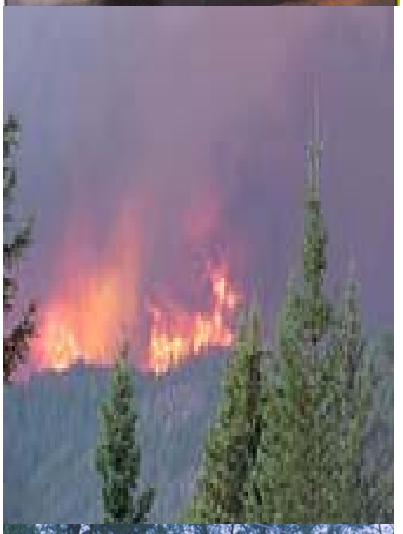

Hazard Mitigation Plan
for
Elizabethton, Watauga and Carter County, TN

Building Sustainable, Disaster Resistant Communities in Tennessee

Developed by the Elizabethton and Carter County Mitigation Planning Team

&

Adopted By the Elizabethton, Watauga, Carter City and County Councils

October, 2006

Elizabethton, Watauga, and Carter County Multi-Hazard Mitigation Plan

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Multi-Hazard Mitigation Plan
1.0 Introduction

As part of the overall community planning effort for hazard mitigation, the City of Elizabethton, the City of Watauga, and Carter County, Tennessee prepared a Multi-Hazard Mitigation Plan pursuant to the requirements of the Disaster Mitigation Act of 2000 (PL 106-390).

Hazard Mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards. Hazard Mitigation Planning is the process through which the natural hazards that threaten communities are identified, impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to reduce impacts are selected, prioritized, and implemented.

Hazard Mitigation Planning is a requirement for state and local governments in order to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs. Communities that are at risk from natural disasters cannot afford to jeopardize this funding.

PURPOSE AND NEED

Each year, natural disasters in the United States take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses and individuals recover from disasters. These monies only partially reflect the true cost of disasters, because additional expenses upon insurance companies and non-government organizations are not reimbursed by tax dollars.

Additionally, many natural disasters are predictable. Many more are repetitive, often with the same results. Many of the damages caused by these events can be alleviated or even eliminated through hazard mitigation activities.

The Federal Emergency Management Agency (FEMA), now a part of the Department of Homeland Security (DHS), has made reducing losses from natural disasters one of its primary goals. Hazard Mitigation Planning, and the subsequent implementation of the objectives, measures, and policies developed, is the primary mechanism in achieving this goal. Mitigation projects, resulting from effective hazard mitigation planning, has been successful in reducing disaster damages.

This plan was developed pursuant to the Disaster Mitigation Act of 2000 (DMA) and the regulations published in the *Federal Register* Volume 67, Number 38, Tuesday, February 26, 2002. Section 104 of DMA revises the Robert T. Stafford Disaster Relief and Emergency Assistance Act by adding Section 322, which provides new and revitalized emphasis on hazard mitigation, including adding a new requirement for local mitigation plans. These new local mitigation planning regulations are implemented through 44 CFR Part 201.6.

Proactive hazard mitigation planning at the local level can help reduce the cost of disaster response and recovery to property owners and government by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption.

SCOPE

The City of Elizabethton, the City of Watauga, and Carter County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that identifies goals, objectives, and measures for hazard mitigation. Information in the plan can also be used to guide and coordinate mitigation activities and local policy decisions for future land use. This Plan covers the jurisdictions of Elizabethton, Watauga, and Carter County.

This Plan follows DMA planning requirements and associated guidance for developing Local Hazard Mitigation Plans. This guidance sets forth a generalized 4-phase process:

1) Organize Resources;
2) Assess Hazards and Risks;
3) Develop a Mitigation Plan; and
4) Evaluate Work.

This Plan also uses the process set forth in FEMA Region IV's Crosswalk Reference Document for Review and Submission of Local Mitigation Plans.

This plan addresses natural hazards only. Although the City of Elizabethton, the City of Watauga, and Carter County recognize that FEMA is both encouraging and promoting communities to integrate human-caused hazards into the mitigation planning process, the scope of this effort did not address human-caused hazards for two reasons. First, DMA requires extensive public information and input, and this is in direct conflict with the security necessary in planning for Chemical, Biological, and Radiological hazards. The Planning Committee determined it was not in the Community's best interest to share specific information about the area's vulnerability to human-caused hazards. Secondly, many of the planning activities for human-caused hazard mitigations are being developed concurrently by a different set of organizations.

Multi-Hazard Mitigation Plan

2.0 Community Profile

GEOGRAPHY – LOCATION AND AREA

Carter County, including the Cities of Elizabethton and Watauga, is located in northeastern Tennessee less than 200 miles away from four major U.S. cities. Carter County is:

- 115 miles northeast of Knoxville, TN;
- 68 miles north of Asheville, NC;
- 131 miles west of Winston-Salem, NC; and
- 161 miles northwest of Charlotte, NC

Elizabethton is recognized as the newest city in the Tri-Cities area (See Figure 2-1).

Figure 2-1. Location of Elizabethton in Relation to Major Cities

Carter County is located in the northeastern part of Tennessee, approximately 20 miles from the Virginia and North Carolina state lines. Carter County is irregularly shaped, measuring 21 miles from east to west and 19 miles from north to south. It covers 340 square miles, or 222,500 acres. Approximately 217,900 acres of the county are dry land and the remaining 4,600 acres are covered by water. The Watauga River and Watauga Lake divide the county from north to south. Carter County is located in the southern Appalachian ridges and valleys and Blue Ridge Major Land Resources Areas (MLRAs). The crest of the Unaka Mountains (Blue Ridge MLRA) forms the Tennessee-North Carolina state line. These mountains range in elevation from 2,500 to 6,300 feet. Due to the location, elevation topography, longitude and latitude of Carter County as previously stated above, each jurisdiction (Carter County, Elizabethton, and Watauga) has an equal chance of experiencing the same hazards with little or no difference in the degree of risk and vulnerability. Historical data and previous disaster declarations proved this to be true.

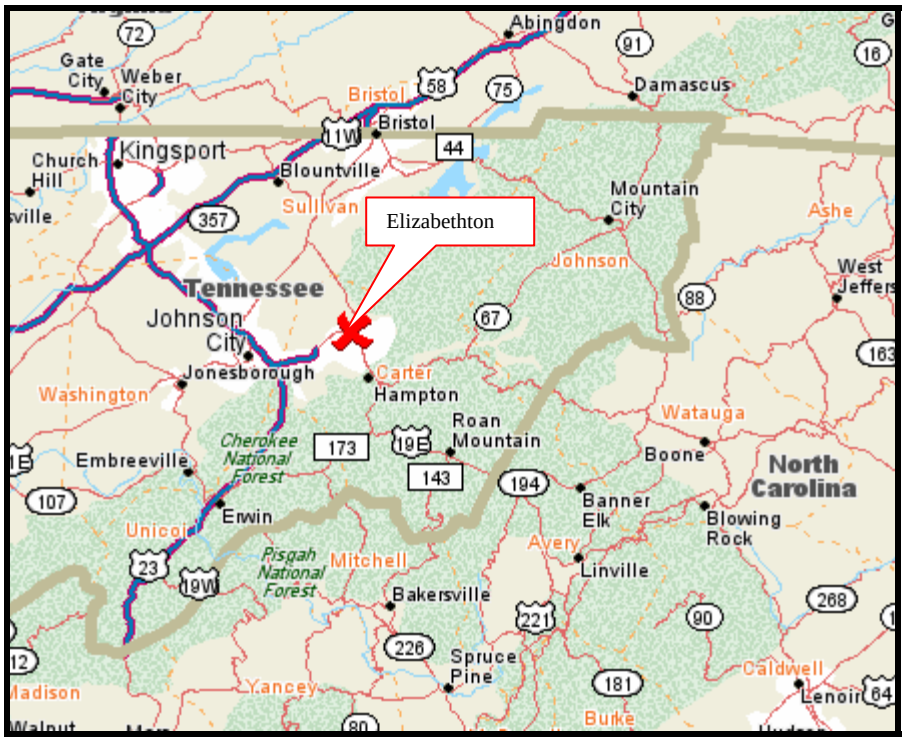

Figure 2-2. Carter County Location Map

CLIMATE

Carter County, including the Cities of Elizabethton and Watauga, has a moderate climate and four distinct seasons. Average temperatures range from 45 to 67 degrees Fahrenheit. Annual rainfall averages 41 inches and annual snowfall averages 15 inches.

The prevailing winds in Carter County are from the southwest. Although the southeastern portion of Tennessee is 350 miles from the Gulf of Mexico, the weather is influenced by the

warm moist air masses from the south. This pattern prevails most of the year, although it is occasionally interrupted by cold fronts that slide south during the winter.

Average annual climate statistics include the following:

- Zero-degree days – 1
- Freezing days – 94
- 90 degree days – 13
- Wind speed – 5.4 mph
- Relative humidity - 72%
- Rainfall- 41 inches
- Snowfall - 15 inches

Although these climate statistics represent Carter County as a whole, temperatures may differ approximately 15 degrees Fahrenheit between low lying valleys and mountainous areas.

These statistics were obtained from the Tri-Cities Airport NOAA Weather Station in Blountville, Tennessee.

PHYSICAL FEATURES AND LAND USE

Carter County is located within the Unaka Mountains physiographic province of Tennessee. The Unaka Mountains are primarily composed of igneous and metamorphic rock. Elevations in this area vary greatly due to the mountainous terrain. Agricultural crops include timber, Christmas trees, nursery greenhouses, vegetables, and corn.

Soils

Soils in Carter County have been classified with limitations for non-farm development due to soil associations, drainage features, and slope of the land. Soils with limitations are found throughout the county. Development on these soils without proper localized studies and appropriate best management practices (BMPs) could result in problems such as erosion, sedimentation, flooding, and damaged underground utilities.

Approximately 20 percent of the soils in Carter County are used for agricultural production. Most of these soils are located in the floodplains of the Watauga and Doe Rivers, and their tributaries.

Trees and Forests

According to the U.S. Forest Service's 1999 Forest Statistics for Tennessee, 76 percent of Carter County is forested. Approximately 51 percent of this area belongs to the Cherokee National Forest and other various parks. The remaining 49 percent of Carter County's forests are privately owned. A large portion of this land is managed for timber (Carter

County's largest agricultural crop) or is not suitable for clearing due to the mountainous terrain.

The types of forests in Carter County are Oak-Hickory and Oak-Pine hardwoods. Most of the un-forested land is on the floodplains of the Watauga and Doe Rivers. The majority of this land has been cleared for agriculture and residential use.

Wetlands

Along with the rivers and streams, an estimated 1,200 acres of wetland habitat exists in Carter County. According to local Natural Resource Conservation Service (NRCS) representatives, approximately 4,600 acres of land in Carter County is covered by water.

Floodplains and Levees

Carter County contains portions of the Watauga River and the South Fork of Holston River Watersheds. Flooding occurs on the banks of the Watauga and Doe Rivers due to prolonged rainfall or backwater flooding. Over 30 percent of the residential and commercial development in Carter County is located within the floodplain.

Frequent devastating floods on the Watauga River led to the construction of the Watauga Dam in 1948 and the Wilbur Dam restoration in 1950. Although these structures have been successful at reducing flood frequency and size, they have not prevented all flooding in this area. This was demonstrated in 1998 by a flood that claimed seven lives.

Seismic Zones

Northeastern Tennessee is in the Southern Appalachian Seismic Zone (SASZ). More specifically, it is in very close proximity to the most active part of the SASZ known as the East Tennessee Seismic Zone (ETSZ). The SASZ extends from Alabama to Virginia, while the ETSZ only extends from northwestern Georgia through most of eastern Tennessee. Northeastern Tennessee is also in moderate proximity to the New Madrid Seismic Zone (NMSZ). The New Madrid Seismic Zone extends from west-central Mississippi northward past Cape Girardeau, Missouri. Elizabethton and Watauga are approximately 430 miles east of New Madrid, Missouri, the center of this seismic zone. The proximity of Northeastern Tennessee to these known zones of seismicity makes the region moderately vulnerable to earthquakes.

POPULATION

The neighboring Tri-Cities area (Kingsport, Bristol, and Johnson City) is the economic center for northeastern Tennessee. Due to recent economic growth in the Tri-Cities area, surrounding counties (i.e. Carter County) have experienced a population increase as people have migrated into the suburbs.

The 2005 U.S. Census data show that the population of Carter County has grown from 51,505 in 1990 to 58,865 in 2005. The population of Carter County and its surrounding counties is detailed in Table 2-1 below.

Table 2-1. Area Populations U.S. Census

PLACE	POPULATION (persons)	SIZE (square mile)
City of Elizabethton, TN	13,993	9.4
City of Watauga, TN	433	0.8
Carter County, TN	58,865	348
Johnson County, TN	18,116	303
Sullivan County, TN	152,716	430
Unicoi County, TN	17,572	186
Washington County, TN	112,507	330
Total Tennessee Counties	**359,776**	**1,597**
Avery County, NC	17,641	247
Mitchell County, NC	15,784	222
Total North Carolina counties	**33,425**	**469**
Bi-State Region	**393,201**	**2,066**

Note: County information was found in the 2005 U.S. Census and City information was found in the 2004 U.S. Census.

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Multi-Hazard Mitigation Plan
3.0 Planning Process

44 CFR 201.6(b): "An open public involvement process is essential to the development of an effective plan".

The City of Elizabethton contracted AMEC Earth & Environmental (AMEC) to assist with developing this multi-jurisdictional Local Hazard Mitigation Plan.

Funding for the planning effort was provided to the City of Elizabethton by FEMA through the Tennessee State Emergency Management Agency (TEMA). The required local match was provided as an "in-kind" or "soft" match, through the many hours spent on this effort by each of the planning team participants; as well as through the use of their facilities for meetings, and actual cash disbursements for copying and public notices, where necessary.

AMEC outlined the process for this planning effort utilizing the DMA planning requirements and FEMA's associated guidance. This guidance is FEMA's structured 4-phase process. AMEC also integrated the older 10-step planning process that was still required for other FEMA programs, such as the Community Rating System (CRS) and Flood Mitigation Assistance (FMA) programs. Thus, AMEC formulated a single planning process to meet the requirements of six major programs: DMA, CRS, FMA, Hazard Mitigation Grant Program (HMGP), FEMA's Pre- Disaster Mitigation Program (PDM), and new flood control projects authorized by the U.S. Army Corps of Engineers (USACE). The graphics below show how the old 10-step process fits within the new 4-phase process.

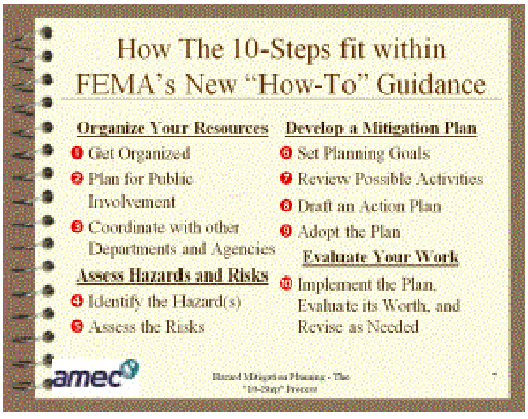

Figure 3-1. CRS and DMA Planning Process

The following table also serves as a means of cross-referencing the CRS and DMA requirements.

Table 3-1. CRS and DMA Planning Cross Reference

CRS Planning Steps	Disaster Mitigation Act Planning Regulations (44 *CFR* 201.6)
Phase I - Planning process (Organize the Work)	
1. Organize	201.6(c)(1)
2. Involve the public	201.6(b)(1)
3. Coordinate	201.6(b)(2) & (3)
Phase II - Risk assessment (Assess Hazards and Risks)	
4. Assess the hazard	201.6(c)(2)(i)
5. Assess the problem	201.6(c)(2)(ii) & (iii)
Phase III - Mitigation strategy (Develop a Plan)	
6. Set goals	201.6(c)(3)(i)
7. Review possible activities	201.6(c)(3)(ii)
8. Draft an action plan	201.6(c)(3)(iii)
9. Adopt the plan	201.6(c)(5)
Phase IV - Plan maintenance (Evaluate your Work)	
10. Implement, evaluate, revise	201.6(c)(4)

LOCAL GOVERNMENT / COMMUNITY PARTICIPATION

DMA planning regulations and guidance stress that each jurisdiction seeking the required FEMA approval of their mitigation plan must:

- Participate in the process;
- Detail areas within the local jurisdiction where the risk differs from that facing the entire area;
- Identify specific projects for funding eligibility; and
- Formally adopt the plan.

For Carter County, including the cities of Elizabethton and Watauga, "participation" means the local government representatives will:

- Attend the Planning Steering Committee meetings;
- Provide available data that is requested by the Steering Committee;
- Review, provide, and coordinate comments on the Draft plans;
- Advertise, coordinate and participate in the Public Input process; and
- Coordinate the formal adoption of the plan by the City Councils and County Commission.

THE PLANNING PROCESS

Step 1: Organize

With the commitment to participate by Carter County and the Cities of Elizabethton and Watauga, AMEC recommended a framework and organization for developing the Multi-Hazard Mitigation Plan. The planning team was led by the City of Elizabethton Director of Planning and the Emergency Management Director for Elizabethton/Carter County, and included key City and County stakeholders. This team was named the Planning Steering Committee, or PSC. The PSC met six times over a four-month period. Typical City and County Representatives attending each meeting included members from the Building Commission, Area Planning Commission, Emergency Management Agency, Tennessee Emergency Management Agency (TEMA), and the Police, Fire, and Engineering Departments.

During the initial PSC meeting on June 28 2006, each committee member was tasked to bring specific information to the next scheduled PSC meeting. Committee members met again on July 12, 2006 to present items they had collected from their respective agencies or departments. During each subsequent PSC meeting, information requirements were updated. Information was collected via telephone, emails, and postal mail. As the plan was being developed, each member was briefed on the plan and was given access to a draft copy of the plan. Edits and updates were made during the PSC meetings until the plan was finalized.

Although representatives from Carter County and the Cities of Elizabethton and Watauga participated in the planning process, the city of Watauga was not able to participate as much due to its limited government staff. Ms. Hattie Skeans, the mayor of Watauga, participated in the July 12, 2006 and September 13, 2006 PSC meetings and provided necessary information to assist in the development of this plan.

Attendees and agendas for each of the PSC meetings are included in Appendix A, and are on file in the Elizabethton Planning Office. The PSC will stay in existence for the purpose of implementing and updating this plan. The six PSC meeting dates and topics were as follows:

- June 28th – Kickoff Meeting;
- July 12th – Hazard Identification;
- August 16th – Risk Assessment;
- August 30th – Vulnerability Assessment;
- September 6th – Capability Assessment;
- September 13th – Goal Setting and Prioritization

Step 2: Involve the Public

In addition to the PSC, a public input committee was also formed. The Public Input Advisory Committee (PIAC) was comprised of representatives from the rural community, amateur radio group, local hospital personnel, private power company, Red Cross, local engineers and developers, neighborhood associations, public library, Historic Preservation Society, and Chamber of Commerce. Meetings for the PIAC were scheduled five times over a three-month period.

The PSC used several methods to get public involvement in developing the plan. People with an interest in the Hazard Mitigation Plan, including the PAIC, were sent meeting notices via letters and emails. Notices concerning the first planning session were sent to the daily newspapers which serve Carter County: the Elizabethton Star and Johnson City Press. News articles and press release information were also posted on the Community website. Additional notices were sent to electronic media in the surrounding counties. At the first session on June 28, 2007, representatives from the Elizabethton Star and Johnson City Press newspapers were present. Following the first session, letters were sent to inform additional stakeholders about the scheduled planning sessions. The letters asked for their involvement and. The second meeting, held on July 12, 2007, was attended by WJHL Television (regional station). The dates and times of the remaining planning sessions were advertised during several of WJHL's local newscasts. The Hazard Mitigation planning project was also regularly (monthly) announced in public meetings by the Planning director. See Appendix B for documentation.

Once the draft plan was complete, a copy of the plan was posted in the Elizabethton Public Library for the public to read and leave any comments. The plan was uploaded to the City of Elizabethton Website (www.elizabethton.org) where it could be reviewed and comments could be sent for consideration. A public input meeting was advertised and held on September 13 to finalize the planning process.

In spite of these multi-media announcements to the public, there was limited attendance at PIAC meetings. Additionally, a public review period of the Final Draft Multi-Hazard Mitigation Plan took place, and public comments were incorporated. The five PIAC meeting dates and topics were as follows:

- July 12th – Kickoff Meeting and Hazard Identification;
- August 16th – Risk Assessment;
- August 30th – Vulnerability Assessment;
- September 6th – Capability Assessment;
- September 13th – Goal Setting and Prioritzation

Step 3: Coordinate with other Departments and Agencies

Early on in the planning process, the PSC determined that data collection, mitigation and action strategy development, and plan approval would be greatly enhanced by inviting other state and federal agencies to participate in the planning process. Based on their involvement in hazard mitigation planning, representatives from the following key agencies were offered inclusion as members of the PSC:

- Tennessee Emergency Management Agency;
- FEMA Region IV;
- Tennessee Valley Authority (TVA);
- U.S. Army Corps of Engineers, Nashville District;
- Natural Resource Conservation Service,
- National Weather Service;
- National Flood Insurance Program (NFIP) State Coordinator; and
- Tennessee Department of Natural Resources, Division of Water.

Additionally, technical data, reports, and studies were obtained from these agencies either through web-based resources or directly from the agencies.

Relationship to Other Community Planning Efforts and Hazard Mitigation Activities

Coordination with other community planning efforts is also paramount to the success of this Plan. Hazard mitigation planning involves identifying existing community policies, tools and actions that will reduce a community's risk and vulnerability from natural hazards. Carter County, including the Cities of Elizabethton and Watauga, utilizes a variety of comprehensive planning mechanisms; such as land use and master plans, emergency response and mitigation plans, and municipal ordinances and building codes; to guide and control community development. Integrating existing planning efforts, mitigation policies, and action strategies into this Hazard Mitigation Plan establishes a credible and consistent plan that ties into and supports other community programs. This Plan, therefore, links the specific natural hazards that present a risk in the community with the existing mitigation elements found in other County plans.

Step 4: Assess the Hazard

The PSC conducted a Hazard Identification study to determine what hazards threaten the planning area. Research focused on previous occurrences of natural hazards, those that

might occur in the future, and the likelihood of their occurrence or recurrence. The primary hazards identified and investigated in the Carter County are:

- Flooding
- Earthquakes
- Severe Weather
    - Drought / Wildfires;
    - Extreme Temperatures;
    - Thunderstorms / High Winds / Lightning / Tornadoes and;
    - Winter Storms.
- Sinkholes/Land Subsidence

Step 5: Assess the Risks

Upon completing the hazard identification, the PSC conducted vulnerability and capability assessments to describe the impact of each hazard on Carter County, including the cities of Elizabethton and Watauga. The PSC determined the capabilities to mitigate hazards through existing policies, regulations, programs, and procedures. This analysis revealed capability shortcomings and set the stage for setting goals.

Step 6: Set Planning Goals

Planning goals were established to reduce mitigation vulnerabilities identified in step 5. The PSC set goals that:

- Represent basic desires of the community;
- Encompass all aspects of the community, public and private;
- Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- Are time-independent, in that they are not scheduled events.

Additionally, goals from other community programs and priorities were identified and discussed. This Multi-Objective Management (MOM) maximizes efficiency by combining projects/needs from several community programs and plans. MOM results in access to multiple sources of funding and broadens the supporting constituency base.

Step 7: Review Possible Mitigation Activities

Following goal setting, the PSC undertook a brainstorming session to generate a set of viable alternatives to support the selected goals. The PSC focused on the following categories of mitigation measures:

- Prevention;
- Property Protection;
- Structural Projects;
- Natural Resource Protection;
- Emergency Services; and
- Public Information.

A facilitated discussion examined and analyzed potential alternatives. Similar to the goal-setting activity, the PSC included mitigation actions from existing jurisdictional plans in its review. After identifying the existing and new mitigation actions, the PSC members used FEMA's "STAPLE/E" criteria set (social, technical, administrative, political, legal, economic, and environmental) to prioritize the mitigation actions. Nevertheless, cost benefit reviews of the prioritized actions weighed heavily in the final selection of the mitigation actions.

Step 8: Draft an Action Plan

The prioritized mitigation actions were further developed into an action plan to identify the following for each action:

- Action Item (developed by the PSC or originating from an existing plan);
- Responsible office;
- Priority (high, medium, or low);
- Hazard Addressed;
- Cost estimate;
- Community Benefit;
- Potential funding source; and
- Schedule.

Step 9: Adopt the Plan

The Elizabethton and Watauga City Councils and Carter County Commission will adopt the Multi-Hazard Mitigation Plan by passing a resolution.

Step 10: Implement the Plan, Evaluate its Worth, Revise as Needed

Step 10 is critical to the overall success of Hazard Mitigation Planning. Upon adoption, the Mitigation Plan faces the truest test of its worth, implementation. Many worthwhile and high priority mitigation actions have been recommended. The PSC must decide which action to undertake based upon priority and available funding.

In addition, the Mitigation Plan requires maintenance. There will be an ongoing effort to monitor and evaluate the implementation of the plan, and to update the plan as progress, roadblocks, or changing circumstances are recognized.

The PSC will meet at least annually to discuss updates, revisions, and status of the Hazard Mitigation Plan, as well as to coordinate plan execution.

Multi-Hazard Mitigation Plan

4.0 Risk Assessment

44 CFR 201.6(c)(2)(ii): "The risk assessment shall include…A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Risk from natural hazards is a combination of hazard and exposure. The risk assessment process measures the potential loss to a community; including loss of life, personal injury, property damage, and economic injury; resulting from a hazard event.

The risk assessment process provides information that allows a community to better understand its potential risk and associated vulnerability to natural hazards. This information provides the framework for a community to develop and prioritize mitigation strategies and to implement plans for reducing the risk and vulnerability to future hazard events. The risk assessment for Carter County, including the Cities of Elizabethton and Watauga, followed the methodology described in FEMA Publication 386-2 "Understanding Your Risks – Identifying Hazards and Estimating Losses" (FEMA, 2002) and was based on a four-step process:

(1) Identify Hazards;
(2) Profile Hazard Events;
(3) Inventory Assets; and
(4) Estimate Losses.

This risk assessment covers DMA Planning Steps 4 and 5, Assess the Hazards and Assess the Risks. It also includes analyzing risks and vulnerabilities in light of existing mitigation measures.

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Multi-Hazard Mitigation Plan

4.1 Hazard Identification

Carter County, including the Cities of Elizabethton and Watauga, conducted a Hazard Identification study to determine what hazards threaten the planning area. This section documents the previous occurrences of natural hazards, those that might occur in the future, and the likelihood of their occurrence or recurrence. All information documenting past occurrences of identified natural hazards applies equally to all jurisdictions of Carter County, including the cities of Elizabethton and Watauga, except as follows. For the hazard of wildfire there are slight variations in either risk of occurrence or in vulnerability between Carter County and the incorporated cities. Additional information about probability of future occurrences and their extent (vulnerability) can be found in Section 4.2 (Vulnerability Assessment).

The natural hazards identified and investigated include:

- Floods
- Earthquakes
- Severe Weather (Drought, Extreme Temperatures, Thunderstorms/High Winds/Lightning/Tornadoes, and Winter Weather)
- Sinkholes/Land Subsidence
- Wildfires

Disaster Declaration

One method of identifying hazards is to determine what events triggered federal and/or state disaster declarations within the planning area. Disaster declarations are granted when the severity and magnitude of the event surpasses the local government's ability to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity is surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. If the disaster is so severe that both the local and state government capacities are exceeded, a federal disaster declaration may be issued, allowing for the provision of federal disaster assistance.

Within Carter County, including the Cities of Elizabethton and Watauga, there have been four Federal Presidential Disaster Declarations since 1998. Detailed data prior to this date was not available from FEMA. The disasters are detailed in the table and figure below.

Table 4-1. Past Federal Presidential Disaster Declarations in Carter County

Date	Cause	FEMA Disaster Number
11/10/04	Severe Storms and Flooding	FEMA-1568-DR
03/20/03	Severe Storms and Flooding	FEMA-1456-DR
08/15/01	Severe Storms and Flooding	FEMA-1387-DR
01/13/98	Severe Storms and Flooding	FEMA-1109-DR

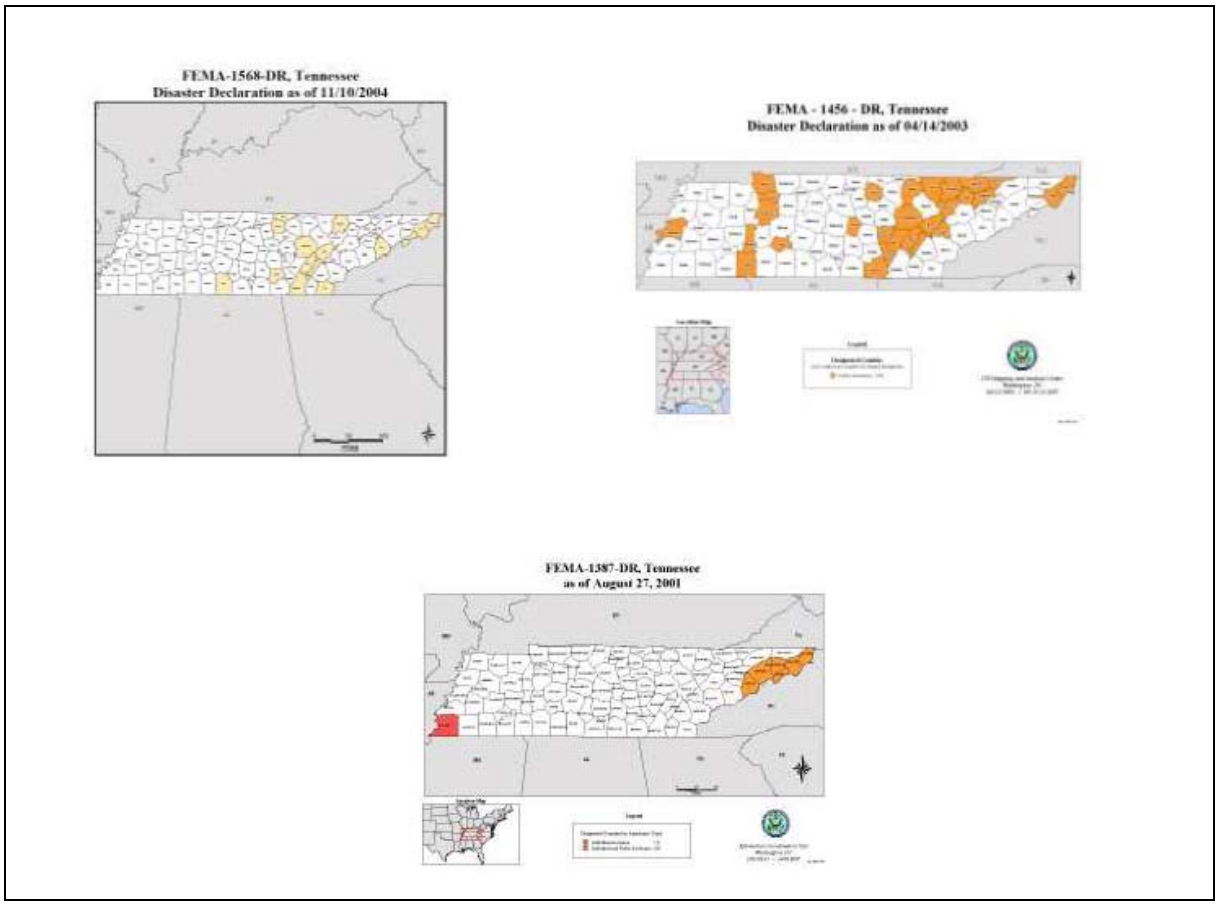

Figure 4-1. Presidential Disaster Declarations in Carter County
(Courtesy of FEMA)

The federal government may issue disaster declarations through the U.S. Department of Agriculture (USDA) and/or the Small Business Administration (SBA), as well as through FEMA.

The USDA provides disaster related assistance to farmers and other rural residents, as the result of natural disasters. Agricultural-related disasters are quite common. One-half to two-thirds of the counties in the United States have been designated as disaster areas in each of the past several years. Agricultural producers may apply for low-interest emergency loans in counties named as primary or contiguous in a disaster designation.

USDA Secretarial disaster designations must be requested of the Secretary of Agriculture by a governor or the governor's authorized representative, or by an Indian Tribal Council leader. Most recently, Carter County was a primary county with a USDA designation, S2283, for drought and above normal temperatures occurring from May 1, 2005 - Present. Assistance will be available through November 13, 2006.

The SBA provides disaster assistance to families and businesses through their Disaster Assistance Program. The mission of this program is to offer financial assistance to those who are trying to rebuild their homes and businesses in the aftermath of a disaster. By offering low-interest loans, the SBA is committed to long-term recovery efforts. SBA is also committed to mitigation, and has additional loan programs to help reduce future losses.

An SBA declaration may be requested by a State Governor. When the Governor's request for assistance is received, a survey of the damaged area(s) is conducted with state and local officials, and the results are submitted to the Administrator for a decision. When the SBA Administrator declares an area, both the primary and adjacent counties are eligible for the same assistance.

