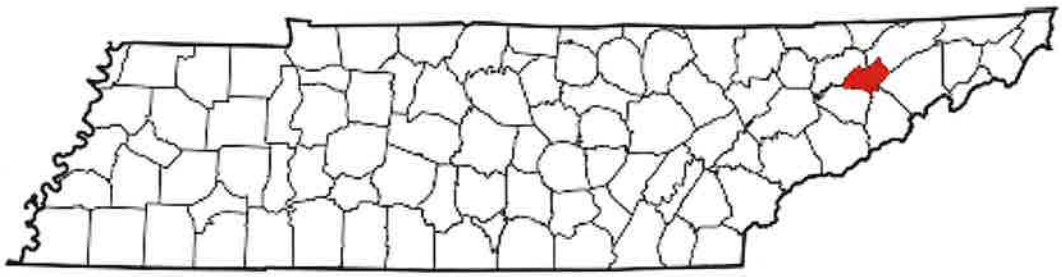
Hamblen County Multi-Jurisdictional Hazard Mitigation Plan



January 18, 2023

Prepared By:

Hamblen County Hazard Mitigation Committee

Hamblen County Emergency Management

Assistance Provided By:

Tennessee Emergency Management Agency
as part of the Tennessee Mitigation Initiative

Executive Summary

Over the past two decades, hazard mitigation has gained increased national attention due to the large number of natural disasters that have occurred throughout the U.S. and the rapid rise in costs associated with those disaster recoveries. It has become apparent that money spent mitigating potential impacts of a disaster event can result in substantial savings of life and property. With these benefit cost ratios being extremely advantageous, the Disaster Mitigation Act of 2000 was developed as U.S. Federal legislation that reinforces the importance of pre-disaster mitigation planning by calling for local governments to develop mitigation plans *(44 CFR 201)*.

The purpose of a local hazard mitigation plan is to identify the community's notable risks and specific vulnerabilities, and then to create/implement corresponding mitigation projects to address those areas of concern. This methodology helps reduce human, environmental, and economical costs from natural and man-made hazards through the creation of long-term mitigation initiatives.

The advantages of developing a local hazard mitigation plan are numerous including improved post-disaster decision making, education on mitigation approaches, an organizational method for prioritizing mitigation projects, etc. It has been noted that communities who successfully complete and maintain a mitigation plan receive larger amounts of Federal and State funding to be used on mitigation projects, and receive these funds faster, than communities who do not have a plan. Such funding sources that the plan caters to are Building Resilient Infrastructure Communities, Flood Mitigation Assistance, and Hazard Mitigation Grant Programs.

The 2022 update of the Hamblen County Multi-Jurisdictional Hazard Mitigation Plan was created to act as a well-thought-out guide to be used by, and for, the people of Hamblen County. For this plan to be successful, the following jurisdictions participated in the drafting and preparation of the plan update.

- Hamblen County (unincorporated)
- City of Morristown

In reference to federal code title *44 CFR 201*, the plan is required to be submitted to both TEMA (State) and FEMA (Federal) for review to be approved. When the plan is deemed "approval pending adoption" by FEMA *(44 CFR 201.6(c)5)*, each of the participating jurisdictions will adopt the plan through a local resolution.

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Appendices

Section 1: Planning Process

Planning Process Update

The last Hamblen County Multi-Jurisdictional Hazard Mitigation Plan was approved by FEMA on July 17, 2018. Per federal requirements stated in *44 CFR 201*, all local hazard mitigation plans are required to go through a FEMA update review every 5 years to remain eligible for hazard mitigation grants. This updated methodology was developed to ensure that local governments are continuing to re-evaluate their risks and to regularly implement mitigation projects that can reduce community vulnerabilities.

The plan's five-year update process took place at a meeting on November 16, 2022, with Hamblen County, City of Morristown, law enforcement, EMS, Chamber of Commerce, National Weather Service, Tennessee Emergency Management Agency (TEMA) (***See Appendix 1***) and others. Emails were exchanged prior and post meeting to ensure the completion of the needed information and communication. The Director for Hamblen County Emergency Management was designated as the person who would be leading staff and interested persons in updating the mitigation plan. The tasks undertaken at the meeting by the Hamblen County Hazard Mitigation Committee consisted of continuing to get agencies and the public involved in the county's mitigation efforts, performing the required 5-year plan update, and soliciting for new mitigation actions/projects to be added to the plan. TEMA provided requested technical assistance at the beginning of the update process by presenting successful strategies that have been used in updating hazard mitigation plans, facilitating the meeting, and guiding the committee on planning requirements; (a service established as part of the Tennessee Mitigation Initiative). Additional activities during the meeting included reviewing past incidents, disasters, and data to gain a complete understanding of the hazards faced by Hamblen County and all jurisdictions within. The committee proceeded to rate each hazard to evaluate risk. This rating of each hazard is incorporated into the plan under Risk Assessment. The mitigation goals were established and reviewed. Emails were exchanged to ensure appropriate documentation of desired projects along with completing the rating of each project.

Prior to these meetings, the Hamblen County Emergency Management Director began reorganizing the county-wide hazard mitigation committee. Realizing that a successful mitigation committee includes a number of representatives, specialists, and individuals who can give valuable/unique insights that local emergency management staff may not have considered; invites to be a part of this plan update included open invitation to elected officials, county and city staff, representatives of the jurisdictions, neighboring counties, local businesses, state agencies, private organizations, academia, non-profits, and other noticeable persons. These invites included email, and phone contact by the Hamblen County Emergency Management Director and the Tennessee Emergency Management Agency.

Within this plan update, the participating jurisdictions are outlined in the Executive Summary. The Hamblen County Hazard Mitigation Committee for the plan update consists of the following members:

Member	Representation
Chris Bell	Director, Morristown-Hamblen County Emergency Management Agency
C. Letterman	Captain/Accreditation Manager, Morristown Police
Danny Houseright	EMS Director, Morristown-Hamblen EMS
Lindsey Horn	Administrative Assistant, Morristown-Hamblen County Emergency Management Agency
Anthony Cavallucci	Warning Coordination Meteorologist, National Weather Service
Paul Brown	Public Works Director, City of Morristown
Jodi Barnard	Director of Business Development, Chamber of Commerce
Hugh Clement	Assistant Superintendent, Hamblen County Board of Education
Keith Rouse	Training Officer, Morristown Fire
Keith Ely	Assessor, Hamblen County
Greg Hurd	Technician, TDOT
Tim Drummonds	Technical Supervisor, Tennessee Department of Transportation
Charles Southerland	Director, Management Services – Morristown Utilities
Barry Poole	Road Superintendent, Hamblen County
Vodra Hugh Moore, Jr	Captain, Hamblen County Sheriff
Michael Poteet	Stormwater Coordinator, City of Morristown
Michelle Klein	Tennessee Emergency Management Agency, Regional Planner

The Hamblen County Hazard Mitigation Committee continues to be the county's lead in all mitigation efforts and in the development of the county's mitigation plan. The committee member's efforts in the plan update were broken down into five stages: **1)** analysis of the 2018 plan **2)** updating of the plan, **3)** public participation, **4)** review of the final updated plan, and **5)** adoption of the plan.

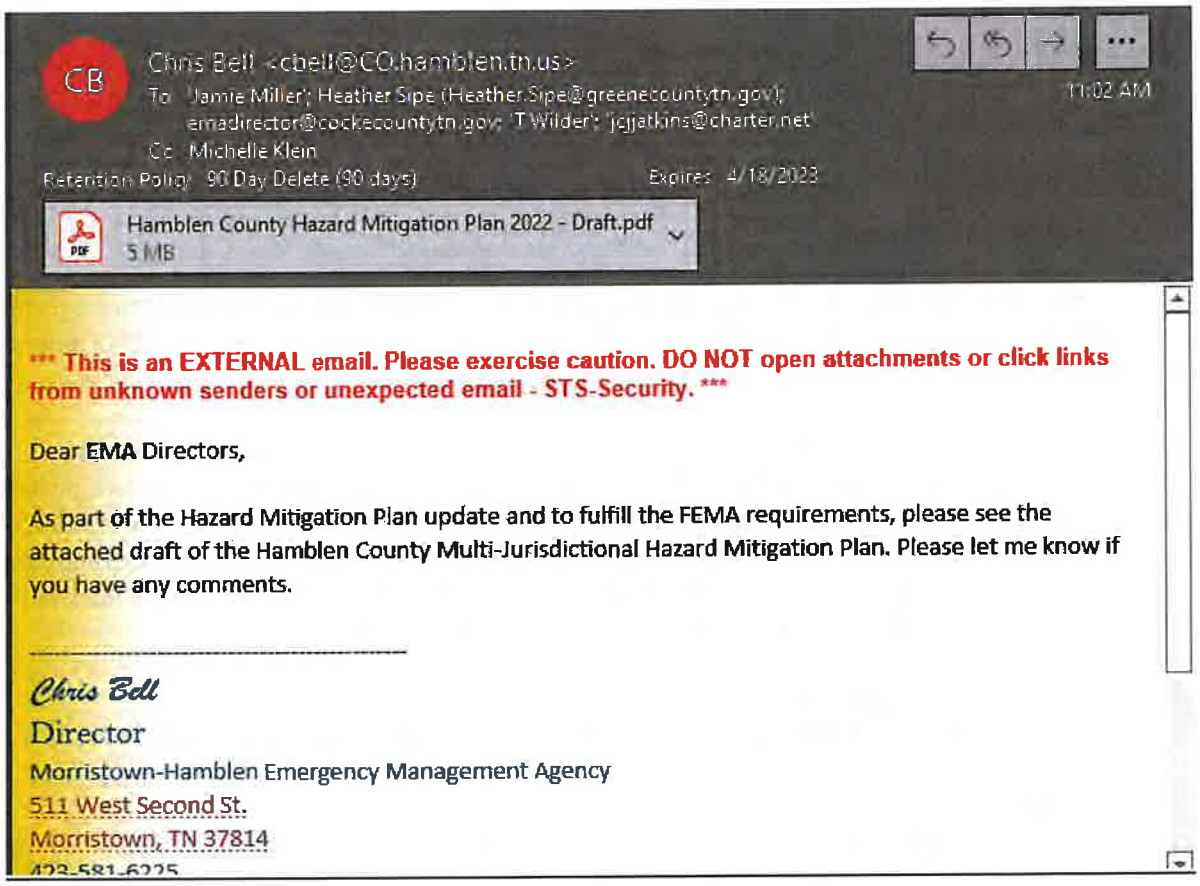
Stage 1: During the analysis of the plan, Hamblen County Emergency Management, with assistance from TEMA, reviewed the original county plan and made notes on what sections would require the main updates. Hamblen County Emergency Management suggested that the two core areas for needed updates were in the risk/vulnerability assessment and in the restructuring of the county's listed hazard mitigation projects. Additionally, a review of the hazards listed in the 2017 plan occurred. An intense discussion occurred to determine its best to focus on the top tier hazards for financial and planning purposes instead of focusing on every possible hazard that Hamblen County, and all jurisdictions within, could face. Within this updated plan are now Hazards of Prime Concern.

