



Sullivan County, TN Multi-Hazard Mitigation Plan



Prepared by
AMEC Environment and Infrastructure
Hazard Mitigation and Emergency Management Program
Nashville, Tennessee





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EXECUTIVE SUMMARY

The purpose of natural hazards mitigation is to reduce or eliminate long-term risk to people and property from natural hazards. Sullivan County and participating jurisdictions have prepared this update to the local hazard mitigation plan to better protect the people and property of the County from the effects of natural hazard events. The plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 and to achieve eligibility for the Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance (HMA) programs.

The Sullivan County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that covers the following local governments that participated in the planning process:

- Sullivan County
- Town of Bluff City
- City of Bristol
- City of Kingsport

The County's planning process for the update followed a methodology prescribed by FEMA, which began with the formation of a Hazard Mitigation Planning Committee (HMPC) comprised of key stakeholders from Sullivan County, participating jurisdictions, and state and federal agencies. The HMPC conducted a risk assessment that identified and profiled hazards that pose a risk to Sullivan County, assessed the County's vulnerability to these hazards, and examined the capabilities in place to mitigate them. The County is vulnerable to several hazards that are identified, profiled, and analyzed in this plan. Floods, earthquakes, and severe weather are among the hazards that can have a significant impact on the County.

Based upon the risk assessment, the HMPC identified goals and objectives for reducing risk to natural hazards. The goals and objectives of this multi-hazard mitigation plan are to:

Goal 1: Reduce the vulnerability of the people, property, and environment of Sullivan County.

- Protect community lifelines (existing and future) from identified natural and man-made hazards;
- Better manage flood hazard areas;
- Better manage fire hazard areas; and
- Protect community historic preservation resources from identified natural and man-made hazards.

Goal 2: Improve and maintain coordination and communication between all jurisdictions.

Goal 3: Educate the public on identified natural and man-made hazards.

- Improve hazard mitigation planning for Bristol Motor Speedway (BMS) facility events

Goal 4: Improve public hazard communication methods.

To meet identified goals and objectives, the plan recommends the mitigation actions summarized in the table on the following page. The HMPC also developed an implementation plan for each action, which identifies priority level, background information, ideas for implementation, responsible agency, timeline, cost estimate, potential funding sources, and more.

The multi-hazard mitigation plan has been formally adopted by the Sullivan County Board of Commissioners and the governing bodies of each participating jurisdiction and will be updated within a five-year timeframe.

Mitigation Action Matrix

Jurisdiction	Action	HMPC Priority	Goals Addressed	Hazards Addressed	Status
Multi-Jurisdictional	<ol style="list-style-type: none"> 1. Public Awareness Program <ol style="list-style-type: none"> a. Continue public education efforts, such as quarterly online newsletter, participation in safety fairs, and press releases/radio PSAs in coordination with the Public Health Coalition regarding natural and man-made hazards. b. Continue public education on shelter c. Educate property owners near the Bristol Motor Speedway facility about hazard mitigation roles and responsibilities. 	High	Goals 1, 3	Multi-Hazard	Revised
Multi-Jurisdictional	<ol style="list-style-type: none"> 2. Continue to seek ways for Tier II facilities to report electronically in a web-based format, as the current system supported by a University may soon be unavailable. 	High	Goals 1, 4	Man-made Hazards	New
Multi-Jurisdictional	<ol style="list-style-type: none"> 3. Identify repetitive flood prone areas. 	High	Goals 1, 3	Flood	Ongoing
Bristol	<ol style="list-style-type: none"> 4. Investigate the feasibility of installing a Hazardous Materials team in the City of Bristol, TN. 	High	Goal 1	Man-made Hazards	Ongoing
Bristol	<ol style="list-style-type: none"> 5. Improve alternative route planning and equipment for Volunteer Parkway and other State roadways that are key transportation routes during race weekends. 	High	Goals 1,2 and 4	Man-made Hazards	Ongoing

Jurisdiction	Action	HMPC Priority	Goals Addressed	Hazards Addressed	Status
Multi-Jurisdictional	6. Identify known sinkhole incident areas.	Medium	Goals 1, 3	Sinkholes	New
Multi-Jurisdictional	7. Increase coordination and pre-staging of critical assets for disasters.	Medium	Goals 1, 2, 4	Multi-Hazard	New
Multi-Jurisdictional	8. Generate a map of sirens and the populations that receive the alert information.	Medium	Goals 1, 3, 4	Severe Weather	New
Multi-Jurisdictional	9. Define “vulnerable” populations in order to better coordinate with Public Health to identify these populations.	Medium	Goals 1, 3, 4	Extreme Temperatures	New
Sullivan County	10. Continue to participate in themed drills, such as TNCAT for focused training.	Medium	Goals 1, 4	Multi-Hazard	New
Bristol	11. Improve communications between Emergency Management Agency and utilities.	Medium	Goals 1, 2, 4	Multi-Hazard	Ongoing
Bristol	12. Leverage other funding sources for hazard mitigation implementation, such as the Hazard Mitigation Grant Program (HMGP) and the Flood Mitigation Assistance (FMA) Program.	Medium	Goals 1, 2	Multi-Hazard	Ongoing

Jurisdiction	Action	HMPC Priority	Goals Addressed	Hazards Addressed	Status
Kingsport	13. Continue partnering with Eastman on floodplain issues and hazardous materials storage.	Medium	Goals 1,2	Man-made Hazards	Ongoing
Multi-Jurisdictional	14. Continue participation as a StormReady community.	Low	Goals 1, 3, 4	Severe Weather	Ongoing
Multi-Jurisdictional	15. Improve emergency communication with surrounding states.	Low	Goals 1, 2, 4	Multi-Hazard	New
Multi-Jurisdictional	16. Reduce Vulnerability to Wildfire Hazard <ul style="list-style-type: none"> a. Investigate Improvements to ingress/egress routes for residential areas in Wildland/Urban Interface (WUI) or wildfire hazard areas. b. Investigate improvements in water delivery to residential areas in wildfire hazard areas. c. Develop and adopt design standards based on Firewise principles into subdivision ordinances. d. Become a certified Firewise community. 	Low	Goals 1, 3	Wildfire	Ongoing
Multi-Jurisdictional	17. Map known areas of landslide incidents and potential areas for landslides.	Low	Goals 1, 3	Landslides	New
Multi-Jurisdictional	18. Identify methods to reduce flooding and loss in historic districts.	Low	Goal 1	Floods	Ongoing

Jurisdiction	Action	HMPC Priority	Goals Addressed	Hazards Addressed	Status
Multi-Jurisdictional	19. Participate in CRS program.	Low	Goals 1, 3	Floods	Ongoing
Multi-Jurisdictional	20. Review and update vulnerability assessments at water treatment facilities.	Low	Goal 1	Multi-Hazard	Ongoing
Multi-Jurisdictional	21. Modify zoning in dam failure inundation zones.	Low	Goal 1	Dam Failure	New
Bristol	22. Continue disaster response training for Bristol Motor Speedway staff.	Low	Goals 1, 3	Multi-Hazard	Ongoing
Kingsport	23. Require underground utilities in new subdivision developments.	Low	Goal 1	Severe Weather	Ongoing
Multi-Jurisdictional	24. Coordinate annual meetings of the Sullivan County Hazard Mitigation Planning Committee to monitor, evaluate, and update the multi-hazard mitigation plan.	Low	Goal 4	Multi-Hazard	Ongoing

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PREREQUISITES

44 CFR requirement 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. For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

Note to Reviewers: When this plan has been reviewed and approved, pending adoption, by FEMA Region IV, the adoption resolution will be signed by the participating jurisdictions and added to Appendix A. A model resolution is provided on the following page.

Model Resolution

Resolution # _____

Adopting the Sullivan County Multi-Hazard Mitigation Plan

Whereas, the (Name of Government/District/Organization seeking FEMA approval of hazard mitigation plan) recognizes the threat that natural hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, the U.S. Congress passed the Disaster Mitigation Act of 2000 (“Disaster Mitigation Act”) emphasizing the need for pre-disaster mitigation of potential hazards;

Whereas, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments;

Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, the (Name of Government/District/Organization) fully participated in the FEMA-prescribed mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

Whereas, the Tennessee Emergency Management Agency (TEMA) and the Federal Emergency Management Agency Region IV officials have reviewed the “Sullivan County Multi-Hazard Mitigation Plan”, and approved it contingent upon this official adoption of the participating governing body;

Whereas, the (Name of Government/District/Organization) desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Sullivan County Multi-Hazard Mitigation Plan.

Whereas, adoption by the governing body for the (Name of Government/District/Organization), demonstrates the jurisdiction’s commitment to fulfilling the mitigation goals and objectives outlined in this Multi-Hazard Mitigation Plan.

Whereas, adoption of this legitimacies the plan and authorizes responsible agencies to carry out their responsibilities under the plan.

Now, therefore, be it resolved, that the (Name of Government/District/Organization) adopts the “Sullivan County Multi-Hazard Mitigation Plan” as an official plan; and

Be it further resolved, the (Name of Government/District/Organization) will submit this Adoption Resolution to the Tennessee Emergency Management Agency (TEMA) and Federal Emergency Management Agency Region IV officials to enable the plan’s final approval.

Passed: _____

Certifying Official

1 INTRODUCTION AND PLANNING PROCESS

1.1 Purpose

Sullivan County, Tennessee, and three participating jurisdictions have prepared this update to the local hazard mitigation plan to better protect the people and property of the County from the effects of natural hazard events. This plan demonstrates the community's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources.

The five goals of the Sullivan County Multi-Hazard Mitigation Plan are the following:

- Reduce the vulnerability of the people, property, and environment of Sullivan County to natural and man-made hazards.
- Improve and maintain coordination and communication between all jurisdictions.
- Educate the public on identified natural and man-made hazards.
- Improve public hazard communication methods.
- Improve Hazard Mitigation Planning for Bristol Motor Speedway (BMS) facility events.

This plan was also updated to make Sullivan County and participating jurisdictions eligible for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program, Pre-Disaster Mitigation program, and Flood Mitigation Assistance program.

1.2 Background and Scope

Each year in the United States, natural disasters 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 to insurance companies and non-governmental organizations are not reimbursed by tax dollars. Many natural disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar

spent on mitigation saves society an average of \$4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. This plan documents Sullivan County's hazard mitigation planning process and identifies relevant hazards and vulnerabilities and strategies the County will use to decrease vulnerability and increase resiliency and sustainability.

The Sullivan County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that geographically covers everything within the County's jurisdictional boundaries (hereinafter referred to as the planning area). Unincorporated Sullivan County and the following communities participated in the planning process:

- Town of Bluff City
- City of Bristol, and
- City of Kingsport.

This plan was updated pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the *Federal Register* on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. (Hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act.) While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because the planning area is subject to many kinds of hazards, access to these programs is vital.

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. The Sullivan County planning area has been affected by hazards in the past and is thus committed to reducing future impacts from hazard events and becoming eligible for mitigation-related federal funding.

1.3 The 10-Step Planning Process

Requirements §201.6(b) and §201.6(c)(1): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

- 1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;**
- 2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and**
- 3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.**

[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Sullivan County recognized the need and importance of a local hazard mitigation plan and initiated its development. The Sullivan County Emergency Management Agency contracted with AMEC Environment & Infrastructure (AMEC) to facilitate and develop the plan. AMEC's role was to:

- Assist in establishing the Hazard Mitigation Planning Committee (HMPC) as defined by the Disaster Mitigation Act (DMA);
- Meet the DMA requirements as established by federal regulations and following FEMA's planning guidance;
- Support objectives under the National Flood Insurance Program's Community Rating System and the Flood Mitigation Assistance program,
- Facilitate the entire planning process;
- Identify the data requirements that HMPC participants could provide and conduct the research and documentation necessary to augment that data;
- Assist in facilitating the public input process;
- Produce the draft and final plan documents; and
- Coordinate the plans reviews with the Tennessee Emergency Management Agency (TEMA) and FEMA Region IV.

AMEC established the planning process for the Sullivan County Multi-Hazard Mitigation Plan using the DMA planning requirements and FEMA's associated guidance. This guidance is structured around a four-phase process:

- 1) Planning Process,
- 2) Risk Assessment,

- 3) Mitigation Strategy, and
- 4) Plan Maintenance.

Into this process, a more detailed 10-step planning process used for FEMA’s Community Rating System (CRS) and Flood Mitigation Assistance programs was integrated. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA’s Hazard Mitigation Grant Program, Pre-Disaster Mitigation program, Community Rating System, Flood Mitigation Assistance Program, Severe Repetitive Loss program, and new flood control projects authorized by the U.S. Army Corps of Engineers.

Table 1.1 shows how the CRS 10-step process fits into FEMA’s four-phase process.

Table 1.1. Mitigation Planning Processes Used to Develop the Sullivan County Multi-Hazard Mitigation Plan

DMA Process	Modified CRS Process
1) Planning Process	
201.6(c)(1)	1) Organize the Planning Effort
201.6(b)(1)	2) Involve the Public
201.6(b)(2) and (3)	3) Coordinate with Other Departments and Agencies
2) Risk Assessment	
201.6(c)(2)(i)	4) Identify the Hazards
201.6(c)(2)(ii)	5) Assess the Risks
3) Mitigation Strategy	
201.6(c)(3)(i)	6) Set Goals
201.6(c)(3)(ii)	7) Review Possible Activities
201.6(c)(3)(iii)	8) Draft an Action Plan
4) Plan Maintenance	
201.6(c)(5)	9) Adopt the Plan
201.6(c)(4)	10) Implement, Evaluate, and Revise the Plan

1.3.1 Phase 1: Planning Process

Planning Step 1: Organize the Planning Effort

The Disaster Mitigation Act of 2000 requires that each jurisdiction participate in the planning process and officially adopt the multi-jurisdictional hazard mitigation plan. A Hazard Mitigation Planning Committee (HMPC) was reconvened for Sullivan County and included representatives from each participating jurisdiction, departments of the County and participating jurisdictions, and other local, state, and federal organizations responsible for making decisions in the plan and agreeing upon the final contents. The agencies or organizations listed in Table 1.2 participated on the HMPC.

Table 1.2. Hazard Mitigation Planning Committee – Participating agencies and organizations

Hazard Mitigation Planning Committee Members
Sullivan County Emergency Management Agency
Sullivan County Department of Planning and Codes
Sullivan County Planning Department
Town of Bluff City Police Department
City of Bristol Public Works Department
City of Kingsport GIS
City of Kingsport Planning and Community Development

The DMA planning regulations and guidance stress that each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the HMPC;
- Detail areas within the planning area where the risk differs from that facing the entire area;
- Identify potential mitigation actions; and
- Formally adopt the plan.

For Sullivan County’s planning area’s HMPC, “participation” meant the following:

- Attending and participating in the HMPC meetings;
- Providing requested data (as available);
- Reviewing and providing comments on plan drafts;
- Advertising, coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the plan by the governing boards.

The planning process update officially began with a kick-off meeting in Blountville, TN, on February 28, 2013. The meeting covered the scope of work and an introduction to the DMA requirements.

The HMPC continued to communicate during the planning process with a combination of face-to-face meetings, phone interviews and email correspondence. The meeting schedule and topics are listed in Table 1.3. The sign-in sheets and meeting minutes for each of the meetings are included in Appendix B.

Table 1.3. Schedule of HMPC Meetings

Meeting	Topic	Date
Coordination	Coordination Meeting with HMPC to begin grant application process and identify HMPC members.	August 16, 2012
HMPC #1	Kickoff meeting: Review of the hazard mitigation planning process and hazard identification	February 28, 2013
HMPC #2	Review of previous risk assessment; discussion of risk assessment and data needs for plan update; and review of plan goals and objectives	May 13, 2013
HMPC #3	Update mitigation actions and prioritization; discussion of process to monitor, evaluate, and update plan	June 18, 2013
HMPC #4	Review draft Multi-Hazard Mitigation Plan document	April 24, 2014

Planning Step 2: Involve the Public

At the kick-off meeting, the HMPC discussed options for public involvement and agreed to an approach using established public information mechanisms and resources within the community. Public involvement activities included press releases, website postings, a public meeting, and the collection of public comments on the draft plan.

The public meeting was held during the draft-plan development and prior to finalizing the plan as further described in Table 1.4. Where appropriate, stakeholder and public comments were incorporated into the final plan, including the sections that address mitigation goals and strategies. All press releases and website postings are on file with the Sullivan County Emergency Management Agency. The draft plan is available online at <http://www.sullivancountyttn.gov/node/123>. The public outreach activities described here were conducted with participation from and on behalf of all jurisdictions participating in this plan.

Table 1.4. Schedule of Public Meetings

Meeting Topic	Meeting Date	Meeting Location
Plan overview and public input on mitigation actions	June 18, 2013	Sullivan County Courthouse

Planning Step 3: Coordinate with Other Departments and Agencies

Early in the planning process, the HMPC determined that data collection, mitigation strategy development, and plan approval would be greatly enhanced by inviting state and federal agencies and organizations to participate in the process. Based on their involvement in hazard mitigation planning, their landowner status in the City, representatives from the following agencies were invited to participate on the HMPC:

- Tennessee Emergency Management Agency
- National Weather Service,
- American Red Cross, and
- Tennessee Valley Authority.

The HMPC also used technical data, reports, and studies from the following agencies and groups:

- Sullivan County Emergency Management Agency,
- Sullivan County Department of Planning and Codes,
- Sullivan County Planning Department,
- City of Bristol Engineering Division,
- City of Bristol Public Works,
- City of Kingsport Geographic Information Systems,
- City of Kingsport Planning and Community Development,
- National Drought Mitigation Center,
- National Oceanic and Atmospheric Administration National Climatic Data Center,
- National Register of Historic Places,
- Natural Resource Conservation Service (formerly the Soil Conservation Service),
- National Weather Service,
- Tennessee Valley Authority,
- U.S. Fish and Wildlife Service, and
- U.S. Geological Survey.

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 policies, tools, and actions that will reduce a community's risk and vulnerability to hazards. Sullivan County uses a variety of comprehensive planning mechanisms, such as general plans and ordinances, to guide growth and development. Integrating existing planning efforts and mitigation policies and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs. The development of this plan incorporated information from the following existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

- Sullivan County Multi-Hazard Mitigation Plan, 2006
- Sullivan County Emergency Operations Plan
- Sullivan County Regional Plan: A Guide for Future Land Use & Transportation Development, 2006-2026
- Town of Bluff City Land Use & Transportation Plan, 2008-2028
- City of Bristol Multi-Hazard Mitigation Plan, 2006
- City of Bristol Future Land Use Plan, 2006-2025
- City of Bristol Capital Improvements Plan, 2015-2019
- City of Kingsport Capital Improvements Plan, FY2013-2014
- City of Kingsport Long Range Transportation Plan, 2035
- Strategic Partnerships for Economic Growth and Sustainability, 2013
- USDA Sullivan County Soils Survey
- Sullivan County, TN Flood Insurance Study, 2006 and
- State of Tennessee Standard Hazard Mitigation Plan.

Other documents were reviewed and considered, as appropriate, during the collection of data to support Planning Steps 4 and 5, which include the hazard identification, vulnerability assessment, and capability assessment.

1.3.2 Phase 2: Risk Assessment

Planning Steps 4 and 5: Identify the Hazards and Assess the Risks

AMEC led the HMPC in an exhaustive research effort to identify and document all the hazards that have, or could, impact the planning area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities. The HMPC also conducted a capability assessment to review and document the planning area's current capabilities to mitigate risk and vulnerability from hazards. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the HMPC could assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. A more detailed description of the risk assessment process and the results are included in Chapter 3 Risk Assessment.

1.3.3 Phase 3: Mitigation Strategy

Planning Steps 6 and 7: Set Goals and Review Possible Activities

AMEC facilitated brainstorming and discussion sessions with the HMPC that described the purpose and the process of developing planning goals and objectives, a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. This information is included in Chapter 4 Mitigation

Strategy. Additional documentation on the process the HMPC used to develop the goals and strategy is in Appendix C: Mitigation Alternatives and Prioritization.

Planning Step 8: Draft an Action Plan

Based on input from the HMPC regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7, AMEC produced a complete first draft of the plan. This complete draft was distributed for HMPC review and comment. Other agencies were invited to comment on this draft as well. HMPC and agency comments were integrated into the second draft, which was advertised and distributed to collect public input and comments. AMEC integrated comments and issues from the public, as appropriate, along with additional internal review comments and produced a final draft for the Tennessee Emergency Management Agency and FEMA Region IV to review and approve, contingent upon final adoption by the governing boards of each participating jurisdiction. All planning document deliverables are outlined in Table 1.5 below.

Table 1.5. Planning Deliverables

Deliverable	Date
HMPC #1- Meeting Minutes	March 1, 2013
Public Information Flyer #1	March 1, 2013
HMPC #2- Meeting Minutes	May 20, 2013
Public Information Flyer #2	May 20, 2013
Draft Multi-Hazard Mitigation Plan - Chapters 1, 2, and 3 - Hazard Identification and Risk Assessment Update - Previous Mitigation Actions	May 29, 2013
HMPC #3- Meeting Minutes	June 20, 2013
Public Meeting Presentation	June 20, 2013
Draft Multi-Hazard Mitigation Plan - Full Document - Chapters 1, 2, 3, 4, and 5 - Appendices A, B, C, and D	April 23, 2014
Public Information Flyer #3	May 5, 2014

1.3.4 Phase 4: Plan Maintenance

Planning Step 9: Adopt the Plan

In order to secure buy-in and officially implement the plan, the plan was adopted by the governing boards of each participating jurisdiction on the dates included in the adoption resolutions in Appendix A: Adoption Resolutions.

Planning Step 10: Implement, Evaluate, and Revise the Plan

The true worth of any mitigation plan is in the effectiveness of its implementation. Up to this point in the planning process, all of the HMPC's efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions. Each recommended action includes key descriptors, such as a lead manager and possible funding sources, to help initiate implementation. An overall implementation strategy is described in Chapter 5 Plan Implementation and Maintenance. A plan update and maintenance schedule and a strategy for continued public involvement are also included in Chapter 5.

Finally, there are numerous organizations within the Sullivan County planning area whose goals and interests interface with hazard mitigation. Coordination with these other planning efforts, as addressed in Planning Step 3, is paramount to the ongoing success of this plan and mitigation in Sullivan County and is addressed further in Chapter 5.

2 COMMUNITY PROFILE AND CAPABILITIES

Chapter 2 provides a profile of the Sullivan County planning area and identifies capabilities already in place in the county and the participating jurisdictions to help mitigate hazards addressed in this plan.

2.1 Sullivan County Planning Area Profile

2.1.1 Geography and Topography

Sullivan County is located in northeastern Tennessee is located in northeast Tennessee on the border of Virginia. It is located within 600 miles (a day's drive) of half the U.S. population. Sullivan County is located within 250 miles of ten cities with populations of over 200,000:

- 132 miles to Charlotte, NC
- 148 miles to Lexington-Fayette, KY
- 157 miles to Greensboro, NC
- 207 miles to Durham, NC
- 209 miles to Cincinnati, OH
- 213 miles to Louisville, KY
- 218 miles to Atlanta, GA
- 224 miles to Raleigh, NC
- 236 miles to Nashville, TN
- 237 miles to Columbus, OH

Sullivan County is bordered by four other Tennessee counties (Hawkins to the west, Washington, Carter to the south and Johnson to the east) and two Virginia Counties (Scott and Washington) to the north. Sullivan County encompasses approximately 429.7 square miles, 17 of which are water. The terrain ranges from smooth rolling hills and valleys to mountain ranges. Elevations range from about 1,200 feet along the Holston River to 3,800 feet in the Holston Mountain Range near the Carter, Johnson and Sullivan County lines. Other spot elevations are: Blountville - 1,595 feet; Kingsport - 1,220 feet; Bristol - 1,650 feet; High Point on Bays Mountain - 2,405 feet; and Overlook at Boone Dam - 1,420 feet. (Sullivan County Regional Plan – 7/15/2008)

Sullivan County is in the Holston River drainage basin. The floodplains of the Holston River, Reedy Creek, Horse Creek, and Beaver Creek are fairly wide and flat. The floodplains of most of the other streams in the county are narrow. The terrain is hilly to mountainous, with elevations ranging from about 1,200 feet to 4,200 feet. The 2010 U.S. Census population for the

County was 156,823 persons (density of 379.4/sq mi) with an estimated population in 2011 of 157,419 persons.

Bluff City, Town of

The Town of Bluff City is situated in Sullivan County approximately 9 miles southwest of the City of Bristol. The 2010 population of Bluff City was 1,733 persons (www.census.gov).

Bristol, City of

The City of Bristol is situated in Sullivan County bordering the Tennessee-Virginia state line with an area of 30.6 square miles. It is approximately 110 miles north east of Knoxville and directly adjacent to its twin city, Bristol, Virginia. The 2010 population of Bristol, Tennessee, was 26,702 persons. (www.census.gov)

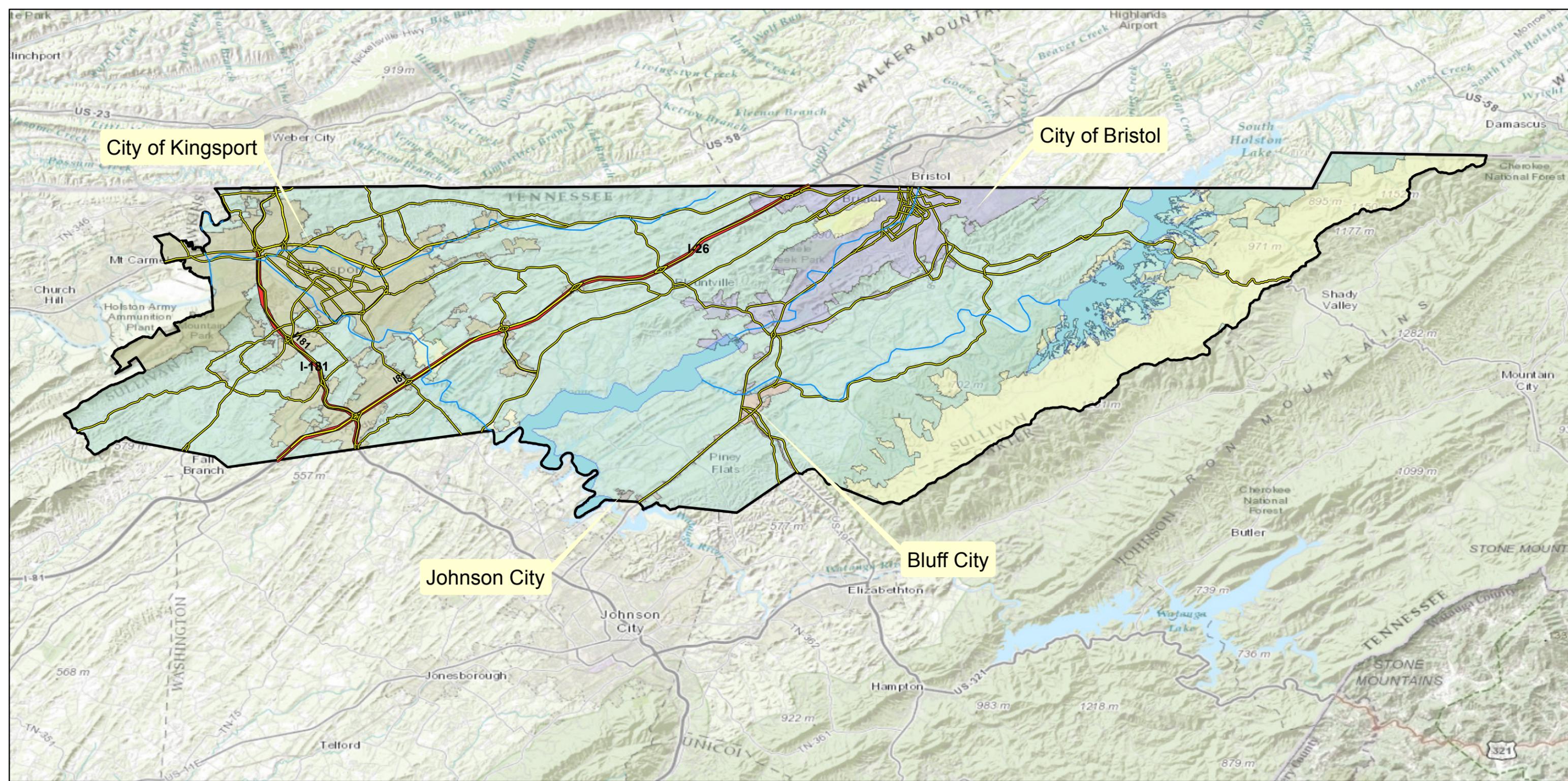
Kingsport, City of

The City of Kingsport is located on the north bank of the South Fork Holston River, just south of the Tennessee-Virginia state line and Weber City, Virginia, and about 85 miles northeast of Knoxville. Kingsport is the home of large industrial and commercial development. The 2010 population of Kingsport was 48,205 persons. (www.census.gov)

Kingsport is located in the western shale hills physiographic division of the valley and ridge province portion of Sullivan County. The elevations of the highest points are about 1850 feet NGVD. The underlying rock formation of Athens and Sevier shales is less susceptible to weathering than the limestone ridges and valleys to the east. Drainage channels have thoroughly dissected this physiographic division and it has been otherwise modified by the South Fork Holston River. The relief is hilly and knobby. Surface drainage is very rapid; internal drainage is moderate.

Kingsport and Bristol represent a recognized trade center for a two-state area and are located very near to the Virginia state line. Kingsport-Bristol, TN (includes Bristol, VA) is the center of a Metropolitan Statistical Area (MSA). The MSA title corresponds to the name of the largest central city(s) in the area. Additionally, the Kingsport-Bristol MSA and the Johnson City MSA constitute the Johnson City-Kingsport-Bristol Combined Statistical Area (CSA). These three cities are commonly referred to as the Tri-Cities region

Figure 2.1, on the following page, provides a map of the Sullivan County planning area.



Scale

1:250,000
1 in = 4 miles



Legend

- | | | |
|-------------------|------------------|-------------|
| Sullivan County | Johnson City | Rivers |
| City Of Bristol | Bluff City | Roads |
| City Of Kingsport | Park/Reservation | Interstates |
| County Boundary | Lakes | |

**Sullivan County
Community Basemap**

Data Source:
World Topographic Map 2010

Prepared February 2014



2.1.2 Climate

Sullivan County has a moderate climate and four distinct seasons. The average temperature is 56.1 degrees Fahrenheit. Annual precipitation is 41.5 inches with annual snowfall averages around 18 inches. The highest recorded temperature was 102° F; the lowest was 15° F. The highest average monthly precipitation, 4.98 inches, occurs in July; the lowest precipitation of 2.25 inches falls in October. (FIS Report – 9/29/2006)

The prevailing winds in the Sullivan County are west southwest. Although Sullivan County is 510 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.

Despite these cold periods, the climate overall is more southern than northern. Snowfall varies a great deal from year to year and significant accumulation (6 inches or more) is rare. Average annual climate statistics include:

Table 2.1 Sullivan County—Annual Climate Averages

Climate	Bristol, TN- Sullivan County	United States
Rainfall (Inches)	41.3	36.5
Snowfall (Inches)	18	25
Precipitation Days	181	100
Sunny Days	201	205
Average July High	86	86.5
Average January Low	26	20.5
Comfort Index (Higher=Better)	41	44
Ultra-Violet Light Index	4.4	4.3
Elevation (Feet)	1,525	1,443

Source: <http://www.bestplaces.net/climate/details.aspx?wmo=723181>

Soils

According to the USDA Soils Survey of Sullivan County, the County is located within two major land resource areas: the Southern Appalachian Ridges and Valleys and the Blue Ridge. The soils in both of these areas formed under forest vegetation and are dominantly light in color. The soils in the Blue Ridge area are shallow to very deep over sandstone or phyllite bedrock. The soils in the Southern Appalachian Ridges and Valleys are shallow to very deep over limestone or shale bedrock or over sandstone or shale bedrock on Bays Mountain.

Natural Resources

According to the USDA Soils Survey of Sullivan County, the County has an abundant supply of limestone, timber, and farmland. Tree production is a major enterprise in the mountainous areas and in areas in the valleys where the soils are not suited to agricultural uses. The primary trees are oak, hickory, poplar, and beech. Numerous limestone quarries provide gravel and lime throughout the County.

2.1.3 Population/Demographics

The 2010 U.S. Census population for Sullivan County was 156,823 persons with an estimated population in 2011 of 157,419 persons. Kingsport is Sullivan County's largest city. Kingsport is America's first planned city designed to accommodate modern industry. Since its re-incorporation as a city in Sullivan County in 1917, Kingsport has grown to become the Tennessee's ninth largest city, covering approximately 44 square miles and containing a population of 48,205 persons, based on the 2010 U.S. Census (see Table 2.2).

Because a large portion of the population of the area surrounding Kingsport is dependent on Kingsport as a place to work or live, Kingsport is considered one of the principal cities in the Kingsport-Bristol MSA (metropolitan statistical area) that includes Hawkins and Sullivan counties in Tennessee and Scott and Washington counties in Virginia. The Kingsport-Bristol MSA population based upon the 2010 census is 358,676 persons, covering an area of 2,291 square miles. The population of the Johnson City-Kingsport-Bristol CSA (combined statistical area) is 512,726 persons.

Table 2.2 Sullivan County—Population

Jurisdiction	2000	2010
Kingsport	44,905	48,438
Bristol	24,821	26,707
Bluff City	1,559	1,733
Unincorporated Areas	81,763	80,541
Total County	153,048	157,419

Source: U.S. Census Bureau

In Table 2.3 below, census demographic and social characteristics for Sullivan County are shown for 2010.

Table 2.3 Sullivan County—Demographic and Social Characteristics

Characteristic	Sullivan County	Bluff City	Bristol	Kingsport
Gender/Age				
Male (%)	48.2	48.4	48.6	46.2
Female (%)	51.8	51.6	51.4	53.8
Under 5 Years (%)	5.2	7.6	5.3	5.5
65 Years and Over (%)	18.3	12.8	19.1	20.3
Median age (years)	43.2	37.4	41.9	43.2
Race/Ethnicity (one race)				
White (%)	95.2	96.9	94.2	91.9
Hispanic/Latino (Any Race) (%)	1.5	0.9	1.8	2.1
Other				
Average Household Size	2.33	2.38	2.26	2.83
Households (Occupied Housing Units)	66,298	727	11,456	21,289
Persons in Group Quarters	2,631	0	833	887

Source: www.census.gov

2.1.4 History

Sullivan County was formed in 1779 and is the second oldest county in Tennessee. The County was named after Revolutionary War General and New Hampshire Governor John Sullivan. Sullivan and neighboring counties were originally established by the North Carolina state legislature. From 1784-1789, these counties were claimed by the short-lived State of Franklin, which had applied for statehood. Sullivan became part of the newly formed State of Tennessee in 1796. (https://www.familysearch.org/learn/wiki/en/Sullivan_County,_Tennessee)

Blountville is the County Seat and is the only Tennessee county seat that is not an incorporated city or town.

The Town of Bluff City was first known as Choate's Ford and then as Middletown when the town was platted in 1858. Later known as Union, Zollicoffer and Union again, it became Bluff City in 1887.

The Town has a historical landmark. In 1780, four hundred Virginia militiamen crossed over the Holston River at Choate's Ford on their way to assemble at Sycamore Shoals for their march to

King's Mountain which was the site of a battle that marked a turning point in the Revolutionary War. In 2007, the National Park Service certified the Over Mountain Victory Trail recognizing Choate's Ford as a historic site. (<http://www.bluffcitytn.org/>)

The City of Bristol Tennessee/Virginia was part of the vast plantation of Rev. James King. In 1852, the son-in-law of Rev. King, Joseph R. Anderson, learned that two railroads would meet in the area and determined that the site would be ideal for the founding of a city. One-hundred acres were contracted, forty-eight acres in Tennessee and fifty-two acres in Virginia for the planned city, which was named "Bristol". Samuel Goodson started a development known as "Goodsonville" on land that adjoined the original Town of Bristol at its northern boundary (Beaver Creek was the divided line). In 1856, that town and the original Bristol, Virginia were merged to form the composite town of Goodson, Virginia. However, the Depot continued to be known as Bristol, Virginia. In 1890, all the development on the Virginia side returned to the name "Bristol" and so remains today. (<http://www.bristoltn.org/history.cfm>)

The City of Kingsport's name is derived from a simplification of the name "King's Port", given to the area along the Holston River by early pioneers. It had many unofficial names prior to the late 18th century. The namesake is Revolutionary War Col. James King, who owned the King's Mill Station at the mouth of Reedy Creek, an area used to ship commodities on the Holston River.

The Long Island of the Holston River in Kingsport is a U.S. National Historic Landmark and was the home of the sacred council of local Cherokee. It was a meeting place for treaties and dealings with other Native American tribes, early pioneers and settlers. In 1822, the Holston River was first chartered by boat. The river was used to transport products and people to Knoxville, where the Holston River meets the Tennessee River. From there, the conjoining river systems lead to the Ohio River and eventually the Mississippi River and the Port of New Orleans. The development and use of the Holston River was a boon for transportation and commerce, providing many jobs for settlers in the area.

As Kingsport developed and became chartered in 1917, it was planned, outlined and designed by city planner and landscape architect John Nolen, who was also the head landscape architect for other American cities, including Madison, Wisconsin, Roanoke, Virginia, San Diego, California and Savannah, Georgia. Main attributes of the plan included setting up areas for commerce and industry, roundabouts, which were common around his home in Massachusetts, and a school system based on a model developed at Columbia University. Kingsport is known for being the first of its kind in that the city is professionally planned and privately financed.

Kingsport is the first Tennessee city to adopt the Council-Manager form of government. This style of government evolved in the early 20th century in response to local governance problems occurring in the nation's cities at the turn of the century. The premise of the Council-Manager form of government is that a trained administrator manages the day to day affairs of the city in an efficient, effective and ethical manner. This type of government became popular in the post World War II era when cities began to grow rapidly. (<http://kingsporttn.gov/?q=history>)

2.1.5 Economy/Industry

According to the American Community Survey, the 2011 industries that employed the highest percentage of Kingsport-Bristol metropolitan statistical area’s labor force (were, in percentage order; educational services, health care, and social assistance, 22 percent, and manufacturing, 18 percent, and retail trade, 13.5 percent.

The civilian labor force in the Kingsport-Bristol metropolitan statistical area was 149,810 in 2011. According to the Tennessee Department of Labor and Workforce Development, March 2012, the annual average unemployment rate was 9.0 percent for the MSA and 8.6 percent for the Sullivan County portion. The statewide unemployment rate was 9.2 percent for that same period.

Table 2.4 lists selected economic characteristics for Sullivan County, the City of Kingsport, and the City of Bristol from the U.S. Census Bureau.

Table 2.4 Sullivan County—Economic Characteristics, 2005-2009

Characteristic	Sullivan County	Bluff City	Bristol	Kingsport
Families below Poverty Level (%)	12.5	21.2	12.7	13.7
Individuals below Poverty Level (%)	16.5	25.5	16.9	17.8
Median Home Value (\$)	115,700	86,700	100,900	120,400
Median Household Income (\$)	40,572	38,512	46,533	39,901
Per Capita Income (\$)	23,536	18,636	22,141	24,739
Population in Labor Force	73,483 57.2%	769 55.9%	11,955 54.6%	22,204 56.2%

Source: US Census Bureau (2005-2009 American Community Survey 5-Year Estimates)

There are many nationally known companies that have grown to prominence from their start-up here and maintain their headquarters in the region. Products vary from helicopter manufacture to chemical, fiber and plastic products, from ordnance to glass production and from batteries to fine printing papers.

Table 2.5 Sullivan County—2009 Economic Sectors

Occupational Sector	No. of Establishments	Annual Payroll (\$1,000)	Number of Employees
Agriculture, forestry, fishing and hunting	1	D	a
Mining, quarrying, and oil and gas extraction	8	D	c
Utilities	5	D	b
Construction	248	129,393	3,735
Manufacturing	148	D	D
Wholesale trade	186	174,475	2,813
Retail trade	560	181,669	8,357
Transportation and warehousing	115	60,547	1,865
Information	49	48,426	1,086
Finance and insurance	258	83,246	1,840
Real estate and rental and leasing	114	11,866	449
Professional, scientific, and technical services	263	63,599	1,543
Management of companies and enterprises	26	78,194	1,131
Administrative and Support and Waste Mang and Remediation Svcs	149	82,401	2,329
Educational services	26	14,894	789
Health care and social assistance	439	514,545	11,958
Arts, entertainment, and recreation	52	14,868	573
Accommodation and food services	297	78,360	6,276
Other services (except public administration)	413	64,897	3,173
Industries not classified	3	84	a
TOTAL FOR ALL SECTORS	3,360	2,436,129	63,307

Source: US Census Bureau; <http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t>

a – 0 to 19 employees; b – 20 to 99 employees; c – 100 to 249 employees; f – 500 to 999 employees;

D – withheld to avoid disclosing data for individual companies; data are included in higher level totals

2.1.6 Agriculture

Agriculture is an economic component in Sullivan County. In 2002, there were 1,453 farms in the County with 100,513 acres. In 2007 there is a negative 12 percent change of the number of farms to 1,280 farms 82,104 acres, an eighteen percent decrease. Cropland makes up 44.85 percent of the land in farms with pasture using 33.36 percent and woodland using 17.79 percent of land in farms. Other uses make up 3.99 percent in Sullivan County.

In 2007, overall value of livestock sales was \$14,186,000 and the value of crops sold was \$2,959,000. Table 2.6 below shows the production quantity and the state rank for the main agricultural products in Sullivan County.

Table 2.6 Sullivan County Agricultural Commodity Groups, 2007

Commodity	Quantity (\$)	State Rank
Grains, oilseeds, dry beans, & dry peas	192	68
Tobacco	228	29
Vegetables, melons, potatoes, & sweet potatoes	50	52
Fruits, tree nuts, & berries	9	46
Nursery, greenhouse, floriculture, & sod	1,912	21
Cut Christmas trees and short rotation woody crops	41	9
Other crops and hay	526	17
Poultry and eggs	(D)	(D)
Cattle and calves	11,806	14
Milk and other dairy products from cows	1,430	34
Hogs and pigs	(D)	(D)
Sheep, goats and their products	307	2
Horses, ponies, mules, burros and donkeys	536	16
Aquaculture	(D)	42
Other animals and animal products	53	17

Source: U.S. Department of Agriculture, 2007 census of agriculture, Sullivan County, TN Profile.
D-Cannot be disclosed

2.2 Jurisdictional Descriptions and Capabilities

The mitigation capabilities for each of the jurisdictions participating in the plan are profiled in the section that follows. These profiles include an overview of the jurisdiction and its organizational structure; a description of staff, fiscal, and technical resources; and information regarding existing hazard mitigation capabilities such as adopted plans policies and regulations, if any. The descriptions and capabilities assessments are based on available and applicable data, including information provided by the jurisdictions collected during the planning process.

The subsections that follow summarize mitigation capabilities for Sullivan County, the Town of Bluff City, the City of Bristol, and the City of Kingsport, respectively.

2.2.1 Sullivan County

Overview

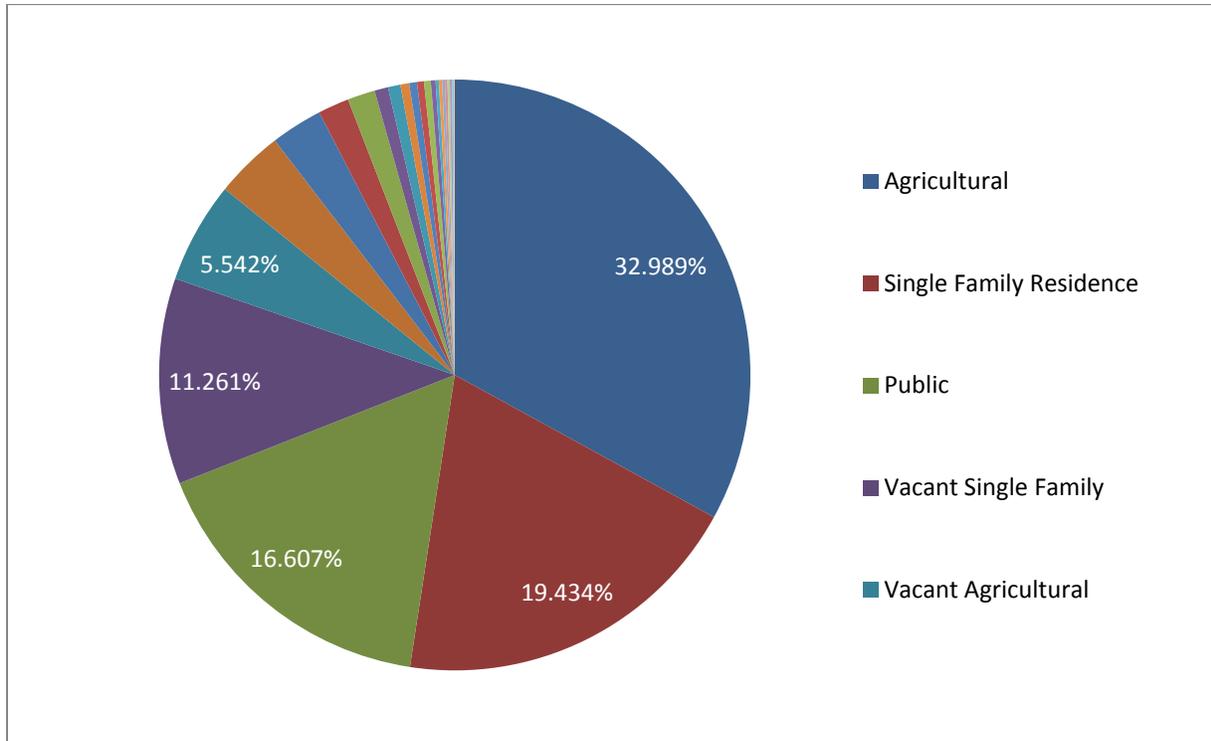
The jurisdiction of Sullivan County includes all unincorporated areas within the County boundaries. Sullivan County is currently governed by an elected County Commission of 24 members with the countywide elected Mayor, traditionally serving as Chairman. Additional elected officers include: Sheriff, Trustee, Assessor of Property, Superintendent of Schools, Commissioner of Roads, Register of Deeds, Circuit Court Clerk, County Clerk, and Administrator of Election Commission. The Sullivan County government includes the following departments:

- Accounts and Budgets
- Archives and Tourism
- Chancery Court
- Circuit Court
- Election Office
- Emergency Management
- Emergency Medical Services
- Highway Department
- Maintenance Department
- Planning and Codes
- Property Assessor
- Purchasing
- Risk management
- Sessions Court
- Solid Waste

Land Use and Development Trends

The 2006 – 2026 Sullivan County Regional Plan details the goals, objectives, and policies for land use in the planning area. As seen in Figure 2.2, agricultural lands make up the largest percentage of land use, based on total acreage, with 33 percent. It is followed by 19 percent single family residence and 17 percent public.

Figure 2.2 Sullivan County Land Use – Top 5 Land Use Types



Source: Developed from 2006-2026 Sullivan County Regional Plan

For future land use, the Sullivan County Regional Plan assumes that the community will experience minimum population growth and that with the average household size will remain at 2.42 persons, approximately 3,423 new housing units will be needed by the year 2026. Suitable land for this growth is available within the county.

The Central Business District (CBD), or downtown, located on State Route 126 in Blountville has been the focal point for commerce and private services in Sullivan County since the early years of the county. Like many older CBD's, this area has experienced some structural deterioration, however; the Sullivan County CBD has very little vacant floor space. In recent years there have been efforts to restore some of the historical buildings in this area. The remodeling of existing buildings and infilling of vacant spaces will be encouraged. The historic character of the area will be highly emphasized through the stewardship of the Sullivan County Historic Preservation Association.

Figure 2.3, on the following page, shows the proposed land use for Sullivan County, as endorsed by the Sullivan County Regional Planning Department in 2006. The majority of the figure is colored yellow or light green depicting low density, single family residential and agricultural/single family residential areas, respectively, of the County.

Technical and Fiscal Resources

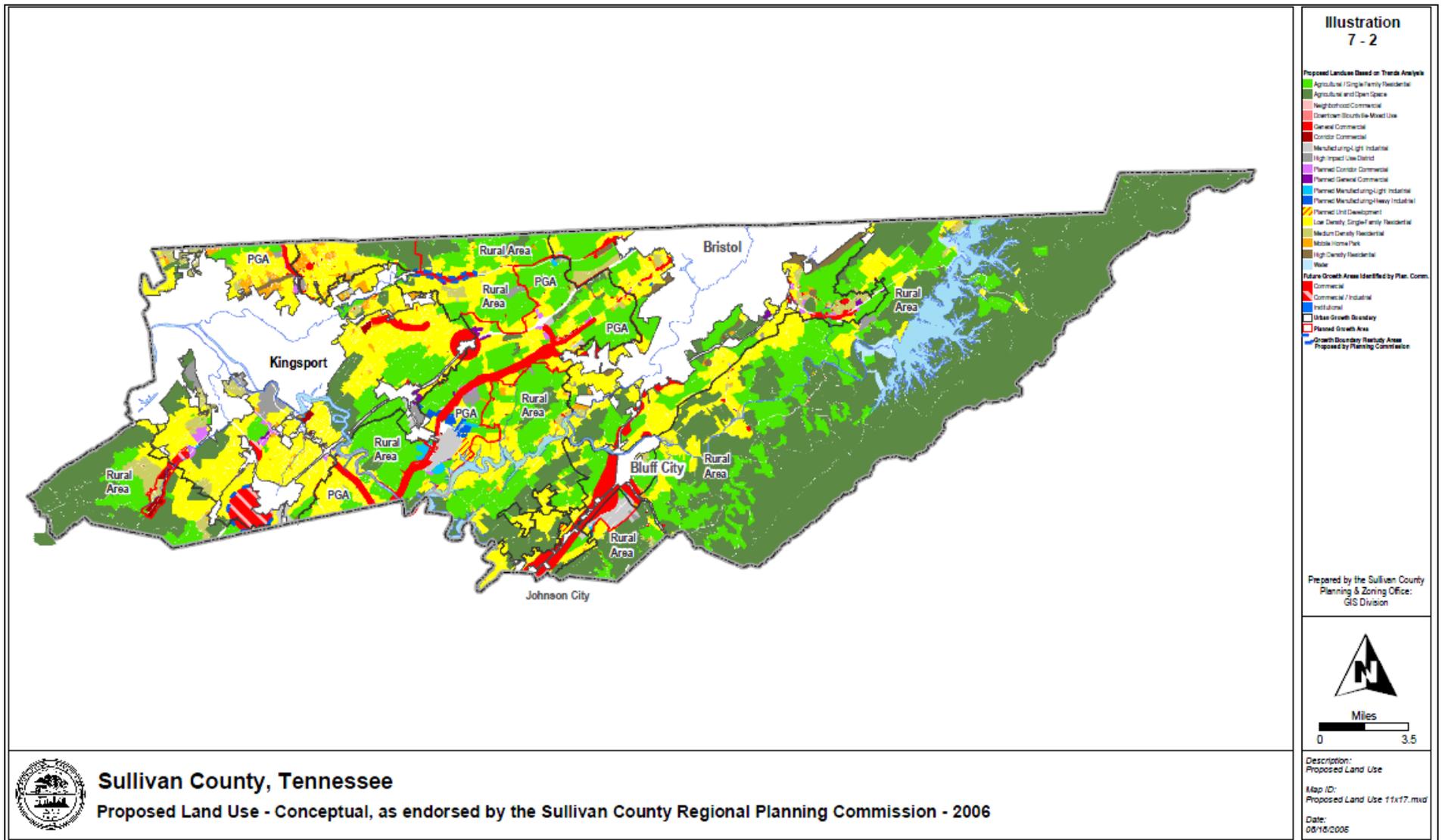
Sullivan County has staff resources in planning, emergency management, and floodplain management. The Sullivan County Regional Planning Department is designated to carry out land use planning for the County. Decisions on zonings and subdivisions and enforcement of zoning and subdivision ordinances are performed by the Sullivan County Board of Zoning Appeals, Regional Historic Zoning Commission, and the Property Maintenance Board.

The Sullivan County Emergency Management Agency (EMA) has the county responsibility to deal with natural disasters, power failures, nuclear incidents, hazardous material incidents, terrorism attacks, and large scale attacks on the United States, etc. There are three emergency dispatch services (Bristol, Kingsport and Sullivan County) that serve the county. Table 2.7 outlines the County’s personnel resources in 2013.

Table 2.7 Sullivan County’s Administrative and Technical Resources

Personnel Resources	Yes/No	Department/Position
Planner/Engineer with knowledge of land development/land management practices	YES	Sullivan County Regional Planning Department
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	YES	Building Commissioner
Planner/Engineer/Scientist with an understanding of natural hazards	YES	EMA
Personnel skilled in GIS	YES	Sullivan County Regional Planning Department
Full time building official	YES	Building Commissioner
Floodplain Manager	YES	Building Commissioner
Emergency Manager	YES	EMA

Figure 2.3 Sullivan County Proposed Land Use



Source: 2006-2026 Sullivan County Regional Plan

Financial tools or resources that the county could potentially use to help fund mitigation activities include the following:

- Community Development Block Grants
- Capital improvements project funding
- Authority to levy taxes for specific purposes
- Fees for water, sewer, gas, or electric services
- Impact fees for new development

Existing Plans and Policies

Sullivan County has a regional land use and transportation development plan, zoning regulations, subdivision regulations, and a flood damage prevention resolution.

The County joined the regular phase of the National Flood Insurance Program on December 30, 1977. They maintain elevation certificates on properties in the floodplain.

Table 2.8 Sullivan County Regulatory Tools

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
General Plan	YES	2006-2026 Sullivan County Regional Plan
Zoning code	YES	
Subdivision regulations	YES	
Growth management ordinance	YES	Open Space Residential Development planning is already established within the existing zoning code
Floodplain ordinance	YES	
Building code	YES	
BCEGS Rating	YES	Unknown
Erosion or sediment control program	YES	
Stormwater management program	YES	
Site plan review requirements	YES	
Capital improvements plan	YES	
Economic development plan	YES	
Local emergency operations plan	YES	Sullivan County EMA Plan
Flood insurance study or other engineering study for streams	YES	
Elevation certificates	YES	

2.2.2 Town of Bluff City

Overview

The Town of Bluff City is currently governed by an elected Board of Aldermen of 4 members with the town-wide elected Mayor, traditionally serving as Chairman. Additional government officers include: Vice Mayor, City Manager, City Recorder/Finance, Chief of Police, City Attorney, and the Planning Commission.

Land Use and Development Trends

The Town of Bluff City is included within the Sullivan County Regional land use and transportation development plan. A separate land use plan has not been prepared for the Town of Bluff City at this time.

Technical and Fiscal Resources

The Town of Bluff City has staff resources in planning and stormwater management. Decisions on zonings and subdivisions and enforcement of zoning and subdivision ordinances are performed by the Town of Bluff City Planning Commission.

Bluff City has a police department and utilizes the Sullivan County Emergency Management Agency (EMA) to assist with natural disasters, power failures, nuclear incidents, hazardous material incidents, terrorism attacks, and large scale attacks on the United States, etc. Table 2.7 outlines the Town’s personnel resources in 2013.

Table 2.9 Town of Bluff City Administrative and Technical Resources

Personnel Resources	Yes/No	Department/Position
Planner/Engineer with knowledge of land development/land management practices	YES	Planning Commission
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	YES	Building Inspector
Planner/Engineer/Scientist with an understanding of natural hazards	YES	Planning Commission
Personnel skilled in GIS	NO	
Full time building official	YES	Building Inspector
Floodplain Manager	YES	Storm Water Coordinator
Emergency Manager	YES	Sullivan County EMA

Financial tools or resources that the city could potentially use to help fund mitigation activities include the following:

- Community Development Block Grants
- Capital improvements project funding
- Authority to levy taxes for specific purposes
- Fees for water, sewer, gas, or electric services
- Impact fees for new development

Existing Plans and Policies

The Town of Bluff City is included within the Sullivan County Regional land use and transportation development plan. The minimum subdivision regulations and zoning ordinance can be found online on the Town’s website (http://www.bluffcitytn.org/codes_ordinances/index.html). In addition, the City has a flood damage prevention ordinance.

The Town joined the regular phase of the National Flood Insurance Program on July 2, 1976. They maintain elevation certificates on properties in the floodplain.

Table 2.10 Town of Bluff City Regulatory Tools

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
General Plan	YES	2006-2026 Sullivan County Regional Plan
Zoning code	YES	
Subdivision regulations	YES	
Growth management ordinance	NO	
Floodplain ordinance	YES	
Building code	YES	
BCEGS Rating	YES	Unknown
Erosion or sediment control program	YES	
Stormwater management program	YES	
Site plan review requirements	YES	
Capital improvements plan	NO	
Economic development plan	NO	Land Use & Transportation Plan 2008-2028
Local emergency operations plan	YES	Sullivan County EMA Plan
Flood insurance study or other engineering study for streams	YES	
Elevation certificates	YES	

2.2.3 City of Bristol

Overview

The City Council is the governing body of the City of Bristol. The Council consists of five persons, three of whom are elected from three council districts by the eligible voters of the city at large and two of whom are elected to at-large seats by the eligible voters of the city at large. The City of Bristol government includes the following departments:

- Community Development
- Community Relations
- Economic Development
- Finance
- Fire
- Human Resource
- Legal
- Metropolitan Planning Organization
- Parks and Recreation
- Police
- Public Works

Land Use and Development Trends

A Land Use Plan and Policy for the City of Bristol details the principles and policies for land use within the City of Bristol. The plan is not intended to be a parcel-by-parcel directive for the specific use of each property in the City. Rather, its purpose is to serve as a general policy guide for the future development of the City and urban growth area. Figure 2.4, on the following page, presents the proposed future land use for the City. The Land Use Plan and Policy document is available online on the City of Bristol's website.

Technical and Fiscal Resources

The City of Bristol has staff resources in planning, development, engineering, and stormwater and floodplain management. Decisions on zonings and subdivisions and enforcement of zoning and subdivision ordinances are performed by the City of Bristol Regional Planning Commission and Board of Zoning Appeals.

The City of Bristol has a police and fire department, and utilizes the Sullivan County Emergency Management Agency (EMA) to assist with natural disasters, power failures, nuclear incidents, hazardous material incidents, terrorism attacks, and large scale attacks on the United States, etc. Table 2.7 outlines the City's personnel resources in 2013.

Figure 2.4 City of Bristol Proposed Land Use

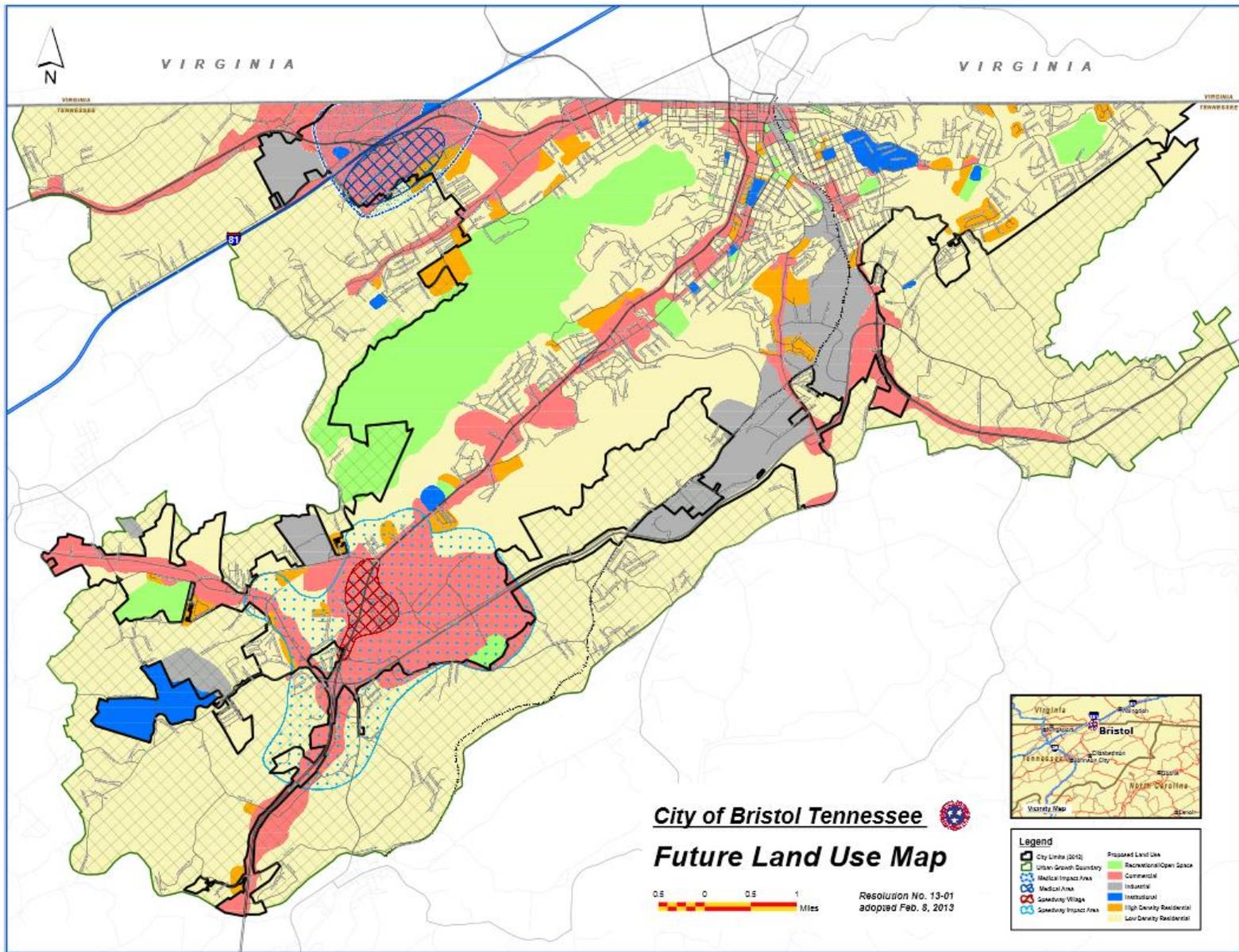


Table 2.11 City of Bristol Administrative and Technical Resources

Personnel Resources	Yes/No	Department/Position
Planner/Engineer with knowledge of land development/land management practices	YES	Community Development Department
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	YES	Codes Enforcement Division; Public Works
Planner/Engineer/Scientist with an understanding of natural hazards	YES	Community Development Department; Public Works
Personnel skilled in GIS	YES	Public Works, Engineering
Full time building official	YES	Codes Enforcement Division
Floodplain Manager	YES	Public Works, Engineering
Emergency Manager	YES	Sullivan County EMA

Financial tools or resources that the city could potentially use to help fund mitigation activities include the following:

- Community Development Block Grants
- Capital improvements project funding
- Authority to levy taxes for specific purposes
- Fees for water, sewer, gas, or electric services
- Impact fees for new development

Existing Plans and Policies

In addition to the Land Use Plan and Policy document, the City of Bristol is included within the Sullivan County Regional land use and transportation development plan. The subdivision regulations and zoning ordinance can be found online on the City of Bristol's website (<http://www.bristoltn.org/Planning.cfm>). In addition, the City has a municipal flood plain management ordinance.