The SBA will make either a physical disaster declaration or economic injury disaster declaration. In the past, Carter County has been a primary county in two SBA physical disaster declarations:

- #9T57 – Drought/Dry Weather, High Temperatures, and Late Freezes that occurred during the 2003 growing season.
- #9T40 – Severe Drought that occurred from January 2002 through July 21, 2003.

FLOOD

Floods are among the most frequent and costly natural disaster in terms of human hardship and economic loss. Likely flood events in Tennessee including flash, riverine, and urban stormwater floods. Regardless of the type, flooding can almost always be attributed to excessive rainfall, either in the flood area or an upstream reach.

The term "flash flood" describes localized floods of great volume and short duration. In contrast to riverine flooding, this type of flood usually results from a heavy rainfall on a relatively small drainage area. Precipitation of this sort usually occurs in the spring and summer. The Doe River is susceptible to this type of flooding.

Riverine floods result from precipitation over large areas. This type of flood occurs in river systems whose tributaries drain large geographic areas and independent river basins. The duration of riverine floods may vary from a few hours to many days. Factors that directly affect the amount of flood runoff include frequency, intensity and duration; the amount of soil moisture, seasonal variation in vegetation, snow depth, and soil permeability. The Watauga River, a TVA controlled waterway can experience this type of flooding.

Urban flood events result as land loses its ability to absorb rainfall when converted from fields or woodlands to roads, buildings, and parking lots. Urbanization increases runoff two to six times over what would occur on undeveloped terrain. During periods of urban flooding, streets can become swift moving rivers.

All flood events may result in upstream flooding due to downstream conditions such as channel restriction and/or high flow in a downstream confluence stream. This type of flooding is known as backwater flooding.

Major Sources of Flooding

The major sources of flooding in Elizabethton, Watauga, and Carter County are the Watauga and Doe Rivers. The Watauga River flows basically north and then west into the city of Elizabethton, where it is joined by the Doe River. The Doe River forms in Carter County near the North Carolina line just south of Roan Mountain State Park. It initially flows north and then flows in northwest toward the city of Elizabethton, where it converges into the Watauga River.

As a part of the National Flood Insurance Program (NFIP), floodplains and floodways on the Watauga River, Doe River, and many local streams have been established and are regulated by the local floodplain management ordinance. The most recent Flood Insurance Study (FIS) for Carter County was published by FEMA in 1990 and revised in 1996. The FIS includes Flood Insurance Rate Maps (FIRM) that presents the adopted floodplains, floodways, and flood profiles for streams in each Community. Table 4-2 presents the watershed, drainage area, and studied reach lengths.

Table 4-2. Major Flooding Sources in Elizabethton, Watauga, and Carter County
(Courtesy of FEMA)

Major Flooding Source	Drainage Area (sq.mi.)	Type of Study	Studied Reach Lengths (mi.)	Mean Velocity Range (fps)
Watauga River	692.0	Detailed	11.90	1.2-9.4
Buffalo Creek	39.0	Detailed	0.75	N/A[1]
Gap Creek	11.0	Detailed	1.24	N/A[1]
Stoney Creek	---	Approximate	---	---
Doe River	137.0	Detailed	21.51	2.2-15.2
Little Doe River	32.8	Detailed	2.38	4.7-12.8

1 Information not available in FIS Reports.

All streams within Carter County, including the Cities of Elizabethton and Watauga, as previously identified, are subject to flooding and backwater flooding. The primary effect of flooding on these streams appears to be inundation, although velocities will become significant to persons and structures under more extreme flooding situations. Calculated floodplain velocities range from 1.2 to 15.2 feet per second (fps). Velocities greater than 5.0 fps are considered to be of dangerous magnitude. The following table outlines the critical depths and velocities that will harm residents and structures during a flood event.

Table 4-3. Critical Flood Depths and Velocities
(Courtesy of Nottawasaga Valley Conservation Authority)

Depth (threat to life)	In stagnant backwater areas (zero velocity), depths in excess of about 1m (3.3ft) are sufficient to float young children, and depths above 1.4m (4.6ft) are sufficient to float teenage children and many adults.
Velocity (threat to life)	In shallow areas, velocities in excess of 1.8m/s (5.9 ft/s) pose a threat to the stability of many individuals.
Depth and Velocity (threat to life)	The hazards of depth and velocity are closely linked as they combine to effect instability through an upward buoyant force and a lateral force. A product of less than or equal to $0.4m^2/s$ ($43\ ft^2/s$) defines a low hazard provided the depth does not exceed 0.8m (2.6ft) and the velocity does not exceed 1.7m/s (5.6 ft/s).
Vehicular access (emergency access)	Most automobiles will be halted by flood depths above 0.3-0.5m (1.0-1.7ft). A maximum flood velocity of 3m/s (9.8 ft/s) would be permissible, providing that flood depths are less than 0.3m (1.0ft). A depth of 0.9-1.2m (2.9-3.9 ft) is the maximum depth for rapid access of large emergency vehicles.
Structural Integrity (structures above ground)	A depth of 0.8m (2.6ft) is the safe upper limit for the above ground/super structure of conventional brick veneer, and certain types of concrete block buildings. The structural integrity of elevated structures is more a function of flood velocities (e.g. Erosion of foundations, footings or fill) than depth. The maximum velocity to maintain structural stability depends on soil type, vegetation cover, and slope but ranges between 0.8-1.5m/s (2.6-4.9 ft/s)
Fill (stability)	In general, fill may become susceptible to erosion/instability at depths of 1.8-2.4m (5.9-7.9ft).

Identified Problem Areas

There are approximately 5 chronic flooding areas within Carter County, including the Cities of Elizabethton and Watauga. The problem areas are categorized as follows:

- Neighborhood flooding;
- Stream system flooding; and
- Stream maintenance problems.

Neighborhood flooding refers primarily to street flooding in residential areas caused by undersized storm sewers and roadside ditches. Stream system flooding refers to areas where natural streams exceed their channel banks or back up at bridges or culverts and flood adjacent property. The stream maintenance problem refers to stream systems which have major debris blockages or are heavily overgrown, causing capacity and back up problems.

Past Occurrences

Since 1950, 17 flood events were recorded in Carter County by the National Climatic Data Center (NCDC) since 1950. These events are presented in Appendix C.

Figure 4-2. Damage from 1998 Flood Event.

Likelihood of Future Occurrences

The terms "10 year", "50 year", "100 year" and "500 year" floods are used to describe the estimated probability of a flood event happening in any given year. A 10 year flood has a 10 percent probability of occurring in any given year, a 50 year event a 2% probability, a 100 year event a 1% probability, and a 500 year event a 0.2% probability. While unlikely, it is possible to have two or more 500 year floods within years or months of each other.

The potential for flooding can change and increase through various land use changes and changes to land surface. A change in environment can create localized flooding problems inside and outside of natural floodplains through the alteration or confinement of natural drainage channels. These changes can be created by human activities or by other events, such as wildfires, earthquakes, or landslides.

EARTHQUAKES

An earthquake is a shaking or trembling of the earth's surface caused by the lifting, shifting, breaking, or slipping of a fault line. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. All areas of Carter County, including the cities of Elizabethton and Watauga, have an equal chance of experiencing earthquakes because of the close proximity of two seismic zones: the Southern Appalachian and the New Madrid.

The Southern Appalachian Seismic Zone (SASZ) extends from Northeast Alabama to Southwest Virginia. This seismic zone, in particular the portion from northwestern Georgia through most of eastern Tennessee (known as the East Tennessee Seismic Zone), is the second most active seismic region in the eastern U.S. The center of this seismic zone is near Athens, TN located approximately 160 miles southwest of Carter County. The SASZ rarely produces earthquakes with a magnitude greater than 5.0.

The New Madrid Seismic Zone (NMSZ) extends from west-central Mississippi northward past Cape Girardeau, Missouri. The center of this seismic zone is in New Madrid, Missouri, which is approximately 430 miles west of Carter County. It is the most active seismic region east of the Rocky Mountains. Although activity in the New Madrid Seismic Zone is less frequent than that along the West Coast, when tremblers do occur, the destruction covers over more than 20 times the area of an equivalent West Coast earthquake because of the underlying geology. The largest earthquake in continental United States, according to the U.S. Geological Survey (USGS), occurred on the New Madrid fault in 1811.

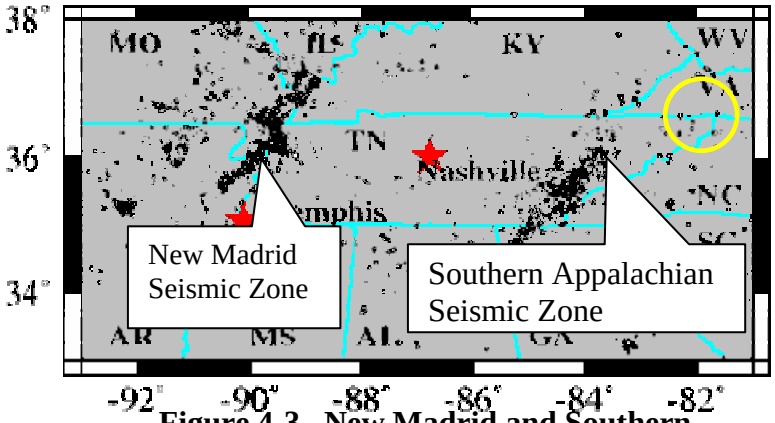

Figure 4-3. New Madrid and Southern Appalachian Seismic Zones.
(Courtesy of Center for Earthquake Research and Information)

Each black dot on Figure 4-3 indicates the location of an earthquake that occurred during the period of 1974 to 1994. Note the high concentration of earthquakes that have occurred in the East Tennessee Seismic Zone (ETSZ) portion of the Southern Appalachian Seismic Zone (SASZ).

Several methods have been developed to quantify the strength of an earthquake. The most recognized methods described below.

Richter Magnitude is a measure of earthquake strength or the amount of energy released. This scale was originally developed by Charles Richter in 1935. Magnitude is expressed in whole numbers and decimals, with each succeeding whole number representing a tenfold increase in the energy released. There is only one Richter value calculated for the epicenter of a specific earthquake. (The epicenter is the location on the surface of the earth directly above where an earthquake originates. It is determined by measuring the amplitudes of ground motion on seismograms.)

Modified Mercalli Intensity Scale is an evaluation of the severity of ground motion at a given location measured relative to the effects of the earthquake on people and property. This scale was developed by Wood and Nueman in 1931, based on Mercalli's 1902 original version. Intensity is expressed in Roman numerals I – XII. The Mercalli scale is the most effective means of determining the approximate magnitude of a quake that occurred in historic time prior to the advent of uniform seismic detection devices and the Richter Scale.

Table 4-4. Comparison of Richter Magnitude and Modified Mercalli Intensity Scales

Richter Magnitude	Mercalli Scale	Effects
2	I – II	Usually detected only by instruments
3	III	Felt Indoors
4	IV – V	Felt by most people; slight damage
5	VI – VII	Felt by all; damage moderate
6	VII – VIII	Damage moderate to major
7	IX – X	Major damage
8+	X - XII	Total and major damage

Past Occurrences

There have been 25 earthquakes recorded within a 100 mile radius of Carter County since summer 2000, according to seismic data from the Center for Earthquake Research and Information.

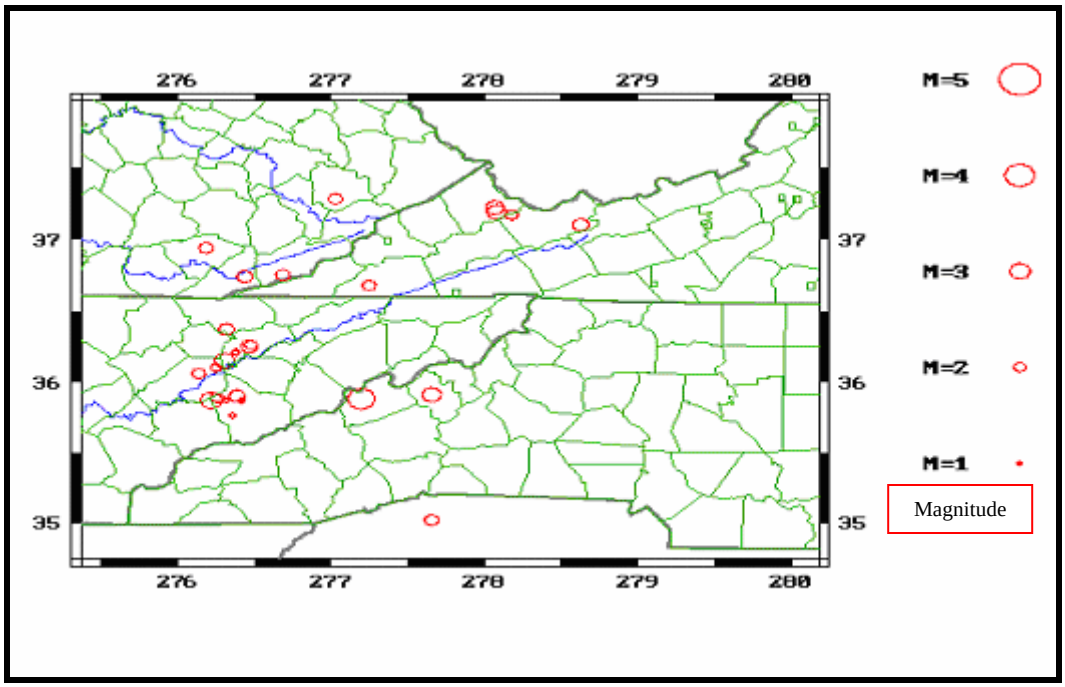

Figure 4-4.: Earthquake Occurrences with 100 miles of Carter County
(Courtesy of Center for Earthquake Research and Information)

Likelihood of Future Occurrences

The close proximity of Carter County to the East Tennessee Seismic Zone and previous records indicate that the occurrence of an earthquake is very likely. However, the recent data suggests that earthquakes in this area are very minor and cause little to no damage.

Drought

A drought is a period of drier-than-normal conditions that results in water-related problems. Precipitation (rain or snow) falls in uneven patterns across the country. The amount of precipitation at a particular location varies from year to year but, over a period of years, the average amount is fairly constant. The average monthly precipitation for Carter County, including the cities of Elizabethton and Watauga, is presented in the table below.

Table 4-5. Precipitation Summary (inches)
2004 National Climatic Data Center (Tri-Cities Airport) Normals

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Tri-Cities	3.52	3.40	3.91	3.23	4.32	3.89	4.21	3.00	3.08	2.30	3.08	3.39	41.33

These statistics were obtained from the Tri-Cities Airport NOAA Weather Station in Blountville, Tennessee.

Although these annual climate statistics represent Carter County as a whole, precipitation may vary between low lying valleys and mountainous areas. All areas of Carter County, including the cities of Elizabethton and Watauga, have an equal chance of experiencing drought.

When no rain or only a very small amount of rain falls, soils can dry out and plants can die. When rainfall is less than normal for several weeks, months, or years, the flow of streams and rivers decline and the water levels in lakes, reservoirs, and wells fall. If dry weather persists and water-supply problems develop, the dry period can become a drought.

A common indicator of drought is the Palmer Drought Severity Index (PDSI), as shown below in Figure 4-6. The PDSI is a soil moisture algorithm calibrated for relatively homogeneous regions. It is used by many U.S. government agencies and states to trigger drought relief programs. It was also the first comprehensive drought index developed in the United States. The classifications of the PDSI are presented in the table below.

Table 4-6. Palmer Classifications

Palmer Classifications	
4.0 or more	extremely wet
3.0 to 3.99	very wet
2.0 to 2.99	moderately wet
1.0 to 1.99	slightly wet
0.5 to 0.99	incipient wet spell
0.49 to -0.49	near normal
-0.5 to -0.99	incipient dry spell
-1.0 to -1.99	mild drought
-2.0 to -2.99	moderate drought
-3.0 to -3.99	severe drought
-4.0 or less	extreme drought

The PDSI indicates that for the period of 1895 through 1995, the northeastern portion of Tennessee was in a severe to extreme drought 5 to 10 percent of the time. During periods of drought, the Governor has called for bans of open burning in an effort to reduce the wildfire risk.

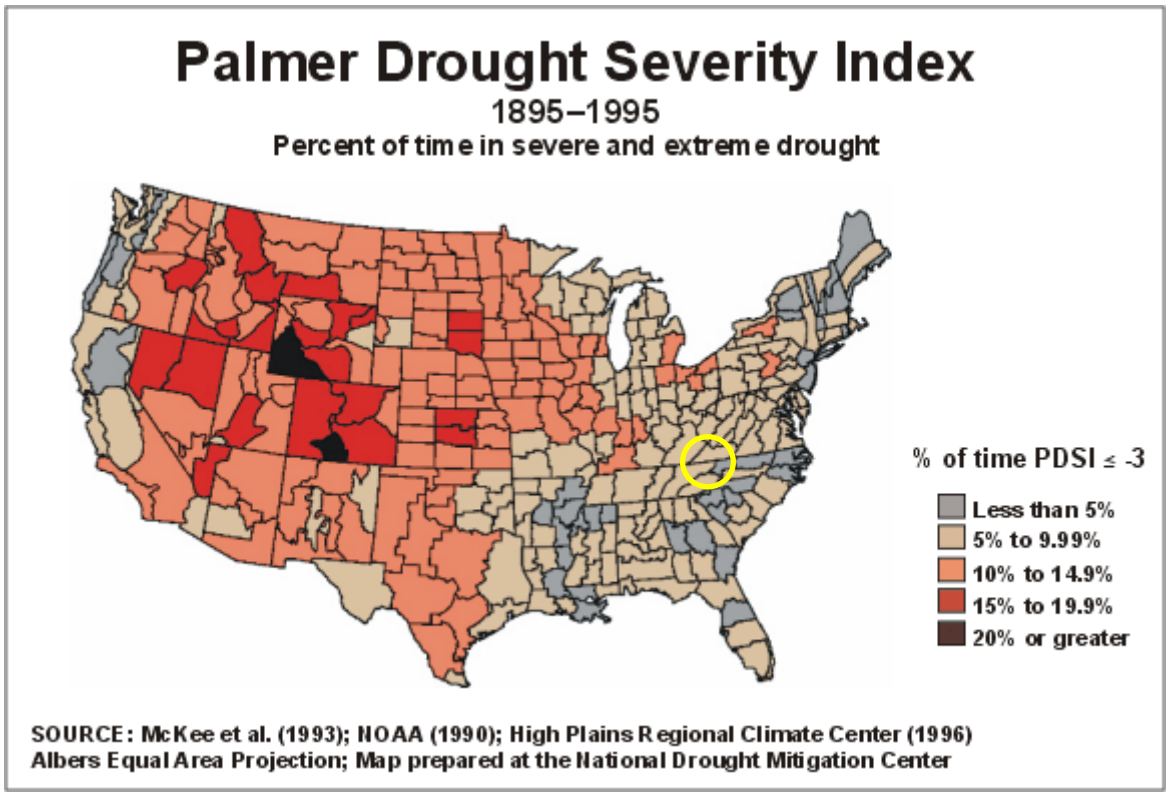

Figure 4-5. Palmer Drought Severity Index
(Courtesy of NOAA)

The beginning of a drought is difficult to determine. Several weeks, months, or even years may pass before people recognize that a drought is occurring. The end of a drought can occur as gradually as it began. Dry periods can last for 10 years or more. The first evidence of drought usually is seen in rainfall records. Within a short period of time, the amount of moisture in soils can begin to decrease. The effects of a drought on flow in streams and rivers or on water levels in lakes and reservoirs may not be noticed for several weeks or months. Water levels in wells may not reflect a shortage of rainfall for a year or more after a drought begins.

Past Occurrences

Detailed records of past drought occurrences for Carter County, including the cities of Elizabethton and Watauga could not be located. Currently, Carter County, including the cities of Elizabethton and Watauga, is a primary county under USDA designation, S2283, for drought and above normal temperatures occurring from May 1, 2005 - Present.

Likelihood of Future Occurrences

The Climate Prediction Center (CPC) of the National Weather Service, together with the United States Department of Agriculture, the National Drought Mitigation Center, and NOAA's National Climatic Data Center, issues a weekly drought assessment for the United States. This assessment provides a consolidated depiction of national drought conditions based on a combination of drought indicators and field reports. The CPC also issues a Seasonal United States Drought Outlook each month in conjunction with the weekly release of the long-lead temperature and precipitation outlooks near the middle of the month.

The current seasonal outlook for the United States is presented in Figure 4-7 below. Due to the increased rainfall during this season, Carter County, including the cities of Elizabethton and Watauga, is not likely to be entering another period of drought in the near future.

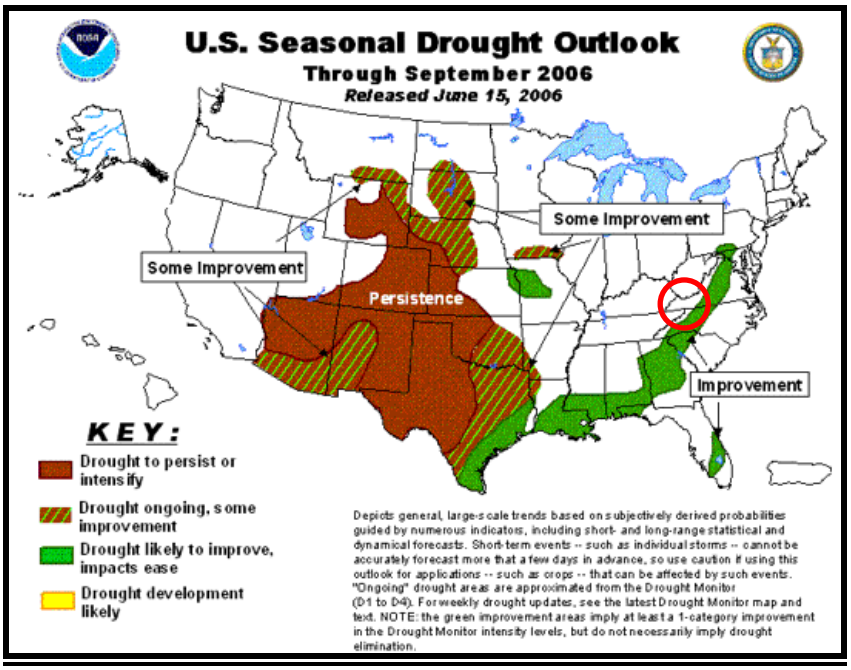

Figure 4-6. U.S. Seasonal Drought Outlook
(Courtesy of National Weather Service)

Extreme Temperatures

Extreme temperature events, both hot and cold, can have severe impacts on natural ecosystems, agriculture and other economic sectors, human health and mortality. All areas of Carter County, including the cities of Elizabethton and Watauga, have an equal chance of experiencing extreme temperatures in the summer or winter months. The normal maximum and normal minimum monthly temperatures for Carter County are presented in the table below.

Table 4-7. Temperature Summary (°F)

2004 National Climatic Data Center (Tri-Cities Airport) Normals

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Tri-Cities (Norm. Max)	44.1	48.9	58.4	67.1	74.9	81.8	84.8	83.9	78.5	68.2	57.4	47.8	66.3
Tri-Cities (Norm. Min)	24.3	27.0	34.6	42.0	51.0	59.5	63.5	61.7	54.7	41.8	33.6	26.8	43.4

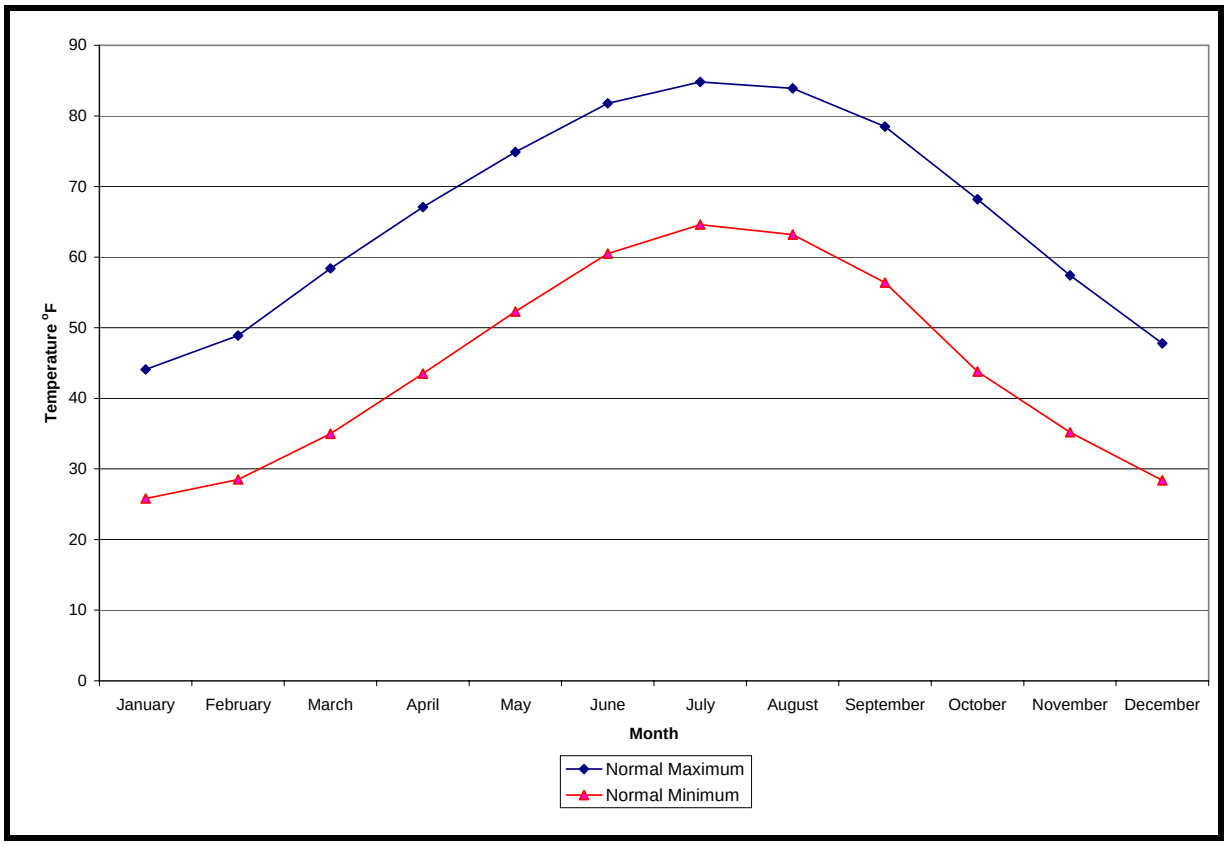

Figure 4-7. Comparison of Maximum and Minimum Normal Temperatures

2004 National Climatic Data Center (Tri-Cities Airport) Normals

These statistics were obtained from the Tri-Cities Airport NOAA Weather Station in Blountville, Tennessee.

Although these annual climate statistics represent Carter County as a whole, temperatures may differ as much as 15 degrees Fahrenheit between low lying valleys and mountainous areas.

High Temperatures

Temperatures that remain 10 degrees or more above the average high temperature for the region and last for several weeks are defined as extreme heat by FEMA. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when high atmospheric pressure traps damp air near the ground.

In an effort to alert the public to the hazards of prolonged heat and humidity episodes, the National Oceanic and Atmospheric Administration (NOAA) devised the "heat index". The heat index is an accurate measure of how hot it feels to an individual when the affects of humidity are added to high temperature. Table 4-8 presents heat index values and their potential physical effects.

The NWS will issue a *Heat Advisory* for Elizabethton, Watauga, and Carter County when daytime heat indices are at or above 105°F and nighttime heat indices are at or above 80°F for two consecutive days. An *Excessive Heat Warning* is issued when the heat index equals or exceeds 120°F for three hours or longer. An excessive heat advisory is also issued when heat advisory conditions persist for at least 3 days. In either of these scenarios, the heat becomes dangerous for a large portion of the population.

Table 4-8. Heat Index Values and Effects
(Courtesy of STORMFAX, Inc.)

Heat Index Values Combination of Heat and Humidity	Heat Index Effects
80 to 90 degrees F	Fatigue possible with prolonged exposure and/or physical activity.
90 to 105 degrees F	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and or physical activity.
105 to 130 degrees F	Sunstroke, heat cramps or heat exhaustion likely, and heatstroke possible with prolonged exposure and/or physical activity.
130 degrees and higher F	Heatstroke/sunstroke highly likely with continued exposure.

Low Temperatures

The NWS will issue a Wind Chill Warning for Carter County, including the cities of Elizabethton and Watauga, when wind-chill temperatures are expected to reach –20 °F or colder for 3 hours or more with a minimum wind peed of 10 mph or more.

In 2001, NWS implemented an updated Wind Chill Temperature (WCT) index. This index was developed to describe the relative discomfort/danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

Specifically, the new WCT index:

- Calculates wind speed at an average height of five feet (typical height of an adult human face) based on readings from the national standard height of 33 feet (typical height of an anemometer);
- Is based on a human face model;
- Incorporates modern heat transfer theory (heat loss from the body to its surroundings, during cold and breezy/windy days);
- Lowers the calm wind threshold to 3 mph;
- Uses a consistent standard for skin tissue resistance; and
- Assumes no impact from the sun (i.e., clear night sky).

Past Occurrences

Although extreme temperature events have been issued in Carter County by the NWS, there is no collected data available. Temperatures below zero degrees Fahrenheit occurred in January in 1877, 1879, 1884, 1885, 1966, 1970, 1982, 1985, 1994 and 1996. The lowest of these cold outbreaks was recorded on January 21, 1985 when the temperature sank to -21 degrees. February sub zero temperatures were experienced in 1880, 1899, 1905, 1958 and 1983. Nearby Mountain City in Johnson County at an elevation of 2400 feet set Tennessee's all time cold temperature record of -31 degrees Fahrenheit on December 30, 1917. The unincorporated town of Roan Mountain in Carter County was nearly as cold but authoritative records do not survive as to the specific temperature reached.

Likelihood of Future Occurrences

Due to the climate of this area, it is possible for future extreme temperature events to occur in Carter County.

Thunderstorms/High Winds

Thunderstorms are defined as localized storms, always accompanied by lightning, and often having strong wind gusts, heavy rain and sometimes hail or tornadoes. Thunderstorms can produce a strong out-rush of wind known as a down-burst, or straight-line winds which may exceed 120 mph. These storms can overturn mobile homes, tear roofs off of houses and topple trees. All areas of Carter County, including the cities of Elizabethton and Watauga, have an equal chance of experiencing thunderstorms/high winds, lightning, and tornadoes.

Approximately 10% of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena:

- Hail measuring ¾ inch or greater;
- Winds gusting in excess of 50 knots (57.5 mph); or
- A tornado.

A *severe thunderstorm watch* is issued by the National Weather Service when the weather conditions are such that a severe thunderstorm is likely to develop. This is the time to locate a safe place in the home and to watch the sky and listen to the radio or television for more information.

A *severe thunderstorm warning* is issued when a severe thunderstorm has been sighted or indicated by weather radar. At this point, the danger is very serious and it is time to go to a safe place, turn on a battery-operated radio or television, and wait for the "all clear" from authorities.

The average number of thunderstorm days per year is presented in Figure 4-9.

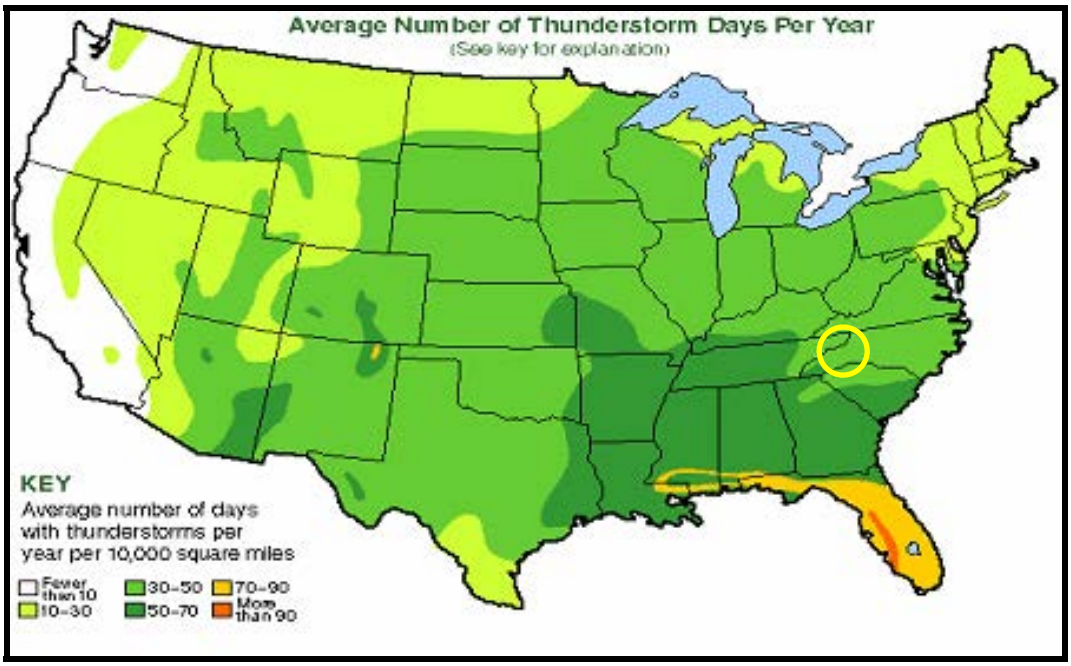

Figure 4-8. Average Number of Thunderstorm Days per Year
(Courtesy of Oklahoma Climatological Survey**)**

Lightning

Lightning is defined as any and all of the various forms of visible electrical discharge caused by thunderstorms.