Stage 2: From there the committee started making the updates to the plan. Tasks included soliciting for new mitigation projects to be added to the plan and examining the status of mitigation projects listed in the 2018 plan.

Stage 3: To encourage public involvement, the Hamblen County Hazard Mitigation Committee advertised the committee meeting on their Facebook page on November 2, 2022. Social media has become further reaching to residents. The local newspaper has limited to no impact due to minimal readers. This notice presents the purpose of the meeting, the time and date of the meeting, how to access the meeting, and stated that all are invited to attend. This meeting provided a great opportunity for the public to comment on the plan during the update drafting stage, to contribute to project proposals, and to participate in project reprioritization. ***Appendix 1*** provides a copy of the meeting's attendance sheet and ***Appendix 2*** presents a copy of the public notice for the meeting. No members of the public attended.

Stage 4: Next the committee evaluated the written updates of the plan against FEMA's crosswalk requirements via email correspondence. This also included having the jurisdictions review the drafts that specifically addressed aspects of their jurisdiction before the plan is sent to FEMA for review.

The Hamblen County Emergency Management Director sent a request to the surrounding Counties to provide an opportunity for review and comment. Below is a screenshot of that request. These Counties are Hawkins, Greene, Cocke, Jefferson and Grainger.



CB

Chris Bell <cbell@CO.hamblen.tn.us>

To: Jamie Miller; Heather Sipe (Heather.Sipe@greenecountytn.gov); emadirector@cockecountytn.gov; T Wilder; jcjjatkins@charter.net

Cc: Michelle Klein

11:02 AM

Retention Policy: 90 Day Delete (90 days) Expires: 4/18/2023

Hamblen County Hazard Mitigation Plan 2022 - Draft.pdf
5 MB

*** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. ***

Dear EMA Directors,

As part of the Hazard Mitigation Plan update and to fulfill the FEMA requirements, please see the attached draft of the Hamblen County Multi-Jurisdictional Hazard Mitigation Plan. Please let me know if you have any comments.

Chris Bell
Director
Morristown-Hamblen Emergency Management Agency
511 West Second St.
Morristown, TN 37814
423-581-6225

Stage 5: Upon receiving the "Approval Pending Adoption" designation from FEMA's review, adoption/resolution will be obtained for each participating jurisdiction.

Review of Existing Information

A preliminary review of existing plans, reports, and information was conducted during the initial phase of creating the Hamblen County Multi-Jurisdictional Hazard Mitigation Plan. The primary purpose of reviewing this information was to identify local hazards, recognize local risks, and understand local vulnerabilities. The following list of sources identifies some of the existing studies that were reviewed:

- State of Tennessee Hazard Mitigation Plan
- Tennessee Emergency Management Plan (TEMP)
- U.S. Census Bureau
- FEMA Mitigation "How to" Guides
- NOAA National Climatic Data Center (NCDC) storm reports
- Hamblen County BEOP
- Hamblen County Schools Emergency Plans

All the listed plans, studies, and data sources were incorporated into the Hamblen County Multi-Jurisdictional Hazard Mitigation Plan. These sources developed the plan's hazard, risk, and vulnerability assessment sections that in return led to the establishment of meaningful mitigation projects (aka: actions).

Updates within the Plan

It is important to note that this countywide plan was entirely reorganized and updated head-to-toe from the original Hamblen County Multi-Jurisdictional Hazard Mitigation Plan. Hamblen County reviewed and analyzed each section of the original plan and made updates in the following ways:

Section 1: Planning Process

Hamblen County updated the original plan's description of the planning process to include the new or no longer participating committee members, updated the plan's description of the most recent countywide mitigation meeting that took place in 2022, and documented the last opportunities for the public to get involved. Hamblen County also reviewed the list of existing documents from the 2018 plan and updated accordingly.

Section 2: County Profile

Hamblen County created a new development trends section in this plan update.

Section 3: Risk Assessment

The committee reviewed their hazards from the 2018 plan and decided to focus more on hazards of prime concern. This shift was made to allow for more meaningful mitigation actions/projects. These hazards include Flooding, Severe Storms (Wind, Tornado), Winter Weather, and Sinkholes.

As part of the plan update, Hamblen County updated their previous occurrence hazard listings going back to 1950, when the sources permitted, allowing for re-evaluation of each hazard's extent, probability, and potential impacts. The source for this data was NOAA's National Centers for Environmental Information, Storm Events Database (NCDC), and TN Forestry Division. The sinkhole information is obtained from County and City of Morristown personal records, along with the Tennessee State Hazard Mitigation Plan. In some NCDC instances, this data did not go back to 1950 but all documented events from the NCDC are included.

The county then decided to use a different method for determining vulnerabilities/risks because this new method was considered superior to the older plan's method. Also, the plan now has a HAZUS-flood model study and simplified countywide floodplain maps (as seen in the plan's appendices).

Section 4: Mitigation Strategy

Hamblen County, and all jurisdictions within, changed maintained the mitigation goals from the 2018 plan allowing for a broader focus and the likely shift in priorities as the 5 years progress. Additionally, Hamblen County, and all jurisdictions within, has utilized a new method for prioritizing mitigation projects, (thought to be superior to the previous method). Hamblen County, and all jurisdictions within, brainstormed many new mitigation projects that were added to the list, used a new chart method to profile project details, and developed a system to describe where their previous plan's projects are in terms of being implemented.

Section 5: Plan Maintenance

Hamblen County, and all jurisdictions within, updated how they would work with the other jurisdictions in monitoring, evaluating, and updating the plan, provided an updated list of mechanisms they could incorporate mitigation, stated that Hamblen County Basic Emergency Operations Plan has mitigation concepts incorporated within it, and updated how all the jurisdictions would keep the public involved in updating processes.

Section 2: Jurisdictional Profile

Hamblen County

The third smallest in area among the ninety-five Tennessee counties, Hamblen County is located between the Holston and the Nolichucky Rivers in a fertile, well-watered valley sheltered from the north winds by Clinch Mountain and from southern storms by the Smoky Mountains.

Hamblen County was formed in 1870 from parts of Jefferson, Grainger, and Hawkins Counties. After much controversy, the county was named for Hezekiah Hamblen, a lawyer in Hawkins County. Morristown, which was incorporated in 1855, was named the county seat, but it would be four years before a county courthouse was constructed. This building, designed by architect A. C. Bruce, is listed in the National Register of Historic Places.

Agriculture continues to be an important factor in the county's economy. The fertile farms produce beef, dairy products, and vegetables. Tobacco annually boosts the economy with revenues in excess of five million dollars.

According to the U.S. Census Bureau, the county has a total area of 176 square miles, of which 161 square miles is land and 15 square miles (8.3%) is water.

The main source of water on Hamblen County is the man-made Cherokee Lake. Cherokee Lake was created during WWII as part of the TVA hydroelectric project. The lake is fed by multiple sources, including a series of natural creeks and runoff waters. The lake begins with its first source at Poor Valley Creek in Hawkins County, extends through neighboring Grainger County and then Hamblen County. Cherokee Lake then ends with Cherokee Dam where the water is drained into the Holston River. In total, Cherokee Lake has 28,780 acres of surface area and extends for 400 miles of shoreline; though, only a portion of this resides in Hamblen County.

Historical population		
Census	Pop.	%±
1880	10,187	—
1890	11,418	12.1%
1900	12,728	11.5%
1910	13,650	7.2%
1920	15,056	10.3%
1930	16,616	10.4%
1940	18,611	12.0%
1950	23,976	28.8%
1960	33,092	38.0%
1970	38,696	16.9%
1980	49,300	27.4%

1990	50,480	2.4%
2000	58,128	15.2%
2010	62,544	7.6%
2020	64,499	3.1%

Resource Capabilities

	YES	NO
Does your jurisdiction enforce building code ordinances?	X	
Does your jurisdiction enforce zoning code ordinances?	X	
Is your jurisdiction a member of the National Flood Insurance Program?	X	
Does your jurisdiction have the following resources in place?		
Law enforcement	X	
Full-time fire services		X
Grant writer	X	
Public information officer	X	

Future growth

The committee was asked a series of questions. The following are those questions along with the answers in quotes.

Are you able to expand these capabilities (referring to the table above)? If yes, state how? If no, what would allow your community to do so?

> "We are working on a long range plan to have at least 1 paid Full-Time Fire Service individual and 1 paid part-time person at each Volunteer Fire Department 24/7."

Please list the areas in your jurisdiction (region, subdivision, etc.) that have experienced growth in the past 10 years, or are anticipated to have significant growth in the near future, as well as any potential complications from natural hazards due to the development.

> Industrial Growth: "All industrial areas are located in City of Morristown jurisdiction."
>
> Commercial Growth: "Only commercial growth has been in entities such as Dollar General Stores. And this has been in all geographic areas of the County. All these developments have gone through codes and planning to minimize the impact of storm water and other impacts of weather related or impacts on environment."
>
> Residential Growth: "The areas that have seen growth are in the southeast district of Hamblen County. 139 permits were issues in the past 4 years in that district. The future projected growth is in the northeast quadrant of the county and properties near the lake. All developments will be reviewed by the Hamblen County Planning Commission and addressed with any public comments and reservations."

