activities of various departments. Towns have zoning and planning authority though they may choose to use the county planning commission as their town planning commission. Towns have the ability to issue general obligation and revenue bonds. In addition, towns of over 5,000 may appoint an emergency services director and exercise emergency powers separate from the county.

Under the County Administrator or the City or Town Manager, each jurisdiction has numerous departments and boards that are responsible for the various functions of local government. Table 6.3 highlights the departments in each jurisdiction that could facilitate the implementation of this hazard mitigation plan.

Table 6.3 Region 2000 Key Departments by Jurisdiction

Region 2000 Key Departments by Jurisdiction		
Jurisdiction	Departments	
Amherst County	Emergency Services	Parks and Recreation
	Economic Development	Planning and Zoning
	Information Technology	Public Safety
	Inspections	Service Authority
	Maintenance	
Appomattox County	Parks and Recreation	County Planner
	County Sheriff	Building Inspector/Official
	Emergency Services	Health Inspector
	County Attourney	Social Services
Bedford County	Building Inspections	Parks and Recreation
	Fire and Rescue Services	Planning
	GIS	Utilities (PSA)
	Natural Resources	
Campbell County	Community Development	GIS
	Building Inspector/Official	Public Safety
	Emergency Services	Parks and Recreation
	Fire Chief	Zoning
	Economic Development	Utility and Service Authority
	Real Estate and Mapping	
City of Lynchburg	Community Planning and Development	Information Technology
	Economic Development	Parks and Recreation
	Emergency Services	Zoning
	Fire and EMS	Public Works
Bedford City	Electric	Parks, Recreation, and Cemetaries
	Emergency Services	Planning and Community Development
	Fire Chief	Public Services
Town of Altavista	Public Works	Fire Chief
	Zoning	
Town of Amherst	Planning	Fire Chief
Town of Appomattox	Clerk	
Town of Brookneal	Fire Chief	Public Works
Town of Pamplin City	Fire Chief	Public Utilities

Departmental Descriptions

Project management team members have been involved in the development of this mitigation plan in order to identify gaps, weaknesses or opportunities for enhancement with existing mitigation programs. Representatives of these departments have been involved in the development of this mitigation plan in order to identify gaps, weaknesses or opportunities for enhancement in existing mitigation programs. Although exact responsibilities differ from jurisdiction to jurisdiction, the general duties of the departments highlighted in Table 6.4 are described below.

The Building Inspections office or department enforces the Virginia Uniform Statewide Building Code (VUSBC). This code includes many floodplain management considerations as it impacts site construction.

Community Development departments are typically responsible for managing grant programs funded by the U.S. Department of Housing and Urban Development. These grant programs include the Community Development Block Grant Program and the HOME Program. Community Development departments also may develop residential and commercial revitalization plans for older areas, serve as a resource on housing and community development issues and undertake special redevelopment projects.

Economic Development departments concentrate on ensuring the growth and prosperity of existing businesses. These departments often administer small business loan programs, state economic development programs, and workforce training programs. They also may recruit new businesses.

Emergency Management or Services departments are responsible for the mitigation, preparedness, response and recovery operations that deal with both natural and man-made disaster events. Often, these functions may be included in a department of Public Safety that encompasses building inspections, emergency management, and fire safety. Fire/EMS departments provide medical aid and fire suppression at the scene of accidents and emergencies. These departments are often responsible for responding to hazardous materials incidents.

Parks and Recreation departments may be responsible for open space programs. If acquisition projects are undertaken, coordination with this department becomes critical. The Planning Department (or Department of Development) addresses land use planning. This department, depending on the jurisdiction, may enforce the National Flood Insurance Program requirements and other applicable local codes. See the Planning Capability Floodplain Management Section for the specific department that is responsible for enforcing the National Flood Insurance Program.

In Region 2000, the Public Utilities Department oversees the maintenance of infrastructure including roadways, sewer and stormwater facilities, and the community's electric, gas, wastewater and water treatment facilities. Depending on the jurisdiction, the Department of Public Works may enforce the National Flood Insurance Program requirements. See the Planning Capability Floodplain Management Section for the specific department that is responsible for enforcing the National Flood Insurance Program.

Hazard Mitigation cuts across all of these disciplines. For a successful mitigation program, it is necessary to have a broad range of people involved with diverse backgrounds. These people include planners, engineers, building inspectors, zoning administrators, floodplain managers, and people familiar with Geographic Information Systems (GIS). It is also important that mitigation be assigned a specific responsibility to a department or person. Table 6.4 provides information on each jurisdiction's current staff and organizational capabilities in key areas related to mitigation.

Table 6.4 Region 2000 Administrative Capability

Region 2000 Administrative Capability [3]							
Jurisdiction	Land Use Planners	GIS Staff	Emergency Planners	Intergovernmental & Regional Cooperation	Building Inspectors	Fire Departments	Overall Administrative Capabilities
Amherst County	Yes	No	Yes (Emergency Services Director) –Works with Volunteer Organizations	Yes	Yes	Yes and Volunteer	Medium
Amherst, Town of	Yes	No	No	Yes	No	Full Time Chief and Volunteer	Low
Appomattox County	Yes	No	No - Volunteer Rescue Squad	Yes	Yes	Volunteer	Medium
Appomattox, Town of	Yes	No	No	Yes	No	No – Through Appomattox County	Low
Pamplin City, Town of	No	No	No	Yes	No	Full Time Chief and Volunteer	Low
Bedford City	Yes	No	Yes (Emergency Services Director)	Yes	Yes	Full Time Chief and Volunteer	High
Bedford County	Yes	Yes	Yes (Emergency Services Director)	Yes	Yes	Yes and Volunteer	Medium
Campbell County	Yes	Yes	Yes (Emergency Services Director) – Public Safety works with Volunteer Organizations	Yes	Yes	Full Time Chief and Volunteer	High
Altavista, Town of	Yes	No	No – Planning through Campbell County with Volunteer EMS	Yes	No	Full Time Chief and Volunteer	Medium
Brookneal, Town of	Yes	No	No	Yes	No	Full Time Chief and Volunteer	Low
Lynchburg City	Yes	Yes	Yes – Working with Fire & EMS Department	Yes	Yes	Yes	High