The City joined the regular phase of the National Flood Insurance Program on March 8, 1974 and participates in the CRS program with a current class 8. They maintain elevation certificates on properties in the floodplain.

Table 2.12 City of Bristol County Regulatory Tools

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
General Plan	YES	2006-2026 Sullivan County Regional Plan
Zoning code	YES	
Subdivision regulations	YES	
Growth management ordinance	YES	Northeast Tennessee Overlay District, Urban Growth Boundary
Floodplain ordinance	YES	
Building code	YES	
BCEGS Rating	YES	Unknown
Erosion or sediment control program	YES	
Stormwater management program	YES	
Site plan review requirements	YES	
Capital improvements plan	YES	Capital Improvements Plan 2015-2019
Economic development plan	YES	Strategic Partnerships for Economic Growth and Sustainability, 2013 Economic Development Incentive Program Transportation & Land Use Study, 2006-2025
Local emergency operations plan	YES	Sullivan County EMA Plan
Flood insurance study or other engineering study for streams	YES	
Elevation certificates	YES	

2.2.4 City of Kingsport

Overview

The City of Kingsport government is based upon the Council-Manager form of government. This form of government was established in 1917 when the City was re-incorporated into what is now known as the modern city of Kingsport. The City is governed by a seven member Board of Mayor and Aldermen, elected at-large and on a non-partisan basis for four-year staggered terms. The City of Kingsport government includes the following departments:

- Parks, Recreation, and Leisure
- City Schools
- Kingsport Library
- Police
- Fire
- Public Works
- Human Resources
- Finance and Customer Service
- Purchasing
- Development Services
- GIS
- Metro Transportation Planning
- Economic Development

Land Use and Development Trends

The City of Kingsport is included within the Sullivan County Regional land use and transportation development plan. A separate land use plan has not been prepared for the City of Kingsport at this time.

Technical and Fiscal Resources

The City of Kingsport has staff resources in planning, development services, engineering, and stormwater and floodplain management. Decisions on zoning and subdivisions and enforcement of zoning and subdivision ordinances are performed by the Kingsport Regional Planning Commission, the Board of Zoning Appeals, and the Historic Zoning Commission.

The City of Kingsport has a police and fire department, and utilizes the Sullivan County Emergency Management Agency (EMA) to assist with natural disasters, power failures, nuclear incidents, hazardous material incidents, terrorism attacks, and large scale attacks on the United States, etc. Table 2.7 outlines the County's personnel resources in 2013.

Table 2.13 City of Kingsport Administrative and Technical Resources

Personnel Resources	Yes/No	Department/Position
Planner/Engineer with knowledge of land development/land management practices	YES	Kingsport Regional Planning Commission; Development Services
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	YES	Kingsport Regional Planning Commission; Development Services; Public Works
Planner/Engineer/Scientist with an understanding of natural hazards	YES	Kingsport Regional Planning Commission; Public Works
Personnel skilled in GIS	YES	Development Services, GIS Department
Full time building official	YES	Development Services, Building Department
Floodplain Manager	YES	Public Works, Stormwater Management
Emergency Manager	YES	Sullivan County EMA

Financial tools or resources that the city could potentially use to help fund mitigation activities include the following:

- Community Development Block Grants
- Capital improvements project funding
- Authority to levy taxes for specific purposes
- Fees for water, sewer, gas, or electric services
- Impact fees for new development

Existing Plans and Policies

The City of Kingsport is included within the Sullivan County Regional land use and transportation development plan. The minimum subdivision regulations and zoning ordinance can be found online on the City of Kingsport website. In addition, the City has a flood hazard reduction ordinance.

The County joined the regular phase of the National Flood Insurance Program on March 8, 1974 and participates in the CRS program with a current class 10. They maintain elevation certificates on properties in the floodplain.

Table 2.14 City of Kingsport Regulatory Tools

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
General Plan	YES	2006-2026 Sullivan County Regional Plan
Zoning code	YES	
Subdivision regulations	YES	
Growth management ordinance	YES	Northeast Tennessee Overlay District, Urban Growth Boundary
Floodplain ordinance	YES	
Building code	YES	
BCEGS Rating	YES	Unknown
Erosion or sediment control program	YES	
Stormwater management program	YES	
Site plan review requirements	YES	
Capital improvements plan	YES	Capital Improvements Plan FY2013-2014
Economic development plan	YES	2035 Long Range Transportation Plan
Local emergency operations plan	YES	Sullivan County EMA Plan
Flood insurance study or other engineering study for streams	YES	
Elevation certificates	YES	

2.3 Capabilities Summary

Table 2.15 summarizes the existing regulatory tools and planning mechanisms for Sullivan County and the participating jurisdictions. These plans, codes, and ordinances form a framework that supports this hazard mitigation plan. It is expected that future updates of these planning mechanisms will acknowledge, integrate, and implement this hazard mitigation plan, as necessary and appropriate.

Table 2.15 Sullivan County—Summary of Mitigation-Related Plans and Policies

Capability	Sullivan County	Bluff City	Bristol	Kingsport
Comprehensive Plan	Sullivan County Regional	Sullivan County Regional	Sullivan County Regional	Sullivan County Regional
Emergency Operations Plan	Sullivan County EMA	Sullivan County EMA	Sullivan County EMA	Sullivan County EMA
Economic Development Plan	Yes	Yes	Yes	Yes
Capital Improvements Plan	Yes	Yes	Yes	Yes
Building Code	Yes	Yes	Yes	Yes
Stormwater Management Ordinance	Yes	Yes	Yes	Yes
Zoning Management Ordinance	Yes	Yes	Yes	Yes
Subdivision Ordinance	Yes	Yes	Yes	Yes
Erosion Management Ordinance	Yes	Yes	Yes	Yes
Current Floodplain Map	02/29/2006	02/29/2006	02/29/2006	02/29/2006
Floodplain Management Ordinance	Yes	Yes	Yes	Yes
Elevation Certificates Maintained	Yes	Yes	Yes	Yes
National Flood Insurance Program Community	Yes	Yes	Yes	Yes
National Flood Insurance Join Date	12/30/1977	07/02/1976	03/08/1974	03/08/1974
NFIP Community Number	470181	470296	470182	470184
NFIP Community Rating System Number	n/a	n/a	8	10

3 RISK ASSESSMENT

44 CFR Requirement §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The goal of the risk assessment is to estimate the potential loss in the planning area, including loss of life, personal injury, property damage, and economic loss, from a hazard event. The risk assessment process allows communities in Sullivan County to better understand their potential risk to natural hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

A Multi-Hazard Mitigation Plan was completed for Sullivan County in 2006 and for the City of Bristol in 2006. This risk assessment is an update to the risk assessments previously prepared. Updates to the risk assessment include the following:

- 1) Hazards to include were evaluated and refined;
- 2) HAZUS 2.1, Tennessee State Dataset was utilized to determine assets and loss estimates;
- 3) HAZUS 2.1, Tennessee State Dataset was utilized to determine critical facilities, which were refined by the HMPC; and
- 4) HAZUS 2.1 results assessed vulnerability and loss estimates for earthquake and flooding.

The risk assessment for Sullivan County and its jurisdictions followed the methodology described in the FEMA publication 386-2, *Understanding Your Risks: Identifying Hazards and Estimating Losses* (2002), which includes a four-step process:

- Identify Hazards
- Profile Hazard Events
- Inventory Assets
- Estimate Losses

This chapter is divided into four parts: hazard identification, hazard profiles, vulnerability assessment, and Summary of Key Issues.

Section 3.1 Hazard Identification identifies the hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.

Section 3.2 Hazard Profiles discusses the threat to the planning area and describes previous occurrences of hazard events and the probability of future occurrence.

Section 3.3 Vulnerability Assessment assesses the County’s total exposure to natural hazards, considering critical facilities and other community assets at risk, and assessing growth and development trends. Hazards that vary geographically across the planning area are addressed in greater detail. This section includes steps 3 and 4 from above.

Section 3.4 Summary of Key Issues provides a summary of the key issues or problems identified in the Risk Assessment.

3.1 Hazard Identification

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type...of all natural hazards that can affect the jurisdiction.

3.1.1 Disaster Declaration History

One method used by the HMPC to identify hazards was to examine events that triggered federal and/or state disaster declarations. Federal and/or state declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government’s capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments’ capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration. FEMA also issues emergency declarations, which are more limited in scope and do not include the long-term federal recovery programs of major disaster declarations. Determinations for declaration type are based on scale and type of damages and institutions or industrial sectors affected.

Table 3.1 lists federal disaster declarations through FEMA received by Sullivan County. Each of the disaster events affected multiple counties; estimated damages reflect total losses to all counties.

Table 3.1 Disaster Declaration History in Sullivan County, 1965-Present

DR #*	Declaration Date	Disaster Description	Counties Included for Public Assistance	Counties Included for Individual Assistance	Public Assistance (\$)	Individual Assistance (\$)
Major Disaster Declarations						
1974	May 1, 2011 (4/25-4/28/2011)	Severe Storms, Tornadoes, Straight-Line Winds, and Flooding	Benton, Blount, Campbell, Chester, Fayette, Fentress, Franklin, Gibson, Giles, Hardeman, Henderson, Hickman, Houston, Humphreys, Jackson, Jefferson, Lake, Lawrence, Lewis, Lincoln, Loudon, Marion, Marshall, McNairy, Moore, Perry, Picket, Polk, Scott, Sequatchie, Shelby, Smith, Sullivan , Wayne, Weakley	Bledsoe, Bradley, Carroll, Cocke, Crockett, Greene, Hamilton, Hardin, Henry, Johnson, Knox, Madison, McMinn, Monroe, Montgomery, Rhea, Washington	\$8,596,963	\$51,558,876
1197	January 13, 1998 (1/6-2/12/98)	Severe Storms/Flooding	Bledsoe, Bradley, Campbell, Cannon, Carter, Chester, Clay, Cocke, Crockett, Cumberland, DeKalb, Fentress, Gibson, Greene, Grundy, Hawkins, Haywood, Jackson, Jefferson, Johnson, Madison, Meigs, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Scott, Sequatchie, Sevier, Sullivan , Tipton, Unicoi, Van Buren, Warren, Washington, White	Carter, Johnson, Unicoi, Washington		
424	April 4, 1974	Tornadoes	Bedford, Blount, Bradley, Cannon, Carter, Clay, Coffee, Cumberland, Davidson, DeKalb, Decatur, Dickson, Fentress, Franklin, Giles, Grundy, Hamblen, Hamilton, Hancock, Hardin, Henderson, Jackson, Jefferson, Johnson, Knox, Lincoln, Loudon, Macon, Marion, Marshall, McMinn, Meigs, Monroe, Overton, Pickett, Polk, Putnam, Rutherford, Scott, Sullivan , Trousdale, Warren, White, Williamson, Wilson	Bedford, Blount, Bradley, Cannon, Carter, Clay, Coffee, Cumberland, Davidson, DeKalb, Decatur, Dickson, Fentress, Franklin, Giles, Grundy, Hamblen, Hamilton, Hancock, Hardin, Henderson, Jackson, Jefferson, Johnson, Knox, Lincoln, Loudon, Macon, Marion, Marshall, McMinn, Meigs, Monroe, Overton, Pickett, Polk, Putnam, Rutherford, Scott, Sullivan , Trousdale, Warren, White, Williamson, Wilson		

DR #*	Declaration Date	Disaster Description	Counties Included for Public Assistance	Counties Included for Individual Assistance	Public Assistance (\$)	Individual Assistance (\$)
366	March 21, 1973	Heavy Rains/Flooding	Anderson, Bedford, Bledsoe, Blount, Bradley, Cannon, Carter, Claiborne, Cocke, Coffee, Franklin, Giles, Grainger, Greene, Grundy, Hamblen, Hamilton, Hancock, Hardin, Hawkins, Hickman, Jefferson, Johnson, Knox, Lawrence, Lincoln, Loudon, Marion, Marshall, Maury, McMinn, Meigs, Monroe, Moore, Rhea, Roane, Rutherford, Sequatchie, Sevier, Sullivan , Unicoi, Union, Van Buren, Warren, Washington, Wayne, White	Anderson, Bedford, Bledsoe, Blount, Bradley, Cannon, Carter, Claiborne, Cocke, Coffee, Franklin, Giles, Grainger, Greene, Grundy, Hamblen, Hamilton, Hancock, Hardin, Hawkins, Hickman, Jefferson, Johnson, Knox, Lawrence, Lincoln, Loudon, Marion, Marshall, Maury, McMinn, Meigs, Monroe, Moore, Rhea, Roane, Rutherford, Sequatchie, Sevier, Sullivan , Unicoi, Union, Van Buren, Warren, Washington, Wayne, White		
Emergency Declarations						
EM-3217	September 5, 2005 (8/29-10/1/2005)	Hurricane Katrina Evacuation	Statewide-All Counties	None		None
EM-3095	March 14, 1993 (3/13-3/17/93)	Severe Snowfall, Winter Storm	Anderson, Bedford, Bledsoe, Blount, Bradley, Campbell, Cannon, Carter, Claiborne, Clay, Cocke, Coffee, Cumberland, DeKalb, Fentress, Franklin, Grainger, Greene County, Grundy, Hamblen, Hamilton, Hancock, Hawkins, Jackson, Jefferson, Johnson, Knox, Lawrence, Lincoln, Loudon, Macon, Marion, McMinn, Meigs, Monroe, Moore, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Rutherford, Scott, Sequatchie, Sevier, Smith, Sullivan , Trousdale, Unicoi, Union, Van Buren, Warren, Washington, White, Wilson	None		None

Source: Federal Emergency Management Agency, www.fema.gov; *DR # = Disaster Number; Note: Incident dates are in parentheses.

It is also important to note that the federal government may issue a disaster declaration through the U.S. Department of Agriculture and/or the Small Business Administration, as well as through FEMA. The quantity and types of damage are the factors that determine whether such declarations are issued.

The U.S. Department of Agriculture (USDA) provides 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. From 2012-2013, Sullivan County has had no primary and one contiguous USDA Secretarial disaster designation.

The Small Business Administration 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 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 Administrator of SBA declares an area, both primary and adjacent counties are eligible for the same assistance. Sullivan County is included in the following SBA declarations:

- #13215 and 13216 for severe storms, flooding and heavy rain occurring on August 5-6, 2012

3.1.2 Research Additional Sources

Additional data on the past impacts of hazards in the planning area was collected from the following sources:

- Tennessee State Hazard Mitigation Plan (2004)
- Sullivan County Regional Plan (2006)
- National Weather Service Weather Forecast Office, Morristown, Tennessee
- Sullivan County Flood Insurance Study (September 2006)
- Information on past hazard events from the Spatial Hazard Event and Loss Database (SHELDUS), a component of the University of South Carolina Hazards Research Lab that compiles county-level hazard data for 18 different natural hazard event types

- Information on past extreme weather and climate events from the National Oceanic and Atmospheric Administration’s (NOAA) National Climatic Data Center
- Disaster declaration history from the Federal Emergency Management Agency (FEMA), the Public Entity Risk Institute, and the USDA Farm Service Agency Disaster Declarations
- The National Drought Mitigation Center Drought Reporter
- Information provided by members of the Hazard Mitigation Planning Committee
- Various articles and publications available on the internet (sources are indicated where data is cited)

3.1.3 Review of Existing Mitigation Plans

The Hazard Mitigation Planning Committee (HMPC) reviewed data and discussed the impacts of each of the hazards included in the 2006 Sullivan County and 2006 City of Bristol Hazard Mitigation Plans, as well as the State of Tennessee Hazard Mitigation Plan. Table 3.2 below provides a comparison of the hazards included in these two plans:

Table 3.2 Hazards Included in 2006 Plan and State Plan

2006 Sullivan County Hazard Mitigation Plan	2006 City of Bristol Hazard Mitigation Plan	State of Tennessee Hazard Mitigation Plan
Dam Failure	Dam Failure	Not an individual hazard
Drought	Drought	Drought
Earthquake	Earthquake	Earthquake
	Extreme Temperature	Extreme Heat
Flood	Flood	Flood
		Hailstorm
Land Subsidence/Sinkhole	Land Subsidence/Sinkhole	Geologic Hazard
Landslide	Landslide	
Severe Thunderstorm (hail, lightning, and wind)	Severe Thunderstorm (hail, lightning, and wind)	Severe Storm
Severe Winter Storms	Severe Winter Storms	Included as Severe Storm
Tornado	Tornado	Tornado
Wildfire	Wildfire	Wildfire
Hazardous Materials Incidents	Hazardous Materials Incidents	Windstorm
Terrorism Event	Terrorism Event	

3.1.4 Hazards Identified

After a careful review of the previous disaster declarations, the State of Tennessee Hazard Mitigation Plan, and additional sources, the HMPC determined that they would make the following modifications to the hazards included in the 2013 plan:

- Extreme temperatures will be addressed for all participating jurisdictions;
- Severe thunderstorms will address hail, lightning, and straight-line winds
- Severe winter storms will be addressed separately from severe thunderstorms;
- Land subsidence and landslides will be addressed as separate geological hazards;

Hazardous Materials Incidents and Terrorism Events will continue to be included as man-made hazards.

Therefore, the HMPC identified 13 natural hazards that significantly affect the planning area. These hazards are listed below with an “X” indicating the affected jurisdictions in Table 3.3. Each of these hazards is profiled in further detail in the next section.

Table 3.3 Hazards Identified for Each Participating Jurisdiction

Hazard	Sullivan County	Bluff City	Bristol	Kingsport
Dam Failure	X	X	X	X
Drought	X	X	X	X
Earthquake	X	X	X	X
Extreme Heat	X	X	X	X
Flood	X	X	X	X
Hazardous Materials Incidents	X	X	X	X
Land Subsidence/Sinkhole	X	X	X	X
Landslide	X	X	X	X
Severe Thunderstorm (hail, lightning, and wind)	X	X	X	X
Severe Winter Storms	X	X	X	X
Tornado	X	X	X	X
Wildfire	X	X	X	X
Terrorism Event	X	X	X	X

Multi-Jurisdictional Risk Assessment

For this multi-jurisdictional plan, the risk assessment assesses each jurisdiction’s risks where they deviate from the risks facing the entire planning area. Sullivan County is 430 square miles and is somewhat uniform in terms of climate and topography as well as construction characteristics and development trends. Accordingly, overall risk to hazards does not vary greatly across the planning area for hazards that do not have geographically-specific hazard boundaries. Weather-related hazards, such as drought, extreme temperature, thunderstorms/high winds, tornadoes, and winter storms, affect the entire planning area.

The hazards that do have specific geographic risk areas and the potential to vary across the planning area include: dam failure, earthquake, flood, levee failure, and wildfires. In Section 3.2, Hazard Profiles, the Geographic Location section discusses how the hazard varies among jurisdictions across the planning area. The Previous Occurrences section lists the best available data on where past events have occurred and the associated losses to particular jurisdictions. Section 3.3.2, Community Asset Inventory, describes critical facilities and other community assets by jurisdiction. Section 3.3.3, Vulnerability by Hazard, identifies structures

and estimates potential losses by jurisdiction where data is available and hazard areas are identified for hazards of moderate and high planning significance.

The previous chapter, Chapter 2 Planning Area Profile and Capabilities, discussed the existing mitigation capabilities of each jurisdiction, such as plans and policies, personnel, and financial resources, which are or could be used to implement measures to reduce hazard losses.

3.2 Hazard Profiles

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the...location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

Methodology

Each hazard identified in Section 3.1 Hazard Identification is profiled individually in this section. The level of information presented in the profiles varies by hazard based on the information available. With each update of this plan, new information will be incorporated to provide for better evaluation and prioritization of the hazards that affect the planning area.

The sources used to collect information for these profiles include those mentioned in Section 3.1.1 as well as those cited individually in each hazard section.

Detailed profiles for each of the identified hazards include information categorized as follows:

Hazard Description

This section consists of a general description of the hazard and the types of impacts it may have on a community.

Geographic Location

This section describes the geographic extent or location of the hazard in the planning area. Where available, maps are utilized to indicate the areas of the planning area that are vulnerable to the subject hazard. The geographic location was assigned a rank as defined in the following manner:

- **Extensive**—50-100 percent of planning area affected.
- **Significant**—10-50 percent of planning area affected.
- **Limited**—less than 10 percent of planning area affected.

Previous Occurrences

This section includes information on historic incidents and their impacts based upon the sources described in Section 3.1 Hazard Identification and the information provided by the Hazard Mitigation Planning Committee.

Probability of Future Occurrence

The frequency of past events is used to gauge the likelihood of future occurrences. Where possible, the probability or chance of occurrence was calculated based on historical data. Probability was determined by dividing the number of events observed by the number of years and multiplying by 100. This gives the percent chance of the event happening in any given year. An example would be three droughts occurring over a 30-year period, which suggests a 10 percent chance of a drought occurring in any given year. The probability was assigned a rank as defined in the following manner:

- **Highly Likely**—Near 100 percent chance of occurrence next year or happens every year.
- **Likely**—10-100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less.
- **Occasional**—1-10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.
- **Unlikely**—Less than 1 percent chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.

Magnitude/Severity

The magnitude of the impact of a hazard event (past and perceived) is related directly to the vulnerability of the people, property, and the environment it affects. This is a function of when the event occurs, the location affected the resilience of the community, and the effectiveness of the emergency response and disaster recovery efforts.

The magnitude of each profiled hazard is classified in the following manner:

- **Catastrophic**—Multiple deaths; property destroyed and severely damaged; and/or interruption of essential facilities and service for more than 72 hours.
- **Critical**—Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours.
- **Limited**—Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours.
- **Negligible**—No or few injuries or illnesses; minor quality of life loss; little or no property damage; and/or brief interruption of essential facilities and services.

3.2.1 Dam Failure

Description

A dam is defined as a barrier constructed across a watercourse for the purpose of storage, control, or diversion of water. Dams are typically constructed of earth, rock, concrete, or mine tailings. A dam failure is the collapse, breach, or other failure resulting in downstream flooding.

A dam impounds water in the upstream area, referred to as the reservoir. The amount of water impounded is measured in acre-feet. An acre-foot is the volume of water that covers an acre of land to a depth of one foot. As a function of upstream topography, even a very small dam may impound or detain many acre-feet of water. Two factors influence the potential severity of a full or partial dam failure: the amount of water impounded, and the density, type, and value of development and infrastructure located downstream.

The failure of dams could result in injuries, loss of life, or damage to property, the environment, and the economy. Dams often serve multiple purposes, one of which may be flood control. Severe flooding and other storms can increase the potential that dams will be damaged and fail as a result of the physical force of the flood waters or overtopping.

Dams are usually engineered to withstand a flood with a computed risk of occurrence. If a larger flood occurs, then that structure will likely be overtopped. If during the overtopping, the dam fails or is washed out, the water behind is released as a flash flood. Failed dams can create floods that are catastrophic to life and property, in part because of the tremendous energy of the released water.

The hazard potential for dam failure is classified according to the following definitions accepted by the Interagency Committee on Dam Safety:

High Hazard Dam—A dam located in an area where failure could result in any of the following: extensive loss of life, damage to more than one home, damage to industrial or commercial facilities, interruption of a public utility serving a large number of customers, damage to traffic on high-volume roads that meet the requirements for hazard class C dams or a high-volume railroad line, inundation of a frequently used recreation facility serving a relatively large number of persons, or two or more individual hazards described for significant hazard dams

Significant Hazard Dam—A dam located in an area where failure could endanger a few lives, damage an isolated home, damage traffic on moderate volume roads that meet certain requirements, damage low-volume railroad tracks, interrupt the use or service of a utility serving a small number of customers, or inundate recreation facilities, including campground areas intermittently used for sleeping and serving a relatively small number of persons

Low Hazard Dam—A dam located in an area where failure could damage only farm or other uninhabited buildings, agricultural or undeveloped land including hiking trails, or traffic on low-volume roads that meet the requirements for low hazard dams

Dam failures can result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding, which causes most failures;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross section of the dam and abutments;
- Improper design, including the use of improper construction materials and construction practices;
- Negligent operation, including failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams o the same waterway;
- Landslides into reservoirs, which cause surges that result in overtopping;
- High winds, which can cause significant wave action and result in substantial erosion; and
- Earthquakes, which typically cause longitudinal cracks at the tops of embankments and weaken entire structures.

Geographic Location

There are 13 dams located in and around the planning area (See Table 3.4 and Figure 3.1). Seven of the dams are owned and regulated by the Tennessee Valley Authority (TVA). The remaining dams are regulated by the Tennessee Department of Environment and Conservation (TDEC) with Middlebrook, Taylor, and Underwood Park are classified by as significant to low hazard dams.

Table 3.4 below summarizes the high and significant hazard dams in the planning area. All but one of the high and significant hazard dams in the planning are publicly owned or owned by TVA and are for recreational purposes as reported by the National Inventory of Dams.

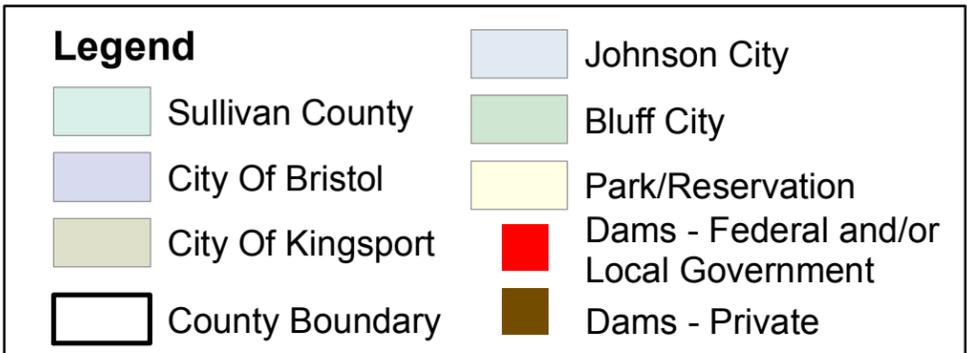
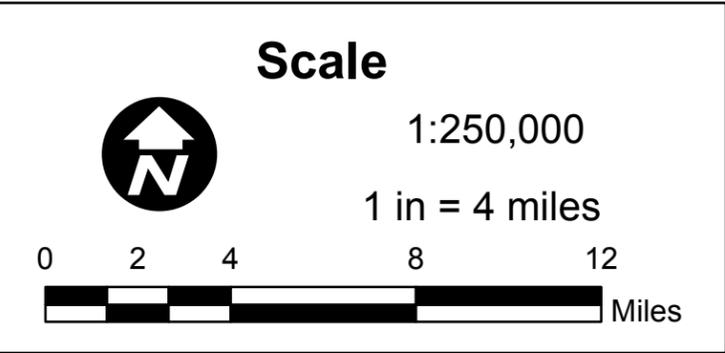
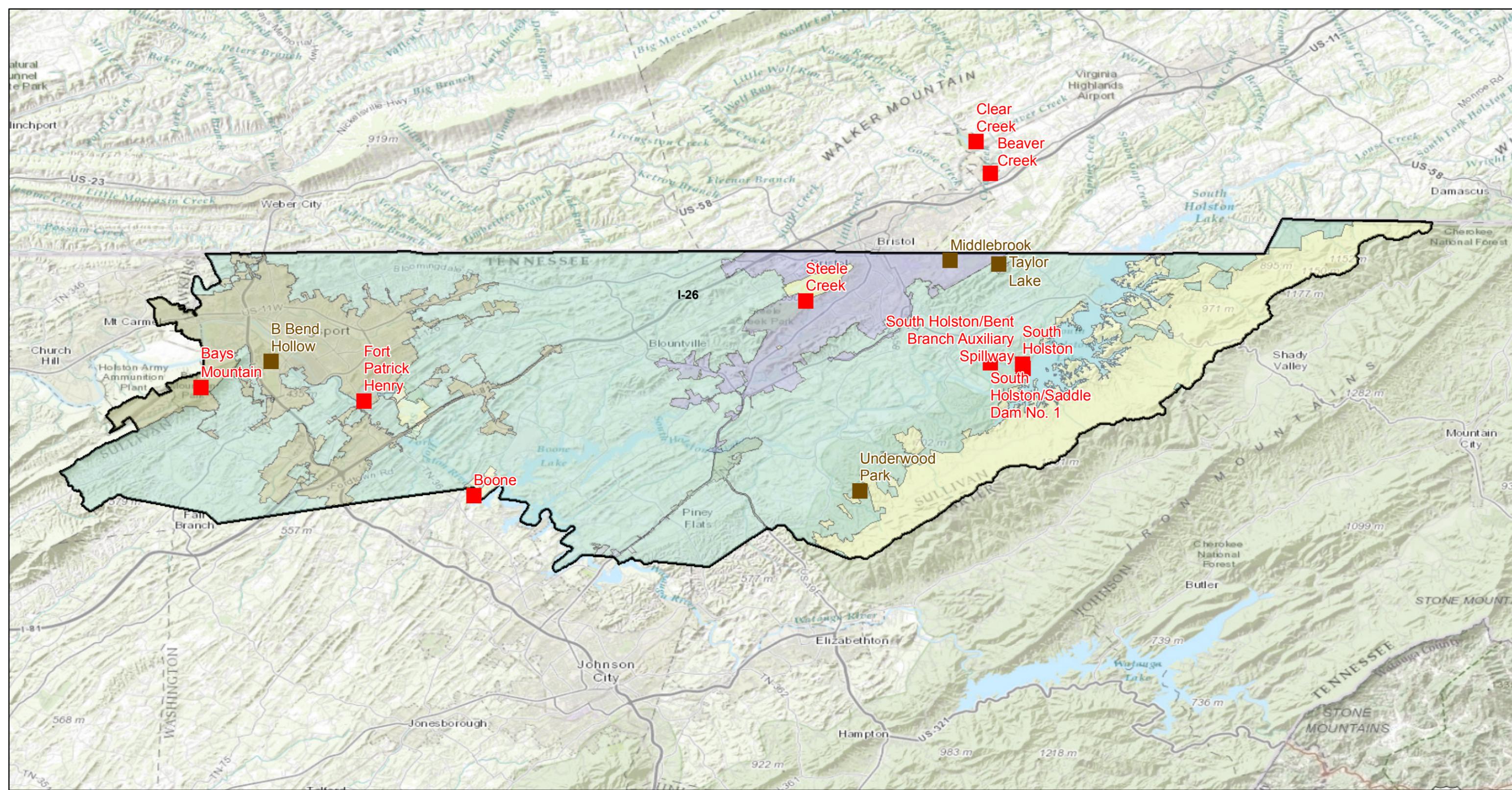
The geographic location of dams in the planning area is given a rank of **significant**:

Significant—10-50 percent of planning area affected.

Table 3.4 Dams within Sullivan County

	Dam Name	Hazard Class	Last Inspection	Height (Ft.)	Storage (Acre Feet)	River	Owner	EAP ¹
Sullivan County								
TN	Bays Mountain	High	5/05/2012	35	550	Dolan Branch	City of Kingsport	Y
TN	Underwood Park	Significant	3/19/2009	24.8	51	Cane Lick Branch	Private	NR ²
Bluff City								
TN	South Holston	High	7/31/2009	285	890,367	South Fork Holston River	TVA	Y
TN	South Holston/Bent Creek Auxiliary Spillway	High	7/31/2009	9	N/A	South Fork Holston River	TVA	Y
TN	South Holston/Saddle Dam No. 1	High	7/31/2009	40	N/A	South Fork Holston River	TVA	Y
City of Bristol								
VA	Clear Creek	High	11/19/2008	51	4660	Clear Creek	TVA	Y
VA	Beaver Creek	High	11/19/2008	85	6920	Beaver Creek	TVA	Y
TN	Middlebrook	Significant	5/15/2012	17	222	Sinking Creek	Middlebrook H.O.A.	NR
TN	Steele Creek	High	11/21/2011	50	1989	Steele Creek	City of Bristol	Y
TN	Taylor Lake	Significant	N/A	N/A	N/A	Nicely Branch	Private	NR
City of Kingsport								
TN	Boone	High	12/08/2009	160	216,147	South Fork Holston River	TVA	Y
TN	Fort Patrick Henry	High	12/8/2009	95	31,728	South Fork Holston River	TVA	Y
TN	Bend Hollow	High	11/16/2011	131	1090		Eastman Chemical Company	Y

Source: *National Inventory of Dams*; <http://nid.usace.army.mil>; EAP – Emergency Action Plan; NR – not required



Sullivan County Dam Location Map

Data Source:
World Topographic Map 2010

Prepared February 2014

Previous Occurrences

A dam break occurred in April 1977 when the Middlebrook Dam on Sinking Creek failed, causing minor flooding damage. However, the dam was reconstructed, in 1990, with a spillway that relieves the 500-year flood without overtopping the dam and causing a similar dam failure. There is no record of dam failure in Sullivan County, Bluff City or the City of Kingsport. (Source: <http://www.state.tn.us/environment/dws/pdf/damoverview.pdf>)

Probability of Future Occurrences

The Tennessee Safe Dams Program, operated by the TDEC, was created to protect the public from dam failures. TDEC inspects dams for safety and requires that dams meet stability and spillway standards in order for the owners to obtain and maintain an operating permit. Dams are inspected every 1, 2, or 3 years depending on the hazard potential category of the dam. Because dam failure is generally a secondary effect of other causes and hazards, calculating probability is difficult. Based on the past performance of these structures during flooding conditions, the HMPC determined that the probability of this hazard is **unlikely**, less than 1 percent chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years. Frequent inspections can identify needed repairs or improvements that may be necessary to prevent failure.

- **Unlikely**—Less than 1 percent chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.

Magnitude/Severity

Although there have been no documented failures of state-regulated dams in The planning area and the probability of failure is low, if failure were to occur, it could be **critical** for people and structures in the inundation path, with isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours.. As a result, data is not available to specifically address potential magnitude of failure in quantitative terms. Additionally, if additional development occurs in downstream areas where inundation would occur, the severity of failure would also increase.

- **Critical**—Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours.

3.2.2 Drought

Description

A drought is a period of drier-than-normal conditions that result 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 Sullivan County is presented in Table 3.5 below.

Table 3.5 Precipitation Summary (inches), 1971-2000 National Climatic Data Center Normals

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
TriCity Airport	3.25	3.40	3.91	3.23	4.32	3.89	4.21	3.00	3.08	2.30	3.08	3.39	41.33
Kingsport	3.87	3.67	4.20	3.35	4.50	4.00	4.64	3.70	3.10	2.64	3.22	3.55	44.44

Source: Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1971 – 2000, National Oceanic and Atmospheric Administration, National Environmental Satellite, Data and Information Service, National Climatic Data Center, Asheville, NC, <http://hurricane.ncdc.noaa.gov/climatenormals/clim81/TNnorm.pdf>

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 declines 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. Lower river levels can also cause transportation interruptions on navigable streams.

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 records of rainfall. 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.

In 1987, the Tennessee Department of Environment and Conservation prepared Tennessee's Drought Management Plan. In February 2010, this plan was revised incorporating input from a variety of stakeholders that comprise the Water Resources Technical Advisory Committee. This plan focuses on TDEC's role to facilitate planning, and to provide a framework for action and cooperation in water resources management among the many local, state, and federal agencies with drought-related responsibilities.

U.S. Drought Monitor: The U.S. Drought Monitor began in 1999 and is a synthesis of multiple climate monitoring tools as well as the informed judgments of its authors and federal, state, and academic reviewers across the country. The U.S. Drought Monitor Map is produced weekly and summarizes information onto a single, easy-to-read colored map. The Drought

Monitor Map identifies general drought areas, labeling droughts by intensity, with D1 being the least intense and D4 being the most intense. The data cutoff for Drought Monitor maps is Tuesday at 7 a.m. Eastern Standard Time. The maps, which are based on analysis of the data, are released each Thursday at 8:30 a.m. Eastern Time. The map released the first Thursday of the month will be used as a drought indicator for the previous month's water shortage stages.

Streamflow: The U.S. Geological Survey, in cooperation with the Department of Natural Resources and a number of other Federal, State and Local agencies, maintains a network of approximately 102 gauging stations in Tennessee. There are two stations in Sullivan County. They are: Bristol Tri City Airport and Kingsport. Streamflow at the 25th percentile means that streamflow is only 25% of the historical average streamflow for that particular month. Lower percentiles correspond to increasingly lower streamflow and drought conditions.

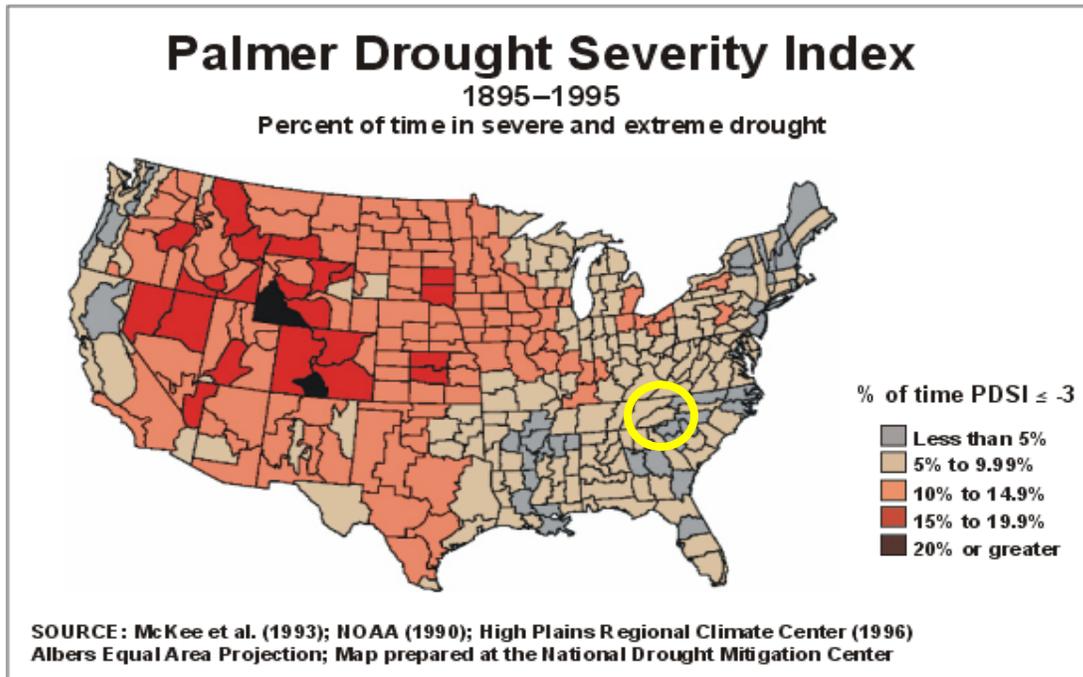
Another common indicator of drought is the Palmer Drought Severity Index (PDSI). The PDSI is a soil moisture algorithm calibrated for relatively homogeneous regions. It is used by many U.S. government agencies and states to trigger drought relief programs. It was also the first comprehensive drought index developed in the United States. The classifications of the PDSI are presented in Table 3.6 below.

Table 3.6 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 (Figure 3.2). During periods of drought, the Governor has called for a ban of open burning in an effort to reduce the risk of wildfire (see Wildfire 3.2.11).

Figure 3.2 Palmer Drought Severity Index, 1895-1995



Geographic Location

Drought tends to affect broad regions and the entire planning area is subject to drought occurrence at roughly equal probability. The impacts of prolonged drought are most significant in agricultural areas of the County. According to the 2007 Census of Agriculture, 82,104 acres in Sullivan County are used for agricultural purpose. This translates to nearly 30% percent of all land in the county.

Additionally, drought can severely limit public water supplies due to depletion of natural water sources and greatly increased demand. Problems due to limited treatment capacity or limited distribution system capacity are an additional concern.

Therefore, the geographic location of this hazard is **significant**:

Significant—10-50 percent of planning area affected.

Previous Occurrences

Historical information on previous periods of drought and drought impacts was obtained from three primary sources, the USDA Secretarial disaster designations for drought, University of Nebraska's National Drought Mitigation Centers Drought Impact Reporter and the National Oceanic Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC).

According to the USDA's Risk Management Agency, insured crop losses in Sullivan County as a result of drought conditions from 2003 to 2012 totaled \$828,217.

Probability of Future Occurrences

Lack of precipitation for a given area is the primary contributor to drought conditions. Since precipitation levels cannot be predicted in the long term, it is difficult to determine the probability of future occurrences of drought. Figure 3.2 shows the Palmer Drought Severity Index for the U.S. from 1895-1995. Sullivan County is in a region of Tennessee that experienced severe and extreme drought 5-10 percent of the time during that 100-year period. Considering this historical data as well as more recent periods of drought, the HMPC determined the probability of future occurrence of drought to be **occasional**:

- **Occasional**—1-10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.

Magnitude/Severity

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in Tennessee are those related to agriculture. A prolonged drought could have severe economic impacts.

Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. An ongoing drought may also leave an area more prone to wildfires.

The magnitude/severity for this hazard is **negligible**:

- **Negligible**—No or few injuries or illnesses; minor quality of life loss; little or no property damage; and/or brief interruption of essential facilities and services.

3.2.3 Earthquake

Description

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.

Sullivan County is subject to earthquakes because of the close proximity to the East Tennessee Seismic Zone (ETSZ) within the Southern Appalachian Seismic Zone (SASZ).

Geographic Location

Sullivan County is located in the Southern Appalachian Seismic Zone, which extends from Alabama to Virginia. Most of the seismicity in the SATZ is thought to be caused by reactivation of Precambrian age faults in the crystalline basement rocks buried beneath a younger veneer of sedimentary rocks. Maximum tectonic stress is oriented nearly horizontal and trends east-northeast to west-southwest, (Munsey, et al., 1985, Teague, et al., 1986, and Nava, et al., 1989). There is a lack of any known earthquakes with magnitudes of 6.0 or greater in the SASZ. The largest known earthquake in the SASZ was the Giles County, Virginia earthquake of 1897, which had an estimated magnitude of 5.8. The most active portion of the SASZ extends from northwestern Georgia through east Tennessee, hereafter termed the East Tennessee Seismic Zone (ETSZ). Given the rate of seismicity in the ETSZ, it is somewhat surprising that the largest known earthquake in the ETSZ was the 1973 Alcoa, Tennessee earthquake which had a magnitude of only 4.6. The scarcity of easily deformable rocks and sediments in the SASZ has made identification of prehistoric earthquakes very difficult. To date, only limited paleoseismic studies have been conducted in the SASZ and these studies have produced no conclusive evidence of damaging prehistoric earthquakes. Thus, definition of a maximum earthquake for the SASZ, and especially for the ETSZ, remains problematic.

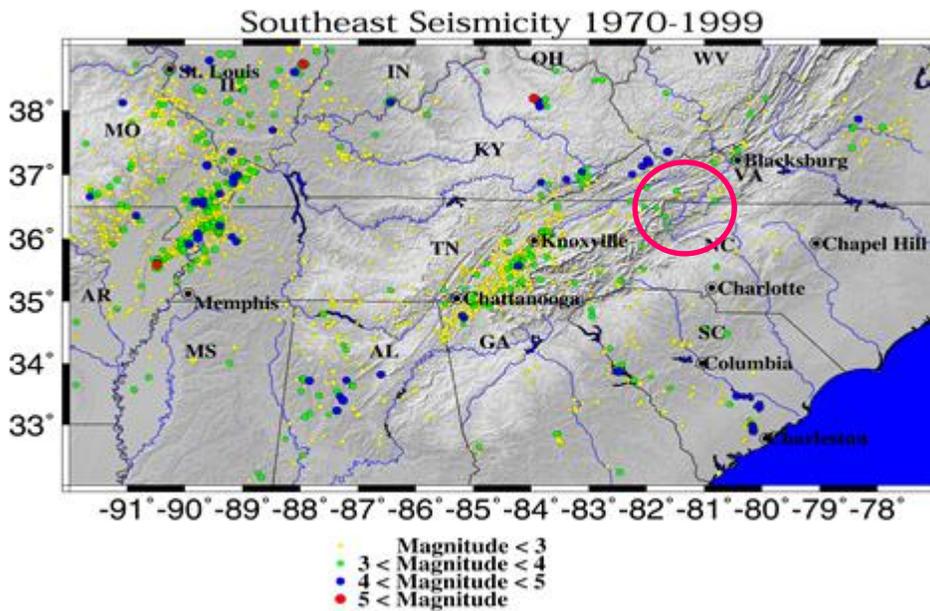
The same factors that limit investigations of possible large prehistoric earthquakes in the SASZ have the positive effect of limiting the extent of secondary earthquake hazards in the SASZ. Most of the SASZ region is covered by hardened, Paleozoic sedimentary rocks or crystalline rocks of Precambrian age. Therefore, rockslides are probably the most important secondary hazard, with little opportunity for liquefaction.

The preponderance of karst conditions in the SASZ may cause occasional instances of small, localized earthquakes when underground limestone caverns collapse or shift. Examples of this phenomenon may include the Bristol, Tennessee, earthquakes of February 1994, the Maryville, Tennessee, earthquakes of April 1994, and the Greeneville, Tennessee, earthquakes of March 1995, as well as some sporadic seismicity along the eastern flank of the Tellico reservoir. These events typically involve relatively small energy releases, and although they may be felt quite strongly in small areas, they do not represent a significant component of the regional seismic hazard.

Figure 3.3 indicates the locations of the New Madrid and Southern Appalachian Seismic Zones. This U.S. Geological Survey map shows earthquakes as colored circles. Larger earthquakes are represented by larger circles.

All these central United States earthquakes are being monitored and researched by multiple sources such as the U.S. Geological Survey, Center for Earthquake Research and Information at the University of Memphis, Central United States Earthquake Consortium, St. Louis University.

Figure 3.3 Southeast Seismic Zones and Earthquakes 1970-1999.



Source: U.S. Geological Survey, Red circle indicates approximate location of Sullivan County, TN.

Several methods have been developed to quantify the strength of an earthquake. The most recognized methods for measuring earthquake strength are:

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 3.7 provides a comparison of the Richter Magnitude and Modified Mercalli Intensity Scales.

Table 3.7 Comparison of Richter Magnitude and Modified Mercalli Intensity Scales

Richter Magnitude	Modified 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

Liquefaction

When strong earthquakes release energy, the resultant violent shaking motions may cause underground layers of saturated sandy soil to behave like a fluid under pressure. This process is called liquefaction. When the pressure forces liquefied sand to move up through cracks in the overlying soil and flow out over the surface a feature called sandblow is created. Liquefaction may cause landslides, the collapse of earthen dams, and the shifting and settling of buildings and other structures.

Ground Motion Amplification

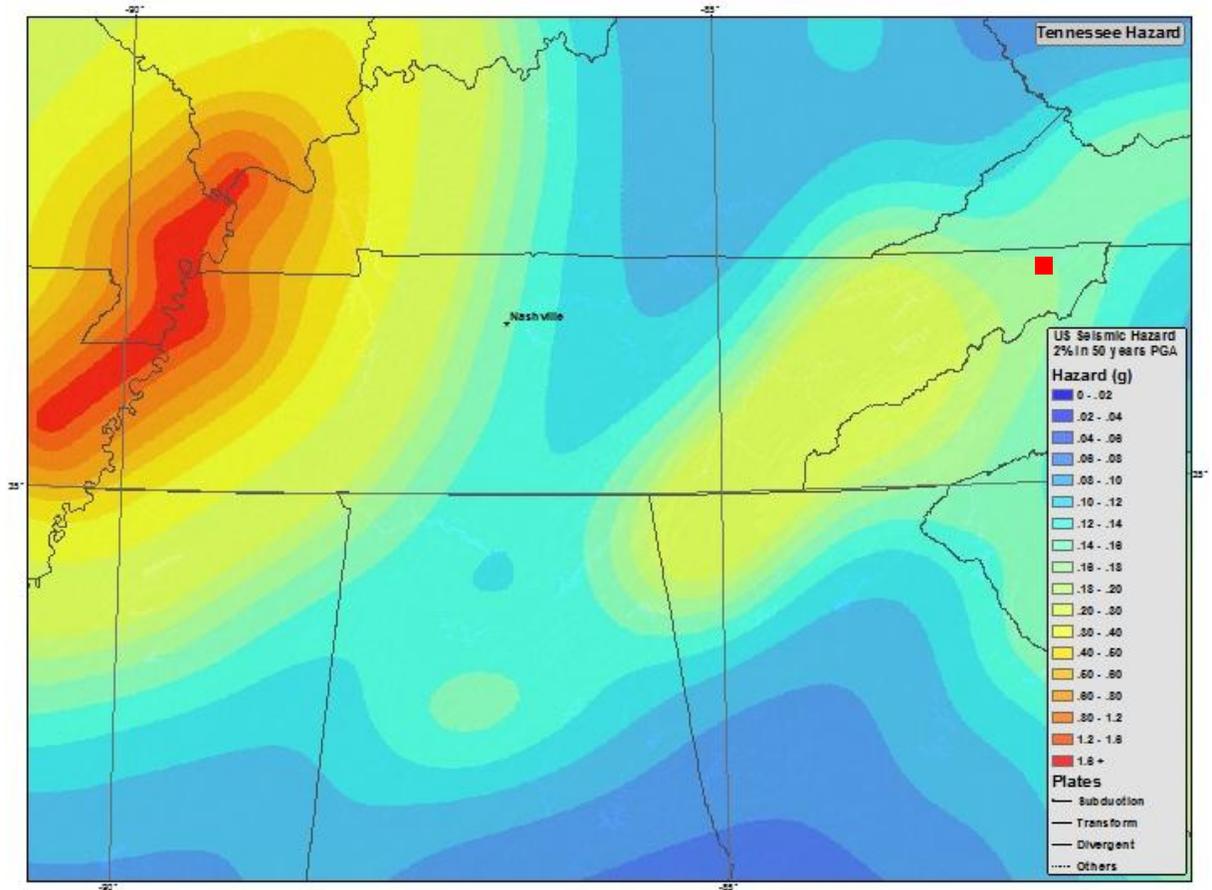
Ground motion is the movement of the earth’s surface due to earthquakes or explosions. It is produced by waves generated by a sudden slip on a fault or sudden pressure at the explosive source and travels through the earth and along its surface. Ground motion is amplified when surface waves of unconsolidated materials bounce off of or are refracted by adjacent solid bedrock. The New Madrid Seismic Zone hazard area and East Tennessee Seismic Zone are shown in Figure 3.4 which uses contour values to indicate the earthquake ground motions that have a common probability of being exceeded in 50 years.

In developing Figure 3.4, the ground motions being considered at a given location are those from all future possible earthquake magnitudes at all possible distances from that location. The ground motion coming from a particular magnitude and distance is assigned an annual probability equal to the annual probability of occurrence of the causative magnitude and distance.

The method assumes a reasonable future catalog of earthquakes, based upon historical earthquake locations and geological information on the recurrence rate of fault ruptures.

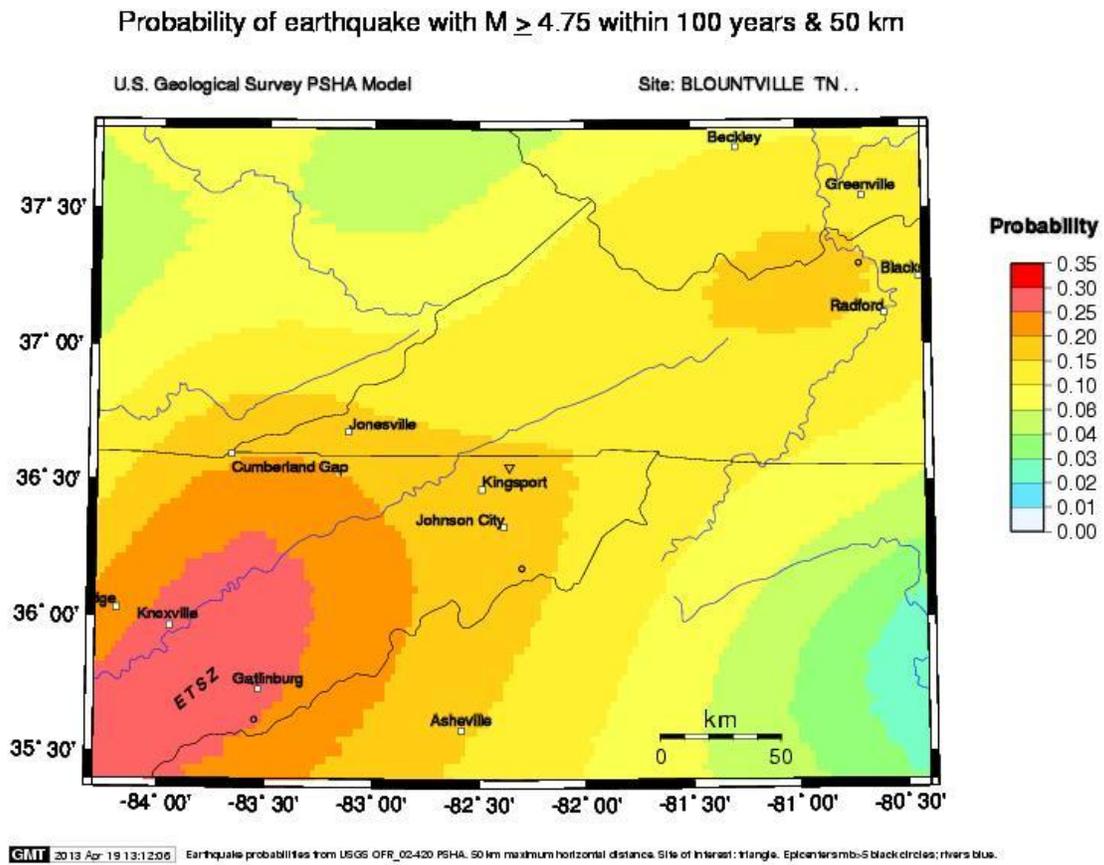
When all the possible earthquakes and magnitudes have been considered, a ground motion value is determined such that the annual rate of its being exceeded has a certain value. Therefore, as presented on Figure 3.4, for the given probability of exceedence, two percent, the locations shaken more frequently will have larger ground motions.

Figure 3.4 Southeast Seismic Zone Map—2 Percent Probability of Exceedence in 50 Years



Source: U.S. Geological Survey, <http://earthquake.usgs.gov/hazards/products/conterminous/2008/maps/>
 Note: Red square shows the approximate location of Sullivan County.

Figure 3.5 Seismic Hazard Map—Probability of Magnitude 4.75 or Greater



Source: U.S. Geological Survey, <http://eqint.cr.usgs.gov/eqprob/2002/index.php>

The geographic location was assigned a rank of **extensive**:

- **Extensive**—50-100 percent of planning area affected.

Previous Occurrences

There have been 29 recorded earthquakes within a 50-mile radius of central Sullivan County since 1973. The following list shows the major events sited from the the U.S. Geological Survey's National Earthquake Information Center. The table rates earthquakes based upon the Mercalli Intensity Scale and Richter Magnitude Scale.

Table 3.8 Recorded Earthquakes

Date	Latitude	Longitude	Depth (km)	Magnitude
June 16, 1976	37.362	-81.624	5.0	4.7
October 23, 1977	36.972	-82.038	5.0	2.8
March 22, 1978	36.201	-81.730	1.0	2.9
June 3, 1981	36.205	-81.651	1.0	3.0
October 22, 1984	36.360	-81.672	8.3	3.1
February 16, 1988	36.561	-82.304	5.0	3.3
April 14, 1988	37.238	-81.987	0.0	4.1
April 10, 1989	37.136	-82.068	0.0	4.3
November 8, 1990	36.858	-83.005	1.0	2.7
November 8, 1990	36.877	-83.011	1.0	3.2
January 1, 1993	35.877	-82.090	3.5	3.0
February 12, 1994	36.800	-82.000	5.0	3.4
July 7, 1995	36.515	-81.873	11.6	3.1
April 19, 1996	36.981	-83.018	0.0	3.9
June 29, 1996	37.187	-81.950	1.0	4.1
October 28, 1997	37.162	-82.025	1.0	3.4
August 25, 2005	35.880	-82.800	8.0	3.6
August 25, 2005	35.876	-82.809	8.0	2.5
December 7, 2005	35.862	-82.380	5.0	2.8
March 6, 2006	35.895	-82.359	0.0	2.8
October 31, 2006	37.242	-81.922	1.0	2.9
November 2, 2006	37.200	-81.920	1.0	4.3
November 23, 2006	37.157	-81.975	0.0	4.3
August 14, 2009	36.745	-82.355	3.8	2.9
August 30, 2010	36.490	-81.724	10.6	2.7
October 31, 2010	36.509	-81.718	3.8	2.9
December 3, 2011	37.130	-81.932	1.0	3.1
August 21, 2012	35.709	-82.851	4.1	2.2
October 29, 2012	35.610	-82.000	6.1	2.9

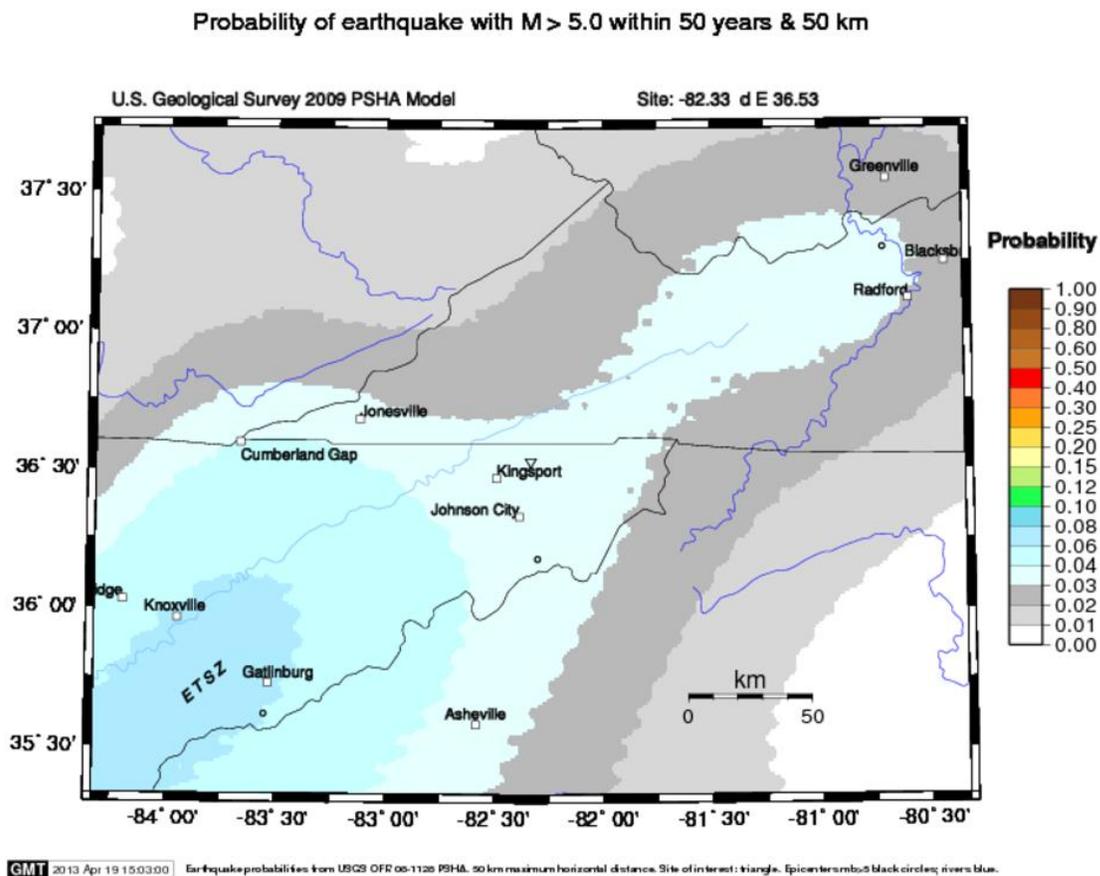
Source: <http://earthquake.usgs.gov/earthquakes/eqarchives/epic/results.php>

Probability of Future Occurrences

Using <https://geohazards.usgs.gov/eqprob/2009/index.php>, the probability of >5.0 within 50 miles is 0.03. According to the Tennessee Emergency Management Agency, instead of a prediction of when an earthquake will strike, an estimate of the likelihood of an earthquake recurring within a given time frame should be given: Only one or two earthquakes with magnitudes equal to or greater than 3.0 are expected in the SASZ per year. The extrapolated, expected recurrence time for earthquakes with magnitudes of 6.0 or greater in the SASZ is 186 years (Bollinger et al., 1989). The HMPC determined the probability of future occurrence of drought to be **occasional**:

- **Occasional**—1-10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.