Expanding & Improving Mitigation Programs

What mitigation actions has your jurisdiction accomplished in the past 5 years, to include with both local (building/zoning codes, incorporating mitigation into existing planning) and external (grants such as mitigation, CDBG, USDA, etc.) funding?

> "Hamblen County has been using the CDBG for water/utility projects as well as supporting our Volunteer Fire Departments utilizing the CDBG to purchase new fire apparatus to aid in lowering the ISO rating for each department. We have also been using local grants to purchase equipment and gear for the Volunteer Fire Departments which in turn has aided in lowering the ISO which in turn has aided homeowners in lower insurance premiums. County has its own building inspector and a separate codes enforcement that enforces all building and zoning codes. Hamblen County has used local funds to address flooding issues at 1 locations in the County in past 5 years: 1) Robin Hills Subdivision – Work on embankment & Culvert. Requested funds for 2 other areas, but not approved."

In what ways do you see opportunity to expand or enhance mitigation programs in your community?

> "None at this time."

What challenges do you face in being able to implement and/or expand mitigation into your jurisdiction?

> "Financial limitations of several flooding areas that need mitigation."

City of Morristown

Located in the northeast corner of Tennessee, Morristown is the county seat of Hamblen County. The area was first settled in the late 1700s by settlers of Scotch-Irish and German descent who moved into the region from Virginia, Pennsylvania ,and North Carolina. The city of Morristown was incorporated in 1855 and at that time was part of Jefferson and Grainger Counties. Hamblen County was formed 15 years later in 1870 from portions of Jefferson, Grainger, and Hawkins Counties and is the 3rd smallest county (of 95) in the State of Tennessee by size.

Today, Morristown is the principal city of the Morristown Metropolitan Statistical Area, which encompasses all of Hamblen and Jefferson Counties. Centrally located between eight counties, Morristown serves as the regional hub for employment, shopping, recreation, healthcare and educational opportunities. The community has evolved from an agriculturally based economy to a manufacturing-based economy, producing a wide range of products such as plastics, automotive parts, frozen cakes and many others.

Since the mid-20th century, the city has established itself as the regional economic hub and metropolis of the Lakeway Area region following efforts to expand the industrial sector of the city's economy into a market with over 100 companies, providing a workforce of an estimated 30,000

people. In 2019, the city was reported to have a daytime population of 118,600, including those commuting to the city from surrounding counties and communities.

According to the 2010 census, the city has a total area of 28.0 square miles, of which 0.04 square miles, or 0.19%, are water. Cherokee Lake, an artificial reservoir built by the Tennessee Valley Authority in the 1940s, is north of the city.

Historical population		
Census Pop.		%±
1870	950	—
1880	1,350	42.1%
1890	1,999	48.1%
1900	2,973	48.7%
1910	4,007	34.8%
1920	5,875	46.6%
1930	7,305	24.3%
1940	8,050	10.2%
1950	13,019	61.7%
1960	21,267	63.4%
1970	20,318	−4.5%
1980	19,570	−3.7%
1990	21,385	9.3%
2000	24,965	16.7%
2010	29,137	16.7%
2020	30,431	4.4%

Resource Capabilities

	YES	NO
Does your jurisdiction enforce building code ordinances?	X	
Does your jurisdiction enforce zoning code ordinances?	X	
Is your jurisdiction a member of the National Flood Insurance Program?	X	
Does your jurisdiction have the following resources in place?		
Law enforcement	X	
Full-time fire services	X	
Grant writer	X	
Public information officer	X	

Future growth

The committee was asked a series of questions. The following are those questions along with the answers in quotes.

Are you able to expand these capabilities (referring to the table above)? If yes, state how? If no, what would allow your community to do so?

"Expansion would require additional funding."

Please list the areas in your jurisdiction (region, subdivision, etc.) that have experienced growth in the past 10 years, or are anticipated to have significant growth in the near future, as well as any potential complications from natural hazards due to the development.

Industrial Growth: "Our 2 Industrial Parks: East TN Progress Center, Morristown Airport Industrial Pak, and East Tennessee Valley Industrial Park, sinkhole occurrence is the top concern for natural hazards development."

Commercial Growth: "South Bellwood Rd., Merchants Greene and Andrew Johnson Highway. Again, sinkholes is the main issue."

Residential Growth: "Thompson Creek, North Davy Crockett/25E, Brights Pike, Central Church Rd, Former Millstone Golf Course and Valley Home Rd./MLK Parkway. Again Sinkholes."

Expanding & Improving Mitigation Programs

What mitigation actions has your jurisdiction accomplished in the past 5 years, to include with both local (building/zoning codes, incorporating mitigation into existing planning) and external (grants such as mitigation, CDBG, USDA, etc.) funding?

"CDBG Funding (Façade Grants) have allowed Morristown to do projects for structures. ARPA funding has allowed the City to do major infrastructure projects, like stormwater mediation, water tank construction and upgrading our emergency communication system. TDOT funding for major street repairs, sidewalks, and airport."

In what ways do you see opportunity to expand or enhance mitigation programs in your community?

"Depending on grant funding and cost increase are the 2 factors that will dictate what projects can be done in the future."

What challenges do you face in being able to implement and/or expand mitigation into your jurisdiction?

"Funding will always dictate what projects can be done. Also, the current environment makes it difficult to do large projects. This is due to cost fluctuations and supply chain issues."

Section 3: Risk Assessment

Hazard Identification

To begin to assess Hamblen County and City of Morristown risks to natural hazards and identify the community's areas of highest vulnerability, the mitigation committee had to identify which hazards have or could impact the county. This hazard identification process began with researching previous hazard events that have occurred in Hamblen County by going through newspaper articles, Hamblen County Emergency Management records, the 2017 Hamblen County Hazard Mitigation Plan, National Weather Service data and recalling personal experiences. From there Emergency Management staff also analyzed hazard events that could occur in the county by reviewing scientific studies and the State of Tennessee Hazard Mitigation Plan. The following hazards have been identified as hazards of prime concern by the Hamblen County Hazard Mitigation Committee. There is a change in focus from the 2017 plan to the 2022 plan to allow for balancing of priorities. By focusing on hazards that are a top priority for the committee, it allowed for better committee discussion and awareness. In some cases, sources of data are restricted to the State of Tennessee Hazard Mitigation Plan and state agencies to ensure continuity of reporting into future years. Consideration has been paid to local needs, input and sensitivities to ensure state and federal input doesn't influence the needs or desires, as deemed appropriate by the committee, of this local plan.

Flooding

Flooding events occur when excess water from rivers and other bodies of water overflow onto riverbanks and adjacent floodplains. In addition, lower lying regions can collect water from rainfall and poorly drained land can accumulate rainfall through ponding on the surface. Floods in Hamblen County are usually caused by rainfall but may also be caused by snowmelt and man-made incidents. The below charts explain common ways flooding occurs and common factors that contribute toward the severity of floods.

Common Ways Flooding Occurs	
Methods	**Description**
Overland Flow **(a) Infiltration** **(b) Saturation**	-Excess overland flow occurs when the rain is falling more rapidly than it infiltrates into the soil. -Excess overland flow occurs when soil spaces are so full of water that no more rain can be absorbed.
Throughflow	-Rainwater which has infiltrated into unsaturated soil can move horizontally to the river channel. This process is slower than overland flow but faster than baseflow.
Baseflow	-Rainwater which has percolated to the aquifer can seep into the river channel. This is the slowest process.

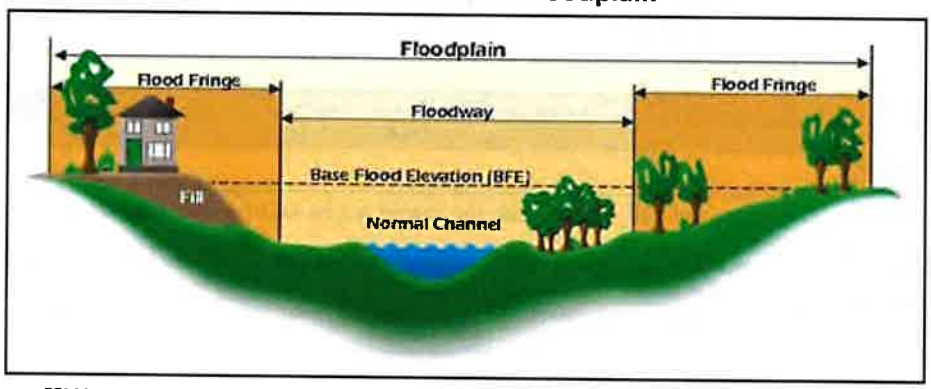
Source: The Field Studies Council

Common Causes of Flooding	
Factor	**Effect on Flooding**
Geology	Impermeable rocks are saturated more quickly than porous and pervious rocks. Saturation-excess overland flow is more common. Sandy soils have larger pore spaces than clay soils. Infiltration is most rapid in sandy soils.
Relief	Water reaches the channel more rapidly in a steeper basin as water is travelling more quickly downhill.
Vegetation	Vegetation intercepts a large proportion of rainfall. Where trees are deciduous, discharge is higher in a forested basin in winter as there is less interception.
Meteorological Factors	Where rain is falling faster than the infiltration rate there is infiltration-excess overland flow. This is common after a summer storm. Snow does not reach the channel but is stored on the ground surface. As snow melts, the meltwater will reach the channel quickly as infiltration is impeded if the ground is still frozen.
Catchment Shape	It takes less time for water to reach the channel in a circular basin as all extremities are roughly equidistant from the channel.
Land Use	Surface runoff is higher in urban areas because there are more urban surfaces (concrete & tarmac) and sewers take water rapidly to rivers. There is less interception and evapotranspiration and more surface runoff in a deforested catchment.
Catchment Size	Water reaches the channel more rapidly in a smaller basin as water has a shorter distance to travel.
Antecedent Conditions	The level of discharge before the storm is called the antecedent discharge. Even a small amount of rain can lead to flooding.