Technical Capability

Technical capability, in this plan, refers to the technology available to the jurisdictions to support mitigation programs and projects. A Geographic Information System (GIS) is critical in identifying potential vulnerable areas and for managing spatial information. Internet sites can be a powerful way to communicate with community members. Public education is an important element of a successful mitigation program.

GIS systems can best be described as a set of tools (hardware, software and people) used to collect, manage, analyze and display spatially-referenced data. Many local governments are now incorporating GIS systems into their existing planning and management operations. GIS is invaluable in identifying areas vulnerable to hazards. Access to the Internet can facilitate plan development, public outreach, and project implementation.

Table 6.5 summarizes the technical capabilities of the jurisdictions. Most of the jurisdictions have GIS capabilities. A majority of the jurisdictions have government websites that could be utilized to promote hazard mitigation.

Table 6.5 Region 2000 Technical Capabilities

Region 2000 Technical Capabilities			
Jurisdiction	**GIS Capabilities**	**Website**	**Overall Technical Capability**
Amherst County	Yes	Yes	High
Appomattox County	Consultant	Yes	Low
Bedford County	Yes	Yes	Medium
Campbell County	Yes	Yes	High
Bedford City	Consultant	Yes	High
City of Lynchburg	Yes	Yes	High
Town of Altavista	Through Campbell County	Yes	Medium
Town of Amherst	Through Amherst County	Yes	Low
Town of Appomattox	Through Region 2000	Yes	Low
Town of Brookneal	Through Campbell County	Yes	Low
Town of Pamplin City	None	No, partial with county site	Low

Fiscal Capability

The local jurisdictions in the planning area receive most of their revenue through state and local sales tax, local services, and through restricted intergovernmental contributions (federal and state pass through dollars). It is unlikely that any of the communities could easily afford to provide the local match for the existing hazard mitigation grant programs. This is a significant and growing concern considering the current budget deficits at both the state and local government level in Virginia, combined with the apparent increased reliance on local accountability by the federal government.

Under DMA 2000, FEMA has made special accommodations for "small and impoverished communities," who will be eligible for a 90% federal share, 10% non- Federal cost share for projects funded through the Pre-Disaster Mitigation (PDM) grant program. The definition is restricted to “communities of 3,000 or fewer individuals that is identified by the State as a rural community.” According to the current Interim Final Rule for Section 322 of the Act, none of the counties and cities in the planning area will qualify as a small and impoverished community.

Table 6.6 indicates the fiscal capabilities by jurisdiction in Region 2000. The overall and non-education budget for each community is listed. For cities and counties, educational funding usually makes up at least half of the overall budget. For town, educational funding is covered by the surrounding county.

Table 6.6 Region 2000 Jurisdictions' Fiscal Capabilities according to Approved FY2012 Budgets

Region 2000 Jurisdictions' Budgets (FY2012)			
Jurisdiction	**General Fund**	**Education**	**Overall Fiscal Capability**
Amherst County	$35,191,627	$47,045,916	Medium
Appomattox County	$37,889,429	$20,432,122	Medium
Bedford County	$84,070,649	$92,162,092	High
Campbell County	$10,518,284	$72,735,390	High
City of Lynchburg	$25,717,427	$31,828,499	High
Bedford City	$16,474,154	n/a	Medium
Town of Altavista	$4,654,600	n/a	Low
Town of Amherst	$1,705,514	n/a	Low
Town of Appomattox	$1,214,108	n/a	Low
Town of Brookneal	$579,469	n/a	Low
Town of Pamplin City	$74,000	n/a	Low

Source: Jurisdiction websites

Floodplain Management

Communities that regulate development in floodplains are able participate in the National Flood Insurance Program (NFIP). In return, the NFIP makes federally-backed flood insurance policies available for properties in the community. Table 6.7 shows when each of the jurisdictions began participating in NFIP. All of the jurisdictions in Region 2000 meet NFIP requirements. The table also provides the date of the Flood Insurance Rate Map (FIRM) in effect in each community. These maps were developed by FEMA or its predecessor and show the boundaries of the 100 year and 500 year flood. As the table shows, seven of the eleven FIRMs in effect in the planning area are over twenty-five years old, three are over twenty years old, and one is thirteen years old. Much of the planning area has experienced dramatic growth over the past two decades that is not reflected in the FIRM. This difference may mean that the actual floodplain varies from that depicted on the map.

Region 2000 Jurisdictions are incorporating a range of techniques to reduce exposure and increase awareness to protect their citizens from flood hazards. Additionally, high-risk properties such as FEMA's Repetitive Loss Properties will be routinely targeted for outreach and education opportunities and the property owners will be aware of potential mitigation options that are available to reduce future damages from flooding. This annual awareness campaign will take place in February of each year. Notices will be sent to the addresses of the severe repetitive loss properties with information regarding potential mitigation options.