Figure 3.6 Probability of 5.0 Earthquake within 50 years



Magnitude/Severity

Building codes in the Cities address peak ground acceleration. The County does not have building codes at this time. Community building codes meet either the Southern Building Codes or the International Building Codes. Single-family residential dwellings are not required to meet seismic building standards. The magnitude/severity for this hazard is **negligible**:

- **Negligible**—No or few injuries or illnesses; minor quality of life loss; little or no property damage; and/or brief interruption of essential facilities and services.

3.2.4 Extreme Temperatures

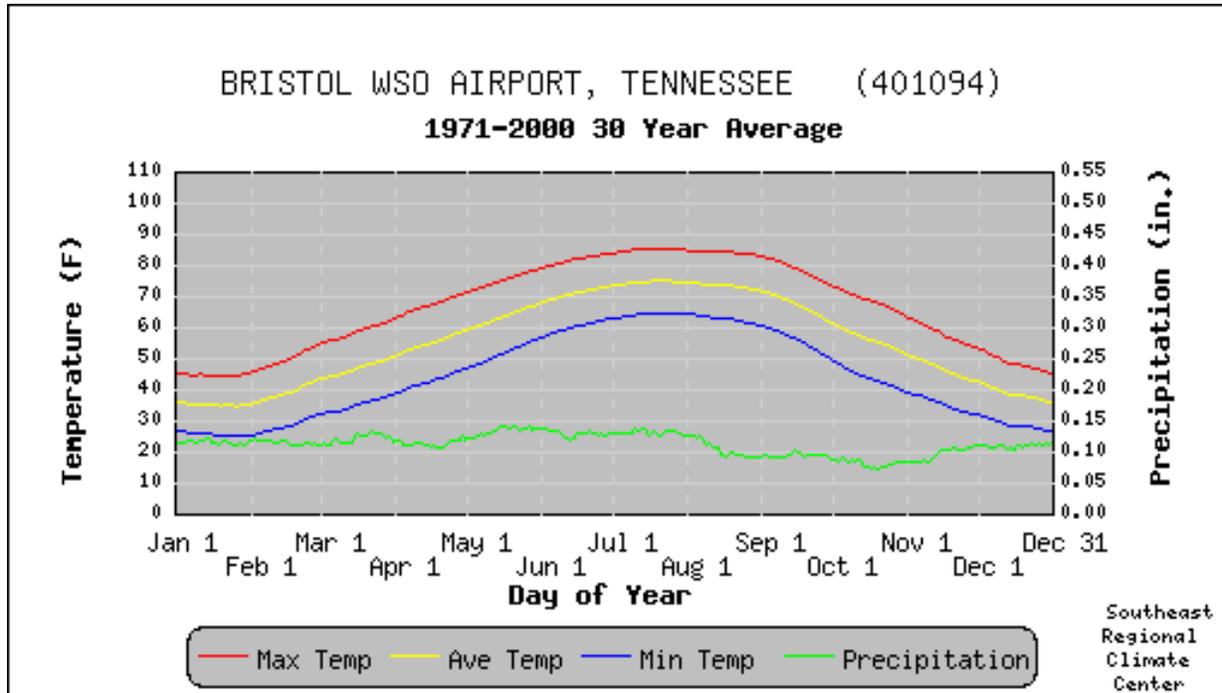
Description

Extreme temperature events, both hot and cold, can have severe impacts on natural ecosystems, agriculture and other economic sectors, and human health and mortality. The normal monthly temperatures for Sullivan County are presented in Table 3.9 and Figure 3.7 below.

Table 3.9 Temperature Summary (°F) 1948-2012 Southeast Regional Climate Center

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Tri City Airport (Maximum)	45.4	49.5	58.4	68.2	76.1	83.0	85.5	85.1	79.6	69.4	58.0	48.2	67.2
Tri City Airport (Minimum)	26.0	28.3	35.1	43.4	52.2	60.5	64.5	63.2	56.4	44.4	35.1	28.3	44.8

Figure 3.7 Normal Monthly Temperatures for Sullivan County



Source: <http://www.sercc.com/cgi-bin/sercc/cliMAIN.pl?tn1094>

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 Weather Service 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 3.10 presents heat index values and their potential physical effects.

The National Weather Service will issue a *Heat Advisory* for Sullivan County when daytime heat indices are at or above 105°F and nighttime heat indices are at or above 80°F. An *Excessive Heat Warning* is issued when the heat index equals or exceeds 115°F for three hours or longer with a minimum heat index of at least 80°F during a 24-hour period. 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.

Those at greatest risk for heat-related illness include infants and children up to four years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications. However, even young and healthy individuals are susceptible if they participate in strenuous physical activities during hot weather. Also, during extreme heat events, infrastructure, energy sources in particular, can be stressed, and long-term extreme heat can stress water sources, particularly if occurring during a period of drought.

Table 3.10 Heat Index Values and Effects

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.

Source: National Weather Service, Heat Index Chart

Cold Temperatures

The National Weather Service will issue a Wind Chill Advisory for Sullivan County when wind-chill temperatures are expected to reach -4°F to -20°F . In 2001, NWS implemented an updated Wind Chill Temperature (WCT) index. This index was developed by the National Weather Service 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 (10m);
- 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).

Extreme cold can cause hypothermia (an extreme lowering of the body's temperature), frostbite and death. Infants and the elderly are particularly at risk, but anyone can be affected. While there are no firm data on hypothermia (cold) death rates, it is estimated that 25,000 older adults die from hypothermia each year. The National Institute on Aging estimates that more than 2.5 million Americans are especially vulnerable to hypothermia, with the isolated elderly being most at risk. About 10 percent of people over the age of 65 have some kind of temperature-regulating defect, and 3-4 percent of all hospital patients over 65 are hypothermic.

Also at risk are those without shelter or who are stranded, or who live in a home that is poorly insulated or without heat. Other impacts of extreme cold include asphyxiation (unconsciousness or death from a lack of oxygen) from toxic fumes from emergency heaters; household fires, which can be caused by fireplaces and emergency heaters; and frozen/burst pipes.

Geographic Location

Sullivan County is susceptible to extreme temperatures throughout the County, and extreme cold temperatures may occur more frequently the higher elevations. The geographic location is assigned a value of **extensive**:

- **Extensive**—50-100 percent of planning area affected.

Previous Occurrences

From 1948 to 2012, the Bristol Airport Weather Station has reported the annual number of days above 90° F to be 17.8 and the annual number of days below 32° F to be 96.1. Averaged temperature maximums and minimums for each month are shown in Table 3.11.

Table 3.11 Average Maximum and Minimum Temperatures by Month 1971-2000

Month	Average High Temperature	Average Low Temperature	Month	Average High Temperature	Average Low Temperature
January	45	26	July	85	64
February	50	29	August	85	63
March	59	35	September	79	56
April	68	43	October	69	44
May	76	52	November	59	35
June	83	60	December	48	28

Source: <http://www.sercc.com/cgi-bin/sercc/cliMAIN.pl?tn1094>

Probability of Future Occurrences

This hazard’s probability is “highly likely” (event is probable within the calendar year). An extreme heat event is more likely to occur in the summer months of June, July, and August; and an extreme cold event is more likely to occur in the winter months of December, January, and February. The HMPC determined the probability of future events to be highly likely:

- **Highly Likely** - near 100 percent chance of occurrence next year or happens every year.

Magnitude/Severity

Extreme temperature events are not common for Eastern Tennessee. Due to the potential for loss of electric power due to increased strain on power generation and distribution for air conditioning, periods of extreme heat can have impacts to the planning area. Extreme cold can also cause injury such as frostbite or in extreme situations, death.

The primary concerns expressed by the planning committee for this hazard are the human health and safety issues, not property damage. Therefore, the HMPC determined the magnitude/severity of extreme temperatures on the planning area to be **negligible**:

- **Negligible**—No or few injuries or illnesses; minor quality of life loss; little or no property damage; and/or brief interruption of essential facilities and services

3.2.5 Flood

Description

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

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

Riverine flooding is defined as an event when a watercourse exceeds its "bank-full" capacity and is the most common type of flood event. Riverine floods result from precipitation over large areas. This type of flood occurs in river systems whose tributaries may drain large geographic areas and include many independent river basins. Riverine flooding generally occurs as a result of prolonged rainfall, or rainfall that is combined with soils already saturated from previous rain events. The duration of riverine floods may vary from a few hours to many days. Factors that directly affect the amount of flood runoff include precipitation, intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, snow depth, and water-resistance of the surface areas due to urbanization. The area adjacent to a river channel is its floodplain. In its common usage, "floodplain" most often refers to that area that is inundated by the 100-year flood, the flood that has a 1 percent chance in any given year of being equaled or exceeded. The 1 percent annual flood is the national standard to which communities regulate their floodplains through the National Flood Insurance Program.

Urban flood events result as land loses its ability to absorb rainfall as it is 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.

Geographic Location

Sullivan County is in the Holston River drainage basin. The major sources of flooding in Sullivan County are North Fork Holston River, South Fork Holston River, Kendrick Creek, Reedy Creek, Horse Creek, Fall Creek, Beaver Creek, Back Creek and Whitetop Creek. The floodplains of Holston River, Reedy Creek, Horse Creek and Beaver Creek are wide and flat. The floodplains of most of the other streams in the county are narrow.

City of Bristol

Beaver Creek flows southwesterly through the central business district of Bristol then roughly parallels Volunteer Parkway, where many developments are located. Much of the central business district is less than 10 feet above the stream bed. Beaver Creek is 30.2 miles long and has a drainage area of 109 square miles. Half its length and a third of its drainage area lies above the Tennessee-Virginia state line.

City of Kingsport

The South Fork Holston River begins in southwestern Virginia in the extreme northeastern tip of the Tennessee Valley. Its watershed is located almost entirely in the Valley and Ridge physiographic province which is characterized by numerous long, narrow, parallel ridges separated by narrow valleys, all with a general northwest trend. The South Fork Holston River drains a generally mountainous watershed of 2,048 square miles. Of this area, 1,171 square miles lie above TVA's Watauga and South Holston Reservoirs, which have large storage reservations for flood control. The remaining 877 square miles below these two dams have only limited flood control and large floods can develop from this area.

The Reedy Creek watershed covers an area of 60 square miles. The watershed is long and narrow, moderately rugged and about 50 percent wooded. The watershed, which originates in Virginia, is about 18 miles long and averages about 3.3 miles wide. The creek flows generally west and slightly south, roughly parallel to the two forks of the Holston River, which lie on either side of it. The lower 3 miles is located in Kingsport. The creek banks are 5 to 8 feet above the streambed. Within the corporate limits, the overflow area ranges from 400 to about 1,000 feet. There has been extensive development along Reedy Creek. A large shopping center was built between miles 1.60 and 1.90, and is subject to 100-year flood level flooding.

Kingsport was named for Colonel James King who established a mill in 1774 at the mouth of Reedy Creek. In 1909 the Clinchfield Railroad was completed through the area and the city was opened for industrial growth. Properties that lay along the South Fork Holston River include Tennessee Eastman Corporation, Holston Ordinance Works, General Shale Products Corporation, and more. Some of these properties suffered damage from floods prior to the construction of TVA dams. Just above the Clinchfield Railroad Bridge, a levee impounds a settling basin for the Mead Corporation. The elevation of the top of the levee is above the level of the May 1927 flood at an elevation of 1201 feet NGVD.

As a part of the National Flood Insurance Program (NFIP), floodplains and floodways on the Holston 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 Sullivan County unincorporated and incorporated areas has an effective date of September 29, 2006. The FIS and associated Digital Flood Insurance Rate Maps (DFIRMs) present the adopted floodplains, floodways, and flood profiles for streams in the planning area.

Figures 3.8a and 3.8b present the known flood hazard areas as identified by FEMA digital flood insurance rate maps (DFIRM) for Sullivan County. The 1-percent annual chance flood event, or 100-year floodplain, encompass approximately 30square miles. This is 7% of the total planning area. The geographic location was assigned a rank of **limited**:

- **Limited**—less than 10 percent of planning area affected.

National Flood Insurance Program (NFIP) Participation

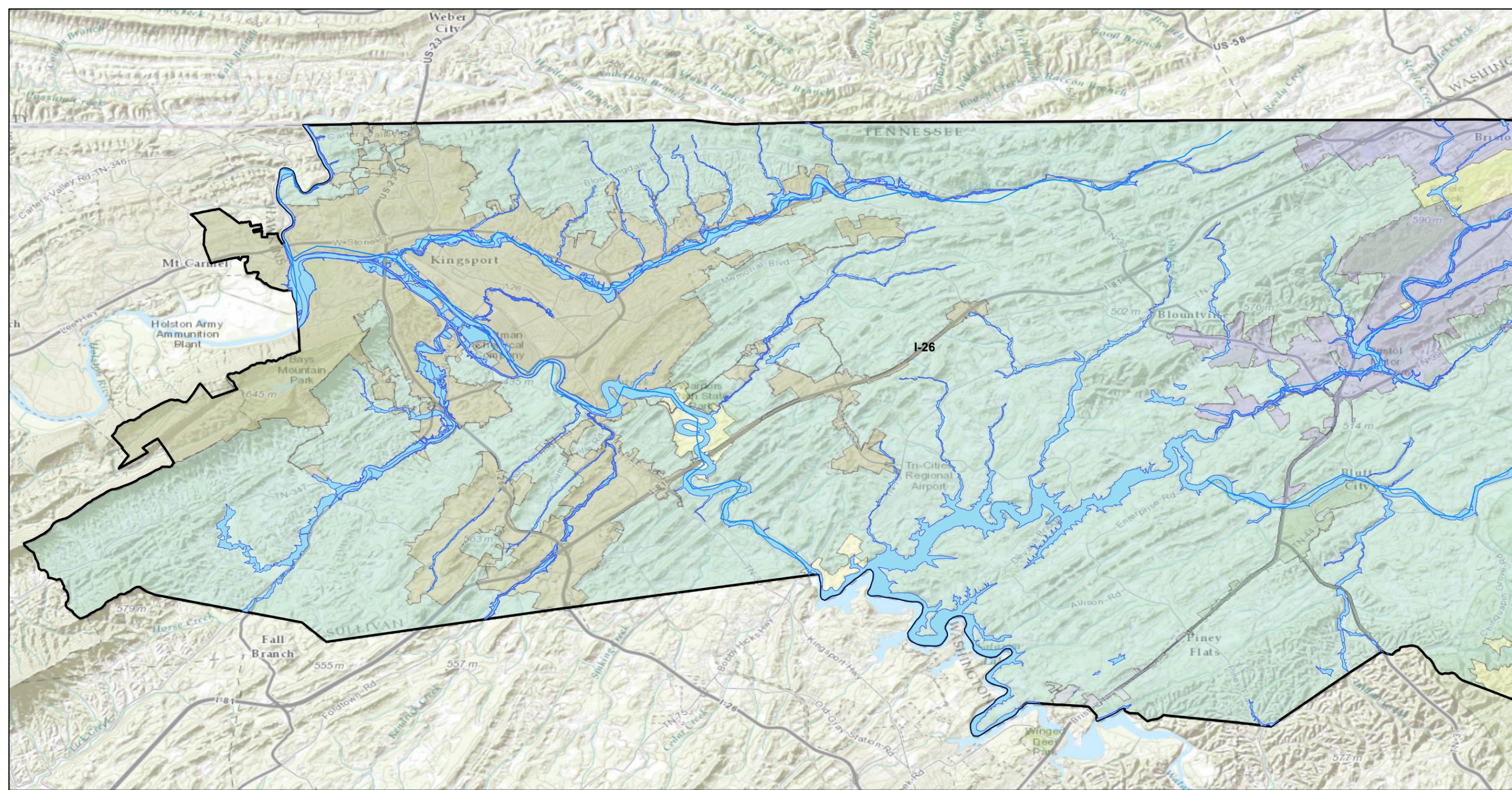
Sullivan County, the City of Bristol, the Town of Bluff City and the City of Kingsport are currently participating in the National Flood Insurance Program (NFIP). Both Sullivan County and Bristol are a rated Class 8 in the Community Rating System. This class rating results in a 10% reduction in flood insurance premiums for NFIP policy holders. As of May 2013, Kingsport is rated at 10, and has rescinded from the CRS program. Table 3.12 provides additional details on NFIP participation as well as flood insurance policies and claims.

Table 3.12 Community Participation in the National Flood Insurance Program in Sullivan County

Jurisdiction	Status/Date	Effective FIRM Date	Policies in Force (3/31/2013)	Insurance in Force (\$)	Number of Paid Losses (1/1/1978 - 3/31/2013)	Total Losses Paid(\$)	Substantial Damage Claims Since 1978
Sullivan County	Participating Regular- 11/09/1982 Emergency 3/06/1979	9/29/2006	165	\$27,218,500	49	\$467,538.79	1
Bluff City	Participating Regular- 9/14/2006 Emergency 9/14/2006	9/29/2006	3	\$285,000	n/a	n/a	n/a
Bristol	Participating Regular- 7/19/1982 Emergency 7/07/1975	9/29/2006	75	\$19,301,100	10	\$37,966.22	2
Kingsport	Participating Regular - 12/04/1979 Emergency 10/15/1974	9/29/2006	201	\$36,311,700	28	\$281,990.64	1

n/a – data not available

Source: <http://www.fema.gov/policy-claim-statistics-flood-insurance/policy-claim-statistics-flood-insurance/policy-claim-13> and <http://www.fema.gov/cis/TN.pdf>



Scale

1:130,000

1 in = 2 miles

0 1 2 4 6 Miles

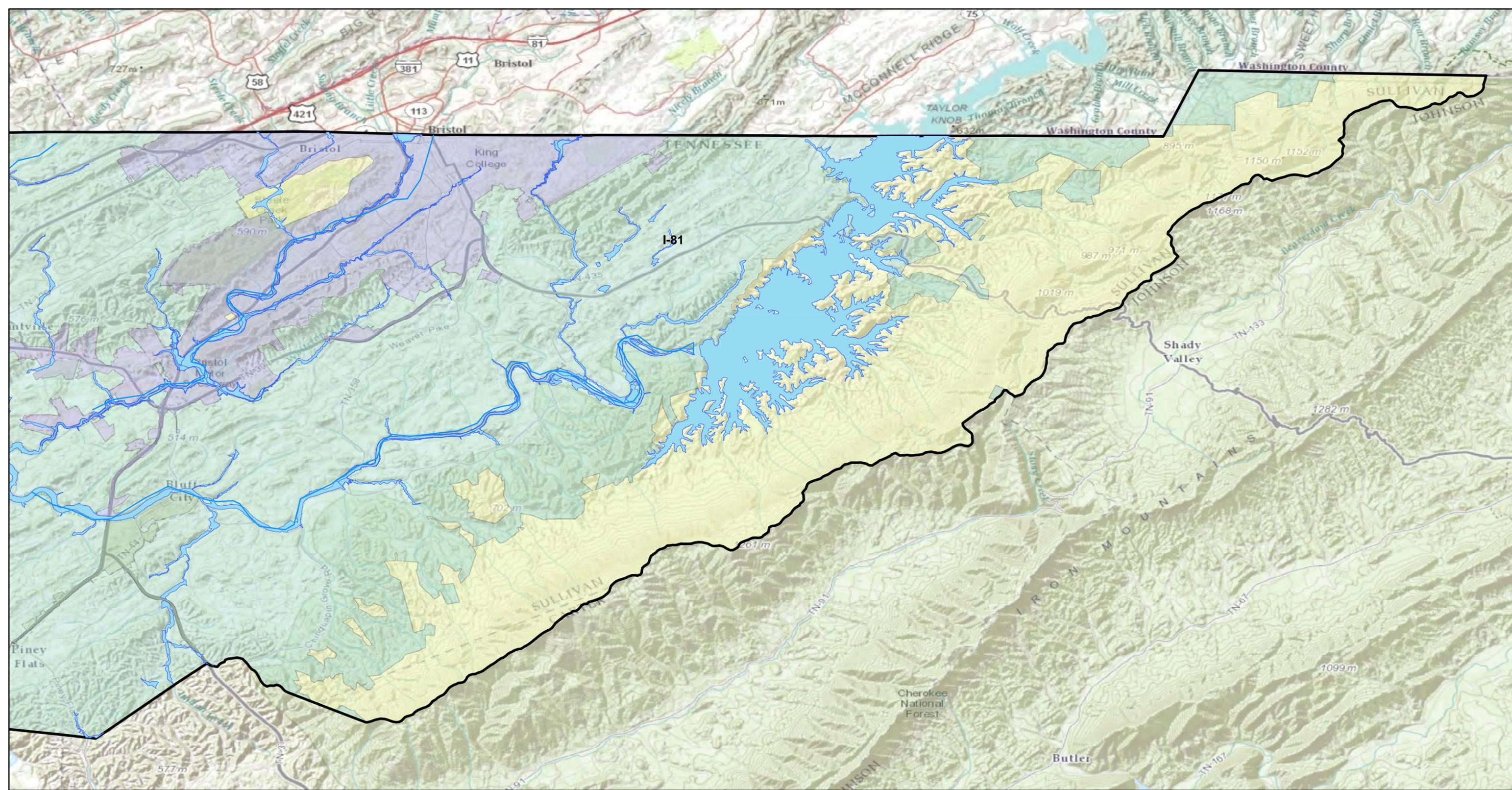
Legend

	Sullivan County		Johnson City
	City Of Bristol		Bluff City
	City Of Kingsport		Park/Reservation
	County Boundary		100 Year Floodplain

**Sullivan County
100 Year Floodplain**

Data Source:
World Topographic Map 2010

Prepared February 2014



Scale

1:130,000

1 in = 2 miles

0 1 2 4 6 Miles

Legend

Sullivan County	Johnson City
City Of Bristol	Bluff City
City Of Kingsport	Park/Reservation
County Boundary	100 Year Floodplain

**Sullivan County
100 Year Floodplain**

Data Source:
World Topographic Map 2010

Prepared May 2013

All streams within Sullivan County, as previously identified, are subject to flooding and backwater flooding. Backwater flooding is defined as upstream flooding caused by downstream conditions such as channel restriction and/ or high flow in a downstream confluence stream. 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 0.2 to 6.5 feet per second (fps). Velocities greater than 5.0 fps which is considered to be of dangerous magnitude. Table 3.13 outlines the critical depths and velocities that will harm residents and structures during a flood event.

Table 3.13 Critical Flood Depths and Velocities

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).

Source: Technical Guide - River and Stream Systems: Flooding Hazard Limit, Ontario Ministry of Natural Resources, 2002

TVA Dams

In Sullivan County, major rivers are controlled by TVA dams. These dams were constructed for power generation and, they also control flooding on the rivers. Since riverine flooding is controlled by the TVA dams, and TVA mitigates riverine flooding hazards through action planning, warning systems, and mapping, riverine flooding is considered a low hazard by the communities. The Sullivan County communities find that small system and urban stormwater flooding on streams and internal infrastructure are frequent, severe hazards.

Repetitive Loss Structures

The Federal Emergency Management Agency (FEMA) has identified eight repetitive loss structures within Sullivan County:

- Sullivan County – 2 repetitive loss structures
- City of Bristol – 2 repetitive loss structures
- City of Kingsport – 4 repetitive loss structures

Repetitive loss structures are those that have been paid two flood insurance claims of \$1,000 or more within a 10-year period since 1978. The original Multi-Hazard Mitigation Plan identified three structures within Sullivan County and one structure within the City of Kingsport. With the addition of the City of Bristol to the mitigation planning process, the overall number of repetitive loss structures has increased from four to eight structures. These repetitive loss properties do not reflect the total number of homes that have flooded in Sullivan County, but rather the number of insured properties that have filed for an insurance claim repeatedly.

Previous Occurrences

There are 17 flood events listed in the NCDC database for Sullivan County between 2001 and 2013. Sources are the NCDC database, and FEMA.

July 3, 2001, Flash Flood—Several homes, streets and roads flooded across the county.

July 29, 2001, Flash Flood—Water was in businesses and two vehicles submerged in a parking lot near Blountville.

July 29, 2001, Flash Flood—Water entered a home on Wyatt Hollow Road in Bristol.

July 29, 2001, Flash Flood—High water problems resulted in the closure of a few county roads and homes were flooded.

March 17, 2002, Flood—Widespread flooding occurred across most of East Tennessee with the hardest hit counties in central East Tennessee including Bledsoe, Meigs, Roane, Rhea, Loudon, Blount, Knox and Sevier Counties. Rainfall totals between five and eight inches were reported in 36 hours. Numerous major rivers flooded including the Clinch, Powell, Sequatchie, and Pigeon Rivers. Total damage estimates were calculated to be over 5 million dollars.

February 14, 2003, Flood—Four day rainfall totals of two to eight inches fell across east Tennessee, with the highest amounts occurring across the Cumberland Plateau and adjacent valleys areas. This rainfall combined with a melting snowpack (reports of up to a foot in the higher elevations) to produce widespread flooding of rivers and streams with numerous mudslides also reported. The Powell, Clinch and Holston Rivers measured the most significant rises with Claiborne, Rhea and Knox counties reporting the most significant damage.

February 21, 2003, Flood—With ground already saturated from the previous week's rainfall, three day rainfall totals of one to three inches created some flooding of streams and rivers as well as several mudslides across east Tennessee. Rivers which rose above their flood stages included the South Chickamauga, Clinch, Powell, Holston, Pigeon, French Broad and Sequatchie rivers.

April 10, 2003, Flood—Seven day rainfall totals (April 4-10) of three to five inches were reported across central east Tennessee and northeast Tennessee, with one to three inches occurring on April 10. Several secondary roads across the area were flooded with several rivers experiencing some minor flooding including the Clinch, French Broad, Holston, Pigeon and Powell Rivers.

June 11, 2003, Flash Flood—Flooding around Bloomingdale from streams out of banks and clogged storm drains. Some road closures.

June 15, 2007, Flash Flood—Stationary thunderstorm over Sullivan County caused flooding. Highway 421 at Pemberton Road was washed out.

September 24, 2009, Flash Flood—Flash flooding occurred with several inches of water across Highway 11E in Bristol.

September 24, 2009, Flash Flood—Flash flooding occurred along Highway 11W and along Sullivan Road in Kingsport. Several inches of water covered roads.

September 26, 2009, Flood—A nearly stationary front across the Tennessee Valley region continues to aid in the development of very heavy rainfall that contributed to flash flooding and evolved into a large area flood event. Area flooding occurred along Highways 36 and 11W in Kingsport. Several inches of water covered the road, with a few areas briefly impassable due to the flooding.

December 9, 2009 Flood—A strong low pressure tracked across east Tennessee bringing damaging non-thunderstorm winds to the area late in the day on December 8 and overnight into December 9. The strongest winds occurred over the higher elevations. Flash flooding was also reported in the overnight hours. Widespread flooding occurred across the county with water over several roads up to three feet deep. The main area that was affected was located in Bristol.

April 25, 2011, Flash Flood—A boundary across the area triggered thunderstorms in east Tennessee during the afternoon and evening hours. A few became severe producing large hail and damaging thunderstorm wind. Law enforcement personnel reported flooding on Carter's Valley Road from a thunderstorm near Kingsport.

July 12, 2012, Flood—A slow low pressure system over the lower Mississippi valley fed deep moisture from the Gulf of Mexico into the area. Several rounds of thunderstorms were produced. Localized heavy rain produced flooding during the morning round. Several roads were reported to be closed due to high water between Blountville and Bristol.

January 15, 2013, Flood—Significant synoptic scale event produces several inches of rain of much of the area. Many roads flooded around Kingsport.

According to the USDA's Risk Management Agency, insured crop losses in Sullivan County as a result of flood conditions and excessive moisture from 2003 to 2012 totaled \$828, 217. Crop insurance claims as a result of flooding are detailed in Table 3.14.

Table 3.14 Claims Paid in Sullivan County for Crop Loss as a Result of Flood and Excessive Moisture (2003-2012)

Year	Crop	Hazard	Claims Paid
2012	All Other Crops	Excess Moisture/Precip/Rain	\$173
2012	All Other Crops	Heat	\$10,642
2012	All Other Crops	Drought	\$70,837
2012	All Other Crops	Drought	\$8,509
2011	All Other Crops	Excess Moisture/Precip/Rain	\$86,324
2011	All Other Crops	Drought	\$3,943
2011	All Other Crops	Drought	\$23,723
2010	All Other Crops	Excess Moisture/Precip/Rain	\$6,394
2010	All Other Crops	Heat	\$7,182
2010	All Other Crops	Drought	\$10,977
2010	All Other Crops	Heat	\$37,086
2010	All Other Crops	Drought	\$46,761
2010	All Other Crops	Drought	\$12,649
2010	All Other Crops	Freeze	\$12,342
2009	All Other Crops	Excess Moisture/Precip/Rain	\$9,374
2009	All Other Crops	Excess Moisture/Precip/Rain	\$14,851
2009	All Other Crops	Excess Moisture/Precip/Rain	\$793
2009	All Other Crops	Drought	\$19,606
2008	All Other Crops	Decline in Price	\$8,213
2008	All Other Crops	Freeze	\$239
2007	All Other Crops	Drought	\$11,097
2007	All Other Crops	Excess Moisture/Precip/Rain	\$6,915
2007	All Other Crops	Drought	\$14,297
2007	All Other Crops	Freeze	\$32,539
2007	All Other Crops	Drought	\$64,554
2007	All Other Crops	Drought	\$17,231
2006	All Other Crops	Frost	\$5,575
2006	All Other Crops	Hail	\$333
2006	All Other Crops	Drought	\$13,489
2005	All Other Crops	House Burn (Pole Burn)	\$2,458
2005	All Other Crops	Drought	\$11,840
2005	Soybeans	Drought	\$2,016
2005	Soybeans	Drought	\$1,249
2004	All Other Crops	Plant Disease	\$6,944
2004	All Other Crops	Excess Moisture/Precip/Rain	\$96,008
2003	All Other Crops	Excess Moisture/Precip/Rain	\$3,154
2003	All Other Crops	Excess Moisture/Precip/Rain	\$12,476

Year	Crop	Hazard	Claims Paid
2003	All Other Crops	Excess Moisture/Precip/Rain	\$127,774
2003	All Other Crops	Hail	\$64
2003	All Other Crops	Excess Moisture/Precip/Rain	\$7,586
TOTAL			\$828,217

Source: USDA Risk Management Agency, 2013

Probability 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 100 or even 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.

Based on data from NCDC, from 2001 to 2013, there were 17 records of flood or flash flood events over a 12 year period. The average number of flood and flash flood events calculates to 1.4 per year. The probability was assigned a rank of **likely**:

- **Likely**—10-100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less.

Magnitude/Severity

The 100-year floodplain, as presented on the Flood Insurance Rate Maps (FIRM) for the Sullivan County, does encompass several residential structures indicating that some property damage from will occur during larger events.

The most frequent type of flooding and damages are as a result of the frequent flash flood events. These are especially problematic in the urban areas where development increases the rate of water flow and decreases the ability for water to be absorbed into the ground. The HMPC determined the magnitude of floods on the planning area to be **critical**:

- **Critical**—Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours.

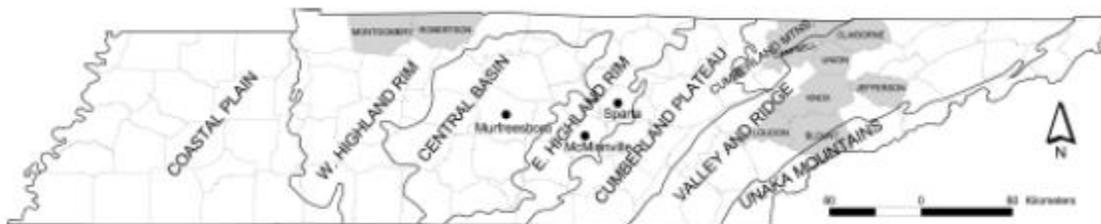
3.2.6 Land Subsidence/Sinkhole

Description

Subsidence is caused when the ground above manmade or natural voids collapses. Subsidence can be related to mine collapse, water and oil withdrawal, or natural causes such as shrinking of expansive soils, salt dissolution (which may also be related to mining activities), and cave collapses. The surface depression is known as a sinkhole. If sinkholes appear beneath developed areas, damage or destruction of buildings, roads and rails, or other infrastructure can result. The rate of subsidence, which ranges from gradual to catastrophic, correlates to its risk to public safety and property damage.

Karst is a distinctive topography in which the landscape is shaped by the dissolving action of water on carbonate bedrock (usually limestone, dolomite, or marble). In the Valley and Ridge physiographic province of east Tennessee, the upper Holston River Valley in the area of Boone Lake is a specific area with highly developed karst (Figure 3.9)

Figure 3.9 Physiographic provinces and counties of Tennessee

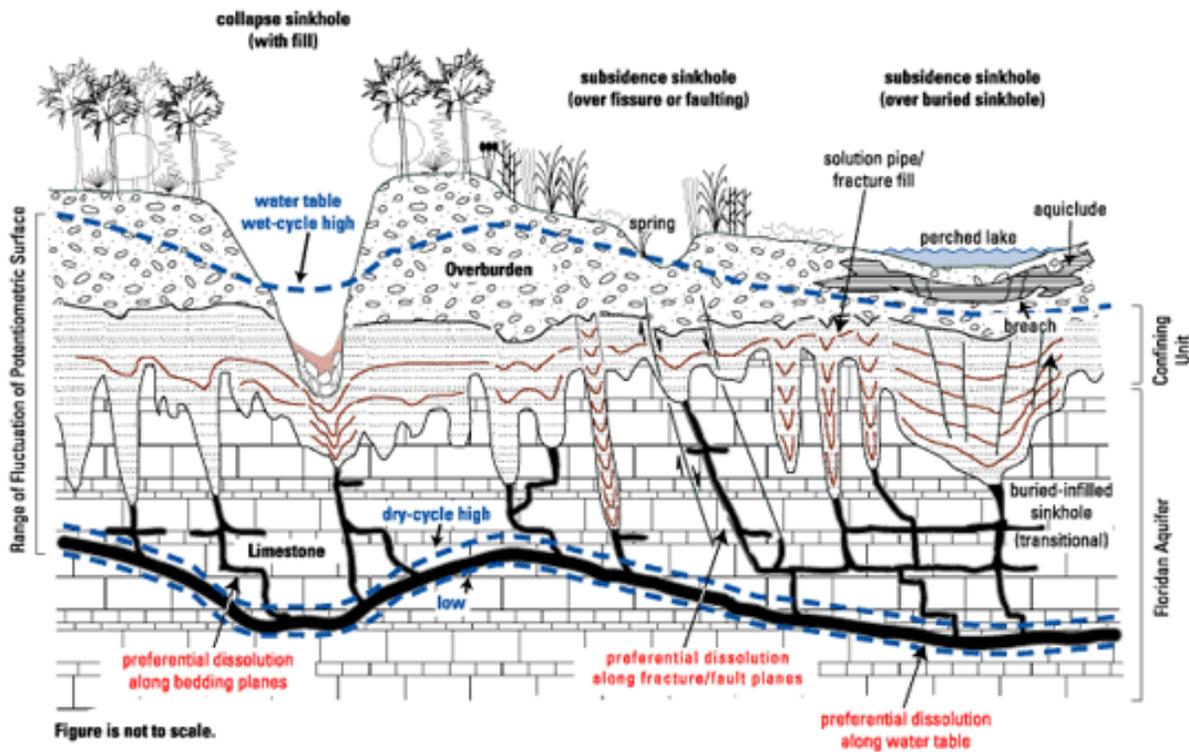


Source: A SIMPLE MAP INDEX OF KARSTIFICATION AND ITS RELATIONSHIP TO SINKHOLE AND CAVE DISTRIBUTION IN TENNESSEE GREGORY A. SHOFNER AND HUGH H. MILLS Department of Earth Sciences, Tennessee Technological University, JASON E. DUKE U. S. Fish and Wildlife Service

Solution sinkholes form as the limestone dissolves, creating sunken areas in the land surface. Collapse sinkholes form when caves collapse and suddenly drop a portion of the land surface above. Damage to buildings commonly results from collapse of soil and/or rock material into an open void space near or beneath man-made structures.

Ground subsidence into even a small opening may be very costly if a structure sits on the overlying surface. Sinkhole collapses are often unpredicted and sudden, although they occur more frequently after heavy rainfall. Heavy rainfalls increase the soils' weight and decrease its strength and stability. Construction can also trigger collapses by directing runoff into a vulnerable area, or weakening the cover of an incipient collapse. Finally, lowering of the water table by a nearby well or from quarry pumping can also trigger collapse when the buoyant effect of groundwater is removed.

Figure 3.10 Collapse Features of Karst Topography



Source: http://www.nationalatlas.gov/articles/geology/a_karst.html

Geographic Location

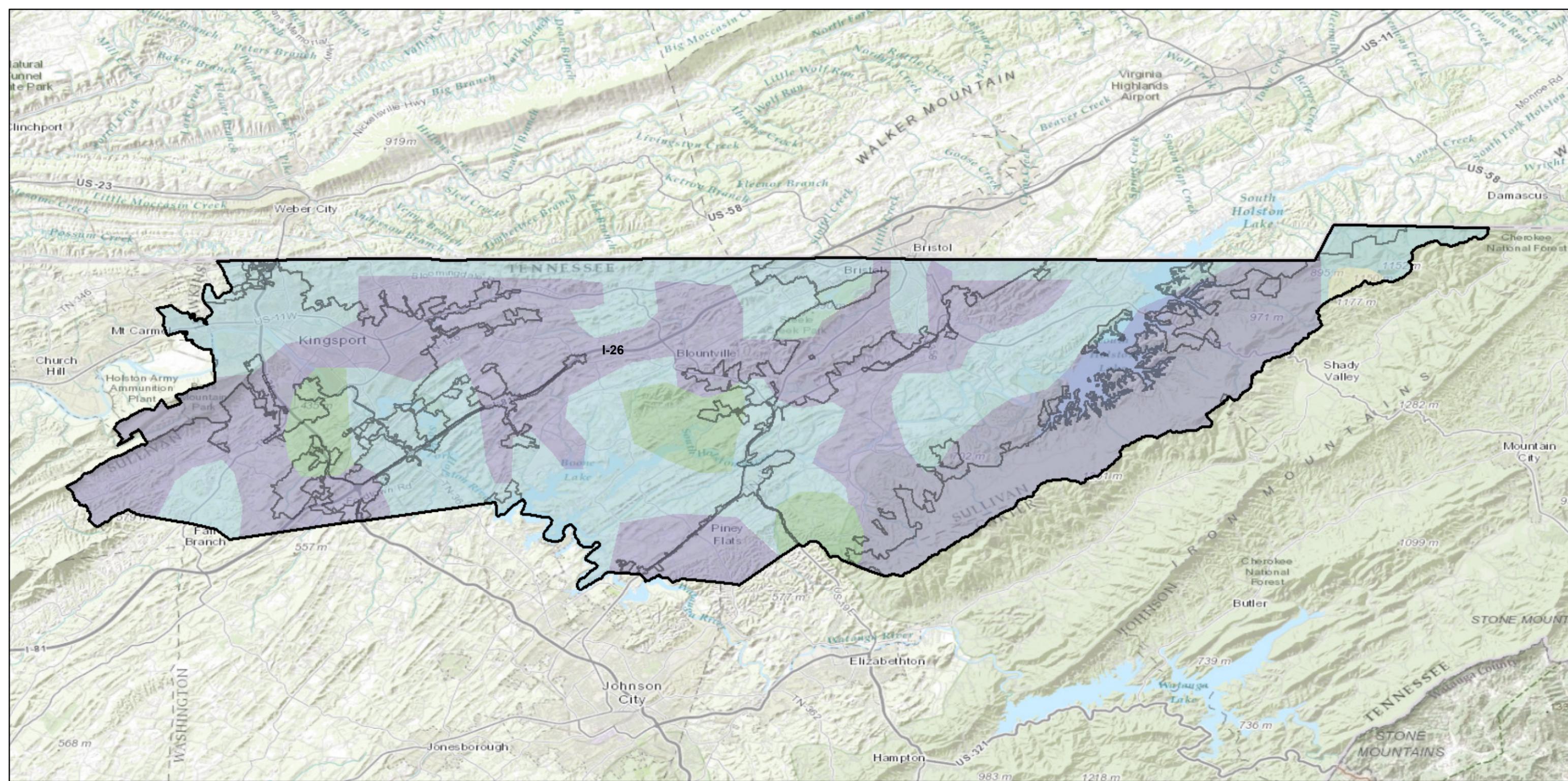
Figure 3.11 illustrates karst hazard areas in Sullivan County. This image was created for Sullivan County utilizing a statewide image of sinkhole distribution in Tennessee. The image was provided by the Tennessee Department of Environment & Conservation (TDEC), Division of Water Resources (<http://www.tn.gov/environment/dws/images/fig15.jpg>). The image originates from Crawford and Veni, 1986: *Karst Hazard Assessment of Tennessee: Sinkhole Flooding, Sinkhole Collapse and Ground Water Contamination*. The extent of karst hazard areas within Sullivan County can be approximated as follows:

Table 3.15 Karst Hazard Areas

Karst Hazard Area	Area within Sullivan County (Sq.Mil)	Area within Sullivan County (%)
Less than 1% Sinkholes	233	53.4%
1-10% Sinkholes	27.6	6.3%
Greater than 10% Sinkholes	174.7	40.1%

With 46.4% of the County having over 1% of sinkholes identified, the geographic extent is significant.

- **Significant**—10-50 percent of planning area affected.



Scale

1:250,000
1 in = 4 miles



**Sullivan County
Karst Hazard Areas**

Data Source:
World Topographic Map 2010

Prepared February 2014



Legend

- No Sinkholes
- <1% Sinkholes
- 1-10% Sinkholes
- >10% Sinkholes
- County/Community Boundary

*Data is approximate and was adapted from Crawford and Veni, 1986: Karst Hazard Assessment of Tennessee: Sinkhole Flooding, Sinkhole Collapse and Ground Water Contamination.

Previous Occurrences

While area formations susceptible to sinkhole formations have been noted in Sullivan County, occurrences of sinkholes are not often documented by Sullivan County Emergency Management Agency.

Most recently in July 2013, an eight-foot deep sinkhole opened in the City of Bristol, at the corner of Melrose Street. An onslaught of rain, nearly 2 inches in 24 hours according to the National Weather Service in Morristown, Tenn., was likely the cause for the erosion and small crater that formed on the street just off Volunteer Parkway, according to the Bristol Public Services Director.

Figure 3.12 Sinkhole within the City of Bristol



Source: http://www.tricities.com/news/local/article_88f4acc8-e5a2-11e2-8125-001a4bcf6878.html?mode=image&photo=1

Probability of Future Occurrences

Based on the infrequency of previous occurrences, the HMPC determined this hazard's probability to be "occasional".

- **Occasional**—1-10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.

Magnitude/Severity

With no previous occurrences of reported injuries or damages, the HMPC determined this hazard's magnitude/severity on the planning area to be "limited". In addition, when sinkholes occur, impacts are limited to a fairly small area.

Limited— Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours.

3.2.7 Landslide

Description

The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on an over-steepened slope is the primary reason for a landslide, there are other contributing factors:

- Erosion by rivers, glaciers, or ocean waves create over steepened slopes;
- Rock and soil slopes are weakened through saturation by snowmelt or heavy rains;
- Earthquakes create stresses that make weak slopes fail;
- Earthquakes of magnitude 4.0 and greater have been known to trigger landslides;
- Volcanic eruptions produce loose ash deposits, heavy rain, and debris flows; and
- Excess weight from accumulation of rain or snow, stockpiling of rock or ore from waste piles or from man-made structures may induce weak slopes to fail.

Landslides constitute a major geologic hazard because they are widespread, occurring in all 50 states, and cause \$1 to 2 billion in damages and more than 25 fatalities, on average, each year. Landslides pose serious threats to highways and to structures that support fisheries, tourism, timber harvesting, mining, and energy production, as well as general transportation. Landslides commonly happen concurrently with other major natural disasters such as earthquakes and floods, which exacerbate relief and reconstruction efforts. Expanded development and other land uses have increased the incidence of landslide disasters.

Geographic Location

The areas where large numbers of landslides have occurred and areas which are susceptible to landsliding in the conterminous United States is presented in Figure 3.13. For Sullivan County, 340 square miles are identified as low incidence and 95 square miles as moderate incidence of landsliding. This comprises 78% and 22% of the County, respectively. With 22% of the county identified as having moderate incidence landsliding, the HMPC determined the geographic extent of the hazard to be **significant**:

- **Significant**—10-50 percent of planning area affected.

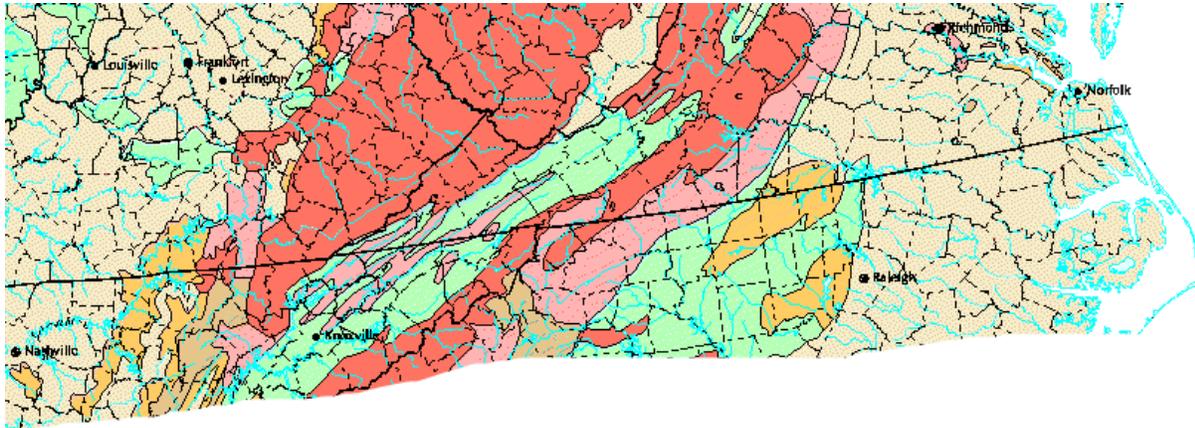
Probability of Future Occurrences

Although the physical cause of many landslides cannot be removed, geologic investigations, good engineering practices, and effective enforcement of land use management regulations can reduce landslide hazards.

For Sullivan County, 134 square miles are identified as high susceptibility to landslides. This comprises 31% of the County and a **likely** probably of future occurrence in the planning area:

- **Likely**—10-100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less.

Figure 3.13 Landslide Risks

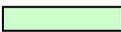


USGS Open File Report 97-289

LANDSLIDE INCIDENCE

	Low (less than 1.5% of an area involved)
	Moderate (1.5% - 15% of an area involved)
	High (greater than 15% of an area involved)

LANDSLIDE SUSCEPTIBILITY/INCIDENCE

	Moderate susceptibility/low incidence
	High susceptibility/low incidence
	High susceptibility/moderate incidence

Previous Occurrences

There are no records of landslides in Sullivan County, except along Tennessee Department of Transportation (TDOT) right-of-way. Repair of landslides along TDOT right-of-way is the responsibility of TDOT.

Magnitude/Severity

There are no records of landslides in Sullivan County, except along TDOT right-of-way, the magnitude and severity was determined to be **limited**:

- **Limited**— Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours.

3.2.8 Severe Thunderstorms- High Winds, Hail and Lightning

Description

Thunderstorms are defined as localized storms, always accompanied by hail, lightning, damaging winds, heavy rain causing flash flooding (discussed separately in Section 3.2.4) and sometimes tornadoes (discussed separately in Section 3.2.8). 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.

According to the National Oceanic and Atmospheric Administration, approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. The typical thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. A thunderstorm is classified as severe when it contains one or more of the following phenomena:

- Hail measuring three quarters of an inch or larger in diameter; and/or
- Winds equal or exceed 58 mph.

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. They are normally issued well in advance of the actual occurrence of severe weather. During the watch, people should review severe thunderstorm safety rules and be prepared to move to a place of safety if threatening weather approaches.

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.

High Winds

A severe thunderstorm can produce winds that can cause as much damage as a weak tornado and these winds can be life threatening. The damaging winds of thunderstorms include downbursts, microbursts, and straight-line winds. Downbursts are localized currents of air blasting down from a thunderstorm, which induce an outward burst of damaging wind on or near the ground. Microbursts are minimized downbursts covering an area of less than 2.5 miles across. They include a strong wind shear (a rapid change in the direction of wind over a short distance) near the surface. Microbursts may or may not include precipitation and can produce winds at speeds of more than 150 miles per hour. Damaging straight-line winds are high winds across a wide area that can reach speeds of 140 miles per hour.

Figure 3.14 shows the wind zones of the United States based on maximum wind speeds; Sullivan County is located within wind zone III. High winds, often accompanying severe thunderstorms, can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss.

Hail

Hail can occur when strong rising currents of air within a storm, called updrafts, carry water droplets to a height where freezing occurs. Then the grown ice particles fall to the ground. Severe thunderstorms can produce hail that can be three quarters of an inch or more in diameter and fall at speeds more than 100 mph. Hailstones of this size cause more than \$1 billion in damages to properties and crops nationwide annually. Large hail can reach the size of grapefruit.

Based on information provided by the Tornado and Storm Research Organization, Table 3.16 describes typical damage impacts of the various sizes of hail.

Table 3.16 TORRO Hailstorm Intensity Scale

Intensity Category	Diameter (mm)	Diameter (inches)	Size Description	Typical Damage Impacts
Hard Hail	5-9	0.2-0.4	Pea	No damage
Potentially Damaging	10-15	0.4-0.6	Mothball	Slight general damage to plants, crops
Significant	16-20	0.6-0.8	Marble, grape	Significant damage to fruit, crops, vegetation
Severe	21-30	0.8-1.2	Walnut	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
Severe	31-40	1.2-1.6	Pigeon's egg > squash ball	Widespread glass damage, vehicle bodywork damage
Destructive	41-50	1.6-2.0	Golf ball > Pullet's egg	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
Destructive	51-60	2.0-2.4	Hen's egg	Bodywork of grounded aircraft dented, brick walls pitted
Destructive	61-75	2.4-3.0	Tennis ball > cricket ball	Severe roof damage, risk of serious injuries
Destructive	76-90	3.0-3.5	Large orange > Soft ball	Severe damage to aircraft bodywork
Super Hailstorms	91-100	3.6-3.9	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
Super Hailstorms	>100	4.0+	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: Tornado and Storm Research Organization (TORRO), Department of Geography, Oxford Brookes University

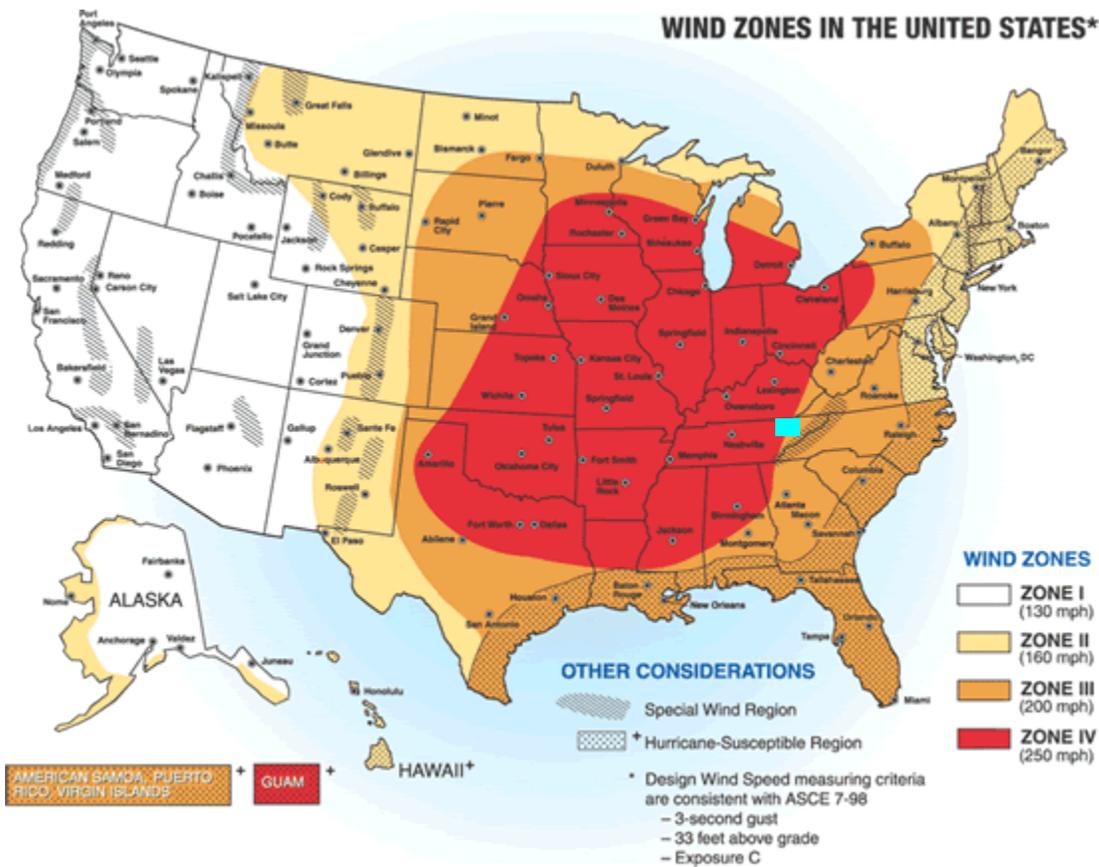
Notes: In addition to hail diameter, factors including number and density of hailstones, hail fall speed and surface wind speeds affect severity.

Lightning

Lightning is defined as any and all of the various forms of visible electrical discharge caused by thunderstorms. Lightning can occur from cloud-to-cloud, within a cloud, cloud-to-ground, or cloud-to-air. It causes an average of about 60 fatalities and 300 injuries each year when people are caught outdoors in the summer months during the afternoon and evening.

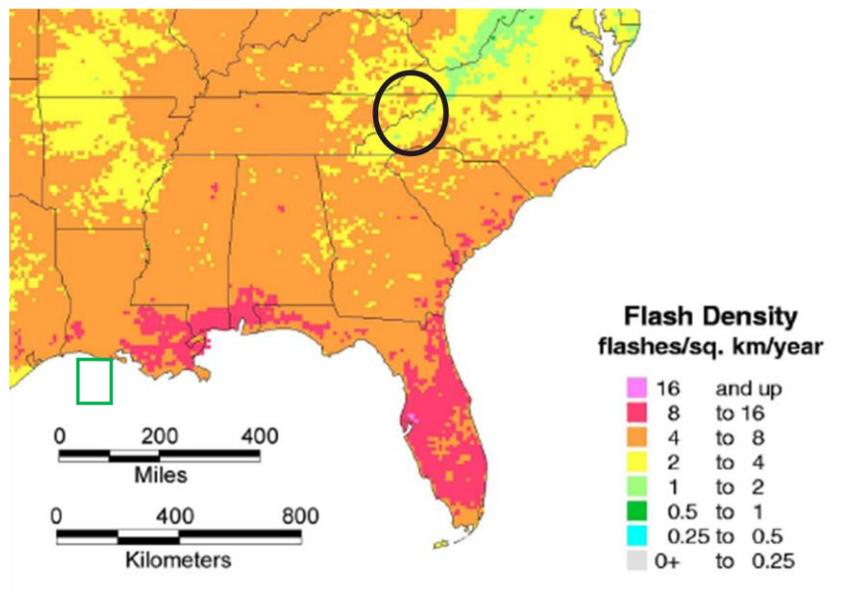
Sullivan County is located in an area with an average of 588,187 lightning flashes per year with a density of 14 flashes per square mile (Figure 3.15). Figure 3.16 shows Sullivan County is located in an area with an average of 30-50 days with thunderstorms per year per 10,000 square miles.

Figure 3.14 Wind Zones in the United States



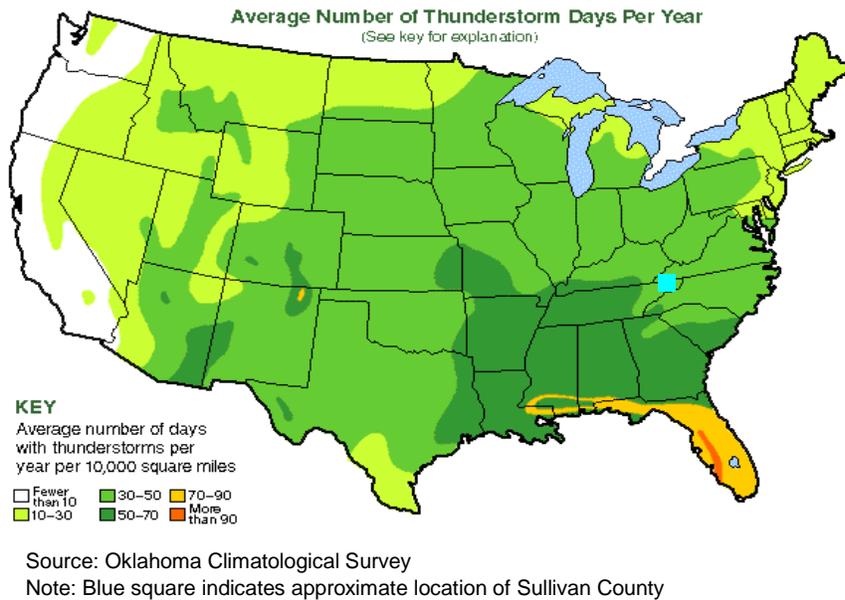
Source: FEMA; http://www.fema.gov/plan/prevent/saferoom/tsfs02_wind_zones.shtml
 Note: Blue square indicates approximate location of Sullivan County

Figure 3.15 Annual Frequency of Lightning, 1996-2000



Source: http://www.lightningsafety.com/nlsi_info/lightningmaps/US_FD_Lightning.pdf

Figure 3.16 Average Number of Thunderstorm Days Per Year



Geographic Location

Thunderstorms and the associated high wind, hail, and lightning impact the entire Sullivan County planning area. Thunderstorms over Tennessee typically occur between late April and early September, but, given the right conditions, they can develop as early as March. They are usually produced by supercell thunderstorms or a line of thunderstorms that typically develop on hot and humid days.

All of Sullivan County is susceptible to high wind events, and all of the participating jurisdictions are vulnerable to this hazard. Figure 3.14 shows Sullivan County (blue square approximates location on map) is in Wind Zone III. This zone of the United States can experience winds 160 to 200 mph.

The geographic location was assigned a rank of **extensive**, the entire planning area is subject to severe thunderstorms and all participating jurisdictions are affected.

- **Extensive**—50-100 percent of planning area affected.

Previous Occurrences

Sullivan County has not been included in any presidential disaster declaration that specifically included high winds. However, generally, the events that included severe storms likely included high winds as well. For reference, the two declarations that Sullivan County received including

severe storms are summarized below in Table 3.17. These events are also discussed separately in the flood and tornado profiles.

Table 3.17 Thunder Storm Disaster Declaration History in Sullivan County, 1965-Present

Declaration Number	Declaration Date (incident period)	Disaster Description
1974	May 1, 2011 (4/25-4/28/2011)	Severe Storms, Tornadoes, Straight Line Winds and Associated Flooding
1179	1/13/2008 (1/6-2/12/2008)	Severe Storms and Flooding

Source: FEMA

High Winds

According to the NCDC database, the planning area experienced 83 severe thunderstorms with high winds in excess of 58 miles per hour (50 knots) from 2001 to 2010.

Summaries of some of the more damaging events are provided below:

September 3, 2011. A roof and back wall of a business located at the intersection of Eastman Road and East Stone Drive were heavily damaged due to severe thunderstorm winds. The roof was lifted up and a large portion of the back wall collapsed in. Property damage was estimated at \$50,000

May 26, 2004. A home was destroyed and eighteen others were damaged in Kingsport. Wind gusts reached an estimated 78 knots. Property damage was estimated at \$300,000.

May 26, 2004. A thunderstorm in Bloomingdale resulted in wind gusts estimated at 78 knots. A portable classroom was demolished and 30 windows were broken at Kingsley Elementary School. The portable classroom was lifted and struck a parked car. At Ketron Middle School, another classroom lost part of its roof and several windows. The school's outdoor lights and scoreboard were blown down. The sign at the main entrance was destroyed by a fallen tree. Property damage was estimated at \$1.5 million.