Source: The Field Studies Council

In Hamblen County, some areas are more flood-prone than others. One of the ways of identifying these flood-prone areas is through determining the county's 100- and 500-year floodplains. 100-year floods are calculated to be the level of flood water expected to be equaled or exceeded every 100 years on average, meaning a flood that has a 1% chance of being equaled or exceeded in magnitude in any single year. A 500-year floodplain has a 0.2% chance. A 100-year floodplain would include the areas adjoining a stream, river, or watercourse that would be covered by water in the event of a 100-year flood (see diagram below).

Characteristics of a Floodplain



Source: FEMA

In Hamblen County, all jurisdictions have 100-year floodplains located within their boundaries and all jurisdictions are susceptible to smaller localized flooding outside of the 100-year floodplains. Areas in the county known to flood more often include:

Submitted from City of Morristown (10-27-22)
S Cumberland Rd (near Barkley Landing)

W Economy Rd (near Rural King)
Debbie Circle (near creek)
Cherokee Dr (near Lockmere S/D)
Central Church Rd (near Parke Villas)
Sunrise Ave (near creek and S Henry St)
Panther Creek Rd (near Bullard Dr)
Old Stage Rd (near Panther Creek Rd)

Submitted from Hamblen County Road Department (10-27-22)
McClister Road
Brady Drive
Robin Circle
Kidwell Ridge Road
Scarlett Drive

*Detailed Flood Insurance Rate Maps (FIRMs) are also included in **Appendix 3**, which shows where FEMA has placed the 100-year floodplains for each jurisdiction.*

Hamblen County and its participating jurisdictions have utility structures, municipal building, school buildings, and commercial and residential structures in floodplains. Flooding can cause minimal or complete damage to any of these types of facilities taking them offline for days to years depending on the resources available after an event.

Hamblen County, and all jurisdictions within, historically has had many flood events in the past. Based on NOAA NCDC data, the following charts provide a list of flood events occurring in Hamblen County from 1950 to 2022 and a list of each flood's description of impacts imposed on the community. No flood was listed for Hamblen County prior to 1997.

The following information was obtained by accessing the NOAA database. https://www.ncdc.noaa.gov/stormevents/. This information represents all the events and extent of the Flooding hazard experienced by Hamblen County, including the jurisdictions located within, and is the only source of data accessible. The information provided for Hamblen County also applies to the school district due to the geographic distribution of the schools throughout the County.

Flood Events in Hamblen County: 1950 to 2022

Location	Date	Event Type	Deaths	Injuries	Property Damage	Extent/Impact Description
Countywide	6/14/1997	Flash Flood	0	0	0	Hamblen county EOC reported numerous bridges washed out on backroads in eastern and southern parts of the county.
Countywide	5/7/1998	Flood	0	0	0	Thunderstorms with very heavy rain cause extensive urban and small stream flooding throughout the county.
Countywide	7/11/1999	Flash Flood	0	0	0	Widespread showers and thunderstorms with heavy rain caused flooding problems throughout much of East Tennessee. In Cocke County, flooding occurred along Knoxville Highway west of Newport and in the fairgrounds. In Blount County, numerous streets and roads were closed. The Abrams Creek Campground in the Cades Cove area of the Great Smoky Mountains National Park was evacuated as a precautionary measure Sunday. The campground was reopened Monday. The bottom two apartments of Atchley Apartments in Maryville had 6 inches of water in them early Monday morning. In Knox County, many cars were stranded in flooded underpasses. In Bledsoe County, the Jack Branch Road bridge along Highway 30 on the Van Buren County line was washed out. Numerous incidents of minor flooding were reported around the remainder of the region. Water began to recede across the region by late afternoon/early evening Monday.
Not provided	3/17/2002	Flood	0	0	0	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.
Countywide	3/18/2002	Flash Flood	0	0	0	Widespread flooding occurred across most of East Tennessee. Rainfall totals between five and eight inches were reported in 36 hours. Total damage estimates were calculated to be over 5 million dollars.

Not provided	2/14/2003	Flood	0	0	0	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 (one notable mudslide pushed an apartment complex off its foundation in Knox County). The Powell, Clinch and Holston rivers measured the most significant rises with Claiborne, Rhea and Knox counties reporting the most significant damage.
Not provided	2/21/2003	Flood	0	0	0	With the 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.
Not provided	4/10/2003	Flood	0	0	0	Seven day rainfall totals (4th through the 10th) of three to five inches were reported across central east Tennessee and northeast Tennessee, with one to three inches occurring on the 10th. 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.
Morristown	9/26/2009	Flood	0	0	0	Areal flooding occurred along highways 11 east and 25 east in and around Morristown, Tennessee. Several inches to nearly a foot of water was over a few of the area roads, with several areas briefly impassable due to the flooding.
Morristown	2/28/2011	Flood	0	0	10000	A NWS employee reported heavy rain from a thunderstorm caused flooding along Panther Creek Road.
Morristown	2/28/2011	Flood	0	0	5000	Mesonet reported 2.26 inches of rain in a 3 hour period from a thunderstorm producing minor flooding.
Barton Springs	6/20/2011	Flash Flood	0	0	30000	Law enforcement personnel reported heavy rain from thunderstorms produced flooding near Morristown. Bethesda Road and portions of east 11E Highway were closed by officers for flooding.
Russellville	6/20/2011	Flash Flood	0	0	0	A NWS employee reported heavy rain from thunderstorms produced flooding of creeks and roads across eastern portions of Hamblen county.

Morristown	8/7/2016	Flash Flood	0	0	0	Several roadways were flooded across the northern portion of the county.
Morristown	2/6/2019	Flash Flood	0	0	0	Low spot in road near Lincoln Heights Middle School was covered with a foot of water.
Morristown	2/6/2019	Flash Flood	0	0	0	Multiple roads flooded across the county.
Morristown	2/23/2019	Flood	0	0	0	Access to houses off of Cherokee Drive was cut off by flooding of Turkey Creek.
Alpha	2/23/2019	Flood	0	0	0	Panther Creek Campground, Shelter, and overlook are inaccessible due to flooded roadways.
Russellville	2/23/2019	Flood	0	0	1230000	Hwy 11E closed at Russellville Elementary School due to flooding. All told, Emergency Management estimated that individual and public flood damages for Hamblen County together combined for $1.23 million for the overall event.
Morristown	2/24/2022	Flash Flood	0	0	0	Flooding near the intersection of White Avenue and Colonial Drive. The road was being monitored for possible closure.
Morristown Airport	2/24/2022	Flash Flood	0	0	0	Kidwell Ridge Road was flooded along the creek crossing.

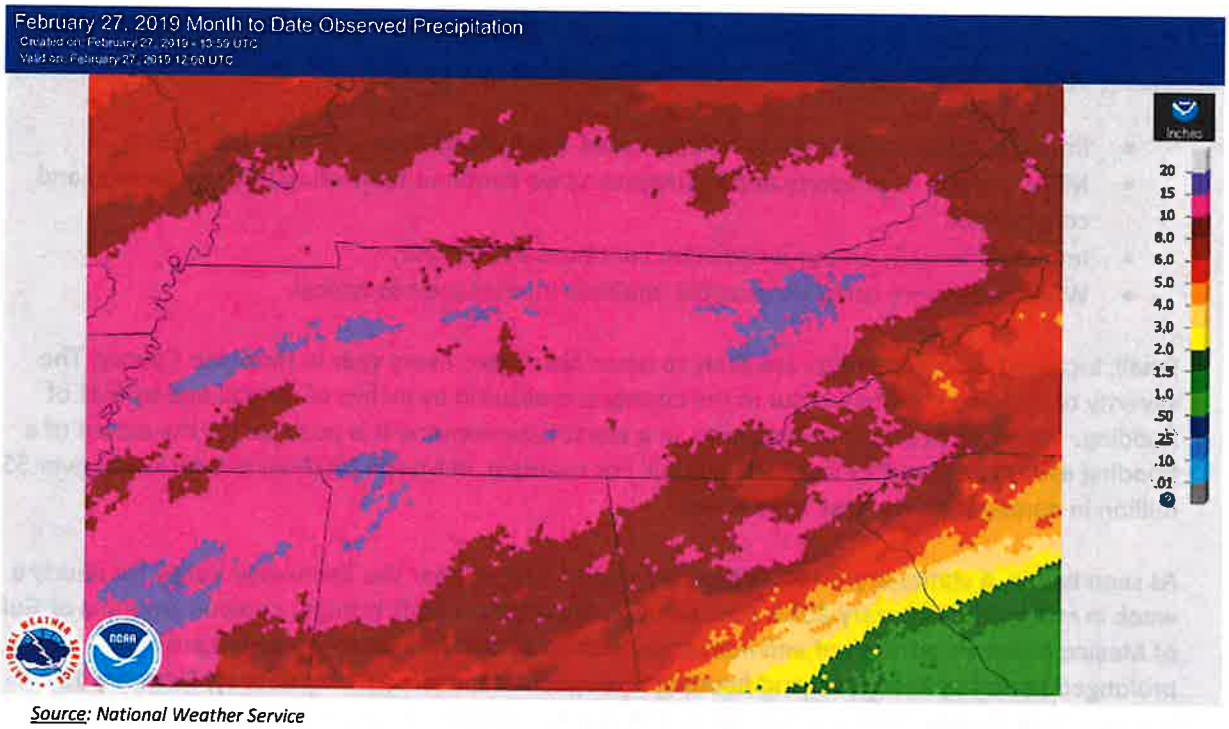
The committee shared their personal experiences of flooding events that have occurred in Hamblen County and City of Morristown. The following is transcribed from their thoughts.

- Impacts, activity and severity has increased dramatically over the past 5 to 7 years.
- More impacts to property and businesses as we continue to develop both residential and commercial.
- Impact financially on our jurisdiction continues to increase.
- While deaths are certainly possible, multiple injuries are not typical.