Cloud-to-ground lightning can kill or injure people by direct or indirect means. The lightning current can branch off to a person from a tree, fence, pole, or other tall object.

Similarly, objects can be directly struck and this impact may result in an explosion, fire, or total destruction. Or, the damage may be indirect when the current passes through or near it. Sometimes, current may enter a building and transfer through wires or plumbing, and damaging everything in its path. In urban areas, lightening may strike a pole or tree and the current then travels to several nearby houses and other structures and enters them through wiring or plumbing.

Tornadoes

The National Weather Service defines a tornado as a violently rotating column of air pendant from a thunderstorm cloud that touches the ground. Tornados are generally considered the most destructive of all atmospheric-generated phenomena. On average, 800 touch down annually in the United States. More tornados occur during the months of May and June than in other months. Additionally, over 30 percent of recorded tornado activity has occurred between the hours of 3:00 pm and 6:00 pm, and an additional estimated 25 percent has occurred between 6:00 pm and 9:00 pm. Thus, over half of all tornadoes occur between 3:00 and 9:00 pm.

Tornados follow the path of least resistance. Therefore, valleys and flatter land areas are most susceptible to them. The typical tornado path is 16 miles long with a width of less than one-quarter mile. Tornadoes have resulted in some of the greatest losses to life of any natural hazard, with the mean national death toll being between 80 and 100 persons every year.

Tornados are classified using the tornado scale developed by Dr. Theodore Fujita. The Fujita Tornado Scale assigns a category to tornados based on their wind speeds and relates this to the general type of damage that is expected. Ratings range from F0 (light damage), to F5 (total destruction). The scale is presented in Table 4-9. Approximately ninety percent of tornados nationwide recorded between 1956 and 2001 were F2, F1, and F0 tornados. Most of these (68 percent of all tornados) were F1 and F0 tornados.

Table 4-9. Fujita Tornado Scale
(Courtesy of NOAA)

SCALE VALUE	WIND SPEED RANGE (MPH)	TYPE OF DAMAGE
F0	40-72	*Light* – May be some damage to poorly maintained roofs. Unsecured lightweight objects, such as trash cans, are displaced.
F1	73-112	*Moderate* – Minor damage to roofs occurs, and windows are broken. Larger heavier objects become displaced. Minor damage to trees and landscaping can be observed.
F2	113-157	*Considerable* – Roofs are damaged. Manufactured homes, on nonpermanent foundations, can be shifted off their foundations. Trees and landscaping either snap or are blown over. Medium-sized debris becomes airborne, damaging other structures.
F3	158-206	*Severe* – Roofs and some walls, especially un-reinforced masonry, are torn from structures. Small ancillary buildings are often destroyed. Manufactured homes on nonpermanent foundations can be overturned. Some trees are uprooted.
F4	207-260	*Devastating* - Well constructed homes, as well as manufactured homes, are destroyed. Some structures are lifted off their foundations. Automobile-sized debris is displaced and often tumbles. Trees are often uprooted and blow over.
F5	261-318	*Incredible* – Strong frame houses and engineered buildings are lifted from their foundations or are significantly damaged or destroyed. Automobile-sized debris is moved significant distances. Trees are uprooted and splintered.

The tornado activity between 1950 and 1998 is presented in the figure below.

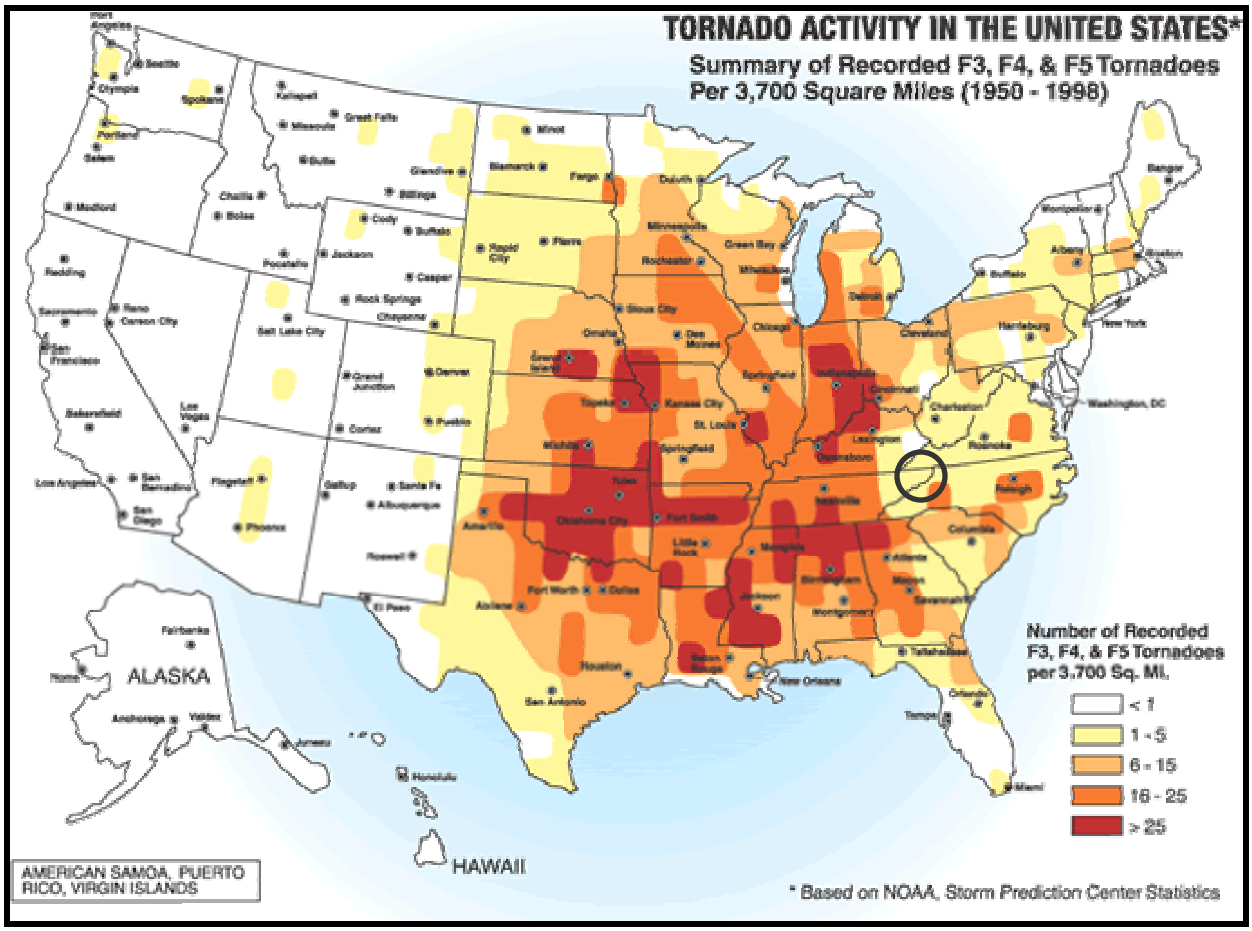

Figure 4-9. United States Tornado Activity, 1950-1998
(Courtesy of FEMA**)**

Past Occurrences

There have been 60 recorded thunderstorm/high wind events in Carter County, including the cities of Elizabethton and Watauga by the National Climatic Data Center since 1950. Three of these thunderstorm/high wind events produced tornadoes as recorded. There have been recorded tornadoes in Carter County: June 16, 1989 near Keenburg (approx 2 miles east of Watauga and one mile north of current Elizabethton City limits); June 3, 1998 near Buladeen in northeast Carter County; and May 1, 2002 along the Stoney Creek valley just 2-3 miles northeast of Elizabethton's city limits. All three tornadoes were very typical of East Tennessee tornadoes in that they were on the ground for a mile or less, were either F0 or F1 strength (old Fujita scale) and the damage paths were fairly narrow. Additional historical data iss presented in Appendix C.

Likelihood of Future Occurrences

Thunderstorms are likely to occur in Carter County, including the cities of Elizabethton and Watauga, approximately 30 to 50 days each year. Seasonally, thunderstorms are more likely to occur during the summer months of April, May, June, and July and least likely to occur during the winter months of December, January, and February. Using the data from 1950 to 2006, the average recurrence interval of tornadoes in Carter County is 1 every 17.3 years, or

approximately a 6 percent chance annually. The total land area of Carter County is 341 square miles. The typical tornado path is sixteen miles long by 0.25 miles wide. Thus, there is a 0.1 percent chance that the tornado path would cross any given square mile within the county, assuming the terrain and/or path of least resistance is near equal.

Winter Storms

Winter storms are especially hazardous in terms of closing emergency routes, creating power and utility system failures, and immobilizing economic activity. Commuters may become stranded, airports may close, and emergency and medical services may be disrupted. Accumulations of snow and ice can cause roofs to collapse and knock down trees and power lines. Ice can disrupt communications and power for days while utility companies repair extensive damage. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians. Bridges and overpasses freeze before other surfaces and are particularly dangerous.

The types of winter precipitation which may occur in Carter County, including the cities of Elizabethton and Watauga, are:

- **Snow Flurries** -- Light snow falling for short durations, resulting in a light dusting or no accumulation.
- **Snow Showers** -- Snow falling at varying intensities for brief periods of time. Some accumulation possible.
- **Blowing Snow** -- Wind-driven snow that reduces visibility and causes drifting. May be falling snow or loose snow picked up off the ground by the wind.
- **Blizzard** -- Winds of more than 35 miles per hour with snow and blowing snow reducing visibility to near zero.
- **Sleet** -- Forms from rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick. It can, however, accumulate and make driving treacherous. Typically occurs at temperatures from 30 to 31 degrees on the ground and 32 to 34 degrees in the clouds.
- **Freezing Rain** -- Falls onto a surface with a temperature below freezing, causing it to freeze to surfaces such as trees, cars and roads and form a coating of ice. Can be very hazardous even in small accumulations. Typically occurs at temperatures from 30 to 33 degrees on the ground and 34 to 36 degrees in the clouds.

The average monthly snowfall for Carter County is presented in the table below.

Table 4-10. Snowfall Summary (inches)
2004 National Climatic Data Center (Tri-Cities Airport) Averages

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Tri-Cities	5.5	4.1	1.9	0.9	0	0	0	0	0	0.1	0.3	2.2	15.0

These statistics were obtained from the Tri-Cities Airport NOAA Weather Station in Blountville, Tennessee.

Although these annual climate statistics represent Carter County as a whole, snowfall greatly varies between low lying valleys and mountainous areas. All areas of Carter County, including the cities of Elizabethton and Watauga, have an equal chance of experiencing winter storms.

Annual mean snowfall and winter storm hazards are presented figure below.

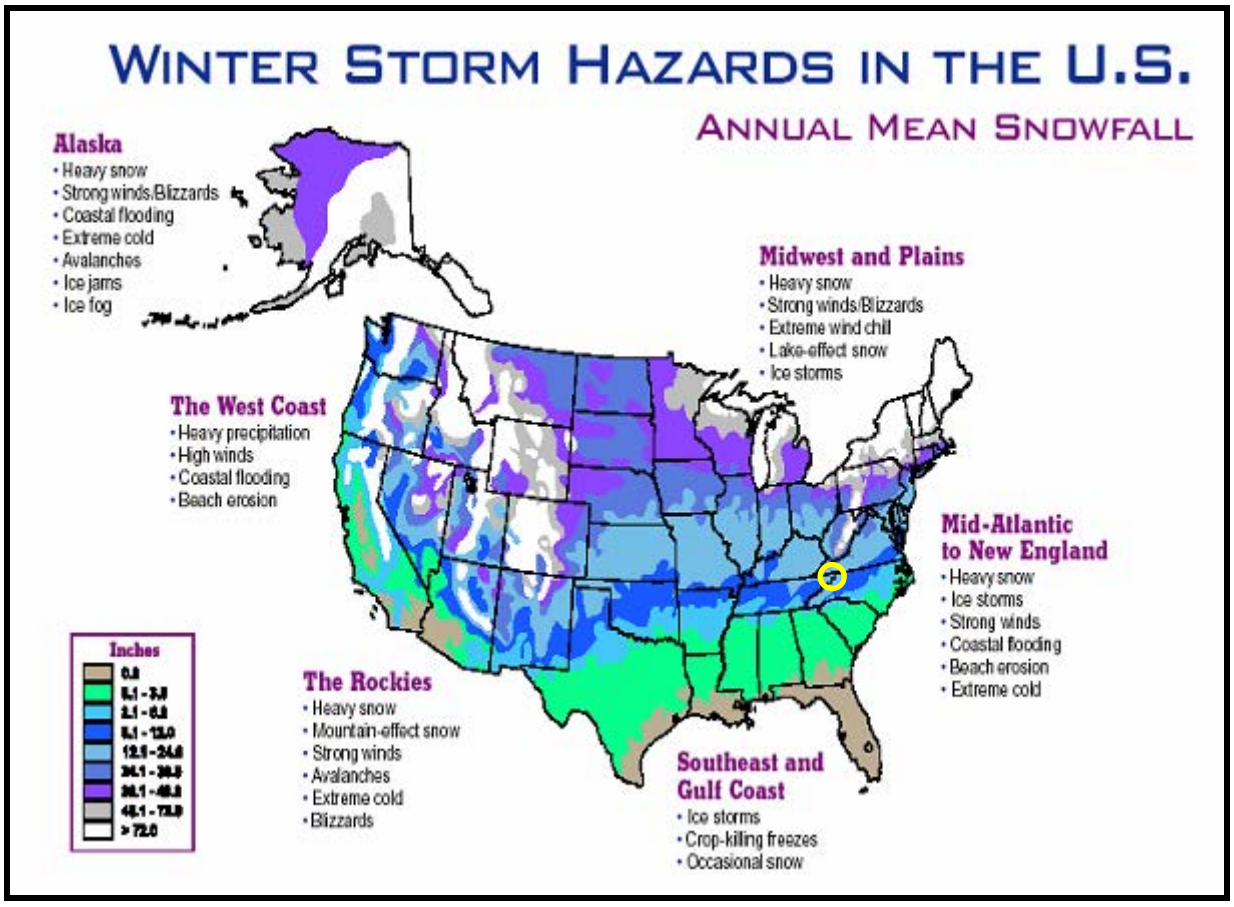

Figure 4-10. Winter Storm Hazards in the United States
(Courtesy of NOAA)

Past Occurrences

Although winter storm events have been issued in Carter County by the NWS in Morristown, TN, The NWS stated that detailed records of the event are only retained for a year. All historical events are documented on NWS's 2006 Tri-Cities Weather Calendar.

Likelihood of Future Occurrences

Due to the climate of this area, it is possible for future winter storm events to occur in Carter County. Winter storms are likely to result in 10 to 30 inches of snowfall annually for Carter County.

Sinkholes / Land Subsidence

A sinkhole is a natural depression or hole in the surface topography caused by the removal of soil and/or bedrock by water. Sinkholes may vary in size from less than a meter to several hundred meters both in diameter and depth, and vary in form from soil-lined bowls to bedrock-edged chasms. They may be formed gradually or suddenly.

Mechanisms of formation may include the gradual removal of slightly soluble bedrock (such as limestone) by percolating water, the collapse of a cave roof, or a lowering of the water table.

Sinkholes are usually but not always linked with karst landscapes. In such regions, there may be hundreds or even thousands of sinkholes in a small area so that the surface as seen from the air looks pock-marked, and there are no surface streams because all drainage occurs sub-surface.

Figure 4-11. Sinkhole.
(Courtesy of Google Images

Land subsidence is the lowering of the land-surface elevation from changes that take place underground. Common causes of land subsidence from human activity are pumping water, oil, and gas from underground reservoirs; dissolution of limestone aquifers (sinkholes); collapse of underground mines; drainage of organic soils; and initial wetting of dry soils (hydrocompaction). Land subsidence occurs in nearly every state of the United States.

Past Occurrences

According to local newspaper research and interviews with civil defense officials and local rsidents, there is no record of structural damage caused by sinkholes/land subsidence in Carter County, including the cities of Elizabethton and Watauga. There are also no records of landslides in Carter County, including the cities of Elizabethton and Watauga, except on Tennessee Department of Transportation (TDOT) Right of Way. TDOT is responsible for landslides on their ROW. Detailed records of past sinkhole/land subsidence occurrences are not available.

Likelihood of Future Occurrences

USGS/TVA topographic maps from 1939 to 1988 show the sinkholes in each jurisdiction. Due to the geology of the area, there is an equal chance that all areas of Carter County, including the cities of Elizabethton and Watauga, may experience formation of sinkholes/land subsidence. However, the Carter County, Elizabethton, and Watauga building permitting processes do not allow construction over sinkhole/land subsidence susceptible geology.

Therefore, the likelihood of structural damage caused by sinkholes/land subsidence is considered low.

Wildfire

Wildfire is any incident of uncontrolled burning of grassland, brush or woodlands. Planning for wildfire is routinely done by each fire department. Mutual aid agreements exist between city and county fire departments, with Tennessee State Division of Forestry and with the U.S. Forest Service.

Past Occurrences

Wildfires required approximately 50 fire department responses to uncontrolled fires on non-U.S. Forest Service land in 2005. Most fires occur in the unincorporated areas of Carter County rather than in the incorporated cities. No specific records of jurisdiction by jurisdiction call outs of fire departments to wildfires is maintained. The figure above is an estimate obtained from the EMA office, TEMA Regional planning staff and the 2007 State Emergency Management Plan. In the notable fire seasons of October-Novemeber 1990 and again in November of 2004, approximately 100 to 300 acres burned in the unincorporated portions of the county in each of those years. There is no record of wildfire damage to any residential structures. This land area does not include fires that were contained entirely within the Cherokee National Forest.

Likelihood of Future Occurrences

It is a virtual certainty that wildfires will continue. A regional drought continued from late 2005 through the spring of 2007 to date. Carter County has experienced rainfall shortage amounting to nearly twenty inches over that time. Citizens and responders alike will need to stay alert, not burn without a permit to do so, exercise caution when burning and promptly report when fire does occur.

Multi-Hazard Mitigation Plan

4.2 Vulnerability Assessment

Once the hazard identification step was complete, the PSC conducted a Vulnerability Assessment to describe the impact that each hazard identified in the preceding section would have on Carter County, including the Cities of Elizabethton and Watauga. The PSC utilized the County Assessor's data to define a baseline against which disaster impacts could be compared. The baseline is the catastrophic, worst-case scenario: the assessed value of the entire county as a whole.

Total Vulnerability of Carter County, including the cities of Elizabethton and Watauga, to Catastrophic Disaster
Risk – Moderate; Vulnerability – Moderate

The current total values of Carter County, including the Cities of Elizabethton and Watauga, as maintained by the County Assessor's office are:

Table 4-11. Catastrophic Damages

	Residential	Commercial	Industrial	Farm & Agriculture	Mineral
Carter County					
Number	26,898	1,531	30	1,921	3
Replacement Value	$ 459,587,375	$ 126,120,400	$ 13,361,960	$ 44,572,600	$ 41,120

Critical Facilities

Of significant concern with respect to the catastrophic event is the location of critical facilities within the community. Critical facilities, as defined by the PSC, include facilities: (1) essential in providing services during the response and recovery operations, and (2) those that house discrete populations that may require greater assistance in the event of a hazard. Critical facilities include the following:

- 911 Operations Area (includes health department, local Red Cross, and emergency shelter)
- County Courthouse (EOC Headquarters)
- Emergency Medical Services (4)
- Sycamore Shoals Hospital
- Select Communication Systems (diagram held by the county)

- Law Enforcement Facilities (4)
- Fire Stations (14)
- National Guard Armory
- Elizabethton City Hall
- Watauga City Hall
- Schools/Shelters (23)
- Nursing Homes (7)
- Walk-in Clinics (6)
- Waste Water/Water Treatment Plants
- Morgues/Funeral Homes (4)
- Radio Stations (2)
- Large Apartment Complexes
- Non TVA dams regulated under Safe Dams Act (3)
- Select Energy Systems (diagram held by county)

Cultural Resources

The table below identifies key cultural resources in Carter County, including the Cities of Elizabethton and Watauga, which would be impacted during a catastrophic event.

Table 4-12. Cultural Resources

Historic Place and Location	Date listed on the National Register
Rueben Brooks Farmstead, 1548 Blue Springs Road	National (2001)
Carriger-Cowan House, East of Siam	National (1979)
John and Landon Carter House, East Broad St.	National (1972)
Elizabethton Historic District, Bounded roughly by 2nd, 4th, East, and Sycamore Streets	National (1973)
Henson Hunt House, Brookdale Road	National (1979)
Henry Range House (Dulaney Cabin), South of Watauga on Smallings Road	National (1991)
Renfro-Allen Farm, Judge Ben Allen Road	National (1996)
Sabine Hill (Watauga Point), Off of TN 67	National (1973)
Simerly-Butler House	National (1996)
Sycamore Shoals, 2 mi. west of Elizabethton on the Watauga River	National (1966)
U.S. Post Office, 201-203 N. Sycamore Street (Library)	National (1983)
John T. Wilder House, 209 Main Street	National (1986)

Natural Resources

The following natural resources could be impacted by a catastrophic event. The species listed below are identified as endangered, threatened, and rare species documented within Carter County by the U.S. Fish and Wildlife Service:

- Northern Flying Squirrel;
- Blue Ridge Goldenrod;
- Spreading Avens;
- Mountain Purple Bluet;
- Spruce Fir Moss Spider;
- Rock Gnome Lichen; and
- Bald Eagle.

Identifying Cultural and Natural Resources is important because:

1. These sites maybe worthy of a greater degree of protection than currently exists, due to their unique and irreplaceable nature.
2. The rules for repair, reconstruction, restoration, rehabilitation and/or replacement usually differ from the norm.

Development Trends

Carter County's close proximity to the Tri-Cities area (Kingsport, Bristol, and Johnson City) has lead to its recent economic and population growth. The Tri-Cities area is the economic center for this portion of Northeastern Tennessee, and Elizabethton is the newest addition to the Tri-Cities area. As the Tri-Cities area becomes more urbanized, residents are moving to the rural areas of Carter County.

The majority of Carter County's workforce commutes to within the County, but a large number of workers commute to the Tri-Cities. Transportation enhancement projects may be necessary if this growth trend continues.

Vulnerability of Carter County, including the Cities of Elizabethton and Watauga, to more Probable Disasters

Community vulnerability can be objectively quantified in those instances where there is a known, identified hazard area; such as a mapped floodplain. In these instances, the numbers and types of buildings subject to the identified hazard can be counted and their values tabulated. Additionally, the location of critical community facilities, historic structures, and valued natural resources within the specific hazard area can be plotted. The quantity and values of infrastructure and resources in the hazard area portray the area's vulnerability.

This vulnerability assessment maybe refined with regard to the percent of probable impact. For example, a single flood event rarely destroys the entire area. In fact, we know from NFIP insurance claims, that a flood with an average depth of 2-feet is likely to damage approximately 20% of the structures in the aggregate. Thus, if the 100-year flood were estimated to be 2-feet deep, a more accurate description of flood vulnerability would be a 1%

annual chance of incurring a 20% loss of the values tabulated in the 100-year floodplain --- not counting damage to infrastructure and economic disruption. This allows a community to measure the cost-effectiveness of alternative mitigation projects. The benefits of a mitigation project are the future losses avoided --- or, in this example, that portion of the value of the 1% annual chance of 20% damage that is protected by the project.

Within Carter County, including the Cities of Elizabethton and Watauga, specific geographical hazard areas have been defined for flooding. The PSC used the following to quantify the vulnerability within the flood hazard area:

- Total Values at Risk (i.e., Types, numbers, and value of land and improvements);
- Critical Facilities at risk;
- Cultural and Natural Resource Sites at risk;
- Development Trends within the identified hazard area; and
- A general statement of community impact.

These factors indicate that the Elizabethton is at greater risk to flood damage than Watauga and the other areas of Carter County. For the other hazards identified in the preceding section (severe weather, earthquakes, and sinkholes/land subsidence), information is available where the potential impacts can be developed or inferred, although they are not tied to a county specific location. For these hazards, the entire county is at risk. In some cases, certain hazard characteristics suggest varying degrees of risk within different areas of Carter County, including the Cities of Elizabethton and Watauga. For example:

> In earthquakes, certain soils are more susceptible to shaking than others, and certain types of building construction are more likely to sustain damage than others. Thus, in areas with higher concentrations of these types of soils or these types of buildings, greater damages can be expected. Any area that included both risky soils and vulnerable construction would be most likely to incur the greatest level of damage and disruption.

Table 4-13 presents the probable risk and vulnerability for identified hazards within the community.

Table 4-13. Summary of Probable Hazard Risk and Vulnerability

Carter County		
Hazard	**Risk**	**Vulnerability**
Floods	High	High
Severe Weather	High	Moderate
Earthquakes	Low	Low
Sinkholes/Land Subsidence	Low	Low
Wildfire	High	Moderate

Elizabethton		
Hazard	**Risk**	**Vulnerability**
Floods	High	High
Severe Weather	High	Moderate
Earthquakes	Low	Low
Sinkholes/Land Subsidence	Low	Low
Wildfire	Low	Moderate

Watauga		
Hazard	**Risk**	**Vulnerability**
Floods	High	High
Severe Weather	High	Moderate
Earthquakes	Low	Low
Sinkholes/Land Subsidence	Low	Low
Wildfire	Low	Moderate

EARTHQUAKE

Risk –Low; Vulnerability – Low

Based on historic and scientific information, the risk to Carter County, including the Cities of Elizabethton and Watauga, from earthquakes is moderate. There have been 25 recorded earthquakes within a 100-mile radius of Carter County since summer 2000. The most recent earthquake within the 100-mile radius of Carter County struck on May 22, 2006 at 5:26 PM. EST and registered at 1.7 Magnitude (according to the U.S. Geological Survey (USGS) in Golden, CO). The epicenter was approximately one mile northeast of Skaggston, TN. The depth of the earthquake was approximately 10.2 km.

Common impacts from earthquakes include damages to infrastructure and buildings (e.g., unreinforced masonry [brick] crumbling; architectural facades falling; underground utilities breaking, gas-fed fires; landslides and rock falls; and road closures). Less common damages could include dam failures and subsequent flash floods (secondary hazard).

A site specific evaluation of the vulnerability of Carter County, including the cities of Elizabethton and Watauga to earthquakes, is presented in a HAZUS software program analysis performed by the City of Elizabethton on August 23, 2006. The study utilized 2000 Census Bureau data for the region with the following assumptions:

- Historical 1926 North Carolina Earthquake (5.1 Magnitude) and Modified historical 1926 North Carolina Earthquake (7.0 Magnitude);
- Approximately 347 square mile region with 17 census tracts;
- 23,000 households;
- Population of 56,742 people;
- Approximately 21,000 buildings within the region;
- Total building replacement cost of 2,189 million dollars; and
- Approximately 99% of the buildings and 81% of the building value are associated with residential housing.

Results are presented in Table 4-14.

Table 4-14. Earthquake HAZUS Results

Impacts / Earthquake	Historical NC 1926 at 5.1	Modified Historical NC 1926 at 7.0
Residential Bldgs. Damaged *(Based upon 20,863 buildings)*	None – 20,848 Slight- 168 Moderate- 38 Extensive- 1 Complete- 0	None – 9,161 Slight- 5,587 Moderate- 4,196 Extensive- 1,576 Complete- 343
Injuries *(Based upon 56,742 people)*	W/O requiring hospitalization: 1 Requiring hospitalization: 0 Life Threatening: 0 Fatalities: 0	W/O requiring hospitalization: 417 Requiring hospitalization: 93 Life Threatening: 13 Fatalities: 20
Displaced Households	0	324
Economic Loss	Income Loss: $ 0.13 M Capital Stock Losses: $ 1.54 M	Income Loss: $ 29.68 M Capital Stock Losses: $ 191.21 M
Damage to Schools *(Based upon 75 buildings)*	All 23 with 50% functionality > 1 day	0 with 50% functionality > 1 day 8 of 23 with at least moderate damage > 50%
Damage to Hospital	All with 50% functionality > 1 day	0 with 50% functionality > 1 day 1 of 1 with at least moderate damage > 50%
Damage to Transportation Systems	All with 50% functionality > 1 day	All with 50% functionality > 1 day
Households w/out Power & Water Service *(Based upon 23,486 households)*	Water Loss at Day 1: 0 Power loss at Day 1: 0	Water loss at Day 1: 1,917 Water loss at Day 0 Power loss at Day 1: 3,345 Power loss at Day 3: 1,757 Power loss at Day 7: 517 Power loss at Day 30: 68 Power loss at Day 90: 5
Debris	0 tons	0 tons

SEVERE WEATHER

(Extreme Temperature, Thunderstorms, Hail, Tornadoes, and Winter Storms)
Risk-High; Vulnerability-Moderate

The severe weather evaluated as part of this risk assessment included: extreme temperatures, thunderstorms and lightning, tornadoes, and winter storms. In general, the risk to Carter County, including the Cities of Elizabethton and Watauga, from severe weather is high with a moderate vulnerability.

Impacts to Carter County, including the Cities of Elizabethton and Watauga, as a result of severe weather could include damage to infrastructure; particularly overhead power lines, road closures, and interruption in business and school activities. Utility outages can impact anything relying on electricity without a redundant power supply and include secondary impacts such as interruption to water and sewage services, heat and refrigeration, fuel supplies, computers and cell phones. If interruption to business occurs for an extended period, economic impacts can be severe. Also of concern would be the impact to populations with special needs. Although typically short-lived, delays in emergencies response services can also be of concern. Depending on the nature of a given storm, all areas within Carter County, including the Cities of Elizabethton and Watauga, are potentially at risk. Areas relying on above ground utilities would potentially suffer the greatest damage.

FLOOD

Risk– High; Vulnerability – High

Flooding is the greatest concern to Carter County, including the Cities of Elizabethton and Watauga. The risk and vulnerability from flooding is high.

Impacts to Carter County, including the Cities of Elizabethton and Watauga, as a result of flooding could include damage to infrastructure (particularly critical facilities), road closures, and emergency response delays. In the past, Carter County has experienced devastating flooding that has resulted in millions of dollars in damage and loss of lives. In 1998, a winter storm brought widespread flooding in the communities of Roan Mountain, Hampton, and Valley Forge. Over 200 mobile homes and 15 houses were demolished; 193 other houses or structures and six businesses were damaged; and 7 people lost their lives. Six of the seven deaths were associated with vehicles attempting to cross flooded roadways. The other fatality occurred when a swift water rescuer's boat capsized during a rescue attempt. Preliminary estimates of loss approached $20 million dollars.

After the flood, Carter County, with the assistance of Federal and State funds, successfully completed a project to aquire 44 parcels in the Roan Mountain Area. In the fall of 2004, this area was tested again with the remnants of two hurricanes back to back. Although significant flooding occurred, the land acquisition project prevented many repetitive losses and fatalities.

A site specific evaluation of the vulnerability of Carter County, including the cities of Elizabethton and Watauga, to flooding on the Doe River, is presented in a HAZUS software program analysis performed by the City of Elizabethton on September 20, 2006. The study utilized 2000 Census Bureau data for the region with the following assumptions:

- Approximately 347 square mile region with 1,880 census blocks;
- 23,000 households;
- Population of 56,742 people;
- Approximately 21,000 buildings within the region;
- Total building replacement cost of 2,189 million dollars; and
- Approximately 99% of the buildings and 81% of the building value are associated with residential housing.

Hazus results are presented below.

Table 4-15. Flood HAZUS Results

Impacts / Flooding	100 year return period
Building Damage	Moderate Damage: 113 (This is over 85% of the buildings in the region) Total Loss: 9
Critical Facility Damage	Fire Stations: None Hospitals: None Police Stations: None Schools: None
Injuries *(Based upon 56,742 people)*	W/O requiring hospitalization: 1 Requiring hospitalization: 0 Life Threatening: 0 Fatalities: 0
Displaced Households	289
Economic Loss	Building Losses: $ 22.38 M Business Interruption: $22.65 M
Debris	5,414 tons

Critical Facilities at risk from flood hazards:
There are 14 critical facilities located in the flood prone areas. These include:

- Carter County EMS Station #3
- Hampton Volunteer Fire Department #1
- Hampton Volunteer Fire Department #2
- Stoney Creek Volunteer Fire Department #1
- Stoney Creek Volunteer Fire Department #2
- Happy Valley Elementary School
- Hampton Elementary School
- Valley Forge Elementary School
- Hunter School
- Unaka Elementary School
- Unaka High School
- Stockton Nursing Home
- Roan Mountain Volunteer Fire Department #2
- Lifecare Health System Center of Elizabethton

Development Trends within areas at risk from flood hazards:

Development trends in Carter County focus on the Elizabethton area to ensure its continued economic viability and dominance as the focal point of social, cultural and financial activity. Since drainage issues in this area are of concern to developers, the City of Elizabethton and Carter County floodplain managers actively work with new businesses during the design phase to decrease drainage problems.