Most of the events in the NCDC database included reports of downed trees and tree limbs. Total reported damages to property from thunderstorm winds are estimated at \$2.47 million for the period between 2000 and 2013. Crop damage is estimated at \$327,000. Debris removal and other associated costs are common as a result of the numerous high wind events.

Hail

The NCDC reports 51 hail events in Sullivan County between 2000 and 2013. Property damage in the amount of \$5,000 was reported for a hail event in Bristol on April 28, 2002. Table 3.18 shows the number of hail events by the size of the hail.

Table 3.18 Sullivan County Hail Events Summarized by Hail Size from 2000 to 2013

Hail Size	Number of Events	Property Damages
< 0.88 in	12	0
0.88 in.	10	\$5,000
1.00 in.	18	0
1.25 in.	2	0
1.50 in.	1	0
1.75 in.	4	0
2.00 in.	0	0
2.25 in.	0	0
2.75 in.	4	0
Total	51	\$5,000

Source National Climatic Data Center Storm Events Database

According to the USDA Risk Management Agency, insurance payments for damages to crops as a result of hail from 2003-2012 totalled \$397.

Table 3.19 Claims Paid in Sullivan County for Crop Loss as a Result of Hail

Year	Crop	Hazard	Insurance Paid (\$)
2003	All Other	Hail	64
2006	All Other	Hail	333
Total			\$397

Source: USDA Risk Management, 2011

Lightning

The NCDC reports 6 lightning events in Sullivan County between 2000 and 2013. Property damage in the amount of \$62,000 was reported over the 12 year period.

Summaries of some of the lightning events are provided below:

- **August 1, 2007.** A roof of a Blountville home was set on fire from a lightning strike during a thunderstorm.
- **June 14, 2007.** Lightning struck an 80 foot tree causing electricity to surge to the ground and rupture a home's gas line in Bristol. No homes were damaged, only the landscape burned.
- **April 25, 2006.** A roof of a Bristol home suffered fire damage from a lightning strike during a thunderstorm.

- **May 1, 2003.** A lightning strike caused a house fire near Blountville.
- **May 1, 2003.** A lightning strike caused a house fire on Heyford Road between Bristol and Blountville.
- **February 23, 2000.** Lightning struck a power substation which resulted in a power outage.

Probability of Future Occurrences

According to NCDC, there were 83 wind events in Sullivan County between 2000 and 2013 (12 years), eight events with hail 1.75 inches in diameter and larger, and six lightning events. Based on this information, the probability that at least one significant thunderstorm any given year is **highly likely**:

- **Highly Likely**—Near 100 percent chance of occurrence next year or happens every year.

Seasonally, thunderstorms are more likely to occur during the summer months of May, June, and July. These rates of occurrence are expected to continue in the future.

Magnitude/Severity

Estimated damages from thunderstorms (including high winds, hail and lightning) in the NCDC database for the 17 year period were reported to be \$2.9 Million in property damages. Many damages and costs as a result of such events are often not reported. So, these estimates can be considered to be very conservative. Common types of damages were structural damages caused by falling limbs and debris, roof damages, overturned vehicles and light structures, and downed power poles resulting in some loss of electric service. In addition, clearance of the debris left behind can be costly and is generally not reported in damage estimates in NCDC.

The magnitude for this hazard is classified as **limited**:

- **Limited**— Minor injuries and illnesses; minimal property damage that does not threaten structural stability; and/or interruption of essential facilities and services for less than 24 hours.

3.2.9 Tornadoes

Description

The National Weather Service defines a tornado as a “violently rotating column of air extending from a thunderstorm to the ground.” Tornadoes are the most violent of all atmospheric storms and are capable of tremendous destruction. Wind speeds can exceed 250 mph, and damage paths can be more than one mile wide and 50 miles long. In an average year, more than 900 tornadoes are reported in the United States, resulting in approximately 80 deaths and more than 1500 injuries. High winds not associated with tornadoes are profiled separately in this document in Section 3.2.8 Severe Thunderstorms.

In bordering states, most tornadoes and tornado-related deaths and injuries occur during the months of April, May, and June. However, tornadoes have struck in every month. Similarly, while most tornadoes occur between 3:00 and 9:00 p.m., a tornado can strike at any time.

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis, better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado.

Table 3.20 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at different levels of intensity.

Table 3.20 Original Fujita Scale

Fujita (F) Scale	Fujita Scale Wind Estimate (mph)	Typical Damage
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/f-scale.html

Table 3.21 shows wind speeds associated with the Enhanced Fujita Scale ratings. The Enhanced Fujita Scale’s damage indicators and degrees of damage can be found online at www.spc.noaa.gov/efscale/ef-scale.html.

Table 3.21 Enhanced Fujita Scale

Enhanced Fujita (EF) Scale	Enhanced Fujita Scale Wind Estimate (mph)
EF0	65-85
EF1	86-110
EF2	111-135
EF3	136-165
EF4	166-200
EF5	Over 200

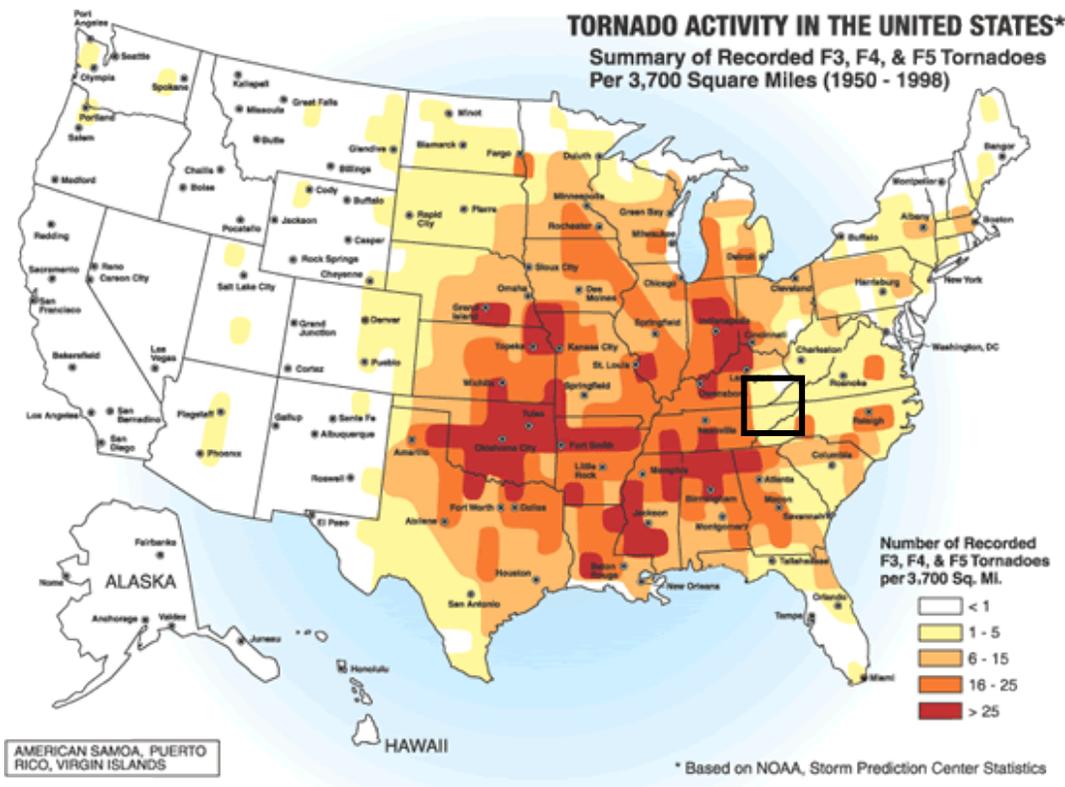
Source: National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/ef-scale.html

Geographic Location

While tornadoes can occur in all areas of the State of Tennessee, historically, some areas of the state have been more susceptible to this type of damaging storm. Figure 3.17 illustrates the number of F3, F4, and F5 tornadoes recorded in the United States per 3,700 square miles between 1950 and 1998. Sullivan County is in the section shaded yellow indicating 1-5 tornadoes of this magnitude during this 48-year period. The geographic location was assigned a rank of extensive.

- **Extensive**—50-100 percent of planning area affected.

Figure 3.17 Tornado Activity in the United States



Source: <http://www.fema.gov/safe-rooms/tornado-activity-united-states>

Previous Occurrences

A comprehensive tornado risk determination considers the risks of death, injury and property damage (costs), in addition to the probability of a tornado striking. The Disaster Center, a private center focusing on disaster mitigation, bases its State risk assessment by dividing the square mileage of each State against the frequency of death, injury, number of tornadoes, and cost of damages for each State. It then ranks each State by these individual categories, adds the total of each State's individual rankings and divides by the number of factors (four). Using data from 1950 –1995, and this methodology, Tennessee ranks 16th in the nation for tornado risk (<http://www.disastercenter.com/tornado/rank.htm>). According to the NCDC, the average number of tornadoes in Tennessee was 26 per year for the period between 1991 to 2010. Sullivan County is in the lowest risk area of Tennessee.

According to the NCDC database, there were 0 separate tornado events in Sullivan County between January of 2000 and April 2013.

While many straight-line winds are reported, NOAA only reported two tornadoes in the area between January 1950 and December 2004. Table 3.22 outlines those events. Figure 3.17 is a

map based upon NOAA weather data, showing wind zones across the United States. Sullivan County is located in an area that has had 1-5 tornadoes per 3,700 square miles.

Table 3.22 NOAA Reported Tornadoes in Sullivan County

Date	Path Length (miles)	Location	Fatality	Injured	Rating	Property Damage	Crop Damage
July 3, 1970	n/a		0	0	n/a	\$52.63	0
April 4, 1974	13.8	Near Colonial Heights to West Bristol	0	2	F0	\$50,000	0
October 1, 1977	16.2	Near Bloomingdale to Cedar Grove	0	10	F1	\$500,000	0

Source: http://webra.cas.sc.edu/hvriapps/sheldus_web/sheldus_results.aspx

Probability of Future Occurrences

Based on NCDC records of 3 tornadoes in a 40-year period, there is a 7.5 percent probability of a tornado in Sullivan County in any given year, resulting in a rank of occasional.

- **Occasional**—1-10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.

Magnitude/Severity

If a strong tornado did impact the populated portions of Sullivan County, the impacts would be **critical**.

- **Critical**—Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours.

3.2.10 Wildfire

Description

A wildfire is an uncontrollable fire spreading through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed and spread quickly and are usually signaled by dense smoke that fills the area for miles around. Generally, there are three major factors that sustain wildfires and allow for predictions of a given area's potential to burn. These factors include:

- Fuel;
- Topography; and
- Weather.

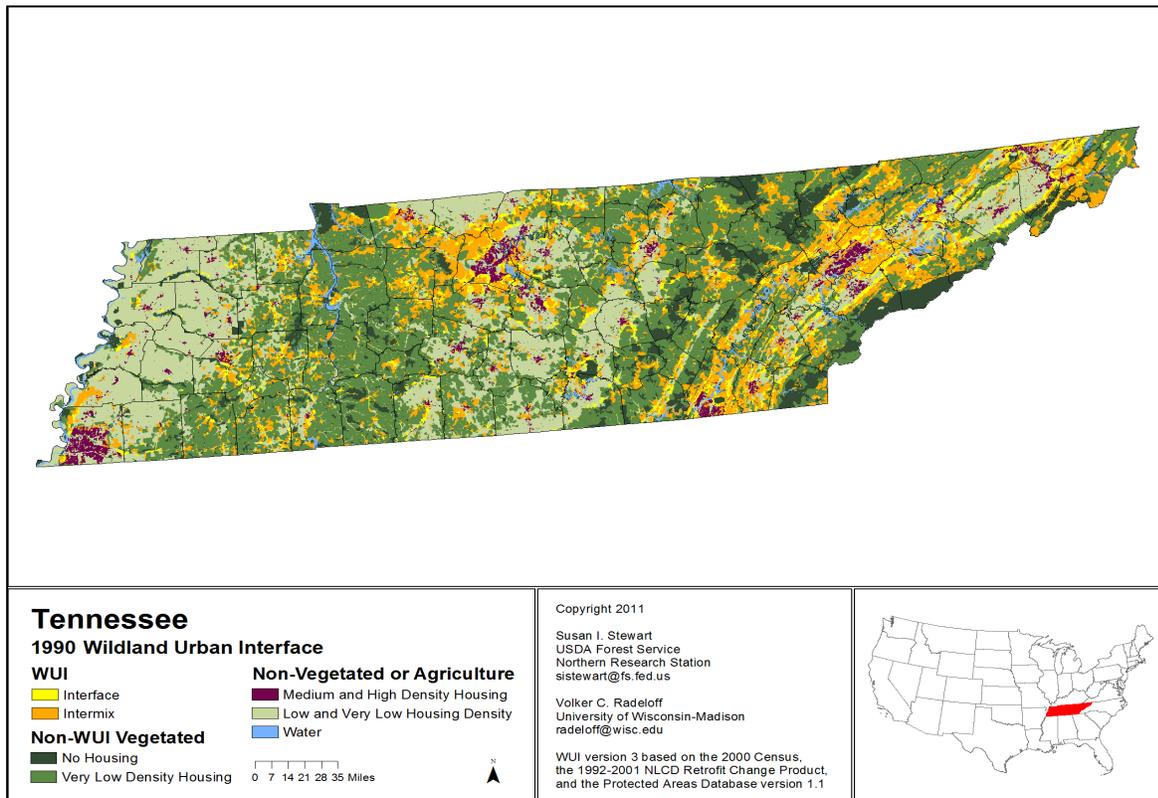
Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree needles, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. Man-made structures and other associated combustibles are also to be considered as a fuel source. The type of prevalent fuel directly influences the behavior of wildfire. Light fuels such as grasses burn quickly and serve as a catalyst for spreading wildfires.

An area's topography (terrain and land slopes) affect its susceptibility to wildfire spread. Fire intensities and rates of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The natural arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes

Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out the fuels that feed the wildfire creating a situation where fuel will more readily ignite and burn more intensely. Wind is the most treacherous weather factor. The issue of drought conditions contributes to concerns about wildfire vulnerability.

The Wildland-Urban Interface (WUI) is the area where houses meet or intermingle with undeveloped wildland vegetation. This makes the WUI a focal area for human-environment conflicts such as wildland fires, habitat fragmentation, invasive species, and biodiversity decline. Using geographic information systems (GIS), U.S. Census and USGS National Land Cover Data was integrated to map the WUI. Figures 3.18 and 3.19 present the identified WUI for Tennessee and Sullivan County, respectively. These two components of WUI, intermix and interface, have some differences that are potentially significant in wildland fire management. In terms of fuels, vegetation dominates intermix, and structural fuels dominate interface. Vegetation and structures ignite and burn differently, and thus fire behavior changes with the mix of these two WUI fuel types.

Figure 3.18 Tennessee Wildland Urban Interface 2000



The National Weather Service Fire Weather Program emerged in response to a need for weather support to large and dangerous wildfires. This service is provided to federal and state land management agencies for the prevention, suppression, and management of forest and rangeland fires. The National Weather Service Forecast Office in Morristown provides year-round fire weather forecasts for most of East Tennessee. Routine fire weather forecasts are issued daily for Tennessee Division of Forestry Districts 1 and 2 (See Figure 3.20).

Figure 3.20 Tennessee Forestry Districts

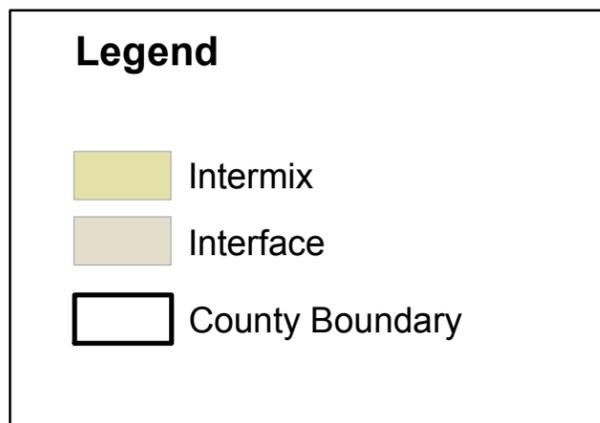
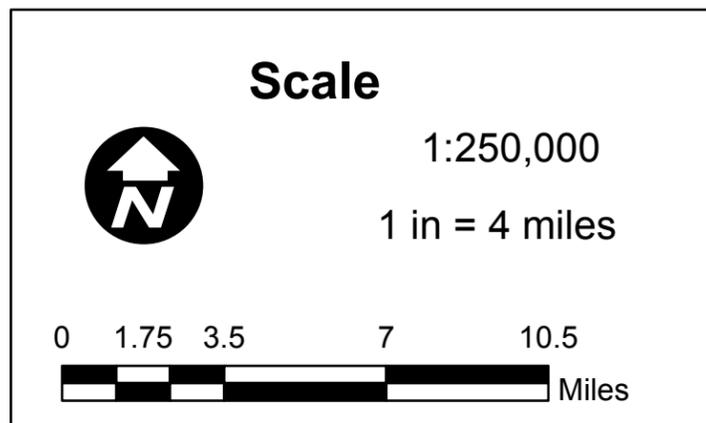
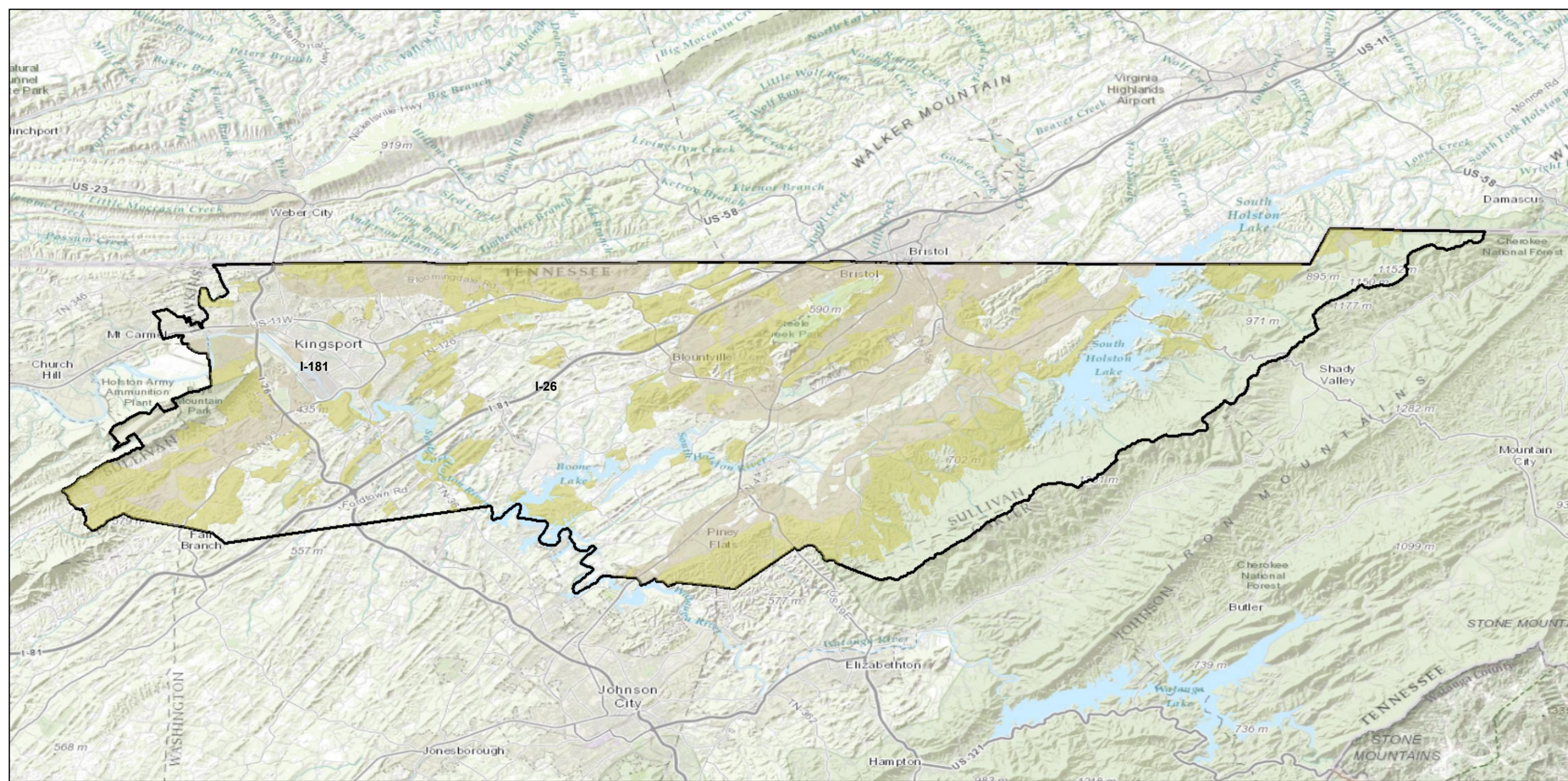
National Weather Service Weather Forecast Office
Morristown, TN

Home Site Map News Organization Search for: [] NWS All NOAA

Fire Weather Program at WFO Morristown

FIRE WEATHER FORECASTS AND OUTLOOKS

- WFO Morristown Fire Weather Forecast [Alternate Forecast Link]
- National Fire Weather Page
- Request a Spot Fire Weather Forecast [Requestor Instructions]
 NOTE: For Forestry Official Use Only
- Fire Weather Outlook Issued By The Storm Prediction Center
- 6 to 10 day Temperature/Precipitation Outlook
- 30 day Temperature/Precipitation Outlook
- 90 day Temperature/Precipitation Outlook
- Forecast Fire Danger Rating



**Sullivan County
Wildland Urban Interface (WUI)**

Data Source:
2010 Wildland Urban Interface GI

Prepared February 2014

Geographic Location

The identified Wildland-Urban Interface (WUI) area encompasses approximately 78 square miles of interface and 106 square miles of intermix for a total of 184 square miles. This is 42% of the total area of Sullivan County and this thus ranked as **significant**:

- **Significant**—10-50 percent of planning area affected.

Previous Occurrences

According to the National Climatic Data Center Storm Events database, there have been 0 recorded wildfire events in Sullivan County since 2000.

Probability of Future Occurrences

The US Forest Service both observes and forecasts a **low** fire danger potential for the Sullivan County (See Figure 3.21).

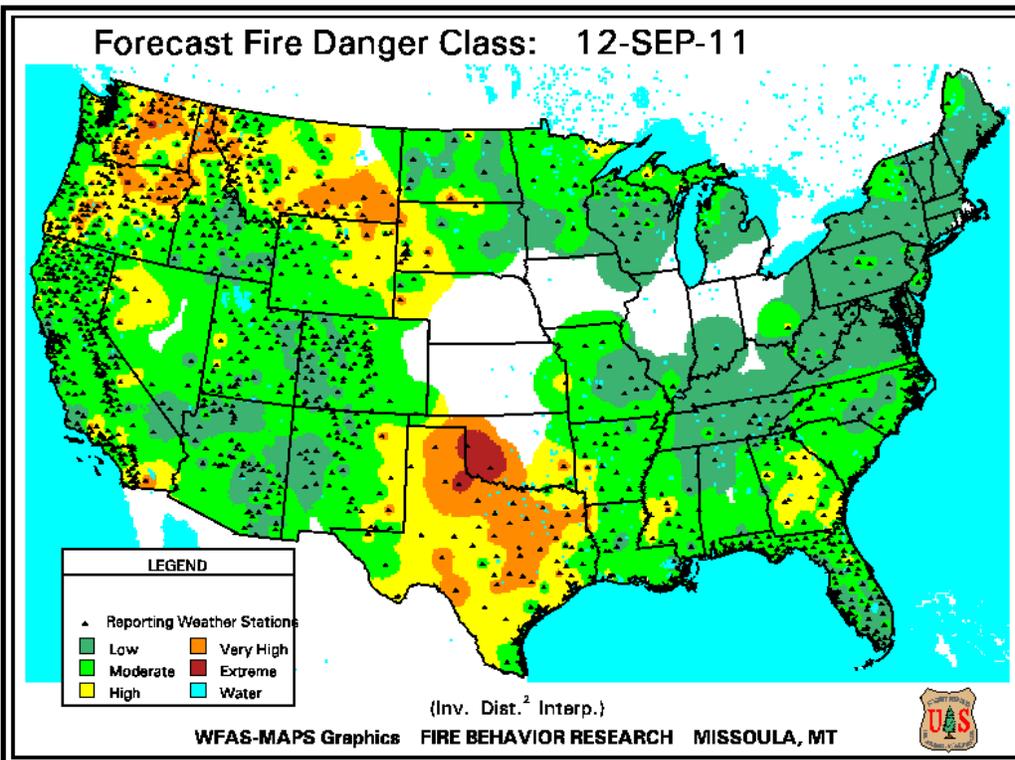
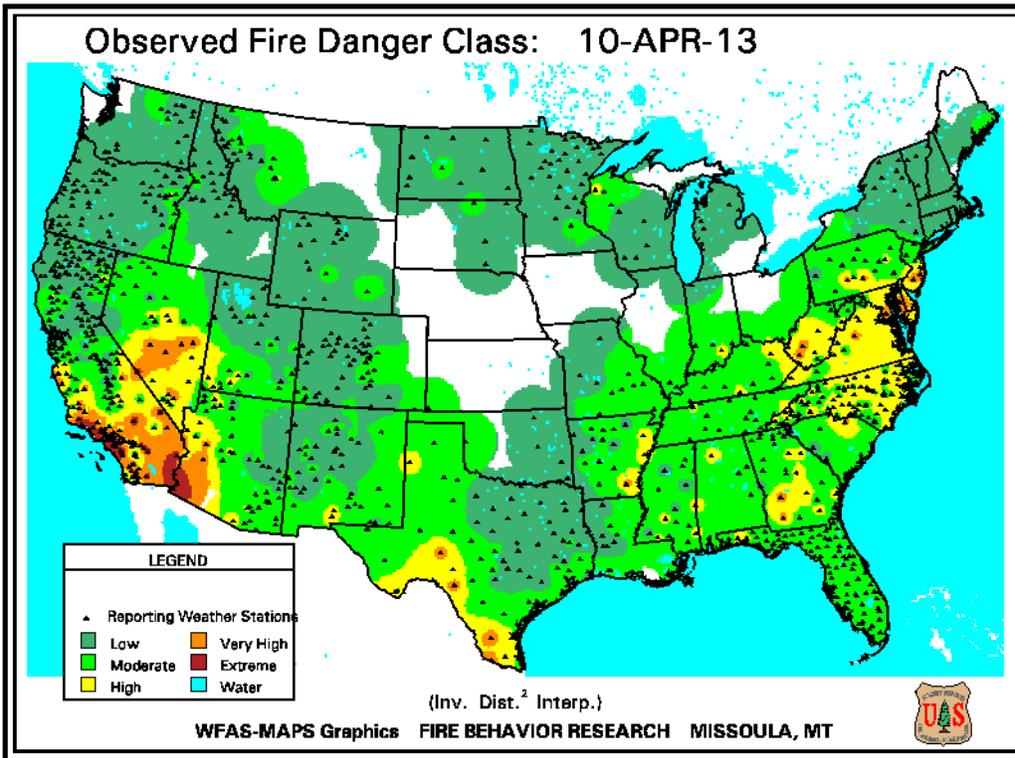
- **Occasional**—1-10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.

Magnitude/Severity

Although no history of fatalities, injuries, or structural damage, the HMPC determined the magnitude/severity to be **critical** due to the geographic extent of the identified WUI area and the population and buildings located within these areas.

- **Critical**—Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours.

Figure 3.21 Observed and Forecast Fire Danger Class



3.2.11 Winter Storms

Description

Winter storms in Tennessee typically involve snow and/or freezing rain (ice storms). These conditions pose a serious threat to public safety, disrupt commerce and transportation, and can damage utilities and communications infrastructure. Winter storms can also disrupt emergency and medical services, hamper the flow of supplies, and isolate homes and farms. Heavy snow can collapse roofs and down trees onto power lines. Direct and indirect economic impacts of winter storms include cost of snow removal, damage repair, increased heating bills, business and crop losses, power failures and frozen or burst water lines.

The National Weather Service describes different types of winter storm conditions as follows:

Blizzard—Winds of 35 mph or more with snow and blowing snow reducing visibility to less than 1/4 mile for at least three hours.

Blowing Snow—Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.

Snow Squalls—Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.

Snow Showers—Snow falling at varying intensities for brief periods of time. Some accumulation is possible.

Freezing Rain—Measurable rain that falls onto a surface whose temperature is below freezing. This causes the rain to freeze on surfaces, such as trees, cars, and roads, forming a coating or glaze of ice. Most freezing-rain events are short lived and occur near sunrise between the months of December and March.

Sleet—Rain drops that freeze into ice pellets before reaching the ground. Sleet usually

The average monthly/annual snowfall for Tri City Airport is presented in Table 3.23.

Table 3.23 Snowfall Summary (inches) 1941-2002

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Tri City Airport	5.2	4.2	2.3	0.4	---	---	---	---	---	---	0.9	2.6	15.6

Source: <http://wf.ncdc.noaa.gov/oa/climate/online/ccd/snowfall.html>

Duration of the most severe impacts of winter storms is generally less than one week, though dangerous cold, snow, and ice conditions can remain present for longer periods in certain cases. Weather forecasts commonly predict the most severe winter storms at least 24 hours in advance, leaving adequate time to warn the public.

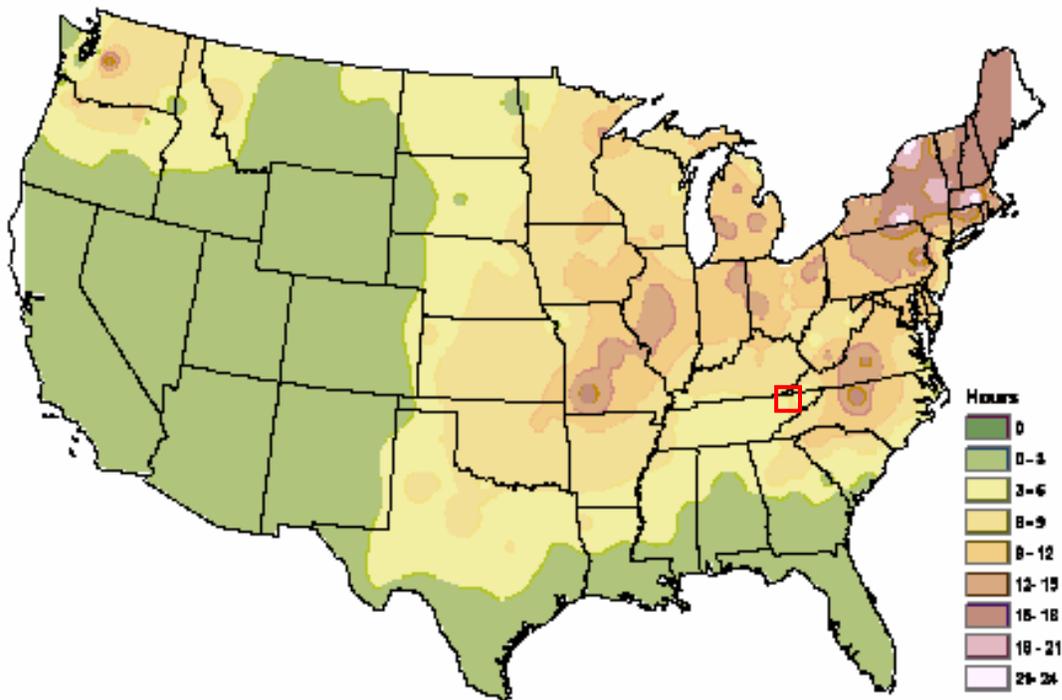
Geographic Location

The entire State of Tennessee is vulnerable to heavy snow and freezing rain. Northeast Tennessee receives the greatest average annual snowfall in the state. Sullivan County receives 15.6 of snow during a normal season according to the National Weather Service in Morristown, Tennessee.

Figure 3.22 shows that Sullivan County falls in a zone that receives 8-9 hours of freezing rain per year. The geographic location was assigned a rank of **extensive**, the entire planning area is subject to extreme temperatures and all participating jurisdictions are affected.

- **Extensive**—50-100 percent of planning area affected.

Figure 3.22 Average Number of Hours per Year with Freezing Rain in the United States



Source: American Meteorological Society. "Freezing Rain Events in the United States."
<http://ams.confex.com/ams/pdfpapers/71872.pdf>.

Note: Red square indicates approximate location of Sullivan County

Previous Occurrences

One emergency declaration has occurred in Sullivan County since 1965 related to winter storms. Declaration number EM-3095 was declared March 14, 1993 for a Severe Winter Storm that affected the area between March 13 and March 17 of that year (<http://www.fema.gov>).

There have also been three USDA Disaster Declarations from 2005 to 2010.

Details of these events are provided in Table 3.24.

Table 3.24 Claims Paid in Sullivan County for Crop Loss as a Result of Cold Wet Weather, Freeze, or Frost.

Year	Crop	Hazard	Insurance Paid (\$)
2007	Other	Freeze	32,539
2007	Other	Freeze	239
2009	Other	Freeze	12,342
Total			77, 479

Source: USDA Risk Management, 2011

According to the NCDC database, 10 winter storm events were reported between 2000 and 2013. These are summarized below.

January 22, 2000. Generally 2-4 inches of snow fell across central and northeast portions of East Tennessee, with only a few reports of amounts in the 1-2 inch range and 4-5 inch range.

December 2, 2000. Widespread snow fell across East Tennessee. Amounts varied widely. In northeast Tennessee, snowfall amounts averaged 1 to 3 inches, with a few locations in the mountains reporting 2 to 4 inches, and with a few isolated reports of 3 to 5 inches.

December 18, 2000. Widespread light snow fell across East Tennessee. Amounts in counties in the valley generally ranged from 1 to 2 inches. In the higher mountain elevations, amounts were a bit higher, averaging 2 to 4 inches.

January 1, 2001. A strong upper level disturbance swept through the Tennessee Valley and southern Appalachians bringing a round of light snow to the area. Amounts were generally ½ inch to 2 inches. There were a few isolated reports of 3 inches, mainly near the mountains.

January 20, 2001. Low pressure moved northeast across the southern Appalachians, bringing light snow to the region. 1 to 3 inches fell in the higher elevations of mountain counties from Johnson County in the northeast to Monroe County in the southeast. A few spots received around 4 inches. Across the remainder of East Tennessee, amounts were under 1 inch.

January 5, 2002. A winter storm brought a wide range of amounts to East Tennessee. Across Northeast Tennessee, amounts average between a dusting and a half inch. There were exceptions, where some areas received more, but Sullivan County is not among them. Hawkins County, a neighboring county, received 6-8 inches.

December 4, 2002. Snowfall accumulations of 4 to 7 inches were reported across the Cumberland Plateau, higher elevations of Northeast Tennessee and Smoky Mountains. Two to four inches were reported in the lower elevations.

January 16, 2003. A storm system moved from the southern plains across the Tennessee Valley of Alabama into the Southern Appalachians bringing snowfall amounts ranging from 2 to 8 inches in east Tennessee. The higher accumulations concentrated across extreme northeast section of the state.

January 21, 2003. A strong upper level disturbance moved southeast from the northern plains and Midwest states across eastern Tennessee producing significant snowfall amounts ranging from 2 to 5 inches in the lower elevations to 5 to 8 inches in the higher elevations.

January 9, 2004. A winter storm system moved into the region early in the morning of January 9 producing snowfall amounts from 1 inch to 4 inches across Northeast Tennessee. The most common range of snowfall reported across the counties of Northeast Tennessee was 2 to 3 inches.

Probability of Future Occurrences

With the combined historical information from FEMA declarations, planning committee accounts, and the NCDC database, during an 18-year period from 1993 to 2010 there were at least 14 significant recorded winter storm events in Sullivan County resulting in an average of 0.7 significant winter storms per year. Based on historic frequency, the probability of future occurrence rating for winter storms is **highly likely**:

- **Highly Likely**—Near 100 percent chance of occurrence next year or happens every year.

Magnitude/Severity

Damages associated with winter storms in Sullivan County are usually related to downed power lines and power infrastructure. These damages and the associated losses as a result of disruptions in normal daily operations can be costly.

One significant winter weather event can have multiple impacts including property damage and damages to power lines and infrastructure from falling trees and limbs, prolonged power outages, road damage, road hazards, and road closures, school, government and business closures.

- **Critical**—Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours.

3.2.12 Hazardous Materials

Description

Hazardous materials (HAZMAT) are chemical substances, which if released or misused can pose a threat to the environment or health. These chemicals are found throughout Sullivan County, in areas of industry, agriculture, medicine, research, consumer goods and a multitude of others. HAZMAT can come in the form of explosives, flammable and combustible substances, poisons and radioactive materials. Many HAZMAT do not have a taste or an odor. Some materials can be detected because they cause physical reactions such as watering eyes or nausea. Some HAZMATs exist beneath the surface of the ground and can be recognized by an oil or foam-like appearance. Under normal conditions, these substances are controlled and pose no threat to human life and the environment. But when a release occurs, they can produce disastrous results. These materials, in their various forms, can cause death, serious injury, long-lasting health effects, and can damage buildings, homes, and other property. Such releases may come from both fixed sources, such as a manufacturing or storage facility, or from a transportation source, such as a truck or pipeline. Accidental releases may be due to equipment failure, human error, or a natural or manmade hazard event.

HAZMAT releases pose short- and long-term toxicological threats to humans and to terrestrial and aquatic plants and wildlife. Toxic materials affect people through one of three processes: inhalation, ingestion, or direct skin contact (Federal Emergency Management Agency, 1997). Inhalation exposures result from breathing gases that may have been vented from containers, liquid aerosols generated during venting of pressurized liquids, fumes from spilled acids, vapor created by evaporating liquids, and airborne dust. Ingestion exposures typically result from poor hygiene habits after handling contaminated material, eating contaminated food, or the inhalation of insoluble particles that may become trapped in the mucous membranes. Skin may be affected by direct contact with gas, liquid, or solid forms of HAZMAT.

In some cases, these substances may irritate the skin or eyes, make it difficult to breathe, cause headaches and nausea, or result in other types of illnesses. Some hazardous substances may cause far more severe health effects, including behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (e.g., reproductive impairment, kidney failure, etc.), physical deformations and birth defects (see Table 3.25).

Table 3.25 Effects of Hazardous Materials on Humans

Common Sources	Contaminants	Potential Health Effects
Household items, such as batteries, thermometers, and paints	Mercury	Toxic to kidneys. Can cause eye and skin irritation; chest pain; tremor; fatigue; weakness.
Pesticides	Chlorinated ethanes; DDT; Lindane	Acute symptoms of apprehension, irritability, dizziness, disturbed equilibrium, tremor, and convulsions.
Various commercial and industrial manufacturing processes	Arsenic; beryllium; cadmium; chromium; lead; mercury	All are toxic to kidneys. Decreased mental ability, weakness, headache, abdominal cramps, diarrhea, and anemia. Also affects blood-forming mechanisms and the peripheral nervous system. Long-term exposure to lead can cause permanent kidney and brain damage. Cadmium can cause kidney and lung disease. Chromium, beryllium, arsenic, and cadmium have been implicated as human carcinogens.
Chemical manufacturing	Benzene; ethyl benzene; toluene; xylene	Benzene suppresses bone marrow function, causing blood changes; chronic exposure can cause leukemia. Central nervous system depression: decreased alertness, headaches, sleepiness, loss of consciousness.
Steel and glass manufacturing	Chromium; lead; mercury	All are toxic to kidneys. Lead causes decreased mental ability, weakness, headache, abdominal cramps, diarrhea, and anemia. Also affects blood-forming mechanisms and the peripheral nervous system.

Source: 2010 State Hazard Mitigation Plan

Some hazardous substances produce toxic effects in humans or the environment after a single, episodic release. These toxic effects are referred to as the acute toxicity of a hazardous substance. Other hazardous substances produce toxic effects in humans or the environment after prolonged exposure to the substance, which is called chronic toxicity.

Children are at greater risk of exposure to hazardous substances emitted from waste sites and emergency events. They are more likely to be exposed for several reasons: children play outside more often increasing the likelihood of exposure to chemicals in the environment; since they are shorter than adults are, they breathe more dust and heavy vapors close to the ground; children are also smaller and thus receive higher doses of chemical exposure per body weight; finally, the developing body systems of children can sustain damage if toxic exposures occur during certain growth stages.

Geographic Location

In Sullivan County, HAZMAT incidents typically take one of two forms: fixed facility incidents and transportation incidents. The major difference between the two is that it is reasonably possible to identify and prepare for a fixed-site incident, because laws require those facilities to report chemicals and quantities to the Tennessee Emergency Management Agency and the

Sullivan County Emergency Management Agency. Transportation incidents are substantially harder to prepare for because the exact chemicals, quantities and locations cannot be identified until the accident has actually happened. The vulnerability and impacts of a HAZMAT event in Sullivan County can differ drastically due to the location of release, surrounding populations, mode of release and other significant scenarios.

Fixed Facility Incidents

Generally, with a fixed facility, the hazards are pre-identified, and the facility is required by law to prepare a risk management plan and provide a copy to the local emergency planning committee (LEPC) and local fire departments.

HAZMAT releases at fixed sites can cause a range of contamination from very minimal to catastrophic. The releases can go into the air, onto the surface, or into the ground and possibly into groundwater, or a combination of all. Although releases into the air or onto the ground surface can pose a great and immediate risk to human health, they are generally easier to remediate than those releases which enter into the ground or groundwater. Soil and groundwater contamination may take years to remediate causing possible long-term health problems for individuals and rendering land unusable for many years.

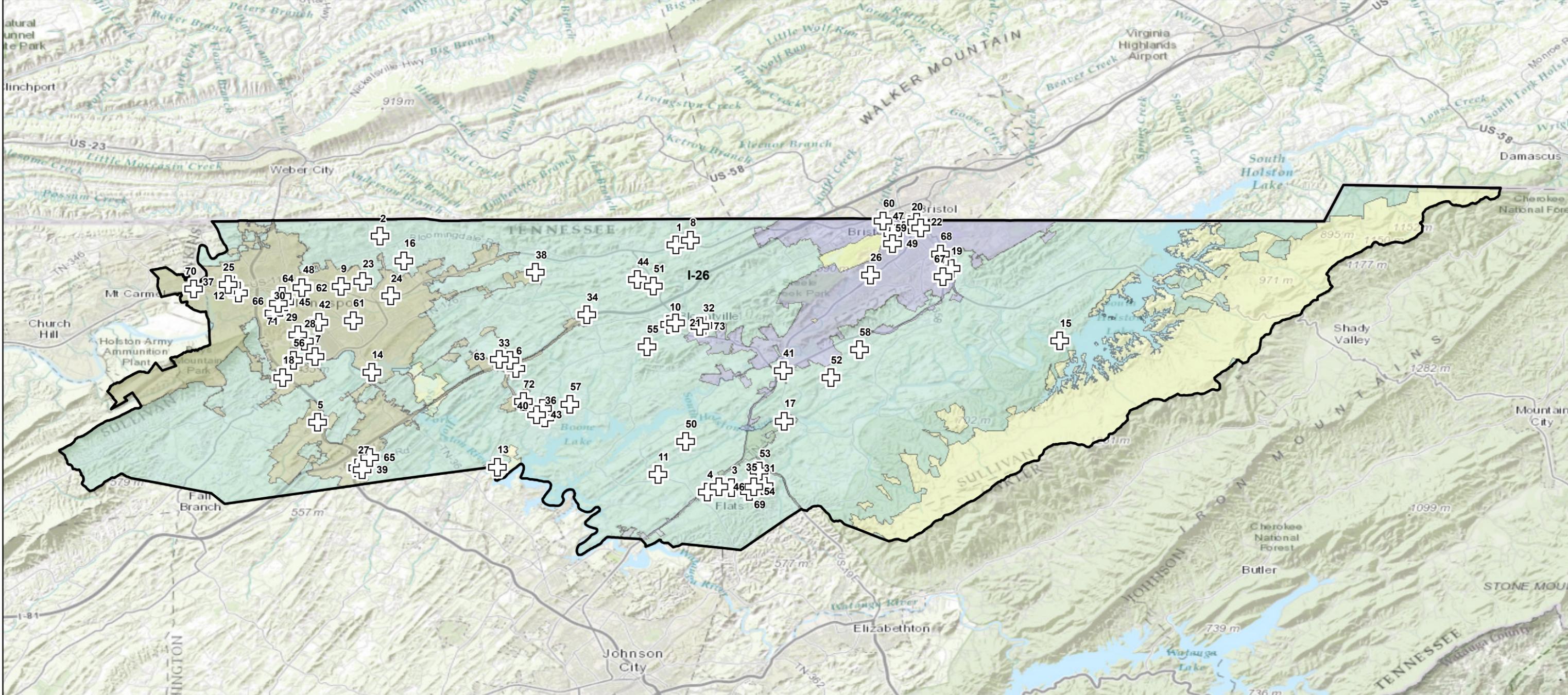
Federal law requires businesses and industry with a repository of certain chemicals to report names, types and quantities on hand to the TEMA/State Emergency Response Council, the local emergency planning committee and the district fire department that would respond to that location. The forms are known as Tier II reports and the facilities included are referred to as Tier II facilities.

In 2012, there were 73 Tier II Facilities housing hazardous chemicals in Sullivan County (See Figure 3.23).

Transportation Incidents

Transportation HAZMAT Incidents can occur when HAZMAT are being transported from one location to another in the normal course of business for manufacturing, refining, or other industrial purposes. Additionally, HAZMAT Incidents can occur as hazardous waste is transported for final storage and/or disposal.

The transportation of hazardous wastes is regulated by federal regulatory agencies (U.S. Department of Transportation and U.S. Environmental Protection Agency) as well as Tennessee regulatory agencies (Tennessee Highway Patrol and Tennessee Department of Environment & Conservation (TDEC)). The TDEC-Hazardous Waste Program administers the transportation, storage and disposal of hazardous material wastes requiring the most stringent management because of their potential danger to human health and the environment. All hazardous wastes shipped in or through Tennessee must be properly contained and labeled, and transported only by permitted hazardous waste transporters. Hazardous wastes may only be shipped to permitted hazardous waste treatment, storage and disposal facilities (TSDFs).



Tier II Facility Locations

1 Wilson Trucking Corporation	20 Kingsport CO - CenturyLink	39 Averitt Express	58 Victaulic, LLC
2 Crown Castle	21 Blountville CO - CenturyLink	40 TRI-Cities Regional Airport	59 King Pharmaceuticals, LLC
3 Bell Helicopter	22 Bristol CO -CenturyLink	41 Scotts Lawn Service	60 King Pharmaceuticals, LLC
4 Bell Helicopter	23 Trugreen - Kingsport	42 AGC Flat Glass North America, Inc.	61 G & K Services
5 Clarke Power Services	24 Lowe's Home Centers, Inc.	43 Wysong Enterprises, Inc.	62 Holston Valley Medical Center
6 Marcus Cable Associates	25 Lowe's Home Centers, Inc.	44 Eco-Safe Systems Landfill	63 Holston Gases Inc.
7 Air Products and Chemicals Inc.	26 Lowe's Home Centers, Inc.	45 CEMEX Construction Materials Atlantic, LLC	64 Domtar Paper Company, LLC
8 UPS - Bristol Freight	27 Resp-I-Care Home Medical Service	46 Specialty Chemical Piney Flats	65 Leisure Products, Inc.
9 THE HOME DEPOT STORE #0702	28 Enterprise Transportation Company	47 Verizon Wireless	66 Airgas USA, LLC
10 Tennessee D.O.T.	29 Enterprise Transportation Company	48 Verizon Wireless	67 Royal Mouldings Limited
11 Safety-Kleen Systems, Inc.	30 Thompson Metal Services, Inc	49 Verizon Wireless	68 Tri-City Extrusion
12 AmeriGas	31 Thompson Metal Services, Inc	50 Verizon Wireless	69 Chemsolv(TM), Inc
13 Boone Hydro Plant	32 Level 3 Communications, LLC	51 Verizon Wireless	70 OmniSource Southeast
14 Fort Patrick Henry	33 Waste Management of Tennessee Tri Cities	52 TVA Bluff City, Tn 161 kV Substation	71 Airgas USA, LLC
15 South Holston Hydro Plant	34 Penske Truck Leasing Co., LP	53 TVA Sullivan 500 kV Substation	72 Carrier Enterprise, LLC
16 Kingsport East CO -CenturyLink	35 General Shale Brick, Inc.	54 Narcote, LLC	73 AG Heins Company, Inc.
17 Bluff City - CenturyLink	36 Regional Elite Airline Services, LLC	55 Austin Powder Midsouth LLC - Blountville	
18 Sullivan Gardens CO -CenturyLink	37 W-L Construction & Paving, Inc.	56 Kingsport Concrete Plant and Shop	
19 Bristol South CO - CenturyLink	38 W-L Construction & Paving, Inc.	57 FedEx Freight, Inc.	

Legend

- Sullivan County
- City Of Bristol
- City Of Kingsport
- Johnson City
- Bluff City
- Park/Reservation
- County Boundary

Scale

1:250,000
1 in = 4 miles

Sullivan County Tier II Facilities

Data Source:
World Topographic Map 2010

Prepared February 2014

Highway

Two major interstates flow through the Sullivan County, Interstate 81 and Interstate 26. Interstate 81 begins at Interstate 40 in Dandridge, Tennessee, runs northeast across Sullivan County to the City of Bristol and onward toward Roanoke, Virginia. Interstate 26 is a north-south spur highway connecting Kingsport and Johnson City to I-81. Both Interstates are used for HAZMAT transportation.

Transportation of HAZMAT on highways, county roads and city streets, involves tanker trucks, trailers and certain types of specialized bulk-cargo vehicles. Because of the distances traveled, it is not surprising that trucks are responsible for the greatest number of HAZMAT events in Sullivan County and the rest of the country.

Railway

The volume of HAZMAT moving by rail in the US has more than doubled since 1980, with approximately 1.7 million carloads now moving each year. In 2001, though, only 32 rail accidents resulted in a release of HAZMAT. An astounding 99 percent of rail HAZMAT shipments reached their final destinations without a release caused by an accident. Overall HAZMAT accident rates have fallen 87 percent since 1980 and 30 percent since 1990.

There are two Class I railroads providing service with long-haul deliveries to national market areas and intermodal rail/truck service providers within Sullivan County:

CSX Transportation, and
Norfolk Southern Corporation

Based on the number of fixed facilities and the transportation routes within Sullivan County, the HMPC determined the geographic extent of hazardous materials incidents to be significant:

- **Significant**—10-50 percent of planning area affected.

Previous Occurrences

The U.S. Department of Transportation's Pipeline & Hazardous Materials Safety Administration's Hazmat Intelligence Portal includes a HAZMAT Incident Report Database for transportation-related HAZMAT incidents. Incidents from this database were retrieved for the 10-year period from 5/01/2003 to 5/01/2013. During this time frame, there were 40 incidents on highways and 5 incidents on rail. Table 3.26 presents specific incident information.

Probability of Future Occurrences

There were 45 incidents from 2003-2013 (10 years), as reported by the US DOT. This translates to an average of 4.5 incidents per year. The probability of a future occurrence is highly likely:

- **Highly Likely**—Near 100 percent chance of occurrence next year or happens every year.

Table 3.26 HAZMAT Transportation Incidents

Date of Incident	Incident City	Incident Route	Carrier/Reporter Name	Shipper Name	Hazardous Class	Total Hazmat Fatalities	Total Hazmat NonHosp Injuries	Total Amount of Damages
7/16/2004	Kingsport	233 WEST MAIN ST	CSX TRANSPORTATION INC.	HONEYWELL INTERNATIONAL INC.	CORROSIVE MATERIAL	0	0	0
9/4/2004	Kingsport	1595 JARED DRIVE	ENTERPRISE TRANSPORTATION COMPANY	PENNZOIL-QUAKER STATE COMPANY	COMBUSTIBLE LIQUID	0	0	0
9/9/2004	Kingsport	I-81	ROGERS CARTAGE CO	EASTMAN CHEMICAL COMPANY	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	36625
6/23/2005	Kingsport	3365 E STONE DRIVE	YRC WORLDWIDE INC.	THE GASFLUX COMPANY	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
7/28/2005	Kingsport	I-81 MM63	DUPRE LOGISTICS L.L.C.	CYTEC INDUSTRIES INC.	MISCELLANEOUS HAZARDOUS MATERIAL	1	0	113000
1/27/2006	Kingsport	1595 JARED DRIVE	ENTERPRISE TRANSPORTATION COMPANY	EASTMAN CHEMICAL LTD. CORPORATION	COMBUSTIBLE LIQUID	0	0	0
3/3/2006	Kingsport	1595 JARED DRIVE	ENTERPRISE TRANSPORTATION COMPANY	EASTMAN CHEMICAL LTD. CORPORATION	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
3/9/2006	Kingsport	1595 JARED DRIVE	ENTERPRISE TRANSPORTATION COMPANY	EASTMAN CHEMICAL LTD. CORPORATION	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
8/12/2006	Kingsport	1595 JARED DRIVE	ENTERPRISE TRANSPORTATION COMPANY	EASTMAN CHEMICAL LTD. CORPORATION	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
10/13/2006	Kingsport	233 MAIN ST	CSX TRANSPORTATION INC.	MOS HOLDINGS INC.	CORROSIVE MATERIAL	0	0	2500
10/16/2006	Kingsport	233 MAIN ST	CSX TRANSPORTATION INC.	MOS HOLDINGS INC.	CORROSIVE MATERIAL	0	0	2500
3/22/2007	Kingsport	1595 JARED DRIVE	ENTERPRISE TRANSPORTATION COMPANY	EASTMAN CHEMICAL COMPANY	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0

Date of Incident	Incident City	Incident Route	Carrier/Reporter Name	Shipper Name	Hazardous Class	Total Hazmat Fatalities	Total Hazmat NonHosp Injuries	Total Amount of Damages
4/25/2007	Kingsport	near Eastern Star exit on I-26	DPC ENTERPRISES	DPC ENTERPRISES	POISONOUS GAS	0	3	0
7/2/2007	Kingsport	1595 JARED DRIVE	ENTERPRISE TRANSPORTATION COMPANY	EASTMAN CHEMICAL COMPANY	CORROSIVE MATERIAL	0	0	0
7/11/2007	Kingsport	1595 JARED DRIVE	ENTERPRISE TRANSPORTATION COMPANY	EASTMAN CHEMICAL COMPANY	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
7/30/2007	Johnson City	2301 SIVERDALE ROAD	UNITED PARCEL SERVICE INC.	INK CUPSNOW CORPORATION	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
8/14/2007	Kingsport	1595 JARED DRIVE	ENTERPRISE TRANSPORTATION COMPANY	EASTMAN CHEMICAL COMPANY	CORROSIVE MATERIAL	0	0	0
8/23/2007	Kingsport	1595 JARED DRIVE	ENTERPRISE TRANSPORTATION COMPANY	EQUISTAR CHEMICALS LP	CORROSIVE MATERIAL	0	0	0
9/6/2007	Kingsport		CSX TRANSPORTATION INC.	ZINIFEX TAYLOR CHEMICAL INC.	CORROSIVE MATERIAL	0	0	2000
12/17/2007	Kingsport	2453 Sherwood Road	FEDEX GROUND PACKAGE SYSTEM INC.	MILLER STEPHENSON CHEMICAL COMPANY INC		0	0	0
12/19/2007	Kingsport	2453 Sherwood Road	FEDEX GROUND PACKAGE SYSTEM INC.	BECKMAN COULTER INC.		0	0	0
10/1/2008	Kingsport	2200 Tri-Cities Crossings	FEDEX GROUND PACKAGE SYSTEM INC.	BUCKEYE FIRE EQUIPMENT CO.	NONFLAMMABLE COMPRESSED GAS	0	0	0
11/19/2008	Kingsport	I-81 Mile Marker 59	COVENANT TRANSPORT INC.	LC GEISMAR SERVICES LLC	CORROSIVE MATERIAL	0	0	149000
3/3/2009	Colonial Heights	2200 Tri Cities Crossings	FEDEX GROUND PACKAGE SYSTEM INC.	XCELIENCE LLC	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
5/21/2009	Johnson City	2301 SIVERDALE ROAD	UNITED PARCEL SERVICE INC.	NATIONAL OAK DISTRIBUTORS INC	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0

Date of Incident	Incident City	Incident Route	Carrier/Reporter Name	Shipper Name	Hazardous Class	Total Hazmat Fatalities	Total Hazmat NonHosp Injuries	Total Amount of Damages
3/19/2010	Colonial Heights	2200 Tri-Cities Crossings	FEDEX GROUND PACKAGE SYSTEM INC.	TRI CITY DISTRIBUTING LLC	CORROSIVE MATERIAL	0	0	0
4/9/2010	Colonial Heights	2200 -Tri-Cities Crossings	FEDEX GROUND PACKAGE SYSTEM INC.	FUJI PHOTO FILM INC	CORROSIVE MATERIAL	0	0	0
5/14/2010	Kingsport	DOMTAR PAPER	QUALITY CARRIERS INC.	VOPAK TERMINALS WILMINGTO	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
7/24/2010	Colonial Heights	2200 tri-cities crossings	FEDEX GROUND PACKAGE SYSTEM INC.	DUPONT PERFORMANCE COATINGS LLC	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
10/7/2010	Colonial Heights	2200 Tri Cities Crossings	FEDEX GROUND PACKAGE SYSTEM INC.	FISHER SCIENTIFIC COMPANY LLC	CORROSIVE MATERIAL	0	0	0
4/11/2011	Kingsport	1 26 456 FEET NEST OF MM 7	TRANSPORTATION EQUIPMENT SPECIALISTS INC.	SACHS CHEMICAL INC.	CORROSIVE MATERIAL	0	0	42000
4/12/2011	Kingsport		CSX TRANSPORTATION INC.	PRAXAIR INC.	NONFLAMMABLE COMPRESSED GAS	0	0	4000
5/20/2011	Colonial Heights	2200 Tri Cities Crossings	FEDEX GROUND PACKAGE SYSTEM INC.	REAGENTS INC	CORROSIVE MATERIAL	0	0	0
5/21/2011	Colonial Heights	2200 tri cities crossings	FEDEX GROUND PACKAGE SYSTEM INC.	REAGENTS INC	CORROSIVE MATERIAL	0	1	0
6/11/2011	Colonial Heights	2200 tri cities crossings	FEDEX GROUND PACKAGE SYSTEM INC.	GEORGIA GRAPHICS INC	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
6/28/2011	Colonial Heights	2200 Tri Cities Crossings	FEDEX GROUND PACKAGE SYSTEM INC.	ULTRA-CHEM INC.	CORROSIVE MATERIAL	0	0	0
7/12/2011	Colonial Heights	220 Tri Cities Crossings	FEDEX GROUND PACKAGE SYSTEM INC.	BIOLAB	CORROSIVE MATERIAL	0	0	0
8/26/2011	Colonial Heights	2200 Tri Cities Crossings	FEDEX GROUND PACKAGE SYSTEM INC.	BIO-LAB INC.	CORROSIVE MATERIAL	0	0	0

Date of Incident	Incident City	Incident Route	Carrier/Reporter Name	Shipper Name	Hazardous Class	Total Hazmat Fatalities	Total Hazmat NonHosp Injuries	Total Amount of Damages
1/10/2012	Colonial Heights	2200 tri cities crossing	FEDEX GROUND PACKAGE SYSTEM INC.	CEVA LOGISTICS	CORROSIVE MATERIAL	0	0	0
3/29/2012	Colonial Heights	2200 Tri cities crossing	FEDEX GROUND PACKAGE SYSTEM INC.	NCH CORPORATION	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
4/4/2012	Colonial Heights	2200 tri cities crossing	FEDEX GROUND PACKAGE SYSTEM INC.	MYERS TIRE SUPPLY DISTRIBUTION INC.	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
9/27/2012	Colonial Heights	2200 tri cities crossing	FEDEX GROUND PACKAGE SYSTEM INC.	SLMP LLC	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
1/2/2013	Colonial Heights	2200 tri street	FEDEX GROUND PACKAGE SYSTEM INC.	MOHAWK LABORATORIES	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
2/14/2013	Colonial Heights	2200 TRI CITIES CROSSING	FEDEX GROUND PACKAGE SYSTEM INC.	NCH CORPORATION	FLAMMABLE - COMBUSTIBLE LIQUID	0	0	0
3/21/2013	Colonial Heights	2200 tri cities crossing	FEDEX GROUND PACKAGE SYSTEM INC.	FUJI PHOTO FILM INC	CORROSIVE MATERIAL	0	0	0
TOTAL								

Magnitude/Severity

Based on Transportation incidents alone, there have been 1 fatality and 4 injuries due to hazardous materials within the past 10 years. In addition, damages total \$351,625. The HMPC has determined the magnitude and severity of a hazardous materials incident to be critical.

- **Critical**—Isolated deaths and/or multiple injuries and illnesses; major or long-term property damage that threatens structural stability; and/or interruption of essential facilities and services for 24-72 hours.

3.2.13 Terrorism

Description

Terrorism is defined in the Code of Federal Regulations as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (28 C.F.R. Section 0.85). The threat of terrorism, both international and domestic, is ever present, and an attack is likely to occur when least expected.