Small, localized or larger events are likely to occur four times every year in Hamblen County. The severity of flooding that may occur in the county is measured by inches of rainfall and by feet of flooding. Based on previous occurrences, in a worst-case scenario it is possible for the extent of a flooding event to exceed 15 inches of rainfall. For example, in March 2002, an event caused over $5 million in damages across East Tennessee.

As seen below, a stationary frontal boundary stalled over or near the Tennessee Valley for nearly a week in mid to late February 2019. Persistent southwest flow aloft brought copious amounts of Gulf of Mexico moisture northward and interacted with this boundary for many days, causing a prolonged period of heavy rain and flooding throughout Tennessee from Tuesday, February 19 through early Sunday, February 24. Due to the heavy rainfall that had already fallen earlier in the month, along with the already unusually wet winter season, widespread flash flooding and river flooding resulted, with dozens of water rescues being conducted and numerous homes and businesses flooded. Additionally, there were numerous reports of mudslides throughout the state impacting critical interstate travel. In addition, this heavy rainfall set new monthly rainfall records for the month of February at many locations including Nashville and Crossville, both of which saw over a foot of rain. By the end of the month, nearly the entire state of Tennessee had received between 10" and 20" of rain in February 2019. This event led to a Presidential Disaster Declaration (DR4427).

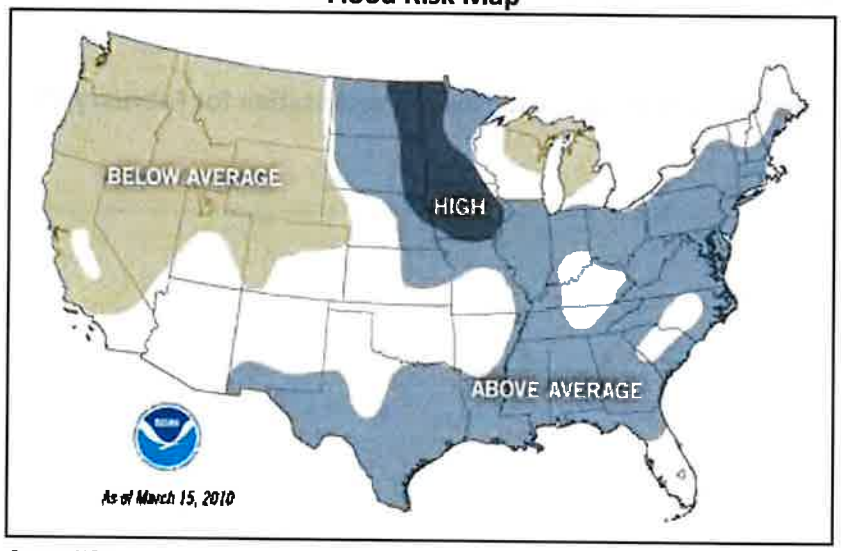
Tennessee February 2019 Flood - Precipitation for February 2019



Source: National Weather Service

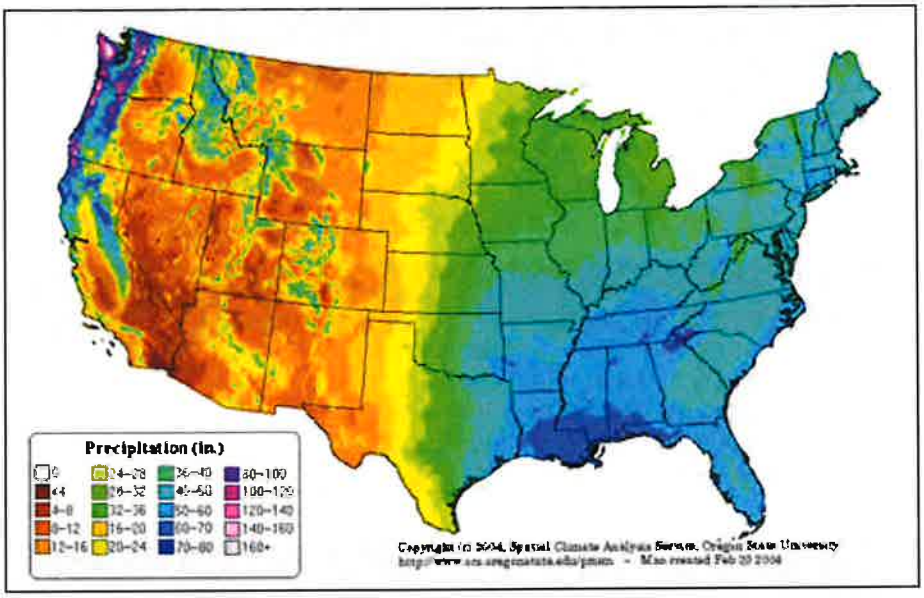
According to a NOAA Flood Risk Map (see map below), the majority of Tennessee was in an "above average" risk of flooding zone during spring 2010. This proposed vulnerability is coupled with the fact that on average Tennessee usually acquires over 50-60 inches of rainfall a year (see following map).

Flood Risk Map



Source: NOAA

Average Annual Precipitation per Year (1971-2000)



Source: Spatial Climate Analysis Service, Oregon State University

Hamblen County uses a ranking system to determine each jurisdiction's vulnerability to flooding events. This system is based off simple arithmetic which analysis's potential impacts to determine vulnerabilities and then analysis's the probability of a flood event occurring to calculate a flood risk ranking for each jurisdiction.

Jurisdiction	Impacts			Vulnerability
	Human	Property	Business	H+P+B=#; #/3=V
Hamblen County Unincorporated	2.33	3.44	2.00	2.59
City of Morristown	2.25	3.00	2.25	2.50

Jurisdiction	Vulnerability	Probability	Risk V+P=R
Hamblen County Unincorporated	2.59	2.56	5.15
City of Morristown	2.50	3.00	5.50

Scale	
Low	2-3.6
Moderate	3.7-5.2
Medium	5.3-6.8
High	6.9-8.4
Severe	8.5-10

Human	
Risk of injuries and deaths from the hazard	
1	Death very unlikely, injuries are unlikely
2	Death unlikely, injuries are minimal
3	Death unlikely, injuries may be substantial
4	Death possible, injuries may be substantial
5	Deaths probable, injuries will likely be substantial

Property	
Amount of residetial property damage associated from the hazard	
1	Less than $500 in damages
2	$500-$10,000 in damages
3	$10,000-$500,000 in damages
4	$500,000-$2,000,000 in damages
5	More than $2,000,000 in damages

Business	
Amount of business damage associated from the hazard	
1	Less than 3 businesses closed for only a day
2	More than 3 businesses closed for a week
3	More than 3 businesses closed for a few months
4	More than 3 businesses closed indefinitly or relocated
5	A top-10 local employer closed indefinitly

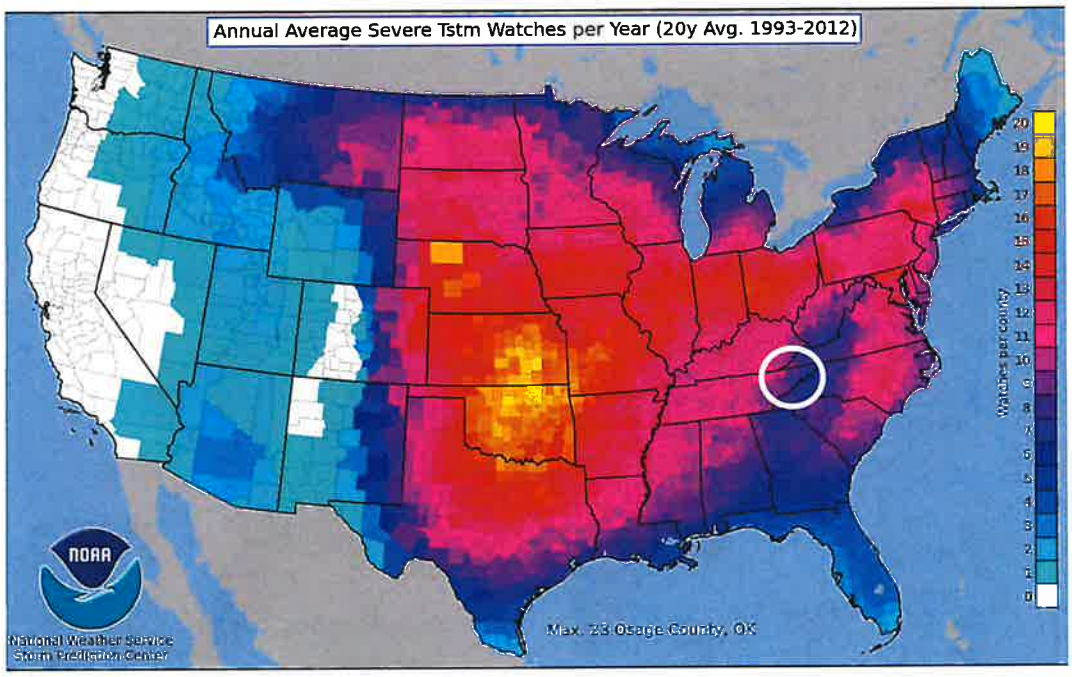
Probability	
Likelihood of the hazard occurring within a given span of years	
1	Less than once every 10 years
2	About once every 5-10 years
3	About once every 2-5 years
4	About once a year
5	More than once a year

For further information about flooding hazards in Hamblen County, see the HAZUS vulnerability study in ***Appendix 4***.

Tornadoes/Severe Storms

According to the National Weather Service, to consider a storm severe it must encompass one of three traits: produce winds greater than 58 miles per hour (50.4 knots), produce hail ¾ of an inch or greater in diameter, or produce tornadoes. On average, a typical county in Tennessee has about 5 to 10 severe storm watches per year (see map below).