Sinkholes / Land Subsidence

Risk –Low; Vulnerability – Low

According to local newspaper research and interviews with civil defense officials and local residents, there is no record of structural damage due to sinkholes/land subsidence in Carter County, including the cities of Elizabethton and Watauga. The Carter County, Elizabethton, and Watauga building permitting processes do not allow construction over sinkhole susceptible geology.

There are no records of landslides in Carter County, including the cities of Elizabethton and Watauga, except along Tennessee Department of Transportation (TDOT) ROW. Repair of landslides along TDOT ROW is the responsibility of TDOT.

Wildfire

Risk– High; Vulnerability – Moderate

Although instances of wildfire are virtually certain in any given year, the fires that have occurred have not damaged residences. Ordinary safety precautions, prompt reporting of fires as they do occur and periodic safety inspections by fire departments should prevent increases vulnerability in the short term. Continued building in the county will require further review by fire personnel, building code officials and hazard mitigation planning committee members to implement ways to lessen the vulnerability to wildfire.

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4.3 Capability Assessment

An additional method of evaluating the potential for hazards to adversely impact Carter County, including the Cities of Elizabethton and Watauga, is by conducting an inventory and analysis of the community's existing mitigation capabilities. Doing so provides an assessment of how well prepared Carter County is presently, and highlights any areas for improvements. The term "mitigation capabilities" is meant to include all existing policies, regulations, procedures, and abilities that contribute to the protection of Carter County.

The PSC identified policies, regulations, procedures, and abilities that contribute to reducing disaster damages. The PSC evaluated these mechanisms in terms of whether they could be improved in order to reduce future disaster damages. For example, a community with building codes has adopted procedures that take a significant step in preventing future damage. However, if that community does not have a Building Official, then the usefulness and effectiveness of that Building Code has been substantially undermined. Such a circumstance would lead the PSC towards recommending that the position of Building Official be funded and filled.

The following matrix captures the inventory of existing mitigation capabilities within the City of Elizabethton, City of Watauga, and Carter County. An evaluation of key capabilities follows.

Table 4-16. City of Elizabethton Capabilities

Capability	City of Elizabethton
Comprehensive Plan	Yes
Land Use Plan	Yes
Subdivision Ordinance	Yes
Zoning Ordinance	Yes
NFIP/FPM Ordinance	Yes
- Map Date	4/16/2003
- Substantial Damage language?	Yes, Available in FPM ordinance
- Certified Floodplain Manager?	Yes, Joe Barnett
- # of Floodprone Buildings?	
- # of NFIP policies	166 policies in force
- Maintain Elevation Certificates?	Yes; Responsibility of Building Commission
- # of Repetitive Losses?	2 structures
CRS Rating, if applicable	9
Stormwater Program?	Currently being developed
Building Code Version	2003 IBC; 2003 IRC
Full-time Building Official	Yes, Joe Barnett
- Conduct "as-built" Inspections?	Yes
Local Emergency Operations Plan	Yes
Hazard Mitigation Plan	Yes – Oct 1996
Warning System in Place?	Yes
- Storm Ready Certified?	No
- Weather Radio reception?	Yes – County Wide Reception
- Outdoor Warning Sirens?	Yes – Station #1
- Emergency Notification (R-911)?	Yes
- Other? (e.g., cable over-ride)	Local Television Station
GIS System?	Yes
- Hazard Data?	Currently being developed
- Building footprints?	Yes
- Tied to Assessor data?	Yes
- Land-Use designations?	Zoning
Structural Protection Projects	Weir dam replacement at Covered Bridge
Critical Facilities Protected?	No
Natural Resources Inventory?	Yes
Cultural Resources Inventory?	Yes
Erosion Control procedures?	Yes
Sediment Control procedures?	Yes
Public Information Program/Outlet	Yes – County Wide
Environmental Education Program?	Roan Mountain State Park, Doe River Gorge, Sycamore Shoals State Park

Table 4-17. City of Watauga Capabilities

Capability	City of Watauga
Comprehensive Plan	
Land Use Plan	
Subdivision Ordinance	Yes – Uses Carter County's
Zoning Ordinance	Yes – Uses Carter County's
NFIP/FPM Ordinance	Yes
- Map Date	4/16/2003
- Substantial Damage language?	Yes, Available in FPM ordinance
- Certified Floodplain Manager?	Yes – Craig Malone
- # of Floodprone Buildings?	
- # of NFIP policies	0 policies in force
- Maintain Elevation Certificates?	Yes – Uses Carter County's
- # of Repetitive Losses?	
CRS Rating, if applicable	
Stormwater Program?	Yes – Uses Carter County's
Building Code Version	Recommend to follow Southern Building Code
Full-time Building Official	Yes, Craig Malone
- Conduct "as-built" Inspections?	Electrical Only
Local Emergency Operations Plan	Yes
Hazard Mitigation Plan	Yes – Uses Carter County's
Warning System in Place?	No
- Storm Ready Certified?	No
- Weather Radio reception?	Yes – County Wide Reception
- Outdoor Warning Sirens?	
- Emergency Notification (R-911)?	Yes
- Other? (e.g., cable over-ride)	
GIS System?	Yes
- Hazard Data?	Yes
- Building footprints?	Yes
- Tied to Assessor data?	Yes
- Land-Use designations?	County Zoning
Structural Protection Projects	No
Critical Facilities Protected?	No
Natural Resources Inventory?	Yes
Cultural Resources Inventory?	Yes
Erosion Control procedures?	Yes – Uses Carter County's
Sediment Control procedures?	Yes – Uses Carter County's
Public Information Program/Outlet	Yes – County Wide
Environmental Education Program?	Roan Mountain State Park, Doe River Gorge, Sycamore Shoals State Park

Table 4-18. Carter County Capabilities

Capability	Carter County
Comprehensive Plan	
Land Use Plan	
Subdivision Ordinance	Yes
Zoning Ordinance	Yes
NFIP/FPM Ordinance	Yes
- Map Date	4/16/2003
- Substantial Damage language?	Yes, Available in FPM ordinance
- Certified Floodplain Manager?	Yes, Craig Malone
- # of Floodprone Buildings?	
- # of NFIP policies	351 policies in force
- Maintain Elevation Certificates?	Yes
- # of Repetitive Losses?	
CRS Rating, if applicable	
Stormwater Program?	Yes
Building Code Version	Recommend to follow Southern Building Code
Full-time Building Official	Yes, Craig Malone
- Conduct "as-built" Inspections?	Electrical Only
Local Emergency Operations Plan	Yes
Hazard Mitigation Plan	Yes – Oct 1996
Warning System in Place?	Yes
- Storm Ready Certified?	No
- Weather Radio reception?	Yes – County Wide
- Outdoor Warning Sirens?	Yes
- Emergency Notification (R-911)?	Yes
- Other? (e.g., cable over-ride)	
GIS System?	Yes
- Hazard Data?	Currently being developed
- Building footprints?	Yes
- Tied to Assessor data?	Yes
- Land-Use designations?	Zoning
Structural Protection Projects	Carter County Highway Department
Critical Facilities Protected?	No
Natural Resources Inventory?	Yes
Cultural Resources Inventory?	Yes
Erosion Control procedures?	Yes
Sediment Control procedures?	Yes
Public Information Program/Outlet	Yes – County Wide
Environmental Education Program?	Roan Mountain State Park, Doe River Gorge, Sycamore Shoals State Park

Explanation of Capability Assessment Matrix

Comp Plan: Comprehensive Long-Term Community Growth Plan

Land Use Plan: Designates type of Land Use desired/required – Comprised of Zoning

Subdivision Ordinance: Regulates platting, recording, infrastructure improvement

Zoning Ordinance: Dictates type of Use and Occupancy, lot sizes, density, set-backs, and construction types, Implements Land Use Plan

NFIP/FPM Ord: Floodplain Management Ordinance: Directs development in identified Flood Hazard Areas. Required for Participation in NFIP and Availability of Flood Insurance

Sub. Damage: Does your FPM Ordinance contain language on Substantial Damage/Improvements? (40% rule)

Administrator: Do you have a Floodplain Management Administrator (someone with the responsibility of enforcing the ordinance and providing ancillary services (map reading, public education on floods, etc.)

# of FP Bldgs: How many buildings are in the Floodplain?

# of policies? How many buildings are insured against flood through the NFIP?

# of RL's: # of Repetitive Losses: (Paid more than $1,000, twice in the past 10 years)

CRS Rating: Are you in the Community Rating System of the NFIP, and if so, what's your rating?

LEOP: Do you have a Local Emergency Operations Plan – a disaster RESPONSE plan

HM Plan: Do you have a Hazard Mitigation Plan

Warning: Do you have any type of system, such as:
"Storm Ready" Certification from the National Weather Service
NOAA Weather Radio reception
Sirens? Cable (TV) Override? "Reverse 911"?

GIS: Geographic Information System

Structural Protection Projects: (levees, drainage facilities, detention/retention basins)

Critical Facility Protection: (for example, protection of power substations, sewage lift stations, water-supply sources, the EOC, police/fire stations. medical facilities . that are at risk . e.g., in the floodplain)

Natural And Cultural Inventory: Do you have an inventory of resources, maps, or special regulations within the community? (wetlands and historic structures/districts, etc.)

Erosion Or Sediment Control: Do you have any projects or regulations in place?

Public Information And/Or Environmental Education Program: Do you have an ongoing program even if it's primary focus is not hazards? Examples would be "regular" flyers included in city utility billings, a website, or an environmental education program for kids in conjunction with Parks & Recreation?)

Evaluation of Existing Capabilities identified through the Matrix

Overall, the existing policies and procedures for implementing and accomplishing mitigation are both strong and comprehensive. Nevertheless, this analysis has highlighted several issues for the PSC to consider. The issues are described below:

- Carter County, including the Cities of Elizabethton and Watauga, participate in the National Flood Insurance Program (NFIP), but not all parcels in the 100 year floodplain have flood insurance.

- Carter County and the City of Watauga recommend the Southern Building Code for new construction. The only "as-built" inspections that occur for in those jurisdictions are electrical inspections.

- The City of Watauga has no outdoor warning sirens.

Other Existing Mitigation Capabilities within Carter County, including the Cities of Elizabethton and Watauga

In addition to the examination of policies and procedures, there are several significant mitigation programs underway in Carter County, including the Cities of Elizabethton and Watauga, which strengthen the existing level of community protection.

Infrastructure

- Carter County has a solid Emergency Management Program.

- Carter County, including the Cities of Elizabethton and Watauga, uses a data back-up system to preserve vital information.

- Weir Replacement below the Covered Bridge – Currently the weir dam that was washed out during the summer of 2004 from the back to back tropical depressions (Hurricane Remnants) is being replaced.

Warning Systems

- NWS Weather Radio Reception – Carter County has recently upgraded their antenna to provide good county-wide coverage.

- Reverse 911 – Carter County is has installed a reverse 911 system to alert those in danger of the disaster.

- The City of Elizabethton has a local cable television channel that is broadcasted out of Johnson City, TN.

- The Carter County Armature Radio Group actively participates in the NWS Skywarn Program.

Public Education

- Weather Awareness Week – In conjunction with the NWS Weather Awareness Week, Carter County, including the cities of Elizabethton and Watauga, dedicates a week each year to inform the public about local weather hazards.

- American Red Cross – provides shelter for flood and storm damage victims, as well as public information brochures and presentations on multiple natural hazards.

- Sycamore Shoals Hospital has recently completed its Hospital Incident Command System (HICS) training.

- All emergency responders are qualified on the National Emergency Incident Management System (NEIMS).

- Public information is available about local hazards (floods and severe weather predominantly), along with risk reduction measures.

Other Mitigation Projects

Additionally there are structural mitigation projects underway in Carter County, including the Cities of Elizabethton and Watauga. These include work being accomplished by multiple entities: City of Elizabethton Planning and Development; City of Elizabethton Public Works; Carter County Housing and Code Enforcement; and Carter County Highway Department; such as

- Debris clearing of culverts and bridges – The Carter County Highway Department and Elizabethton Public Works Department inspect major crossing prior to large anticipated storm events to ensure that debris is not blocking flow from crossing. Inspections are also conducted after large storm events to remove debris that may have formed during the event.

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Multi-Hazard Mitigation Plan

5.0 Mitigation Strategy

The PSC reviewed and discussed the process of formulating mitigation goals. Each PSC member was provided with a written explanation of Goals and Objectives, the purposes they serve, and how they are developed and written. Up to this point in the planning process, the PSC has been involved in talking to agencies and organizations, and collecting and recording hazard related data. From these discussions and efforts, the PSC completed all three components of the Risk Assessment:

1. Hazard Identification,
2. Vulnerability Assessment, and
3. Capability Assessment.

The first two components have painted a picture of the vulnerability of Carter County, including the Cities of Elizabethton and Watauga, to natural hazards. The PSC learned that:

1. Stream system flooding continues to be a greatest threat to the community. There are 14 critical facilities in the flood prone areas of Stony Creek and the Doe River.

2. Although most severe weather occurs periodically (drought, extreme temperatures, severe thunderstorms/high wind, tornadoes, and severe winter storms), it still constitutes a significant on-going threat to the community.

3. Earthquakes pose a low threat.

4. Sinkholes/land subsidences pose a low threat.

5. Wildfire poses a low threat to the cities and a moderate threat to the county.

The third component, Capability Assessment, described the current ability of Carter County, including the Cities of Elizabethton and Watauga, to counter these threats through existing policies, regulations, programs, and procedures. Here, the PSC learned that:

1. Carter County has a solid Emergency Management Program.

2. Flood insurance is available, but we need information on number of current policies.

3. The City of Elizabethton has a local cable television channel that is broadcasted out of Johnson City, TN.

4. Carter County has improved the NWS radio reception throughout the County

5. Carter County has completed the implementation of its reverse 911 system.

6. The Carter County Armature Radio Group actively participates in the NWS Skywarn Program.

7. Carter County, including the Cities of Elizabethton and Watauga, uses a data back-up system to preserve vital information.

8. Sycamore Shoals Hospital has recently completed its Hospital Incident Command System (HICS) training.

9. All emergency responders are qualified on the National Emergency Incident Management System (NEIMS).

10. Public information is available about local hazards (floods and severe weather predominantly), along with risk reduction measures.

GOAL SETTING

The analysis of the three components of the Risk Assessment identified areas where mitigation improvements could be made, providing the framework for the PSC to formulate planning goals. Each PSC member was provided with an example set of goals from similar community plans. Then, each PSC member wrote their own list of goals and objectives. The PSC consolidated the list, discussed, modified, and prioritized the goals.

Some of the statements were determined to be better suited as mitigation actions, and were set aside for later use. Based upon the planning data review, and the process described above, the PSC developed the final goal statements listed below. The goals and objectives provide the direction for reducing future hazard-related losses in within Carter County, including the Cities of Elizabethton and Watauga.

GOAL #1: **Implement a comprehensive Public Education Campaign regarding the hazards posing significant risk to Carter County, Elizabethton, and Watauga.**

Objective 1.1: Strengthen communication and coordination between public agencies, citizens, non-profit organization, business, industry, and school systems to create a widespread interest in hazard mitigation.

Objective 1.2: Provide information on Hazard Mitigation alternatives and their respective costs, benefits, and impacts.

Objective 1.3: *Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.*

GOAL #2: Reduce exposure to hazard related losses, before and after disaster strikes.

Objective 2.1: Implement a Pre-Disaster mitigation Program.
Objective 2.2: Implement a Post-Disaster mitigation Program.

GOAL #3: Utilize latest technology and data in hazard mitigation activities

Objective 3.1: Maximize "Lead-Time" provided by an all-hazards warning system

IDENTIFICATION OF MITIGATION MEASAURES

Following the goal setting meeting, the PSC undertook a brainstorming session to generate a set of viable alternatives that would support the goals and objectives. Potential mitigation actions were presented to the PSC. A facilitated discussion examined and analyzed the alternatives. Then, with an understanding of the alternatives, the PSC generated a prioritized list of mitigation actions. Similar to the goal-setting activity, the PSC included all previously recommended mitigation actions from existing mitigation plans in its review. This process reinforced the use of the Multi-Hazard Mitigation Plan as an umbrella document for all exiting mitigation plans.

After the old and new mitigation actions were identified, the PSC members prioritized them using FEMA's recommended "STAPLE/E" criteria set (social, technical, administrative, political, legal, economic, and environmental criteria). Financial considerations (cost/benefit reviews) of the prioritized actions weighed heavily in the final selection of mitigation actions. When cost and benefit data are missing, the PSC will perform a qualitative assessment of the comparative benefits. In addition to cost benefit review, secondary considerations included social impact, technical feasibility, administrative capabilities, and political and legal effects, as well as environmental issues.

THE MITIGATION STRATEGY

The results of the planning process (Risk Assessment, Goal Setting, Identification and Prioritization of Mitigation Measures) and the hard work of the PSC led to the Action Plan presented herein. It also helped the PSC clearly comprehend the overall mitigation strategy that will lead to Action Plan implementation.

All of the action items set forth fall into four easily identifiable strategies:

- ENFORCE existing rules, regulations, policies and procedures. Communities can reduce future losses not only by pursuing new programs and projects, but also by paying closer attention to what's already "on the books."

- EDUCATE the community to understand what disasters can happen, where disasters might occur, and what they can do to prepare themselves better. As part of public education, publicize the "success stories" that are achieved through the PSC's ongoing efforts.

- IMPLEMENT the Action Plan.

- MOM --- ardently monitor Multi-Objective Management (MOM) to share funding opportunities and achieve broad constituent support.

ACTION PLAN

The Action Plan presents the prioritized action items for Carter County, including the Cities of Elizabethton and Watauga, to mitigate the occurrence of natural hazards. The action items are presented in priority. The action items are also listed below in Table 5.1 and under the goal they support. Each action item includes a cost estimate and community benefit to meet the regulatory requirements of DMA. Action items that were considered, but not recommended, are included at the end of this section.

Table 5-1. Specific Mitigation Actions

Mitigation Action	Carter County	Elizabethton	Watauga
Action Item 1	X	X	X
Action Item 2	X	X	X
Action Item 3	X	X	X
Action Item4	X	X	X
Action Item 5	X	X	X
Action Item 6	X	X	X
Action Item 7			X

GOAL #1: IMPLEMENT A COMPREHENSIVE PUBLIC EDUCATION CAMPAIGN REGARDING THE HAZARDS POSING SIGNIFICANT RISK TO CARTER COUNTY, ELIZABETHTON, AND WATAUGA.

Objective 1.1: Strengthen communication and coordination between public agencies, citizens, non-profit organizations, business, industry, and school systems to create a widespread interest in hazard mitigation.

Objective 1.2: Provide information on hazard mitigation alternatives and their respective costs, benefits, and impacts.

Objective 1.3: Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.

ACTION ITEM 1:

Develop and Conduct a coordinated Public Education Program that provides the community with accurate information on the risks and vulnerability to natural hazards.

Issue/Background:

Carter County, including the Cities of Elizabethton and Watauga, is subject to several natural hazards with varying degrees of risk and associated vulnerability. The flooding hazard may be addressed by specific geographically defined actions For other hazards (severe weather and earthquakes), the PSC determined that the best approach would simply be public awareness. People should know what the PSC knows: information describing historical events and losses, the likelihood of future occurrences, the range of possible impacts, appropriate actions they can take to save lives and minimize property damage, and where additional information can be found. Any information provided through this effort should be accurate, specific, timely, and consistent with current and accepted local emergency management procedures as promoted by the Tennessee Emergency Management Agency, Elizabethton/Carter County Emergency Management Agency, and the American Red Cross.

The specific actions cited by the PSC for program considerations are:

- Conduct an annual "Hazards Awareness Week".
- Incorporate Hazard Mitigation into other community goals, plans, programs and policies.
- Monitor and publicize the effectiveness of mitigation measures implemented in the community.
- Interface with the federal government to provide technical and financial assistance to the community.
- Build and support local partnerships for joint training and educational purposes.
- Encourage participation of property owners in investing in hazard mitigation projects on their own property.
- Continue to be communities in good standing with the National Flood Insurance Program.

Mitigation Category:	Public Education
Responsible Office:	Carter County Emergency Management Agency
Priority (H, M, L):	High
Cost Estimate:	$10, 000
Community Benefit:	This will save lives, protect property, and the environment from natural hazards. It will also maintain/increase property values.
Potential funding:	Emergency Management Agency budget
Schedule:	On-going

GOAL #2: REDUCE EXPOSURE TO HAZARD RELATED LOSSES, BEFORE AND AFTER DISASTER STRIKES.

Objective 2.1: **Implement a Pre-Disaster Mitigation Program.**
Objective 2.2: **Implement a Post-Disaster Mitigation Program.**

ACTION ITEM 2:

Initiate design and construction of priority Capital Improvements projects for flood protection, beginning with repair and maintenance of the Doe River flood wall.

Mitigation Category:	Public Health and Safety
Responsible Office:	City of Elizabethton Planning and Development Office
Priority (H, M, L):	High
Cost Estimate:	Budgets are being developed by local contractors.
Community Benefit:	This will save lives, protect property, and the environment from natural hazards. It will also maintain property values and reduce the cost of restoration/replacement of public infrastructure.
Potential Funding:	TEMA/ FEMA HMGP/ USACE
Schedule:	2 years upon funding.

ACTION ITEM 3:

Develop a plan and schedule to synchronize the existing building code regulations between Carter County, Elizabethton, and Watauga; with the intent of minimizing future damage from flooding, severe weather, earthquakes, and sinkholes/land subsidence.

Mitigation Category:	Pubic Health and Safety
Responsible Office:	County/Municipalities Building Inspection and Code Enforcement
Priority (H, M, L):	High
Cost Estimate:	$6,000
Community Benefit:	This will save lives, protect property, and property damage when hazards occur. It will also protect the environment from natural hazards.
Potential Funding:	Carter County/City of Elizabethton/City of Watauga
Schedule:	On-going

ACTION ITEM 4:

Develop "Phase II" of the property acquisition plan that was implemented after the 1998 floods to acquire prioritized properties in the repetitive loss areas.

Mitigation Category:	Public Health and Safety
Responsible Office:	City of Elizabethton Planning and Development Office
Priority (H, M, L):	High
Cost Estimate:	$1, 500, 000

Community Benefit:	This will save lives, reduce repetitive losses, protect property, and protect the environment**.**
Potential Funding:	TEMA, FEMA, City of Elizabethton
Schedule:	2 years upon funding

ACTION ITEM 5:

Purchase and distribute post disaster response equipment (snow removal equipment, chainsaws, portable 6" pumps, swift water rescue equipment, etc).

Mitigation Category:	Public Health and Safety
Responsible Office:	Carter County, Elizabethton, and Watauga
Priority (H, M, L):	High
Cost Estimate:	$100,000
Community Benefit:	This will save lives, expedite response time natural hazards, and prevent additional property and infrastructure damage.
Potential Funding:	Carter County, Elizabethton, Watauga
Schedule:	9 months upon funding

GOAL #3: UTILIZE LATEST TECHNOLOGY AND DATA IN HAZARD MITIGATION ACTIVITIES

Objective 3.1: Maximize "Lead-Time" provided by an all-hazards warning system

ACTION ITEM 6:

Purchase and install stream gauges on Stoney Creek, Doe River tributaries, and Watauga that automatically trigger the reverse 911 system when upstream.

Mitigation Category:	Local data/ technology
Responsible Office:	Carter County Emergency Management Agency
Priority (H, M, L):	High
Cost Estimate:	$200,000
Community Benefit:	This will save lives, improve response time of emergency service providers, and reduce property damage.
Potential funding:	TEMA, FEMA, Carter County, Elizabethton, and Watauga
Schedule:	9 months upon funding

ACTION ITEM 7:

Expand warning siren coverage to all areas in Carter County.

Mitigation Category:	Local data/ technology
Responsible Office:	Carter County Emergency Management Agency
Priority (H, M, L):	high
Cost Estimate:	$100,000
Community Benefit:	This will save lives and improve response time to prepare for natural hazards.
Potential Funding:	TEMA and FEMA
Schedule:	12 months upon funding

OTHER ACTION ITEMS CONSIDERED

Not all of the mitigation alternatives presented discussed and considered by the PSC and PIAC became recommended action items within this plan. These alternatives may have been determined to not be cost-effective or supportive of other community goals and priorities. Additionally, some alternatives were determined to lack political and/or constituent support and funding. Mitigation alternatives considered, but not included as priority actions are presented below.

PUBLIC EDUCATION

- Establish an interagency Coordination committee to review/revise all public information prior to its release.

- Publish and distribute graphic depictions of hazards and risks over existing and proposed infrastructure.

PUBLIC HEALTH AND SAFETY

- ***Pursue alternative funding sources for priority capital improvement projects.***

- ***Incorporate Hazard Identification and Management Strategies into the Comprehensive Plan for Elizabethton, Watauga, and Carter County.***

- ***Develop a County-wide Stormwater Master Plan to provide relief from run-off and flooding.***

- ***Update existing ordinances to incorporate Erosion Prevention and Sediment Control (EPSC) design parameters for construction projects.***

- ***Develop and implement a comprehensive training program for First Responders (both professional and volunteer).***

- ***Train Emergency Management and Planning staffs on the use and application of the HAZUS GIS system located in the Elizabethton Planning Department.***

- ***Purchase and install permanent two-way radio systems at critical emergency facilities (Red Cross shelters, medical facilities, EMS command posts).***

- ***Purchase, store, and rotate a back-up water supply (bottled water) at emergency shelters.***

Multi-Hazard Mitigation Plan

6.0 Plan Adoption

44 CFR 201.6(c)(5): "{The local hazard mitigation plan shall include} documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g.,City Council, County Commissioner, Tribal Council)."

Elizabethton and Watauga City Councils adopted this Natural Hazards Mitigation Plan by passing formal resolutions. Copies of each resolution are included below. A draft resolution for Carter County is included also.. The Council's and Commission's resolutions create the Planning Steering Committee and Public Input Advisory Committee that is described in Section 7.0, Plan Implementation and Maintenance. The executed copy of the adopted resolution is also included in Appendix A. The adoption of this resolution completes Step 9 of the Plan Development Process: Formal Plan Adoption.

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BEFORE THE CITY COUNCIL
OF THE CITY OF ELIZABETHTON, TENNESSEE

REGULAR MEETING MARCH 8, 2007

RESOLUTION NO. 43-13

"A RESOLUTION APPROVING AND ADOPTING THE CITY OF ELIZABETHTON, CITY OF WATAUGA, AND CARTER COUNTY, TENNESSEE, HAZARD MITIGATION PLAN."

WHEREAS, our lives, residential and commercial property, businesses, and infrastructure are at risk from a variety of natural hazards, including floods, thunderstorms, earthquakes, wildfire and tornadoes; and,

WHEREAS, Hazard Mitigation Planning will create an operational framework for reducing losses from these hazards in a cost-effective, environmentally sound, manner; and,

WHEREAS, a Hazard Mitigation Planning process was undertaken in order to maintain eligibility for multiple sources of Federal mitigation funding programs that support loss-reduction activities; and,

WHEREAS, a Hazard Mitigation Planning Steering Committee did analyze the hazards that threaten our community, have determined our vulnerability to those hazards and evaluated alternatives to minimize or eliminate their impact; and,

WHEREAS, the City of Elizabethton has adopted policies and regulations that must be implemented following any incident that results in significant damages and that would impact rebuilding and redevelopment; and,

WHEREAS, as a benefit of being enrolled in the Community Rating System within the National Flood Insurance Program, formally establishing our Hazard Mitigation Plan contributes towards lowering the cost of flood insurance across the entire community.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Elizabethton, Tennessee, meeting in regular session on this the 8th day of Mach, 2007, with a lawful quorum of said Council being present and with a majority of said Council voting in the affirmative as follows:

1. The City of Elizabethton does hereby approve and adopt a Hazard Mitigation Plan that identifies protective and mitigation measures that will lessen the City's exposure to future hazard losses, while contributing to other community goals and objectives as identified in other community plans, policies and regulations.

2. The City of Elizabethton did solicit public input throughout the development of the Hazard Mitigation Plan.

3. The City of Elizabethton desires to keep the City in good standing in the National Flood Insurance Program (NFIP) and the NFIP's Community Rating System which reduces the cost of flood insurance for our constituents that either are required or desire to purchase it.

4. This Resolution shall be effective from and after its adoption.

CITY OF ELIZABETHTON, TENNESSEE

By: _____
CURT ALEXANDER, MAYOR

_____
CHARLES LAPORTE, MAYOR PRO-TEM

ATTEST:

_____
LARRY D. CLARK, CITY CLERK

PREPARED BY ME AND APPROVED AS TO FORM:

_____
ROGER G. DAY, CITY ATTORNEY
CITY OF ELIZABETHTON, TN
136 SOUTH SYCAMORE STREET
ELIZABETHTON, TN 37643
PHONE: (423) 542-9575
FAX: (423) 975-0449
BPR #14545

STATE OF TENNESSEE
COUNTY OF CARTER
CITY OF ELIZABETHTON

I, Larry Clark, hereby certify that I am the duly qualified and acting City Clerk of the City of Elizabethton, Tennessee and as such official I further certify that attached hereto is a copy of Resolution No. 43-13 of the City Council of the City of Elizabethton, Tennessee passed on March 8, 2007; that I have compared said copy with the original Resolution, and that the same is a true and correct copy thereof.

WITNESS my signature and the official seal of said City this the 13th day of March, 2007.

City Clerk

(SEAL)

RESOLUTION NO. 110

RESOLUTION TO ADOPT A HAZARD MITIGATION PLAN

WHEREAS, our lives and property are frequently exposed to the risk of loss due to natural hazards, including storms, floods and fire; and,

WHEREAS, Hazard Mitigation Planning for cost-effective and environmentally sound loss-reduction activities is desirable; and,

WHEREAS, in addition, Hazard Mitigation Planning is required in order to maintain eligibility for participation in federal programs for loss-reduction activities; and,

WHEREAS, the Carter County Hazard Mitigation Steering Committee performed an analysis of the hazards that threaten our community, has determined our vulnerability to those hazards and evaluated alternatives to minimize or eliminate their impact; and,

WHEREAS, enrolling in the Community Rating System within the National Flood Insurance Program by adopting a Hazard Mitigation Plan contributes to the lowering of flood insurance cost across the entire community; and,

WHEREAS, policies and regulations applicable to any natural disaster that results in significant damage requiring re-building or redevelopment have been developed. Now therefore,

BE IT RESOLVED by the City Commission as follows:

SECTION 1: That the public input which was solicited throughout the development of the Hazard Mitigation Plan is hereby recognized.

SECTION 2: That retaining good standing in the National Flood Insurance Program (NFIP) and the NFIP's Community Rating System reduces the cost of flood insurance for those that are required or desire to purchase it.

SECTION 3: The Hazard Mitigation Plan identifying protective as well as mitigation measures designed to lessen our exposure to future hazard losses, while contributing to other community goals and objectives as identified in other plans, policies and regulations, is hereby approved and adopted.

ADOPTED this 19th day of April, 2007.

Kenneth Ray
KENNETH RAY, Mayor

ATTEST:

Shirley Fair
SHIRLEY FAIR, CITY CLERK

Ethel F Wilhoit
Ethel Wilhoit, Recorder

BEFORE THE COUNTY COMMISSION
OF CARTER COUNTY, TENNESSEE

REGULAR MEETING **,2006**

RESOLUTION NO. _____

"A RESOLUTION APPROVING AND ADOPTING THE CITY OF ELIZABETHTON, CITY OF WATAUGA, AND CARTER COUNTY, TENNESSEE, HAZARD MITIGATION PLAN."

WHEREAS, our lives, residential and commercial property, business, and infrastructure are at risk from a variety of natural hazards, including floods, thunderstorms, earthquakes, wildfire, tornadoes; and

WHEREAS, Hazard Mitigation Planning created an operational framework for reducing losses from these hazards in a cost-effective, environmentally sound manner; and

WHEREAS, A Hazard Mitigation Planning process was undertaken in order to maintain eligibility for multiple sources of federal mitigation funding programs that support loss-reduction activities; and,

WHEREAS, a Hazard Mitigation Planning Steering Committee analyzed the hazards that threaten our community, determine our vulnerability to those hazards, and evaluate alternatives to minimize or eliminate their impact; and,

WHEREAS, we have adopted policies and regulations that must be implemented following any incident that results in significant damages and that would impact rebuilding and redevelopment; and,

WHEREAS, as a benefit of being enrolled in the Community Rating System within the National Flood Insurance Program, formally establishing our Hazard Mitigation Plan contributes towards lowering the cost of flood insurance across the entire community.

NOW, THEREFORE, BE IT RESOLVED by the County Commission of Carter County, Tennessee, meeting in regular session on this the day of , 2006, with a lawful quorum of said Commission voting in the affirmative as follows:

The Carter County Commission does hereby:

1. Approve and adopt a Hazard Mitigation Plan that identifies protective and mitigation measures that will lessen our exposure to future hazard losses, while contributing to other community goals and objectives as identified in other community plans, policies and regulations.
2. Did solicit public input throughout the development of the Hazard Mitigation Plan.
3. Desires to keep the County in good standing in the National Flood Insurance Program (NFIP) and the NFIP's Community Rating System, which reduces the cost of flood insurance for our constituents that either are required or desire to purchase it.
4. This Resolution shall be effective from and after its adoption.