Domestic terrorism involves groups or individuals whose terrorist activities are directed at elements of our government or population without foreign direction.

International terrorism involves groups or individuals whose terrorist activities are foreign-based and/or directed by countries or groups outside the United States or whose activities transcend national boundaries.

In the United States, most terrorist incidents have involved small extremist groups who use terrorism to achieve a designated objective. Local, state and federal law enforcement officials monitor suspected terrorist groups and try to prevent or protect against a suspected attack. Additionally, the US government works with other countries to limit the sources of support for terrorism.

The Southern Poverty Law Center reports that in 2012, there were 33 active hate groups in Tennessee, as seen in Table 3.27. Although no major terrorist acts have been attributed to any of these groups, their involvement in violent acts is meant to disrupt governmental functions and cannot be discounted.

Table 3.27 Alphabetical List of Hate Groups in Tennessee, 2012

Name	Type	City
American Third Position	White Nationalist	Gatlinburg
Citizen Warrior	Anti-Muslim	Nashville
Confederate Hammerskins	Racist Skinhead	Nashville
Council of Conservative Citizens	White Nationalist	Cleveland
Council of Conservative Citizens	White Nationalist	Franklin
Council of Conservative Citizens	White Nationalist	Knoxville/Chattanooga
Council of Conservative Citizens	White Nationalist	Memphis
Creativity Alliance, The	Neo-Nazi	Mountain City
Crew 38	Racist Skinhead	
Fraternal White Knights of the Ku Klux Klan	Ku Klux Klan	Woodbury
Knights of the Ku Klux Klan	Ku Klux Klan	Newport
Ku Klos Knights of the Ku Klux Klan	Ku Klux Klan	Church Hill

Name	Type	City
League of the South	Neo-Confederate	Lobelville
Loyal White Knights of the Ku Klux Klan	Ku Klux Klan	
Mary Noel Kershaw Foundation	Neo-Confederate	Lobelville
Nation of Islam	Black Separatist	Memphis
Nation of Islam	Black Separatist	Nashville
National Black Foot Soldier Network	Black Separatist	Knoxville
National Socialist Movement	Neo-Nazi	Central Tennessee
National Socialist Movement	Neo-Nazi	
Political Cesspool, The	White Nationalist	Bartlett
Political Islam	Anti-Muslim	Nashville
Revolutionary Order of the Aryan Republic	Neo-Nazi	Chattanooga
Shepherd's Call Ministries	Christian Identity	New Tazewell
South Africa Project	White Nationalist	
Tea Party Nation	General Hate	Franklin

Source: Southern Poverty Law, www.splcenter.org

Geographic Location

Before the September 11, 2001 attacks in New York and the Pentagon, most terrorist incidents in the United States have been bombing attacks, involving detonated and un-detonated explosive devices, tear gas, and pipe and fire bombs. The effects of terrorism can vary significantly from loss of life and injuries to property damage and disruptions in services such as electricity, water supply, public transportation and communications. The U.S. government has attempted to reduce vulnerability to terrorist incidents by developing infrastructure protection programs for critical infrastructure and key resource facilities and increased security at airports.

While we can never predict what target a terrorist will choose, we do know some of the factors they use when selecting a target. Terrorists want to achieve one or more of the following:

- Produce a large number of victims,
- Attack places that have a symbolic value,
- Get the greatest possible media attention, and
- Produce mass panic.

Terrorists also select targets best suited for the type of material being used. For example, some biological agents are not effective in sunlight. Most chemical agents are more effective indoors with limited airflow. A radioactive material will be most effective where large numbers of people will pass close by without detecting it. Terrorists are likely to target heavily populated, enclosed areas like stadiums, government buildings, sporting events, airport terminals, subways, shopping malls and industrial manufacturing facilities. For this reason, it is critical that employers and local government agencies have some type of anti-terrorism plan in place should a terrorist act occur.

A terrorist attack can take several forms, depending on the technological means available to the terrorist, the nature of the political issue motivating the attack, and the points of weakness of the terrorist's target. Bombings have been the most frequently used terrorist method in the United States. Other possibilities include an attack at transportation facilities, an attack against utilities or other public services or an incident involving chemical or biological agents.

A number priority facilities and infrastructure could be potential terrorism targets. These facilities and hazard mitigation efforts taken to date are summarized below:

- Fort Patrick Henry Dam, City of Kingsport;
- Boone Lake Reservoir, Sullivan County; and
- South Holston Reservoir, Sullivan County.

Each TVA facility has an Emergency Action Plan in the event of dam failure. TVA also has addressed terrorism in internal documents. However, because of the sensitive nature of these documents, TVA has been reluctant to release the information.

- Holston Army Ammunition Plant/BAE - City of Kingsport

The Holston Army Ammunition Plant Emergency Plan addresses vapor releases and hazardous spills after the fact. Their plan for prevention and reaction to terrorism is included in the Holston Army Ammunition Plan Security Action Plan.

- Eastman - City of Kingsport

Internal and external vulnerability assessments have been prepared for the facility; the latest assessment was performed in early 2003. An overall preparedness plan is in place for the facility as well, since it is located beside the Holston River.

- Water treatment plants - City of Bristol, Town of Bluff City, and City of Kingsport

Vulnerability assessments have been performed on the Bristol and Kingsport facilities as required by the Public Health Security and Bioterrorism and Response Act (H. R. 3448). However, the Bluff City water treatment plant falls below the threshold for the requirement of a Vulnerability Assessment and therefore is not required to have one.

- Wastewater treatment plants - City of Bristol, City of Kingsport

Vulnerability assessments are not required for WWTPs. However, emergency operations plans are in place.

- Bristol Motor Speedway- City of Bristol, Sullivan County

On race days two times a year, several hundred thousand people are in and around Bristol Motor Speedway (BMS). While the speedway is located in Bristol, it has the potential to have impact on the Sullivan County in the event of a catastrophic event. BMS has an Emergency Operations Plan for the speedway.

- Tri-Cities Regional Airport

For the airport, hazardous spills, terrorism, and natural disasters are covered in the Tri-Cities Regional Airport Emergency Response Plan and the Tri-Cities Regional Airport, Airport Security Program. The Transportation Security Administration has approved the airport's security program.

With the identification of specific locations, the geographic extent of a terrorism event is limited:

- **Limited**—less than 10 percent of planning area affected.

Previous Occurrences

There are no reported terrorism incidents for the planning area.

Probability of Future Occurrences

There is no sure way to predict future terrorism events. The probability of a major terrorist event in the Sullivan County is very low, however planning must be done as part of the larger national Homeland Security initiatives. The probability for this hazard based on past occurrences is considered "**Unlikely**".

- **Unlikely**—Less than 1 percent chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.

Magnitude/Severity

Although there is no history of fatalities, injuries, or structural damage due to terrorism events, the HMPC determined the potential magnitude/severity of an event to be **catastrophic**:

- **Catastrophic**—Multiple deaths; property destroyed and severely damaged; and/or interruption of essential facilities and service for more than 72 hours.

3.2.14 Hazard Profiles Summary

This section summarizes the results of the hazard profiles and assigns a level of overall planning significance to each hazard of low, moderate, or high. Significance was determined based on the hazard profile, focusing on key criteria such as frequency and resulting damage, including deaths/injuries and property, crop, and economic damage. This assessment was used by the HMPC to prioritize those hazards of greatest significance to the planning area; thus enabling the County to focus resources where they are most needed. Those hazards that occur infrequently or have little or no impact on the planning area were determined to be of low significance. Those hazards determined to be of high significance were characterized as priority hazards that required further evaluation in Section 3.3 Vulnerability Assessment.

Table 3.28 Planning Significance of Identified Hazards

Hazard	Geographic Location	Probability	Magnitude	Planning Significance
Dam Failure	Significant	Unlikely	Critical	Low
Drought	Significant	Occasional	Negligible	Low
Earthquake	Extensive	Occasional	Negligible	Low
Extreme Temperatures	Extensive	Highly Likely	Negligible	Medium
Flood	Limited	Likely	Critical	Medium
Land Subsidence	Significant	Occasional	Limited	Low
Landslide	Significant	Likely	Limited	Medium
Severe Thunderstorms	Extensive	Highly Likely	Limited	High
Severe Winter Storm	Extensive	Highly Likely	Critical	High
Tornado	Extensive	Occasional	Critical	Medium
Wildfire	Significant	Occasional	Critical	Medium
Hazardous Materials Incidents	Significant	Highly Likely	Critical	Medium
Terrorism Events	Limited	Unlikely	Catastrophic	Medium

See Section 3.2 for definitions of these factors

3.3 Vulnerability Assessment

Requirement §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.

Requirement §201.6(c)(2)(ii)(A) :The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

Requirement §201.6(c)(2)(ii)(B) :[The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Requirement §201.6(c)(2)(ii)(C) : [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Requirement §201.6(c)(2)(ii) : (As of October 1, 2008) [The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.

3.3.1 Methodology

The vulnerability assessment further defines and quantifies populations, buildings, critical facilities, and other community assets at risk to natural hazards. The vulnerability assessment for this plan followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses* (2002).

The vulnerability assessment was conducted based on the best available data and the overall planning significance of the hazard. Data to support the vulnerability assessment was collected from the same sources identified in Section 3.1 Hazard Identification and Section 3.2 Hazard Profiles and from FEMA’s Hazus-MH 2.1 loss estimation software.

The Vulnerability Assessment is divided into four parts:

- **Section 3.3.2 Community Assets** first describes the assets at risk in Sullivan County, including the total exposure of people and property; critical facilities and infrastructure; natural, cultural, and historic resources; and economic assets. Note, Hazus-MH 2.1 currently uses 2000 Census Bureau Data.
- **Section 3.3.3 Vulnerability by Hazard** describes the vulnerability to each hazard identified in section 3.1 and profiled in section 3.2. This vulnerability analysis includes a vulnerability overview for each hazard. For hazards of high and moderate significance, the vulnerability analysis includes evaluation of vulnerable buildings, infrastructure, and critical facilities; estimated losses and a description of the methodology used to estimate losses; discussion of future development in relation to hazard-prone areas.

- **Section 3.3.4 Future Land Use and Development** discusses development trends, including population growth, housing demand, and future projects.
- **Section 3.3.5 Summary of Key Issues** summarizes the key issues and conclusions identified in the risk assessment process.

3.3.2 Community Assets

This section assesses the population, structures, critical facilities and infrastructure, and other important assets in Sullivan County that may be at risk to natural hazards.

Total Exposure of Population and Structures

Table 3.29 shows the total population, number of structures, and value of structure and contents by jurisdiction. Land values have been purposely excluded because land remains following disasters, and subsequent market devaluations are frequently short term and difficult to quantify. Additionally, state and federal disaster assistance programs generally do not address loss of land or its associated value. The greatest exposure of people and property is concentrated in the City of Kingsport, though significant population and structures are spread out in the unincorporated areas of the County.

Table 3.29 Maximum Population and Building Exposure by Jurisdiction

Community	2010 Population	Number of Structures	Total Structure and Contents Value
Bluff City	1,559	969	141,474,206
Bristol	24,821	12,604	3,108,523,897
Kingsport	44,905	22,124	5,447,790,086
Sullivan County Unincorporated Areas	81,763	41,032	6,812,473,045
Total	153,048	76,729	15,510,261,234

Source: Population - 2010 US Census Bureau; Structures and Value – HAZUS-MH 2.1, 2000 US Census Bureau; *Value represents "improved structure value" does not include land value.

Critical Facilities and Infrastructure

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. Table 3.30 is an inventory of critical facilities in Sullivan County. Figure 3.23 provides locations of the critical facilities in the entire planning area.

Table 3.30 Inventory of Critical Facilities and Infrastructure

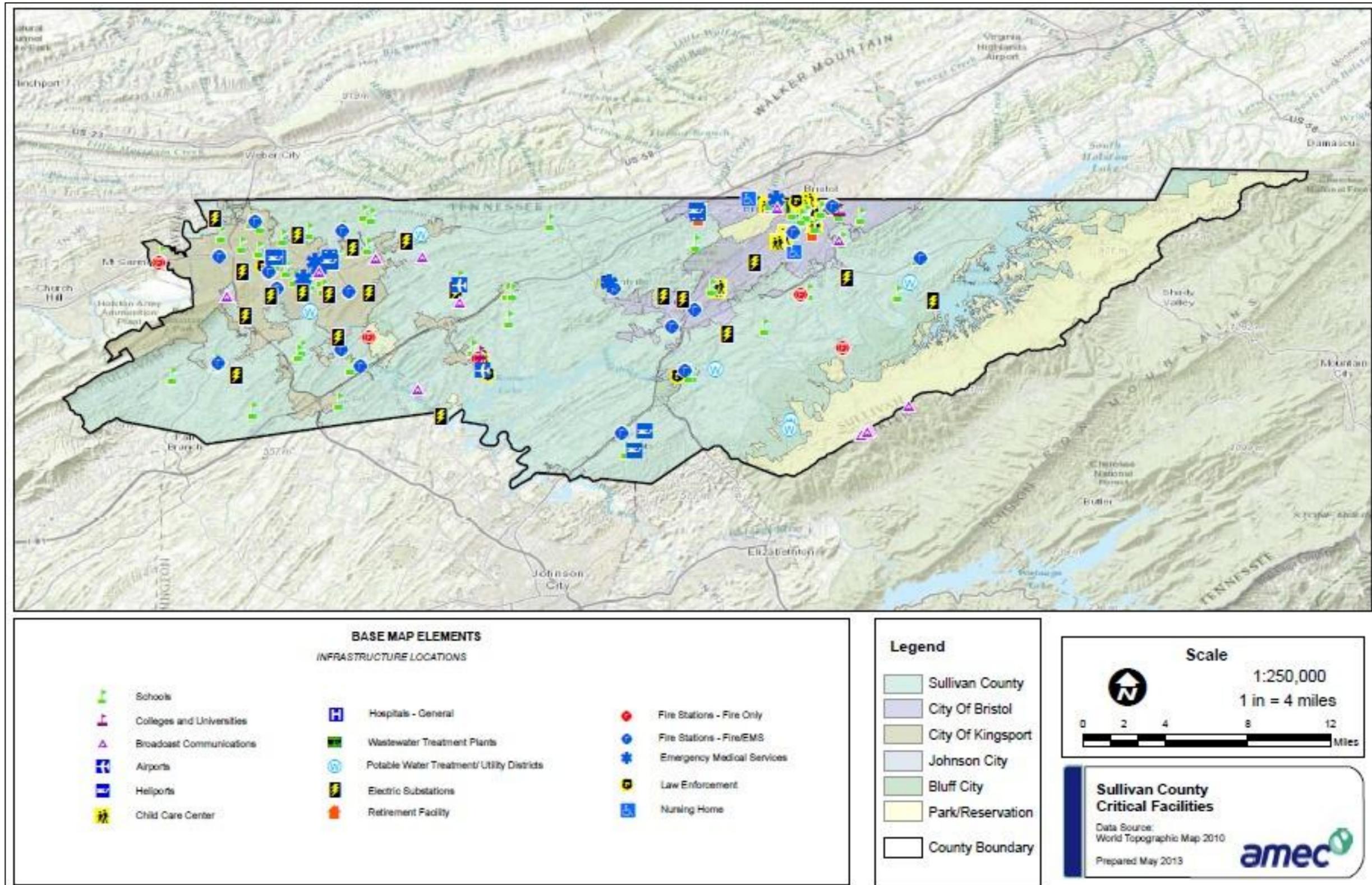
Critical Facility	Address	Jurisdiction
Airport		
TRI-CITIES RGNL TN/VA	BLOUNTVILLE, TN 37617	
Heliport		
AIR TRADE CENTER (TN57)	BRISTOL, TN 37625	
BRENDLE'S (1TN7)	KINGSPORT, TN 37660	
BRISTOL MOTOR SPEEDWAY	BRISTOL, TN 37625	
BRISTOL RGNL MEDICAL CENTER (TN04)	KINGSPORT, TN 37660	
EDWARDS (89TN)	BRISTOL, TN 37625	
INDIAN PATH MEDICAL CENTER (15TN)	KINGSPORT, TN 37660	
WELLMONT HOLSTON VALLEY MEDICAL CENTER (3TN5)	KINGSPORT, TN 37660	
Police Stations		
BLUFF CITY POLICE DEPARTMENT	4391 BLUFF CITY HIGHWAY	BLUFF CITY
BRISTOL POLICE DEPARTMENT	801 ANDERSON STREET	BRISTOL
KINGSPORT POLICE DEPARTMENT / KINGSPORT JAIL	200 SHELBY STREET	KINGSPORT
NORTHEAST STATE TECHNICAL COMMUNITY COLLEGE SECURITY OFFICE	2425 STATE HIGHWAY 75	BLOUNTVILLE
SULLIVAN COUNTY SHERIFFS DEPARTMENT / SULLIVAN COUNTY JAIL	140 BLOUNTVILLE BYPASS	BLOUNTVILLE
TRI-CITIES AIRPORT PUBLIC SAFETY DEPARTMENT	2525 STATE HIGHWAY 75	BLOUNTVILLE
UNITED STATES CUSTOMS AND BORDER PROTECTION - PORT OF ENTRY - TRI-CITIES	100 CARGO CENTER DRIVE	BLOUNTVILLE
WARRIORS PATH STATE PARK - RANGER STATION	490 HEMLOCK ROAD	KINGSPORT
Fire - EMS		
BRISTOL MOTOR SPEEDWAY	151 SPEEDWAY BOULEVARD	BRISTOL
BRISTOL TENNESSEE FIRE DEPARTMENT STATION 1	211 BLUFF CITY HIGHWAY	BRISTOL
BRISTOL TENNESSEE FIRE DEPARTMENT STATION 2	1109 KING COLLEGE ROAD	BRISTOL
BRISTOL TENNESSEE FIRE DEPARTMENT STATION 3	500 17TH STREET	BRISTOL
BRISTOL TENNESSEE FIRE DEPARTMENT STATION 4	361 EXIDE DRIVE	BRISTOL
EASTMAN CHEMICAL COMPANY	200 SOUTH WILCOX DRIVE	KINGSPORT
KINGSPORT FIRE DEPARTMENT STATION 1	130 ISLAND STREET	KINGSPORT
KINGSPORT FIRE DEPARTMENT STATION 2	1804 CRESCENT DRIVE	KINGSPORT
KINGSPORT FIRE DEPARTMENT STATION 3	3828 MEMORIAL BOULEVARD	KINGSPORT
KINGSPORT FIRE DEPARTMENT STATION 4	2105 WEST STONE DRIVE	KINGSPORT
KINGSPORT FIRE DEPARTMENT STATION 5	1517 LYNN GARDEN DRIVE	KINGSPORT
KINGSPORT FIRE DEPARTMENT STATION 6	4598 FORT HENRY DRIVE	KINGSPORT
KINGSPORT FIRE DEPARTMENT STATION 7	1440 ROCK SPRINGS ROAD	KINGSPORT
KINGSPORT FIRE DEPARTMENT STATION 8	1205 NEW BEASON WELL ROAD	KINGSPORT

Critical Facility	Address	Jurisdiction
Fire - Only		
AREA 421 EMERGENCY SERVICES	1758 BRISTOL CAVERNS HIGHWAY	BRISTOL
AVOCA VOLUNTEER FIRE DEPARTMENT	183 BEAVER CREEK ROAD	BLUFF CITY
BLOOMINGDALE VOLUNTEER FIRE DEPARTMENT	3017 NORTH JOHN B DENNIS HIGHWAY	KINGSPORT
BLUFF CITY FIRE DEPARTMENT	4256 BLUFF CITY HIGHWAY	BLUFF CITY
EAST SULLIVAN COUNTY VOLUNTEER FIRE DEPARTMENT	3287 WEAVER PIKE	BRISTOL
HICKORY TREE VOLUNTEER FIRE DEPARTMENT	2363 HICKORY TREE ROAD	BLUFF CITY
HOLSTON ARMY AMMUNITION PLANT FIRE DEPARTMENT-DOD	STATE HIGHWAY 1	KINGSPORT
PINEY FLATS VOLUNTEER FIRE DEPARTMENT	125 INDUSTRIAL PARK ROAD	PINEY FLATS
SULLIVAN COUNTY VOLUNTEER FIRE DEPARTMENT - BLOUNTVILLE	BLOUNTVILLE BOULEVARD	BLOUNTVILLE
SULLIVAN WEST VOLUNTEER FIRE DEPARTMENT	113 ROSEMONT STREET	KINGSPORT
TENNESSEE DEPARTMENT OF AGRICULTURE - DIVISION OF FORESTRY - SULLIVAN	486 HEMLOCK ROAD	KINGSPORT
TRI-CITIES REGIONAL AIRPORT PUBLIC SAFETY FIRE DEPARTMENT	2525 STATE HIGHWAY 75	BLOUNTVILLE
WARRIORS PATH VOLUNTEER FIRE DEPARTMENT	1908 MORELAND DRIVE	KINGSPORT
EMS		
AMBULANCE SERVICE OF BRISTOL	1718 SHELBY STREET	BRISTOL
CHURCH HILL EMERGENCY MEDICAL SERVICES STATION 3	1700 PINEBROOK DRIVE	KINGSPORT
KINGSPORT LIFESAVING CREW	1800 CRESCENT DRIVE	KINGSPORT
SULLIVAN COUNTY EMERGENCY MEDICAL SERVICES	3411 STATE HIGHWAY 126	BLOUNTVILLE
Rescue Squads		
Blountville Emergency Response	209 Emergency Lane	Blountville
Bluff City Rescue Squad	146 Main Street	Bluff City
Kingsport Life Saving Crew	1800 Crescent Drive	Kingsport
South Holston Rescue	2363 Hickory Tree Road	Bluff City
Utilities – Potable Water Treatment		
BLOOMING DALE UTILITY DISTRICT	3312 BLOOMINGTON PIKE	KINGSPORT
BLUFF CITY WATER TREATMENT PLT	226 MAIN STREET	BLUFF CITY
BRISTOL TENNESSEE WATER TREATMENT FACILI	364 SOUTH HOLSTON DAM ROAD	BRISTOL
BRISTOL/BLUFF CITY U.D.	318 RIVERVIEW DR.	BLUFF CITY
CHINUAPIN GROVE U.D.	1844 CHINUAPIN GROVE RD.	BLUFF CITY
KINGSPORT WTP	225 W. CENTER ST.	KINGSPORT
Utilities – WasteWater Treatment		
Kingsport WWTP		Kingsport
Bristol WWTP		Bristol TN/VA
Medical Facilities		
HEALTHSOUTH REHABILITATION HOSPITAL OF KINGSPORT	113 CASSEL DRIVE	KINGSPORT
INDIAN PATH MEDICAL CENTER	2000 BROOKSIDE DRIVE	KINGSPORT
SELECT SPECIALTY HOSPITAL - TRICITIES	1 MEDICAL PARK BOULEVARD	BRISTOL
WELLMONT BRISTOL REGIONAL MEDICAL CENTER	1 MEDICAL PARK BOULEVARD	BRISTOL
WELLMONT HOLSTON VALLEY MEDICAL CENTER INCORPORATED	130 WEST RAVINE ROAD	KINGSPORT
HEALTHSOUTH REHABILITATION	113 CASSEL DRIVE	KINGSPORT

Critical Facility	Address	Jurisdiction
HOSPITAL OF KINGSPORT		
INDIAN PATH MEDICAL CENTER	2000 BROOKSIDE DRIVE	KINGSPORT
SELECT SPECIALTY HOSPITAL - TRICITIES	1 MEDICAL PARK BOULEVARD	BRISTOL
WELLMONT BRISTOL REGIONAL MEDICAL CENTER	1 MEDICAL PARK BOULEVARD	BRISTOL
WELLMONT HOLSTON VALLEY MEDICAL CENTER INCORPORATED	130 WEST RAVINE ROAD	KINGSPORT
Electric Substations		
Blountville	Proposed	Blountville, TN
Bluff City	In Service	Walnut Hill, TN
Boone (TN)	In Service	Spurgeon, TN
Edens Ridge	In Service	Colonial Heights, TN
Fort Patrick Henry	In Service	Colonial Heights, TN
Fort Robinson	In Service	Lynn Garden, TN
Holston	In Service	Kingsport, TN
Indian Springs	In Service	Colonial Heights, TN
Kingsport Mill	In Service	Blountville, TN
Moreland Drive	In Service	Kingsport, TN
Orebank	In Service	Bloomington, TN
Reedy Creek	In Service	Bloomington, TN
Short Hills	In Service	Bloomington, TN
South Holston	In Service	Bristol, TN
Sullivan	In Service	Bluff City, TN
Sullivan Gardens	In Service	Fall Branch, TN
Tap	In Service	Bristol, TN
Tenn Eastman Division A Division of East	In Service	Kingsport, TN
Tenn Eastman No 1	In Service	Kingsport, TN
West Kingsport	In Service	Kingsport, TN
Beaver Creek Road @ Buffalo	per HMPC	
On Pleasant Grove	per HMPC	
Schools		
ANDERSON ELEMENTARY SCHOOL	901 NINTH ST	BRISTOL
APOSTOLIC GOSPEL ACADEMY		
APPALACHIAN CHRISTIAN SCHOOL		
APPALACHIAN CHRISTIAN SCHOOL		
AVOCA ELEMENTARY SCHOOL	2440 VOLUNTEER PARKWAY	BRISTOL
BLOUNTVILLE ELEMENTARY SCHOOL	155 SCHOOL AVE	BLOUNTVILLE
BLOUNTVILLE MIDDLE SCHOOL	1651 BLOUNTVILLE BLVD	BLOUNTVILLE
BLUFF CITY ELEMENTARY SCHOOL	282 MAPLE DR	BLUFF CITY
BLUFF CITY MIDDLE SCHOOL	715 CARTER ST	BLUFF CITY
BROOKSIDE INNOVATION ACADEMY	149 BROOKSIDE SCHOOL LN	KINGSPORT
CENTRAL ELEMENTARY SCHOOL	735 MARTIN L KING JR BLVD	BRISTOL
CENTRAL HEIGHTS ELEMENTARY	158 CENTRAL HEIGHTS RD	BLOUNTVILLE
CHRISTIAN LIFE ACADEMY		
COLONIAL HEIGHTS MIDDLE SCHOOL	415 LEBANON RD	KINGSPORT
COMPREHENSIVE COMMUNITY SERVICES		
DOBYNS BENNETT HIGH SCHOOL	1800 LEGION DR	KINGSPORT
EMMETT ELEMENTARY SCHOOL	753 EMMETT RD	BRISTOL
FAIRMOUNT ELEMENTARY SCHOOL	500 CYPRESS ST	BRISTOL
GUNNINGS SCHOOL	229 SHIPLEY FERRY RD	BLOUNTVILLE
HAYNESFIELD ELEMENTARY SCHOOL	201 BLUFF CITY HWY	BRISTOL
HOLSTON ELEMENTARY SCHOOL	2348 HWY 75	BLOUNTVILLE
HOLSTON MIDDLE SCHOOL	2348 HWY 75	BLOUNTVILLE
HOLSTON VALLEY MIDDLE SCHOOL	1717 BRISTOL CAVERNS HWY	BRISTOL
HOLSTON VIEW ELEMENTARY SCHOOL	1840 KING COLLEGE RD	BRISTOL
INDIAN SPRINGS ELEMENTARY	333 HILL RD	KINGSPORT
JACKSON ELEMENTARY SCHOOL	600 JACKSON ST	KINGSPORT
JEFFERSON ELEMENTARY SCHOOL	2216 WESTMORELAND AVE	KINGSPORT
JOHN ADAMS ELEMENTARY	2727 EDINBURGH CHANNEL RD	KINGSPORT
JOHNSON ELEMENTARY SCHOOL	1001 ORMOND DR	KINGSPORT
KENNEDY ELEMENTARY SCHOOL	1500 WOODLAND AVE	KINGSPORT

Critical Facility	Address	Jurisdiction
KETRON INTERMEDIATE SCHOOL	3301 BLOOMINGDALE PK	KINGSPORT
LIGHTHOUSE CHRISTIAN SCHOOL	145 SHIPP SPRINGS RD	KINGSPORT
LINCOLN ELEMENTARY SCHOOL	1000 SUMMER ST	KINGSPORT
MARY HUGHES SCHOOL	240 AUSTIN SPRINGS RD	PINEY FLATS
MILLER PERRY ELEMENTARY SCHOOL	904 FORDTOWN RD	KINGSPORT
MOUNTAIN EMPIRE BAPTIST SCHOOL		
PALMER CENTER	1609 FT HENRY DR	KINGSPORT
ROBINSON MIDDLE SCHOOL	1517 JESSEE ST	KINGSPORT
ROCK SPRINGS ELEMENTARY SCHOOL	1238 MORELAND DR	KINGSPORT
ROOSEVELT ELEMENTARY	1051 LAKE ST	KINGSPORT
SEVIER MIDDLE SCHOOL	1200 WATEREE ST	KINGSPORT
ST DOMINIC SCHOOL		
ST PAUL'S DAY SCHOOL AND KINDERGARTEN		
SULLIVAN CENTRAL HIGH SCHOOL	131 SHIPLEY FERRY RD	BLOUNTVILLE
SULLIVAN EAST HIGH SCHOOL	4180 WEAVER PK	BLUFF CITY
SULLIVAN ELEMENTARY SCHOOL	209 ROSEMONT AVE	KINGSPORT
SULLIVAN MIDDLE SCHOOL	4154 SOUTH WILCOX DR	KINGSPORT
SULLIVAN NORTH HIGH SCHOOL	2533 J B DENNIS BYPASS	KINGSPORT
SULLIVAN SOUTH HIGH SCHOOL	1236 MORELAND DR	KINGSPORT
TENNESSEE AVENUE CHRISTIAN ACADEMY		
TENNESSEE HIGH SCHOOL	1112 EDGEMONT AVE	BRISTOL
TRI-CITIES CHRISTIAN SCHOOL		
TRI-CITIES CHRISTIAN SCHOOL-AIRPORT		
VANCE MIDDLE SCHOOL	815 EDGEMONT AVE	BRISTOL
WASHINGTON ELEMENTARY SCHOOL	1100 BELLINGHAM DR	KINGSPORT
WEAVER ELEMENTARY SCHOOL	3341 WEAVER PK	BRISTOL
Colleges		
King College	1350 King College Rd	Bristol
Kingsport Center for Higher Education	300 W. Market St.	Kingsport
Northeast State Community College	2425 Hwy 75	Blountville
Northeast State Community College	620 State Street, Suite 300	Bristol
Broadcast Communications		
POSITIVE ALTERNATIVE RADIO, INC.	W210BR	KINGSPORT
THE MOODY BIBLE INSTITUTE OF CHICAGO	W211CD	JOHNSON CITY
HOLSTON VALLEY BROADCASTING CORPORATION	W232BP	KINGSPORT
APPALACHIAN EDUCATIONAL COMMUNICATION CORPORATION	W264BY	KINGSPORT
POSITIVE ALTERNATIVE RADIO, INC.	W270BN	WALNUT HILL
HOLSTON VALLEY BROADCASTING CORPORATION	WAPK-CA	KINGSPORT
POSITIVE ALTERNATIVE RADIO, INC.	WCQR-FM	KINGSPORT
KINGSPORT CITY SCHOOLS BD. OF EDUC .	WCSK	KINGSPORT
BLUESTONE LICENSE HOLDINGS INC.	WCYB-TV	BRISTOL
EAST TENNESSEE STATE UNIVERSITY	WETS-FM	JOHNSON CITY
RADIO LICENSE HOLDING CBC, LLC	WGOC	KINGSPORT
RADIO LICENSE HOLDING CBC, LLC	WGOC	KINGSPORT
INFORMATION COMMUNICATIONS CORPORATION	WHGG	KINGSPORT
MOUNTAIN MUSIC MINISTRIES, LLC	WIGN	BRISTOL
MEDIA GENERAL COMMUNICATIONS HOLDINGS, LLC	WJHL-TV	JOHNSON CITY
HOLSTON VALLEY BROADCASTING CORPORATION	WKIN-LP	WEBER CY,VA-KPT,TN
RADIO LICENSE HOLDING CBC, LLC	WKOS	KINGSPORT
HOLSTON VALLEY BROADCASTING CORPORATION	WKPT	KINGSPORT
HOLSTON VALLEY BROADCASTING CORPORATION	WKPT-LP	KINGSPORT
HOLSTON VALLEY BROADCASTING CORPORATION	WKPT-TV	KINGSPORT
HOLSTON VALLEY BROADCASTING CORPORATION	WOPI-CA	KINGSPORT
INFORMATION COMMUNICATIONS CORP.	WPWT	COLONIAL HEIGHTS
HOLSTON VALLEY BROADCASTING CORPORATION	WRZK	COLONIAL HEIGHTS
HOLSTON VALLEY BROADCASTING CORPORATION	WTFM	KINGSPORT
HOLSTON VALLEY BROADCASTING CORPORATION	WTFM	KINGSPORT
HOLSTON VALLEY BROADCASTING CORPORATION	WVEK-FM	WEBER CITY
BRISTOL BROADCASTING COMPANY, INC.	WXBQ-FM	BRISTOL
RADIO LICENSE HOLDING CBC, LLC	WXSM	BLOUNTVILLE

Figure 3.23 Critical Facilities



Natural, Historic, and Cultural Assets

Assessing the vulnerability of Sullivan County to disaster also involves inventorying the natural, historic, and cultural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

Additional vulnerability to the catastrophic event would include the current listing of natural resources within Sullivan County. Those species listed below are identified as endangered, threatened, and rare species documented within Sullivan County by the Tennessee Department of Environment & Conservation:

Table 3.31 Inventory of Natural Resources

Category	Scientific Name	Common Name	State Status
Amphibian	<i>Plethodon yonahlossee</i>	Yonahlossee Salamander	Rare, Not State Listed
Bird	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Deemed in Need of Management
Bird	<i>Tyto alba</i>	Barn Owl	Deemed in Need of Management
Bird	<i>Corvus corax</i>	Common Raven	Threatened
Bird	<i>Limnothlypis swainsonii</i>	Swainson's Warbler	Deemed in Need of Management
Fish	<i>Chrosomus tennesseensis</i>	Tennessee Dace	Deemed in Need of Management
Fish	<i>Etheostoma acuticeps</i>	Sharphead Darter	Rare, Not State Listed
Fish	<i>Percina aurantiaca</i>	Tangerine Darter	Deemed in Need of Management
Fish	<i>Percina burtoni</i>	Blotchside Logperch	Deemed in Need of Management
Mammal	<i>Sorex longirostris</i>	Southeastern Shrew	Deemed in Need of Management
Mammal	<i>Sorex fumeus</i>	Smoky Shrew	Deemed in Need of Management
Mammal	<i>Parascalops breweri</i>	Hairy-tailed Mole	Deemed in Need of Management
Mammal	<i>Myotis grisescens</i>	Gray Myotis	Endangered
Mammal	<i>Myotis leibii</i>	Eastern Small-footed Myotis	Deemed in Need of Management
Mammal	<i>Synaptomys cooperi</i>	Southern Bog Lemming	Deemed in Need of Management
Mammal	<i>Zapus hudsonius</i>	Meadow Jumping Mouse	Deemed in Need of Management
Mammal	<i>Mustela nivalis</i>	Least Weasel	Rare, Not State Listed
Insect	<i>Speyeria diana</i>	Diana Fritillary	Rare, Not State Listed
Insect	<i>Gomphus consanguis</i>	Cherokee Clubtail	Rare, Not State Listed
Insect	<i>Allocapnia brooksi</i>	Sevier Snowfly	Rare, Not State Listed

Category	Scientific Name	Common Name	State Status
Arachnid	<i>Nesticus paynei</i>	A Cave Spider	Rare, Not State Listed
Mollusc	<i>Epioblasma florentina walkeri</i>	Tan Riffleshell	Endangered
Mollusc	<i>Fusconaia cor</i>	Shiny Pigtoe	Endangered
Mollusc	<i>Fusconaia cuneolus</i>	Finerayed Pigtoe	Endangered
Mollusc	<i>Pegias fabula</i>	Littlewing Pearlymussel	Endangered
Mollusc	<i>Quadrula intermedia</i>	Cumberland Monkeyface	Endangered
Mollusc	<i>Villosa perpurpurea</i>	Purple Bean	Endangered
Mollusc	<i>Helicodiscus notius specus</i>	A Terrestrial Snail	Rare, Not State Listed
Mollusc	<i>Io fluviialis</i>	Spiny Riversnail	Rare, Not State Listed
Flowering Plant	<i>Panax quinquefolius</i>	American Ginseng	Special Concern, Commercially Exploited
Flowering Plant	<i>Hexastylis virginica</i>	Virginia Heartleaf	Special Concern
Flowering Plant	<i>Berberis canadensis</i>	American Barberry	Special Concern
Flowering Plant	<i>Draba ramosissima</i>	Branching Whitlow-grass	Special Concern
Flowering Plant	<i>Silene caroliniana</i> ssp. <i>pennsylvanica</i>	Carolina Pink	Threatened
Flowering Plant	<i>Lonicera dioica</i>	Mountain Honeysuckle	Special Concern
Flowering Plant	<i>Hydrophyllum virginianum</i>	Appalachian Waterleaf	Threatened
Flowering Plant	<i>Juglans cinerea</i>	Butternut	Threatened
Flowering Plant	<i>Meehania cordata</i>	Heartleaf Meehania	Threatened
Flowering Plant	<i>Magnolia virginiana</i>	Sweetbay Magnolia	Threatened
Flowering Plant	<i>Trientalis borealis</i>	Northern Starflower	Threatened
Flowering Plant	<i>Pyrola americana</i>	American Wintergreen	Endangered
Flowering Plant	<i>Cimicifuga rubifolia</i>	Appalachian Bugbane	Threatened
Flowering Plant	<i>Buckleya distichophylla</i>	Piratebush	Threatened
Plant: Gymnosperm	<i>Thuja occidentalis</i>	Northern White Cedar	Special Concern
Plant: Gymnosperm	<i>Tsuga caroliniana</i>	Carolina Hemlock	Threatened
Flowering Plant	<i>Symplocarpus foetidus</i>	Skunk-cabbage	Endangered
Flowering Plant	<i>Carex roanensis</i>	Roan Mountain Sedge	Endangered
Flowering Plant	<i>Cymophyllus fraserianus</i>	Fraser's Sedge	Special Concern
Flowering Plant	<i>Allium burdickii</i>	Narrow-leaf Ramps	Threatened, Commercially Exploited
Flowering Plant	<i>Lilium canadense</i>	Canada Lily	Threatened
Flowering Plant	<i>Maianthemum stellatum</i>	Starflower False Solomon's-seal	Endangered
Flowering Plant	<i>Streptopus amplexifolius</i>	White Mandarin	Threatened
Flowering Plant	<i>Goodyera repens</i>	Dwarf Rattlesnake-plantain	Special Concern
Flowering Plant	<i>Platanthera grandiflora</i>	Large Purple Fringed Orchid	Endangered
Flowering Plant	<i>Platanthera orbiculata</i>	Large Round-leaved Orchid	Threatened
Flowering Plant	<i>Potamogeton epihydrus</i>	Nuttall's Pondweed	Special Concern
Fern and Fern Ally	<i>Dryopteris cristata</i>	Crested Shield-fern	Threatened
Fern and Fern Ally	<i>Woodsia scopulina</i> ssp. <i>appalachiana</i>	Alleghany Cliff-fern	Special Concern
Fern and Fern Ally	<i>Botrychium matricariifolium</i>	Chamomile Grapefern	Special Concern
Heron Rookery	Heron rookery	Heron Rookery	Rare, Not State Listed
Fish	<i>Erimonax monachus</i>	Spotfin Chub	Threatened
Fish	<i>Percina williamsi</i>	Sickle Darter	Threatened

Category	Scientific Name	Common Name	State Status
Fish	Etheostoma marmorpinnum	Marbled Darter	Endangered
Flowering Plant	Ribes americanum	Wild Black Currant	Endangered, Possibly Extirpated
Flowering Plant	Viburnum rafinesquianum	Downy Arrowwood	Special Concern

Source: http://environment-online.state.tn.us:8080/pls/enf_reports/f?p=9014:3:551410478623801:::

Historic and Cultural Resources

Sullivan County is rich in history ranging as far back as the 1700's. There are several historic sites located in the county as well as each of its municipalities. Kingsport, Bristol, Bluff City and Blountville all have significant historical districts. Historic homes, inns, churches, cemeteries, battlegrounds and living museums can be found within its boundaries. Preservation of the cultural heritage of this area has been identified as an important value and is ensured by a variety of initiatives. The National Register of Historic Places was reviewed to identify historic and cultural assets in Sullivan County.

The **National Register of Historic Places** is the Nation's official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

Table 3.32 lists the properties in Sullivan County that are the National Register of Historic Places.

Table 3.32 Sullivan County Historic Properties in the National Register

Name on the Register	Date Listed	Location
Alison, Finlay, House	1973	W of Piney Flats off U.S. 11 , Piney Flats
Alison, Jesse, House	1973	SW of Bluff City off U.S. 11E , Bluff City
Arcadia also known as Fain Plantation	1973	E of Bloomingdale off U.S. 11W , Arcadia
Blountville Historic District, also known Old Deery Inn	1973	Center of Blountville along both sides of TN 126 , Blountville
Boatyard Historic District also known as Long Island of the Holston	1973	SW of Kingsport on Holston and S. Fork of Holston River , Kingsport
Bristol Commercial Historic District	2003	Roughly along State, Piedmont, Moore, Shelby, Bank, Progress, 5th, 6th, 7th and 8th Sts. , Bristol
Bristol Municipal Stadium also known as Stone Castle	1987	1112 Edgemont Ave. , Bristol
Bristol Virginia--Tennessee Slogan Sign	1988	E. State St. , Bristol
Bunting's Drug Store		420 State St. , Bristol
Church Circle District	1973	Center of Kingsport, along Sullivan St. , Kingsport
Clinchfield Railroad Station	1973	101 E. Main St. , Kingsport
DeVault-Masengill House also known as Mary Lou Farms	1985	Andrew Johnson Hwy. US 11E , Piney Flats

Name on the Register	Date Listed	Location
Erwin Farm also known as Walnut Shade	1973	W of Blountville off TN 75 , Blountville
Fain, Squire John, Barn	1985	Lone Oak Estates, TN 126 , Blountville
Fairmont Neighborhood Historic District	2010	Roughly bounded by Taylor St, Pennsylvania Ave, Maple St, and Florida Ave , Bristol
First National Bank of Bristol	1985	500 State St. , Bristol
Gammon House also known as McFarland, William and Maggie House	2009	324 6th St. , Bristol
Grass Dale also known as Joseph Groseclose House	1984	774 Bloomingdale Pike , Kingsport
Hall, Alexander Doak, Farm also known as Hall Rockhaven Farm;Hall,Alexander H.,House	1995	440 Proffitt Ln. , Kingsport
Johnson, J. Fred, House	1973	1322 Watauga Ave. , Kingsport
King, Edward Washington, House	1999	308 7th St. , Bristol
Kingsport Improvement Building also known as City of Kingsport Development Services Building	1999	201 W. Market St. , Kingsport
Long Island of the Holston	1966	S fork of the Holston River , Kingsport
Looney, Moses, Fort House also known as Charles H. Pope House	1978	5436 Old Island Rd. , Kingsport
Mount Ida also known as See Also:Mount Ida (Boundary Decrease)	1973	1010--1012 Sevier Terrace Dr. , Kingsport
Mount Ida (Boundary Decrease) also known as Mount Ida	1991	Bounded by Stone Dr., Fairmont Ave., Sevier Terrace Dr. and Lynn Garden Dr., excepting 1010-- 1012 Sevier Terrace Dr. , Kingsport
Netherland Inn and Complex also known as Netherland Tavern;King's Boat Yard	1969	2144 Netherland Inn Rd. , Kingsport
Old Deery Inn also known as The Old Tavern, The Mansion House & Store	1973	Main St. , Blountville
Old Kingsport Presbyterian Church also known as Boatyard Presbyterian Church	1973	Stone Dr. (Hwy. 11W) and Afton , Kingsport
Paramount Theatre and Office Building	1985	516 State St. , Bristol
Parlett House	1983	728 Georgia Ave. , Bristol
Pearson Brick House	1973	E of Kingsport on Shipley Ferry Rd. , Kingsport
Pemberton Mansion and Oak	1973	9 mi. NE of Bristol on TN 34 , Bristol
Pierce Chapel AME Church Cemetery	2000	Seaver Rd. at Horse Creek Rd. , Kingsport
Preston Farm also known as Gaines-Preston Farm;Exchange Place	1971	4812 Orebank Rd. , Kingsport
Rock Ledge also known as Shaver-Welsh-Stuffle House	1978	117 Stuffle Pl. , Kingsport
Rocky Mount	1970	SW of Piney Flats off U.S. 11E , Piney Flats
Roller-Pettyjohn Mill also known as Indian Springs Mill	1977	W of Blountville on Creek Rd. , Blountville
Roseland	1973	S of Kingsport on Shipp St. , Kingsport
Spring Place	1973	NW of Kingsport on W. Carter's Valley Rd., off US 23 , Kingsport
Steel-Seneker Houses	1977	4 mi. W of Bristol on TN 126 , Bristol
Stone-Penn House	1984	1306 Watauga St. , Kingsport
US Post Office--Shelby Street Station also known as Shelby Street Station Post Office	1985	620 Shelby St. , Bristol
Washington, George, School also known as Washington-Lee School	2007	205 E. Sevier Ave. , Kingsport

Source: <http://www.nationalregisterofhistoricplaces.com/tn/knox/state.html>

3.3.3 Vulnerability by Hazard

This section describes overall vulnerability and identifies structures and estimates potential losses to buildings, infrastructure, and critical facilities located in identified hazard areas. The method of conducting a vulnerability assessment analysis varies by hazard type and data available. Many of the identified hazards, particularly weather related hazards, affect the entire planning area, and specific hazards areas cannot be mapped geographically. For these hazards, which include drought, extreme temperatures, severe thunderstorms, severe winter storms, and tornadoes, vulnerability is mainly discussed in qualitative terms because data on potential losses to structures is not available. Geographic hazard areas can be mapped for the following identified hazards: earthquake, flood, dam failure,; land subsidence, landslide, wildfire, hazardous materials incidents, and terrorism events.

Dam Failure

Existing Development

Although there is no specific evidence to indicate the likelihood of dam failure within the County, there are several high hazard dams located in the County. GIS analysis of populations and development in dam inundation areas would provide the most accurate results in terms of estimates of potential loss in the unlikely event of failure. However, GIS-based inundation maps for the Sullivan County dams were not readily available to determine loss estimates based on inundation areas. This effort has been added to the mitigation strategy as action item.

Since GIS-based inundation maps are not readily available, loss estimates were derived from the Hazard Class Definitions.

- High Hazard—Potential for loss of human life and/or excessive public, industrial, commercial, or agricultural development in inundation areas. Losses could be over **\$500,000**. Emergency Action Plans are required for all High Hazard Dams.
- Significant Hazard—No potential for loss of human life. But, significant structures, industrial, or commercial development, or cropland in inundation areas. Losses could be **\$100,000 to \$500,000**.
- Low Hazard. No potential for loss of human life. No significant structures in inundation areas. Primarily pastures, woodland, or undeveloped land. Losses expected to be less than **\$100,000**

With these definitions in mind, loss estimates were calculated as follows:

- (\$500,000) * the number of High Hazard Dams,
- (\$250,000) * the number of Significant Hazard Dams, and
- (\$50,000) * the number of Low Hazard Dams.

This analysis is not intended to indicate that all dams in a county would fail simultaneously. **Table 3.33** provides the potential loss estimate results by jurisdiction based on this analysis.

Table 3.33 Dam Failure Loss Estimates

Dam Name	Hazard Class	Loss Estimates
Sullivan County		
Bays Mountain	High	\$500,000
Underwood Park	Significant	\$250,000
TOTAL		\$750,000
Bluff City		
South Holston	High	\$500,000
South Holston/Bent Creek Auxiliary Spillway	High	\$500,000
South Holston/Saddle Dam No. 1	High	\$500,000
TOTAL		\$1,500,000
City of Bristol		
Clear Creek	High	\$500,000
Beaver Creek	High	\$500,000
Middlebrook	Significant	\$250,000
Steele Creek	High	\$500,000
Taylor Lake	Significant	\$250,000
TOTAL		\$2,500,000
City of Kingsport		
Boone	High	\$500,000
Fort Patrick Henry	High	\$500,000
Bend Hollow	High	\$500,000
TOTAL		\$1,500,000

Future Development

Flooding due to a dam failure event is likely to exceed the special flood hazard areas regulated through local floodplain ordinances. Sullivan County should consider the dam failure hazard when permitting development downstream of the 10 high hazard and 3 significant hazard dams in the County.

Drought

Existing Development

Drought affects the water supply of communities in the County, as well as agricultural irrigation on a more widespread scale, affecting the economy. It normally does not impact structures and can be difficult to identify specific hazard areas. Data is not available to estimate potential losses to structures within Sullivan County.

The most significant impacts are to water intensive activities such as agriculture, municipal usage, commerce, and tourism and recreation. Water quality deterioration can also occur during droughts. According to the 2007 Census of Agriculture, 82,104 acres in Sullivan County is dedicated to agriculture with total sales of \$17,144,000. A future drought that causes a 20 percent loss of the total value in the County would result in potential losses of about \$3,428,800. Also, as noted in Section 3.2.2 *Drought*, the insured crop losses in Sullivan County as a result of drought conditions from 2003 to 2012 totaled \$828,217 for an annualized crop loss of \$82,821.

Future Development

As population grows, so do the water needs for household, commercial, industrial, recreation, and agricultural uses. Vulnerability to drought will increase with these growing demands on existing water supplies. The Tennessee Department of Environment and Conservation (TDEC) has prepared a Drought Management Plan for the State, revised February 2010. The purpose of the plan is to outline TDEC's role during a drought, to facilitate planning, and to provide a framework for action and cooperation in water resources management among the many local, state, and federal agencies with drought related responsibilities. The plan also represents the state's plan on drought management, since TDEC serves as the lead state agency on drinking water and water quality issues. The plan outlines the resources that other state, federal and local entities can provide and the ways in which we can work together to lessen the impacts of a drought.

The Drought Management Plan identifies potential impacts that today's water resource managers might expect during an extreme drought include abnormally low streamflows, reservoir releases, and declining reservoir elevations which can affect water supplies, navigation, power generation, recreation, water quality and aquatic life. The extent of the potential impacts will vary from one location to another, and will depend on the time of year, length and severity of the drought.

Earthquake

Existing Development

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, but possible damages would include dam failures and subsequent flash floods.

FEMA’s software program, Hazus-MH 2.1, was utilized for estimating the potential losses due to earthquakes. Hazus-MH 2.1 evaluates the geographic distribution of ground shaking resulting from a specified scenario earthquake and expresses ground shaking using quantitative parameters, such as peak ground acceleration and spectral acceleration. For Sullivan County, the following specified earthquake scenarios were utilized:

Table 3.34 HAZUS Specified Earthquakes

Community Characteristics	Historical Earthquake Dates	Earthquake Parameters
<ul style="list-style-type: none"> • 429.46 square mile region with 36 census tracts; • 63,000+ households; • Population of 153,048 people; • 58,000 buildings within the region; • Total building replacement cost of 9,488 million dollars; and • Approximately 99% of the buildings (and 83% of the building value) are associated with residential housing. 	January 5, 1843	<ul style="list-style-type: none"> • 5.8 Magnitude at 10 KM depth;
	August 17, 1865	<ul style="list-style-type: none"> • 5.3 Magnitude at 10 KM depth;
	October 30, 1973	<ul style="list-style-type: none"> • 5.6 Magnitude at 10 KM depth;

Source: HAZUS-MH 2.1 HMPC; and Sullivan County EMA

Based upon the HAZUS-MH output, no damages to buildings or lifelines are projected for the August 1865 or October 1973 events. However, damages to buildings in Sullivan County, including the City of Kingsport and Bluff City, were projected for the parameters included for the January 1843 event. No damages were projected for the City of Bristol for the January 1843 event. The damages are summarized in the table below.

Table 3.35. HAZUS Earthquake Results

	None		Slight		Moderate		Extensive		Complete	
	Count	%	Count	%	Count	%	Count	%	Count	%
Agriculture	1	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Commercial	466	0.79%	2	2.15%	1	4.76%	0	0.00%	0	0.00%
Education	1	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Government	7	0.01%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Industrial	91	0.15%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Other Residential	10,595	18.02%	44	47.31%	10	47.62%	0	0.00%	0	0.00%
Religion	36	0.06%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Single Family	47,611	80.96%	47	50.54%	10	47.62%	1	100.00%	0	0.00%
Total	58,808		93		21		1		0	

Future Development

Building codes substantially reduce the costs of damage to future structures from earthquakes. As previously noted, Sullivan County does not have building codes at this time. Community building codes meet either the Southern Building Codes or the International Building Codes. Building codes in the Cities address peak ground acceleration.

Extreme Temperatures, Severe Thunderstorms, Severe Winter Storms, and Tornadoes

Existing Development

The severe weather evaluated as part of this risk assessment included: extreme temperatures, severe thunderstorms, severe winter storms, and tornadoes. During severe weather events, the threat to public safety is typically the greatest concern. However, these storms also impact the local economy by disrupting transportation and commercial activities and damaging agricultural crops.

Impacts to existing development within the community, as a result of severe weather, includes damage to infrastructure, particularly overhead power lines, road closures, and interruption in business and school activities. Utility outages impact anything relying on electricity without a redundant power supply (e.g., a generator), 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 is the impact to populations with special needs such as the elderly and those requiring the use of medical equipment. Although typically short-lived, delays in emergencies response services are of concern. Depending on the nature of a given storm, all areas within Sullivan County are potentially at risk; however, those areas relying on above ground utilities would potentially suffer the greatest damage.

With respect to agricultural crops within the community, insurance payments for damages to crops as a result of excess moisture/precipitation/ rain, freeze, frost, hail, and heat from 2003 to 2012 totaled \$477,824 for an annualized crop loss of \$47,782.

Future Development

Future residential or commercial buildings built to code should be able to withstand wind and snow loads from severe thunderstorms and severe winter storms. Population growth in the County will increase problems with road, business, and school closures and increase need for snow removal and emergency services related to severe winter weather events.

Flood

Existing Development

To analyze vulnerability to flood events and how this varies by jurisdiction, the population, number of structures, and critical facilities located within the 1-percent annual chance floodplain were calculated using the current Flood Insurance Study and associated Digital Flood Insurance Rate Maps (DFIRMs), dated September 29, 2006 and US Census data. Table 3.36 presents this data.

Table 3.36 Population, Critical Facilities, and Building Counts within the 1-percent annual chance (100-year) floodplain

Jurisdiction	Population within 100-Year Floodplain	No. of Critical Facilities within 100-Year Floodplain	Building Counts within 100-Year Floodplain			
			Residential	Commercial	Industrial	Other
Bluff City	27	0	15	1	0	0
Bristol	731	2	365	83	13	8
Kingsport	1,640	6	748	94	12	10
Sullivan County Unincorporated Areas	4,775	2	2,374	222	43	29
TOTAL	7,173	10	3502	400	68	47

Source: US Census

Critical facilities identified within the City of Bristol that are within the 100-year (1-percent annual chance) floodplain include:

- Electric Substation – Shelby Street
- Fire –EMS – Bristol Motor Speedway
- Bristol Police Department
- Bristol Courthouse
- Public Transportation Center
- Downtown Center
- State Street Farmer’s Market

Critical facilities identified within the City of Kingsport that are within the 100-year (1-percent annual chance) floodplain include:

- Electric Substation – West Kingsport
- Electric Substation – Fort Patrick Henry
- Communications – WKPT
- Communications - WGOC

- Utilities – Bloomingdale Utility District
- Utilities – Kingsport Water Treatment Plant

Critical facilities identified within the Sullivan County Unincorporated Areas that are within the 100-year (1-percent annual chance) floodplain include:

- Holston Valley Middle School
- Electric Substation – South Holston

The current Flood Insurance Study and associated Digital Flood Insurance Rate Maps (DFIRMs) did not include flood-depth grids and were therefore, not utilized in the additional analysis for potential losses. In 2009-2010, FEMA conducted a HAZUS Flood Average Annualized Loss (AAL) study which was performed for the entire continental United States using the MR4 release of HAZUS-MH. The inputs for the AAL included 30 meter Digital Elevation Model (DEM) and the default census block data in HAZUS MR4, which utilized the 2000 Decennial Census data.

The analysis was performed at the county level using Level 1 methodology with national datasets. The purpose of the AAL study was to identify flood-prone areas and communicate relative flood risk in terms of people and property vulnerable to damage. The AAL study data provides potential dollar losses for four flood frequencies as follows: 10-percent (10-year), 2-percent (50-year), 1-percent (100-year), and 0.2 percent (500-year). The average annualized loss estimates are then calculated based on the aggregated dollar losses from the various flood frequencies (averaged and annualized). **Table 3.37** provides the detailed estimated AAL results for each jurisdiction in Sullivan County.

Table 3.37 Average Annualized Losses by Jurisdiction

Jurisdiction	Building Damage (\$)	Content Damage (\$)	Total Loss (\$)	Total Structure and Contents Value (\$)	% of Total
Bluff City	2,396,000	4,510,000	7,440,000	141,474,206	5.3%
Bristol	11,651,000	12,727,000	24,790,000	3,108,523,897	0.8%
Kingsport	15,566,000	33,821,000	51,643,000	5,447,790,086	0.9%
Sullivan County Unincorporated Areas	11,750,000	13,501,000	26,414,000	6,812,473,045	0.4%
Total County	41,363,000	64,559,000	110,287,000	15,510,261,234	0.7%

Source: HAZUS-MR4

Future Development

The risk of flooding to future development should be minimized by the floodplain management programs of the County and its jurisdictions, if properly enforced. Risk could be further reduced by strengthening floodplain ordinances and floodplain management programs beyond minimum NFIP requirements.

Land Subsidence

Existing Development

Structures located within karst hazard areas are most at risk to a land subsidence event. Any development that takes place in these areas will place more people and structures in the risk area for land subsidence events. To analyze vulnerability to land subsidence events and how this varies by jurisdiction, the population, structures, and critical facilities located within the karst hazard areas characterized as having greater than 10-percent sinkholes was calculated. Table 3.38 presents this data.

Table 3.38 Population, Critical Facilities, and Building Counts within the Karst Hazard Areas (greater than 10% sinkholes)

Jurisdiction	Population within Karst Hazard Area - >10% sinkholes	No. of Critical Facilities within Karst Hazard Area - >10% sinkholes	Building Counts within Karst Hazard Area - >10% sinkholes			
			Residential	Commercial	Industrial	Other
Bluff City	25	0	0	0	0	0
Bristol	53	0	30	0	0	1
Kingsport	1,284	5	678	64	11	7
Sullivan County Unincorporated Areas	6,598	0	3,019	82	29	23
TOTAL	7,960	5	3,727	146	40	31

Critical facilities identified within the City of Bristol that are within the karst hazard area include:

- Waste Water Treatment Plant
- Demolition Landfill

Critical facilities identified within the City of Kingsport that are within the karst hazard area include:

- Electrical Substation – Tenn Eastman Division A of East
- Water Treatment Plant – Kingsport
- Schools – Rock Springs Elementary School
- Schools – Sullivan South High School
- Schools – Johnson Elementary School

Critical facilities identified within the Sullivan County Unincorporated Area that are within the karst hazard area include:

- Electrical Substation – Buffalo

Table 3.39 Building Values within the Karst Hazard Areas (greater than 10% sinkholes)

Jurisdiction	Building and Content Value (\$1000) within Karst Hazard Area - >10% sinkholes			
	Residential	Commercial	Industrial	Other
Bluff City	808,710	914,338	416,292	0
Bristol	2,658,191	98,529	37,185	377,639
Kingsport	80,969,951	80,602,842	12,998,763	10,044,456
Sullivan County Unincorporated Areas	392,809,791	40,142,552	24,959,942	20,085,455
TOTAL	477,246,643	121,758,261	38,412,182	30,507,550

Future Development

Growth continues to occur in the karst hazard areas of Sullivan County, increasing the vulnerability of people, property, and infrastructure to land subsidence. Currently, there are no community regulations for development in the karst hazard areas in the County or local jurisdictions.

Landslide

Existing Development

Structures located within karst hazard areas are most at risk to a land subsidence event. Any development that takes place in these areas will place more people and structures in the risk area for land subsidence events. To analyze vulnerability to landslide events and how this varies by jurisdiction, the population and critical facilities located within the areas noted as having both high susceptibility and moderate incidence of landslides was calculated. Table 3.40 presents this data.