Table 6.7 NFIP Compliance and Flood Insurance Policy Information by Jurisdiction, Source: Department of Conservation and Recreation

Jurisdictions	Entry in NFIP	FIRM Current Effective Date	Flood Insurance Policies	Insured Value	Claims	Total Value in Losses Paid
Lynchburg	9/1/1978	6/6/2010	96	$29,150,600.00	80	$3,247,935.56
Bedford	6/1/1978	9/29/2010	2	$78,000.00	0	$0.00
Amherst County	7/17/1978	9/19/2007	46	$9,848,800.00	38	$9,848,800.00
Campbell County	10/17/1978	8/28/2008	28	$7,078,900.00	12	$7,078,900.00
Bedford County	9/29/1978	9/29/2010	145	$36,887,300.00	20	$206,583.05
Appomattox County	7/17/1978	1/2/2008	10	$1,839,200.00	8	$253,216.06
Town of Amherst	11/2/1977	9/19/2007	2	$450,800.00	29	$128,029.19
Town of Pamplin City	2/12/1976	1/2/2008	0	$0.00	0	$0.00
Town of Appomattox	5/25/1984	1/2/2008	0	$0.00	0	$0.00
Town of Brookneal	3/1/1978	8/28/2008	3	$589,400.00	0	$0.00
Town of Altavista	8/1/1978	8/28/2008	12	$2,688,800.00	5	$79,561.38

Virginia statutes provide cities and counties the land use authority. In particular, issues such as floodwater control, are empowered through §15.2-2223 and §15.2-2280. All of the jurisdictions in the planning area have adopted a local floodplain ordinance as a requirement of participation in the National Flood Insurance Program.

The Community Rating System (CRS) was implemented in 1990 as a program for recognizing and encouraging community floodplain management activities that exceed the minimum NFIP standards. Residents of communities that participate in CRS receive a reduction in the flood insurance premium. There are ten CRS classes: class 1 requires the most credit points and gives the largest premium reduction; class 10 receives no premium reduction. None of the jurisdictions in this hazard mitigation plan are members of the CRS.

Comprehensive Plans

A community's comprehensive plan provides the future vision for the community regarding growth and development. Hazard mitigation planning is not specifically addressed as a goal or objective in any of the comprehensive plans in the study area. Only one comprehensive plan includes a hazard mitigation strategy. However, many of the plans include land use or environmental protection goals that could support future mitigation efforts. These goals generally address flood-prone areas. There also may be opportunities to include hazard mitigation in revisions to the comprehensive plans and to link to existing goals. For example, limiting development in the floodplain (which can be considered mitigation) also may help meet open space goals laid out in a plan. Table 6.8 provides details on those sections of the community plans that relate to Hazard Mitigation.

Stormwater Management Plans

Currently, the Environmental Protection Agency is requiring localities to update their stormwater regulations to meet new and heightened standards. This process will require significant funding to clean up existing and future sources of water runoff. The plan will be updated with new regulations when they become available.

Emergency Operations Plans

A comprehensive Emergency Operations Plan (EOP) typically predetermines actions to be taken by government agencies and private organizations in response to an emergency or disaster event. The plan describes the jurisdiction's capabilities to respond to emergencies and establishes the responsibilities and procedures for responding effectively to the actual occurrence of a disaster. Hazard mitigation is incorporated into the various operational phases of these plans.

Hazard mitigation is included as a functional annex to the Emergency Operations Plans developed by many jurisdictions. Generally, the annex describes the responsibilities of various departments and agencies, private businesses, and the public. The annex outlines a concept of operations that explains what activities will be undertaken before and after a disaster. Specific tasks are assigned to the Board of Supervisors/City Council (or other local governing body), Department of Emergency Services, Department of Health, Building Officials/County Engineer/Planning and Zoning, Law Enforcement, Fire Department and Emergency Crew, Superintendent of Schools, and Public Information Officer. Table 6.8 provides details on those sections of the community plans that relate to Hazard Mitigation.

Table 6.8 Region 2000 Community Plans Related to Hazard Mitigation

Region 2000 Community Plans Related to Hazard Mitigation[5]				
Jurisdiction	**Comprehensive Plan**	**Stormwater Management Plan**	**Emergency Operations Plan**	**Planning Capability**
Amherst County	Yes – New version currently under development; Chapters related to Hazard Mitigation will include Environment, Community Facilities and Services, and Land Use. When plan is complete it will be posted to the County's website (tentative 5/2006).	No – Amherst County Code of Ordinances has adopted the and incorporated the State Erosion and Sediment Control Regulations	Yes	Medium
Amherst, Town of	N/A – Hazard Mitigation items covered in Amherst County Plan	No- Amherst County Code of Ordinances has adopted the and incorporated the State Erosion and Sediment Control Regulations	No – Emergency Services planning provided by Amherst County	Low
Appomattox County	Yes – Community Development Plan (AKA Comprehensive Plan) has chapters related to Hazard Mitigation including Natural Environment and Resources, Community Facilities and Services, Growth Management, and Information Technology	No	Yes	Medium
Appomattox, Town of	N/A – Hazard Mitigation items covered in Appomattox County Plan	No	No – Emergency Services planning provided by Appomattox County	Low
Pamplin City, Town of	N/A – Hazard Mitigation items covered in Appomattox County Plan	No	No – Emergency Services planning provided by Appomattox County	Low
Bedford City	Yes - Chapters related to Hazard Mitigation include Community Facilities and Services, Environment, and Existing Land Use	No	Yes	Medium
Bedford County	Yes – Chapters related to Hazard Mitigation include Environmental Factors, Utilities, and Land Use	No	Yes – New Master Plan for Fire & Rescue Services currently under development	Medium
Campbell County	Yes – New version currently under development; Chapters related to Hazard Mitigation include Forest Land Assessment, Infrastructure Development, Land Use, and Natural Environment	No – Chapter 8 of the Campbell County Code of 1988 details Erosions and Sedimentation Control and Stormwater Management	Yes – Includes Chapters on Hazard Mitigation and Human-Caused Hazards	High
Altavista, Town of	Yes - – Chapters related to Hazard Mitigation include Natural Environment, Community Facilities and Services, and Land Use	Yes – Addresses new state and federal environmental laws and regulations, floodplain management issues, design methods, and engineering practices.	No – Emergency Services planning provided by Campbell County	Medium
Brookneal, Town of	N/A – Hazard Mitigation items covered in Campbell County Plan	No	No – Emergency Services planning provided by Campbell County	Low
Lynchburg City	Yes – Chapters related to Hazard Mitigation include Citywide Land use and Development, Downtown and Riverfront Master Plan, Natural Systems, Parks & Recreation, Public Utilities, and Public Facilities	Yes – Stormwater issues addressed in Combined Sewer Overflow Project and Stormwater Management Ordinance	Yes – Includes Annex on Human Caused Hazards	High