CARTER COUNTY, TENNESSEE

By: _____
Mayor

ATTEST:

_____

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Multi-Hazard Mitigation Plan

7.0 Plan Implementation and Maintenance

44 CFR 201.6(c)(4): "{The plan maintenance process shall include a} section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle."

IMPLEMENTATION

Step 10 of the Plan Development Process: Implementation and Maintenance of the Plan is critical to the overall success of Hazard Mitigation Planning. Upon adoption, the plan faces the truest test of its worth: implementation. Implementation implies two closely related concepts: action and priority.

While this plan recommends several worthwhile and "High" priority actions, the decision about which action to undertake first will be the first issue that the PSC faces. Fortunately, there are two factors that will help the PSC make that decision; prioritization and funding. Thus, pursuing low or no-cost high-priority action items will have the greatest likelihood of being the first steps.

Another important implementation mechanism that is highly effective but low-cost, is to incorporate both the action items and the underlying principles of this Hazard Mitigation Plan into other community plans and mechanisms, such as Comprehensive Planning, Capital Improvement Budgeting, Economic Development goals and incentives; and/or regional plans such as those put forth by the State Department of Transportation. Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development.

The Hazard Mitigation Plan will be used by the City of Elizabethton to coordinate development in the city and planning region in accordance with the city's land use plan, zoning ordinance, subdivision regulations, national flood insurance program (NFIP) and the city's urban growth plan to assure that hazard mitigation planning is incorporated for the health, welfare and safety of our citizens. The Planning Director, Public Works Director, Deputy Public Works Director, Chief Building Official, NFIP enforcing officer, gas inspector, plumbing inspector, electrical inspector, and Fire Marshall are members of the Development Committee which administers development policies and procedures and coordinates the Hazard Mitigation Grant Program (HMGP) within the city and planning region. The EMA director coordinates Carter County, City of Watauga and City of Elizabethton HMGP with county planning, policies and procedures. This multi-jurisdictional approach and coordination working with the Planning Steering Committee (which may be converted to a permanent Mitigation Coordination Committee) will serve as a check-and-balance to maintain, amend and apply the HMGP to the community to protect the health, welfare and safety of all citizens in Carter County. The HMGP will be reviewed by the Mitigation Coordinating Committee and other agencies previously stated.

The PSC staff and elected officials will maintain a vigilance to incorporate this plan into governmental operations. This integration is accomplished by a constant, prevailing, and energetic effort to network among programs and to identify and highlight the multi-objective, "win-win" benefits for each affected program, as well as the communities and constituents. This effort will be achieved through monitoring agendas, attending meetings, sending memos, and promoting safe, sustainable communities.

In concert with these efforts, the PSC will constantly monitor funding opportunities that can be leveraged to implement some of the more costly actions. This includes creating and maintaining a base of knowledge on how to meet required cost sharing, partnering, and/or other participation requirements. Then, when funding does become available, the PSC will be in a position to capitalize upon the opportunity. Funding opportunities that will be monitored include special pre- and post-disaster funds, special district budgeted funds, state or federal ear-marked funds, and grant programs; especially those that can serve or support multi-objective applications.

With adoption of this plan, the PSC should be converted to a permanent advisory body referred to as the Mitigation Coordinating Committee. This Committee, led by the City of Elizabethton, agrees to commit to:

- act as a forum for hazard mitigation issues;
- disseminate hazard mitigation ideas and activities to all participants;
- pursue the implementation of the high priority, low/no-cost action items;
- keep the concept of mitigation in the forefront of community decision-making by identifying action items of this plan when other community goals, plans and activities overlap, influence, or directly affect community vulnerability to disasters;
- maintain vigilant monitoring of multi-objective cost-share opportunities to assist the community in implementing the action items for which no current funding or support exists;
- monitor implementation of this Plan;
- report on progress and recommended changes to the City Councils and County Commission; and
- inform and solicit input from the public.

The Committee will not have any powers over County staff; it will be an advisory body only. Its primary duty is to see the Plan is carried out successfully and to report to the City Councilmen and County Commissioners and to the public on the status of Plan implementation and mitigation opportunities in Carter County, including the Cities of Elizabethton and Watauga. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing the concerns on to the appropriate entities, and posting relevant information on the Elizabethton and Carter County community website.

MAINTENANCE

Plan maintenance implies an ongoing effort to monitor and evaluate the implementation of the plan, and to update the plan as progress, roadblocks, or changing circumstances are recognized.

This monitoring, evaluating, and updating will take place through a semi-annual review by the Elizabethton Planning and Development and the Elizabethton/Carter County Emergency Management Agency, an annual review through the standing PSC or Mitigation Coordinating Committee, and a 5-year written update to be submitted to the state and FEMA Region IV, unless disaster or other circumstances (e.g., changing regulations) mandate different time frames.

When the Committee reconvenes for the review they will coordinate with all of the stakeholders that participated in the planning process – or that have since joined the Committee – to update and revise the plan. Public participation will be encouraged through web postings, press releases, newspapers and radio stations. The PSC chairman is responsible for the monitoring, evaluating, and updating processes.

Evaluation can be achieved by monitoring changes in the degree of vulnerability identified in the plan. Changes in vulnerability can be identified by noting:

- Lessened vulnerability as a result of implementing Recommended Actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or,
- Increased vulnerability as a result of new development (and/or annexation).

The Plan will be updated via written changes and submissions, as the Committee deems appropriate and necessary, and as approved by the City Councils and County Commissioners.

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Elizabethton, Watauga, and Carter County Multi-Hazard Mitigation Plan

APPENDIX A – PLANNING PROCESS

The DMA planning regulations and guidance ardently stress that each local government seeking the required FEMA approval of their mitigation plan must participate in the process. The Planning Steering Committee (PSC) is composed of typical city and county representatives. The following members participated on the PSC:

Organization	Representative	**Phone**	E-mail
Director Planning & Development – City of Elizabethton	David Ornduff*	(423) 542-1502	kingd@preferred.com
Planning & Development Administrative Assistant	Sherry Sheets	(423) 542-1508	sherrys39@hotmail.com
Emergency Management Agency	Earnest Jackson*	(423) 542-1888	ejackson@preferred.com
Emergency Management Agency	Judy Carver	(423) 542-1888	eccema.carterco@charterbn.com
Carter County (Mayor)	Dale Fair	(423) 542-1801	dfair.charterco@charterbn.com
City of Watauga (Town Manager)	Hattie Skeans	(423) 928-3490 - Also fax #	Home-(423) 928-5740 (No Email Address)
Carter County Sheriff's Dept	Bradley Johnson	(423) 542-6249	johnsonb@sheriff.cc
City Public Works Director	Ted Leger	(423) 547-6307	tedleger@gmail.com
County Road Superintendent	Jack Perkins	(423) 543-2331	cartercntyhgwydept@earthlink.net
Director, Watauga River Regional Water Authority	Mike Hughes	(423) 543-2700	hughes5567@comcast.net
Chief Building Official	Joseph Barnett	(423) 547-6234	zboyzdad2@hotmail.com
Housing and Code Enforcement	Craig Malone	(423) 542-1834	planning.carterco@charterinternet.com
Elizabethton Police Department	Roger Deal	(423) 547-6403	rdeal@elizabethtonpolice.com
Elizabethton Fire Department	Mike Shouse	(423) 547-6390	shouse_mike@yahoo.com
Carter County Fire Department	David Nichols	(423) 543-5445	ccrs@preferred.com
Emergency Management Services	Terry Arnold	(423) 543-5445	ccems@usit.net
Carter County 911 Director	Walt Pierce	(423) 543-0911	cce911@earthlink.net

* PSC Co-Chair

DMA planning regulations and guidance ardently stress public participation in the mitigation planning process. This is partially accomplished by inviting public "stakeholders" to serve on a "Public Input Advisory Committee" (PIAC) to the PSC. The following members participated on the PIAC:

Organization	Representative	Phone	E-mail
Carter County Chamber of Commerce	Larry Gobble	(423) 547-3850	ecctour@earthlink.net
Sycamore Shoals Hospital	Ronnie Lee Carr	(423) 542-1895	carrrl@msha.com
Elizabethton Electric System	Gary Richards	(423) 542-1100	grichards@eesonline.org
Carter Co Amateur Radio Group	Jerry Lake	(423) 725-2662	gerald.lake@comcast.net
American OSH Consultants	Sam Todaro	(423) 543-2620	stodaru@charter.net
Building Associations - Summers-Taylor	Kenny Carter	(423) 543-3181	kennyc@chartertn.net
American Red Cross	Mitzi Hobbs	(423) 542-2833	carterredcross@charter.net
Churches and Charity Organizations	Art Webb	(423) 543-1451 Fax: (423-543-8735	wataugabaptist@earthlink.net
Elizabethton Parks and Recreation	Mike Mains	(423) 547-6441	etwins@preferred.com
State Parks – Roan Mountain	Glen Hatfield	(423) 772-0190 (423) 772-0142-Fax	Glen.Hatfield@state.tn.us
Historical Preservation	Helen Wilson	(423) 543-1938	helenjim@chartertn.net
Public Library	Joyce White	(423) 547-6364	jwhite@eccpl.org
Local Building Contractors – Summers-Taylor	Kenny Carter	(423) 543-3181	kennyc@chartertn.net
Elizabethton-Carter County Health Department	Caroline Hurt	(423) 543-2521	caroline.hurt@state.tn.us
Elizabethton Star	Abby Morris-Frye	(432) 542-4151	amorris@starhq.com
Johnson City Press	John Thompson	(423) 929-3111	jthompson@johnsoncitypress.com
Elizabethton Airport	Randy Musick	(423) 543-2801 Fax-423-543-7053	barron559@cs.com
Sycamore Shoals Hospital	Ronnie Lee Carr	(423) 542-1300	carrrl@msha.com
Elizabethton City School System	John Hutchins	(423) 547-8000	hutchinsj@k12tn.net
Carter County School System	Kevin Ward	(423) 547-4020	kevinward@k12tn.net

Organization	Representative	Phone	E-mail
		Fax: (423)-547-4016	

Additional Agencies and Organizations

Additional agencies and organizations interested in Carter County's, including the Cities of Elizabethton and Watauga, natural hazards were contacted at the beginning of the planning process to see if they were doing anything that might affect the community's program and to see how they could support the community's efforts. The following key agencies were contacted:

- Tennessee Emergency Management Agency;
- FEMA Region IV;
- Tennessee Valley Authority (TVA);
- U.S. Army Corps of Engineers, Nashville District;
- Natural Resource Conservation Service,
- National Weather Service;
- National Flood Insurance Program (NFIP) State Coordinator; and
- Tennessee Department of Natural Resources, Division of Water.

Additional agencies and adjacent jurisdictions were informed by telephone that this process was ongoing. In addition, technical data, reports, and studies were obtained from these agencies either through web-based resources or directly from the agencies.

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MEETING MINUTES

The PSC met six times during the planning process. Meeting dates are listed below.

- June 28th – Kickoff Meeting;
- July 12th – Hazard Identification;
- August 16th – Risk Assessment;
- August 30th – Vulnerability Assessment;
- September 6th – Capability Assessment;
- September 13th – Goal Setting and Review Possible Mitigation Activities

The PAIC meetings were scheduled five times over a three-month period during the planning process. Meeting dates are listed below.

- July 12th – Kickoff Meeting and Hazard Identification;
- August 16th – Risk Assessment;
- August 30th – Vulnerability Assessment;
- September 6th – Capability Assessment;
- September 13th – Goal Setting and Review Possible Mitigation Activities

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MEETING MINUTES
Elizabethton, Carter County, and Watauga, TN
All-Hazards, DMA Compliant, CRS Enhancing Mitigation Plan

Planning Steering Committee

Meeting #1 – Project Kickoff Meeting

4:00 – 6:00 PM, June 28, 2006

1. Introductions

The kick-off meeting was attended by the following:

Attendee	Agency / Company	Phone	E-mail
Richard D (Don) Peters	AMEC	(865) 671-6774	richard.peters@amec.com
Lance Rasnake	AMEC	(865) 671-6774	lance.rasnake@amec.com
Dale Fair	Carter County Mayor	(423) 542-1801	dfair.charterco@charterbn.com
Earnest Jackson	Carter Co Emergency Mgt	(423) 542-1888	ejackson@preferred.com
Judy Carver	Carter Co Emergency Mgt	(423) 542-1888	eccema.carterco@charterbn.com
Larry Gobble	Carter Co Chamber of Commerce	(423) 547-3850	ecctour@earthlink.net
Bradley Johnson	Carter Co Sheriff Dept	(423) 542-6249	johnsonb@sheriff.cc
Brent Dugger	Elizabethton Electric System	(423) 542-1100	bdugger@eesonline.org
Ronnie Lee Carr	Sycamore Shoals Hospital	(423) 542-1895	carrrl@msha.com
Jerry Lake	Carter Co Amateur Radio Group		gerald.lake@comcast.net
Sam Todaro	American OSH Consultants		stodaru@charter.net

2. Meeting Folder Review

Project notebooks were distributed to the kick-off meeting attendees. The notebook contains the project scope; Disaster Mitigation Act (DMA) 2000 federal regulations; and Meeting #1 agenda and slide presentation. The project notebooks are intended to

organize and assist the Planning Steering Committee (PSC) in the plan preparation process.

3. Mitigation, Mitigation Planning, & the Disaster Mitigation Act (DMA) Requirements

The slide presentation discussed DMA regulations, the planning process, and outlined planning steps #1 – Organization; #2 – Public Input; and #3 – Coordination with Other Agencies. All slides are included in the project notebook.

4. The Role of the Planning Steering Committee (PSC)

The DMA planning regulations and guidance stress that each local government seeking the required FEMA approval of their mitigation plan must participate in the process. "Participation" means that local government representatives will:

- Attend and participate in the Planning Steering Committee (PSC) meetings;
- Provide data and information that is requested by AMEC;
- Provide, review, and coordinate DRAFT plan comments;
- Facilitate and document the public input process; and
- Secure formal plan adoption by City/County Councils.

The make up of the Planning Steering Committee (PSC) was discussed. The following organizations were suggested to compose the team:

Organization	Representative	**Phone**	E-mail
Director Planning & Development – City of Elizabethton	David Ornduff*	(423) 542-1502	kingd@preferred.com
Planning & Development Administrative Assistant	Sherry Sheets	(423) 542-1508	sherrys39@hotmail.com
Emergency Management Agency	Earnest Jackson*	(423) 542-1888	ejackson@preferred.com
Emergency Management Agency	Judy Carver	(423) 542-1888	eccema.carterco@charterbn.com
Carter County (Mayor)	Dale Fair	(423) 542-1801	dfair.charterco@charterbn.com
City of Watauga (Town Manager)	Hattie Skeans	(423) 928-3490 - Also fax #	Home-(423) 928-5740 (No Email Address)
Carter County Sheriff's Dept	Bradley Johnson	(423) 542-6249	johnsonb@sheriff.cc
City Public Works Director	Ted Leger	(423) 547-6307	tedleger@gmail.com
County Road Superintendent	Jack Perkins	(423) 543-2331	cartercntyhgwydept@earthlink.net
Director, Watauga River Regional Water Authority	Mike Hughes	(423) 543-2700	hughes5567@comcast.net
Chief Building Official	Joseph Barnett	(423) 547-6234	zboyzdad2@hotmail.com
Housing and Code Enforcement	Craig Malone	(423) 542-1834	planning.carterco@charterinternet.com

Elizabethton Police Department	Roger Deal	(423) 547-6403	rdeal@elizabethtonpolice.com
Elizabethton Fire Department	Mike Shouse	(423) 547-6390	shouse_mike@yahoo.com
Carter County Fire Department	David Nichols	(423) 543-5445	ccrs@preferred.com
Emergency Management Services	Terry Arnold	(423) 543-5445	ccems@usit.net
Carter County 911 Director	Walt Pierce	(423) 543-0911	cce911@earthlink.net

- PSC Co-Chair

Each municipality (Incorporated City) that wants the *Multi-Jurisdictional Hazard Mitigation Plan* to qualify them for FEMA mitigation grants or Community Rating System (CRS) credit must have at least one representative on the PSC.

The PSC is expected to meet six times during the planning process. Suggested dates for the remaining five meetings are:

- July 12th – Hazard ID and Risk Assessment;
- August 2nd – Vulnerability & Capability Assessments; Goals and Objectives
- August 16th – Prioritize Mitigation Activities;
- September 6th – Draft Plan Discussion;
- September 20th – Public Input Meeting.

5. Planning for Public Input

To maximize CRS credits, a 50/50 mixture of community officials and public "stakeholders" is required. This will be accomplished by inviting public "stakeholders" to serve on a "Public Input Advisory Committee" (PIAC) to the PSC. The PIAC will be comprised of an equal or greater number of representatives than the PSC.

PIAC meetings are suggested to coincide with the PSC and should be scheduled following the PSC meeting.

The make up of the Public Input Advisory Committee was also discussed. The following stakeholders were suggested to compose the PIAC:

Organization	Representative	Phone	E-mail
Carter County Chamber of Commerce	Larry Gobble	(423) 547-3850	ecctour@earthlink.net
Sycamore Shoals Hospital	Ronnie Lee Carr	(423) 542-1895	carrrl@msha.com
Elizabethton Electric System	Gary Richards	(423) 542-1100	grichards@eesonline.org
Carter Co Amateur Radio Group	Jerry Lake	(423) 725-2662	gerald.lake@comcast.net
American OSH Consultants	Sam Todaro	(423) 543-2620	stodaru@charter.net

Organization	Representative	Phone	E-mail
Building Associations - Summers-Taylor	Kenny Carter	(423) 543-3181	kennyc@chartertn.net
American Red Cross	Mitzi Hobbs	(423) 542-2833	carterredcross@charter.net
Churches and Charity Organizations	Art Webb	(423) 543-1451 Fax: (423-543-8735	wataugabaptist@earthlink.net
Elizabethton Parks and Recreation	Mike Mains	(423) 547-6441	etwins@preferred.com
State Parks – Roan Mountain	Glen Hatfield	(423) 772-0190 (423) 772-0142-Fax	Glen.Hatfield@state.tn.us
Historical Preservation	Helen Wilson	(423) 543-1938	helenjim@chartertn.net
Public Library	Joyce White	(423) 547-6364	jwhite@eccpl.org
Local Building Contractors – Summers-Taylor	Kenny Carter	(423) 543-3181	kennyc@chartertn.net
Elizabethton-Carter County Health Department	Caroline Hurt	(423) 543-2521	caroline.hurt@state.tn.us
Elizabethton Star	Abby Morris-Frye	(432) 542-4151	amorris@starhq.com
Johnson City Press	John Thompson	(423) 929-3111	jthompson@johnsoncitypress.com
Elizabethton Airport	Randy Musick	(423) 543-2801 Fax-423-543-7053	barron559@cs.com
Sycamore Shoals Hospital	Ronnie Lee Carr	(423) 542-1300	carrrl@msha.com
Elizabethton City School System	John Hutchins	(423) 547-8000	hutchinsj@k12tn.net
Carter County School System	Kevin Ward	(423) 547-4020 Fax: (423)-547-4016	kevinward@k12tn.net

6. Coordinating with Other Agencies

Other representatives, including state and federal agencies, will be invited to join the PSC. Likely candidates include:

- FEMA;
- National Weather Service (NWS);
- U.S. Army Corps of Engineers (USACE);
- National Resource Conservation Service (NRCS);
- United States Geological Survey (USGS);
- Tennessee Valley Authority (TVA):
- Tennessee State Emergency Management Agency (TEMA);

- Tennessee Department of Natural Resources, Water Division; and
- Tennessee State NFIP Coordinator.

These agencies and organizations will be contacted and, in the case of the more active ones, will be visited and interviewed. The objective is to determine what activities these agencies and organizations are currently implementing that impact hazard mitigation, and what things could be done to help mitigate losses in the area.

7. Deliverables

- Draft text for resolution for the City-County Council to create the Planning Steering Committee and Public Input Advisory Committee, specifying its duties and appointing the chair or co-chairs.

- Draft text for resolution for the City of Watauga, committing them to cooperate with the effort and participate in the process.

- Draft text for press releases that explain the project. The press releases will include information on how people can participate and submit their comments or concerns. Members of the PSC will be encouraged to provide the press release to their community newsletters and other local media.

- Draft invitations to appropriate coordinating agencies.

8. Information Received

The following materials were provided to AMEC at the kick-off meeting:

- Elizabethton and Carter County Ordinances
- Hard copy Flood Insurance Rate Maps (FIRMs) – Carter County and Elizabethton, TN
- Literature on Carter County, TN hazards

9. Next Meeting

The second PSC meeting is tentatively scheduled for Wednesday, July 12th, 2006. Following the assimilation, compilation and analysis of all the Hazard Identification data collected, AMEC will reconvene the 2nd meeting of the PSC. The Hazard Identification data will be presented, and the next Planning Step - Vulnerability and Capability Assessments, will be explained to the PSC members.

The first PIAC meeting is also anticipated to follow the PSC meeting. This meeting will be similar to the PSC meeting; presenting the hazard identification, as well a portion of the introductory information from PSC Meeting #1.

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MEETING MINUTES
Elizabethton, Carter County, and Watauga, TN
All-Hazards, DMA Compliant, CRS Enhancing Mitigation Plan

Planning Steering Committee

Meeting #2 – Planning Steering Committee

4:00 – 6:00 PM, July 12, 2006

1. Introductions

The second PSC meeting was attended by the following:

Attendee	Agency / Company	Phone	E-mail
Richard D (Don) Peters	AMEC	(865) 671-6774	richard.peters@amec.com
Lance Rasnake	AMEC	(865) 671-6774	lance.rasnake@amec.com
David R. Ornduff*	City of Elizabethton	(423) 542-1502	kingd@preferred.com
Earnest Jackson*	Carter Co Emergency Mgt	(423) 542-1888	ejackson@preferred.com
Dale Fair	Carter County Mayor	(423) 542-1801	dfair.charterco@chartertn.com
Hattie Skeans	City of Watauga	(423) 928-3490	
Bill Worth	TNEMA	(865) 981-5287	bworth@tnema.org
Judy Carver	Carter Co Emergency Mgt	(423) 542-1888	eccema.carterco@chartertn.com
Gregory Lenske	American Red Cross	(423) 474-3743	
Barry Carrier	City of Elizabethton Fire Department	(423) 474-3308	
Sherry Sheets	City of Elizabethton	(423) 542-1502	Sherrys39@hotmail.com
Joesph Barnett	Chief Building Official	423-542-1503	2boyzdad2@hotmail.com
Bradley Johnson	Carter Co Sheriff Dept	(423) 542-6249	johnsonb@sheriff.cc
David Nichols	Carter County Rescue Squad	(423) 543-5445	ccrs@perferred.com
Roger Deal	Elizabethton Police Department	(423) 542-4141	chiefrogerdeal@yahoo.com
Craig Malone	Housing and Code Enforcement – Carter County	(423) 542-1834	planning.carterco@chartertn.com

Jack Perkins	Carter County Highway Department	(423) 542-1834	cchydep@chartertn.com
Glen McCloud		(423) 895-2076	csmsam79@yahoo.com
Glen Hatfield	Roan Mountain State Park	(423) 772-0190	glen.hatfield@state.tn.us
Ted Leger	City of Elizabethton Public Works	(423) 895-0800	tedleger@gmail.com
Gary Richards	Elizabethton Electric System	(423) 542-1100	grichards@eesonline.org
Ronnie Lee Carr	Sycamore Shoals Hospital	(423) 542-1895	carrrl@msha.com
Jerry Lake	Carter Co Amateur Radio Group		gerald.lake@comcast.net
Jennifer Davis	American Red Cross	(423) 474-6622	
Shawn Davis	WJHL News	(423)-571-2673	sdavis@wjhl.com

* Indicates PSC Co-Chairs

2. PSC Meeting #1 Minutes Review

Mr. Peters reviewed the PSC Meeting #1 minutes with the attendees. Project Notebooks were passed out to PSC members that were not present at the first meeting.

3. Review of the Planning Process

Where we have been

We have successfully completed steps 1-2 of the 10-step process within FEMA's 4-phase guidance. AMEC provided the City of Elizabethton, City of Watauga, and Carter County with a draft invitation letter to send to key personnel in other governmental agencies (USACE, TVA, FEMA, etc).

Where we are

We are currently working on steps 4-5 of the 10-step process within FEMA's 4-phase guidance (Identify the Hazards, and Assess the Risks). AMEC drafted the hazard identification chapter of the HMP and identified information gaps to the PSC. The PSC agreed to provide the identified information. The following information needs and points of contact (POCs) were identified:

TN Division of Forestry – James Heaton (423) 612-7748

- Number of wildfires recorded, including dates.

Keith Hart (423) 542-1818

- Number of droughts recorded, including dates.

Elizabethton Planning and Development – David Ornduff (423) 542-1502

- HAZUS determinations *(This is a critical information need prior to the next PSC).*

Tennessee Valley Authority – Cris Hughes

- Dam failure information.

National Weather Service – Brian Boyd

- Number of extreme temperature events, including dates.

Harvey Tester (423) 213-2240

- Flood Prone Areas

Carter County Rescue Squad – David Nichols (423) 543-5445

- River descriptions, from a local perspective

Tennessee Department of Environmental Conservation – Bob Bentley (615) 532-0154

- Information on dams in Carter County (other than TVA's)

Carter County Emergency Management Agency – Ernest Jackson (423) 542-1888

- Information on past winter storms

The agreed upon due date for the information specified above was July 14, 2006.

Where we are going

The next step in the planning process is to set planning goals (step number 6 of the 10 step process). Before we can set planning goals, we must perform a vulnerability assessment to our identified hazards, and a capability assessment to address the vulnerabilities. The following information and data is required for the Vulnerability and Capability Assessments. The PSC agreed to provide the identified information, as shown below.

Cites of Elizabethton and Watauga

- Hazard Mitigation Grant Application
- Carter County commuting trends
- Applicable Building Codes.
- NFIP ordinance or other legal mechanism adopting NFIP.
- Number of NFIP Policies in your jurisdiction

- Number of flood prone buildings in the jurisdiction
- Repetitive loss structures (name and location) and dollars spent on these structures
- Natural Resources Inventory
- Cultural Resources Inventory
- Structure inventory, by jurisdiction, broken down in the following categories: Residential, Commercial, Industrial, Agricultural, Tax Exempt, or Equivalents; and the total assessed value of each category.
- Property owner protection projects
- Structural protection projects
- Environmental Education Programs
- Public Information Program

Carter County

- Applicable Building Codes.
- NFIP ordinance or other legal mechanism adopting NFIP.
- Number of NFIP Policies in your jurisdiction
- Number of flood prone buildings in the jurisdiction
- Repetitive loss structures (name and location) and dollars spent on these structures
- Natural Resources Inventory
- Cultural Resources Inventory
- Structure inventory, by jurisdiction, broken down in the following categories: Residential, Commercial, Industrial, Agricultural, Tax Exempt, or Equivalents; and the total assessed value of each category.
- Property owner protection projects
- Structural protection projects
- FIRMs #70, #128, and #150.

The agreed upon due date for this information was July 19, 2006.

The table below, completed during the meeting, will facilitate procuring the required information.

Information/Data for Goal Setting

Information Needed	POC
GIS	Gary Moody (county), David Ornduff
HAZUS	David Ornduff
NFIP Ordinances	David Ornduff (E), Hattie Skeans (W),
Who are the Certified Floodplain	Joe Barnett (E), Chris Schuttler (CC)
# of Floodprone Buildings	Dale Fair and Gary Moody
# of NFIP policies	County Tax Asse.
# of Repetitive Losses	County Tax Asse.
Stormwater Program?	Craig Malone
Building Code Versions?	Recom. Southern States Codes (CC),
Full time building official?	Joe Barnett (E), Craig Malone (CC)
Who conducts As-built	Joe Barnett (E),
Building Code Effectiveness	Joe Barnett (E)
Local Emergency Operations	Ernest Jackson
Warning System In Place?	One Siren inside city at station #1
Storm ready certified?	No
Weather Radio Reception?	Yes, Just Upgraded
Outdoor Warning Sirens?	One Siren inside city at station #1
Emergency Notification (R-911)	Being Installed
Structural Protection Projects	Weir Replacement Construction, Jack
Property Owner Protection	Jack Perkins, Tysinger Studies
Natural Resources Inventory	Larry Gobble, Roan Mountain - 772-
Cultural Resources Inventory	Larry Gobble
Public Information Program	Ernest Jackson, Website, TV
Environmental Education	Roan Mountain, Doe River Gorge,
County Inventory	County Tax Asse.

4. Action Items

AMEC provided a draft copy of the Hazard Identification and Risk Assessment to the PSC members. The PSC agreed to review provide comments back to AMEC not later than July 19, 2006.

5. Next Meeting

The third PSC meeting is tentatively scheduled for Wednesday, August 2nd, 2006. Following the assimilation, compilation and analysis of the vulnerabilities to the identified hazards and the capabilities to address them, the PSC will reconvene. During this meeting the planning goals will be established.

The second PIAC meeting is also anticipated to follow the PSC meeting. This meeting will be similar to the PSC meeting; providing input to the planning goals set by the PSC.

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MEETING MINUTES
Elizabethton, Carter County, and Watauga, TN
All-Hazards, DMA Compliant, CRS Enhancing Mitigation Plan

Planning Steering Committee

Meeting #3 – Planning Steering Committee

4:00 – 6:00 PM, August 16, 2006

1. Introductions

The third PSC meeting was attended by the following:

Attendee	Agency / Company	Phone	E-mail
Lance Rasnake	AMEC	(865) 671-6774	lance.rasnake@amec.com
David R. Ornduff*	City of Elizabethton	(423) 542-1502	kingd@preferred.com
Earnest Jackson*	Carter Co Emergency Mgt	(423) 542-1888	ejackson@preferred.com
Dale Fair	Carter County Mayor	(423) 542-1801	dfair.charterco@chartertn.com
Tom Cloud	TNEMA	(865) 981-5286	tcloud@tnema.org
Judy Carver	Carter Co Emergency Mgt	(423) 542-1888	eccema.carterco@chartertn.com
Gregory Lenske	American Red Cross	(423) 474-3743	
Johnny Holder	Carter County Mayor Elect	(423) 542-4368	
Craig Malone	Housing and Code Enforcement – Carter County	(423) 542-1834	planning.carterco@chartertn.com
Jerry Lake	Carter Co Amateur Radio Group		gerald.lake@comcast.net
Joyce White	Elizabethton/Carter County Public Library	(423) 542-1801	jwhite@eccpl.org

* Indicates PSC Co-Chairs

2. PSC Meeting #2 Minutes Review

Mr. Rasnake reviewed the PSC Meeting #2 minutes with the attendees. The following information is still required to complete the vulnerability assessment and the capability assessment as required in step 5 of the 10-step process within FEMA's 4-phase guidance (Assess the Risks) of the HMP:

- Number of flood prone areas in the City of Elizabethton, City of Watauga, and Carter County.
- Repetitive loss structures (name and location) and dollars spent on these structures for the City of Elizabethton, City of Watauga, and Carter County.
- Property owner and structural protection projects for the City of Elizabethton, City of Watauga, and Carter County (past, present, and future)
- Environmental Education Programs for the City of Elizabethton, City of Watauga, and Carter County (past, present, and future).
- Public Information Programs for the City of Elizabethton, City of Watauga, and Carter County (past, present, and future).

3. Review of the Planning Process

Where we have been

We have successfully completed steps 1-4 of the 10-step process within FEMA's 4-phase guidance. AMEC drafted the hazard identification chapter of the HMP and identified information gaps to the PSC. As of this date, AMEC has received no comments on the draft.

The PSC provided some of the information required for step 5 of the 10-step process within FEMA's 4-phase guidance (Assess the Risks). The above stated information (paragraph 2) is required to complete step 5.

Where we are

We are currently working on step 5 of the 10-step process within FEMA's 4-phase guidance (Assess the Risks). During the meeting we identified and prioritized the critical facilities list provided by the Elizabethton/Carter County EMA. The PSC customized the list to meet the needs of the HMP. AMEC will publish the revised critical facilities list not later than August 25, 2006.

Where we are going

The next step is to set the planning goals (step 6 of the 10 step process). Before we can set planning goals, we must perform a vulnerability assessment to our identified hazards, and a capability assessment to address the vulnerabilities. The above stated information (paragraph 2) is required before we can do this. This information is required not later than August 23, 2006 in order to prepare for the next PSC meeting.

4. Action Items

AMEC provided a draft copy of the Hazard Identification and Risk Assessment to the PSC members. As of this date, AMEC has received no comments. Please provide comments not later than August 25, 2006.

5. Next Meeting

The fourth PSC meeting is tentatively scheduled for Wednesday, August 30th, 2006. Following the assimilation, compilation and analysis of the vulnerabilities to the identified hazards and the capabilities to address them, the PSC will reconvene. During this meeting the planning goals will be established.

The second PIAC meeting was scheduled after the PSC meeting, but no attendees were present.