Table 3.40 Population, Critical Facilities, and Building Counts within the High Incidence Landslide Areas

Jurisdiction	Population within High Incidence Areas	Critical Facilities within High Incidence Areas	Building Counts within High Incidence Areas			
			Residential	Commercial	Industrial	Other
Bluff City	0	0	0	0	0	0
Bristol	16,276	8	7,827	445	107	81
Kingsport	17,158	17	8424	328	93	89
Sullivan County Unincorporated Areas	37,984	18	15,924	559	172	145
TOTAL	71,418	43	32,175	1,332	372	315

Critical facilities identified within the City of Bristol that are within the landslide hazard area include:

- Fire-EMS - Bristol TN Fire Department Station No. 1
- Fire-EMS - Bristol TN Fire Department Station No. 2
- City of Bristol – Maintenance Garage
- National Guard Armory
- Schools - Anderson School
- Schools - Bristol Tennessee High School
- Schools - Central Elementary
- Schools - Fairmount Elementary School
- Schools - King College
- Schools - Vance Middle

Critical facilities identified within the City of Kingsport that are within the landslide hazard area include:

- Fire-EMS - Bloomingdale volunteer fire dept
- Fire-EMS - Kingsport Fire Dept. Station 5
- Fire-EMS - Kingsport Fire Dept. Station 6
- Fire-EMS - Warriors Path Volunteer Fire Dept
- Electric Substation - Fort Patrick Henry
- Electric Substation - Orebank
- Electric Substation - Reedy Creek
- Electric Substation - Short Hills
- Bloomingdale Utility District
- Schools -Apostolic Gospel Academy
- Schools -Appalachian Christian school
- Schools -Brookside Elementary school
- Schools -Kennedy Elementary School
- Schools -Lighthouse Christian School
- Schools - Roosevelt Elementary
- Schools -Sullivan North High School
- Schools -Tri-Cities Christian School

Critical facilities identified within the Sullivan County Unincorporated Areas that are within the landslide hazard area include:

- Communications - WIGN
- Electric Substation - Ruthton
- Fire-EMS - Sullivan West Volunteer Fire Department
- Fire-EMS - TN Dept of Ag - Division of Forestry
- Fire-EMS - Warriors Path State Park Ranger Station
- Electric Substation - Fort Robinson
- Schools - Colonial Heights Middle School
- Schools - Cedar Grove Elementary
- Schools - Central Heights Elementary
- Schools - John Adams Elementary
- Schools - Ketron Middle School
- Schools - Kingsley Elementary School
- Schools - Miller Perry Elementary
- Schools - Rock Springs Elementary
- Schools - Sullivan Elementary School
- Schools - Sullivan Middle School
- Schools - Sullivan South High School
- Schools - Valley Pike Elementary

Table 3.41 Building Values within the High Incidence Landslide Areas

Jurisdiction	Building Value (\$1000) within High Incidence Areas			
	Residential	Commercial	Industrial	Other
Bluff City	0	0	0	0
Bristol	1,122,408	384,327	224,404	102,764
Kingsport	1,143,097	359,023	136,921	150,610
Sullivan County Unincorporated Areas	2,260,279	530,187	174,674	166,159
TOTAL	4,525,784	1,273,537	535,999	419,533

Future Development

Growth continues to occur in the landslide prone areas of Sullivan County, increasing the vulnerability of people, property, and infrastructure to land subsidence. Currently, there are no community regulations for development in the landslide prone areas in the County or local jurisdictions.

Wildfire

Existing Development

Vulnerability to wildfire is predominantly associated with wildland-urban interface areas. The wildland-urban interface is a general term that applies to development interspersed or adjacent to forests and wildlands. To analyze vulnerability to wildfire events and how this varies by jurisdiction, the population and critical facilities located within the wildland-urban interface and intermix areas was calculated. Table 3.42 presents this data.

In addition, the August 17, 2001, *Federal Register* included a list of “urban wildland interface communities within the vicinity of federal lands that are at high risk from wildfire.” The communities were identified as required by the National Fire Plan, a cooperative, long-term effort between various government agency partners with the intent of actively responding to severe wildfires and their impacts to communities while ensuring sufficient firefighting capacity for the future. None of the communities within Sullivan County were included on this list.

Table 3.42 Population, Critical Facilities, and Building Counts within the Wildland-Urban Interface Areas

Jurisdiction	Population within Interface Areas	No. of Critical Facilities within Interface Areas	Building Counts within Interface Areas			
			Residential	Commercial	Industrial	Other
Bluff City	423	1	211	38	7	3
Bristol	24,830	24	12,717	725	197	145
Kingsport	8,697	1	4,063	330	63	56
Sullivan County Unincorporated Areas	45,194	21	19,467	627	246	212
TOTAL	79,144	47	36,458	1,720	513	416

Critical facilities identified within the City of Bluff City that are within the Wildland Urban Interface area include:

- Fire-EMS - Piney Flats Volunteer Fire Department

Critical facilities identified within the City of Bristol that are within the Wildland Urban Interface area include:

- Communications - W270BN
- Communications - WIGN
- Electric Substation – Steele Creek

- Electric Substation – Medical Center
- Electric Substation – Conley Scott
- Fire-EMS - Avoca Volunteer Fire Department
- Fire-EMS - Bristol Fire Dept. Stations #1, #2, #3, and #4
- Fire-EMS - Fire Station No. 4
- Fire-EMS - Ambulance Service of Bristol
- Heliport - Bristol Regional Med Center
- Medical Facilities - Wellmont Bristol Regional Medical Center
- Medical Facilities - Select Specialty Hospital – Tri-Cities
- Police Stations - Bristol Police Department
- Schools - Anderson School
- Schools - Avoca Elementary School
- Schools - Bristol High School
- Schools - Central Elementary School
- Schools - Fairmount Elementary School
- Schools - Holston View Elementary School
- Schools - Haynesfield Elementary School
- Schools - King College
- Schools - Vance Middle School
- Schools - Valley Pike Elementary School
- Other – Public Transportation Center
- Other – Downtown Center
- Other – State Street Farmers’ Market
- Other – Avoca Library
- Other – City of Bristol Maintenance Garage
- National Guard Armory

Critical facilities identified within the City of Kingsport that are within the Wildland Urban Interface area include:

- Fire-EMS - Kingsport Fire Station No. 4

Critical facilities identified within the Sullivan County Unincorporated Areas that are within the Wildland Urban Interface area include:

- Comprehensive community services
- Communications - WIGN
- Electric Substation – Blountville
- Electric Substation – Bluff City Primary
- Electric Substation – Piney Flats
- Electric Substation – Pemberton
- Water Filtration Plant
- Fire-EMS - East Sullivan County Volunteer Fire Dept
- Fire-EMS - Piney Flats Volunteer Fire
- Fire-EMS - Sullivan West Fire Dept
- Fire-EMS - Sullivan County Volunteer Fire Department - Blountville
- Heliport - Air Trace Center
- Heliport - Edwards

- Medical Facilities - Sullivan County Emergency Medical Services
- Police Stations - Sullivan County Sheriffs Dept
- Schools - Blountville elementary School
- Schools - Central Heights Elementary
- Schools - Kingless Elementary School
- Schools - Ketron Middle School
- Schools - Mary Hughes School
- Schools - Blountville Middle School
- Schools - Sullivan Elementary School
- Schools - Sullivan Middle School
- Schools - Valley Pike Elementary School
- Schools - Weaver Elementary School

Table 3.43 Building Values within the Wildland-Urban Interface Areas

Jurisdiction	Building Value (\$1000) within Interface Areas			
	Residential	Commercial	Industrial	Other
Bluff City	20,439	27,460	3,589	3,650
Bristol	1,866,805	699,129	628,663	185,726
Kingsport	642,261	360,102	79,625	72,828
Sullivan County Unincorporated Areas	2,495,503	444,555	355,850	244,656
TOTAL	5,025,008	1,531,246	1,067,727	506,860

Future Development

Growth continues to occur in wildland-urban interface areas of unincorporated Sullivan County, increasing the vulnerability of people, property, and infrastructure to wildfires. Currently, there are no community wildfire protection plans and no wildfire mitigation review requirements or regulations for development in the wildland-urban interface in the County or towns. However, education and other mitigation initiatives are in place in the County.

Hazardous Materials Incidents

Existing Development

Structures located near fixed facilities, highways and other high traffic roadways are most at risk to a HAZMAT event. Any development that takes place in these areas will place more people and structures in the risk area for HAZMAT events, however since most hazardous material spills are localized to an extremely small area this will not have an effect on the overall risk assessment for this hazard.

Due to the prevalence of hazardous materials fixed facilities and the variety of modes of transportation that carry HAZMAT within Sullivan County, the entire county is viewed to be vulnerable to a HAZMAT Incidents of one form or another. However, some locations are more vulnerable to the impacts of a HAZMAT Incident due to various factors such as:

- Number of commercial fixed facilities with HAZMAT,
- Presence of major transportation routes,
- Population in proximity to facilities and various transportation routes, and
- Critical facilities in proximity to facilities and various transportation routes.

To analyze vulnerability to HAZMAT events and how this varies by jurisdiction, these factors were taken into account. Table 3.44 provides the population and number of critical facilities within ½ mile proximity to Tier II Chemical Facilities, Major Highways/Interstates, and Railways. The ½ mile area was chosen since this is the recommended Initial Isolation Zone for HAZMAT incidents if the chemical has not yet been identified (U.S. DOT 2012 Emergency Response Guidebook)

Table 3.44 Population and Critical Facilities in Proximity to Hazardous Materials Facilities and Transportation Routes

Jurisdiction	Population in ½ mile of Tier II Facilities	Critical Facility in ½ mile of Tier II Facilities	Population in ½ mile of Major Hwy/Interstate	Critical Facility in ½ mile of Transportation Route
Bluff City	952	5	1,519	4
Bristol	8,061	9	9,632	9
Kingsport	12,863	19	13,610	21
Sullivan County Unincorporated Areas	7,639	21	13,935	13
TOTAL	29,515	54	38,695	47

Sufficient data is not available at this time to make estimates of potential losses by jurisdiction for all types of HAZMAT Incidents. However the following assumptions have been made that begin the process of estimating these actual losses:

- Most HAZMAT events are localized and affect only the immediate area.
- Most events are small in nature and are quickly contained and cleaned.
- Fixed sites can be identified through the federal reporting requirements and some historical event data is available by jurisdiction.
- Maps for highways and railroads are available thereby designating the jurisdictions at risk to these specific hazards.
- Most HAZMAT events involve an immediate response and an expedited cleanup with relatively fixed costs. Depending on the size and location of a release, the associated costs can range from a few thousand dollars to hundreds of thousands of dollars.
- Losses could include limited loss of life, injuries and sickness for the general population and for the first responders.
- Losses could include the financial costs for response and cleanup.
- There could be significant loss of reputation or confidence in associated organizations.
- There could be short-term impacts to the local economy due to a major event.

Of the 45 transportation incidents that occurred over the 10 year period from 5/01/2003 to 5/01/2013, estimates of dollar damages were provided for 8 of the incidents with a total of \$351,625 in reported damages. This translates to an average of \$43,953 per incident and \$35,162 per year.

Future Development

Structures located near fixed facilities, highways and other high traffic roadways are most at risk to a HAZMAT event. Any development that takes place in these areas will place more people and structures in the risk area for HAZMAT events, however since most hazardous material spills are localized to an extremely small area this will not have an effect on the overall risk assessment for this hazard.

Terrorism Events

The HMPC identified several priority facilities and infrastructure which could be potential terrorism targets (see Table 3.45 below). Terrorist events are largely targeted at populated areas and events. Within Sullivan County, there are many daily public events and gatherings where thousands of people congregate. Any of these locations could be a target for a terrorist event and if it were to take place, it would result in a catastrophic loss of life.

Table 3.45 Priority Facilities and Infrastructure in Sullivan County

Facility	Jurisdiction	Employees / Capacity
Holston Army Ammunition Plant/BAE	Kingsport	14,120 employees
Eastman	Kingsport	6,600 employees
Water treatment plant - Bluff City Water Department	Bluff City	2,467 served
Water treatment plant – Bristol – Bluff City Utility Dept.	Bluff City	5,254 served
Water treatment plant – Bristol Dept. Utilities	Bristol	29,362 served
Water treatment plant – Bloomingdale Utility District	Kingsport	11,753 served
Water treatment plant – Kingsport Water Dept.	Kingsport	91,499 served
Wastewater treatment plant	Bristol	11,000 served
Wastewater treatment plant	Kingsport	Data not available
Bristol Motor Speedway	Bristol, Sullivan County	160,000 capacity
Tri-Cities Regional Airport	Sullivan County	202,114 enplanements

Existing Development

Analysis of vulnerable populations is aided by a program developed by Johns Hopkins University in 2006 called Electronic Mass Casualty Assessment and Planning Scenarios (EMCAPS) <http://www.hopkins-cepar.org/EMCAPS/EMCAPS.html> which utilizes scenarios developed by the Department of Homeland Security.

****THE FOLLOWING HYPOTHETICAL SCENARIO IS FOR INSTRUCTIONAL AND ILLUSTRATIVE PURPOSES ONLY****

Explosive Device – Truck Bomb

Scenario Overview: An Improvised Explosive Device (IED) utilizing an ammonium nitrate/fuel oil (ANFO) mixture is carried in a cargo truck to a populated area and detonated. Depending upon the size of the explosive that is chosen and the population density, EMCAPS will calculate the resulting casualty population. Buildings and other physical structures are not considered in these calculations; it is assumed that the explosion takes place in a relatively open area (e.g. stadium parking lot, park, etc).

Assumptions: (1) The population density in the parking lot during the beginning and ending of the races is high, at least 1 person/25 square feet. (2) The disguised large vehicle bomb contains between 2,000 and 4,000 pounds of a readily attainable conventional explosive material such as ammonium nitrate/fuel oil (ANFO) or a commercial high explosive. (3) The estimated lethal air blast range for this vehicle (4,000 pounds of ANFO) is 300 feet.

Table 3.46 ECAMPS Described Losses

Total Dead	1,391 persons
Total Traumatic Injuries	2,438 persons
Total Urgent Care Injuries	11,935 persons
Injuries not Requiring Hospitalization	4,467 persons
Total “Worried Well” Cases (9 times the number of affected cases)	177,219 persons
Structures and Other Physical Assets (Damages would certainly occur to vehicles and depending on the proximity of other structures, damages would occur to the speedway complex itself. The exact amount of these damages is difficult to predict because of the large numbers of factors, including the type of structures nearby and the amount of insurance held by vehicle owners.)	<p>Vehicles –</p> <p>Replacement cost for approximately 100 vehicles @ \$15,000 per vehicle inside the 300 ft lethal air blast range = \$ 150,000</p> <p>Repair / repainting cost for approximately 500 vehicles @ \$ 4,000 per vehicle inside the falling glass hazard = \$2,000,000</p>

Future Development

As more and more large public events are held in Sullivan County, more potential may exist for these venues to become targets of attack. With human-caused hazards such as this that can have multiple variables involved, increases in development are not always a factor in determining risk, although the physical cost of the event may increase with the increased or newly developed areas.

3.3.4 Development and Land Use Trends

As part of the planning process, the HMPC looked at changes in growth and development and land use trends and examined these changes in the context of hazard-prone areas. Information from the 2006-2026 Sullivan County Regional Plan was used to form the basis of this discussion.

Population

The 2006-2026 Sullivan County Regional Plan presented projected the future population for Sullivan County and the jurisdictions. The population projections were developed by the University of Tennessee Center for Business and Economic Research to be used for the growth plans and do not take into consideration any annexations by the cities, as those cannot be predicted by the county. Although the population estimates between 2020 and 2025 show a slight decrease for Bluff City, Bristol, and Kingsport, the County as a whole is anticipated to continue to experience overall steady growth in population based upon a conservative trends analysis.

Table 3.47 Population Projections for Sullivan County, 2025

	2010 Census	2015 Projection	2020 Projection	2025 Projection
Bluff City				
Population	1,559	1,621	1,630	1,629
Amount of Change		62	9	-1
Percent of Change		3.8%	0.6%	-0.1%
Bristol				
Population	24,821	26,156	26,323	26,318
Amount of Change		1,335	167	-5
Percent of Change		5.1%	0.6%	-0.02%
Kingsport				
Population	44,905	43,005	43,107	42,928
Amount of Change		-1,900	102	-179
Percent of Change		-4.4%	0.2%	-0.4%
Sullivan County Unincorporated Areas				
Population	81,763	89,396	90,040	90,098
Amount of Change		7,633	644	58
Percent of Change		8.5%	0.7%	0.1%

Source: U.S. Census; 2006-2026 Sullivan County Regional Plan

Land Use

The Tennessee Growth Boundary Law, enacted as Public Chapter 1101, required Sullivan County and its jurisdictions to evaluate their potential growth over the next 20 years, defining their responsibility to manage growth, ensuring efficient use of land, and providing appropriate public service standards. The law required that Sullivan County and its jurisdictions to prepare a growth plan that is based on a 20-year projection of growth and land uses, which divides the county into three (3) types of areas:

- Urban Growth Boundary (UGB) - the municipality and contiguous territory where high-density residential, commercial, and industrial growth is expected, or where the municipality is better able than other municipalities to provide urban services.
- Planned Growth Areas (PGA) - territory outside municipalities where high or moderate density of residential, commercial, and industrial growth are projected.
- Rural Areas (RA) - territory not in a UGB or PGA and that which is to be preserved as agricultural lands, forests, recreational uses, wildlife management

The Urban Growth Boundaries (UGBs) are addressed in the Comprehensive Plans for the City of Bristol and Town of Kingsport.

The Planned Growth Areas (PGAs) of Sullivan County hold a broadband of land uses ranging from low to high density residential neighborhoods, neighborhood-type business to general commercial and some light to moderate industrial land uses. The proposed land use plan proposes the highest and best choices for development based upon the known availability of public services, the recent trends for rezoning requests as approved, as well as, protection of property values within the established residential neighborhoods. There are five PGAs identified with in Sullivan County include the following:

- The Tri-County Industrial Park in Piney Flats
- The Bloomingdale area near Kingsport north of Stone Drive;
- the Sullivan Gardens Parkway south of the Kingsport city limits;
- Fort Henry Drive within Colonial Heights near the city limits of Kingsport to the end of the county line; and most notably,
- The Hwy 75 and Hwy 126 corridors near the Tri-Cities Regional Airport on up to the urbanized areas of Blountville.

The major assumptions, findings, and trends identified in the preparation of the 2006-2026 Sullivan County Regional Plan as related to hazard vulnerability include:

- The county government will continue to support economic and community development through their continued strong planning programs in the cities and county.
- Natural factors, primarily topography, poor soils and flood plain, will limit areas for medium to higher density developments in most cases without public utilities.
- Modest, but steady, population growth is projected for the county during the planning period, with an increase from 153,048 in 2000, to approximately 161,263 in 2025.
- The elderly sector of the County's population is expected to increase in percentage in comparison to the total population.

3.4 Risk Assessment Summary

The Sullivan County Risk Assessment revealed a number of problem areas to be addressed in the mitigation strategy. These key findings are summarized in the following list:

- The majority of past disaster declarations, as well as past damages, have been related to severe storms, tornadoes, and flooding.
- Emergency Action Plans are required for all High Hazard Dams. Inundation mapping in a digital format would assist the County in quantifying vulnerabilities and loss estimates to this hazard.
- Sullivan County is in a region of Tennessee that experienced severe and extreme drought 5-10 percent of the time during a 100-year period.
- Sullivan County is located in the Southern Appalachian Seismic Zone, which extends from Alabama to Virginia. There have been 29 recorded earthquakes within a 50-mile radius of central Sullivan County since 1973.
- People, facilities and infrastructure located within the floodplains in Arkansas are susceptible to flood impacts.
- Areas with poor drainage (e.g., fast growing municipalities that lack adequate storm drainage management) are more susceptible to the short-term effects of flash flooding.
- Flooding, and particularly flash flooding, has caused traffic accidents and congestion that has resulted in short-term impacts on the transportation infrastructure.
- Responders are often put at risk during flood events as they respond to calls for assistance. Their risks can range from sickness due to exposure to inclement weather, to performing dangerous rescue missions for stranded citizens. Most responders, however, are not at a great health and safety risk from flooding events.
- Flooding is usually the result of fast moving, severe storm systems and often includes other hazards including tornadoes, lightning, straight-line winds and hail. The impact from these related hazards will compound the response and recovery issues related directly to flooding.
- There are eight identified repetitive loss structures within Sullivan County, an increase from the original Multi-Hazard Mitigation Plans.
- Karst hazard areas are approximated throughout the County, with sinkhole activity occurring during the update of this hazard mitigation plan.
- Sensitive natural areas and species primarily occur along streams and drainages.
- Winter weather events create problems with water lines, snow loads on roofs, and traveler safety.
- Hazardous materials incidents, both fixed facility incidents and transportation incidents are addressed. Digital reporting capabilities for fixed facilities are anticipated to change in the upcoming year.
- Priority facilities and infrastructure which could be potential terrorism targets have been identified by the HMPC.

4 MITIGATION STRATEGY

44 CFR Requirement 201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This section presents the mitigation strategy developed by the Hazard Mitigation Planning Committee (HMPC) based on the risk assessment. The mitigation strategy was developed through a collaborative group process and consists of goals, objectives, and mitigation actions. The HMPC used the following definitions, which are based upon those found in FEMA publication 386-3, *Developing the Mitigation Plan* (2002):

- **Goals** are general guidelines that explain what you want to achieve. Goals are defined before considering how to accomplish them so that they are not dependent on the means of achievement. They are usually long-term, broad, policy-type statements.
- **Objectives** define strategies or implementation steps to attain the identified goals and are specific and measurable.
- **Mitigation Actions** are specific actions that help achieve goals and objectives.

4.1 Goals and Objectives

The HMPC developed goals and objectives to provide direction for reducing hazard-related losses in Sullivan County. These were based upon the results of the risk assessment and a review of goals and objectives from other state and local plans, specifically, the State of Tennessee Hazard Mitigation Plan and the previous hazard mitigation plans for Sullivan County and the City of Bristol. This review was to ensure that this plan's mitigation strategy was integrated with existing plans and policies.

Through a brainstorming process at their second and third meeting, the HMPC identified a variety of possible goals and then came to a consensus on four main ones. Following the development of goals, the HMPC identified specific objectives to achieve each goal. Goals and objectives are listed below, but are not prioritized:

Goal 1: Reduce the vulnerability of the people, property, and environment of Sullivan County.

- Protect community lifelines (existing and future) from identified natural and man-made hazards;
- Better manage flood hazard areas;
- Better manage fire hazard areas; and
- Protect community historic preservation resources from identified natural and man-made hazards.

Goal 2: Improve and maintain coordination and communication between all jurisdictions.

Goal 3: Educate the public on identified natural and man-made hazards.

- Improve hazard mitigation planning for Bristol Motor Speedway (BMS) facility events

Goal 4: Improve public hazard communication methods.

4.2 Identification and Analysis of Mitigation Actions

44 CFR Requirement §201.6(c)(3)(ii): The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

To identify and analyze potential mitigation actions to achieve the mitigation goals, the HMPC discussed the key issues that emerged in the Risk Assessment at their third meeting. Each hazard identified in Section 3.1 was evaluated. Only those hazards with an overall vulnerability ranking of moderate or high were determined to be a priority hazard and were considered further in the development of hazard-specific mitigation measures. The following are Sullivan County's priority hazards:

- Flood
- Hazardous Materials Incidents
- Sinkholes
- Thunderstorms (high winds, hail, lightning)
- Tornadoes
- Winter Storms
- Wildfire

The HMPC eliminated other hazards from further consideration in the development of mitigation actions because the risk of a hazard event in the county is unlikely, the vulnerability of the county to the hazard is low, or capabilities are already in place to mitigate its negative impacts. It is important to note that many of the final mitigation actions are multi-hazard actions designed to reduce potential losses from all types of hazard events.

At their third meeting, the HMPC was provided the following list of categories of mitigation actions, which originated from the National Flood Insurance Program's Community Rating System, as well as definitions and examples for each category:

- 1) **Prevention:** Administrative or regulatory actions or processes that influence the way land and buildings are developed and built
- 2) **Property protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area

- 3) **Structural:** Actions that involve the construction of structures to reduce the impact of hazard
- 4) **Natural resource protection:** Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems
- 5) **Emergency services:** Actions that protect people and property during and immediately after a disaster or hazard event
- 6) **Public education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigation them

The HMPC then analyzed a list of potential structural and nonstructural mitigation alternatives, which were organized by hazard and based upon the risk assessment, existing capabilities, and plan goals and objectives. Through a facilitated planning process, each committee member developed ideas for mitigation actions based upon these alternatives and their own ideas. Duplicate ideas were condensed to a refined list of mitigation actions that were written on index cards and categorized by mitigation action type.

Some alternatives identified did not make it to this refined list because they were determined by the HMPC to not be politically, technically, or financially feasible or because no champion for the action was present in the group. However, these ideas are still captured in Appendix C and may be readdressed if funding opportunities change or during the next plan update process.

4.3 Implementation of Mitigation Actions

44 CFR Requirement §201.6(c)(3)(ii): The mitigation strategy shall include an action strategy describing how the actions identified in paragraph (c)(2)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefits review of the proposed projects and their associated costs.

To prioritize the mitigation actions, the HMPC voted on the identified actions. For this “multi-voting” approach all of the mitigation actions under consideration were presented on index cards. Each member of the HMPC was then given 5 votes, or colored dots, to apply to the mitigation actions he felt most important. The number of dots on each index card was added up. Based upon the number of dots, or votes, they received, the mitigation actions were assigned a priority of high, medium, or low.

This process of identification and analysis of mitigation options allowed the HMPC to come to consensus and to prioritize recommended mitigation actions. Emphasis was placed on the importance of a cost-benefit analysis in determining project priority; however, this was not a quantitative analysis. The Disaster Mitigation Act

Sullivan County, Mitigation Actions



regulations state that benefit-cost review is the primary method by which mitigation projects should be prioritized. Recognizing the federal regulatory requirement to prioritize by benefit-cost and the need for any publicly funded project to be cost-effective, the HMPC decided to pursue implementation according to when and where damage occurs, available funding, political will, local priority, and priorities identified in the State of Tennessee Hazard Mitigation Plan. Cost-effectiveness will be considered in additional detail when seeking FEMA mitigation grant funding for eligible projects identified in this plan.

Tables 4.1 summarizes identified actions and provides information on the hazards addressed and plan goals achieved. The individual action items, as recommended and prioritized by the HMPC, are presented in order of priority. Each action item includes the background information, ideas for implementation, responsible office, potential funding, cost estimates, benefits, and timeline for each identified action. Completed action items, as noted in Table 4.1 are presented in Appendix C.

Table 4.1. Mitigation Action Matrix

Jurisdiction	Action	HMPC Priority	Goals Addressed	Hazards Addressed	Status
Multi-Jurisdictional	<ol style="list-style-type: none"> 1. Public Awareness Program <ol style="list-style-type: none"> a. Continue public education efforts, such as quarterly online newsletter, participation in safety fairs, and press releases/radio PSAs in coordination with the Public Health Coalition regarding natural and man-made hazards. b. Continue public education on shelter c. Educate property owners near the Bristol Motor Speedway facility about hazard mitigation roles and responsibilities. 	High	Goals 1, 3	Multi-Hazard	Revised
Multi-Jurisdictional	<ol style="list-style-type: none"> 2. Continue to seek ways for Tier II facilities to report electronically in a web-based format, as the current system supported by a University may soon be unavailable. 	High	Goals 1, 4	Man-made Hazards	New
Multi-Jurisdictional	<ol style="list-style-type: none"> 3. Identify repetitive flood prone areas. 	High	Goals 1, 3	Flood	Ongoing
Bristol	<ol style="list-style-type: none"> 4. Investigate the feasibility of installing a Hazardous Materials team in the City of Bristol, TN. 	High	Goal 1	Man-made Hazards	Ongoing

Jurisdiction	Action	HMPC Priority	Goals Addressed	Hazards Addressed	Status
Bristol	5. Improve alternative route planning and equipment for Volunteer Parkway and other State roadways that are key transportation routes during race weekends.	High	Goals 1,2 and 4	Man-made Hazards	Ongoing
Multi-Jurisdictional	6. Identify known sinkhole incident areas. All jurisdictions will report sinkhole incidents to Sullivan County EMA over the next 10 years.	Medium	Goals 1, 3	Sinkholes	New
Multi-Jurisdictional	7. Increase coordination and pre-staging of critical assets for disasters.	Medium	Goals 1, 2, 4	Multi-Hazard	New
Multi-Jurisdictional	8. Generate a map of sirens and the populations that receive the alert information.	Medium	Goals 1, 3, 4	Severe Weather	New
Multi-Jurisdictional	9. Define “vulnerable” populations in order to better coordinate with Public Health to identify these populations.	Medium	Goals 1, 3, 4	Extreme Temperatures	New
Sullivan County	10. Continue to participate in themed drills, such as TNCAT for focused training.	Medium	Goals 1, 4	Multi-Hazard	New
Bristol	11. Improve communications between Emergency Management Agency and utilities.	Medium	Goals 1, 2, 4	Multi-Hazard	Ongoing

Jurisdiction	Action	HMPC Priority	Goals Addressed	Hazards Addressed	Status
Bristol	12. Leverage other funding sources for hazard mitigation implementation, such as the Hazard Mitigation Grant Program (HMGP) and the Flood Mitigation Assistance (FMA) Program.	Medium	Goals 1, 2	Multi-Hazard	Ongoing
Kingsport	13. Continue partnering with Eastman on floodplain issues and hazardous materials storage.	Medium	Goals 1,2	Man-made Hazards	Ongoing
Multi-Jurisdictional	14. Continue participation as a StormReady community.	Low	Goals 1, 3, 4	Severe Weather	Ongoing
Multi-Jurisdictional	15. Improve emergency communication with surrounding states.	Low	Goals 1, 2, 4	Multi-Hazard	New
Multi-Jurisdictional	16. Reduce Vulnerability to Wildfire Hazard <ul style="list-style-type: none"> a. Investigate Improvements to ingress/egress routes for residential areas in Wildland/Urban Interface (WUI) or wildfire hazard areas. b. Investigate improvements in water delivery to residential areas in wildfire hazard areas. c. Develop and adopt design standards based on Firewise principles into subdivision ordinances. d. Become a certified Firewise community. 	Low	Goals 1, 3	Wildfire	Ongoing

Jurisdiction	Action	HMPC Priority	Goals Addressed	Hazards Addressed	Status
Multi-Jurisdictional	17. Map known areas of landslide incidents and potential areas for landslides.	Low	Goals 1, 3	Landslides	New
Multi-Jurisdictional	18. Identify methods to reduce flooding and loss in historic districts.	Low	Goal 1	Floods	Ongoing
Multi-Jurisdictional	19. Participate in CRS program.	Low	Goals 1, 3	Floods	Ongoing
Multi-Jurisdictional	20. Review and update vulnerability assessments at water treatment facilities.	Low	Goal 1	Multi-Hazard	Ongoing
Multi-Jurisdictional	21. Modify zoning in dam failure inundation zones.	Low	Goal 1	Dam Failure	New
Bristol	22. Continue disaster response training for Bristol Motor Speedway staff.	Low	Goals 1, 3	Multi-Hazard	Ongoing
Kingsport	23. Require underground utilities in new subdivision developments.	Low	Goal 1	Severe Weather	Ongoing

Jurisdiction	Action	HMPC Priority	Goals Addressed	Hazards Addressed	Status
Multi-Jurisdictional	24. Coordinate annual meetings of the Sullivan County Hazard Mitigation Planning Committee to monitor, evaluate, and update the multi-hazard mitigation plan.	Low	Goal 4	Multi-Hazard	Ongoing
Completed Action Items					
Sullivan County	1. Align the Sullivan County Multi-Jurisdiction HMP with Bristol's HMP. Re-incorporate the Bristol HMP into the overall Sullivan County plan to coordinate hazard mitigation better within the County.				
Multi-Jurisdictional	2. Integrate hazard mitigation into all aspects of County planning, including land use planning and Emergency Operations Plan.				
Bristol	3. Improve and maintain coordination and communication with TDOT on bridge replacements and repairs for Volunteer Parkway and other State roadways that are key transportation routes during race weekends.				
Bristol	4. Partner with local industries for hazard mitigation implementation.				
Multi-Jurisdictional	5.a. Improve community regulation and planning to address small stream flooding. 5.b. Revise floodplain regulations to better guide development in and around floodplains.				
Sullivan County	6. Become a Storm Ready Community.				
Bristol	7. Improve pedestrian ingress/egress walkways and signage around the Bristol Motor Speedway facility to improve evacuation procedures in the event of an emergency.				
Bristol	8. Prepare hazard mitigation plans and procedures for campsites surrounding the Bristol Motor Speedway facility.				
Bristol	9. Improve coordination with the Federal Aviation Administration (FAA) and the Transportation Security Administration (TSA) on airspace restrictions associated with events at the Bristol Motor Speedway facility.				

Jurisdiction	Action	HMPC Priority	Goals Addressed	Hazards Addressed	Status
Bristol	10. Improve communication to public attending BMS events about evacuation procedures in and around Bristol Motor Speedway.				
Bristol	11. Improve the City's emergency communication system.				
Bristol	12. Investigate the replacement of the current civil alarm notification system.				
Multi- Jurisdictional	13.a. Update Floodplain Mapping. 13.b. Pursue alternative funding sources for updating floodplain mapping.				
Multi- Jurisdictional	14.a. Identify all historic resources, such as buildings and other properties, and assess their potential hazards. 14.b. Develop repair and reconstruction policies or rules for historic structures and integrate into historic preservation requirements in each community. Educate historic districts and the planning departments/commissions about the policies.				

Recommended Action Items

Mitigation Action 1 – Public Awareness Program

Project Description:	Develop and conduct a multi-hazard, seasonal Public Awareness Program that provides citizens and businesses with accurate information describing the risk and vulnerability to natural hazards, and is implemented on an annual basis.
Local Prioritization:	High
Primary Hazard :	Multi-Hazard
Issue/Background:	<p>Sullivan is subject to several natural hazards, each of which poses a different degree of risk and associated vulnerability. Some hazards have a combination of attributes, including a high likelihood of occurrence, a specific location that is likely to be affected, and proven approaches that can reduce the impact; therefore the HMPC has recommended that specific actions be taken in regard to these hazards.</p> <p>For other hazards, where either the likelihood of occurrence is very low, the area of likely impact cannot be specified, or there is very little that can be done to reduce the impacts of the hazard, the HMPC has determined that the best approach would be to raise public awareness. .</p>
Progress and/or Implementation:	<ul style="list-style-type: none"> • Public education has been consolidated into a single public awareness program for this LHMP Update. Previously, public education was noted in the Bristol LHMP as Action Items #8 and #16; and in the Sullivan County LHMP as Goal #6 and associated action items for Sullivan County, Kingsport, and Bluff City. • Continue to make information available through social media and the Sullivan County EMA website: Multi-Hazard Mitigation Plan, quarterly newsletter. City and County websites maintain a link to the EMA website. • Continue participation in Safety Fair. • Continue press releases and radio PSAs in coordination with Public Health Coalition.
Lead Agency:	Sullivan County EMA
Partners:	City and County Web Designers
Funding Description:	Emergency Management Agency operating budget
Total Cost:	Staff Time
Benefits: (Losses Avoided)	Loss of life and infrastructure damage
Completion Date:	Annually

Mitigation Action 1b – Sheltering Information

Project Description:	Coordinate with Red Cross and National Weather Service to provide information on shelter locations and safe places during storms.
Local Prioritization:	High
Primary Hazard :	Severe Weather
Issue/Background:	In the event of a natural hazard emergency, residents may need to seek shelter or find a safe place. Providing shelter location information or guidance on how to determine safe places advises residents of their options during an emergency.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Utilize materials and methods through StormReady program operated by National Weather Service. • Use social media to advise residents of hazardous conditions and link to Red Cross for information on shelter locations.
Lead Agency:	Sullivan County EMA
Partners:	American Red Cross-Local Chapters, National Weather Service
Funding Description:	Sullivan County Emergency Management operating budget.
Total Cost:	Staff Time
Benefits: (Losses Avoided)	Loss of life and infrastructure damage
Completion Date:	Within 1 year

Mitigation Action 1c – Public Education for BMS neighboring Property Owners

Project Description:	Educate property owners near the Bristol Motor Speedway facility on roles and responsibilities during a hazard event.
Local Prioritization:	High
Primary Hazard :	Multi-Hazard
Issue/Background:	During events at the Bristol Motor Speedway, property owners adjacent to the BMS provide campsites for numerous attendees. Property owners and attendees utilizing the campsites should be educated on what to do during a natural or man-made hazard event.
Progress and/or Implementation:	<ul style="list-style-type: none"> Public education information programs are given at various locations. This information is included in programs as appropriate.
Lead Agency:	Bristol Motor Speedway
Partners:	Bristol Fire Department
Funding Description:	General Fund
Total Cost:	Staff time for coordination with campsite owners and preparation of public education materials
Benefits: (Losses Avoided)	Life Safety; Property Protection; Pro-active approach to hazard mitigation
Completion Date:	Ongoing

Mitigation Action 2 – Critical Facilities Reporting Mechanism

Project Description:	Seek a web-based format for Tier II facilities to submit reports to the Emergency Management Agency.
Local Prioritization:	High
Primary Hazard :	Multi-Hazard
Issue/Background:	Currently, facilities report electronically and/or on paper. In 2014, the federal government will require electronic reporting. The University of Texas currently administers an electronic reporting system, however, funding for the continuation of the program is uncertain. Therefore a consistent format and set of procedures for facilities to utilize must be made available.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Research existing web services that support the ability for facilities to complete the required reporting. • Contact facilities to ensure the system is functional. • Adopt the system.
Lead Agency:	Emergency Management Agency
Partners:	City of Bristol and City of Kingsport HazMat teams, facility managers
Funding Description:	Emergency Management Operating Budget
Total Cost:	Staff time for research and establishment of system.
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Within 1 year

Mitigation Action 3 – Identify Repetitive Flood Prone Areas

Project Description:	Develop a map of repetitive flood prone areas.
Local Prioritization:	High
Primary Hazard :	Flood
Issue/Background:	Define repetitive loss areas adjacent to the repetitive loss properties in order to identify problematic areas and educate appropriate residents on the flooding hazard.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Collect information on repetitive loss properties. • As new locations are added, focus mitigation and education efforts on these areas. • Use map information to allow for the creation of zones around these properties to use for future mitigation actions such as mailing educational materials to the residents within that zone.
Lead Agency:	Sullivan County Emergency Management Agency
Partners:	City and county planning agencies
Funding Description:	Emergency Management operating budget; City and County Planning/ Development Services budgets for GIS.
Total Cost:	\$5-\$20,000 depending upon printing and mailing costs, level of volunteer participation, and scope and frequency of events.
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Annually

Mitigation Action 4 – City of Bristol Hazardous Materials Team

Project Description:	Investigate the feasibility of installing a Hazardous Materials team in the City of Bristol, TN.
Local Prioritization:	High
Primary Hazard :	Man-made Hazards
Issue/Background:	The City of Bristol has a HazMat Team, but it is not TEMA certified. The City of Kingsport is the District I certified HazMat Team.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Coordinate with TEMA on required courses for HazMat Team to obtain certification. • Allow staff time for training and certification
Lead Agency:	City of Bristol Fire Department
Partners:	TEMA
Funding Description:	City of Bristol Fire Department operating budget
Total Cost:	Staff Time
Benefits: (Losses Avoided)	Life Safety; Eliminating gaps and duplications in response activities
Completion Date:	Ongoing

Mitigation Action 5 – Alternative Route Planning

Project Description:	Improve alternative route planning and equipment for Volunteer Parkway and other State roadways that are key transportation routes during race weekends.
Local Prioritization:	High
Primary Hazard :	Man-made Hazards
Issue/Background:	During events at the Bristol Motor Speedway, Sullivan County roadways are inundated with event attendees congesting traffic.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Contingency plans for all street routs for race traffic on a block-by-block basis have been identified. • Evaluate the effectiveness of the contingency plan during implementation.
Lead Agency:	City of Bristol Transportation Engineer
Partners:	Law Enforcement; TDOT
Funding Description:	Staff time for plan evaluation
Total Cost:	City of Bristol Transportation Engineer operating budget
Benefits: (Losses Avoided)	Life Safety; Reduce complaints and staff time in responding to complaints
Completion Date:	Ongoing; Updated each race weekend (2X annually)

Mitigation Action 6 – Identification of Sinkhole Incident Areas

Project Description:	Identify known sinkhole incident areas. All jurisdictions will report sinkhole incidents to Sullivan County EMA over the next 10 years.
Local Prioritization:	Medium
Primary Hazard :	Sinkholes
Issue/Background:	Increased development within Sullivan County utilizes prime land areas. Development of less ideal land may expose building and infrastructure to damage or destruction. Identifying sinkhole areas may equip planners with knowledge needed to locate infrastructure and buildings appropriate with site conditions.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Use GIS to map areas of known sinkholes and areas susceptible to sinkhole formation. • Educate residents and designers about risks and impacts of sinkholes. • Restrict development in areas with soils considered poor or unsuitable for development. • Educate design professionals about where to locate sinkhole hazard information.
Lead Agency:	Sullivan County EMA
Partners:	City and County Planning/Development Services agencies
Funding Description:	Sullivan County EMA operating budget, Planning/Development Services operating budgets
Total Cost:	Data collection and GIS development - \$5,000 - \$25,000
Benefits: (Losses Avoided)	Protection of property and infrastructure
Completion Date:	Within 3 to 5 years

Mitigation Action 7 – Emergency Operations Coordination

Project Description:	Coordinate with multiple entities for pre-staging of critical assets prior to disasters.
Local Prioritization:	Medium
Primary Hazard :	Multi-Hazard
Issue/Background:	Assistance agreements between agencies, organizations, and jurisdictions provide a mechanism to quickly obtain emergency assistance in the form of personnel, equipment, materials, and other associated services. The primary objective is to facilitate rapid, short-term deployment of emergency support prior to, during, and after an incident.
Progress and/or Implementation:	Develop formal agreements with partners (e.g. non-profit organizations, cities, and state agencies) to work together on risk reduction efforts in the County.
Lead Agency:	Sullivan County EMA
Partners:	Town of Bluff City, City of Bristol and City of Kingsport Emergency Departments
Funding Description:	Sullivan County EMA operating budget, City Emergency Department operating budgets.
Total Cost:	Staff time; equipment and tools to facilitate communication and pre-staging.
Benefits: (Losses Avoided)	Loss of life and infrastructure damage
Completion Date:	Within 1 year

Mitigation Action 8 – Warning Siren Coverage

Project Description:	Map warning siren coverage areas to understand which areas are being served by warning sirens.
Local Prioritization:	Medium
Primary Hazard :	Multi-Hazard
Issue/Background:	The HMPC identified that the City of Bristol and the City of Kingsport recently expanded siren coverage in each community. These warning systems are necessary to let residents know of impending natural disasters or other emergency situations. Identifying warning system coverage areas may help emergency managers understand outstanding needs for warning siren expansion or to provide alternate methods to alert residents in areas not served by the warning sirens.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Map the warning system(s) to determined served areas and/or areas in need of service. • Consult with the HMPC to develop recommendations for improvements. • Conduct public outreach efforts to make the public aware of warning systems in the community.
Lead Agency:	Sullivan County EMA, City and County Emergency Departments
Partners:	City or County Officials affiliated with the operation of the warning systems.
Funding Description:	Sullivan County EMA operating budget, Emergency Department operating budgets
Total Cost:	Cost of additional assessment to determine needs for expansion- \$2,000 - \$10,000
Benefits: (Losses Avoided)	Life safety, property protection; improved warning, increased lead time on warning systems and mitigation efforts, reduced losses
Completion Date:	Within 3 to 5 years

Mitigation Action 9 – Vulnerable Populations

Project Description:	Define “vulnerable” populations so that mitigation actions can be developed to address those populations.
Local Prioritization:	Medium
Primary Hazard :	Extreme Temperatures
Issue/Background:	The Sullivan County EMA coordinates with the Public Health Coalition to provide outreach to community members in need of special information or instructions for extreme temperatures.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Coordinate with the Public Health Coalition to define “vulnerable” populations, who are likely experience elevated impacts over the general population as a result of extreme temperatures. • Organize outreach to promote awareness of personal actions to be taken during extreme heat or extreme cold. • Coordinate with organizations that establish or promote warming or cooling centers in the community. • Create a database of vulnerable individuals who are at high risk of death
Lead Agency:	Sullivan County EMA
Partners:	Public Health Coalition
Funding Description:	Sullivan County EMA
Total Cost	Staff Time for materials and information publication
Benefits: (Losses Avoided)	Life safety
Completion Date:	Within 3 to 5 years

Mitigation Action 10 – Emergency Operation Drills

Project Description:	Continue participation in drills or focused training such as TNCAT.
Local Prioritization:	Medium
Primary Hazard :	Multi-Hazard
Issue/Background:	Provide intra- and inter-agency operability between the Sullivan County EMA and other relevant agencies through training for disaster response.
Progress and/or Implementation:	•
Lead Agency:	Sullivan County EMA
Partners:	Federal, State, and city emergency agencies
Funding Description:	Sullivan County EMA operating budget, grant funds
Total Cost:	Staff Time and Training Equipment (approximately \$400 to \$5000)
Benefits: (Losses Avoided)	Life safety, property protection, infrastructure damage
Completion Date:	Annually

Mitigation Action 11 – Communication with Utility Providers

Project Description:	Strengthen communication with utility providers
Local Prioritization:	High
Primary Hazard :	Multi-Hazard
Issue/Background:	Strengthening the communication between emergency managers and utility providers will implement hazard mitigation and establish relationships prior to emergency situations.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Identify appropriate contacts within utility providers with which collaboration would be beneficial for furthering hazard mitigation and emergency response. • Develop a regular meeting schedule to discuss current issues and concerns with hazard mitigation implementation and emergency response.
Lead Agency:	Sullivan County EMA
Partners:	Bristol Tennessee Electric Service
Funding Description:	Sullivan County EMA
Total Cost:	Staff Time
Benefits: (Losses Avoided)	Improved communication mitigation efforts, infrastructure damage
Completion Date:	Within 1 year

Mitigation Action 12 – Leverage Funding

Project Description:	Leverage other funding sources for hazard mitigation implementation, such as the Hazard Mitigation Grant Program (HMGP) and the Flood Mitigation Assistance (FMA) Program.
Local Prioritization:	Medium
Primary Hazard :	Multi-Hazard
Issue/Background:	FEMA offers these programs to assist local communities with reducing future losses of lives and properties due to disasters. The HMGP provides grants to local communities to implement long-term hazard mitigation measures such as the elevation, acquisition, or relocation of flood-prone structures after a major disaster declaration. The FMA program provides grants to communities for projects that reduce the risk of flood damage to structures that have flood insurance coverage. FEMA's mitigation grant programs are administered by the TEMA, which prioritizes and selects project applications developed and submitted by local jurisdictions.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Identify eligible projects for grant funding • Prepare grant applications
Lead Agency:	Sullivan County EMA
Partners:	HMPC; City and County Planning/Development Services agencies
Funding Description:	Sullivan County EMA operating budget, City Emergency Department operating budgets.
Total Cost:	Staff Time to complete grant applications
Benefits: (Losses Avoided)	Potential funding sources for action items of this Mitigation Plan
Completion Date:	Annually evaluate opportunities

Mitigation Action 13 – Partnership with Eastman

Project Description:	Continue partnering with Eastman on floodplain issues and hazardous materials storage.
Local Prioritization:	Medium
Primary Hazard :	Multi-Hazard
Issue/Background:	The City and Eastman have coordinated on floodplain issues and hazardous materials storage in the past. Partnering on staff training and emergency planning will be investigated.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Hazardous material storage and radiological storage locations have been identified within Sullivan County. Each location has been identified and documented in the Sullivan County Emergency Operations Plan. This plan is reviewed and updated annually. The plan is distributed to all emergency and government agencies within the county. • Type and location of hazardous materials in businesses are reported to the Emergency Management Director annually in the form of Tier II reports. Those documents are stored at the Emergency Management office and copies are stored with the Kingsport Fire Department Hazardous Material Response Teams location.
Lead Agency:	Eastman
Partners:	Sullivan County EMA
Funding Description:	Sullivan EMA operating budget
Total Cost:	Staff Time
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Annually update hazardous materials locations in the Sullivan County Emergency Operations Plan.

Mitigation Action 14 – Community Storm Preparedness

Project Description:	Improve community preparedness through participation in programs such as the National Weather Service’s StormReady.
Local Prioritization:	Low
Primary Hazard :	Severe Storms
Issue/Background:	StormReady is a nationwide community preparedness program that uses a grassroots approach to help communities develop plans to handle all types of severe weather. StormReady communities must follow guidelines to maintain their status.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Continue to operate Emergency Operations Center as 24-hour warning point. • Maintain more than one method to receive severe weather warnings and forecasts and to alert the public. • Maintain a system that monitors weather conditions locally. • Promote the importance of public readiness through community seminars. • Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.
Lead Agency:	Sullivan County EMA
Partners:	City and County Emergency Departments
Funding Description:	Sullivan EMA operating budget and City Emergency Department operating budgets.
Total Cost:	Operation of EOC, staff time, cost of equipment to detect severe weather and communication, cost of outreach materials and training.
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Ongoing

Mitigation Action 15 – Emergency Communication with Other States

Project Description:	Improve communication and coordination with emergency agencies in Scott County, Washington County and Bristol, Virginia.
Local Prioritization:	Low
Primary Hazard :	Multi-Hazard
Issue/Background:	Emergency communication and coordination within the State of Tennessee is adequate, however, there is a gap when it comes to the same in neighboring jurisdictions in Virginia.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Form a working group of emergency personnel in jurisdictions across state lines. • Meet periodically to establish protocols and solve problems.
Lead Agency:	Sullivan County EMA
Partners:	Scott County, Washington County and Bristol, VA
Funding Description:	Sullivan County EMA operating budget
Total Cost	Staff time
Benefits: (Losses Avoided)	Updated, more accurate information about points of contact and coordinated operations of neighboring emergency management agencies.
Completion Date:	Within 1 year

Mitigation Action 16a – Ingress/egress Routes for residential areas in Wildland/Urban Interface (WUI)

Project Description:	Analyze routes in existing developments and add a procedure in land use planning that considers emergency routes for proposed development.
Local Prioritization:	Low
Primary Hazard :	Wildfire
Issue/Background:	Emergency personnel may need to make use of alternate routes when responding to and addressing a wildfire.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Create a map of possible routes available to responding personnel. • Create a wildfire scenario to estimate potential loss of life and injuries, the types of potential damage, and existing vulnerabilities within a community to develop wildfire mitigation priorities.
Lead Agency:	Sullivan County EMA, Planning
Partners:	State and local fire management personnel
Funding Description:	Sullivan County EMA operating budget, City and County operating budgets
Total Cost:	Staff time
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Within 3 to 5 years

Mitigation Action 16b – Water Delivery Analysis

Project Description:	Set guidelines for annexation and service extensions in high-risk areas.
Local Prioritization:	Low
Primary Hazard :	Wildfire
Issue/Background:	Residential areas located in wildfire hazard areas should be analyzed for appropriate fire suppression techniques.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Use GIS mapping of wildfire hazard areas to facilitate analysis and planning decisions for infrastructure. • Set guidelines for annexation and service extensions in high-risk areas.
Lead Agency:	Sullivan County EMA, Planning/Development Services, Utilities
Partners:	Regional Planning Commissions
Funding Description:	Sullivan County EMA operating budget, City and County operating budgets
Total Cost:	Staff time
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Within 3 to 5 years

Mitigation Action 16c – Wildfire Considerations in Land Use Planning

Project Description:	Local governments can mitigate future losses by regulating development in wildfire hazard areas through land use planning.
Local Prioritization:	Low
Primary Hazard :	Wildfire
Issue/Background:	As urban centers and service areas continue to grow, market pressures and lifestyle preferences may eventually result in increased residential development in WUI areas.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Use GIS mapping of wildfire hazard areas to facilitate analysis and planning decisions through comparison with zoning, development, infrastructure, etc. • Use zoning and/or a special wildfire overlay district to designate high-risk areas and specify the conditions for the use and development of specific areas. • Address density and quantity of development, as well emergency access, landscaping and water supply. • Promote conservation of open space or wildland-urban boundary zones to separate developed areas from high-hazard areas. • Set guidelines for annexation and service extensions in high-risk areas.
Lead Agency:	Sullivan County EMA, Planning/Development Services
Partners:	Regional Planning Commissions
Funding Description:	Sullivan County EMA operating budget, City and County operating budgets
Total Cost:	Staff time
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Within 3 to 5 years

Mitigation Action 16d – Recognized Firewise Community

Project Description:	Protect life and property by teaching people how to adapt to living with wildfire and encourage neighbors to work together to take action to prevent losses.
Local Prioritization:	Low
Primary Hazard :	Wildfires
Issue/Background:	Due to its mountainous terrain with forest land cover, Sullivan County communities may experience the impacts of wildfire. The National Fire Protection Association offers a voluntary Firewise recognition program for communities to protect lives and property.
Progress and/or Implementation:	<ul style="list-style-type: none"> • If not already, initiate application for Firewise Recognition. • Utilize Firewise toolkit which includes Firewise principles and Tips for homeowners. • If recognized as a Firewise Community, renew application each year.
Lead Agency:	Sullivan County EMA
Partners:	Town of Bluff City, City of Bristol and City of Kingsport emergency departments.
Funding Description:	Sullivan County EMA operating budget, City and County operating budgets
Total Cost:	Staff time, cost of reproduction/distribution of materials
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Within 1 year (Bristol has already started the process)

Mitigation Action 17 – Landslide Information

Project Description:	Create a map of known landslide incidents and potential landslide areas.
Local Prioritization:	Low
Primary Hazard :	Landslide
Issue/Background:	Many steep slopes are located in Sullivan County. Knowledge of where landslide incidents have occurred or could occur enables more appropriate land use planning decisions.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Create a plan to implement reinforcement measures in high-risk areas. • Define steep slope/high-risk areas in land use and comprehensive plans and creating guidelines or restricting new development in those areas. • Create or increase setback limits on parcels near high-risk areas. • Locate utilities outside of landslide areas to decrease the risk of service disruption. • Restrict or limit industrial activity that would strip slopes of essential top soil. • Incorporate economic development activity restrictions in high-risk areas.
Lead Agency:	Sullivan County EMA, Planning/Development Services
Partners:	Regional Planning Commissions
Funding Description:	Sullivan County EMA operating budget, City and County operating budgets
Total Cost:	Staff time
Benefits: (Losses Avoided)	Life safety, property protection, infrastructure protection
Completion Date:	Within 3 to 5 years

Mitigation Action 18 – Historic Districts

Project Description:	Identify methods to reduce flooding and loss in historic districts.
Local Prioritization:	Low
Primary Hazard :	Flood
Issue/Background:	Historic places and structures are valuable community assets in Sullivan County. Development adjacent to or around these areas may put them at an additional risk for flood. Therefore a plan should be initiated to address their protection.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Identify the assets that are at risk for flood damage • Develop a plan for protecting historical structures
Lead Agency:	Planning/Development Services
Partners:	Regional Planning Commissions
Funding Description:	City and County operating budgets
Total Cost:	Staff time, cost of acquisition, construction of flood management structures, etc.
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Underway within Sullivan County (Blountville) Within 3 to 5 years

Mitigation Action 19 – Community Rating System

Project Description:	Participate in CRS.
Local Prioritization:	Low
Primary Hazard :	Flood
Issue/Background:	CRS rewards communities that exceed the minimum NFIP requirements. Depending upon the level of participation, flood insurance premium rates are discounted for policyholders.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Advise the public about the local flood hazard, flood insurance, and flood protection measures. • Enact and enforce regulations that exceed NFIP minimum standards so that more flood protection is provided for new development. • Implement damage reduction measures for existing buildings such as acquisition, relocation, retrofitting, and maintenance of drainageways and retention basins. • Take action to minimize the effects of flooding on people, property, and building contents through measures including flood warning, emergency response, and evacuation planning.
Lead Agency:	Planning/Development Services
Partners:	Regional Planning Commissions
Funding Description:	City and County operating budgets
Total Cost:	Staff time, cost of acquisition, construction of flood management structures, etc.
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Some jurisdictions are participating. Within 3 to 5 years

Mitigation Action 20 – Infrastructure Assessment

Project Description:	Review and update vulnerability assessments at water treatment facilities.
Local Prioritization:	Low
Primary Hazard :	Multi-Hazard
Issue/Background:	As knowledge about the hazards continues to grow, the ability to create vulnerability assessments and mitigation actions is improved. Utility providers should revisit previous assessments with new perspectives and tools to ensure vulnerabilities are adequately identified and mitigation actions are planned accordingly.
Progress and/or Implementation:	<p>Analysis may be performed in the following areas:</p> <ul style="list-style-type: none"> • Stormwater pumping stations installation/upgrade. • Electrical components of sewage lift stations raised above base flood elevation. • Manhole openings raised using concrete pillars. • Watertight covers or inflow guards installed on sewer manholes. • Flood telemetry systems installed in sewage lift stations. • Back-up generators installed for pumping and lift stations in sanitary sewer systems along with other measures (e.g., alarms, meters, remote controls, and switchgear upgrades). • Earthen dikes constructed around flood-threatened critical facilities. • Bioengineered bank stabilization techniques employed.
Lead Agency:	Engineering Public Works
Partners:	Utilities
Funding Description:	City and County operating budgets
Total Cost:	Staff time, cost of acquisition, construction of flood management structures, etc.
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Within 3 to 5 years

Mitigation Action 21 – Dam Inundation

Project Description:	Modify zoning in Dam Inundation Zones.
Local Prioritization:	Low
Primary Hazard :	Dam Failure
Issue/Background:	Data obtained from the Tennessee Valley Authority included inundation mapping. Updating zoning in these areas may improve land use planning efforts; response/evacuation efforts; and can prevent future damage to property.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Incorporate TVA information into zoning efforts. • Collect information on other inundation areas for public and private dams. • Require future development to adhere to zoning requirements for these areas.
Lead Agency:	Planning/Development Services
Partners:	Tennessee Valley Authority (TVA); Regional Planning Commissions
Funding Description:	City and County operating budgets
Total Cost:	Staff time, cost of acquisition, construction of flood management structures, etc.
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Some jurisdictions are participating. Within 3 to 5 years

Mitigation Action 22 – Disaster Response Training for Large Events

Project Description:	Conduct training for Bristol Motor Speedway staff and other staff who operate large events where there potential impacts from terrorist attacks.
Local Prioritization:	Medium
Primary Hazard :	Terrorism
Issue/Background:	Man-made hazards are becoming more frequent nationally. Unfortunately, large events can be targets for such acts. Bristol, Tennessee, Bristol, Virginia and Kingsport host several events annually that draw tens of thousands of people.
Progress and/or Implementation:	<ul style="list-style-type: none"> • Meet with events coordinators to determine needs for coordination and communication in the event of a terrorism incident. • Establish training mechanism and protocols for events staff.
Lead Agency:	Sullivan County EMA
Partners:	Bristol Motor Speedway, Bristol Rhythm and Roots Reunion, FunFest, etc.
Funding Description:	Sullivan County EMA operating budget, City and County operating budgets
Total Cost:	Staff time
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Within 1 year

Mitigation Action 23 – Underground Utilities

Project Description:	Require underground utilities in new subdivision developments.
Local Prioritization:	Low
Primary Hazard :	Severe Weather
Issue/Background:	
Progress and/or Implementation:	<ul style="list-style-type: none"> • Assess the community's need and desire for this requirement. • Confer with utilities to discuss a plan for implementing a requirement or an incentive program.
Lead Agency:	Sullivan County EMA, Planning/Development Services
Partners:	Regional Planning Commissions
Funding Description:	Sullivan County EMA operating budget, City and County operating budgets
Total Cost:	Staff time
Benefits: (Losses Avoided)	Life safety, property protection
Completion Date:	Within 3 to 5 years

Mitigation Action 24 – HMPC Annual Meeting

Project Description:	Coordinate annual meetings of the Sullivan County Hazard Mitigation Planning Committee to monitor, evaluate, and update the multi-hazard mitigation plan
Local Prioritization:	Medium
Primary Hazard :	Multi-Hazard
Issue/Background:	Holding annual meetings to evaluate the plan’s progress and effectiveness will help to keep the plan action-oriented and will assist in a smoother five-year update process. This action will also implement the process for monitoring, evaluating, and updating the plan described in Chapter 5 Plan Implementation and Maintenance.
Progress and/or Implementation:	The Sullivan County Emergency Manager will coordinate these meetings. The first annual meeting will be held in September 2014 to evaluate progress and, if necessary, update the hazard mitigation plan. The meeting will be held at the Sullivan County Emergency Operations Center. Meeting agendas will incorporate the process described in Chapter 5 Plan Implementation and Maintenance.
Lead Agency:	Sullivan County Emergency Management Agency
Partners:	All agencies involved in initial planning efforts and the Hazard Mitigation Planning Committee
Funding Description:	Sullivan County EMA existing operating budget
Total Cost:	Minimal
Benefits: (Losses Avoided)	Keep plan current and accurate Improve communication
Completion Date:	Annually, first meeting September 2014

5 PLAN MAINTENANCE PROCESS

This chapter provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

5.1 Monitoring, Evaluating, and Updating the Plan

44 CFR Requirement 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.

5.1.1 Hazard Mitigation Planning Committee

With adoption of this plan, the HMPC will be tasked with monitoring, evaluation, and maintenance of the plan. The participating jurisdictions and agencies, led by the Sullivan County Emergency Management Agency, agree to:

- Meet annually and after a disaster event to monitor and evaluate the implementation of the plan;
- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high priority, low- or no-cost recommended actions;
- Maintain vigilant monitoring of multi-objective, cost-share, and other funding opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Report on plan progress and recommended changes to the governing bodies of participating jurisdictions; and
- Inform and solicit input from the public.