Based on information from community websites, available through www.region2000.org

Plan Incorporation

Amherst County (including the Town of Amherst)

The Planning and Zoning department is responsible for updating and amending the Amherst County Comprehensive Plan. The plan covers, to varying degrees, all aspects of the cultural and physical landscape in Amherst County. The plan addresses land use types, roads, sewer and water services, public safety, public education, environmental issues, recreation, and even aesthetic issues. The plan has legal standing, in fact is required by Virginia law, but is used only to guide or influence actual courses of action by county government. Implementation of the plan usually takes the form of policy or law.

Through the Code of the County of Amherst, Virginia General Ordinances of the County (1987, codified through Ord. of April 19, 2005) Amherst County has adopted the Virginia Uniform Statewide Building Code and the State Erosion and Sediment Control Regulations. The purpose of these codes and regulations is to prevent the loss of property and life, health and safety hazards, the disruption of commerce and governmental services, the extraordinary and unnecessary expenditure of public funds for flood protection and relief, and the impairment of the tax base by:

- Regulating uses, activities, and development which, acting alone or in combination with other existing or future uses, activities and development, will cause unacceptable increases in flood heights, velocities and frequencies.
- Restricting or prohibiting certain uses, activities, and development from locating within areas subject to flooding.
- Requiring all those uses, activities, and developments that do occur in flood proofed against flooding and flood damage.
- Protecting individuals from buying lands and structures which are unsuited for intended purposes because of flood hazards.

Appomattox County (including Town of Appomattox and Town of Pamplin City)

The local government staff along with the Joint Appomattox Planning Commission is responsible for updating and amending the community development plan. The Natural Environment section of the plan details objectives to minimize risks to personal safety and property from natural hazards as well as protect environmentally sensitive and/or scenic areas of the County. The Zoning Ordinances in Appomattox County include floodplain regulations. The purposes of the plan include:

- First, it establishes government policy used to help guide public and private activities as they relate to land use and resource utilization.

- Second, it is the basis for land development regulations and decisions (i.e. re-zonings and conditional use permits), capital improvement programming (i.e. public projects such as schools, parks and libraries), transportation, environmental and historical resource protection initiatives, new County programs and decisions concerning the distribution of County budget dollars to a multitude of programs and agencies.

- Most importantly, it serves as the community's guide for future development and as the vision for what the County should look like in twenty years.

Appomattox County along with its towns works with a variety of different agencies and organizations, one being Region 2000. Region 2000 is focused on providing economic competitiveness on a regional basis, reducing redundancy in government, improving efficiency, enhancing services, and improving implementation time for regional projects. This organization provides a forum for innovative and creative interaction in the effort to address quality of life issues on a regional basis and offers a variety of technical and program services to its member localities, particularly in the areas of grant applications and administration and geographic information systems (GIS).

Bedford City

Bedford City goals include protecting and promoting sound development and growth practices that take into account environmental factors (i.e. flooding, fire, drought). The Department of Planning and Community Development includes planning, economic development, the building department, and code enforcement. This department reviews site plans and plat surveys, works with businesses looking to relocate or establish themselves in Bedford, works with the community to develop and update the Comprehensive Plan, administers the Land Development Regulations and Zoning and enforces the City Code as well as the Uniform Statewide Building Code (USBC). The Zoning Ordinances in Bedford City include floodplain regulations.

For the purpose of planning, the City of Bedford Land Development Regulations was divided into different types of districts. The intent of Flood Hazard District FH is to preserve and protect lives and property in the flood plains of the City and to satisfy the United States Department of Housing and Urban Development and the State Water Control Board requirements for full entry into the National Flood Insurance Program, upon adoption of the Official Flood Hazard District Map from an engineering study.

Bedford County

The Bedford County Department of Planning is responsible for updating the Comprehensive Plan for the County. The County administrator or his designee serves as the zoning

administrator. The zoning administrator is responsible for the enforcement of the zoning ordinance. The zoning ordinance in Bedford County includes floodplain regulations.