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MEETING MINUTES
Elizabethton, Carter County, and Watauga, TN
All-Hazards, DMA Compliant, CRS Enhancing Mitigation Plan

Planning Steering Committee

Meeting #4 – Planning Steering Committee

4:00 – 6:00 PM, August 30, 2006

1. Introductions

The fourth PSC meeting was attended by the following:

Attendee	Agency / Company	Phone	E-mail
Richard D. Peters Jr.	AMEC	(865) 671-6774	richard.peters@amec.com
Lance Rasnake	AMEC	(865) 671-6774	lance.rasnake@amec.com
David R. Ornduff*	City of Elizabethton	(423) 542-1502	kingd@preferred.com
Earnest Jackson*	Carter Co Emergency Mgt	(423) 542-1888	ejackson@preferred.com
Sherry Sheets	City of Elizabethton	(423) 542-1502	Sherrys39@hotmail.com
Ronnie Lee Carr	Sycamore Shoals Hospital	(423) 542-1895	carrrl@msha.com
Judy Carver	Carter Co Emergency Mgt	(423) 542-1888	eccema.carterco@chartertn.com
Gregory Lenske	American Red Cross	(423) 474-3743	
Jack Perkins	Carter County Highway Department	(423) 542-1834	cchydep@chartertn.com
Ted Leger	City of Elizabethton Public Works	(423) 895-0800	tedleger@gmail.com

* Indicates PSC Co-Chairs

2. PSC Meeting #3 Minutes Review

Mr. Peters reviewed the PSC Meeting #3 minutes with the attendees. The following information is still required to complete the vulnerability assessment and the capability assessment as required in step 5 of the 10-step process within FEMA's 4-phase guidance (Assess the Risks) of the HMP:

- Number of flood prone areas in the City of Elizabethton, City of Watauga, and Carter County.

- Repetitive loss structures (name and location) and dollars spent on these structures for the City of Elizabethton, City of Watauga, and Carter County.
- Property owner and structural protection projects for the City of Elizabethton, City of Watauga, and Carter County (past, present, and future)
- Public Information Programs for the City of Elizabethton, City of Watauga, and Carter County (past, present, and future).

3. Review of the Planning Process

Where we have been

We have successfully completed steps 1-4 of the 10-step process within FEMA's 4-phase guidance. AMEC drafted the hazard identification chapter of the HMP and identified information gaps to the PSC. As of this date, AMEC has received no comments on the draft.
The PSC provided some of the information required for step 5 of the 10-step process within FEMA's 4-phase guidance (Assess the Risks). The above stated information (paragraph 2) is required to complete step 5.

Where we are

We are currently working on step 5 of the 10-step process within FEMA's 4-phase guidance (Assess the Risks). Since the last meeting AMEC had received a list of flood prone areas and repetitive loss information from Carter County and HAZUS analysis for probalistic impacts to the area and historic events from the City of Elizabethton. The Elizabethton/Carter County Emergency Management Agency also provided an area map with the plotted critical facilities established during the last PSC meeting.
During the meeting we identified the flood prone areas within Carter County, including the Cites of Elizabethton and Watauga. These areas were sketched on a county stream reach map provided by the City of Elizabethton. The City of Elizabethton will overlay the critical facilities on this map and send to TEMA for preparation of graphics. No timeline was provided by the City of Elizabethton for the additional work by TEMA.

Where we are going

The next step is to set the planning goals (step 6 of the 10 step process). This will be performed during the next PSC meeting scheduled for September 6, 2006.

4. <u>Action Items</u>

AMEC provided a draft copy of the Hazard Identification and Risk Assessment to the PSC members. As of this date, AMEC has received no comments. Please provide comments not later than September 8, 2006.

5. Next Meeting

The fifth PSC meeting is tentatively scheduled for Wednesday, September 6, 2006. Following the assimilation, compilation and analysis of the vulnerabilities to the identified hazards and the capabilities to address them, the PSC will reconvene. During this meeting the planning goals will be established.

The third PIAC meeting was scheduled after the PSC meeting, but no attendees were present.

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MEETING MINUTES
Elizabethton, Carter County, and Watauga, TN
All-Hazards, DMA Compliant, CRS Enhancing Mitigation Plan

Planning Steering Committee

Meeting #5 – Planning Steering Committee

4:00 – 6:00 PM, September 6, 2006

1. Introductions

The fifth PSC meeting was attended by the following:

Attendee	Agency / Company	Phone	E-mail
Richard D. Peters Jr.	AMEC	(865) 671-6774	richard.peters@amec.com
Lance Rasnake	AMEC	(865) 671-6774	lance.rasnake@amec.com
David R. Ornduff*	City of Elizabethton	(423) 542-1502	kingd@preferred.com
Earnest Jackson*	Carter Co Emergency Mgt	(423) 542-1888	ejackson@preferred.com
Sherry Sheets	City of Elizabethton	(423) 542-1508	Sherrys39@hotmail.com
Ronnie Lee Carr	Sycamore Shoals Hospital	(423) 542-1895	carrrl@msha.com
Judy Carver	Carter Co Emergency Mgt	(423) 542-1888	eccema.carterco@chartertn.com
Gregory Lenske	American Red Cross	(423) 474-3743	
Jack Perkins	Carter County Highway Department	(423) 542-1834	cchydep@chartertn.com
Joesph Barnett	Chief Building Official	423-542-1503	zboyzdad2@hotmail.com
Jerry Lake	Carter Co Amateur Radio Group		gerald.lake@comcast.net
Tom Cloud	TEMA	(865) 981-5286	tcloud@tnema.org

* Indicates PSC Co-Chairs

2. PSC Meeting #4 Minutes Review

Mr. Peters reviewed the PSC Meeting #4 minutes with the attendees. The following information is still required to complete the vulnerability assessment and the

capability assessment as specified in step 5 of the 10-step process within FEMA's 4-phase guidance (Assess the Risks) of the HMP:

- Repetitive loss structures (name and location) and dollars spent on these structures for the City of Elizabethton, City of Watauga, and Carter County.
- NFIP Information

3. Review of the Planning Process

Where we have been

We have successfully completed steps 1-4 of the 10-step process within FEMA's 4-phase guidance. AMEC drafted the hazard identification chapter of the HMP and identified information gaps to the PSC. As of this date, AMEC has received no comments on the draft.
The PSC provided some more of the information required forcompleting the vulnerability and capability assessment. . The above stated information (paragraph 2) is required to complete this.

Where we are

Up to now, the PSC has gathered, recorded, and organized information from applicable agencies and organizations. From these discussions we have produced:

1. The Hazard Identification
2. The Vulnerability and Capability Assessment (70%)

From this, we have "painted a picture" of the vulnerability of Carter County, including the Cities of Elizabethton and Watauga to natural hazards. We have learned that:

Stream system flooding continues to be a greatest threat to the community. There are 14 critical facilities in the flood prone areas of Stony Creek and the Doe River.

Although most severe weather occurs periodically (drought, extreme temperatures, severe thunderstorms/high wind, tornadoes, and severe winter storms), it still constitutes a significant on-going threat to the community.

Earthquakes pose a low threat.

The Capability Assessment describes the ability of Carter County, including the Cities on Elizabethton and Watauga, to counter these threats through existing policies, regulations, programs, and procedures. By discussing capabilities, the PSC learned that:

Carter County has a solid Emergency Management Program.

Flood insurance is available, but we need information on number of current policies.

The City of Elizabethton has a local, cable television channel that is broadcasted out of Johnson City, TN.

Carter County has improved the NWS radio reception throughout the County

Carter County has completed the implementation of its reverse 911 system.

The Carter County Armature Radio Group actively participates in the NWS Skywarn Program.

Carter County, including the Cities of Elizabethton and Watauga, uses a data back-up system to preserve vital information.

Sycamore Shoals Hospital has recently completed its Hospital Incident Command System (HICS) training.

All emergency responders are qualified on National Emergency Incident Management System (NEIMS) training.

Public information is available about local hazards (floods and severe weather predominantly), along with risk reduction measures.

Our analysis has identified areas for improvements, and will be the basis for formulating mitigation goals.

Where we are going

During the next meeting (September 13, 2006), the PSC will set the HMP goals (step 6 of the 10 step process). AMEC provided the PSC an example set of goals and objectives to review before the next meeting.

4. <u>Action Items</u>

- AMEC provided a draft copy of the Hazard Identification and Risk Assessment and a 70% draft of the Vulnerability and Capability Assessment to PSC members; and requested comments NLT September 13, 2006. **Responsibility: All PSC members**

- Provide information on HICS and NEIMS training. **Responsibility: Ronnie Carr**

- Provide required flooding information (Table 22 of the draft Vulnerability and Capability Assessment). **Responsibility: Elizabethton, Watauga, and Carter County**

- Contact Chris Schuttler with Carter County about Flood Hazard Damages (Table 22 of the draft Vulnerability and Capability Assessment). **Responsibility: Carter County Emergency Management Agency**

- Call Stan Harrison with the local planning office about NFIP and BCEGS information. **Responsibility: AMEC**

- Check on jurisdiction's CRS Rating. **Responsibility: Joe Barnett**

- Provide graphical depiction of infrastructure overlaying the flood prone areas. **Responsibility: David Ornduff**

- Determine approximate number of Skywarn participants. **Responsibility: Ernest Jackson**

- Fax Capability Matrix to Carter County and Watauga to fill out. **Responsibility: AMEC**

5. <u>Next Meeting</u>

The fifth PSC meeting is tentatively scheduled for Wednesday, September 13, 2006. During this meeting the planning goals will be established.
The fourth PIAC meeting was scheduled after the PSC meeting, but no attendees were present.

MEETING MINUTES
Elizabethton, Carter County, and Watauga, TN
All-Hazards, DMA Compliant, CRS Enhancing Mitigation Plan

Planning Steering Committee

Meeting #6 – Planning Steering Committee

4:00 – 6:00 PM, September 13, 2006

1. Introductions

The sixth PSC meeting was attended by the following:

Attendee	Agency / Company	Phone	E-mail
Richard D. Peters Jr.	AMEC	(865) 671-6774	richard.peters@amec.com
Lance Rasnake	AMEC	(865) 671-6774	lance.rasnake@amec.com
David R. Ornduff*	City of Elizabethton	(423) 542-1502	kingd@preferred.com
Hattie Skeans	City of Watauga	(423) 928-3490	
Ted Leger	City of Elizabethton	(423) 895-0800	tedleger@gmail.com
Gregory Lenske	American Red Cross	(423) 474-3743	
Jack Perkins	Carter County Highway Department	(423) 542-1834	cchydep@chartertn.com
Joesph Barnett	Chief Building Official	423-542-1503	zboyzdad2@hotmail.com
Jerry Lake	Carter Co Amateur Radio Group		gerald.lake@comcast.net

* Indicates PSC Co-Chair

2. PSC Meeting #5 Minutes Review

Mr. Peters reviewed the PSC Meeting #5 minutes with the attendees. AMEC needs the following information to complete the Vulnerability and Capability Assessment (step 5 of the 10-step process within FEMA's 4-phase guidance). Action Officers are in **[bold brackets]**.

- Repetitive loss structures (name and location) and dollars spent on these structures for Carter County **[Carter Co EMA].** The Cities of Elizabethton and Watauga have provided this information.
- NFIP Information for Carter County **[Carter Co EMA]**

- Graphic Depiction of Infrastructure over Flood Prone Areas **[Mr. Ornduff]**
- Graphic Depiction (Critical Facilities / Infrastructure Overlay) **[Mr. Ornduff]**
- Comments on Drafts (Hazard ID, Risk Assessment, Vulnerability Assessment, and Capability Assessment) **[All PSC Members]**
- Approximate number of SKYWARN participants **[Ernest Jackson]**
- Carter County CRS Rating **[Carter Co EMA]**
- Example Multi-jurisdictional Plan from TEMA **[Mr. Ornduff**

3. Review of the Planning Process

Where we have been

We have completed steps 1-4 of the 10-step process within FEMA's 4-phase guidance. AMEC drafted the hazard identification chapter of the HMP and identified information gaps to the PSC. As of this date, AMEC has received no comments on the draft.
The above stated information (paragraph 2) is required to complete Step 5 (Vulnerability and Capability Assessment).

The PSC gathered, recorded, and organized information from applicable agencies and organizations. From these discussions we have produced:

1. The Hazard Identification
2. The Vulnerability and Capability Assessment (70%)

With this, we determined the vulnerability of Carter County, including the Cities of Elizabethton and Watauga to natural hazards. We have learned that:

Stream system flooding continues to be the greatest threat to the community. There are 14 critical facilities in the flood prone areas of Stony Creek and the Doe River.

Although most severe weather occurs periodically (drought, extreme temperatures, severe thunderstorms/high wind, tornadoes, and severe winter storms), it still constitutes a significant on-going threat to the community.

Earthquakes pose a low threat.

The Capability Assessment describes the ability of Carter County, including the Cities of Elizabethton and Watauga, to counter these threats through existing policies, regulations, programs, and procedures. By discussing capabilities, the PSC learned that:

Carter County has a solid Emergency Management Program.

Flood insurance is available, but we need information on a number of current policies.

The City of Elizabethton has a local, cable television channel that is broadcasted out of Johnson City, TN.

Carter County has improved the NWS radio reception throughout the County.

Carter County has completed the implementation of its reverse 911 system.

The Carter County Armature Radio Group actively participates in the NWS Skywarn Program.

Carter County, including the Cities of Elizabethton and Watauga, uses a data back-up system to preserve vital information.

Sycamore Shoals Hospital has recently completed its Hospital Incident Command System (HICS) training.

All emergency responders are qualified on National Emergency Incident Management System (NEIMS) training.

Local Hazard information (floods and severe weather) is available to the public, along with risk reduction measures.

Our analysis has identified areas for improvements, and will be the basis for formulating mitigation goals.

Where we are

During this meeting, the PSC drafted and prioritized the HMP Goals, Objectives, and Mitigation Activities, using FEMA's STAPLE/E criteria. Goals were defined in three primary areas: Public Education, Public Health and Safety, and Local Data / Technology. The respective Goals, Objectives, and Mitigation Activities are presented below. The top priority Mitigation Activities are highlighted.

•

PUBLIC EDUCATION

GOAL: **Implement a comprehensive Public Education Campaign regarding the hazards posing significant risk to Carter County, Elizabethton, and Watauga.**

Objectives: *Strengthen communication and coordination between public agencies, citizens, non-profit organization, business, industry, and school systems to create a widespread interest in hazard mitigation.*

Provide information on Hazard Mitigation alternatives and their respective costs, benefits, and impacts.

Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.

Potential Mitigation Activities:

1. Develop and conduct a coordinated, multi-hazard, seasonal Public Education program that provides the community with accurate information on the risks and vulnerability to natural hazards.
2. Establish an interagency Coordination committee to review/revise all public information prior to its release.
3. Publish and distribute graphic depictions of hazards and risks over existing and proposed infrastructure.
4. Conduct an annual "Hazards Awareness Week".
5. Incorporate Hazard Mitigation into other community goals, plans, programs and policies.
6. Monitor and publicize the effectiveness of mitigation measures implemented in the community.
7. Interface with the federal government to provide technical and financial assistance to the community.
8. Build and support local partnerships for joint training and educational purposes.
9. Encourage participation of property owners in investing in hazard mitigation projects on their own property.

PUBLIC HEALTH AND SAFETY

GOAL: Reduce exposure to hazard related losses, before and after disaster strikes.

Objectives: *Implement a Pre-Disaster mitigation Program.*
Implement a Post-Disaster mitigation Program.

Potential Mitigation Activities:

1. Initiate design and construction of priority capital improvement projects for flood protection, beginning with repair and maintenance of the Doe River Flood Wall.
2. Pursue alternative funding sources for priority capital improvement projects.
3. Incorporate Hazard Identification and Management Strategies into the Comprehensive Plan for Elizabethton, Watauga, and Carter County.
4. Develop a County-wide Stormwater Master Plan to provide relief from run-off and flooding.
5. Develop a plan and schedule to synchronize the existing Building Code regulations between the County, Elizabethton, and Watauga; with the intent of minimizing future damages from flooding, severe weather, and earthquakes.
6. Develop "Phase II" of the property acquisition plan that was implemented after the 1998 floods .to acquire prioritized properties in the repetitive loss areas.
7. Update existing ordinances to incorporate Erosion Prevention and Sediment Control (EPSC) design parameters for construction projects.

8. Develop and implement a comprehensive training program for First Responders (both professional and volunteer).
9. Train Emergency Management and Planning staffs on the use and application of the HAZUS GIS system located in the Elizabethton Planning Department.
10. Purchase and distribute post disaster response equipment (snow removal equipment, chain saws, portable 6" pumps, swift water rescue equipment, etc.).
11. Purchase and install permanent two-way radio systems at critical emergency facilities (Red Cross shelters, medical facilities, EMS command posts).
12. Purchase, store, and rotate a back-up water supply (bottled water) at emergency shelters

LOCAL DATA / TECHNOLOGY

GOAL: Utilize latest technology and data in hazard mitigation activities

Objective: *Maximize "lead-time" provided by an all-hazards warning system.*

Potential Mitigation Activities:

1. Purchase and install stream gauges on Stony Creek Doe River tributaries that automatically trigger the reverse 911 system when upstream areas reach critical stages.
2. Expand warning siren coverage to all areas in Carter County.

Where we are going

During the next week, the PSC will obtain and consolidate the remaining required information (paragraph 2), refine the Vulnerability and Capability Assessments, and finalize the Draft Goals, Objectives, and Actions.

The PSC will provide this information to AMEC to draft the HMP. Each jurisdiction will post the draft for public comment. At the end of the public comment period, the PSC will consolidate all comments and provide back to AMEC to incorporate into the Final HMP.

AMEC will draft the required Local Hazard Mitigation Plan Review Crosswalk, and provide to Elizabethton with the Final HMP. Elizabethton will submit both to TEMA.

4. Action Items –

- See paragraph 2 for overdue Action Items, and responsible parties
- Provide AMEC with a copy of the Carter County Emergency Management Plan **[Mr. Ornduff / Carter Co EMA]**
- Finalize and approve the Draft Goals, Objectives, and Mitigation Actions in paragraph 3, and provide to AMEC **[Elizabethton / Carter Co / Watauga]**. Each Jurisdiction must have at least one "jurisdiction specific" goal.

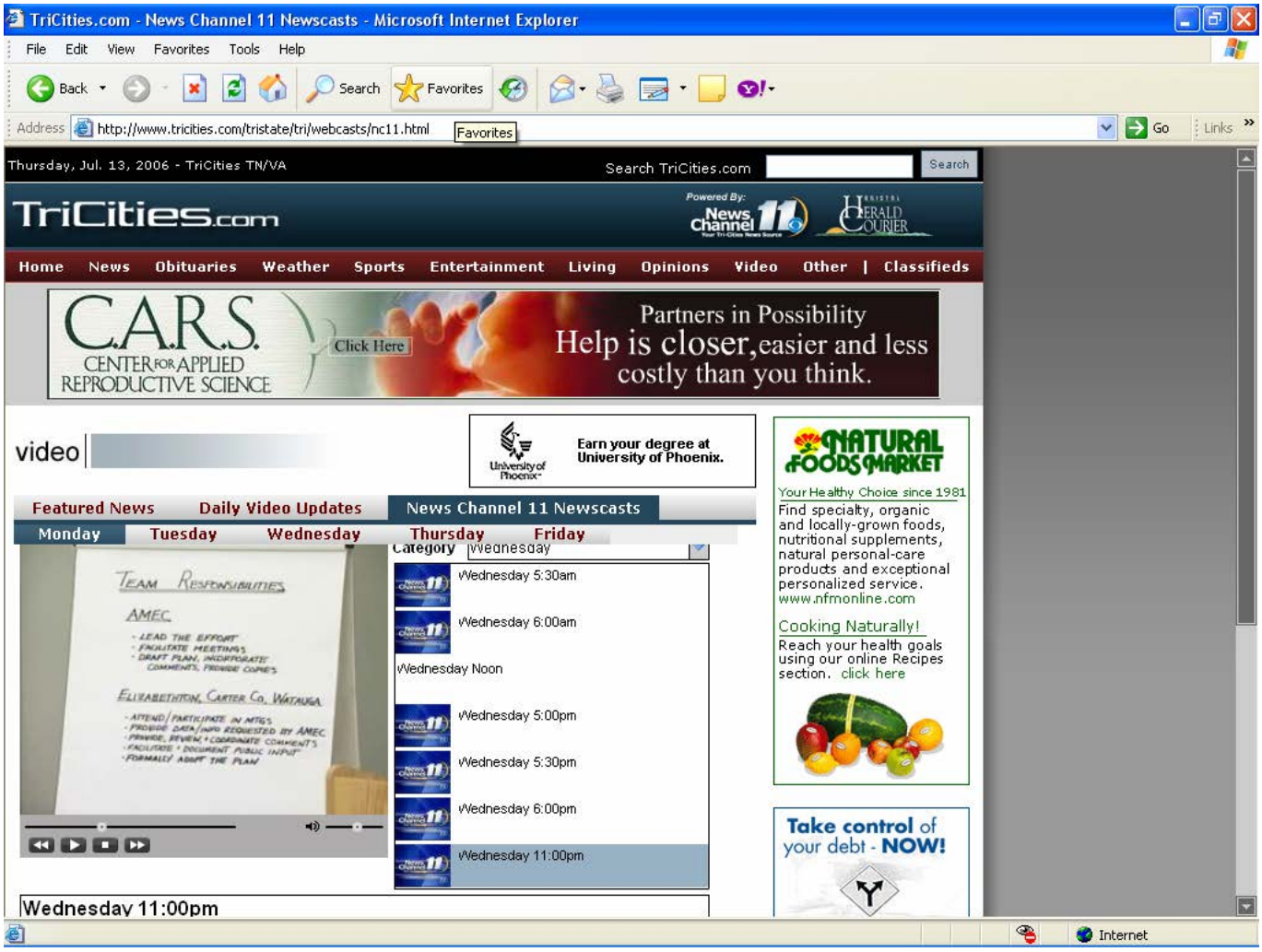
- Specify the following for each Mitigation Action, and provide to AMEC **[Elizabethton / Carter Co / Watauga]:**
    - Action Item
    - Responsible Office / Person
    - Priority (H,M,L)
    - Hazard Addressed (Flooding, Severe Weather, Earthquake)
    - Cost Estimate
    - Community Benefit
    - Potential Funding Source
    - Schedule
- Upon receiving the above stated information, draft the HMP **[AMEC]**
- Obtain and Consolidate Public Comments on the Draft HMP, and provide to AMEC **[Elizabethton / Carter Co / Watauga]**
- Finalize the HMP, and draft the Plan Review Crosswalk **[AMEC]**
- Submit HMP and Crosswalk to TEMA **[Mr. Ornduff]**

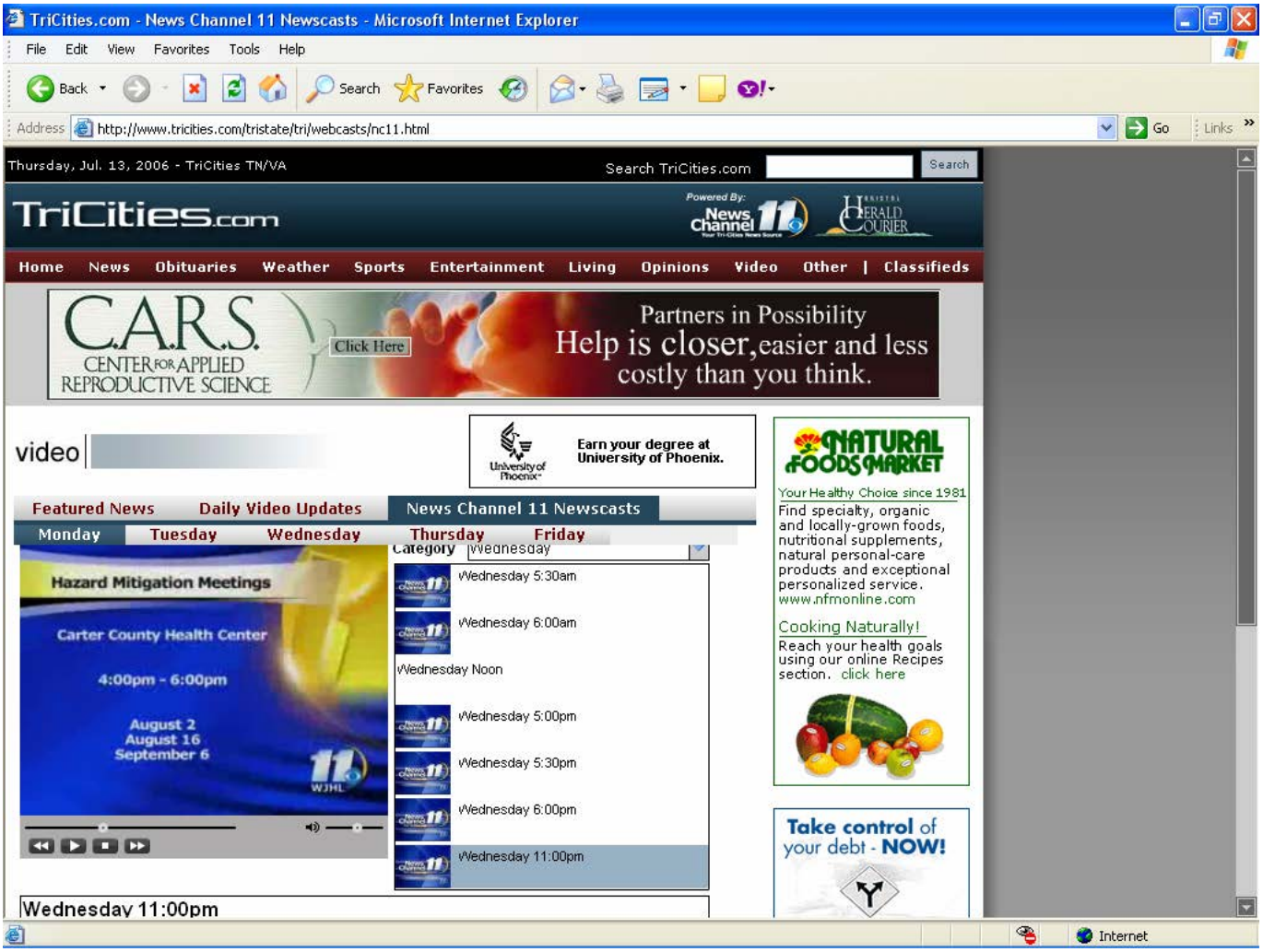
5. Next Meeting

The next PSC meeting date and time is to be determined (TBD).
The fifth PIAC meeting was scheduled after this PSC meeting, but no one attended.

Elizabethton, Watauga, and Carter County Multi-Hazard Mitigation Plan

APPENDIX B – PIAC Meeting Press Release Documentation

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Carter County Health Center
4:00pm - 6:00pm
August 2
August 16
September 6
WJHL
Category Wednesday
Wednesday 5:30am
Wednesday 6:00am
Wednesday Noon
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Take control of your debt - NOW!
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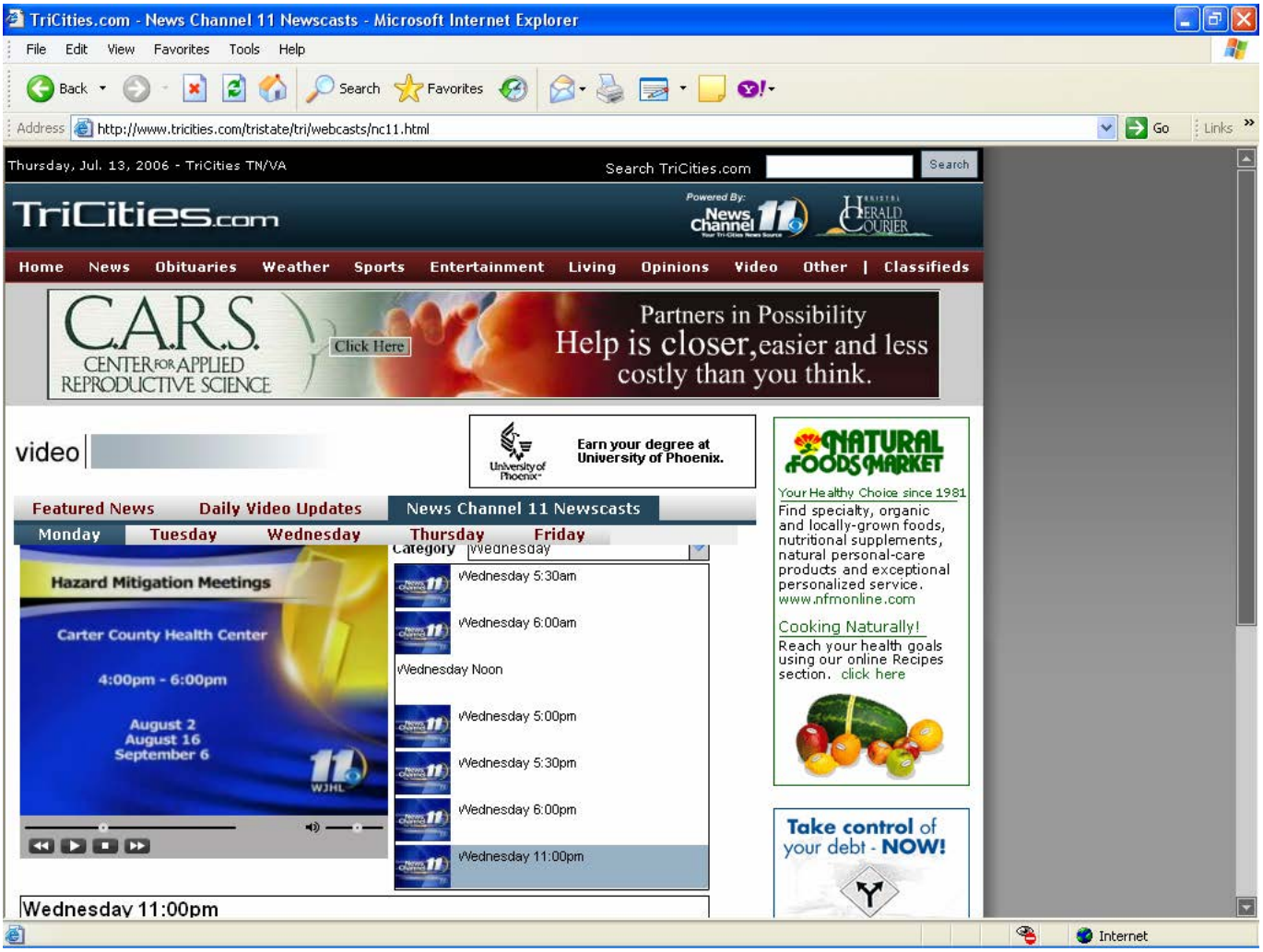
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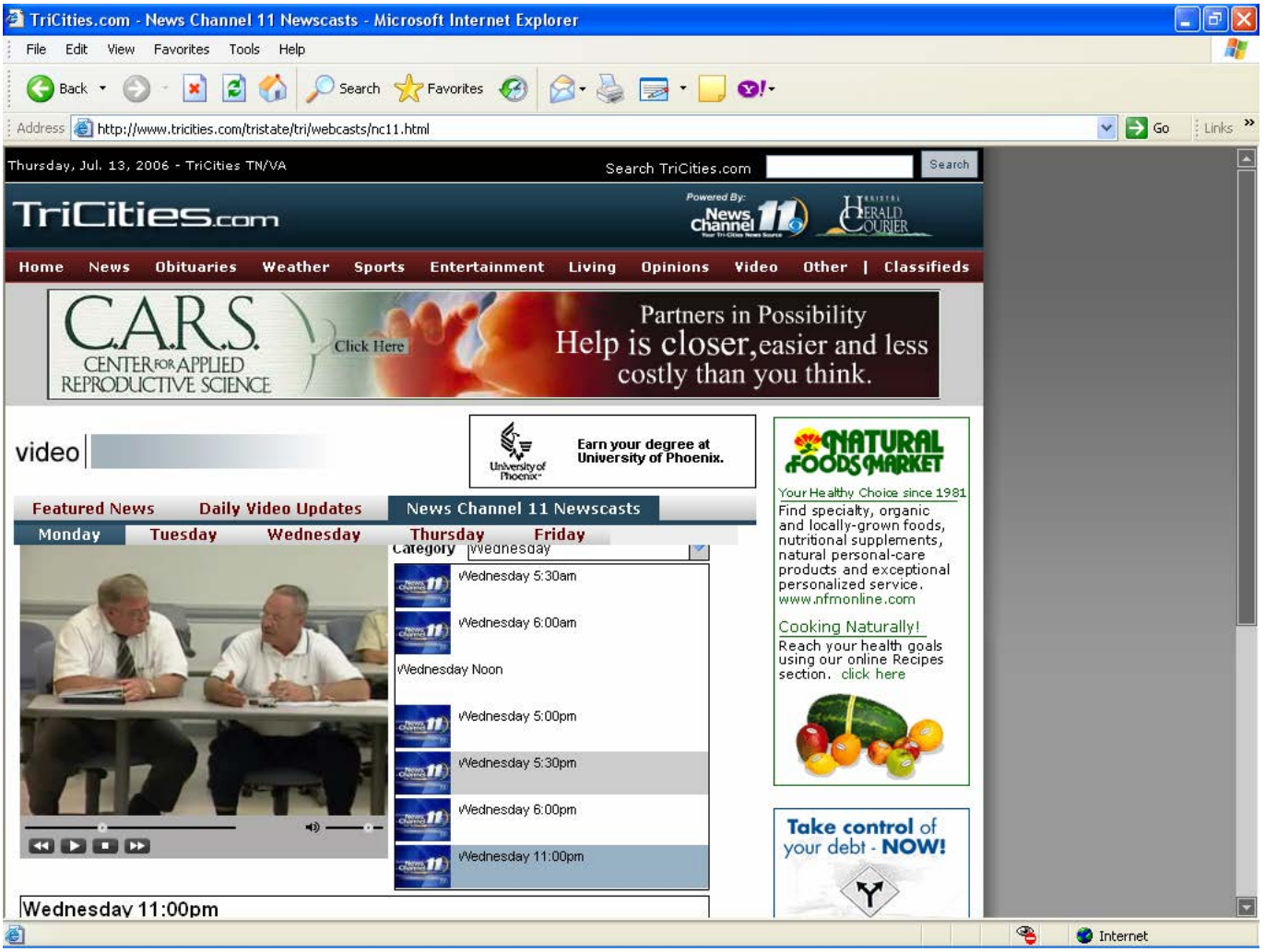
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Multi-Hazards Mitigation Planning Project

July 7, 2006

The City of Elizabethton, City of Watauga, and Carter County are participating in a planning effort in order to maintain their eligibility for disaster mitigation funding from the Federal Emergency Management Agency (FEMA). FEMA is the federal agency that assists state and local governments in recovering from disasters. The Disaster Mitigation Act of October 2000 (DMA 2000) established the requirement for a FEMA approved local Hazard Mitigation Plan (HMP) in order to maintain eligibility for disaster mitigation funding. Mitigation funding is provided to reduce the impacts of future disasters resulting from natural hazards; such as floods, droughts, tornadoes, and ice storms.