The HMPC is an advisory body and will not have any powers over County, City, or Town staff. Its primary duty is to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the City, Town, and County websites.

5.1.2 Plan Maintenance Schedule

The HMPC agrees to meet annually and after a hazard event to monitor progress and update the mitigation strategy. The Sullivan County emergency manager is responsible for initiating these plan reviews. In conjunction with the other participating jurisdictions, a five-year written update of the plan will be submitted to the TEMA and FEMA Region IV per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule.

5.1.3 Plan Maintenance Process

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

- Decreased 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).

Updates to this plan will:

- Consider changes in vulnerability due to action implementation,
- Document success stories where mitigation efforts have proven effective,
- Document areas where mitigation actions were not effective,
- Document any new hazards that may arise or were previously overlooked,
- Incorporate new data or studies on hazards and risks,
- Incorporate new capabilities or changes in capabilities,
- Incorporate growth and development-related changes to inventories, and
- Incorporate new action recommendations or changes in action prioritization.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the participating jurisdictions will follow the following process:

- A representative from the responsible office identified in each mitigation action will be responsible for tracking and reporting on an annual basis to the jurisdictional lead on action status and provide input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.
- If the action does not meet identified objectives, the jurisdictional lead will determine what additional measures may be implemented, and an assigned individual will be responsible for defining action scope, implementing the action, monitoring success of the action, and making any required modifications to the plan.

Changes will be made to the plan to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame,

community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be by written changes and submissions, as the Sullivan County Emergency Management Agency deems appropriate and necessary, and as approved by the governing boards of the participating jurisdictions.

5.2 Incorporation into Existing Planning Mechanisms

44 CFR Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. Based on the capability assessments of the participating jurisdictions, communities in Sullivan County continue to plan and implement programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through the following plans:

- General or master plans of participating jurisdictions
- Ordinances of participating jurisdictions
- Sullivan County Emergency Operations Plan
- Capital improvement plans and budgets
- Other community plans within the County, such as water conservation plans, stormwater management plans, and parks and recreation plans
- Other plans and policies outlined in the capability assessments in the jurisdictional annexes

HMPC members involved in updating these existing planning mechanisms will be responsible for integrating the findings and actions of the mitigation plan, as appropriate. The HMPC is also responsible for monitoring this integration and incorporating the appropriate information into the five-year update of the multi-hazard mitigation plan.

5.3 Continued Public Involvement

44 CFR Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

The update process provides an opportunity to publicize success stories from the plan's implementation and seek additional public comment. Information will be posted in the *Kingsport Times-News* and the *Bristol Herald Courier* and on the City and County websites following the annual review of the mitigation plan. A public hearing(s) to receive public comment on plan maintenance and updating will be held during the update period. When the HMPC reconvenes

for the update, they will coordinate with all stakeholders participating in the planning process, including those who joined the HMPC after the initial effort, to update and revise the plan. Public notice will be posted and public participation will be invited, at a minimum, through available website postings and press releases to the local media outlets, primarily newspapers.

APPENDIX A

ADOPTION RESOLUTION

To be inserted upon approval by TEMA and FEMA Region IV

APPENDIX B

PLANNING PROCESS

DOCUMENTATION

Hazard Mitigation Planning Committee

- February 28, 2013 – Kickoff Meeting Minutes
- May 13, 2013 – Risk Assessment Meeting Minutes
- June 18, 2013 – Mitigation Strategy Meeting Minutes
- April 23, 2014 – Final HMPC Review comments on Draft Document

Public Involvement

- Public Information Flyer
- Sullivan County Emergency Management Website
 - Screen Capture of HMP on Website
- Sullivan County EMA Facebook Page
- Public Meeting Announcement in Local Newspaper
- June 18, 2013 – Public Meeting Presentation

**Sullivan County Multi-Jurisdictional Local Multi-Hazard Mitigation Plan Kickoff Meeting
February 28, 2013
Sullivan County EMA Office**

Participants:

Jake White, City of Kingsport
Trina Wright, Sullivan County EMA
Judy Dulaney, City of Bluff City
Greg Depew, City of Bluff City
Bill Sorah, City of Bristol
Jim Bean, Sullivan County EMA
Steve Perry, Sullivan County EMA
Tom Zimmerman, AMEC E&I
Sarah Ketron, AMEC E&I

Meeting began at 9:00 am

- Introduction by Jim Bean
 - Review of purpose of meeting
 - Introduction of Sarah Ketron and AMEC

- Presentation by Sarah Ketron
 - Update of changes to mitigation plans since 2005
 - City of Bristol mitigation plan needs to be integrated into updated mitigation plan
 - Safety moment
 - Presentation
 - Introduction to Hazard Mitigation
 - Requirements of Local Hazard Mitigation Plan
 - Review of 10 Planning Steps
 - Changes from 2005 plan to 2013 update
 - Hazard Mitigation Planning Committee and Participation Requirements (data collection)
 - Public Involvement
 - Timeline of Planning Process
 - Update to Hazard Profile and Risk Assessment
 - Data Collection Needs (mapping)
 - Information strategy
 - Next Steps

- Question from Bill Sorah
 - Why is it necessary for all municipalities to adopt the mitigation plan? Will Sullivan County's mitigation plan not serve as an umbrella plan for all municipalities?
 - Answer from Sarah Ketron and Jim Bean
 - All communities must agree to participate in the plan through each respective councils. This demonstrates the necessary commitment to qualify for federal and state disaster assistance.

- Handouts of individual required tasks given to each participant
- Date set for next meeting for the week of May 6th, 2013

- Jim Bean reminded participants to track the time spent on mitigation planning for purposes of matching grants accounting

Meeting concluded at approximately 9:40 am

Notes compiled by Tom Zimmerman

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Event Details:

Organizer: Jim Bean (will also be attending)
Subject/Purpose: Hazard Mitigation Kick-Off Meeting
Format: face-to-face
Confirmed Start Date/Time: **Thursday February 28, 2013 9:00 AM Eastern Time**
Timezone: Eastern Time
Duration: approximately 2 hours
Location: Sullivan County EMA Office
3193 Highway 126 Upstairs
Reminder: No automated reminder was requested.

Message from Organizer:

This is best date we could agree for the most part. If unable to attend it is not a big problem. We are just getting together to put together a game plan for moving forward.
Jim

-- previous message -- All,
We have received the grant from TEMA and contracts have been signed by Mayor Godsey. We need to set up a kickoff meeting of the core group with AMEC soon to begin the process. Trying to have this meeting before everything gets busy for race weekend. Please look over the potential dates and choose which would be best for all and will finalize ASAP.
Jim

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Sullivan County Multi-Jurisdictional Multi-Hazard Mitigation Plan Kickoff Meeting February 28, 2013

Sarah Ketron
AMEC Environment &
Infrastructure
Johnson City, TN

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Multi-Hazard Mitigation Plan

Agenda

1. Introduction to Hazard Mitigation
2. Requirements of Local Hazard Mitigation Planning
 - ✓ Review of 10 Planning Steps
 - ✓ Changes from 2005 plan to 2013 update
 - ✓ Hazard Mitigation Planning Committee and Participation Requirements (data collection)
 - ✓ Public Involvement
3. Timeline of Planning Process
4. Update to Hazard Profile and Risk Assessment
 - ✓ Data Collection Needs (mapping)
 - ✓ Information strategy
5. Next Steps

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Multi-Hazard Mitigation Plan

What Is Mitigation?

- Sustained action taken to reduce or eliminate long-term risk to human life and property from natural hazards.

What is Mitigation Planning?

A process for communities to:

- Identify the natural hazards to which they are at risk,
- Assess the potential impacts of those hazards,
- Develop goals, objectives, and actions to reduce impacts, and
- Prioritize and implement mitigation actions.

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Multi-Hazard Mitigation Plan

Why Mitigation Planning?

- Increasing Cost of Disaster Response and Recovery
- Population Growth and Development
 - More People, Buildings, Infrastructure in Hazardous Areas
 - 1990 – 143, 596 2000 – 153,048 2009 – 156,823
- More Disaster Declarations
 - Average 34 Declarations/Year

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Multi-Hazard Mitigation Plan

Why Mitigation Planning?

- Cost of “Doing Nothing” Too Much
- Many Events are Predictable and Repetitive
- Loss Reduction Activities
 - Cost Effective
 - Environmentally Sound
 - Funds Available
- Legal and Moral Responsibilities

Multi-Hazard Mitigation Plan

Disaster Mitigation Act of 2000

- Public Law 106-390; Amendment to the Stafford Act
- Requires local governments to adopt a natural hazard mitigation plan to maintain eligibility for FEMA mitigation funds:
 - ✓ Hazard Mitigation Grant Program
 - ✓ Pre-Disaster Mitigation Program
 - ✓ Flood Mitigation Assistance Program
 - ✓ Severe Repetitive Loss Program
 - ✓ And expect more in the future ...

Multi-Hazard Mitigation Plan

Local Hazard Mitigation Plan Requirements

<p>ORGANIZE RESOURCES</p> <ol style="list-style-type: none"> 1. Get Organized <small>(includes coordination of local and national emergency plans)</small> 2. Plan for Public Involvement 3. Coordinate with Other Departments and Agencies <p>ASSESS HAZARDS AND RISK</p> <ol style="list-style-type: none"> 4. Identify Hazards 5. Assess the Risks (○) 	<p>DEVELOP MITIGATION PLAN</p> <ol style="list-style-type: none"> 6. Set Planning Goals 7. Review Possible Activities (*) 8. Draft an Action Plan 9. Adopt the Plan (*) <p>EVALUATE YOUR WORK</p> <ol style="list-style-type: none"> 10. Implement the Plan, Evaluate Work, Revise as Needed
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Multi-Hazard Mitigation Plan

1. Get Organized

- Obtain communities’ commitment to mitigation
- Establish mitigation planning committee
- Determine and assign staff

Multi-Hazard Mitigation Plan

Hazard Mitigation Planning Committee

- Emergency Manager
- Community Development/Planning
- Public Works
- Building Department
- Assessor's Office
- GIS
- Utilities
- Parks and Recreation
- Public Information
- Fire and Police

```

graph TD
    EM[Emergency Manager] --- P[Planning]
    EM --- PW[Public Works]
    EM --- TA[Tax Assessor]
    P --- GIS[GIS]
    P --- BD[Building Dept]
    P --- PIO[PIO]
  
```

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Multi-Hazard Mitigation Plan

HMPC Responsibilities

- Attend meetings
- Provide available data in timely manner
- Advertise, coordinate, and participate in public involvement process
- Develop mitigation projects (actions)
- Distribute, review, and comment on draft plan
- Distribute final document
- Coordinate formal adoption of the plan

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Multi-Hazard Mitigation Plan

2. Plan for Public Involvement

- Post Data on Web-Sites
- Develop Press Releases
- Host Public Input Meetings

AMEC has developed flyers for each of the four phases-to keep the public up to date and understand the potential for involvement.

```

graph TD
    EM[Emergency Manager] --- Public[Public]
    EM --- P[Planning]
    P --- GIS[GIS]
    P --- BD[Building Dept]
    P --- PIO[PIO]
  
```

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Multi-Hazard Mitigation Plan

3. Coordinate with Other Departments and Agencies

- Invite to HMPC Meetings
- Request hazard data
- Send Draft Report for Review

```

graph TD
    EM[Emergency Manager] --- OA[Other Agencies]
    EM --- P[Planning]
    P --- GIS[GIS]
    P --- BD[Building Dept]
    P --- PIO[PIO]
  
```

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Multi-Hazard Mitigation Plan

Local Hazard Mitigation Plan Requirements

- **Steps 4 and 5. Assess Hazards and Risk**
 - Describes natural hazards that can affect jurisdiction, including past occurrences and probable future hazard events
 - Assesses existing and future buildings, infrastructure, and critical facilities at risk
 - Estimates potential \$ losses
 - Analyzes land use and development trends
 - Must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.



Multi-Hazard Mitigation Plan

Local Hazard Mitigation Plan Requirements

- **Steps 6 – 9. Develop Mitigation Plan**
 - Sets local goals and objectives
 - Identifies actions to reduce vulnerability with emphasis on new and existing buildings and infrastructure
 - Describes how the proposed actions will be evaluated, prioritized, and implemented
 - Participation in the NFIP and continued compliance with the NFIP.
 - Adoption timeline for all jurisdictions.



Multi-Hazard Mitigation Plan

Local Hazard Mitigation Plan Requirements

- **Step 10. Evaluate Your Work**
 - Establishes method and schedule of monitoring, evaluating, and updating the plan within 5-year cycle
 - Identifies process to incorporate plan into other plans and programs
 - Describes method to maintain public involvement



Multi-Hazard Mitigation Plan

Timeline for Planning Process

- **February 28th** **Kick-Off Meeting**
- **May (set date today)** **2nd Committee Meeting**
Review updated HIRA
Mitigation Goals/Actions
- **July** **3rd Committee Meeting**
- **August** **Committee and Public**
Review Draft Plan
- **September** **Submit to TEMA**



Multi-Hazard Mitigation Plan

Review of Hazards in Current Plan

- Drought/Wildfire
- Earthquake
- Extreme Temperatures
- Flood
 - Dam/Levee Failure
- Infestations
- Manmade Hazards
 - Comprehensive Emergency Mgmt Plan
- Mine Subsidence
- Thunderstorms/High Winds
- Tornadoes
- Winter Storms



Multi-Hazard Mitigation Plan

Worksheet #2 Update Mitigation Actions

- Action
- Responsible Party
- Date Completed
- Comments

We need to get date completed and comments.

If not completed, it is okay, but we'll need to state why, i.e. lack of funding, etc.



Multi-Hazard Mitigation Plan

Next Steps

- ✓ Complete Data Collection Sheets
- ✓ Next Meeting – April
- ✓ Contact ANYTIME with questions or concerns

cindy.popplewell@amec.com
 (615) 333-0630 ext. 122
 (615) 944-9013





Memo

To **Sullivan County
Hazard Mitigation Planning Committee**
From **Sarah Ketron**
Tel / Email **(423) 220-7480 / sarah.ketron@amec.com**
Date **May 20, 2013**

Subject Minutes from Local Hazard Mitigation Plan - Risk Assessment Meeting

This memo presents the meeting minutes from the May 13, 2013, risk assessment meeting for the Sullivan County, TN, Local Hazard Mitigation Plan. The meeting provided a review of the benefits of hazard mitigation planning; a review of the planning process and progress to date; presentation of the hazard identification and risk assessment; a review of the goals and objectives; an update on the project timeline; public participation opportunities; and the next steps. The powerpoint presentation for the meeting is included as Attachment A to this memo.

Attendees

Steve Perry, Sullivan County Emergency Management Agency, sperry@sullivancountyema.com
Judy Dulaney, City of Bluff City, bluffcitycityof@aol.com
Greg Depew, City of Bluff City, gregdepewbcpd@gmail.com
Jim Bean, Sullivan County Emergency Management Agency, jbean@sullivancountyema.com
Ambre Torbett, Sullivan County Planning, planning@sullivancountytn.gov
Tina Wright, Sullivan County Emergency Management Agency, twright@sullivancountyema.com
Bill Sorah, City of Bristol, bsorah@bristoltn.org
Sarah Ketron, AMEC Environment & Infrastructure, Inc., sarah.ketron@amec.com
Cindy Popplewell, AMEC Environment & Infrastructure, Inc., cindy.popplewell@amec.com

The sign-in sheet for the meeting is included as Attachment B to this memo.

Overview of Natural Hazard Mitigation Planning

Cindy Popplewell reviewed the benefits of hazard mitigation planning and the planning process, which is designed to meet the requirements of the Disaster Mitigation Act and the Federal Emergency Management Agency’s associated guidance. The table below outlines the 10-step planning process. This HMPC meeting focused on planning steps 3 and 4.

Table 1. 10-Step Mitigation Planning Process

10-Step Planning Process
1. Organize Resources
2. Plan for Public Involvement
3. Develop Risk Assessment
4. Identify Goals and Objectives
5. Identify Mitigation Actions
6. Establish Plan Maintenance Process
7. Draft the Plan
8. Review and Revise Plan
9. Submit the Plan
10. Adopt the Plan

Develop Risk Assessment - Hazard Identification

Hazard profiles were developed and presented for those natural hazards that can affect the County. Each profile described the hazard and its potential impacts, its location in the planning area, previous occurrences, and its probability of future occurrences. Profiles also explore vulnerability and potential losses. The magnitude of the impact of a hazard event is related directly to the vulnerability of the people, property, and the environment it affects. Table 2, on the following page, identifies the hazards and *draft* planning significance for Sullivan County.

Comments received during the presentation of the hazard profiles include:

- Dam Failure – Sullivan County will get private dam information which can be added to the LHMP. TVA provides inundation zones to Sullivan County EMA in hard copy, digital format is preferred to overlay population and buildings to assess vulnerability. A potential mitigation action is to modify zoning in these areas.
- Flood – The DFIRM scale may need to be adjusted to capture smaller flood zones. Once the percentage of area is captured appropriately, may change location from “significant” to another rating.
- Land Subsidence – Sullivan County EMA receives increased calls related to sinkholes, but there is little or no reportable damage. AMEC has digitized a land subsidence map that can be overlaid to determine vulnerability. Planning commented that this will become an increased problem as the good land becomes more scarce and development occurs in known sinkhole areas. A possible mitigation action is to address zoning in these areas. Filling of sinkholes for residential and commercial areas (not agriculture) is regulated by TDEC.
- Severe Thunderstorms – This hazard is the most likely to occur. A possible mitigation

action is to require underground utilities in certain areas.

- Severe Winter Storms – Bristol noted some historic events may be missing. Sullivan County EMA noted that if storms are experienced statewide, rain/thunderstorm in the middle and west parts of the state may be ice here.
- Tornadoes – Most mobile home parks pre-date codes, no safe rooms.
- Wildfire – Sullivan County EMA indicated TFIRS is used to collect reported information from all fires. Classification of fires varies, e.g. wildfire vs. brush fire, etc.
- Hazardous Materials Incidents – Sullivan County EMA receives paper and electronic files from Tier II facilities. Electronic submittal ePlan will be required in the future. Highway spills are most common response reported. Railways often have cut hydraulic lines, they clean it up and report it. Probability should be changed to “highly likely”.
- Terrorism – Bristol noted that all water treatment and waste water treatment facilities should be noted. The magnitude should be changed to “catastrophic”, which will raise the overall planning significance to “medium”.

Table 2. Hazard Profile Information and *Draft* Planning Significance

	Geographic Location	Probability	Magnitude	Planning Significance
Dam Failure	Significant	2 Unlikely	1 Critical	3 6 Low
Drought	Significant	2 Occasional	2 Negligible	1 5 Low
Earthquake	Extensive	3 Occasional	2 Negligible	1 6 Low
Extreme Temps	Extensive	3 Highly Likely	4 Negligible	1 8 Medium
Flood	Significant	2 Likely	3 Critical	3 8 Medium
Land Subsidence	Significant	2 Occasional	2 Limited	2 6 Low
Landslide	Significant	2 Likely	3 Limited	2 7 Medium
Severe Thunderstorm	Extensive	3 Highly Likely	4 Limited	2 9 High
Severe Winter Storms	Extensive	3 Highly Likely	4 Critical	3 10 High
Tornado	Extensive	3 Occasional	2 Critical	3 8 Medium
Wildfire	Significant	2 Occasional	2 Critical	3 7 Medium
Hazardous Materials Incidents	Significant	2 Likely	3 Critical	3 8 Medium
Terrorism Events	Limited	1 Unlikely	1 Critical	3 5 Low

Develop Risk Assessment – Vulnerability Assessment

For each hazard identified, a vulnerability assessment will be conducted. The vulnerability assessment will inventory critical facilities and structures located within the hazard area, determine the value of structures and number of people in the hazard area, identify vulnerable infrastructure, and estimate potential losses due to the hazard events. The vulnerability assessment will also identify development trends and constraints. The method for completing the vulnerability assessment for each hazard is provided in the table below.

Vulnerability and Loss Estimation Method	
Dam Failure	<ul style="list-style-type: none"> • GIS-based risk modeling • Inundation mapping and/or 5-mile radius (removing upstream portion) • Population and buildings within identified area
Earthquake	<ul style="list-style-type: none"> • HAZUS-MH Loss Estimation • Newer version of HAZUS since original plan, but still uses 2000 Census Data
Flood	<ul style="list-style-type: none"> • HAZUS-MH Loss Estimation • Newer version of HAZUS since original plan, but updated FIRM Mapping
Land Subsidence	<ul style="list-style-type: none"> • GIS-based risk modeling • Sinkhole Mapping – Med/High Areas • Population and buildings within identified area
Landslide	<ul style="list-style-type: none"> • GIS-based risk modeling • Landslide Susceptibility Mapping – High Areas • Population and buildings within identified area
Wildfire	<ul style="list-style-type: none"> • GIS-based risk modeling • WUI – Interface and Intermix Areas • Population and buildings within identified area
Hazardous Materials Incidents	<ul style="list-style-type: none"> • GIS-based risk modeling • Tier-II facilities; Interstates and Railways – boundary area • Population and buildings within identified area
Terrorism Events	<ul style="list-style-type: none"> • Hypothetical Scenario Based Estimates • Analysis of vulnerable populations is aided by a program developed by Johns Hopkins University in 2006 called Electronic Mass Casualty Assessment and Planning Scenarios (EMCAPS) which utilizes scenarios developed by the Department of Homeland Security.

During the HMPC Meeting the critical facilities were reviewed. An updated list of critical facilities is included as Attachment C to this memo.

Goals and Objectives

The goals of the existing Local Hazard Mitigation Plan for Sullivan County were reviewed with the HMPC and incorporate the goals of state plan and the two previously separate plans (Sullivan County and Bristol) for the combined LHMP update. The updated goals and objectives are as follows:

GOAL #1: Reduce the vulnerability of the people, property, and environment of Sullivan County to natural and man-made hazards.

- Objective 1.1: Protect community lifelines (existing and future) from identified natural and man-made hazards.
- Objective 1.2: Better manage flood hazard areas.
- Objective 1.3: Better manage fire hazard areas.
- Objective 1.4: Protect community historic preservation resources from identified natural and man-made hazards.

GOAL #2: Improve and maintain coordination and communication between all jurisdictions.

GOAL #3: Educate the public on identified natural and man-made hazards.

GOAL #4: Improve public hazard communication methods.

GOAL #5: Improve Hazard Mitigation Planning for Bristol Motor Speedway (BMS) facility events.

Planning for Public Involvement

The HMPC members were provided with a digital public information flyer for distribution and publication on community websites. This document is included as Attachment D to this memo.

Additionally, a public workshop is scheduled to be held on June 18th at the Sullivan County Planning Commission Meeting at 6pm. The public workshop will be advertised by the HMPC.

Timeline

The following timeline was identified for the planning process:

- Kickoff Meeting – February 28th
- 2nd Committee Meeting – May 13th
 - Review of updated Hazard Identification and Risk Assessment
- 3rd Committee Meeting – June 18th
 - Mitigation Actions
- Public Workshop – June 18th

Next Steps

The following next steps and tasks were outlined at the close of the HPMC meeting:

- HPMC members are tasked with distributing the public information flyer.
- AMEC to address comments and distribute to the HPMC the Risk Assessment Chapter of the LHMP Draft Report – May 31st deadline
- HPMC members are tasked to review and comment on the Draft Report and return comments to AMEC by June 18th.
- HPMC members are tasked to review the mitigation action items of the existing LHMP and provide update status at next meeting on June 18th. The mitigation action items are provided as Attachment E to this memo.

The next meeting of the Hazard Mitigation Planning Committee is scheduled for **June 18 at 9:00 am** and will involve the review and development of mitigation action items.

ATTACHMENT A

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Sullivan County Local Multi-Hazard Mitigation Plan Risk Assessment Meeting May 13, 2011

Cindy Popplewell and Sarah Ketron
AMEC Hazard Mitigation &
Emergency Management Program
Nashville, TN / Johnson City, TN



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Agenda

- Review benefits of hazard mitigation planning
- Review of planning process and progress
- Hazard Identification and Risk Assessment (HIRA)
- Capability Assessment and discussion
- Review of Goals and Objectives
- Timeline – and Public Participation
- Next steps

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Benefits of the Hazard Mitigation Plan

- Eligibility for federal disaster assistance (mitigation funding)
 - ✓ May 1, 2011 – Severe Storms, Tornadoes, Straight-line Winds, and Flooding
- Reduced losses
- Reduced local, state, and federal expenditures

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Mitigation Planning Process

Phase I	<ol style="list-style-type: none"> 1. Organize Resources 2. Plan for Public Involvement 3. Coordinate with Other Departments and Agencies
Phase 2	<ol style="list-style-type: none"> 4. Identify the Hazards 5. Estimate Losses
<hr/>	
Phase 3	<ol style="list-style-type: none"> 6. Identify Goals 7. Develop Potential Mitigation Actions 8. Draft the Mitigation Plan
Phase 4	<ol style="list-style-type: none"> 9. Adopt the Plan 10. Implement and Maintain the Plan

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Participating Jurisdictions

- Meeting Participation—Designate a representative to serve on the Hazard Mitigation Planning Committee, which will meet three times during the planning process,
- Data Assistance—Provide data and comment on plan drafts
- Mitigation Actions— Assist in the development of a risk assessment and mitigation actions (at least one) specific to the jurisdiction,
- Disseminate Information—Inform the public, local officials, and other interested parties about the planning process and provide opportunity for them to comment on the plan, and
- Formally Adopt the Mitigation Plan



Hazard Identification and Risk Assessment

- Hazard Identification
- Hazard Profiles
 - ✓ Description
 - ✓ Geographic Location
 - ✓ Previous Occurrences
 - ✓ Probability of Future Occurrences
 - ✓ Magnitude/Severity
- Vulnerability Assessment
 - ✓ Inventory Assets
 - ✓ Estimate Losses



Hazard Identification

2006 Sullivan County Hazard Mitigation Plan	2006 City of Bristol Hazard Mitigation Plan	State of Tennessee Hazard Mitigation Plan
Dam Failure	Dam Failure	Not an individual hazard
Drought	Drought	Drought
Earthquake	Earthquake	Earthquake
	Extreme Temperature	Extreme Heat
Flood	Flood	Flood
		Hailstorm
Land Subsidence/Sinkhole	Land Subsidence/Sinkhole	Geologic Hazard
Landslide	Landslide	
Severe Thunderstorm (hail, lightning, and wind)	Severe Thunderstorm (hail, lightning, and wind)	Severe Storm
Severe Winter Storms	Severe Winter Storms	Included as Severe Storm
Tornado	Tornado	Tornado
Wildfire	Wildfire	Wildfire
Hazardous Materials Incidents	Hazardous Materials Incidents	Windstorm
Terrorism Event	Terrorism Event	



Hazard Profiles

- Hazard/problem description
- Geographic Location
 - ✓ Extensive – 50 to 100% of planning area
 - ✓ Significant – 10 to 50% of planning area
 - ✓ Limited – less than 10% of planning area
- Past occurrences
- Probability of future occurrence
 - ✓ Highly Likely – near 100% chance of occurrence
 - ✓ Likely – 10 to 100% chance of occurrence
 - ✓ Occasional – 1 to 10% chance of occurrence
 - ✓ Unlikely – less than 1% chance of occurrence
- Magnitude/Severity
 - ✓ Catastrophic
 - ✓ Critical
 - ✓ Limited
 - ✓ Negligible
- Planning Significance
 - ✓ Low
 - ✓ Moderate
 - ✓ High

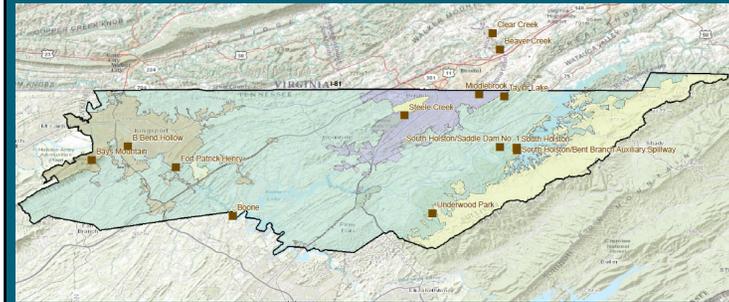


Hazard Summary

	Geographic Location	Probability	Magnitude	Planning Significance
Dam Failure				
Drought				
Earthquake				
Extreme Temps				
Flood				
Land Subsidence				
Landslide				
Severe Thunderstorm				
Severe Winter Storms				
Tornado				
Wildfire				
Hazardous Materials Incidents				
Terrorism Events				



Dam Failure



Dam Failure

Dam Name	Hazard Class	Last Inspection	Height (Ft.)	Storage (Acre Feet)	River	Owner	EAP
Sullivan County							
Bays Mountain	High	5/05/2012	35	550	Dolan Branch	City of Kingsport	Y
Underwood Park	Significant	3/19/2009	24.8	51	Cane Lick Branch	Private	NR
Bluff City							
South Holston	High	7/31/2009	285	890,367	South Fork Holston River	TVA	Y
South Holston/Bent Creek Auxiliary Spillway	High	7/31/2009	9	N/A	South Fork Holston River	TVA	Y
South Holston/Saddle Dam No. 1	High	7/31/2009	40	N/A	South Fork Holston River	TVA	Y
City of Bristol							
Clear Creek	High	11/19/2008	51	4660	Clear Creek	TVA	Y
Beaver Creek	High	11/19/2008	85	6920	Beaver Creek	TVA	Y
Middlebrook	Significant	5/15/2012	17	222	Sinking Creek	Middlebrook H.O.A.	NR
Steele Creek	High	11/21/2011	50	1989	Steele Creek	City of Bristol	Y
Taylor Lake	Significant				Niceley Branch		
City of Kingsport							
Boone	High	12/08/2009	160	216,147	South Fork Holston River	TVA	Y
Fort Patrick Henry	High	12/8/2009	95	31,728	South Fork Holston River	TVA	Y
Bend Hollow	High	11/16/2011	131	1090		Eastman Chemical Company	Y



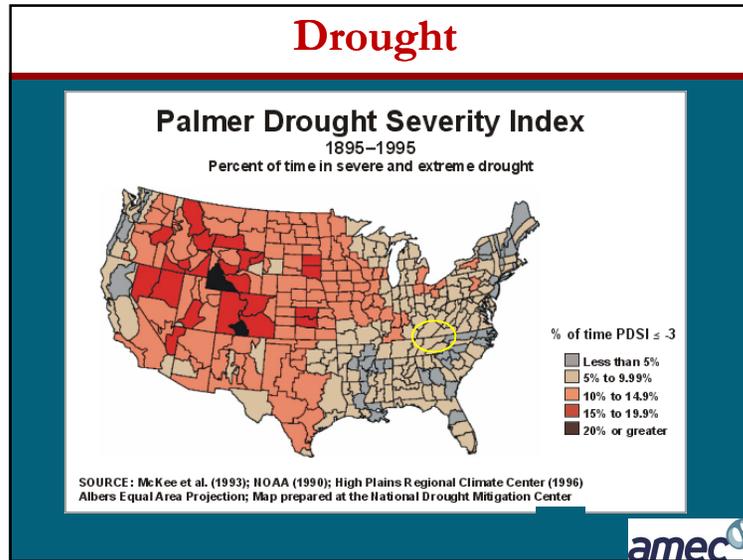
Dam Failure

- High Hazard Dams – 10
- Significant/Low Hazard Dams -3
- Existing capabilities: Emergency action plans
- Do jurisdictions have dam breach inundation zoning ordinances to restrict development in inundation areas?

- ✓ Location: Significant (10 to 50% of planning area)
- ✓ Previous Occurrences: 1977 Middlebrook Dam failed
- ✓ Probability: Unlikely
- ✓ Magnitude/Severity: Critical



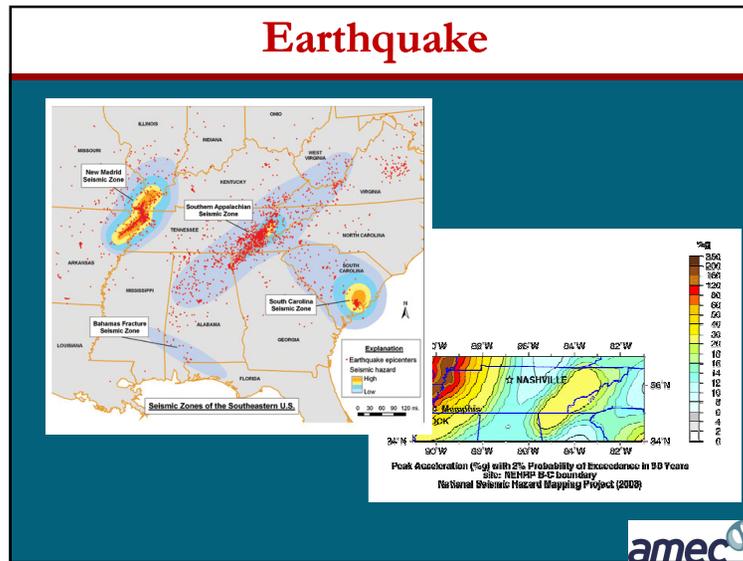
Drought



Drought

- Drier-than-Normal conditions that result in water-related problems
 - 82,104 acres (30%) used for agricultural purpose
 - Depletion of water supply, increased demand
 - Existing capabilities: Water conservation; ban on open burning
- ✓ Location: Significant (10-50% of planning area)
 - ✓ Previous Occurrences: Average Annual paid claims for crop insurance – (2003-200??)
 - ✓ Probability: Occasional – 1 to 10% chance of occurrence
 - ✓ Magnitude/Severity: Negligible
- amec logo

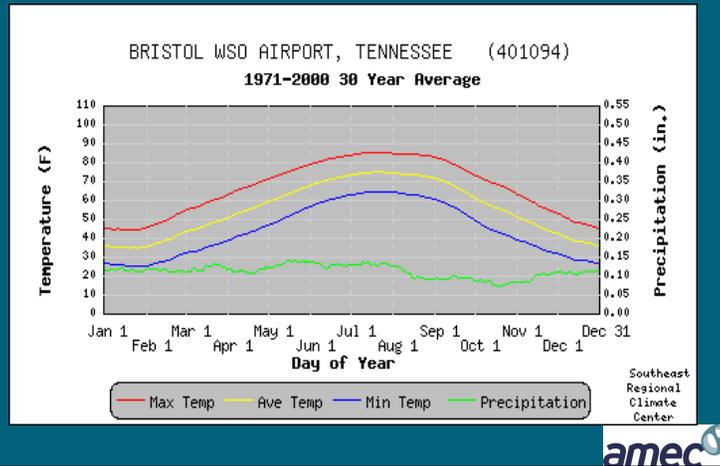
Earthquake



Earthquake

- East Tennessee Seismic Zone within the Southern Appalachian Seismic Zone
 - Only one or two earthquakes with magnitudes equal to or greater than 3.0 are expected in the SASZ per year.
 - Existing capabilities: Building codes
- ✓ Location: Extensive
 - ✓ Previous Occurrences: USGS National Earthquake Information Center's PDE catalog - 29 events (magnitude 2.2-4.7)
 - ✓ Probability: Occasional – 1 – 10% chance
 - ✓ Magnitude/Severity: Negligible
- amec logo

Extreme Temperatures



Extreme Temperatures

- Summer Average High - 85°
- Winter Average Low - 28°
- Persons over 65 and under 5 yrs are especially vulnerable.
- Persons below poverty level may not be able to afford air condition/adequate heat
- Existing Capabilities: Red Cross shelters

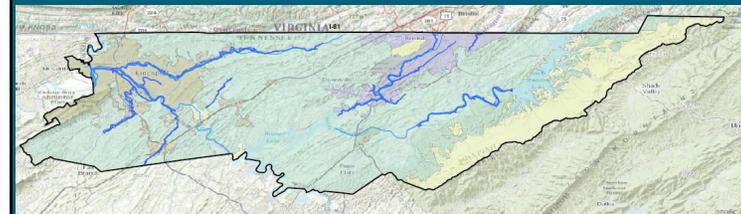
- ✓ Location: Extensive
- ✓ Previous Occurrences:
- ✓ Probability: Highly Likely
- ✓ Magnitude/Severity: Negligible

Floods

Floods are among the most frequent and costly natural disaster in terms of human hardship and economic loss

- ✓ **Flash Flooding** – localized floods of great volume and short duration
- ✓ **Riverine** – an event when a watercourse exceeds its “bank-full” capacity and is the most common type of flood event. Riverine floods result from precipitation over large areas.
- ✓ **Urban Stormwater** – land loses its ability to absorb rainfall as it is converted from fields or woodlands to roads, buildings, and parking lots

Floods

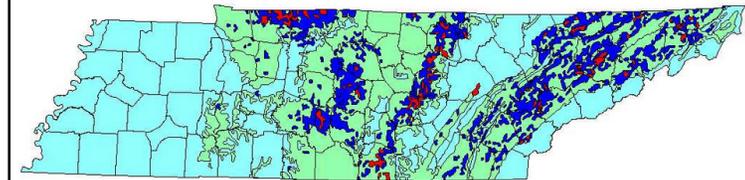


Floods

- FEMA mapped floodplain; flash-flooding occurs repeatedly in some known areas
- Annualized crop losses due to flooding and excessive moisture - \$41,314
- Existing capabilities: NFIP; flood ordinance, and floodplain management
 - Location: Significant – X% of planning area
 - Previous Occurrences: NCDC – 32 events in Sullivan County – predominantly flash flooding or small system flooding
 - Probability: Likely
 - Magnitude/Severity: Critical (major or long-term property damage)



Land Subsidence



Counties	
Sinkhole Distribution	
	0
	< 1 % Sinkholes
	1 - 10% Sinkholes
	> 10 % Sinkholes

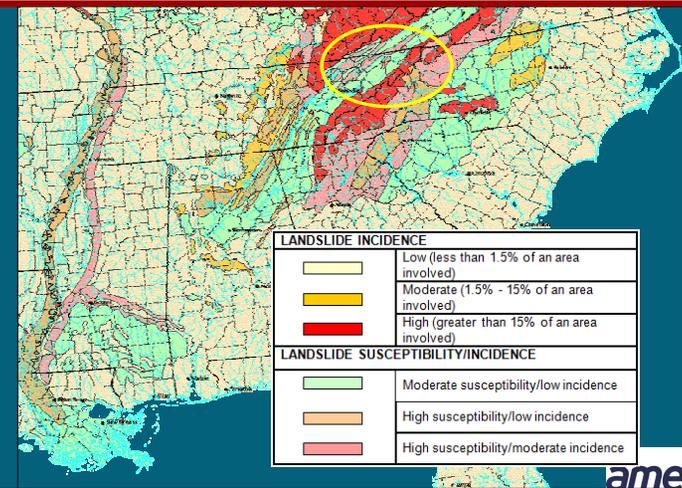


Land Subsidence

- Ground above a manmade or natural void collapses; Karst features
- Approximate 50% of County is within the 1-10% or over 10% sinkhole area
- Minor subsidence has affected infrastructure, but community lifelines where not interrupted.
- Existing capabilities: Planning/Zoning
 - ✓ Location: Significant (10-50% of planning area)
 - ✓ Previous Occurrences: Minor subsidence has affected infrastructure, but community lifelines where not interrupted.
 - ✓ Probability: Occasional
 - ✓ Magnitude/Severity: Limited



Landslide

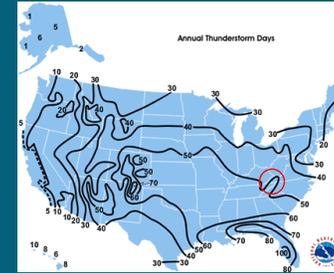


Landslide

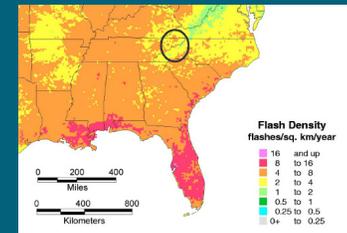
- The downhill movement of masses of soil and rock by gravity
- All of planning area has at least moderate susceptibility/low incidence to landslide. Some portions with high susceptibility/moderate incidence.
- Existing capabilities: Planning/zoning
 - ✓ Location: Extensive (50-100% of planning area)
 - ✓ Previous Occurrences: Some minor slides have occurred that block roadways, but roadways are quickly cleared.
 - ✓ Probability: Likely
 - ✓ Magnitude/Severity: Limited



Severe Thunderstorms



Hail, damaging winds, and lightning



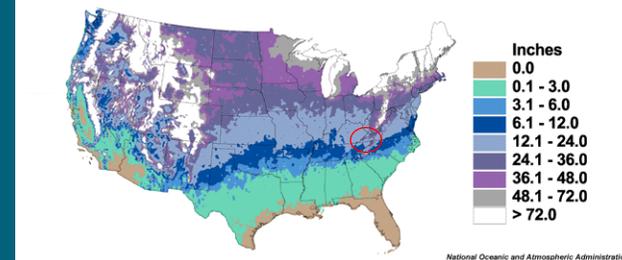
Severe Thunderstorms

- Localized storms accompanied by hail, high winds, lightning, heavy rain causing flash flooding and sometimes tornadoes.
- Power outages from downed power lines. Manufactured homes, campers and light buildings at increased risk of damages.
- Existing Capabilities: Insurance; NOAA radios, weather announcements; Ordinance underground utilities?
 - ✓ Location: Extensive (50-100% of planning area)
 - ✓ Previous Occurrences: NCDC – 125 wind events; 8 hail events (1.75”), 6 lightning events, average 50 thunderstorm days per year
 - ✓ Probability: Highly likely (near 100% chance every year)
 - ✓ Magnitude/Severity: Limited



Severe Winter Storm

Annual Mean Total Snowfall



National Oceanic and Atmospheric Administration

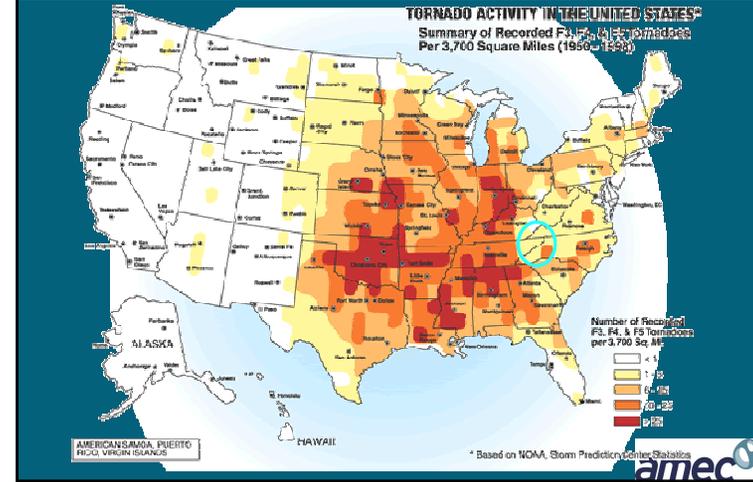


Severe Winter Storm

- Winter precipitation includes freezing rain, sleet, and snow (flurries, showers, blowing, blizzard)
- Property damage, power, phone outages, and closures of streets, highways, schools, businesses, and nonessential government operations
- Existing capabilities: Building codes, snow removal
 - ✓ Location: Extensive (50 to 100% of planning area)
 - ✓ Previous Occurrences: 1 emergency declaration in 1965; NCDC: 10 winter storm events; 12 heavy snow events
 - ✓ Probability: Highly Likely; 6 to 12 inches annually
 - ✓ Magnitude/Severity: Critical



Tornado

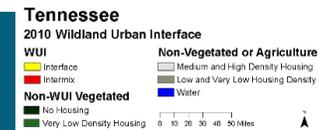
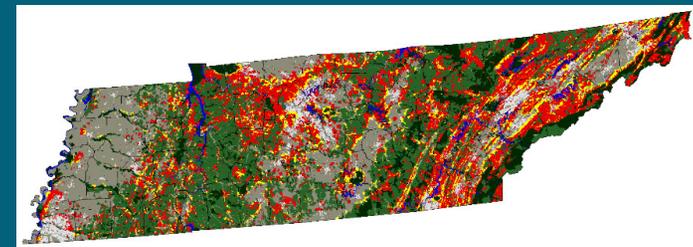


Tornado

- Tornado: violently rotating column of air pendant from a thunderstorm cloud that touches the ground
- Existing Capabilities: shelters, warning systems, NOAA radios, weather announcements
- Mobile Homes - do mobile home parks have tornado safe rooms?
 - ✓ Location: Extensive (50 to 100% of planning area)
 - ✓ Previous Occurrences: While many straight-line winds are reported, NOAA only reported two tornados in the area between January 1950 and December 2004.
 - ✓ Probability: Occasional/Likely (10%)
 - ✓ Magnitude/Severity: Critical



Wildfire



Wildfire

- Uncontrolled fire in combustible vegetation that occurs in the countryside or wilderness area
- WUI – Interface/Intermix Area
- Existing Capabilities: building codes; burn permits; TN Wildfire laws

- ✓ Location: Significant
- ✓ Previous Occurrences: NCDC – 0 events in Sullivan County
- ✓ Probability: Occasional
- ✓ Magnitude/Severity: Critical



Hazardous Materials Incidents

- Tier II Reporting Facilities – approximately 73
- Interstates and Railways – transportation corridors for hazardous materials

- ✓ Location: Significant
- ✓ Previous Occurrences: Follow-up with Tier II Reporting and EMA for any spill cleanups
- ✓ Probability: Likely
- ✓ Magnitude/Severity: Critical



Terrorism Event

- Dams; BAE Ammunition Plant, Eastman, WTP, WWTP, Bristol Motor Speedway, TriCities Airport
- Existing Capabilities: Emergency Action Plans, Preparedness Plans, Emergency Operations Plans

- ✓ Location: Limited
- ✓ Previous Occurrences: None
- ✓ Probability: Unlikely
- ✓ Magnitude/Severity: Critical



Hazard Summary

	Geographic Location	Probability		Magnitude		Planning Significance		
Dam Failure	Significant	2	Unlikely	1	Critical	3	6	Low
Drought	Significant	2	Occasional	2	Negligible	1	5	Low
Earthquake	Extensive	3	Occasional	2	Negligible	1	6	Low
Extreme Temps	Extensive	3	Highly Likely	4	Negligible	1	8	Medium
Flood	Significant	2	Likely	3	Critical	3	8	Medium
Land Subsidence	Significant	2	Occasional	2	Limited	2	6	Low
Landslide	Significant	2	Likely	3	Limited	2	7	Medium
Severe Thunderstorm	Extensive	3	Highly Likely	4	Limited	2	9	High
Severe Winter Storms	Extensive	3	Highly Likely	4	Critical	3	10	High
Tornado	Extensive	3	Occasional	2	Critical	3	8	Medium
Wildfire	Significant	2	Occasional	2	Critical	3	7	Medium
Hazardous Materials Incidents	Significant	2	Likely	3	Critical	3	8	Medium
Terrorism Events	Limited	1	Unlikely	1	Critical	3	5	Low



Vulnerability Assessment

- Inventory critical facilities
- Inventory structures – residential, commercial, industrial, etc.
- Determine # of people in area – census block data
- Identify development trends/constraints
- Identify historic, cultural, and natural resource areas
- Estimate the losses

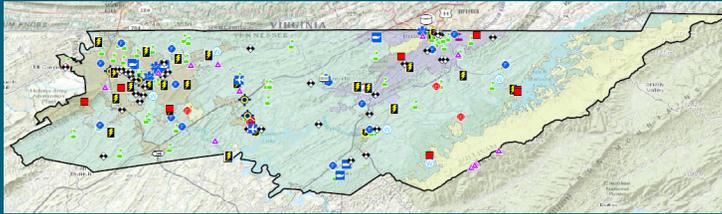


Critical Facilities/Infrastructure

Essential Facilities	High Potential Loss Facilities	Transportation and Lifelines
<ul style="list-style-type: none"> • Hospitals and other medical facilities • Police stations • Fire stations • Emergency operations centers 	<ul style="list-style-type: none"> • Power plants • Dams and levees • Military installations • Hazardous material sites • Schools • Shelters • Day care centers • Nursing homes • Main government buildings 	<ul style="list-style-type: none"> • Highways, bridges, and tunnels • Railroads and facilities • Airports • Water treatment facilities • Natural gas and oil facilities and pipelines • Communications facilities



Critical Facilities



■ USACE Dams	⚕ Hospitals - General	⚙ Correctional Facilities
■ Non-USACE Dams	🏭 Wastewater Treatment Plants	🔥 Fire Stations - Fire Only
🎓 Schools	💧 Potable Water Treatment	🚒 Fire Stations - Fire/EMS
🎓 Colleges and Universities	🛢 Natural Gas Storage	🏥 Emergency Medical Services
📡 Broadcast Communications	🛢 Petroleum Bulk Stations and Terminals	⚡ Fossil Fuel Electric Power Generation and Other Power Generation
✈ Airports	🏭 Chemical Industries	⚡ Nuclear Electric Power Generation
✈ Heliports	🏭 Nuclear Fuel Manufacturing	⚡ Hydroelectric Power Generation
👮 Law Enforcement	⚡ Electric Substations	🚢 Intermodal Shipping Facilities



Hazard Summary

	Geographic Location	Probability		Magnitude		Planning Significance	
Drought	Significant	2	Occasional	2	Negligible	1 5	Low
Extreme Temps	Extensive	3	Highly Likely	4	Negligible	1 8	Medium
Severe Thunderstorm	Extensive	3	Highly Likely	4	Limited	2 9	High
Severe Winter Storms	Extensive	3	Highly Likely	4	Critical	3 10	High
Tornado	Extensive	3	Occasional	2	Critical	3 8	Medium
Dam Failure	Significant	2	Unlikely	1	Critical	3 6	Low
Earthquake	Extensive	3	Occasional	2	Negligible	1 6	Low
Flood	Significant	2	Likely	3	Critical	3 8	Medium
Land Subsidence	Significant	2	Occasional	2	Limited	2 6	Low
Landslide	Significant	2	Likely	3	Limited	2 7	Medium
Wildfire	Significant	2	Occasional	2	Critical	3 7	Medium
Hazardous Materials Incidents	Significant	2	Likely	3	Critical	3 8	Medium
Terrorism Events	Limited	1	Unlikely	1	Critical	3 5	Low



Hazard Summary

Vulnerability and Loss Estimation Method	
Dam Failure	<ul style="list-style-type: none"> • GIS-based risk modeling • Inundation mapping and/or 5-mile radius (removing upstream portion) • Population and buildings within identified area
Earthquake	<ul style="list-style-type: none"> • HAZUS-MH Loss Estimation • Newer version of HAZUS since original plan, but still uses 2000 Census Data
Flood	<ul style="list-style-type: none"> • HAZUS-MH Loss Estimation • Newer version of HAZUS since original plan, but updated FIRM Mapping
Land Subsidence	<ul style="list-style-type: none"> • GIS-based risk modeling • Sinkhole Mapping – Med/High Areas • Population and buildings within identified area
Landslide	<ul style="list-style-type: none"> • GIS-based risk modeling • Landslide Susceptibility Mapping – High Areas • Population and buildings within identified area
Wildfire	<ul style="list-style-type: none"> • GIS-based risk modeling • WUI – Interface and Intermix Areas • Population and buildings within identified area
Hazardous Materials Incidents	<ul style="list-style-type: none"> • GIS-based risk modeling • Tier-II facilities; Interstates and Railways – boundary area • Population and buildings within identified area • Hypothetical Scenario Based Estimates
Terrorism Events	<ul style="list-style-type: none"> • Analysis of vulnerable populations is aided by a program developed by Johns Hopkins University in 2006 called Electronic Mass Casualty Assessment and Planning Scenarios (EMCAPS) which utilizes scenarios developed by the Department of Homeland Security.



QUESTIONS ??

~ BREAK ~



- ## Mitigation Strategy
- Goals
 - Tennessee State Hazard Mitigation Plan
 - Sullivan County and Bristol LHMP
 - Objectives
 - ✓ Capability Assessment
 - Action Items – Next HMPC Meeting
 - Status Update of Existing Action Items
 - *Homework from Meeting #1 – Kickoff*
 - Additional Action Items
 - Prioritization of all Action Items
- 

- ## GOALS
- Tennessee State Plan
 - Reduce or eliminate the adverse affects of natural and technological hazards to the socio-economic and physical environments in the State of Tennessee
- 

EXISTING GOALS

- Goal 1: Protect community lifelines (existing and future) from identified natural and man-made hazards
- Goal 2: Ensure that public funds are used efficiently
- Goal 3: Better manage flood hazard areas
- Goal 4: Protect community historic preservation resources from identified natural and man-made hazards
 - ❖ Sullivan County Only
- Goal 5: Improve and maintain coordination and communication between all jurisdictions
- Goal 6: Educate the public on identified natural and man-made hazards



EXISTING GOALS

- Goal 6: Improve hazard mitigation planning for Bristol Motor Speedway (BMS) facility events
 - ❖ City of Bristol Only
- Goal 7: Improve public hazard communication methods
 - ❖ City of Bristol Only
- Goal 8: Better manage fire hazard areas
 - ❖ City of Bristol Only



SUGGESTED GOALS

- Goal 1: Reduce the vulnerability of the people, property, and environment of Sullivan County to natural and man-made hazards
 - ❖ Objective: Protect community lifelines (existing and future) from identified natural and man-made hazards
 - ❖ Objective: Better manage flood hazard areas
 - ❖ Objective: Better manage fire hazard areas
 - ❖ Objective: Protect community historic preservation resources from identified natural and man-made hazards
- Goal 2: Improve and maintain coordination and communication between all jurisdictions
- Goal 3: Educate the public on identified natural and man-made hazards
 - ❖ Objective: Improve hazard mitigation planning for Bristol Motor Speedway (BMS) facility events
- Goal 4: Improve public hazard communication methods



Capability Assessment

	Sullivan County	City of Kingsport	City of Bluff City	City of Bristol
Land Use Plan	Y	Y	Y	Y
- with integrated Hazard Mitigation planning?	N	N	N	N
Subdivision Ordinance	Y	Y	Y	Y
Zoning Ordinance	Y	Y	Y	Y
Hazard Mitigation Plan	Y	Y	Y	Y
Floodplain (FP) Ordinance	Y	Y	Y	Y
FP Administrator?	Y	Y	Y	Y
• # of parcels with buildings in FP?	2,623	Information not available	Information not available	942 (parcels)
• # of Flood Insurance Policies	Information not available	Information not available	Information not available	60 (in 2003)
• # of Repetitive Loss Properties	3	1	0	0
Community Rating System	Not participating	Not participating	Not participating	Not participating
Stormwater Program	NPDES Phase II Community	NPDES Phase II Community	NPDES Phase II Community	NPDES Phase II Community



Capability Assessment

	Sullivan County	City of Kingsport	City of Bluff City	City of Bristol
Building Code	N	Y	Y	Y
Building Official	Y	Y	Y (part time)	Y
• Inspections?	Y	Y	Y	Y
Emergency Operations Plan?	Y	County managed	Stand alone	Y
Warning-sirens?	Y	Y	Y	Y
• Cable-TV over ride capability?	Y	Y	Y	
• Reverse 911?	Y – Sheriff's Dept	Y	Y	Y
Property Protection	Erosion and sediment control ordinance; Detention policies	E&SC ordinance; draft illicit discharge ordinance; requirements for detention/retention	E&SC ordinance; illicit discharge ordinance	
Vulnerability Assessments	N/A	Y- Water plant	Y	
Public Information Program	Y, as part of NPDES Phase II	Y, as part of NPDES Phase II	Y, as part of NPDES Phase II	



- ### Next Steps
- AMEC: Incorporate comments and update Hazard Profile and Vulnerability Assessment
 - AMEC: Distribution of draft risk assessment for review
 - Deliver May 28th
 - ✓ Chapter 2 – Community Profiles
 - ✓ Chapter 3 – Hazard Identification and Risk Assessment
 - HMPC: Review content for accuracy & ideas
 - HMPC: Provide additional information you may have
- 

- ### Next Steps
- Schedule next HMPC meetings and one public meeting (or piggy back on one)
 - June/July?
 - ✓ Develop actions and implementation strategies
 - 1st complete draft target - July
 - Chapter 1 – Introduction
 - Chapter 4 – Mitigation Strategy
 - Chapter 5 – Plan Maintenance
- 

Thank You!
 See you at the next meeting

Cindy Popplewell and Sarah Ketron
 AMEC Hazard Mitigation &
 Emergency Management Program
 (615) 944-9013
 (423) 220-7480



ATTACHMENT B

Sullivan County Multi-Jurisdictional
Local Multi-Hazard Mitigation Plan
Risk Assessment ~~Kickoff Meeting - February 28, 2013~~
May 13, 2013

Name	Agency	Phone	Email
STEVE PEARLY	SC.EMA.	423 323-6912	Sperry@sullivan-county-ema.com
Judy Dulaney	City of Bluff City	423-612-0828	bluffcitycityof@aol.com
Greg Deper	City of Bluff City	423-612-2063	gregdeperwbc@aol.com
Joe B	Sullivan EMA	423.323.6912	jdb@sullivan-county-ema.com
Ambie Tothell	Sullivan County	423 323 6440	planning@sullivan-county-va.gov
Sina Wright	EMA	423-323-6912	twright@sullivan-county-ema.com
Bill Sorra	City of Bristol	423-989-5565	bsorra@bristolva.org

ATTACHMENT C

AMEC Environment & Infrastructure, Inc.
3800 Ezell Road, Suite 100
Nashville, TN 37211
Tel +(615) 333-0630
Fax +(615) 781-0655

AIRPORTS

FULLNAME	FAC_CYSTZP	LATITUDE	LONGITUDE
TRI-CITIES RGNL TN/VA	BLOUNTVILLE, TN 37617	36.475222222220	-82.40741666670

BROADCAST COMMUNICATION

CALLSIGN	CITY	LICENSEE	LATDD	LONDD
W210BR	KINGSPORT	POSITIVE ALTERNATIVE RADIO, INC.	36.526900000000	82.587500000000
W211CD	JOHNSON CITY	THE MOODY BIBLE INSTITUTE OF CHICAGO	36.429200000000	82.141700000000
W232BP	KINGSPORT	HOLSTON VALLEY BROADCASTING CORPORATION	36.526900000000	82.586700000000
W264BY	KINGSPORT	APPALACHIAN EDUCATIONAL COMMUNICATION CORPORAT	36.526900000000	82.586400000000
W270BN	WALNUT HILL	POSITIVE ALTERNATIVE RADIO, INC.	36.588600000000	82.200600000000
WAPK-CA	KINGSPORT	HOLSTON VALLEY BROADCASTING CORPORATION	36.431700000000	82.137500000000
WCQR-FM	KINGSPORT	POSITIVE ALTERNATIVE RADIO, INC.	36.431400000000	82.137800000000
WCSK	KINGSPORT	KINGSPORT CITY SCHOOLS BD. OF EDUC .	36.526900000000	82.586700000000
WCYB-TV	BRISTOL	BLUESTONE LICENSE HOLDINGS INC.	36.449400000000	82.108100000000
WETS-FM	JOHNSON CITY	EAST TENNESSEE STATE UNIVERSITY	36.433900000000	82.135600000000
WGOC	KINGSPORT	RADIO LICENSE HOLDING CBC, LLC	36.553300000000	82.482800000000
WGOC	KINGSPORT	RADIO LICENSE HOLDING CBC, LLC	36.553300000000	82.482800000000
WHGG	KINGSPORT	INFORMATION COMMUNICATIONS CORPORATION	36.461100000000	82.453300000000
WIGN	BRISTOL	MOUNTAIN MUSIC MINISTRIES, LLC	36.565800000000	82.157500000000
WJHL-TV	JOHNSON CITY	MEDIA GENERAL COMMUNICATIONS HOLDINGS, LLC	36.431900000000	82.137500000000
WKIN-LP	WEBER CY,VA-KPT,TN	HOLSTON VALLEY BROADCASTING CORPORATION	36.526900000000	82.586700000000
WKOS	KINGSPORT	RADIO LICENSE HOLDING CBC, LLC	36.553900000000	82.450000000000
WKPT	KINGSPORT	HOLSTON VALLEY BROADCASTING CORPORATION	36.543600000000	82.522500000000
WKPT-LP	KINGSPORT	HOLSTON VALLEY BROADCASTING CORPORATION	36.526700000000	82.587200000000
WKPT-TV	KINGSPORT	HOLSTON VALLEY BROADCASTING CORPORATION	36.431700000000	82.137500000000
WOPI-CA	KINGSPORT	HOLSTON VALLEY BROADCASTING CORPORATION	36.431700000000	82.137500000000
WPWT	COLONIAL HEIGHTS	INFORMATION COMMUNICATIONS CORP.	36.461100000000	82.453300000000
WRZK	COLONIAL HEIGHTS	HOLSTON VALLEY BROADCASTING CORPORATION	36.526700000000	82.586900000000
WTFM	KINGSPORT	HOLSTON VALLEY BROADCASTING CORPORATION	36.431700000000	82.137500000000
WTFM	KINGSPORT	HOLSTON VALLEY BROADCASTING CORPORATION	36.526700000000	82.587200000000
WVEK-FM	WEBER CITY	HOLSTON VALLEY BROADCASTING CORPORATION	36.526700000000	82.586900000000
WXBQ-FM	BRISTOL	BRISTOL BROADCASTING COMPANY, INC.	36.433100000000	82.136400000000
WXSM	BLOUNTVILLE	RADIO LICENSE HOLDING CBC, LLC	36.521900000000	82.423600000000

CHEMICAL

Tier II reporting facilities will be included under the Hazardous Materials Incident hazard, and not addressed as critical facility.