The zoning regulations and districts set forth in this ordinance are for the general purpose of implementing the comprehensive plan of Bedford County. The Zoning Ordinances in Bedford County include floodplain regulations. They are designed to achieve the general purposes of promoting the health, safety, and general welfare of the public, and of further accomplishing the objectives of Section 15.2-2200 of the Code of Virginia, as amended. To these ends, this ordinance is designed to give reasonable consideration to each of the following purposes:

- Provide for adequate light, air, convenience of access, and safety from fire, flood and other dangers;
- Reduce or prevent congestion in the public streets;
- Facilitate the creation of a convenient, attractive, and harmonious community;
- Facilitate the provision of adequate police, fire protection, disaster evacuation, civil defense, transportation, water, sewer, flood protection, schools, parks, forests, playgrounds, recreational facilities, airports, and other public requirements;
- Protect against destruction of, or encroachment upon, historic buildings or areas;
- Protect against one or more of the following: overcrowding of land, undue density of population in relation to the community facilities existing or available, obstruction of light or air, hazards and congestion in travel and transportation, or loss of life, health, or property from fire, flood, panic, or other hazards;
- Encourage economic development activities that provide desirable employment and enlarge the tax base;
- Provide for the preservation of agricultural and forested lands;
- Protect approach slopes and other safety areas of licensed airports, and;
- Protect surface and groundwater resources9.

Campbell County (including Town of Altavista and Town of Brookneal) Campbell County Community Development staffs, with the input of the Board of Supervisors, Planning Commission, and citizens are responsible for updating the Comprehensive Plan.

The County has adopted and incorporated the State Erosion and Sedimentation Regulations. The Campbell County Code of 1988 includes a chapter on Erosion and Sedimentation Control and Stormwater Management. The Zoning Ordinances in Campbell County include floodplain regulations. The purpose of this zoning ordinance is to promote the general health, safety and welfare of the public and for the accomplishment of the above stated objectives. To these ends, this ordinance has been designed to give reasonable consideration to each of the following purposes, where applicable:

- To provide for adequate light, air, convenience of access, and safety from fire, flood, crime and other dangers;
- To facilitate the provision of adequate police and fire protection, disaster evacuation, civil defense, transportation, water, sewerage, flood protection, schools, parks, forests, playgrounds, recreational facilities, airports and other public requirements;
- To protect against one or more of the following: overcrowding of land, undue density of population in relation to the community facilities existing or available, obstruction of light and air, danger and congestion in travel and transportation, or loss of life, health or property from fire, flood, panic and other dangers;
- To encourage economic development activities that provide desirable employment and enlarge the tax base;
- To provide for the preservation of agricultural and forestall lands and other lands of significance for the protection of the natural environment;
- To protect approach slopes and other safety areas of licensed airports, including United States government and military air facilities;
- To promote the creation and preservation of affordable housing suitable for meeting the current and future needs of the County as well as a reasonable proportion of the current and future needs of the planning district within which Campbell County is situated;
- To make reasonable provisions, not inconsistent with applicable state water quality standards, to protect surface water and ground water as defined in VA. CODE ANN. § 62.1-255 (Repl. Vol. 2001).

Lynchburg City

The vision of Lynchburg City is to take pride in being a sustainable community; one that protects and manages its limited natural, historical, and cultural resources in such a way that the community environment, which its residents value and which sustains us today will sustain future generations. In order to achieve its Vision for the future, the City of Lynchburg has adopted a number of goals for the city government, citizens, organizations, and businesses to work toward. These goals outline broad policies for future action that address the various elements of the City's character that its citizens wish to protect, improve, and enhance. In the Comprehensive Plan, they are used to frame more detailed objectives and strategies, the latter outlining the specific actions that the City and its partners can take to achieve the goals and realize its Vision for the future.

Community Planning and Development Department is responsible for updating the Lynchburg City Comprehensive Plan. Many City officials, boards, and commissions are responsible for implementation of the plan. They include the Planning Commission, the project management team, and City Staff. The Zoning Ordinances in Lynchburg City include floodplain regulations.

Legal Capability

This section will detail different legal considerations and their impact on local capability. In general, all Region 2000 jurisdictions operate within the same legal environment, so there are no major differences in legal capability among the jurisdictions.

Dillon Rule

The Commonwealth of Virginia is considered a Dillon Rule state, one of only five remaining in the nation along with Kentucky, Minnesota, North Carolina and Pennsylvania. The Dillon Rule, named for John Forest Dillon, chief justice of the Iowa Supreme Court in the late 1800's, is used to interpret state law when there is a question of whether or not a local government has a certain power. Under the Dillon Rule, should reasonable doubt exist as to whether or not a power has been granted to a local government, then the power has not been granted. Therefore, a local government can exercise no power or authority not expressly conferred on the locality by the Virginia General Assembly via the Code of Virginia or the local charter.

Local governments in Virginia have a wide range of tools available to them for implementing mitigation programs, policies and actions. A hazard mitigation program can utilize any or all of the four broad types of government powers granted by the State of Virginia, which are: (a) regulation, (b) acquisition, (c) taxation, and (d) spending. The scope of this local authority is subject to constraints; however, as all of Virginia's political subdivisions must not act without proper delegation from the state. All power is vested in the state and can only be exercised by local governments to the extent it is delegated. Thus, this portion of the capabilities assessment

will summarize Virginia's enabling legislation which grants the four types of government powers listed above within the context of available hazard mitigation tools and techniques.

Regulation

Virginia local governments have been granted broad regulatory powers in their jurisdictions. Virginia State Statutes bestow the general police power on local governments, allowing them to enact and enforce ordinances which define, prohibit, regulate or abate acts, omissions, or conditions detrimental to the health, safety, and welfare of the people, and to define and abate nuisances (including public health nuisances). Since hazard mitigation can be included under the police power (as protection of public health, safety and welfare), towns, cities and counties may include requirements for hazard mitigation in local ordinances. Local governments also may use their ordinance-making power to abate "nuisances," which could include, by local definition, any activity or condition making people or property more vulnerable to any hazard.