This HMP will address mitigation for natural disasters including potential biological epidemics, such as the West Nile Virus. Following September 11, 2001, FEMA became part of the Department of Homeland Security (DHS), and additional requirements were established for addressing and responding to terrorist threats, and those planning efforts are already underway.

Each incorporated municipality within the county must participate in the planning process in order to maintain eligibility for funding. "Participation" is defined as attending the planning meetings, providing information particular to each jurisdiction, involving the public and interested stakeholders, and formally adopting the completed plan. The resulting multi-jurisdictional HMP will also qualify for credits under the Community Rating System (CRS), which can result in lower flood insurance rates in the City of Elizabethton, City of Watauga, and Carter County.

Initial planning efforts will focus on natural hazard identification and risk assessment. The next step will be to identify existing mitigation capabilities; such as an Emergency Management office, warning systems, floodplain regulations, land-use designations, levees, dams, and building codes. Identifying and prioritizing the additional required capabilities will determine the specific goals objectives and measures of the HMP.

Your input to the planning process is valuable and welcome. In fact, your participation is a key. If you have suffered any disaster related losses, or have a localized problem that may cause or aggravate future losses, please notify the below noted personnel.

Public input meetings are scheduled at the Carter County Health Center -Truman Clark Annex located at 403 East G Street on July 12th, August 2nd, August 16th, and September 6th. A final public input meeting will also be held at the Truman Clark Annex on September 20th where you can comment on the Draft Plan before it is officially adopted and submitted to FEMA. Your comments will be incorporated into in the final plan.

The planning process is already underway, and will continue throughout the summer. You are invited to submit your comments and ideas, and attend the planning meetings.

The project point-of-contact may be reached at the following address:

David Ornduff, Director Planning & Development for the City of Elizabethton

City Hall

136 South Sycamore Street

Elizabethton, TN 37643

423-542-1508

The planning progress will also be posted on the internet at www.elizabethton.org

Elizabethton, Watauga, and County Multi-Hazard Mitigation Plan

APPENDIX C HAZARD IDENTIFICATION

The Elizabethton, Watauga, and Carter County Planning Steering Committee (PSC) conducted a Hazard Identification study to determine what hazards threaten the planning area. This section documents the previous occurrences of natural hazards.

- Floods,
- Earthquakes, and
- Severe Weather
- Sinkholes/Land subsidence
- Wildfire

The following organizations provided data relating to previous occurrences of the natural hazards addressed in this plan.

- Nottawasaga Valley Conservation Authority (NVCA),
- Center for Earthquake Research and Information (CERI),
- National Climatic Data Center (NCDC),
- National Oceanic and Atmospheric Administration (NOAA),
- National Weather Service (NWS),
- Oklahoma Climatological Survey,
- STORMFAX, Inc., and
- Federal Emergency Management Agency
- TEMA State Hazard Mitigation Officer
- TEMA Planning Section/Regional Planner

Query Results

17 FLOOD event(s) were reported in **Carter County, Tennessee** between **01/01/1950** and **07/31/2006**.

*Click on **Location or County** to display Details.*

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Tennessee

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 Elizabethton	03/27/1994	1800	Flash Flooding	N/A	0	0	4	0
2 Roan Mountain	01/14/1995	0830	Flood	N/A	0	0	50K	0
3 Elizabethton	05/13/1995	1600	Flash Flooding	N/A	0	0	5K	0
4 CARTER	05/27/1995	1350	Flash Flooding	N/A	0	0	5K	0
5 Countywide	01/19/1996	08:00 PM	Flash Flood	N/A	0	0	0	0
6 Countywide	05/26/1997	09:50 PM	Flash Flood	N/A	0	0	0	0
7 Countywide	01/07/1998	09:35 PM	Flood	N/A	7	0	20.0M	0
8 Hampton	06/22/1998	08:12 PM	Flash Flood	N/A	0	0	0	0
9 Countywide	07/11/1999	11:00 AM	Flood	N/A	0	0	0	0
10 Countywide	07/24/1999	03:05 PM	Flash Flood	N/A	0	0	0	0
11 Elizabethton	07/03/2001	02:00 PM	Flash Flood	N/A	0	0	0	0
12 Hunter	07/29/2001	01:10 PM	Flash Flood	N/A	0	0	0	0
13 Buladeen	07/29/2001	05:00 PM	Flash Flood	N/A	0	0	0	0
14 Roan Mtn	07/29/2001	10:00 AM	Flash Flood	N/A	0	0	0	0
15 Elizabethton	05/15/2004	06:45 PM	Flash Flood	N/A	0	0	10K	0
16 Hampton	05/15/2004	06:45 PM	Flash Flood	N/A	0	0	10K	0
17 Valley Forge	05/15/2004	06:45 PM	Flash Flood	N/A	0	0	33K	0
				TOTALS:	7	0	20.113M	0

Top of Page

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New Madrid Catalog

This is a catalog of instrumental locations for earthquakes in the New Madrid Seismic Zone and surrounding regions, 1974 to present. Because the network has evolved over the years, there is no guarantee of consistency in detection threshold, magnitude determination or region covered. The data in this catalog come from numerous sources:

- 1974-1992: TEIC earthquake bulletin and St Louis Regional Catalog
- 1993-1994: Saint Louis University and Central Mississippi Valley Earthquake Bulletins
- 1995-present: earthquakes reported by SLU and/or CERI