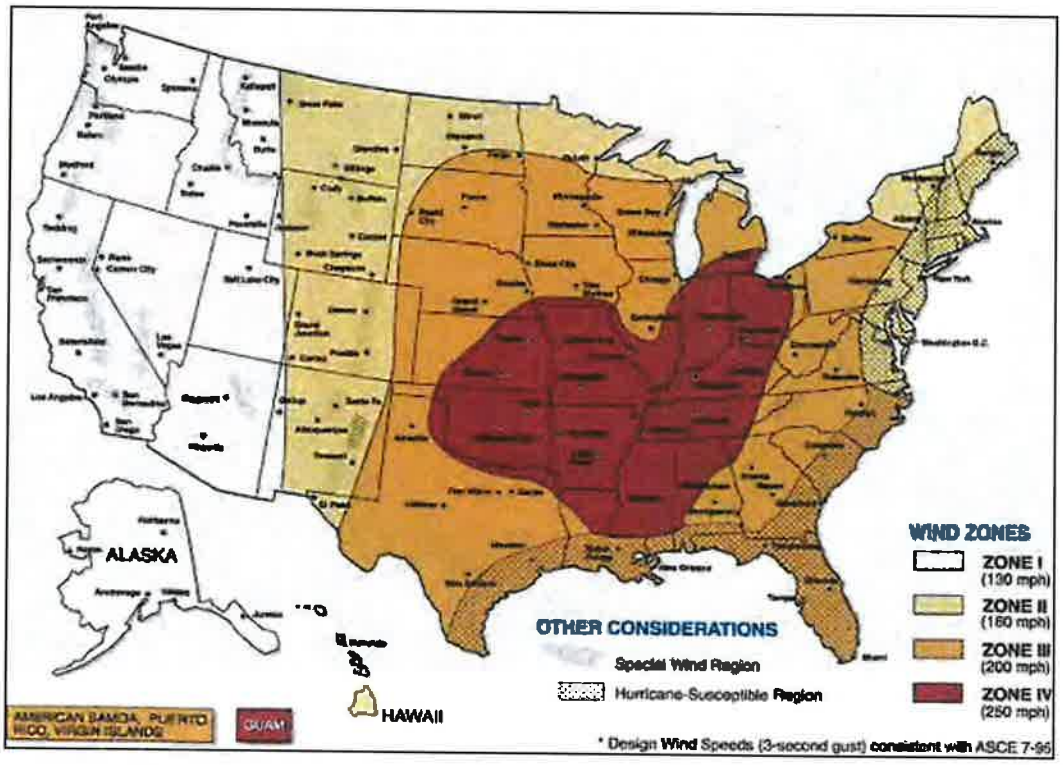
Average Severe Storm Watches Per Year (1993-2012)



Source: NOAA/NWS Storm Prediction Center

A tornado is a violently rotating column of air that extends from a thunderstorm, etc. down to the ground, and can reach wind speeds of 40 mph to 250 mph and higher. Tornadoes paths, lengths, and widths can vary greatly. In Hamblen County, all jurisdictions are vulnerable to tornado threats. The following map places much of Tennessee in the highest wind zone (see following map).

Wind Zones in the United States



Source: FEMA

Hamblen County historically has had very few tornados in the past. Based on NOAA NCDC data, the following chart provides a list of tornado events occurring in Hamblen County from 1950 to 2022 and a description of impacts. The largest tornado occurred in 1985 at an F1. The data shows that Hamblen County and City of Morristown has not had significant or many tornados in the past. Because surrounding jurisdictions appear to be at higher risk is the reason for this to be a hazard of prime concern as future conditions may change.

The following information was obtained by accessing the NOAA database. https://www.ncdc.noaa.gov/stormevents/. This information represents all the events and extent of the Tornado hazard experienced by Hamblen County, including the jurisdictions located within, and is the only source of data accessible. The information provided for Hamblen County also applies to the school district due to the geographic distribution of the schools throughout the County.

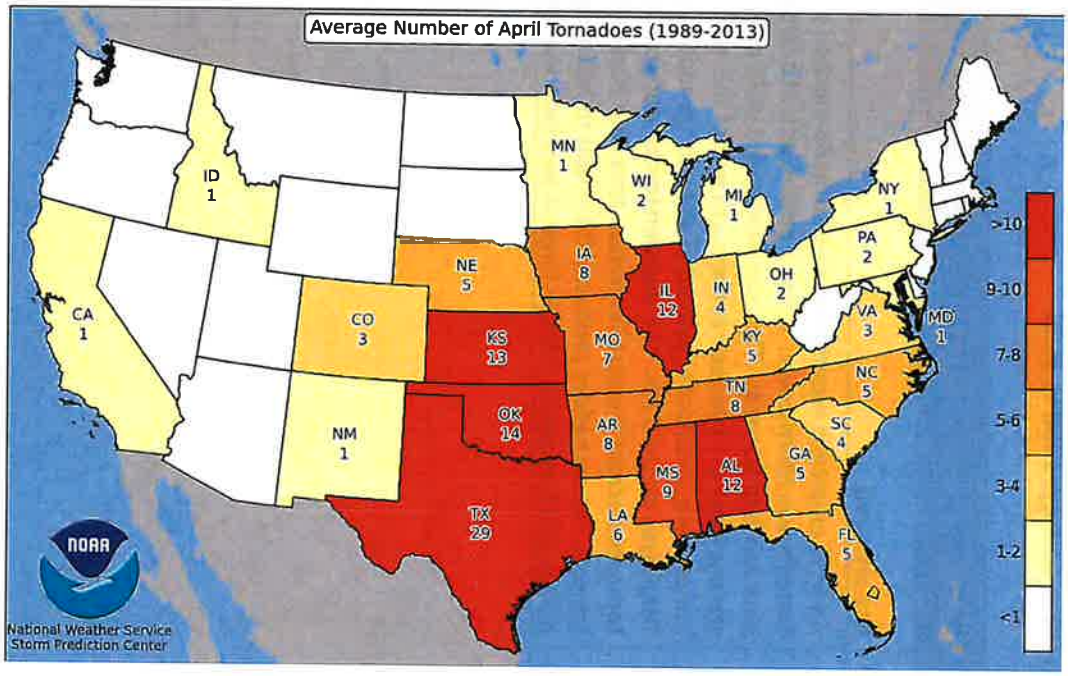
Tornado Events in Hamblen County: 1950 to 2022

Location	Date	Extent	Deaths	Injuries	Property Damage	Extent/Impact Description
Not provided	11/27/1985	F1	0	0	25000	Not provided.
Alpha	4/27/2011	EF0	0	0	10000	An NWS employee reported an EF-0 tornado touched down near Panther State Park in Morristown. It had a path length of one third of a mile and a path width of 50 yards. The max wind speed of 70 mph downed several trees starting from the overlook at the north end of the park. Favorable atmospheric conditions resulted in a deadly tornado outbreak across east Tennessee on the 27th. The thunderstorms produced more than 50 tornadoes across the east Tennessee area with 32 deaths and more than 200 injured. The tornadoes produced from light to heavy damage to hundreds of homes and businesses. Hail as large as baseballs was also reported.

Based on previous occurrences, it's a rare occurrence for Hamblen County, and the jurisdictions within, to experience a tornado.

The following map may provide some idea for probability information.

Average Number of Tornadoes Per Year



The severity of tornadoes that may occur in the county is measured using the Enhanced Fujita Scale for tornadoes (see chart below). Based on tornado events in other East Tennessee counties, in a worst-case scenario it is possible for the extent of a tornado to exceed an EF4 ranking.

Fujita Scale/Enhanced Fujita Scale for Tornadoes

Fujita Scale/Enhanced Fujita Scale for Tornadoes				
F-Scale	Fastest Quarter Mile Wind Speed	Typical Impacts	Enhanced Scale: 3 Sec Wind Gust Speed	Enhanced F-Scale
F0	40-72 mph	Some damage to chimney; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.	65-85 mph	EF0
F1	73-112 mph	Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.	86-110 mph	EF1
F2	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.	111-135 mph	EF2
F3	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted.	136-165 mph	EF3
F4	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.	166-200 mph	EF4
F5	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged.	Over 200 mph	EF5

Source: NOAA National Weather Service; The Tornado Project

Severe storm winds most commonly occur as straight-line winds; a downburst of wind created by an area of significantly rain-cooled air that spreads out in all directions after hitting the ground. All jurisdictions are vulnerable to receiving damage from these severe storm winds. Historically, severe storm wind events occur about four times a year in Hamblen County but it's not rare to see fluctuations in this number. The severity of severe storm winds is commonly measured by wind speed (knots or mph). It is not unusual for Hamblen County to experience winds speeds up to 70 knots (81 mph) causing a roof to be blown off.

The following chart provides severe storm wind event information for Hamblen County between 1950 and 2022. The following information was obtained by accessing the NOAA database. https://www.ncdc.noaa.gov/stormevents/. This information represents all the events and extent of the Severe Storm Wind hazard experienced by Hamblen County, including the jurisdictions located within, and is the only source of data accessible. The information provided for Hamblen County also applies to the school district due to the geographic distribution of the schools throughout the County.

Wind Events in Hamblen County: 1950 to 2022

NP = not provided

Location	Date	Extent in Knots	Deaths	Injuries	Property Damage	Impact/Extent Description
Not provided	6/29/1963	0	0	0	0	Not provided
Not provided	5/22/1969	0	0	0	0	Not provided
Not provided	6/24/1969	0	0	0	0	Not provided
Not provided	6/6/1977	0	0	0	0	Not provided
Not provided	6/6/1977	0	0	0	0	Not provided
Not provided	7/8/1980	0	0	0	0	Not provided
Not provided	4/14/1981	0	0	0	0	Not provided
Not provided	5/31/1982	62	0	0	0	Not provided
Not provided	8/11/1983	0	0	0	0	Not provided
Not provided	6/3/1985	0	0	0	0	Not provided
Not provided	7/13/1986	0	0	0	0	Not provided
Not provided	6/26/1988	0	0	0	0	Not provided
Not provided	8/2/1988	0	0	0	0	Not provided
Not provided	5/17/1990	0	0	0	0	Not provided
Not provided	5/28/1990	0	0	0	0	Not provided
Not provided	4/9/1991	0	0	0	0	Not provided
Morristown	6/16/1994	0	0	0	500	A few trees were knocked down.
Morristown	5/14/1995	0	0	0	2000	Several trees were knocked down.
Morristown	8/1/1995	0	0	0	5000	A few trees were knocked down.
Morristown	8/1/1995	0	0	0	5000	Several trees knocked down.
West	8/19/1995	0	0	0	5000	Several trees were blown down.
Morristown	8/19/1995	0	0	0	5000	Some trees were blown down.
Morristown	4/13/1996	NP	0	0	0	Trees were blown down
North part	5/25/1996	NP	0	0	0	Numerous trees and powerlines were blown down.
Morristown	6/9/1996	NP	0	0	2000	Several large tree limbs were blown down.
Morristown	6/13/1996	NP	0	0	2000	A tree blew down across a road. Numerous large tree limbs were blown down.