COLLEGES

NAME	LADDR	LCITY	LAT	LON
King College	1350 King College Rd	Bristol	36.58589851590	-82.15653200030
Kingsport Center for Higher Education	300 W. Market St.	Kingsport		
Northeast State Community College	2425 Hwy 75	Blountville	36.48558004370	-82.40862633370
Northeast State Community College	620 State Street, Suite 300	Bristol		

EMS

NAME	ADDRESS	CITY	X	Y
AMBULANCE SERVICE OF BRISTOL	1718 SHELBY STREET	BRISTOL	-82.20117570000	36.59415110000
CHURCH HILL EMERGENCY MEDICAL SERVICES STATION	1700 PINEBROOK DRIVE	KINGSPORT	-82.52527390000	36.55113240000
KINGSPORT LIFESAVING CREW	1800 CRESCENT DRIVE	KINGSPORT	-82.53337710000	36.53887030000
SULLIVAN COUNTY EMERGENCY MEDICAL SERVICES	3411 STATE HIGHWAY 126	BLOUNTVILLE	-82.31845320000	36.53538670000

FIRE - EMS

NAME	ADDRESS	CITY	X	Y
BRISTOL MOTOR SPEEDWAY	151 SPEEDWAY BOULEVARE	BRISTOL	-82.25835410000	36.51732570000
BRISTOL TENNESSEE FIRE DEPARTMENT STATION 1	211 BLUFF CITY HIGHWAY	BRISTOL	-82.18902870000	36.57160890000
BRISTOL TENNESSEE FIRE DEPARTMENT STATION 2	1109 KING COLLEGE ROAD	BRISTOL	-82.16194220000	36.59031770000

BRISTOL TENNESSEE FIRE DEPARTMENT STATION 3	500 17TH STREET	BRISTOL	-82.20110240000	36.59205770000
BRISTOL TENNESSEE FIRE DEPARTMENT STATION 4	361 EXIDE DRIVE	BRISTOL	-82.26818030000	36.52286080000
EASTMAN CHEMICAL COMPANY	200 SOUTH WILCOX DRIVE	KINGSPORT	-82.55190070000	36.53241020000
KINGSPORT FIRE DEPARTMENT STATION 1	130 ISLAND STREET	KINGSPORT	-82.55754110000	36.54365830000
KINGSPORT FIRE DEPARTMENT STATION 2	1804 CRESCENT DRIVE	KINGSPORT	-82.53355000000	36.53880060000
KINGSPORT FIRE DEPARTMENT STATION 3	3828 MEMORIAL BOULEVARD	KINGSPORT	-82.50135040000	36.52980000000
KINGSPORT FIRE DEPARTMENT STATION 4	2105 WEST STONE DRIVE	KINGSPORT	-82.59240600000	36.55513230000
KINGSPORT FIRE DEPARTMENT STATION 5	1517 LYNN GARDEN DRIVE	KINGSPORT	-82.56739970000	36.57960680000
KINGSPORT FIRE DEPARTMENT STATION 6	4598 FORT HENRY DRIVE	KINGSPORT	-82.49334060000	36.47814410000

FIRE - ONLY

NAME	ADDRESS	CITY	X	Y
AREA 421 EMERGENCY SERVICES	1758 BRISTOL CAVERNS HIGHWAY	BRISTOL	-82.09973780000	36.55359420000
AVOCA VOLUNTEER FIRE DEPARTMENT	183 BEAVER CREEK ROAD	BLUFF CITY	-82.27432940000	36.50593050000
BLOOMINGDALE VOLUNTEER FIRE DEPARTMENT	3017 NORTH JOHN B DENNIS DRIVE	KINGSPORT	-82.50609250000	36.57262920000
BLUFF CITY FIRE DEPARTMENT	4256 BLUFF CITY HIGHWAY	BLUFF CITY	-82.26514170000	36.47457110000
EAST SULLIVAN COUNTY VOLUNTEER FIRE DEPARTMENT	3287 WEAVER PIKE	BRISTOL	-82.18390950000	36.52747880000
HICKORY TREE VOLUNTEER FIRE DEPARTMENT	2363 HICKORY TREE ROAD	BLUFF CITY	-82.15416590000	36.49015090000
HOLSTON ARMY AMMUNITION PLANT FIRE DEPARTMENT	STATE HIGHWAY 1	KINGSPORT	-82.63484060000	36.55055260000
PINEY FLATS VOLUNTEER FIRE DEPARTMENT	125 INDUSTRIAL PARK ROAD	PINEY FLATS	-82.30975840000	36.43121000000
SULLIVAN COUNTY VOLUNTEER FIRE DEPARTMENT - BLOUNTVILLE	BLOUNTVILLE BOULEVARD	BLOUNTVILLE	-82.31490690000	36.53204070000
SULLIVAN WEST VOLUNTEER FIRE DEPARTMENT	113 ROSEMONT STREET	KINGSPORT	-82.59312920000	36.47963450000
TENNESSEE DEPARTMENT OF AGRICULTURE - DIVISION OF	486 HEMLOCK ROAD	KINGSPORT	-82.48702300000	36.49803980000
TRI-CITIES REGIONAL AIRPORT PUBLIC SAFETY FIRE DEPARTMENT	2525 STATE HIGHWAY 75	BLOUNTVILLE	-82.41033750000	36.48346450000
WARRIORS PATH VOLUNTEER FIRE DEPARTMENT	1908 MORELAND DRIVE	KINGSPORT	-82.50664230000	36.48914050000

RESCUE SQUADS

Blountville Emergency Resonse	209 Emergency Lane	Blountville
Bluff City Rescue Squad	146 Main Street	Bluff City
Kingsport Life Saving Crew	1800 Cresent Drive	Kingsport
South Holston Rescue	2363 Hickory Tree Road	Bluff City

FOSSIL FUEL

Tier II reporting facilities will be included under the Hazardous Materials Incident hazard, and not addressed as critical facility.

HELIPORT

FULLNAME	FAC_CYSTZP	LATITUDE	LONGITUDE
AIR TRADE CENTER (TN57)	BRISTOL, TN 37625	36.41888888890	-82.30111111110
BRENDLE'S (1TN7)	KINGSPORT, TN 37660	36.54787916670	-82.52237222220
BRISTOL MOTOR SPEEDWAY	BRISTOL, TN 37625		
BRISTOL RGNL MEDICAL CENTER (TN04)	KINGSPORT, TN 37660	36.58677027780	-82.25735861110
EDWARDS (89TN)	BRISTOL, TN 37625	36.43250000000	-82.29361111110
INDIAN PATH MEDICAL CENTER (15TN)	KINGSPORT, TN 37660	36.55155000000	-82.51523333330
WELLMONT HOLSTON VALLEY MEDICAL CENTER (3TN5)	KINGSPORT, TN 37660	36.55361111110	-82.55333333330

HOSPITALS

NAME	ADDRESS	CITY	X	Y
HEALTHSOUTH REHABILITATION HOSPITAL OF KINGSPORT	113 CASSEL DRIVE	KINGSPORT	-82.55132910000	36.55353810000
INDIAN PATH MEDICAL CENTER	2000 BROOKSIDE DRIVE	KINGSPORT	-82.51427400000	36.55098260000
SELECT SPECIALTY HOSPITAL - TRICITIES	1 MEDICAL PARK BOULEVARD	BRISTOL	-82.25632020000	36.58528470000
WELLMONT BRISTOL REGIONAL MEDICAL CENTER	1 MEDICAL PARK BOULEVARD	BRISTOL	-82.25631490000	36.58528600000
WELLMONT HOLSTON VALLEY MEDICAL CENTER INCORPORATED	130 WEST RAVINE ROAD	KINGSPORT	-82.55436320000	36.55415070000

HYDROELECTRIC

Dams are addressed individually under the Dam Failure Hazard, and not addressed as critical facilities

NATURAL GAS STORAGE

Tier II reporting facilities will be included under the Hazardous Materials Incident hazard, and not addressed as critical facility.

PETROLEUM BULK STATIONS

Tier II reporting facilities will be included under the Hazardous Materials Incident hazard, and not addressed as critical facility.

LAW ENFORCEMENT

NAME	ADDRESS	CITY	X	Y
BLUFF CITY POLICE DEPARTMENT	4391 BLUFF CITY HIGHWAY	BLUFF CITY	-82.27029310000	36.47084220000
BRISTOL POLICE DEPARTMENT	801 ANDERSON STREET	BRISTOL	-82.18680130000	36.59292890000
KINGSPORT POLICE DEPARTMENT / KINGSPORT JAIL	200 SHELBY STREET	KINGSPORT	-82.56189820000	36.54752130000
NORTHEAST STATE TECHNICAL COMMUNITY COLLEGE SE	2425 STATE HIGHWAY 75	BLOUNTVILLE	-82.40843540000	36.48502130000
SULLIVAN COUNTY SHERIFFS DEPARTMENT / SULLIVAN C	140 BLOUNTVILLE BYPASS	BLOUNTVILLE	-82.32055770000	36.53654840000
TRI-CITIES AIRPORT PUBLIC SAFETY DEPARTMENT	2525 STATE HIGHWAY 75	BLOUNTVILLE	-82.40790430000	36.48100630000
UNITED STATES CUSTOMS AND BORDER PROTECTION - F	100 CARGO CENTER DRIVE	BLOUNTVILLE	-82.40353480000	36.47150210000
WARRIORS PATH STATE PARK - RANGER STATION	490 HEMLOCK ROAD	KINGSPORT	-82.48550390000	36.49899290000

POTABLE WATER TREATMENT/UTILITY DISTRICTS

Name	Address	City	Latitude	Longitude
BLOOMING DALE UTILITY DISTRICT	3312 BLOOMINGTON PIKE	KINGSPORT	36.56972000000	-82.45111000000
BLUFF CITY WATER TREATMENT PLT	226 MAIN STREET	BLUFF CITY	36.43861000000	-82.19083000000
BRISTOL TENNESSEE WATER TREATMENT FACILI	364 SOUTH HOLSTON DAM R	BRISTOL	36.53556000000	-82.10750000000
BRISTOL/BLUFF CITY U.D.	318 RIVERVIEW DR.	BLUFF CITY	36.47484000000	-82.24402000000
CHINQUAPIN GROVE U.D.	1844 CHINUAPIN GROVE RD.	BLUFF CITY	36.43333000000	-82.19222000000
KINGSPORT WTP	225 W. CENTER ST.	KINGSPORT	36.51556000000	-82.52861000000

CORRECTIONAL FACILITIES

See Law Enforcement

SCHOOLS

NAME	LADDR	LCITY	LAT	LON
ANDERSON ELEMENTARY SCHOOL	901 NINTH ST	BRISTOL	36.58633196900	-82.18928800000
APOSTOLIC GOSPEL ACADEMY			36.57047012800	-82.59069899300
APPALACHIAN CHRISTIAN SCHOOL			36.56137504700	-82.48765122100
APPALACHIAN CHRISTIAN SCHOOL			36.56129490700	-82.48770053800
AVOCA ELEMENTARY SCHOOL	2440 VOLUNTEER PARKWAY	BRISTOL	36.53294357300	-82.24615250000
BLOUNTVILLE ELEMENTARY SCHOOL	155 SCHOOL AVE	BLOUNTVILLE	36.53439283500	-82.31426150000
BLOUNTVILLE MIDDLE SCHOOL	1651 BLOUNTVILLE BLVD	BLOUNTVILLE	36.53255779000	-82.31484500000
BLUFF CITY ELEMENTARY SCHOOL	282 MAPLE DR	BLUFF CITY	36.47247436000	-82.26241100000
BLUFF CITY MIDDLE SCHOOL	715 CARTER ST	BLUFF CITY	36.47247642100	-82.25942700000
BROOKSIDE INNOVATION ACADEMY	149 BROOKSIDE SCHOOL LN	KINGSPORT	36.57485644700	-82.50542300000
CENTRAL ELEMENTARY SCHOOL	735 MARTIN L KING JR BLVD	BRISTOL	36.58608165300	-82.18371774300
CENTRAL HEIGHTS ELEMENTARY	158 CENTRAL HEIGHTS RD	BLOUNTVILLE	36.57882051700	-82.35981273700
CHRISTIAN LIFE ACADEMY			36.55387392000	-82.50920002900
COLONIAL HEIGHTS MIDDLE SCHOOL	415 LEBANON RD	KINGSPORT	36.47699142400	-82.50018650000
COMPREHENSIVE COMMUNITY SERVICES			36.47031840500	-82.62511636600
DOBYNS BENNETT HIGH SCHOOL	1800 LEGION DR	KINGSPORT	36.53636244100	-82.52797595600
EMMETT ELEMENTARY SCHOOL	753 EMMETT RD	BRISTOL	36.52804097500	-82.11547350000
FAIRMOUNT ELEMENTARY SCHOOL	500 CYPRESS ST	BRISTOL	36.58699252200	-82.16942900000
GUNNINGS SCHOOL	229 SHIPLEY FERRY RD	BLOUNTVILLE	36.52966834200	-82.39006805100
HAYNESFIELD ELEMENTARY SCHOOL	201 BLUFF CITY HWY	BRISTOL	36.57238877000	-82.18812050000
HOLSTON ELEMENTARY SCHOOL	2348 HWY 75	BLOUNTVILLE	36.48955376500	-82.41427698300
HOLSTON MIDDLE SCHOOL	2348 HWY 75	BLOUNTVILLE	36.49008000000	-82.41398000000
HOLSTON VALLEY MIDDLE SCHOOL	1717 BRISTOL CAVERNS HW	BRISTOL	36.55373887900	-82.10195100000

HOLSTON VIEW ELEMENTARY SCHOOL	1840 KING COLLEGE RD	BRISTOL	36.58317813300	-82.14124900000
INDIAN SPRINGS ELEMENTARY	333 HILL RD	KINGSPORT	36.53918556800	-82.42333050000
JACKSON ELEMENTARY SCHOOL	600 JACKSON ST	KINGSPORT	36.55903528400	-82.56445800000
JEFFERSON ELEMENTARY SCHOOL	2216 WESTMORELAND AVE	KINGSPORT	36.53945891800	-82.52072800000
JOHN ADAMS ELEMENTARY	2727 EDINBURGH CHANNEL	KINGSPORT	36.44653632700	-82.56869949700
JOHNSON ELEMENTARY SCHOOL	1001 ORMOND DR	KINGSPORT	36.52739730100	-82.53038200000
KENNEDY ELEMENTARY SCHOOL	1500 WOODLAND AVE	KINGSPORT	36.57945282600	-82.57010650000
KETRON INTERMEDIATE SCHOOL	3301 BLOOMINGDALE PK	KINGSPORT	36.58307929600	-82.48531750000
LIGHTHOUSE CHRISTIAN SCHOOL	145 SHIPP SPRINGS RD	KINGSPORT	36.56793717300	-82.54760655000
LINCOLN ELEMENTARY SCHOOL	1000 SUMMER ST	KINGSPORT	36.53905013100	-82.53944150000
MARY HUGHES SCHOOL	240 AUSTIN SPRINGS RD	PINEY FLATS	36.41861369500	-82.30663483300
MILLER PERRY ELEMENTARY SCHOOL	904 FORDTOWN RD	KINGSPORT	36.45272660000	-82.50828154200
MOUNTAIN EMPIRE BAPTIST SCHOOL			36.57648089300	-82.17389688800
PALMER CENTER	1609 FT HENRY DR	KINGSPORT	36.53726659800	-82.53131600000
ROBINSON MIDDLE SCHOOL	1517 JESSEE ST	KINGSPORT	36.53315559300	-82.51926350000
ROCK SPRINGS ELEMENTARY SCHOOL	1238 MORELAND DR	KINGSPORT	36.48735642200	-82.53665950000
ROOSEVELT ELEMENTARY	1051 LAKE ST	KINGSPORT	36.56225159300	-82.57655350000
SEVIER MIDDLE SCHOOL	1200 WATEREE ST	KINGSPORT	36.54547755400	-82.54529100000
ST DOMINIC SCHOOL			36.53970181700	-82.53401200000
ST PAUL'S DAY SCHOOL AND KINDERGARTEN			36.54934971500	-82.55276500000
SULLIVAN CENTRAL HIGH SCHOOL	131 SHIPLEY FERRY RD	BLOUNTVILLE	36.53003283200	-82.38622450000
SULLIVAN EAST HIGH SCHOOL	4180 WEAVER PK	BLUFF CITY	36.50497521900	-82.20913300000
SULLIVAN ELEMENTARY SCHOOL	209 ROSEMONT AVE	KINGSPORT	36.48018642000	-82.59471448200
SULLIVAN MIDDLE SCHOOL	4154 SOUTH WILCOX DR	KINGSPORT	36.47913214400	-82.59409850000
SULLIVAN NORTH HIGH SCHOOL	2533 J B DENNIS BYPASS	KINGSPORT	36.55955490800	-82.50076650000
SULLIVAN SOUTH HIGH SCHOOL	1236 MORELAND DR	KINGSPORT	36.49060659400	-82.53404530700
TENNESSEE AVENUE CHRISTIAN ACADEMY			36.58572606300	-82.17506650000
TENNESSEE HIGH SCHOOL	1112 EDGEMONT AVE	BRISTOL	36.58084521400	-82.18382750000
TRI-CITIES CHRISTIAN SCHOOL			36.57707417700	-82.56318047700
TRI-CITIES CHRISTIAN SCHOOL-AIRPORT			36.51001190900	-82.38878543100
VANCE MIDDLE SCHOOL	815 EDGEMONT AVE	BRISTOL	36.58371218100	-82.17983954000
WASHINGTON ELEMENTARY SCHOOL	1100 BELLINGHAM DR	KINGSPORT	36.55653737900	-82.63271903400
WEAVER ELEMENTARY SCHOOL	3341 WEAVER PK	BRISTOL	36.52999432600	-82.17820700000

ELECTRIC SUBSTATIONS

NAME	PROPOSED	CITY	LATITUDE	LONGITUDE
Blountville	Proposed	Blountville, TN	36.52688500000	-82.27988000000
Bluff City	In Service	Walnut Hill, TN	36.55008700000	-82.21594300000
Boone (TN)	In Service	Spurgeon, TN	36.44230700000	-82.43630800000
Edens Ridge	In Service	Colonial Heights, TN	36.52940800000	-82.48705400000
Fort Patrick Henry	In Service	Colonial Heights, TN	36.49833500000	-82.50855100000
Fort Robinson	In Service	Lynn Garden, TN	36.58096700000	-82.59502800000
Holston	In Service	Kingsport, TN	36.52824700000	-82.51504900000
Indian Springs	In Service	Colonial Heights, TN	36.53059500000	-82.42626800000
Kingsport Mill	In Service	Blountville, TN	36.52462000000	-82.26646000000
Moreland Drive	In Service	Kingsport, TN	36.51241600000	-82.57382800000
Orebank	In Service	Bloomington, TN	36.56503800000	-82.46072700000
Reedy Creek	In Service	Bloomington, TN	36.56933400000	-82.53697900000
Short Hills	In Service	Bloomington, TN	36.56052700000	-82.49818000000
South Holston	In Service	Bristol, TN	36.52304100000	-82.09071300000
Sullivan	In Service	Bluff City, TN	36.49977600000	-82.23516800000
Sullivan Gardens	In Service	Fall Branch, TN	36.47118100000	-82.58001200000
Tap	In Service	Bristol, TN	36.54009500000	-82.15131700000
Tenn Eastman Division A Division of East	In Service	Kingsport, TN	36.52639700000	-82.55583700000
Tenn Eastman No 1	In Service	Kingsport, TN	36.52857900000	-82.53355100000
West Kingsport	In Service	Kingsport, TN	36.54340700000	-82.57595300000
Beaver Creek Road @ Buffalo	per HMPC			
On Pleasant Grove	per HMPC			

WASTE WATER TREATMENT PLANT

BusName	Address	City	Latitude	Longitude
Kingsport WWTP		Kingsport	36.5502778	-82.57444444
Bristol WWTP		Bristol TN/VA		

ATTACHMENT D

Sullivan County Local Hazard Mitigation Plan

Sullivan County is developing a comprehensive Hazard Mitigation Plan to better address potential natural and manmade hazards **before they occur** and to obtain eligibility for mitigation funding from the Federal Emergency Management Agency (FEMA). This is a **multi-jurisdictional planning process** and is a cooperative effort between Sullivan County, the Town of Bluff City, City of Bristol, and City of Kingsport.

What Is a Hazard Mitigation Plan?

A hazard mitigation plan is the result of a planning process to determine how to reduce or eliminate the loss of life and property damage resulting from hazards. This plan will address a comprehensive list of natural hazards – ranging from flooding and earthquakes to tornadoes, and severe winter weather. The plan will assess the likely impacts of these hazards to communities in Sullivan County. This planning process is structured around four phases: Phase 1: Organize Resources, Phase 2: Assess Risks, Phase 3: Develop a Mitigation Plan, and Phase 4: Implement the Plan and Monitor Progress. These four phases are further broken down into 10 steps, shown in the box to the right.



Why is it Important to Me?

It is important for citizens to become involved in mitigation planning in their community. The planning team needs your input on the types of hazards that are your priority concern. Your opinion on ways to prevent or lessen the impacts of hazards is also valuable input for the planning team.

What Can I do to Participate?

Please plan to attend our upcoming public meeting:

**Multi-Hazard Mitigation Plan
Public Meeting
Tuesday, June 18th
6:00pm
~ following Planning Commission Meeting ~
Commission Room
Sullivan County Courthouse
3411 Highway 126
Blountville, TN**

Additionally, prior to being submitted to the Tennessee Emergency Management Agency and FEMA, the draft plan will be circulated for public comment. Information on accessing and commenting on the plan will be posted in local newspapers and the County's website in the future.

For more information please contact Jim Bean
Sullivan County Emergency Management Agency
at (423) 323-6912 or <http://www.sullivancountyttn.gov/node/99>



Memo

To **Sullivan County
Hazard Mitigation Planning Committee**
From **Sarah Ketron**
Tel / Email **(423) 220-7480 / sarah.ketron@amec.com**
Date **June 26, 2013**

Subject Minutes from Local Hazard Mitigation Plan

This memo presents the meeting minutes from the June 18, 2013, meeting for the Sullivan County, TN, Local Hazard Mitigation Plan. The meeting provided a review of the hazard mitigation planning process and progress to date; review of the hazard identification and risk assessment; a review of the goals and objectives; development and prioritization of mitigation action items; a status of the draft plan; and the next steps. The powerpoint presentation for the meeting is included as Attachment A to this memo.

Attendees

Steve Perry, Sullivan County Emergency Management Agency, sperry@sullivancountyema.com
Judy Dulaney, City of Bluff City, bluffcitycityof@aol.com
Greg Depew, City of Bluff City, gregdepewbcpd@gmail.com
Jim Bean, Sullivan County Emergency Management Agency, jbean@sullivancountyema.com
Tina Wright, Sullivan County Emergency Management Agency, twright@sullivancountyema.com
Bill Sorah, City of Bristol, bsorah@bristoltn.org
Sarah Ketron, AMEC Environment & Infrastructure, Inc., sarah.ketron@amec.com
Cindy Popplewell, AMEC Environment & Infrastructure, Inc., cindy.popplewell@amec.com

The sign-in sheet for the meeting is included as Attachment B to this memo.

Overview of Natural Hazard Mitigation Planning

Cindy Popplewell reviewed the benefits of hazard mitigation planning and the planning process, which is designed to meet the requirements of the Disaster Mitigation Act and the Federal Emergency Management Agency's associated guidance. The table below outlines the 10-step planning process. This HMPC meeting focused on planning step 5.

Table 1. 10-Step Mitigation Planning Process

10-Step Planning Process
1. Organize Resources
2. Plan for Public Involvement
3. Develop Risk Assessment
4. Identify Goals and Objectives
5. Identify Mitigation Actions
6. Establish Plan Maintenance Process
7. Draft the Plan
8. Review and Revise Plan
9. Submit the Plan
10. Adopt the Plan

Noted during the overview:

- Quarterly reports will be added to deliverables table of Chapter 1.
- Terrorism will be updated to reflect moderate/high planning significance.

Develop Mitigation Actions

Mitigation actions are developed to reduce losses before a disaster occurs. Mitigation actions have long-term and cumulative benefits. Some mitigation actions are identified and prioritized because they are low cost or readily implemented. Other mitigation actions may be dependent on funding or are best implemented following a disaster.

Mitigation actions identified include:

- Hazardous Materials Incidents – Continue to seek ways for Tier II facilities to report electronically in a web-based format, as the current system supported by a University may soon be unavailable
- Flood – Identify repetitive flood prone areas.
- Hazard Mitigation Planning in General – Continue public education efforts, such as quarterly online newsletter, participation in safety fairs, and press releases/radio PSAs in coordination with the Public Health Coalition.
- Severe Thunderstorms – Continue public education on safe places for people to go during storms.
- Sinkholes – Identify known sinkhole incident areas.
- Terrorism – Increase coordination and pre-staging of critical assets for disasters.
- Tornado – Generate a map of sirens and the populations that receive the alert information.
- Severe Winter Storms – Increase public education for preparedness.

- Severe Winter Storms – Improve communications between Emergency Management Agency and utilities.
- Wildfire – Continue to participate in themed drills, such as TNCAT 12 for focused training.
- Extreme Temperatures – Define “vulnerable” populations in order to better coordinate with Public Health to identify these populations.
- Severe Thunderstorm – Continue participation as a STORMREADY community.
- Hazard Mitigation Planning in General – Improve emergency communication with surrounding states.
- Hazard Mitigation Planning in General – Hazard Mitigation Planning Committee meets annually to update action items.
- Terrorism – Continue disaster response training for Bristol Motor Speedway staff.
- Wildfire – Become a certified FIREWISE community.
- Wildfire – Investigate Improvements to ingress/egress routes for residential areas in Wildland/Urban Interface (WUI) or wildfire hazard areas.
- Willdfire – Investigate improvements in water delivery to residential areas in wildfire hazard areas.
- Wildfire – Develop and adopt design standards based on FIREWISE principles into subdivision ordinances.
- Landslides – Map known areas of landslide incidents and potential areas for landslides.
- Severe Thunderstorms/Severe Winter Storms – Require underground utilities in new subdivision developments.
- Floods – Identify methods to reduce flooding and loss in historic districts.
- Floods – Participate in CRS program.
- Review and update vulnerability assessments at water treatment facilities.
- Dam Failure – Modify zoning in inundation zones.

Goals and Objectives

The goals of the existing Local Hazard Mitigation Plan for Sullivan County were reviewed with the HMPC. The goals and objectives are as follows:

GOAL #1: Reduce the vulnerability of the people, property, and environment of Sullivan County to natural and man-made hazards.

- Objective 1.1: Protect community lifelines (existing and future) from identified natural and man-made hazards.
- Objective 1.2: Better manage flood hazard areas.
- Objective 1.3: Better manage fire hazard areas.
- Objective 1.4: Protect community historic preservation resources from identified natural and man-made hazards.

GOAL #2: Improve and maintain coordination and communication between all jurisdictions.

GOAL #3: Educate the public on identified natural and man-made hazards.

- **Improve Hazard Mitigation Planning for Bristol Motor Speedway (BMS) facility events.**

GOAL #4: Improve public hazard communication methods.

Planning for Public Involvement

Information Flyers and Website Information

Three public information flyers are available on the Sullivan County EMA website <http://www.sullivancountyttn.gov/node/99> .

Public Meeting

A public meeting is scheduled for June 18, 6pm at the Sullivan County Courthouse.

Review and Comment on Draft Plan

The draft plan will be available for public comment and review in mid-August. The plan will be posted to the Sullivan County EMA website as well as hard copies distributed within the community. AMEC will coordinate with Jim Bean on hard copy distribution.

Timeline

The following timeline was identified for the planning process:

- February 28th – HMPC Kickoff Meeting
- May 13th – HMPC Meeting #2 - Review of updated Hazard Identification and Risk Assessment
- June 18th - HMPC Meeting #3 - Mitigation Actions
- June 18th - Public Workshop

Next Steps

The following next steps and tasks were outlined at the close of the HPMC meeting:

- HMPC members are tasked with reviewing Chapters 1, 2 and the first part of Chapter 3 by July 12.
- AMEC and HMPC members to complete follow up on mitigation action implementation and administration items by July 26.
- AMEC to prepare draft and distribute to the HMPC by August 5.
- HMPC members are tasked to review and comment on the Draft Report and return comments to AMEC by August 16th
- Following incorporation of HMPC comments, the Draft Report will be available for the public to review and comment.
- Anticipated submittal date to TEMA – September 13.

ATTACHMENT A



Sullivan County Local Multi-Hazard Mitigation Plan Mitigation Strategy Meeting June 18, 2013

Cindy Popplewell and Sarah Ketron
AMEC Environment & Infrastructure, Inc.
Nashville, TN



Meeting Purpose

- Review of planning process and progress
- Review status of Draft Plan
- Mitigation Strategy
 - Review of Goals presented at HMPC Mtg #2
 - Development of Mitigation Action Items
 - Prioritization of Mitigation Action Items
- Next steps



Local Hazard Mitigation Plan Requirements

ORGANIZE RESOURCES

1. Get Organized
2. Plan for Public Involvement
3. Coordinate with Other Departments and Agencies

ASSESS HAZARDS AND RISK

4. Identify Hazards
5. Assess the Risks

DEVELOP MITIGATION PLAN

6. Set Planning Goals/Objectives
7. Review Possible Activities
8. Draft an Action Plan
9. Adopt the Plan

EVALUATE YOUR WORK

10. Implement the Plan, Evaluate Work, Revise as Needed



Status of Draft Plan

ORGANIZE RESOURCES

Chapter 1 – Introduction and Planning Process - *Draft for Review*

Chapter 2 – Community Profile and Capabilities - *Draft for Review*

ASSESS HAZARDS AND RISK

Chapter 3 – Risk Assessment

Part 1 – Hazard Profile
- *Draft for Review*

Part 2 – Vulnerability Assessment
- *Draft in progress*

DEVELOP MITIGATION PLAN

Chapter 4 – Mitigation Strategy
- *Draft in progress – TODAY'S TOPIC*

EVALUATE YOUR WORK

Chapter 5 – Plan Maintenance

- *Draft in progress*



Status of Draft Plan

- Draft Ch. 1 – Intro and Planning Process
- Draft Ch. 2 – Community Profile
- Draft Ch. 3 – Risk Assessment (Part 1)

COMMENTS DUE July 12th

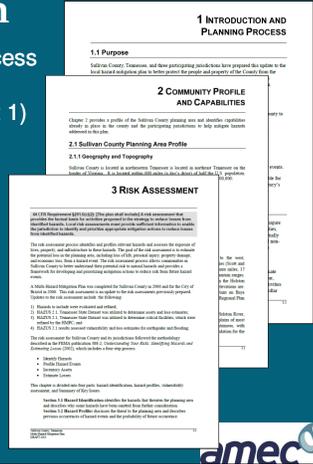
Provide Comments to:

E-mail to: sarah.ketron@amec.com

Fax to: 865-671-6254

Mail to:
AMEC
Attn: Sarah Ketron
9725 Cogdill Road
Knoxville, TN 37932

Phone: 423-220-7480



Mitigation Strategy

- Goals and Objectives
 - HMPC Meeting #2 – Updated Goals
- Action Items



GOALS

- Goal 1: Reduce the vulnerability of the people, property, and environment of Sullivan County to natural and man-made hazards
 - ❖ Objective: Protect community lifelines (existing and future) from identified natural and man-made hazards
 - ❖ Objective: Better manage flood hazard areas
 - ❖ Objective: Better manage fire hazard areas
 - ❖ Objective: Protect community historic preservation resources from identified natural and man-made hazards
- Goal 2: Improve and maintain coordination and communication between all jurisdictions
- Goal 3: Educate the public on identified natural and man-made hazards
 - ❖ Objective: Improve hazard mitigation planning for Bristol Motor Speedway (BMS) facility events
- Goal 4: Improve public hazard communication methods



Development of Mitigation Action Items

- Losses from hazards can be reduced if states and communities take constructive action before the next disaster occurs
- Actions have long term and cumulative benefits
- Some may be low-cost initiatives readily adopted
- Others may be dependent on available funding or best implemented following a disaster
- *Not all actions identified through this planning process will be eligible for FEMA grants*



Development of Mitigation Action Items

- Address hazards with high and moderate planning significance
- Address existing and future buildings and infrastructure
- Address participation in the National Flood Insurance Program (NFIP)
- Identify implementation and administration details for each action item



Hazard Summary

	Geographic Location	Probability	Magnitude	Planning Significance
Severe Winter Storms	Extensive	3 Highly Likely	4 Critical	3 10 High
Hazardous Materials Incidents	Significant	2 Highly Likely	4 Critical	3 9 High
Severe Thunderstorm	Extensive	3 Highly Likely	4 Limited	2 9 High
Extreme Temps	Extensive	3 Highly Likely	4 Negligible	1 8 Medium
Tornado	Extensive	3 Occasional	2 Critical	3 8 Medium
Flood	Limited	1 Likely	3 Critical	3 7 Medium
Landslide	Significant	2 Likely	3 Limited	2 7 Medium
Wildfire	Significant	2 Occasional	2 Critical	3 7 Medium
Terrorism Events	Limited	1 Unlikely	1 Catastrophic	4 6 Medium
Dam Failure	Significant	2 Unlikely	1 Critical	3 6 Low
Earthquake	Extensive	3 Occasional	2 Negligible	1 6 Low
Land Subsidence	Significant	2 Occasional	2 Limited	2 6 Low
Drought	Significant	2 Occasional	2 Negligible	1 5 Low



Mitigation Action Development

1. Review each hazard issues and potential actions
2. Group brainstorm potential mitigation actions
 - ❖ Write down individual ideas
 - ❖ Utilize example handout
3. Summarize/sort group developed actions
4. Prioritize/vote on all group developed actions
5. Follow-up with action implementation needs



Severe Winter Storm

- Issues
 - ❖ Entire community is susceptible
 - ❖ Power and utility failures; closing traffic routes; disruption in emergency and medical services; icy/dangerous roadways
- Potential Mitigation Actions
 - ❖ Utility repair/protection/replacement
 - ❖ Tree Maintenance program/training for pruning trees
 - ❖ Shelters/Heating Centers – Coordination with Red Cross
 - ❖ Public Education - preparation
 - ❖ Develop/revise a snow removal plan



Severe Thunderstorms

➤ Issues

- ❖ The majority of past disaster declarations, as well as past damages, have been related to flooding, *severe storms*, and tornadoes.
- ❖ Entire community is susceptible
- ❖ Winds can cause as much damage as a weak tornado

➤ Potential Mitigation Actions

- ❖ Public Education
- ❖ Utility repair/protection/replacement
- ❖ Lightning rods and grounding at critical facilities
- ❖ Warning Systems; Storm Ready communities
- ❖ Communication with neighboring communities
- ✓ Safe room / Shelters
- ✓ MACC developed in 2007



Hazardous Materials Incidents

➤ Issues

- ❖ Multiple Highway and railway incidents each year
- ❖ Previous events have resulted in major property damage and injury

➤ Potential Mitigation Actions

- ❖ HazMat Team certifications
- ❖ Develop and maintain comprehensive pre-incident and recovery plans
- ❖ Locate critical assets (people, activities, systems) away from entrances, vehicle circulation and parking, and loading and maintenance areas



Extreme Temperatures

➤ Issues

- ❖ Entire community is susceptible
- ❖ No or few injuries/illnesses; little or no property damage
- ❖ Little or no economic/crop loss

➤ Potential Mitigation Actions

- ❖ Shelters, Coordination with Red Cross
- ❖ Public Education, Identifying vulnerable populations
- ❖ Water Supply concerns/study
- ❖ Increase tree plantings around buildings to shade parking lots
- ❖ Encourage green roof designs



Tornado

➤ Issues

- ❖ Entire community is susceptible
- ❖ Previous events have resulted in major property damage and fatalities

➤ Potential Mitigation Actions

- ❖ Warning Systems
- ❖ Communication with neighboring communities and citizens
- ❖ Safe rooms/Shelters at mobile home parks
- ❖ Utility repair/protection/replacement
- ❖ Public Education
- ❖ Conduct tornado spotting classes



Floods

➤ Issues

- ❖ The majority of past disaster declarations, as well as past damages, have been related to flooding, severe storms, and tornadoes.
- ❖ Mapped 1% annual chance floodplain
- ❖ Stormwater Infrastructure
- ❖ Sensitive natural areas and species primarily occur along streams and drainages.
- ❖ NFIP Community – enforce floodplain ordinance and management regulations



Floods

➤ Potential Mitigation Actions

- ❖ Implement/adopt stream buffer standards for plans review standards
- ❖ Designate environmentally sensitive watersheds/stream reaches; wetlands
- ❖ Identify and implement stormwater infrastructure improvements – CIP?
- ❖ Improve floodplain management information on website
- ❖ Distribute NFIP and floodplain development information for access by the public
- ✓ Participate in Community Rating System
- ✓ Public education regarding flood insurance – annual mailings
- ✓ 2006 new DFIRM mapping and new Flood Ordinance
- ✓ Land Use Plan adopted 2008



Landslide

➤ Issues

- ❖ Steep topography
- ❖ Resulting property damage and road closures

➤ Potential Mitigation Actions

- ❖ Open space preservation
- ❖ Implementation and enforcement of hillside protection plan
- ❖ Creating or increasing setback limits on parcels near high-risk areas.
- ❖ Acquisition of hazard-prone structures
- ❖ Emergency Action Plan for warning and evacuation
- ❖ Landslide – preparedness outreach



Wildfire

➤ Issues

- ❖ Defined Wildland-Urban Interface areas

➤ Potential Mitigation Actions

- ❖ Open space preservation
- ❖ Policy/Zoning for development within the WUI area
- ❖ Encouraging the use of non-combustible materials (i.e., stone, brick, and stucco) for new construction in wildfire hazard areas.
- ❖ Creating defensible zones around power lines, oil and gas lines, and other infrastructure systems.
- ❖ Certification as Firewise Community



Terrorism

➤ Issues

- ❖ High profile events at Bristol Motor Speedway draw large crowds
- ❖ Identified critical assets and potential locations for terrorist events

➤ Potential Mitigation Actions – Facility Specific

- ✓ Pedestrian Enhancements – separate vehicle and pedestrian traffic
- ❖ Minimize concealment opportunities in landscaping
- ❖ Ensure adequate site lighting
- ❖ Separate delivery processing facilities from remaining buildings
- ❖ Maintain access for emergency responders, including large fire apparatus
- ❖ Identify and provide alternate water supplies for fire suppression



General

➤ Potential Mitigation Actions

- ❖ Coordinate annual meetings for Hazard Mitigation Planning Committee to monitor, evaluate, and update the local mitigation plan
- ❖ Develop public and private sector partnerships to foster hazard mitigation activities
- ❖ Ongoing education in newsletter
- ❖ Coordinate timely clean-up when resources permit



Prioritization

➤ Multi-Vote Ranking

- ❖ Ease of Implementation
- ❖ Multi-Objective Actions
- ❖ Time
- ❖ Post-Disaster Mitigation



Next Steps

- Follow up on Mitigation Action implementation and administration
- Distribute 3rd public information flyer
- Set date for Draft Plan completion and review
- Set procedure for public review of Draft plan



July							August							September						
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6			1	2	3			1	2	3	4	5	6	7
7	8	9	10	11	12	13	4	5	6	7	8	9	10	8	9	10	11	12	13	14
14	15	16	17	18	19	20	11	12	13	14	15	16	17	15	16	17	18	19	20	21
21	22	23	24	25	26	27	18	19	20	21	22	23	24	22	23	24	25	26	27	28
28	29	30	31				25	26	27	28	29	30	31	29	30					

- ✓ July 12 – Deadline for comments on Ch 1 – 3
- ✓ July 26 – Deadline for implement/admin information on action items
- ✓ August 5th – AMEC provide final DRAFT document
- ✓ August 16th – Deadline for all comments on DRAFT document (HMPC)
- ✓ August 30th – Deadline for all comments on DRAFT document (Public)
- ✓ September 13th – Submit to TEMA/FEMA

Thank You!

Cindy Popplewell and Sarah Ketron
 AMEC Environment & Infrastructure, Inc.
 (615) 944-9013 (423) 220-7480



ATTACHMENT B

Sullivan County Multi-Jurisdictional
Local Multi-Hazard Mitigation Plan
Planning Committee Meeting – June 18, 2013

Name	Agency	Phone	Email
Judy Dulaney	Bluff City	612-0828	bluffcitycityof@aol.com
Greg Depew	Bluff City	612-2663	gregdepewbcpc@aol.com
Jim Breen	EMA	323-6912	jbrean@sullivancountyema.com
Steve Perry	EMA	323-6912	sperry@sullivancountyema.com
Bill Sorrah	City of Bristol	989-5565	bsorrah@brillta.org
Tina Wright	EMA	323-6912	twright@sullivancountyema.com
Bryan Embree	EMA	340-1392	bced113@gmail.com

Sullivan County Local Hazard Mitigation Plan

Sullivan County is developing a comprehensive Hazard Mitigation Plan to better address potential natural and manmade hazards **before they occur** and to obtain eligibility for mitigation funding from the Federal Emergency Management Agency (FEMA). This is a **multi-jurisdictional planning process** and is a cooperative effort between Sullivan County, the Town of Bluff City, City of Bristol, and City of Kingsport.

What Is a Hazard Mitigation Plan?

A hazard mitigation plan is the result of a planning process to determine how to reduce or eliminate the loss of life and property damage resulting from hazards. This plan will address a comprehensive list of natural hazards – ranging from flooding and earthquakes to tornadoes, and severe winter weather. The plan will assess the likely impacts of these hazards to communities in Sullivan County. This planning process is structured around four phases: Phase 1: Organize Resources, Phase 2: Assess Risks, Phase 3: Develop a Mitigation Plan, and Phase 4: Implement the Plan and Monitor Progress. These four phases are further broken down into 10 steps, shown in the box to the right.



Why is it Important to Me?

It is important for citizens to become involved in mitigation planning in their community. The planning team needs your input on the types of hazards that are your priority concern. Your opinion on ways to prevent or lessen the impacts of hazards is also valuable input for the planning team.

What Can I do to Participate?

Please plan to attend our upcoming public meeting:

**Multi-Hazard Mitigation Plan
Public Meeting
Tuesday, June 18th
6:00pm
~ following Planning Commission Meeting ~
Commission Room
Sullivan County Courthouse
3411 Highway 126
Blountville, TN**

Additionally, prior to being submitted to the Tennessee Emergency Management Agency and FEMA, the draft plan will be circulated for public comment. Information on accessing and commenting on the plan will be posted in local newspapers and the County's website in the future.

For more information please contact Jim Bean
Sullivan County Emergency Management Agency
at (423) 323-6912 or <http://www.sullivancountyttn.gov/node/99>

LHMPC-Comments April 23, 2014

Notes from Jake White (Kingsport):

1. On page 25 "Sullivan Vounty Community Basemap" I-181 was changed to I-26 several years back. The Interstate labeled as I-181 should be labeled as I-26. I-81 is mislabeled as I-26.
2. On page 36 Figure 2.3 - "Sullivan County Proposed Land Use" the current Kingsport City Limits should be used.
3. On page 60 "Sullivan County Dam Location Map". I-81 is mislabeled as I-26.
4. On page 81 "Sullivan County 100 Year Floodplain" - . I-81 is mislabeled as I-26.
5. On page 82 "Sullivan County 100 year Floodplain" - Label "I-81" is out in space. It should be placed on interstate.
6. On page 90 "Sullivan County Karst Hazard Areas". I-81 is mislabeled as I-26.
7. On page 107 "Sullivan County Wildland Urban Interface (WUI)" - The Interstate labeled as I-181 should be labeled as I-26. I-81 is mislabeled as I-26.
8. On page 117 "Sullivan County Tier II Facilities. I-81 is mislabeled as I-26.
9. On page 135 "Sullivan County Critical Facilities". I-81 is mislabeled as I-26.

Notes from Jim Bean:

10. p. 2-12 to 2-13, transition between pages, "0" starts the paragraph on page 2-13.
11. p. 3-21, second to last paragraph, refers to "0" table name.
12. p.3-32, Third paragraph under City of Kingsport, date"1174" is incorrect- change to 1774. (I also attached some notes so that references can be added accordingly.)
13. p.3-67, last paragraph, refers to table "0".

Notes from Ambre Torbett (Sullivan County):

14. For mitigation strategies- Sinkholes, p. 4-6, add a statement that all jurisdictions will report sinkhole incidents to Sullivan County emergency management over the next 10 years.
15. Global-Sullivan County Planning "Commission" should be changed "Department" except in reference to the Commission meeting that took place.
16. Table 2-10 needs to reference Bluff City's Plan
17. Table 2-12 needs to reference Bristol's Plan
18. Table 2-14 needs to reference Kingsport's Plan

Notes from Scott Boyd (Kingsport Fire Chief)

19. Table 3-30 add Kingsport Fire Department Station #7 @ 1440 Rock Springs Road and Kingsport Fire Department Station #8 @ 1205 New Beason Well Road. I question do these locations fall within the flood, land subsidence, landslide or wildfire zones? Population projections may have changed some, Kingsport's current population is 51,264. If I find any other discrepancies I will forward them to you.

SULLIVAN COUNTY



- HOME
- GOVERNMENT
- LIVING IN SULLIVAN COUNTY
- ONLINE SERVICES
- EMPLOYEE INFORMATION

Home › Government › Emergency Management › Emergency Management

EMERGENCY MANAGEMENT

Sullivan County is developing a comprehensive Hazard Mitigation Plan to better address potential natural hazards **before they occur** and to obtain eligibility for mitigation funding from the Federal Emergency Management Agency (FEMA). This is a **multi-jurisdictional planning** process and is a cooperative effort between Sullivan County, The Town of Bluff City, City of Bristol, and City of Kingsport. Please look at the documents listed below for more information.

Check back to this site frequently for a survey collect public input.

- [Sullivan_Mitigation_Info_1_Feb_2013.pdf](#)
- [Sullivan_Mitigation_Info_2_May_2013.pdf](#)
- [Sullivan_Mitigation_Info_3_June_2013.pdf](#)
- [DRAFT_Sullivan_1 Intro and Planning Process.pdf](#)
- [DRAFT_Sullivan_2 Community Profiles.pdf](#)
- [DRAFT_Sullivan_3_Risk Assessment_Part I_6-25-v2.pdf](#)

- › Home
- › EMA Employees
- › LEPC
- › Hazard Mitigation
- › EMA Links
 - › WebEOC
 - › Tier II Reporting
 - › Documents
 - › NIMS Resource Center
- › Emergency Links
 - › TEMA
 - › FEMA Independent Study
 - › CDC Emergency Preparedness
- › Customer Service
 - › Morristown Weather
 - › Ready.Gov
 - › KidsReady.Gov



Sullivan County Emergency Management Agency

109 likes · 7 talking about this · 0 were here

✓ Liked

Message



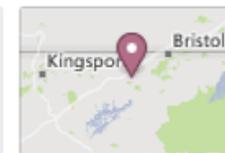
Government Organization



Photos

109 Likes

Likes



Map

About - Suggest an Edit

Highlights

Post Photo / Video

Write something...



Sullivan County Emergency Management Agency shared a link

14 hours ago

Sullivan County is updating the Hazard Mitigation Plan. Part of this is to add a section on our website. Check back frequently for updates.

Recent Posts by Others

See All



Bill Creasy

Thanks for the alerts

June 13 at 1:50pm

Recommendations



What do you like about this place?

Create Page



Learn to Buy & Sell Homes for Fast Profit! Knoxville-Johnson City Area 7/10-7/13. Sign Up.

HAPPYFAMILY



Are your kids picky eaters? Share your story with us for a chance to win \$20,000!

Like Jennifer Glisson Olson likes HAPPYFAMILY.

Now

Joined Facebook

Chat (10)

Public Notice

The Sullivan County Regional Planning Commission will host a public meeting on June 18th at 6:00 PM within the Commission Hall on the 2nd floor of the Historic County Courthouse, located at 3411 Hwy. 126, Blountville, TN. The purpose of the meeting is to hear the summary of the draft plan of the Multi-Hazard Mitigation Plan prepared for Sullivan County, Town of Bluff City, City of Bristol and the City of Kingsport. The plan is part of the multi-jurisdictional planning process to meet the mandated mitigation planning requirements set forth by the Federal Emergency Management Agency. The public is welcome to attend and comment on the draft plan. The plan will be circulated for public comment as well as posted on the websites of each community prior to being submitted to TEMA and FEMA. For more information, please contact the local Sullivan County EMA office at 423.323.6912.

KINGSPORT TIMES-NEWS

PUBLICATION CERTIFICATE

Kingsport, TN 6/3/13

This is to certify that the Legal Notice hereto attached was published in the Kingsport Times-News, a daily newspaper published in the City of Kingsport, County of Sullivan, State of Tennessee, beginning in the issue of June 1, 2013, and appearing 1 consecutive weeks (times), as per order of

Sullivan County Planning + Zoning

Signed Sheryl Edwards

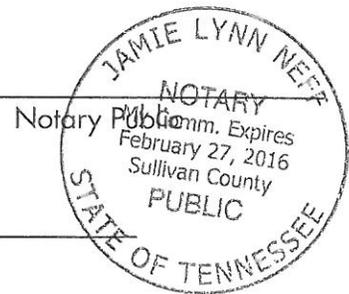
PUBLIC NOTICE
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PUB1T; 06/01/13

STATE OF TENNESSEE, SULLIVAN COUNTY, TO WIT:

Personally appeared before me this 3rd day of June, 2013, Sheryl Edwards

of the Kingsport Times-News and in due form of law made oath that the foregoing statement was true to the best of my knowledge and belief.

June S. Reff



My commission expires Feb 27, 2016



Order Confirmation

Ad Order Number 0001083952	Customer SULLIVAN CO PLANNING & ZONING	Payor Customer SULLIVAN CO PLANNING & ZONING
Sales Rep. sedwards	Customer Account 1047408	Payor Account 1047408
Order Taker sedwards	Customer Address 3411 HIGHWAY 126,SUITE 206,AMBRE T BLOUNTVILLE TN 37617 USA	Payor Address 3411 HIGHWAY 126,SUITE 206,AMB BLOUNTVILLE TN 37617 USA
Ordered By	Customer Phone 423-279-2603	Payor Phone 423-279-2603
Order Source	Customer Fax	Customer EMail planning@sullivancountytn.gov
PO Number		

PUBLIC NOTICE

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PUB1T: 06/01/13

Tear Sheets 0	Proofs 0	Affidavits 1	Payment Method
Invoice Text:			Color <NONE>
Blind Box	Materials		
Net Amount \$50.88	Tax Amount \$0.00	Total Amount \$50.88	Payment Amt \$0.00
			Amount Due \$50.88

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External Ad #	Ad Attributes		
Run Dates	6/1/2013		

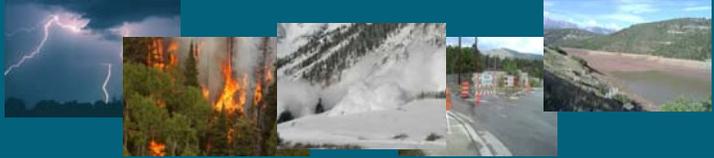
PLEASE SIGN IN:

	<u>Name</u>		<u>Name</u>
1	John & Dolores Compton	21	
2	James Roberts	22	
3	Jim Bae - EMA	23	
4	Sarah Keaton - AMEC	24	
5	Scott Boyd - Kpt Fire Dept.	25	
6	Cindy Popplewell - AMEC	26	
7	Stephen Scheer	27	
8	Wayne BARTNEY	28	
9		29	
10		30	
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20		40	

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Sullivan County Multi-Hazard Mitigation Plan Update

Cindy Popplewell and Sarah Ketron
AMEC Environment & Infrastructure, Inc.
Nashville, TN and Gray, TN



Multi-Hazard Mitigation Plan

What Is Mitigation?

- **Sustained action** taken to reduce or eliminate long-term risk to human life and property from natural or man-made hazards.

What is Mitigation Planning?

A process for communities to:

- Identify the natural or man-made hazards to which they are at risk,
- Assess the potential impacts of those hazards,
- Develop goals, objectives, and **actions** to reduce impacts
- Prioritize and implement mitigation actions.

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Multi-Hazard Mitigation Plan

Why Mitigation Planning?

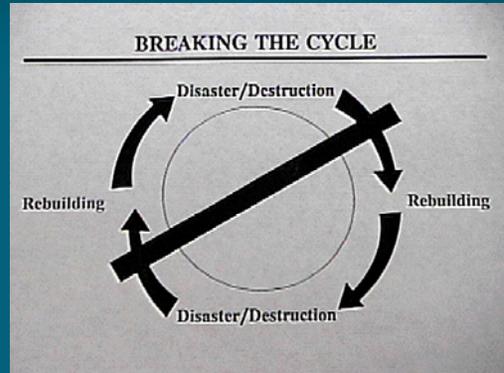
- **Increasing Cost of Disaster Response and Recovery**
- **Population Growth and Development**
 - 1990 – 143,596 2000 – 153,048 2010 - 156,823
- **More Disaster Declarations**
 - Average 34 Declarations/Year
 - Over 8,000 fatalities and 50,000 injuries since 1975
 - Thousands Made Homeless
 - Billions of Tax Dollars Spent



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Multi-Hazard Mitigation Plan

Why Mitigation Planning?



amec

Why Mitigation Planning?

Disaster Mitigation Act of 2000

- Public Law 106-390; Amendment to the Stafford Act
- Requires local governments to adopt a natural hazard mitigation plan to maintain eligibility for FEMA mitigation funds:
 - ✓ Hazard Mitigation Grant Program
 - ✓ Pre-Disaster Mitigation Program
 - ✓ Flood Mitigation Assistance Program
 - ✓ Severe Repetitive Loss Program
 - ✓ And expect more in the future ...



How do we prepare a Local Mitigation Plan?

ORGANIZE RESOURCES

1. Get Organized
2. Plan for Public Involvement
3. Coordinate with Other Departments and Agencies

ASSESS HAZARDS AND RISK

4. Identify Hazards
5. Assess the Risks

DEVELOP MITIGATION PLAN

6. Set Planning Goals
7. Review Possible Activities
8. Draft an Action Plan
9. Adopt the Plan

EVALUATE YOUR WORK

10. Implement the Plan, Evaluate Work, Revise as Needed



How do we UPDATE a Local Mitigation Plan?

ORGANIZE RESOURCES

1. Get Organized – *Single County-Wide Plan; new Hazard Mitigation Planning Committee (new staff, new communities)*
2. Plan for Public Involvement
3. Coordinate with Other Departments and Agencies

ASSESS HAZARDS AND RISK

4. Identify Hazards – *new events since 2005; new flood insurance rate maps; hazardous materials reporting and incidents*
5. Assess the Risks – *updated population; development; community boundaries*



How do we UPDATE a Local Mitigation Plan?

DEVELOP MITIGATION PLAN

6. Set Planning Goals – *Reorganization; update with combination of plans*
7. Review Possible Activities – *Update status of existing; Identify new*
8. Draft an Action Plan – *Develop implementation plan for new mitigation actions*
9. Adopt the Plan – *All communities are required to adopt updated plan*

EVALUATE YOUR WORK

10. Implement the Plan, Evaluate Work, Revise as Needed



Current Status of Local Mitigation Planning

ORGANIZE RESOURCES

- Kickoff Meeting in Feb 2013

1. Get Organized
2. Plan for Public Involvement
3. Coordinate with Other Departments and Agencies

ASSESS HAZARDS AND RISK

- HMPC Meeting in May 2013

4. Identify Hazards
5. Assess the Risks

DEVELOP MITIGATION PLAN

- HMPC Meeting in June 2013

6. Set Planning Goals
7. Review Possible Activities
8. Draft an Action Plan
9. Adopt the Plan
10. Implement the Plan, Evaluate Work, Revise as Needed

EVALUATE YOUR WORK



How Can I Get Involved?

- Information Flyers on Community Website



- Contact Local Emergency Management with any questions or concerns
- Review and Comment on the Draft Plan
– available in mid-August



APPENDIX C

MITIGATION ALTERNATIVES

Appendix B includes information from a handout used in Meeting #3 of the Hazard Mitigation Planning Committee to identify and prioritize mitigation actions.

Categories of Mitigation Actions

FEMA's publication *Developing the Mitigation Plan* emphasizes the following six categories of mitigation activities and examples:

1. Prevention: Administrative or regulatory actions/processes that influence the way land and buildings are developed and built.

- Building codes and enforcement
- Floodplain development regulations
- Open space preservation
- Stormwater management regulations

2. Property Protection: Actions that involve the modification of existing buildings or structures to protect them from a hazard or removal from the hazard area.

- Acquisition of hazard prone structures
- Construction of barriers around structures
- Elevation of structures
- Relocation out of hazard areas

3. Public Education and Awareness: Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.

- Public education and outreach programs
- Real estate disclosure
- Flood insurance
- Hazard Information Centers

4 Natural Resource Protection: Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems.

- Best Management Practices (BMPs)
- Forest and vegetation management
- Hydrological Monitoring

- Urban forestry and landscape management

5. Emergency Services: Actions that protect people and property during and immediately after a disaster or hazard event. Protection of critical facilities

- Critical facilities protection
- Emergency response services
- Hazard warning systems
- Hazard threat recognition

6. Structural Projects: Actions that involve the construction of structures to reduce the impact of hazard.

- Channel maintenance
- Dam/reservoirs
- Levees/floodwalls
- Safe rooms/shelters

Not all of the mitigation actions presented to and/or discussed by the HMPC became recommended action items. Action items may not have been considered to be cost-effective or support the community's goals. Additionally, action items may have lacked political support, constituent support, and funding. Action items not recommended or included in the priority list are presented in the following tables.

Table C.1. Alternative Mitigation Actions Completed

Jurisdiction	Action	Status
Sullivan County	1. Align the Sullivan County Multi-Jurisdiction HMP with Bristol’s HMP. Re-incorporate the Bristol HMP into the overall Sullivan County plan to coordinate hazard mitigation better within the County.	Completed with this 2013 plan update.
Multi-Jurisdictional	2. Integrate hazard mitigation into all aspects of County planning, including land use planning and Emergency Operations Plan.	Completed in 2008 with the adoption of the Sullivan County Land Use 2006-2026 Plan; Kingsport also integrates hazard mitigation into CIP stormwater projects and in EOP continuing to work on updates to LUP and strategic plans.
Bristol	3. Improve and maintain coordination and communication with TDOT on bridge replacements and repairs for Volunteer Parkway and other State roadways that are key transportation routes during race weekends.	Completed in November 2008; Highway 11E pedestrian enhancements.
Bristol	4. Partner with local industries for hazard mitigation implementation.	Completed in 2005; BMS event management for hazard mitigation.
Multi-Jurisdictional	5.a. Improve community regulation and planning to address small stream flooding. 5.b. Revise floodplain regulations to better guide development in and around floodplains.	Completed September 2006 with adoption of new mapping and flood damage prevention ordinance.
Sullivan County	6. Become a Storm Ready Community.	Completed in 2008; Sullivan County became a StormReady Community.
Bristol	7. Improve pedestrian ingress/egress walkways and signage around the Bristol Motor Speedway facility to improve evacuation procedures in the event of an emergency.	Completed in November 2008; Highway 11E pedestrian enhancements.

Jurisdiction	Action	Status
Bristol	8. Prepare hazard mitigation plans and procedures for campsites surrounding the Bristol Motor Speedway facility.	Procedures have been developed for Fire Department shift commanders.
Bristol	9. Improve coordination with the Federal Aviation Administration (FAA) and the Transportation Security Administration (TSA) on airspace restrictions associated with events at the Bristol Motor Speedway facility.	At maximum restriction for specific security level.
Bristol	10. Improve communication to public attending BMS events about evacuation procedures in and around Bristol Motor Speedway.	Completed 2010; Facility evacuation plan was developed by BMS. Public notification is given on the large viewing screens inside the track.
Bristol	11. Improve the City's emergency communication system.	Completed in 2007 with periodic updates; An Executive Emergency Plan for internal communications was put in place in 2005. The Multi-Agency Communications Center (MACC) was developed in 2007.
Bristol	12. Investigate the replacement of the current civil alarm notification system.	Completed in 2007; Electronically through the Reverse Calling System. Adding 2 more warning sirens for system total of 7 with potential of adding more and upgrading the original 5.
Multi-Jurisdictional	13.a. Update Floodplain Mapping. 13.b. Pursue alternative funding sources for updating floodplain mapping.	Completed September 2006; New Countywide FIRM maps; LOMRs may occur at future dates.

Jurisdiction	Action	Status
Multi-Jurisdictional	<p>14.a. Identify all historic resources, such as buildings and other properties, and assess their potential hazards.</p> <p>14.b. Develop repair and reconstruction policies or rules for historic structures and integrate into historic preservation requirements in each community. Educate historic districts and the planning commission about the policies.</p>	<p>Historic structures are identified in the National Register and local historic zoning districts. Kingsport has implemented a “demo by neglect” policy to ensure the structures within the historic district are maintained at a certain level that is consistent with the character of the neighborhood. In addition, the Kingsport has developed extensive guidelines for each historic district. Kingsport also makes a concerted effort to communicate information to realtors regarding historic districts.</p>