Land Use

Regulatory powers granted by the state to local governments are the most basic manner in which a local government can control the use of land within its jurisdiction. Through various land use regulatory powers, a local government can control the amount, timing, density, quality, and location of new development. All these characteristics of growth can determine the level of vulnerability of the community in the event of a natural hazard. Land use regulatory powers include the power to engage in planning, enact and enforce zoning ordinances, floodplain ordinances, and subdivision controls. Each local community possesses great power to prevent unsuitable development in hazard-prone areas.

Planning

According to State Statutes, local governments in Virginia may create or designate a planning agency. The planning agency may perform a number of duties, including make studies of the area, determine objectives, prepare and adopt plans for achieving objectives, develop and recommend policies, ordinances, and administrative means to implements plans, and perform other related duties.

The importance of the planning powers of local governments is illustrated by the requirement that zoning regulations be made in accordance with a comprehensive plan. While the ordinance itself may provide evidence that zoning is being conducted "in accordance with a plan," the existence of a separate planning document ensures that the government is developing regulations and ordinances that are consistent with the overall goals of the community.

Zoning

Zoning is the traditional and most common tool available to local governments to control the use of land. Broad enabling authority is granted for municipalities and counties in Virginia to engage in zoning. Land "uses" controlled by zoning include the type of use (e.g., residential, commercial, and industrial) as well as minimum specifications that control height and bulk such as lot size, building height and setbacks, and density of population. Local governments are authorized to divide their territorial jurisdiction into districts, and to regulate and restrict the erection, construction, reconstruction, alteration, repair or use of buildings, structures, or land within those districts. Districts may include general use districts, overlay districts, and special use or conditional use districts. Zoning ordinances consist of maps and written text.

Every locality in the state that enacts a zoning ordinance is required to also establish a board of zoning appeals. The responsibilities of the Board of Zoning Appeals include the ability to hear and decide appeals of decisions made by the Zoning Administrator; the ability to grant variances to provisions of the Zoning Ordinance based on strict guidelines; and the ability to provide interpretations for zoning district boundaries where uncertainty exists. The Board of Zoning Appeals does not have the authority to rezone property or to rule upon or revoke conditional use permits, powers reserved for the Board of Supervisors. Decisions of the Board of Zoning Appeals made be appealed to Circuit Court.

Subdivision Regulation

Subdivision regulations control the division of land into parcels for the purpose of building development or sale. Flood-related subdivision controls typically require that sub-dividers install adequate drainage facilities and design water and sewer systems to minimize flood damage and contamination. They also may prohibit the subdivision of land subject to flooding unless flood hazards are overcome through filling or other measures, and they prohibit filling of floodway areas.

Floodplain Regulation

All of the communities in the study area have adopted floodplain regulations that meet the minimum requirements of the National Flood Insurance Program. All of the communities have chosen to implement the floodplain ordinance as a zoning district (regular or overlay) including restrictions on manufactured homes. See the Planning Capability Floodplain Management Section for the specific details on how the jurisdictions implement their floodplain ordinance. These restrictions include the need for manufactured homes to be elevated and/or anchored to a permanent foundation.

Building Codes and Building Inspection

Many structural mitigation measures involve constructing and retrofitting homes, businesses and other structures according to standards designed to make the buildings more resilient to the impacts of natural hazards. Many of these standards are imposed through building codes. All of the jurisdictions have adopted the Uniform Virginia Statewide Building Code.

Local governments in Virginia also are empowered to carry out building inspections. It empowers cities and counties to create an inspection department, and enumerates their duties and responsibilities, which include enforcing state and local laws relating to the construction of buildings, installation of plumbing, electrical, and heating systems; building maintenance; and other matters. Most of the jurisdictions in the planning area have established a Building Inspections Office or have designated a Building Official to carry out building inspections.

Acquisition

The power of acquisition can be a useful tool for pursuing local mitigation goals. Local governments may find the most effective method for completely "hazard-proofing" a particular piece of property or area is to acquire the property (either in fee simple or a lesser interest, such as an easement), thus removing the property from the private market and eliminating or reducing the possibility of inappropriate development occurring. Virginia legislation empowers cities, towns, and counties to acquire property for public purpose by gift, grant, devise, bequest, exchange, purchase, lease or eminent domain. Acquisition has not been used by any of the communities in the planning area though it has been used successfully in other parts of Virginia.

Taxation

The power to levy taxes and special assessments is an important tool delegated to local governments by Virginia law. The power of taxation extends beyond merely the collection of revenue, and can have a profound impact on the pattern of development in the community. Communities have the power to set preferential tax rates for areas which are more suitable for development in order to discourage development in otherwise hazardous areas. Local units of government also have the authority to levy special assessments on property owners for all or part of the costs of acquiring, constructing, reconstructing, extending or otherwise building or improving flood protection works within a designated area. This can serve to increase the cost of building in such areas, thereby discouraging development.

Because the usual methods of apportionment seem mechanical and arbitrary, and because the tax burden on a particular piece of property is often quite large, the major constraint in using special assessments is political. Special assessments seem to offer little in terms of control over land use in developing areas. They can, however, be used to finance the provision of necessary

services within municipal or county boundaries. In addition, they are useful in distributing to the new property owners the costs of the infrastructure required by new development.

Localities in Virginia collect a 1% sales tax. In addition, all of the jurisdictions in the planning area levy property taxes.

Spending

The fourth major power that has been delegated from the Virginia General Assembly to local governments is the power to make expenditures in the public interest. Hazard mitigation principles should be made a routine part of all spending decisions made by the local government, including the adoption of annual budgets and the Capital Improvement Plan (CIP).

A CIP is a schedule for the provision of municipal or county services over a specified period of time. Capital programming, by itself, can be used as a growth management technique, with a view to hazard mitigation. By tentatively committing itself to a timetable for the provision of capital to extend services, a community can control growth to some extent, especially in areas where the provision of on-site sewage disposal and water supply are unusually expensive.