Morristown	6/24/1996	NP	0	0	4000	Trees blew down across Fernwood Road. Powerlines were downed on Jaybird Road.
South Part	7/2/1996	NP	0	0	20000	A barn was heavily damaged in the southern part of the county.
Morristown	1/5/1997	NP	0	0	0	Trees down on South Fairmont Road and Lakeway Road. Reported by the sheriff's office.
Countywide	2/21/1997	NP	0	0	3000	Tree down near Talbott post office on Highway 11E. A parked car was struck by a fallen tree.
Countywide	3/3/1997	NP	0	0	0	A few trees knocked down throughout the county.
Countywide	5/13/1997	NP	0	0	20000	Trees down and a few powerlines down throughout county.
Morristown	6/20/1997	NP	0	0	0	A severe thunderstorm knocked down a large tree onto Fernwood Church Road.
Lowland	7/4/1997	NP	0	0	0	Large tree down on I-81 at Lowland exit.
Morristown	2/17/1998	50	0	0	0	Sustained winds of 40 knots with gusts to 50 knots observed as line of thunderstorms moved across the National Weather Service office.
Morristown	2/17/1998	NP	0	0	1000	Trees fell on and damaged a National Weather Service employee's home on Mill Race Road.
Witt	5/7/1998	NP	0	0	50000	Barn and trees down on Chucky River Road. Roof damage and power poles and lines down.
Morristown	6/1/1998	NP	0	0	0	A tree down at Redwood and Sycamore Streets.
Morristown	6/30/1998	NP	0	0	30000	Numerous trees and powerlines down in Morristown and countywide. A roof was blown off a home on Kidwell Ridge Road.
Morristown	11/25/1998	NP	0	0	20000	Power lines down on West Andrew Johnson Highway between National Weather Service office and Morristown. Windows blown out of houses and businesses in northeast Morristown. Bishop-Goodman shelter at Fred Miller Park in Morristown was demolished. Numerous trees down throughout the greater Morristown area. The storm knocked out power to around 3000 homes. Power was restored by the following day.
Morristown	5/6/1999	NP	0	0	0	Large tree limbs down on McGinnis Road.
Morristown	6/2/1999	NP	0	0	3000	Trees down on Sussex Lane in Seven Oaks subdivision.
Morristown	6/2/1999	NP	0	0	10000	Trees down.
Whitesburg	7/7/1999	NP	0	0	5000	Trees down.
Morristown	7/24/1999	NP	0	0	12000	Trees down.

Morristown	8/23/1999	NP	0	0	2000	A large tree down, as well as large limbs from other trees.
Morristown	8/23/1999	NP	0	0	4000	Several trees down.
Countywide	2/13/2000	NP	0	0	15000	Trees and power lines down.
Morristown	4/20/2000	NP	0	0	20000	Two homes on Lincoln Avenue sustained considerable roof damage.
Morristown	5/27/2000	NP	0	0	0	Large limbs down.
Morristown	7/14/2000	NP	0	0	0	Trees down.
Countywide	7/14/2000	NP	0	0	0	Trees down, especially the western section.
Countywide	7/29/2000	NP	0	0	0	A few trees down.
Countywide	8/10/2000	NP	0	0	0	Trees down.
Countywide	11/9/2000	NP	0	0	0	Trees down.
Countywide	5/6/2001	NP	0	0	0	Trees down.
Countywide	5/21/2001	NP	0	0	10000	Numerous trees and power lines down. Electricity was out for about 2 hours for around 1000 customers. Power was restored to all by 11 pm.
Countywide	7/4/2001	NP	0	0	0	Trees down.
Morristown	8/11/2001	NP	0	0	0	Trees down on Brights Pike.
Countywide	10/24/2001	NP	0	0	0	Trees down.
Morristown	1/24/2002	NP	0	0	2000	Trees down.
Morristown	5/13/2002	NP	0	0	20000	Several trees reported down and 2 gas pumps and outbuildings blown over in Lakemoore.
Morristown	7/2/2002	NP	0	0	10000	Trees were reported down along Kidwells Ridge road.
Not provided	2/3/2003	40	0	0	1000	Strong winds (with gusts up to 40 mph) associated with a band of showers caused numerous reports of fallen trees and power outages across east Tennessee.
Morristown	5/2/2003	60	0	0	6000	Several trees were reported down along Alpha Valley Home Road in southwest Hamblen County.
Morristown	5/11/2003	8	0	0	8000	A few trees were reported down two miles north of Morristown.
Countywide	5/17/2003	55	0	0	15000	A few trees and power lines were reported down across the county.
Countywide	6/11/2003	55	0	0	15000	Numerous trees were reported down across the county.
Countywide	6/11/2003	55	0	0	15000	Numerous trees were reported down across the county.

Morristown	7/16/2003	60	0	0	0	A few trees reported down by highway department on Carroll road and Dover drive.
Morristown	8/31/2003	60	0	0	0	Numerous trees reported down by 911 dispatch.
Morristown	5/26/2004	60	0	0	2000	One tree was reported down across Howard Allen road.
Morristown	5/26/2004	60	0	0	2000	One tree was reported down across Old Kentucky Road.
Morristown	5/26/2004	60	0	0	3000	Two trees were reported down in Seven Oaks subdivision in Morristown.
Countywide	5/31/2004	65	0	0	20000	Numerous trees were reported down across the county.
Morristown	7/13/2004	60	0	0	2000	One tree was reported down on Beacon Road seven miles west southwest of Morristown.
Morristown	7/13/2004	60	0	0	2000	One tree was reported down on Lakewood Drive two mile north of Morristown at around 1250 am EDT on 07/14.
Morristown	7/25/2004	65	0	0	40000	Columns were blown through windows at Mayes Mortuary. Also, numerous trees were reported down in the area.
Morristown	7/26/2004	60	0	0	2000	A tree was reported down on Spout Springs Road.
Morristown	4/22/2005	65	0	0	5000	A power pole and several powerlines down in Alpha near intersection of Highway 11E and Highway 160.
Morristown	4/22/2005	70	0	0	25000	A roof was blown off a house on Kidwells Ridge Road.
Morristown	6/6/2005	65	0	0	15000	Several trees down countywide
Countywide	7/1/2005	60	0	0	20000	Several trees were reported down across the county.
Morristown	4/2/2006	60	0	0	5000	Two trees down in Morristown
Countywide	4/8/2006	60	0	0	12000	Several trees and powerlines down across the eastern third of the county.
Morristown	6/24/2006	40	0	0	5000	A few trees and powerlines down. A barn was also slightly damaged.
Morristown	7/28/2006	60	0	0	25000	Numerous trees and power lines were reported down in the Talbott area.
Morristown	8/8/2006	60	0	0	10000	Numerous trees down across the east side of Morristown.
Countywide	8/10/2006	60	0	0	25000	Numerous trees and powerlines down countywide. 5000 homes and businesses lost power. One tree fell on a vehicle on West Fourth North Street in Morristown.
Russellville	9/28/2006	60	0	0	3000	One tree was reported down on Slop Branch Road.
Russellville	9/28/2006	60	0	0	3000	One tree was reported down on Mullins Road two miles northeast of Russellville.
Not provided	12/1/2006	60	0	0	20000	Scattered trees and powerlines down countywide.

Morristown	4/3/2007	50	0	0	30000	Numerous trees were reported down on Buffalo Trail road and Springs road. |Also, two power poles two feet in diameter snapped in the eastern part of Morristown.
Morristown	6/8/2007	60	0	0	15000	Thunderstorm winds downed a few trees and powerlines countywide.
Morristown	6/24/2007	55	0	0	12000	Thunderstorm winds downed several trees countywide.
Russellville	6/25/2007	55	0	0	10000	A spotter reported several trees down near Russellville.
Morristown	6/26/2007	55	0	0	15000	Thunderstorm winds downed about a dozen large oak trees near Morristown.
Pineville	7/18/2007	55	0	0	0	A tree fell downing a power line in the process on Thompson Creek Road.
Alpha	7/18/2007	55	0	0	0	One tree fell onto and damaged a home on Millrace Road.
Morristown	7/19/2007	60	0	0	0	Several trees were reported down along Panther Creek Road.
Morristown Airport	1/30/2008	55	0	0	0	A 40 foot tall tree was reported down across Alpha Valley Home Road near Nelson School Road.
Russellville	3/19/2008	50	0	0	0	A few trees were reported down in Russellville.
Cherokee Lake	4/11/2008	45	0	0	2000	Law enforcement reported one tree downed by thunderstorm winds on Bowen Road.
Morristown	6/28/2008	55	0	0	8000	Dispatch reported several trees downed by thunderstorm winds across the western portions of the county.
Russellville	6/28/2008	52	0	0	5000	Dispatch reported a few trees downed by thunderstorm winds in the Russellville area.
Russellville	2/11/2009	60	0	0	20000	A trained spotter reported several trees downed by thunderstorm winds in the northeast portion of the county. Several roofs were also damaged.
Morristown	6/11/2009	60	0	0	0	A NWS employee estimated a thunderstorm wind gust to 60 mph in Morristown.
Morristown	6/16/2009	60	0	0	20000	Law enforcement personnel reported numerous trees downed by thunderstorm winds countywide.
Morristown	6/16/2009	60	0	0	15000	Law enforcement personnel reported numerous trees downed by thunderstorm winds countywide.
Russellville	8/4/2009	60	0	0	30000	Newspaper reporters reported numerous trees and powerlines downed by thunderstorm winds on Beth Drive in Russellville. A tree fell on a vehicle. The winds also damaged a roofs on a few homes.
Alpha	9/7/2009	50	0	0	5000	Convective wind gusts removed the roofs of seven rental storage units in the western section of Morristown.