Output from the catalog search should have the following format:

```
  DATE     O.T. (UTC)    LAT      LONG   DEP   MAG COMMENTS

92/12/27  10:12:58.76   37.501  -89.616   10   3.2 TEIC catalog event
93/ 1/ 3  21:14:54.14   35.194  -90.244   17   2.7 WEST MEMPHIS, AR
95/ 4/27   0:42:35.00   36.690  -89.480    5   2.8 C HENDERSON MOUND, MO
95/ 5/27  19:51:10.00   36.170  -89.430    6   3.0 C MISTON, TN  Felt


DATE:       Date of earthquake (YY/MM/DD)
O.T.:       Origin Time of earthquake (UTC)
LAT:        Latitude
LON:        Longitude
DEP:        Depth (km)
MAG:        Magnitude
COMMENTS:   Additional comments, including felt information or
            independent magnitude determinations.  Events from
            1995 on include event quality (A=good, D=poor) and
            only report origin times to the nearest second even
            though accuracy may be known to a few tens of milliseconds.
            Epicentral accuracy varies throughout the catalog but
            in no case is better than a few tenths of a kilometer
            (0.01 degrees latitude is about 1.11 km or 0.69 miles).
```

```
2000/07/11 14:59:47.00 35.87 -83.78 10.2 3.1  D 0.88 km east of  Huskey Valley, TN
(C)
2000/09/23 03:20:46.00 35.02 -82.34  7.8 2.2  B 26.87 km north of Greenville,SC(R)
2003/10/17 01:49:41.00 37.10 -81.37  5.7 2.5  D 2.21 km soutwest of Little Town,VA
2004/04/27 01:11:50.00 36.37 -83.68 21.9 2.4  C 2.93 km south of Sandlick,TN
2004/04/30 13:26:11.00 36.68 -82.75  3.5 2.1  D 0.77 km west of Clinchport,VA
2004/05/25 13:55:08.00 35.90 -83.61 19.4 2.4  C 2.66 km west of Catlettsburg,TN
2004/06/11 08:51:41.00 35.89 -83.74  2.8 2.0  D 0.58 km northwest of Trundle
Crossroad,TN
2004/09/18 14:02:41.00 37.28 -82.97  0.2 2.2  D 3.27 km northwest of Amburgey,KY
2004/11/17 05:00:40.00 36.26 -83.52 11.1 2.0  D 1.52 km north of Hammer Store,TN
2004/11/17 05:09:15.00 36.25 -83.53  9.7 2.5  C 0.56 km northwest of Hammer Store,TN

2005/02/08 11:42:53.00 37.22 -81.93  9.4 2.7  D 3.54 km northeast of Shack Mills,VA
2005/02/15 02:36:55.00 37.19 -81.92 11.2 2.8  D 2.50 km east of Marvin,VA
2005/02/15 04:17:44.00 37.17 -81.82  9.1 2.0  D 2.38 km north of Glen Burke,VA
2005/04/05 20:37:43.00 36.15 -83.69 10.0 2.9  C 1.36 km east of Blaine,TN
2005/05/01 22:47:50.00 35.76 -83.64 23.4 1.3  C 1.79 km west of Cove Creek,TN
2005/06/06 15:22:15.00 36.06 -83.86  4.6 2.1  C 0.70 km east of Ritta,TN
2005/07/25 02:30:53.00 36.75 -83.31  9.8 2.2  D 2.38 km south of Yancey,KY
2005/07/31 12:49:04.00 36.74 -83.56 13.4 2.4  C 1.97 km north of Oaks,KY
2005/08/25 03:09:42.00 35.88 -82.80  7.9 3.7  C 2.49 km west of Runion,NC
2005/11/10 03:11:59.00 35.87 -83.58 24.1 1.5  C 0.72 km south of Yettland Park,TN
2005/11/18 07:26:32.00 35.87 -83.68 19.2 1.3  C 3.63 km northeast of Cusick,TN
2006/02/07 07:06:24.00 36.94 -83.81  4.3 2.2  D 2.97 km east of Girdler,KY
2006/03/07 10:28:02.00 35.91 -82.34  3.7 2.8  D 0.64 km east of Riverside,NC
2006/04/09 05:43:23.00 36.21 -83.62 18.6 1.4  C 1.02 km north of New Corinth,TN
2006/05/22 17:26:29.00 36.10 -83.75 10.0 1.7  C 1.65 km northeast of Skaggston,TN
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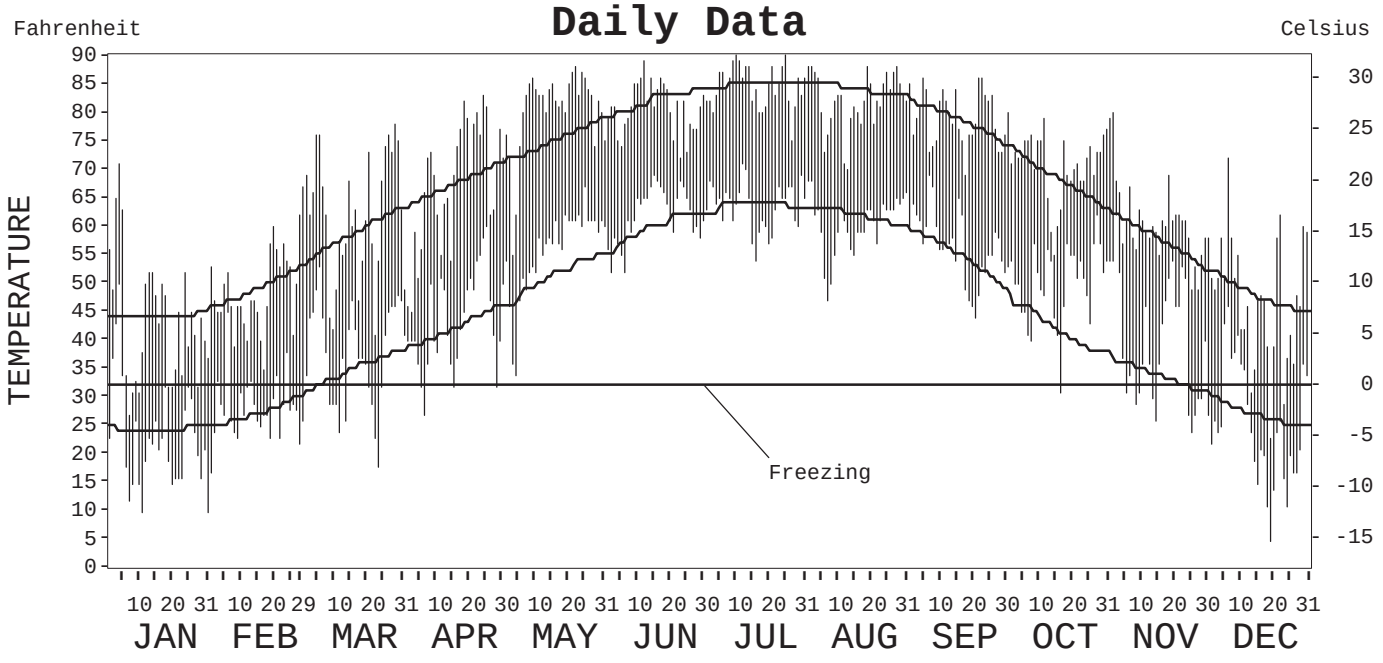
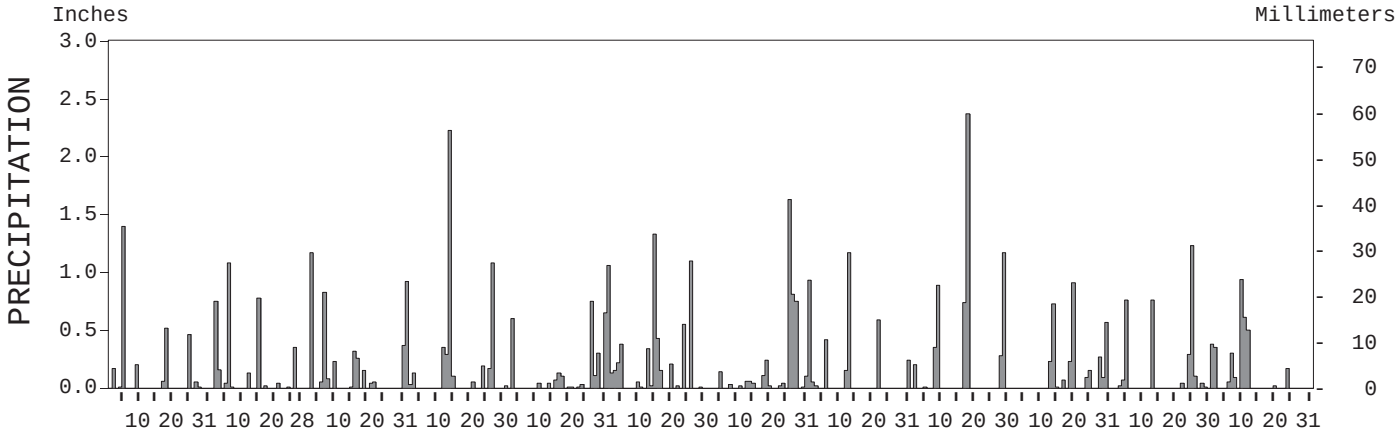
2004 LOCAL CLIMATOLOGICAL DATA
ANNUAL SUMMARY WITH COMPARATIVE DATA

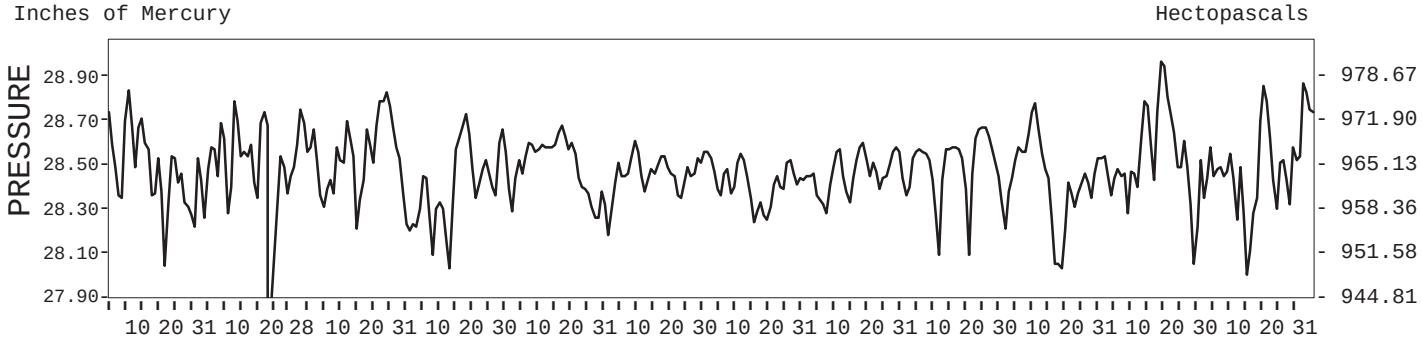
BRISTOL, JOHNSON CITY, KINGSPORT,
TENNESSEE (TRI)

ISSN 0198-4764

Daily Data







I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER.

Thomas R. Karl

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE

NATIONAL CLIMATIC DATA CENTER
ASHEVILLE, NORTH CAROLINA

DIRECTOR
NATIONAL CLIMATIC DATA CENTER

METEOROLOGICAL DATA FOR 2004

BRISTOL/JHNSN CTY/KNGSPRT, TN (TRI)

LATITUDE: 36° 28′ 47″ N LONGITUDE: 82° 23′ 56″ W ELEVATION (FT): GRND: 1536 BARO: 1539 TIME ZONE: EASTERN (UTC + 5) WBAN: 13877

	ELEMENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	MEAN DAILY MAXIMUM	43.5	49.0	61.8	67.7	80.4	80.7	84.5	82.0	79.1	70.9	60.9	47.4	67.3
	HIGHEST DAILY MAXIMUM	71	67	78	83	88	89	90	88	86	80	80	72	90
	DATE OF OCCURRENCE	04	29	28	24	22	12	25+	28+	23+	01	02	07	JUL 25+
	MEAN DAILY MINIMUM	23.0	28.1	37.7	43.3	55.8	61.9	63.6	60.4	56.6	50.1	40.0	25.2	45.5
	LOWEST DAILY MINIMUM	10	17	18	27	34	52	54	47	44	31	24	5	5
	DATE OF OCCURRENCE	31+	01	23	06	04	06+	16	07	21	17	26	20	DEC 20
	AVERAGE DRY BULB	33.3	38.6	49.8	55.5	68.1	71.3	74.1	71.2	67.9	60.5	50.5	36.3	56.4
	MEAN WET BULB	29.9		43.8	49.1	62.1	66.1	67.9	65.6	62.5	56.0	46.3	32.8	
	MEAN DEW POINT	23.5		36.5	42.6	58.8	63.5	65.1	62.7	59.5	52.9	41.7	27.3	
	NUMBER OF DAYS WITH:													
	MAXIMUM ≥ 90°	0	0	0	0	0	0	2	0	0	0	0	0	2
	MAXIMUM ≤ 32°	6	0	0	0	0	0	0	0	0	0	0	3	9
	MINIMUM ≤ 32°	27	24	10	4	0	0	0	0	0	1	10	22	98
	MINIMUM ≤ 0°	0	0	0	0	0	0	0	0	0	0	0	0	0
H/C	HEATING DEGREE DAYS	976	761	463	292	46	0	0	6	19	137	435	881	4016
	COOLING DEGREE DAYS	0	0	0	15	150	196	288	206	111	6	4	0	976
RH	MEAN (PERCENT)	69	70	64	66	76	80	78	79	78	81	75	72	74
	HOUR 01 LST	75	77	74	77	91	93	92	92	91	91	85	79	85
	HOUR 07 LST	81	81	78	84	91	92	92	94	92	95	88	83	88
	HOUR 13 LST	58	59	51	52	55	65	61	59	60	64	58	58	58
	HOUR 19 LST	62	65	56	53	66	70	67	69	74	78	72	68	67
S	PERCENT POSSIBLE SUNSHINE													
W/O	NUMBER OF DAYS WITH:													
	HEAVY FOG(VISBY ≤ 1/4 MI)	1	3	3	2	5	6	8	9	4	17	1	4	63
	THUNDERSTORMS	0	0	1	3	11	6	12	4	0	1	0	2	40
CLOUDINESS	SUNRISE-SUNSET: (OKTAS)													
	CEILOMETER (≤ 12,000 FT.)													
	SATELLITE (> 12,000 FT.)													
	MIDNIGHT-MIDNIGHT: (OKTAS)													
	CEILOMETER (≤ 12,000 FT.)													
	SATELLITE (> 12,000 FT.)													
	NUMBER OF DAYS WITH:													
	CLEAR													
	PARTLY CLOUDY													
	CLOUDY													
PR	MEAN STATION PRESS. (IN.)	28.47		28.54	28.41	28.48	28.47	28.42	28.46	28.48	28.44	28.53	28.51	
	MEAN SEA-LEVEL PRESS. (IN.)	30.12		30.16	30.01	30.06			30.04	30.07		30.15	30.15	
WINDS	RESULTANT SPEED (MPH)	3.3		3.2	3.1	2.7	1.1	0.7	0.9	0.8	2.2	1.0	2.9	
	RES. DIR. (TENS OF DEGS.)	27		26	26	24	24	23	25	02	25	29	27	
	MEAN SPEED (MPH)	5.7	4.7	5.6	5.1	4.2	3.1	3.4	2.7	3.2	3.0	3.2	4.5	4.0
	PREVAIL.DIR.(TENS OF DEGS.)	26	26	25	25	24	24	24	36	01	24	26	27	24
	MAXIMUM 2-MINUTE WIND:													
	SPEED (MPH)	26	24	38	29	40	29	30	18	21	35	28	36	40
	DIR. (TENS OF DEGS.)	29	28	31	29	25	33	29	29	30	24	28	24	25
	DATE OF OCCURRENCE	15	07+	07	27	26	02	05	21+	17	16	04	01	MAY 26
	MAXIMUM 5-SECOND WIND:													
	SPEED (MPH)	32	35	47	37	51	36	38	23	28	43	33	44	51
	DIR. (TENS OF DEGS.)	30	25	29	29	23	33	28	29	29	23	29	26	23
	DATE OF OCCURRENCE	15	07	07	27	26	02	05	20+	17	16	25	01	MAY 26
PRECIPITATION	WATER EQUIVALENT:													
	TOTAL (IN.)	2.88	3.37	4.48	4.64	3.91	5.10	5.01	2.64	6.01	3.35	3.70	3.03	48.12
	GREATEST 24-HOUR (IN.)	1.40	1.08	1.17	2.26	1.71	1.66	1.70	1.24	3.10	1.14	1.37	1.10	3.10
	DATE OF OCCURRENCE	05	06	02	12-13	30-31	14-15	25-26	11-12	16-17	18-19	23-24	10-11	SEP 16-17
	NUMBER OF DAYS WITH:													
	PRECIPITATION ≥ 0.01	9	11	13	11	15	16	17	7	8	11	11	9	138
	PRECIPITATION ≥ 0.10	5	6	8	8	8	11	8	5	7	7	6	6	85
	PRECIPITATION ≥ 1.00	1	1	1	2	1	2	1	1	2	0	1	0	13
SNOWFALL	SNOW,ICE PELLETS,HAIL:													
	TOTAL (IN.)	2.2	6.7	T	T	0.0	0.0	0.0	0.0	0.0	0.0	T	0.1	9.0
	GREATEST 24-HOUR (IN.)	2.0	3.2	T	T	0.0	0.0	0.0	0.0	0.0	0.0	T	0.1	3.2
	DATE OF OCCURRENCE	09	26	09	14+							25	19	FEB 26
	MAXIMUM SNOW DEPTH (IN.)	2	2	0	0	0	0	0	0	0	0	0	0	2
	DATE OF OCCURRENCE	10+	16											FEB 16
	NUMBER OF DAYS WITH:													
	SNOWFALL ≥ 1.0		2	0	0	0	0	0	0	0	0	0	0	

NORMALS, MEANS, AND EXTREMES

BRISTOL/JHNSN CTY/KNGSPRT, TN (TRI)

LATITUDE: 36° 28′ 47″ N LONGITUDE: 82° 23′ 56″ W ELEVATION (FT): GRND: 1536 BARO: 1539 TIME ZONE: EASTERN (UTC + 5) WBAN: 13877

	ELEMENT	POR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F	NORMAL DAILY MAXIMUM	30	44.1	48.9	58.4	67.1	74.9	81.8	84.8	83.9	78.5	68.2	57.4	47.8	66.3
	MEAN DAILY MAXIMUM	57	45.2	49.5	58.2	67.9	76.2	82.8	85.6	84.8	79.5	68.2	57.9	48.3	67.0
	HIGHEST DAILY MAXIMUM	59	79	80	85	89	92	97	102	101	100	90	81	78	102
	YEAR OF OCCURRENCE		1950	1977	1954	1995	1969	1952	1952	1988	1954	1954	2003	1951	JUL 1952
	MEAN OF EXTREME MAXS.	57	66.1	69.1	76.8	83.8	86.5	90.8	92.3	92.0	89.4	80.5	75.1	67.4	80.8
	NORMAL DAILY MINIMUM	30	24.3	27.0	34.6	42.0	51.0	59.5	63.5	61.7	54.7	41.8	33.6	26.8	43.4
	MEAN DAILY MINIMUM	57	25.8	28.5	35.0	43.5	52.3	60.5	64.6	63.2	56.4	43.8	35.2	28.4	44.8
	LOWEST DAILY MINIMUM	59	-21	-15	-2	21	30	38	45	43	34	20	5	-9	-21
	YEAR OF OCCURRENCE		1985	1996	1980	1982	1997	1966	1947	1986	1983	1962	1950	1962	JAN 1985
	MEAN OF EXTREME MINS.	57	5.2	9.5	18.3	27.5	37.7	48.3	55.5	53.6	42.5	28.8	19.4	10.1	29.7
	NORMAL DRY BULB	30	34.2	38.0	46.5	54.6	63.0	70.7	74.2	72.8	66.6	55.0	45.5	37.3	54.9
	MEAN DRY BULB	57	35.6	39.2	46.7	55.6	64.2	71.6	75.0	73.9	68.1	56.0	46.6	38.4	55.9
	MEAN WET BULB	20	32.3	35.7	41.4	49.1	57.9	65.2	68.8	64.0	61.4	48.7	40.5	33.3	49.9
	MEAN DEW POINT	20	26.7	29.4	34.3	42.5	53.4	61.8	65.7	61.2	58.0	44.0	35.3	28.2	45.0
	NORMAL NO. DAYS WITH:														
	MAXIMUM ≥ 90°	30	0.0	0.0	0.0	0.0	0.0	1.9	5.9	4.2	1.4	0.0	0.0	0.0	13.4
	MAXIMUM ≤ 32°	30	4.7	2.9	0.4	*	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.4	10.5
	MINIMUM ≤ 32°	30	22.4	18.9	12.5	4.0	0.2	0.0	0.0	0.0	0.0	3.1	13.0	20.3	94.4
	MINIMUM ≤ 0°	30	0.6	0.3	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.1
H/C	NORMAL HEATING DEG. DAYS	30	939	745	561	306	110	11	3	2	52	303	570	843	4445
	NORMAL COOLING DEG. DAYS	30	0	0	1	10	61	198	304	260	116	6	0	0	956
RH	NORMAL (PERCENT)	30	72	70	65	64	72	75	77	78	77	73	71	74	72
	HOUR 01 LST	30	78	76	73	73	84	88	90	90	90	86	80	79	82
	HOUR 07 LST	30	82	81	81	82	89	90	92	94	94	91	85	83	87
	HOUR 13 LST	30	63	59	53	50	55	58	61	60	58	53	56	62	57
	HOUR 19 LST	30	67	62	56	52	61	64	67	69	70	66	65	68	64
S	PERCENT POSSIBLE SUNSHINE														
W/O	MEAN NO. DAYS WITH:														
	HEAVY FOG(VISBY≤1/4 MI)	62	3.3	2.5	1.4	1.6	3.8	4.0	4.9	7.2	5.4	5.3	2.9	3.2	45.5
	THUNDERSTORMS	62	0.3	0.9	2.0	3.5	6.7	8.1	9.0	7.2	3.2	0.8	0.4	0.2	42.3
CLOUDINESS	MEAN:														
	SUNRISE-SUNSET (OKTAS)	1					4.8	4.0							
	MIDNIGHT-MIDNIGHT (OKTAS)	1						4.0							
	MEAN NO. DAYS WITH:														
	CLEAR	1	2.0	2.0	3.0		10.0	10.0							
	PARTLY CLOUDY	1	1.0	2.0	2.0		5.0	7.0							
	CLOUDY	1	1.0	6.0	10.0		6.0	5.0							
PR	MEAN STATION PRESSURE(IN)	32	28.50	28.49	28.40	28.40	28.40	28.40	28.40	28.50	28.50	28.50	28.50	28.49	28.46
	MEAN SEA-LEVEL PRES. (IN)	21	30.13	30.11	30.05	30.00	30.00	30.01	30.04	30.05	30.07	30.13	30.13	30.16	30.07
WINDS	MEAN SPEED (MPH)	41	6.2	6.4	7.2	6.7	5.4	4.7	4.3	3.9	4.3	4.2	5.3	5.8	5.4
	PREVAIL.DIR(TENS OF DEGS)	32	24	24	24	24	24	24	24	24	06	06	24	24	24
	MAXIMUM 2-MINUTE:														
	SPEED (MPH)	9	40	37	39	39	40	39	36	37	29	36	36	36	40
	DIR. (TENS OF DEGS)		24	24	26	25	25	31	01	25	28	27	25	24	25
	YEAR OF OCCURRENCE		1996	2000	1998	1996	2004	1998	1998	2002	2003	2001	2000	2004	MAY 2004
	MAXIMUM 5-SECOND:														
	SPEED (MPH)	9	51	45	47	54	62	52	52	54	39	48	47	48	62
	DIR. (TENS OF DEGS)		26	26	29	27	28	33	24	29	30	34	25	29	28
	YEAR OF OCCURRENCE		1996	2003	2004	1996	2000	1997	1997	2000	2003	1999	2000	2003	MAY 2000
PRECIPITATION	NORMAL (IN)	30	3.52	3.40	3.91	3.23	4.32	3.89	4.21	3.00	3.08	2.30	3.08	3.39	41.33
	MAXIMUM MONTHLY (IN)	59	9.18	7.75	9.56	7.03	9.71	7.37	9.73	11.34	7.09	5.65	6.74	6.75	11.34
	YEAR OF OCCURRENCE		1957	1994	1955	1998	1950	1998	1949	2003	1972	1959	2003	1961	AUG 2003
	MINIMUM MONTHLY (IN)	59	1.37	0.75	1.31	0.21	1.31	0.75	0.67	0.55	0.50	0.02	0.50	0.21	0.02
	YEAR OF OCCURRENCE		1981	1968	1985	1976	1966	1986	1995	1987	1985	2000	2001	1965	OCT 2000
	MAXIMUM IN 24 HOURS (IN)	59	2.34	2.48	3.35	2.66	3.26	3.10	2.90	3.50	3.61	3.65	3.18	2.95	3.65
	YEAR OF OCCURRENCE		1950	1994	1973	1977	1984	1954	1946	2003	1972	1964	2003	1969	OCT 1964
	NORMAL NO. DAYS WITH:														
	PRECIPITATION ≥ 0.01	30	13.3	11.9	13.0	11.3	12.3	11.9	11.5	10.0	8.8	8.4	10.2	12.0	134.6
	PRECIPITATION ≥ 1.00	30	0.5	0.6	0.6	0.3	0.9	0.7	0.9	0.8	0.7	0.5	0.5	0.5	7.5
SNOWFALL	NORMAL (IN)	30	5.5	4.1	1.9	0.9	0.*	0.0	0.0	0.0	0.0	0.1	0.3	2.2	15.0
	MAXIMUM MONTHLY (IN)	60	22.1	20.4	27.9	14.8	T	T	0.0	0.0	T	1.3	18.1	12.9	27.9
	YEAR OF OCCURRENCE		1966	1979	1960	1987	1992	1995			1994	1993	1952	1963	MAR 1960
	MAXIMUM IN 24 HOURS (IN)	54	13.0	11.5	14.2	10.0	T	T	0.0	0.0	T	1.3	16.2	9.6	16.2
	YEAR OF OCCURRENCE		1996	1996	1993	1987	1992	1995			1994	1993	1952	1969	NOV 1952
	MAXIMUM SNOW DEPTH (IN)	48	13	10	13	11	0	0	0	0	0	1	12	20	20
	YEAR OF OCCURRENCE		1966	1969	1960	1987						1993	1952	1948	DEC 1948
	NORMAL NO. DAYS WITH:														
	SNOWFALL ≥ 1.0	30	1.9	1.0	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8	4.6

PRECIPITATION (inches) 2004 BRISTOL, JOHNSON CITY, KINGSPORT, TN (TRI)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1975	4.19	3.13	9.22	3.67	4.29	3.19	2.46	3.87	5.02	1.54	3.14	3.33	47.05
1976	2.60	3.07	3.24	0.21	3.31	5.62	2.14	2.27	4.44	5.30	1.41	3.80	37.41
1977	1.90	1.01	4.86	5.43	1.91	3.77	2.13	3.09	2.36	4.89	4.91	2.72	38.98
1978	4.22	0.89	3.18	2.44	4.50	5.67	4.78	3.71	3.04	0.58	2.64	4.89	40.54
1979	5.29	3.58	3.16	3.68	3.35	3.55	6.12	2.80	3.89	2.19	4.44	1.66	43.71
1980	3.91	1.39	5.68	3.56	2.69	1.10	3.82	2.54	3.01	2.09	2.10	1.38	33.27
1981	1.37	2.59	1.94	5.10	4.51	4.28	6.24	3.05	4.17	2.51	1.95	3.20	40.91
1982	4.07	5.07	3.35	2.30	2.55	5.52	9.14	4.70	5.53	2.54	4.12	2.89	51.78
1983	1.67	2.14	1.73	4.44	4.83	4.60	3.29	5.05	1.88	2.18	2.74	4.15	38.70
1984	1.79	4.50	2.73	2.85	7.42	3.86	4.63	1.23	1.43	1.14	2.61	1.76	35.95
1985	3.21	3.40	1.31	2.08	2.85	4.35	4.38	3.09	0.50	3.02	5.87	1.17	35.23
1986	1.55	4.11	1.56	0.51	4.16	0.75	5.50	3.40	3.93	1.69	2.67	3.66	33.49
1987	4.11	4.13	2.80	5.23	1.62	2.64	1.91	0.55	4.57	0.62	2.10	3.00	33.28
1988	2.74	3.20	1.54	2.69	2.48	0.89	3.20	2.78	3.20	1.79	3.44	2.73	30.68
1989	3.69	4.07	3.76	2.97	4.10	6.97	3.81	3.41	6.95	1.77	3.18	3.16	47.84
1990	3.23	5.06	4.00	2.44	6.57	2.90	3.78	3.51	1.47	5.23	1.32	4.85	44.36
1991	2.01	5.43	6.30	3.39	2.10	4.51	3.81	3.98	2.44	0.31	3.42	6.73	44.43
1992	2.42	3.52	2.62	1.53	5.46	3.44	5.11	2.41	1.49	3.42	2.25	5.05	38.72
1993	3.21	2.12	5.51	2.43	3.42	0.98	4.59	5.01	2.50	2.19	3.58	5.85	41.39
1994	4.52	7.75	7.46	4.26	3.90	4.63	4.95	4.63	1.30	2.68	2.37	1.38	49.83
1995	4.63	3.64	3.24	1.52	6.19	4.18	0.67	2.40	3.82	2.35	5.34	2.24	40.22
1996	6.51	2.51	4.10	3.54	6.76	3.36	5.74	3.64	3.79	0.97	4.82	3.90	49.64
1997	3.91	4.25	5.92	3.78	4.80	4.45	4.25	1.53	3.02	1.70	1.71	2.17	41.49
1998	5.12	2.13	3.85	7.03	4.94	7.37	1.96	2.14	0.90	1.68	1.44	5.36	43.92
1999	4.40	2.91	2.64	2.47	2.37	4.30	5.79	2.01	1.09	2.17	3.29	1.38	34.82
2000	3.62	1.86	3.84	3.55	3.19	4.56	5.42	3.70	1.74	0.02	2.42	1.69	35.61
2001	2.56	4.58	3.69	1.82	4.05	4.41	8.73	4.96	2.20	0.84	0.50	3.42	41.76
2002	4.32	0.89	5.86	0.98	2.39	1.99	4.76	3.20	2.79	3.74	4.95	4.38	40.25
2003	2.47	6.32	2.83	6.66	5.32	6.40	7.52	11.34	5.29	1.55	6.74	3.20	65.64
2004	2.88	3.37	4.48	4.64	3.91	5.10	5.01	2.64	6.01	3.35	3.70	3.03	48.12
POR= 67 YRS	3.54	3.50	3.93	3.24	3.80	3.72	4.83	3.49	2.93	2.16	2.99	3.40	41.53

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AVERAGE TEMPERATURE (˚F) 2004 BRISTOL, JOHNSON CITY, KINGSPORT, TN (TRI)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1975	40.4	42.8	44.7	54.2	67.1	71.1	74.8	76.1	67.8	59.0	49.8	40.0	57.3
1976	33.5	47.3	51.9	55.3	61.2	70.7	73.2	71.6	65.1	51.6	38.8	33.3	54.5
1977	22.1	34.5	50.0	59.4	66.8	71.2	76.8	74.8	69.6	53.3	49.9	35.3	55.3
1978	25.8	28.8	44.8	55.5	62.3	71.5	74.4	74.5	72.3	56.3	51.0	39.5	54.7
1979	30.4	31.9	48.3	55.4	63.8	68.2	70.9	73.1	66.8	54.6	48.7	38.8	54.2
1980	37.9	30.6	43.2	55.4	64.2	70.6	76.4	76.9	70.9	54.1	45.3	36.3	55.2
1981	29.3	37.9	42.6	60.4	61.3	75.1	75.3	72.1	65.0	53.7	45.8	34.5	54.4
1982	31.2	40.2	49.8	53.1	68.2	71.4	75.1	72.3	65.7	57.6	48.3	43.3	56.4
1983	35.1	38.2	46.4	50.5	60.9	69.5	74.2	74.7	65.9	57.1	45.3	34.8	54.4
1984	32.7	40.3	44.5	53.0	59.4	72.4	71.3	72.9	64.5	63.6	43.0	45.5	55.3
1985	27.6	35.5	48.2	57.0	63.8	69.5	73.2	71.2	66.1	61.4	55.3	33.9	55.2
1986	32.0	40.4	46.2	57.2	64.8	74.1	77.2	73.0	69.7	58.7	51.4	38.8	57.0
1987	34.7	39.9	47.8	52.0	69.3	73.5	77.0	77.5	68.2	50.8	48.5	41.6	56.7
1988	31.5	37.3	47.8	54.1	62.3	70.5	76.7	77.1	68.1	50.2	47.6	37.6	55.1
1989	42.3	39.5	51.2	54.7	59.8	71.9	75.1	73.3	67.8	56.6	45.6	28.1	55.5
1990	41.6	45.4	51.2	55.3	63.7	72.0	75.2	74.4	68.7	58.0	49.1	44.3	58.2
1991	38.8	41.2	49.2	59.7	69.6	72.0	76.6	73.2	67.7	58.1	46.1	40.6	57.7
1992	38.6	42.7	44.8	55.5	61.2	69.2	74.9	71.1	68.4	54.0	47.0	38.3	55.5
1993	41.7	37.4	43.6	53.2	64.7	72.7	79.6	73.8	67.1	55.3	46.8	38.3	56.2
1994	31.3	41.1	46.3	59.0	60.8	74.8	75.3	72.8	65.8	57.3	50.7	43.6	56.6
1995	38.1	37.5	50.1	57.1	64.7	71.3	77.2	78.4	67.7	56.1	41.0	34.4	56.1
1996	33.9	36.4	42.0	51.7	64.8	71.5	72.1	72.6	65.0		41.3	39.9	
1997	35.8	43.1	50.6	50.7	58.3	68.6	74.6	70.7	65.9	55.4	41.5	36.6	54.3
1998	40.3	42.7	45.3	54.3	66.0	71.1	74.4	74.3	71.6	57.7	47.7	41.6	57.3
1999	39.9	40.3	42.7	58.2	63.3	72.2	76.7	74.3	66.5	55.5	49.4	39.1	56.5
2000	33.9	43.0	49.3	52.9	66.3	71.9	73.3	72.4	67.1	56.9	44.1	30.8	55.2
2001	33.2	43.4	43.0	58.0	65.2	70.8	73.2	74.5	64.5	53.6	50.2	42.8	56.0
2002	38.3	38.5	47.3	59.4	62.5	73.6	76.6	75.9	71.4	59.8	43.6	37.7	57.1
2003	30.6	37.2	50.3	56.6	64.2	69.0	73.7	74.9	65.9	55.7	50.6	36.1	55.4
2004	33.3	38.6	49.8	55.5	68.1	71.3	74.1	71.2	67.9	60.5	50.5	36.3	56.4
POR= 67 YRS	35.8	39.3	46.7	55.6	64.3	71.9	75.0	73.9	68.1	56.4	46.6	38.4	56.0

HEATING DEGREE DAYS (base 65˚F) 2004 BRISTOL, JOHNSON CITY, KINGSPORT, TN (TRI)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1975-76	0	0	46	188	451	768	970	509	402	297	134	9	3774
1976-77	0	0	46	409	776	973	1321	845	459	184	61	21	5095
1977-78	0	0	19	359	455	913	1207	1005	620	286	130	4	4998
1978-79	0	0	0	268	411	786	1065	920	511	283	88	11	4343
1979-80	3	3	23	323	483	804	832	990	670	285	76	4	4496
1980-81	0	0	31	337	586	882	1099	752	686	161	137	0	4671
1981-82	0	0	83	346	570	942	1042	687	465	351	32	0	4518
1982-83	0	0	66	256	494	667	922	745	570	436	140	19	4315
1983-84	0	0	98	242	583	928	995	709	627	357	199	8	4746
1984-85	0	0	91	73	652	599	1154	819	518	243	88	19	4256
1985-86	0	2	76	124	283	960	1015	681	577	240	80	0	4038
1986-87	0	19	2	227	402	804	932	698	527	393	30	0	4034
1987-88	0	0	24	436	489	718	1031	798	527	322	113	45	4503
1988-89	0	0	22	455	512	844	698	709	428	325	198	1	4192
1989-90	0	6	55	262	575	1139	718	540	423	303	93	0	4114
1990-91	0	0	48	225	474	636	806	659	483	175	32	2	3540
1991-92	0	0	68	224	562	750	813	638	617	293	148	22	4135
1992-93	0	3	32	337	532	820	714	767	657	346	65	10	4283
1993-94	0	0	59	298	537	823	1039	665	571	196	156	0	4344
1994-95	0	0	37	232	425	653	828	764	454	256	85	10	3744
1995-96	0	0	31	281	712	944	956	820	705	402	85	4	4940
1996-97	0	0	74		706	769	900	605	442	423	222	30	
1997-98	0	5	28	300	699	871	758	618	606	314	72	26	4297
1998-99	0	0	15	237	511	718	773	686	685	212	70	3	3910
1999-00	1	0	49	293	463	798	956	631	480	356	36	11	4074
2000-01	0	0	75	253	619	1053	979	602	675	232	56	0	4544
2001-02	0	0	101	348	435	678	822	737	541	215	143	1	4021
2002-03	0	0	4	201	635	841	1059	772	449	249	51	20	4281
2003-04	0	0	52	288	429	890	976	761	463	292	46	0	4197
2004-	0	6	19	137	435	881							

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COOLING DEGREE DAYS (base 65˚F) 2004 BRISTOL, JOHNSON CITY, KINGSPORT, TN

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1975	0	0	0	12	101	190	310	353	136	7	0	0	1109
1976	0	0	2	14	24	185	262	212	54	0	0	0	753
1977	0	0	1	23	124	213	374	309	163	2	8	0	1217
1978	0	0	0	6	53	204	299	302	224	4	0	0	1092
1979	0	0	0	1	59	113	194	259	85	9	0	0	720
1980	0	0	0	6	61	179	359	377	215	5	0	0	1202
1981	0	0	0	27	30	309	325	226	87	1	0	0	1005
1982	0	0	0	0	136	199	322	232	93	36	0	0	1018
1983	0	0	2	5	21	163	294	307	131	3	0	0	926
1984	0	0	0	2	35	236	202	253	83	38	0	0	849
1985	0	0	5	11	53	159	262	201	114	22	0	0	827
1986	0	0	0	14	78	278	385	275	149	38	3	0	1220
1987	0	0	0	11	171	259	378	395	126	0	0	0	1340
1988	0	0	0	4	32	214	369	383	120	2	0	0	1124
1989	0	0	5	24	42	218	322	268	144	11	0	0	1034
1990	0	0	3	20	62	217	325	299	161	17	0	0	1104
1991	0	0	0	23	180	218	367	258	157	20	2	0	1225
1992	0	0	0	14	36	155	312	199	143	0	0	0	859
1993	0	0	0	1	62	250	460	281	131	6	0	0	1191
1994	0	0	0	21	31	298	327	247	70	0	0	0	994
1995	0	0	0	25	81	204	387	423	117	11	0	0	1248
1996	0	0	0	7	84	205	227	244	80		1	0	
1997	0	0	3	2	17	144	303	190	65	9	0	0	733
1998	0	0	3	0	111	215	297	295	219	16	0	0	1156
1999	0	0	0	11	25	225	370	294	102	4	0	0	1031
2000	0	0	0	0	80	226	263	237	144	6	1	0	957
2001	0	0	0	25	67	187	262	300	92	2	0	0	935
2002	0	0	0	51	69	266	364	346	204	50	1	0	1351
2003	0	0	0	3	34	145	274	314	84	7	4	0	865
2004	0	0	0	15	150	196	288	206	111	6	4	0	976

SNOWFALL (inches) 2004 BRISTOL, JOHNSON CITY, KINGSPORT, TN (TRI)

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
1975-76	0.0	0.0	0.0	0.0	T	T	0.5	3.2	T	0.0	0.0	0.0	3.7
1976-77	0.0	0.0	0.0	0.0	1.2	6.2	12.7	2.4	0.4	T	0.0	0.0	22.9
1977-78	0.0	0.0	0.0	T	1.6	0.4	13.6	6.7	3.9	T	0.0	0.0	26.2
1978-79	0.0	0.0	0.0	0.0	0.0	T	9.2	20.4	0.8	0.0	0.0	0.0	30.4
1979-80	0.0	0.0	0.0	0.0	T	0.4	7.8	5.4	3.6	0.0	0.0	0.0	17.2
1980-81	0.0	0.0	0.0	0.0	T	T	7.3	1.1	1.1	0.0	0.0	0.0	9.5
1981-82	0.0	0.0	0.0	0.0	T	7.3	3.6	2.3	2.6	0.6	0.0	0.0	16.4
1982-83	0.0	0.0	0.0	0.0	0.0	6.3	3.4	5.5	1.1	5.6	0.0	0.0	21.9
1983-84	0.0	0.0	0.0	0.0	T	0.3	4.6	3.8	1.2	T	0.0	0.0	9.9
1984-85	0.0	0.0	0.0	0.0	0.0	0.3	9.7	6.0	T	T	0.0	0.0	16.0
1985-86	0.0	0.0	0.0	0.0	0.0	3.2	10.5	7.7	T	T	0.0	0.0	21.4
1986-87	0.0	0.0	0.0	0.0	T	0.2	12.2	4.0	0.3	14.8	0.0	0.0	31.5
1987-88	0.0	0.0	0.0	0.0	0.8	0.2	7.6	T	0.4	0.0	0.0	0.0	9.0
1988-89	0.0	0.0	0.0	T	T	2.3	3.7	11.0	T	T	T	0.0	17.0
1989-90	0.0	0.0	0.0	0.1	0.9	6.9	0.7	0.4	0.5	T	0.0	0.0	9.5
1990-91	0.0	0.0	0.0	0.0	0.0	T	T	1.4	T	0.0	0.0	0.0	1.4
1991-92	0.0	0.0	0.0	0.0	T	T	0.2	T	0.1	0.4	T	0.0	0.7
1992-93	0.0	0.0	0.0	0.0	T	3.5	T	2.3	14.2	T	0.0	T	20.0
1993-94	0.0	0.0	0.0	1.3	T	1.9	3.8	0.1	0.3	T	0.0	0.0	7.4
1994-95	0.0	0.0	T	0.0	0.0	T	2.7	1.7	5.0	0.0	0.0	T	9.4
1995-96	0.0	0.0	0.0	0.0	T	3.6	17.4		3.2	0.2			
1996-97													
1997-98													
1998-99													
1999-00													
2000-01													
2001-02													
2002-03													
2003-04							2.2	6.7	T	T	0.0	0.0	
2004-	0.0	0.0	0.0	0.0	T	0.1							
POR= 59 YRS	0.0	0.0	T	0.0	0.9	2.6	5.1	4.1	2.3	0.4	T	T	15.4

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REFERENCE NOTES:

PAGE 1:
THE TEMPERATURE GRAPH SHOWS NORMAL MAXIMUM AND NORMAL MINIMUM DAILY TEMPERATURES (SOLID CURVES) AND THE ACTUAL DAILY HIGH AND LOW TEMPERATURES (VERTICAL BARS).

PAGE 2 AND 3:
H/C INDICATES HEATING AND COOLING DEGREE DAYS.
RH INDICATES RELATIVE HUMIDITY
W/O INDICATES WEATHER AND OBSTRUCTIONS
S INDICATES SUNSHINE.
PR INDICATES PRESSURE.
CLOUDINESS ON PAGE 3 IS THE SUM OF THE CEILOMETER AND SATELLITE DATA NOT TO EXCEED EIGHT EIGHTHS(OKTAS).

GENERAL:
T INDICATES TRACE PRECIPITATION, AN AMOUNT GREATER THAN ZERO BUT LESS THAN THE LOWEST REPORTABLE VALUE.
+ INDICATES THE VALUE ALSO OCCURS ON EARLIER DATES.
BLANK ENTRIES DENOTE MISSING OR UNREPORTED DATA.
NORMALS ARE 30-YEAR AVERAGES (1971 - 2000).
ASOS INDICATES AUTOMATED SURFACE OBSERVING SYSTEM.
PM INDICATES THE LAST DAY OF THE PREVIOUS MONTH.
POR (PERIOD OF RECORD) BEGINS WITH THE JANUARY DATA MONTH AND IS THE NUMBER OF YEARS USED TO COMPUTE THE MEAN. INDIVIDUAL MONTHS WITHIN THE POR MAY BE MISSING.
WHEN THE POR FOR A NORMAL IS LESS THAN 30 YEARS, THE NORMAL IS PROVISIONAL AND IS BASED ON THE NUMBER OF YEARS INDICATED.
0.* OR * INDICATES THE VALUE OR MEAN-DAYS-WITH IS BETWEEN 0.00 AND 0.05.
CLOUDINESS FOR ASOS STATIONS DIFFERS FROM THE NON-ASOS OBSERVATION TAKEN BY A HUMAN OBSERVER. ASOS STATION CLOUDINESS IS BASED ON TIME-AVERAGED CEILOMETER DATA FOR CLOUDS AT OR BELOW 12,000 FEET AND ON SATELLITE DATA FOR CLOUDS ABOVE 12,000 FEET.
THE NUMBER OF DAYS WITH CLEAR, PARTLY CLOUDY, AND CLOUDY CONDITIONS FOR ASOS STATIONS IS THE SUM OF THE CEILOMETER AND SATELLITE DATA FOR THE SUNRISE TO SUNSET PERIOD.

GENERAL CONTINUED:
CLEAR INDICATES 0 - 2 OKTAS, PARTLY CLOUDY INDICATES 3 - 6 OKTAS, AND CLOUDY INDICATES 7 OR 8 OKTAS. WHEN AT LEAST ONE OF THE ELEMENTS (CEILOMETER OR SATELLITE) IS MISSING, THE DAILY CLOUDINESS IS NOT COMPUTED.
WIND DIRECTION IS RECORDED IN TENS OF DEGREES (2 DIGITS) CLOCKWISE FROM TRUE NORTH. ”00” INDICATES CALM. ”36” INDICATES TRUE NORTH.
RESULTANT WIND IS THE VECTOR AVERAGE OF THE SPEED AND DIRECTION.
AVERAGE TEMPERATURE IS THE SUM OF THE MEAN DAILY MAXIMUM AND MINIMUM TEMPERATURE DIVIDED BY 2.
SNOWFALL DATA COMPRISE ALL FORMS OF FROZEN PRECIPITATION, INCLUDING HAIL.
A HEATING (COOLING) DEGREE DAY IS THE DIFFERENCE BETWEEN THE AVERAGE DAILY TEMPERATURE AND 65° F.
DRY BULB IS THE TEMPERATURE OF THE AMBIENT AIR.
DEW POINT IS THE TEMPERATURE TO WHICH THE AIR MUST BE COOLED TO ACHIEVE 100 PERCENT RELATIVE HUMIDITY.
WET BULB IS THE TEMPERATURE THE AIR WOULD HAVE IF THE MOISTURE CONTENT WAS INCREASED TO 100 PERCENT RELATIVE HUMIDITY.

ON JULY 1, 1996, THE NATIONAL WEATHER SERVICE BEGAN USING THE ”METAR” OBSERVATION CODE THAT WAS ALREADY EMPLOYED BY MOST OTHER NATIONS OF THE WORLD. THE MOST NOTICEABLE DIFFERENCE IN THIS ANNUAL PUBLICATION WILL BE THE CHANGE IN UNITS FROM TENTHS TO EIGHTS(OKTAS) FOR REPORTING THE AMOUNT OF SKY COVER.

2004
BRISTOL, JOHNSON CITY, KINGSPORT, TENNESSEE (TRI)

The Weather Service Office is located an almost equal distance of l5 miles in the middle of a geographical triangle between the cities of Bristol, Tennessee-Virginia, Kingsport and Johnson City, Tennessee, and is more commonly known as the Tri-City Area. This location is situated in the extreme upper East Tennessee Valley. The terrain immediately surrounding the station ranges from gently rolling on the east and south to very hilly on the west and north. Mountain ranges begin about l0 miles to the southeast and about l5 miles to the west and north, with many peaks and ridges rising to 4,000 feet, and some to 6,000 feet toward the southeast.

This section does not lie directly within any of the principal storm tracks that cross the country, but comes under the influence of storm centers that pass along the Gulf Coast and then up the Atlantic Coast toward the northeast. Being quite varied, the topography has considerable influence on the weather. Moist air from the east is forced up the slopes of the mountains causing much of the moisture to be precipitated before the air mass reaches the Bristol area. The same process occurs to a lesser extent when air masses move over the smaller mountain ranges to the west and north. The maximum monthly precipitation occurs in July, usually from afternoon and early evening thunderstorms. A second maximum of precipitation occurs in the late winter months, due mainly to moist air associated with storm centers to the south or northeast. Annual precipitation amounts recorded in mountainous sections to the east and southeast are almost double what they are in the immediate vicinity.

Lowest temperatures normally occur during the early morning hours, but rise rapidly during the morning hours. Periods of cold weather are generally associated with air flow from winter storm centers near the northeast coast. Periods of unusually high temperatures occur most frequently when Gulf air associated with the Bermuda high pressure system dominates the area.

Snowfall seldom occurs before November and rarely remains on the ground for more than a few days. However, mountains to the east and south of the station are frequently well blanketed with snow for much longer periods of time.

Agricultural activies within this area include such staple crops as tobacco, beans, and hay which are raised in such amounts as to be important commercially. The last freezing temperature in spring normally occurs in late April, and the first in autumn around mid-October. The growing season of l80 days, usually coupled with ample sunshine and rainfall, permits a second planting and harvesting of some staple crops.

STATION LOCATION

BRISTOL, JOHNSON CITY,
KINGSPORT, TENNESSEE

LOCATION	Occupied From	Occupied To	Airline Distances and Directions from previous Location	LATITUDE NORTH	LONGITUDE WEST	ELEVATION ABOVE SEA LEVEL GROUND TEMPERATURE SITE	ELEVATION ABOVE GROUND WIND INSTRUMENT	EXTREME THERMOMETERS	PSYCHROMETER	SUN-SHINE SWITCH	TIPPING BUCKET RAIN GAUGE	WEIGHING RAIN GAGE	8 INCH RAIN GAGE	HYGROTHERMOMETER	AUTOMATIC OBSERVING EQUIPMENT *	REMARKS
AIRPORT																
Bristol Airport 3-1/3 miles ENE Bristol, Virginia Post Office	6/23/34	9/30/37	NA	36°37′	82°08′	1900										No instrument records.
Tri-City Airport Administration Bldg. 7 miles WSW of P.O. at Blountville, Tenn.	10/1/37	4/10/45	18 mi. WSW	36°29′	82°24′	1519	68	60	60	NA	NA	58	58	NA	NA	Change in status from CAA to WBAS 3/17/44.
Tri-City Airport Administration Bldg. 7 miles WSW of P.O. at Blountville, Tenn.	4/10/45	2/2/65	No Chang	36°29′	82°24′	1519 a1507	61 a20	5	5	NA	NA	3	3	NA b5	NA	a. Effective 5/1/61. b. Commissioned 2900′ SSE of thermometer site 5/6/61.
FAA/Weather Bureau + Building, Tri-City Airport + NWS/FAA Building effective 1970.	2/2/65	10/01/95	150 ft. NW	36° 29′	82°24′	1507	c20	NA e6	NA f6	NA	NA g20	4 d4	4 d4	c5 h5 i5	NA	c. Not moved 2/2/65. d. Moved 65′ SSE 5/15/71. e. Installed 12/20/72. f. Installed 5/10/74. g. Installed 8/19/74. h. Type change 11/5/82. i. Type change 3/24/86.
Tri-City Airport	10/01/95	Present	NA	36°29′	82°24′	j1536									S	ASOS Commissioned 10/01/95 j. Ground elevation.

* TYPE

M = AMOS
T = AUTOB
S = ASOS
W = AWOS

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Query Results

60 THUNDERSTORM & HIGH WIND event(s) were reported in **Carter County, Tennessee** between **01/01/1950** and **07/31/2006**.

*Click on **Location or County** to display Details.*

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Tennessee

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 CARTER	05/09/1958	1800	Tstm Wind	0 kts.	0	0	0	0
2 CARTER	06/24/1969	1120	Tstm Wind	0 kts.	0	0	0	0
3 CARTER	05/23/1973	1900	Tstm Wind	0 kts.	0	0	0	0
4 CARTER	01/28/1974	1100	Tstm Wind	0 kts.	0	0	0	0
5 CARTER	04/04/1974	0400	Tstm Wind	0 kts.	0	0	0	0
6 CARTER	06/03/1985	0245	Tstm Wind	0 kts.	0	0	0	0
7 CARTER	09/08/1985	1530	Tstm Wind	0 kts.	0	0	0	0
8 CARTER	05/06/1989	1100	Tstm Wind	0 kts.	0	0	0	0
9 CARTER	07/25/1989	1600	Tstm Wind	0 kts.	0	0	0	0
10 CARTER	05/20/1990	0200	Tstm Wind	0 kts.	0	0	0	0
11 CARTER	04/09/1991	1630	Tstm Wind	0 kts.	0	0	0	0
12 CARTER	06/29/1992	1515	Tstm Wind	0 kts.	0	0	0	0
13 CARTER	06/30/1992	1525	Tstm Wind	0 kts.	0	0	0	0
14 Elizabethton	04/15/1993	1600	Thunderstorm Winds	N/A	0	0	5K	0
15 Elizabethton	08/20/1993	1510	Thunderstorm Winds	N/A	0	0	1K	0
16 Elizabethton	08/30/1993	1700	Thunderstorm Winds	N/A	0	0	1K	0
17 Elizabethton	11/28/1994	0400	Thunderstorm Wind	N/A	0	0	1K	0
18 Elizabethton	06/11/1995	1445	Thunderstorm Winds	N/A	0	0	0.0M	0

19 Elizabethton	06/26/1995	1910	Thunderstorm Winds	N/A	0	0	7K	0
20 Gap Creek	06/30/1995	1837	Thunderstorm Winds	N/A	0	0	5K	0
21 Elizabethton	07/25/1995	1655	Thunderstorm Winds	N/A	0	0	2K	0
22 Countywide	06/24/1996	12:10 PM	Tstm Wind	0 kts.	0	0	4K	0
23 Elizabethton	08/24/1996	02:20 PM	Tstm Wind	0 kts.	0	0	0	1K
24 Countywide	01/05/1997	04:30 AM	Tstm Wind	0 kts.	0	0	0	2K
25 Countywide	03/05/1997	04:30 PM	Tstm Wind	0 kts.	0	0	11K	9K
26 Elizabethton	06/13/1997	07:30 PM	Tstm Wind	0 kts.	0	0	0	5K
27 N Half Of County	07/16/1997	02:30 PM	Tstm Wind	0 kts.	0	0	0	25K
28 Elizabethton	06/22/1998	07:40 PM	Tstm Wind	0 kts.	0	0	20K	15K
29 Elizabethton	07/19/1998	04:15 PM	Tstm Wind	0 kts.	0	0	5K	7K
30 Watauga	02/14/2000	12:15 AM	Tstm Wind	0 kts.	0	0	0	15K
31 Hunter	05/28/2000	06:25 PM	Tstm Wind	0 kts.	0	0	0	10K
32 Hampton	07/14/2000	10:35 PM	Tstm Wind	0 kts.	0	0	0	8K
33 Elizabethton	05/21/2001	12:50 PM	Tstm Wind	0 kts.	0	0	10K	13K
34 Countywide	07/04/2001	04:20 PM	Tstm Wind	0 kts.	0	0	0	12K
35 Countywide	07/08/2001	04:00 PM	Tstm Wind	0 kts.	0	0	0	27K
36 Elizabethton	05/01/2002	10:18 PM	Tstm Wind	0 kts.	0	0	10K	0
37 Elizabethton	07/03/2002	02:15 PM	Tstm Wind	0 kts.	0	0	10K	0
38 Oak Grove	07/04/2002	03:45 PM	Tstm Wind	0 kts.	0	0	10K	0
39 Elizabethton	07/22/2002	06:45 PM	Tstm Wind	0 kts.	0	0	25K	0
40 Elizabethton	05/02/2003	02:40 PM	Tstm Wind	60 kts.	0	0	12K	0
41 Elizabethton	05/09/2003	02:40 AM	Tstm Wind	55 kts.	0	0	8K	0
42 Elizabethton	06/11/2003	04:20 PM	Tstm Wind	55 kts.	0	0	16K	0
43 Countywide	07/09/2003	03:15 PM	Tstm Wind	60 kts.	0	0	0	0
44 Elizabethton	08/16/2003	01:20 AM	Tstm Wind	60 kts.	0	0	0	0
45 Countywide	08/22/2003	03:40 PM	Tstm Wind	60 kts.	0	0	0	0
46 Elizabethton	05/26/2004	05:15 PM	Tstm Wind	70 kts.	0	0	30K	0

47 Elizabethton	05/26/2004	05:15 PM	Tstm Wind	70 kts.	0	0	30K	0
48 Elizabethton	05/31/2004	04:30 AM	Tstm Wind	60 kts.	0	0	3K	0
49 Countywide	07/05/2004	08:15 PM	Tstm Wind	60 kts.	0	0	20K	0
50 Elizabethton	05/14/2005	06:05 PM	Tstm Wind	60 kts.	0	0	20K	0
51 Elizabethton	07/27/2005	05:50 PM	Tstm Wind	55 kts.	0	0	12K	0
52 Elizabethton	07/27/2005	06:30 PM	Tstm Wind	55 kts.	0	0	12K	0
53 Countywide	07/28/2005	03:00 PM	Tstm Wind	60 kts.	0	0	25K	0
54 Elizabethton	07/28/2005	03:05 PM	Tstm Wind	60 kts.	0	0	3K	0
55 Roan Mtn	11/28/2005	08:30 PM	Tstm Wind	65 kts.	0	0	20K	0
56 Countywide	04/03/2006	01:40 AM	Tstm Wind	60 kts.	0	0	5K	0
57 Countywide	04/22/2006	12:45 AM	Tstm Wind	60 kts.	0	0	10K	0
58 Countywide	04/25/2006	06:30 PM	Tstm Wind	65 kts.	0	0	15K	0
59 Milligan College	05/18/2006	08:00 PM	Tstm Wind	60 kts.	0	0	20K	0
60 Elizabethton	05/26/2006	03:40 PM	Tstm Wind	60 kts.	0	0	12K	0
				TOTALS:	0	0	409K	149K

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National Weather Service Forecast Office
Morristown, TN

Carter County TN Tornadoes since 1950

Date	Time (LST)	Dead	Injured	Path Length (miles)	Rating	Location
June 16, 1989	3:00 PM	0	0	1.0	F1	near Keenburg
June 3, 1998	7:15 PM	0	0	1.0	F0	Buladeen
May 1, 2002	10:18 PM	0	0	0.1	F1	Stoney Creek

For more information about the Fujita tornado intensity scale (F scale), click here.


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