In addition to formulating a timetable for the provision of services, a local community can regulate the extension of and access to services. A CIP that is coordinated with extension and access policies can provide a significant degree of control over the location and timing of growth. These tools can also influence the cost of growth. If the CIP is effective in directing growth away from environmentally sensitive or high hazard areas, for example, it can reduce environmental costs.

Summary

Table 6.8 provides a summary of the overall capabilities, by jurisdiction. As seen in the table, three of the jurisdictions are indicated as having a high overall capability.

Table 6.8 Region 2000 Jurisdictions' Overall Capability Assessment

Region 2000 Overall Capability Assessment					
Jurisdiction	**Administrative Capability**	**Technical Capability**	**Fiscal Capability**	**Planning Capability**	**Overall Capability**
Amherst County	Medium	Medium	Medium	Medium	**Medium**
Amherst, Town of	Low	Low	Low	Low	**Low**
Appomattox County	Medium	Low	Medium	Medium	**Medium**
Appomattox, Town of	Low	Low	Low	Low	**Low**
Pamplin City, Town of	Low	Low	Low	Low	**Low**
Bedford City	High	High	Medium	Medium	**High**
Bedford County	Medium	Medium	High	Medium	**Medium**
Campbell County	High	High	High	High	**High**
Altavista, Town of	Medium	Medium	Low	Medium	**Medium**
Brookneal, Town of	Low	Low	Low	Low	**Low**
Lynchburg City	High	High	High	High	**High**

Each locality has a range of departments responsible for varying actions. Each locality has determined that their capability for the proposed and ongoing actions adequate relays what can be completed in their localities. Most localities in the region rely on their Local Emergency Planning Commission (LEPC) to implement mitigation actions. Localities that do not currently have an active LEPC have shown an interest in reconvening their organizations (see Section VI for Jurisdictional Actions).

Implementation and Plan Maintenance

The Region 2000 Hazard Mitigation Plan Update has pulled together many different resources into one document and should be considered a living document. The plan needs to be updated, adopted and submitted to the Virginia Department of Emergency Management (VDEM) and Federal Emergency Management Agency (FEMA) every five years.

Summary of Changes

The project management team reviewed this section of the plan as a part of the plan update and indicated the following changes. Project management team members indicated the need to increase awareness of grant opportunities among local governments. They also indicated the need to increase the Hazard Mitigation Plan's presence in other major plans such as the comprehensive plan and the emergency operations plan. The project management team agreed that the prioritization methods put forth in the original plan were still prevalent and could be used in the plan update. The maintenance of this plan will be the responsibility of the members of the project management team and representation of the jurisdictions involved. Meetings will be scheduled at the request of the plan's governing body. One of the ways the progress of the mitigation plan will be monitored through is the completion of the mitigation actions, which can be viewed in the Goals and Mitigation Strategies section on pp. 5-6.

Adoption

The eleven participating jurisdictions (Amherst County, Town of Amherst, Appomattox County, Town of Appomattox, Town of Pamplin City, Bedford County, Bedford City, Campbell County, Town of Altavista, Town of Brookneal, and Lynchburg City) will have to adopt the hazard mitigation plan formally once it is reviewed and passed by VDEM and FEMA.

Once the Hazard Mitigation Plan has been adopted by the individual governing bodies, the jurisdictions will be responsible for incorporating the plan into other local plans as follows:

• **Comprehensive Plans**: These plans are updated every three to five years for each jurisdiction according to specific state regulations. County plans sometimes will cover smaller towns' plans as well, due to limited planning capacity of the communities. When these plans are updated, the appropriate information for the community will be extracted from the Multi-Jurisdiction Hazard Mitigation Plan. For comprehensive plans, the HIRA portion of the Hazard Mitigation Plan will be the primary focus for integration, especially on the limitations to future development by the location of hazards such as floodplains or high slope areas. The planning departments of communities are the primary staff involved with comprehensive plan update.

• **Capital Improvement Plans (CIP)**: These plans are less formalized than Comprehensive Plans and are the primary tool for determining various community projects, such as street

improvements, infrastructure maintenance and repairs, and new community building construction, such as schools. CIPs also play a supporting role to justify expansion of community staff as new departments and programs are established in the annual budget process. The Mitigation Actions section of the Hazard Mitigation Plan will be integrated in each community's CIP and local budgeting as funding and politics allow. For actions such as education, existing or new staff may be able to expand their roles to conduct these projects. For "bricks and mortar" types of actions, these can be built into the CIP budget and timeline. For CIPs, the public works departments are the primary staff who develops these plans, while annual budgets fall to community administrators and boards.

• **Emergency Operation Plans (EOP)**: These plans focus primarily on the immediate response to emergency events. There are numerous important ties between response plans and mitigation plans, often in terms of personnel training and emergency equipment. Also, human-caused hazards such as hazardous materials spills are addressed in EOPs. To integrate the Hazard Mitigation Plan into community EOPs, the community emergency services directors and the Local Emergency Planning Commissions (LEPCs) will work with the community planning staff. For some hazards, like winter storms, the mitigation actions are extensions of response actions, such as clearing tree debris and having backup power available. For other hazards, like flooding, the mitigations actions may be led by planning staff, but first responders can provide valuable information about hazard impacts that will be useful for mitigation grant applications.

Tracking Incorporation of the Plan into Local Planning Processes

Plan incorporation will begin with each localities adoption of the mitigation plan. After the plan has been adopted, future implementation will take place in the form of steering committee meetings. When a hazard mitigation plan is put into action it is important to continuously monitor the goals, objectives, strategies, and projects to make sure that they are current and being implemented effectively. One of the best ways of carrying out a mitigation plan is to incorporate these components into the day-to-day functionality and priorities of the government and development of the region. Project Management Team members mentioned that the Hazard Mitigation Plan is reviewed alongside many other planning documents when jurisdictions draft their important planning documents such as:

- City or Town Comprehensive Plans
    - Land Use Plans
- Capital Improvement Budgets and Plans
- Economic Development Goals and Incentives-

Not only is it important to track incorporation of the plan, but another critical component to success in hazard mitigation is to monitor occurrence and impacts of natural and manmade hazards/disasters within communities in the region. This will not only keep the region up to date on hazard vulnerability but will also keep data and statistics current for analysis and future implementation purposes.

The final thing to consider during implementation is the security of all data and information involved in the plan. Maintain security of any information that pertains to vulnerabilities, security measures, and response plans. Ensure that sensitive information is handled in such a way as to maintain security and have adequate protections in place to ensure that sensitive information is not released when it is requested by members of the public who have no justifiable reason for seeing the information.

Monitoring Progress

This plan will be monitored through meetings of the governing bodies and steering committee members as they see fit. When updates of this plan are needed, the changes will be submitted to VDEM and FEMA for review. Jurisdictions will take on the responsibility for keeping the public involved with the updates and revisions of this plan. Programs are already in place at the local level to deal with different types of hazards.

These programs have been documented throughout this plan. In order to accomplish this method of tracking progress, committees and affiliated entities need to monitor agendas, attend meetings, send memos, monitor funding opportunities, keep stakeholders and the public updated, and promote a safe and sustainable community as a result of the actions within their plan. As the mitigation plan takes shape, progress reports should be compiled and distributed to state and federal agencies, local government, regional commissions, industry, organizations, and legislators.

Evaluating the Plan

Evaluation of the plan will be the responsibility of the governing bodies and steering committee members. Evaluation of the plan will take the form that they have followed in the development of this plan. Comments and additions will be obtained by the governing bodies and steering committee and they will be incorporated in the update of the plan. Realistically, funding for future updates and evaluations of this plan will fall heavily on state and federal resources.

Plan Update

During the implementation process, there may be road blocks, new objectives, new demands, or alternative strategies that arise which force the plan to be altered and updated. It is important to keep track of these changes and incorporate revisions into the plan when necessary. A five-year written update to the Hazard Mitigation Plan will be submitted to VDEM and FEMA for review, unless federal regulations change this timeframe or format. The local community planning and emergency services departments will work closely in updating the portions of the Multi-Jurisdiction Hazard Mitigation Plan that relates to that community. For some communities with greater local capacity, like Lynchburg City, the update to the plan may have the community develop a separate plan document. For the smaller communities, like Town of Brookneal, the plan update will be an integral part of the county's updated plan, since the town has limited planning capacity to update the plan themselves. The plan revisions will include new objectives and strategies, filling in gaps in data as new data becomes available, and describing alternative analysis and implementation procedures. Success in updating this plan involves:

- Evaluating successes and failures of implemented mitigation strategies
- Monitoring changes in and updating hazard risks, asset inventory, government policies and programs, and development trends
- Evaluating public and municipal participation in current implementation strategies

Prioritization

Mitigation plan implementation can flow more smoothly if strategies and projects are prioritized in an order that makes most sense given current hazard vulnerabilities and available funding. This includes prioritizing disaster assessments based on highest vulnerability rankings, targeting key locations and facilities that are impacted the most by each hazard, determining the budgeting requirements for each section of the mitigation plan, and staying on top of funding opportunities that can contribute to project completions. Low or no-cost recommendations have the greatest likelihood of succeeding, so these actions should be pursued first. Then, as new funding becomes available, other high priority projects can be initiated. As in the prioritization of the mitigation projects, the FEMA STAPLE(E) approach will be utilized to determine capability and feasibility of the proposed projects and plan updates. Prioritization will be completed at the jurisdictional level and will follow local evaluation criteria.

The STAPLE(E) prioritization method takes into account seven criteria:

1. Socially Acceptable
2. Technically feasible
3. Administrative support
4. Politically acceptable
5. Legal
6. Economically justifiable
7. Environmentally responsive

Other considerations when prioritizing will be how well the project reduces future losses, how they further the goals and objectives put forth in this plan, and the cost versus the benefit of the project.

Funding Opportunities

By tracking funding opportunities the jurisdictions will be able to apply these funding sources to implement imperative and costly mitigation actions. Pragmatically, funding opportunities from the state and federal government will be the keystone in the future updates of this plan.

Continued Public Involvement

The public will remain engaged and involved throughout the planning process by:

- There will be continued correspondence between members of the Project Management Team and the public. PMT members are encouraged to send comments received in public settings to Region 2000 to be incorporated into a database which will be accessed for the next plan update.
- Website announcements will be posted to invite the public to provide comments and suggestions during an annual public comment period. A potential timeframe for these annual updates is February 1st of each year.
- Public meetings will be held as a part of the planning revisions every five years.
- Copies of the plan will be available for public review at the planning offices of all Region 2000 jurisdictions, on the Region 2000 website, and at all jurisdictional libraries. Addendums and minor revisions will be inserted into the Appendices of these copies as they are completed.

Conclusions

With the updated Region 2000 Hazard Mitigation Plan adopted and in place, the region will have a better handle on mitigating the hazards that impact their region. The shift to mitigating hazards before they happen is prevalent within Region 2000. Through meetings and group interactions it was observed that the region works well together and already has in place a handful of actions to anticipate events. The region is currently working on some regional actions to mitigate against some of their highest ranked hazards.