Valley Home	7/13/2010	50	0	0	0	Two large oak trees were downed at a residence on Alpha Valley Home Road. Also, a barn on the property received significant roof damage.
Morristown	8/5/2010	50	0	0	2000	An NWS employee reported numerous large limbs downed by thunderstorm winds on Miginnis Road in west Morristown.
Morristown	8/5/2010	50	0	0	1000	An NWS employee reported 1 large tree downed by thunderstorm winds in Hickory Shadows subdivision in Morristown.
Alpha	9/3/2010	50	0	0	0	Two trees were reported down near Panther Creek.
Morristown	9/3/2010	50	0	0	0	One tree was reported down on East Morris Boulevard.
Russellville	2/28/2011	55	0	0	20000	Law enforcement personnel reported a roof from a barn was blown off by thunderstorm wind at the intersection of Carlyle Avenue and Cedar Creek Road near Russellville.
Morristown	4/27/2011	55	0	0	20000	Law enforcement personnel reported several trees downed by thunderstorm wind in Morristown. One tree fell on home.
Morristown	5/26/2011	50	0	0	0	A large tree and power lines were reported down on a Dentist Office.
Russellville	6/20/2011	50	0	0	2000	Law enforcement personnel reported one tree downed by thunderstorm wind southeast of Russellville.
Morristown	6/21/2011	55	0	0	5000	A trained spotter reported a few trees downed by thunderstorm wind in the Talbott area.
Morristown	6/21/2011	60	0	0	20000	Law enforcement personnel reported numerous trees downed by thunderstorm wind in Morristown.
Morristown	7/1/2012	55	0	0	0	Several trees and power lines were reported down in Morristown.
Morristown	7/5/2012	60	0	0	0	A few trees were reported down on Henry Street in Morristown.
Witt	7/5/2012	60	0	0	0	A few trees were reported down in the Witt community.
Morristown	7/5/2012	60	0	0	0	A few trees were reported down near Old Stage Road.
Cherokee Lake	7/31/2012	50	0	0	0	One tree was reported down four miles west northwest of Morristown.
Morristown	5/21/2013	50	0	0	0	Twelve trees were reported down in the county.
Morristown	5/22/2013	50	0	0	0	A few trees were reported down on Cameron Road in Morristown.

Alpha	6/27/2013	50	0	0	2000	A NWS employee reported 1 tree downed by thunderstorm wind 4 miles northeast of Jefferson City on Tarr Road just across the county-line.
Morristown	6/27/2013	50	0	0	2000	Dispatch personnel reported 1 tree downed by thunderstorm wind on Jenkins Road in Morristown.
Russellville	8/23/2013	50	0	0	5000	Two separate callers from the public reported several trees were snapped by the thunderstorm wind along Cane Mill Road 1 mile north of Russellville. One of the callers also reported an above ground pool was flipped into the neighbors yard.
Morristown	2/21/2014	55	0	0	10000	Law enforcement reported several power poles and lines downed by thunderstorm wind in Morristown.
Morristown	6/10/2014	50	0	0	10000	Law enforcement personnel reported many trees downed by thunderstorms wind countywide.
Valley Home	6/18/2015	50	0	0	0	A tree was reported down in the vicinity of Interstate 81 east southeast of Alpha while another was downed south of Morristown.
Morristown	9/30/2015	50	0	0	0	A few trees were reported down near Cherokee Park.
Not provided	2/24/2016	60	0	0	0	A few trees and power lines were reported down.
Morristown	5/12/2016	50	0	0	0	Two trees were reported down in Morristown.
Russellville	5/12/2016	52	0	0	0	A gust to 60 mph was recorded.
Morristown	7/4/2016	50	0	0	0	Trees were reported down at the intersection of South Cumberland Street and Algonquin Drive, at the intersection of Dover and Carroll Road in Morristown. Another tree was reported down in Talbott at the intersection fo Allen and Cody Road.
Alpha	7/4/2016	52	0	0	0	A 52 knot wind gust was recorded on a personal weather station.
Barton Springs	7/4/2016	50	0	0	0	Several trees were reported down across the county.
Alpha	7/6/2016	50	0	1	0	A tree was downed onto a car on Greenbriar Road.
Morristown	7/6/2016	50	0	0	0	Several trees were reported down across the county.
Alpha	2/25/2017	50	0	0	0	Several trees were blown down and a barn was damaged.
Alpha	2/25/2017	50	0	0	0	A few trees were reported down across the western part of Hamblen county.
Springvale	2/25/2017	50	0	0	0	Several trees were reported down across southeastern parts of Hamblen County.

Alpha	5/4/2017	50	0	0	0	A tree was reported down near Panther Creek Road and Seven Oaks Drive.
Russellville	3/17/2018	50	0	0	0	A few trees were reported down between Russellville and Whitesburg.
Morristown	4/4/2018	50	0	0	0	Several trees were reported down across the county.
Whtesburg	6/26/2018	50	0	0	0	Several trees were reported down.
Barton Springs	7/20/2018	63	0	0	0	A 73 mph gust was recorded at Whitesburg.
Morristown	1/4/2019	50	0	0	0	Numerous reports of trees, limbs, and downed power lines were received across the entire county.
Whitesburg	1/4/2019	50	0	0	0	Numerous reports of trees, limbs, and power lines were received across the county.
Morristown	4/14/2019	55	0	0	0	One tree was reported down along West Morris Boulevard.
Not provided	4/26/2019	35	0	1	0	A gust of wind associated with a rain shower (no lightning was observed) of around 30-40 mph, caused a large limb to break free from a dead tree. Winds across the area were gusting in the 30-40 mph range all day long; just below advisory criteria. The limb struck and killed an 85 year old woman who was outside at the time.
Morristown	1/11/2020	55	0	0	0	Several trees were reported down.
Russellville	1/11/2020	55	0	0	0	A few trees were reported down.
Alpha	3/29/2020	56	0	0	0	Large tree branches were broken off.
Alpha	3/29/2020	61	0	0	0	In the Seven Oaks neighborhood in Alpha, some tree branches had fallen, at least two lawn chairs were blown around. Power outages occurred with the convective line in this area.
Morristown	3/29/2020	61	0	0	0	Several trees were reported down in the Morristown historic district. Time was estimated from radar.
Needmore	3/29/2020	61	0	0	0	Several trees were uprooted and broken off low on the trunk on St. Clair Road in Whitesburg.
Alpha	5/25/2020	50	0	0	0	A few trees were reported down.
Hales Crossroads	6/4/2020	50	0	0	0	A tree was downed five miles southeast of Morristown on St. Paul Road.
Witt	6/4/2020	50	0	0	0	A tree was downed along Jacobs Road along Highway 25. The time of occurrence was estimated by radar.
New Line	6/21/2020	60	0	0	0	Trees reported down in numerous locations across the county.

Russellville	6/21/2020	50	0	0	0	Multiple trees reported down.
Russellville	7/24/2020	50	0	0	0	Several trees reported down across the area.
Morristown	7/31/2020	50	0	0	0	Several trees were reported down across the Morristown area.
Alpha	5/28/2021	52	0	0	0	Sustained winds were around 40 mph with the strongest gusts up to 60 mph.
Morristown Airport	5/28/2021	58	0	0	0	A spotter measured a 67 mph gust. Numerous large tree limbs were blown down.
Alpha	5/28/2021	52	0	0	0	Several boats were damaged at Cedar Hill Marina on Cherokee Lake.
Alpha	5/28/2021	52	0	0	0	Trees were blown down and limbs broken in Panther Creek State Park.
New Line	5/28/2021	52	0	0	0	A shed was damaged.
Barton Springs	8/11/2021	52	0	0	0	Photos from social media showed a tree blown down on two vehicles, no injuries reported.
Cherokee Lake	12/11/2021	50	0	0	0	Trees and power lines were blown down on Kidwell Ridge Road.
Cherokee Lake	7/8/2022	52	0	0	0	Trees were blown down around the county.

The committee shared their personal experiences of tornado/wind events that have occurred in Hamblen County, Clinton, Norris, Oak Ridge, and Rocky Top. The following is transcribed from their thoughts.

- None

Hamblen County uses a ranking system to determine each jurisdiction's vulnerability to severe storm events (with a focus on tornadoes). This system is based off simple arithmetic which analysis's potential impacts to determine vulnerabilities and then analyzes the probability of a severe storm event occurring to calculate a risk ranking for each jurisdiction.

Jurisdiction	Impacts			Vulnerability
	Human	Property	Business	H+P+B=#; #/3=V
Hamblen County Unincorporated	3.22	3.56	1.67	2.81
City of Morristown	3.43	3.71	2.14	3.10

Jurisdiction	Vulnerability	Probability	Risk V+P=R
Hamblen County Unincorporated	2.81	3.67	6.48
City of Morristown	3.10	3.38	6.47

Scale	
Low	2-3.6
Moderate	3.7-5.2
Medium	5.3-6.8
High	6.9-8.4
Severe	8.5-10

Human	
Risk of injuries and deaths from the hazard	
1	Death very unlikely, injuries are unlikely
2	Death unlikely, injuries are minimal
3	Death unlikely, injuries may be substantial
4	Death possible, injuries may be substantial
5	Deaths probable, injuries will likely be substantial

Property	
Amount of residetial property damage associated from the hazard	
1	Less than $500 in damages
2	$500-$10,000 in damages
3	$10,000-$500,000 in damages
4	$500,000-$2,000,000 in damages
5	More than $2,000,000 in damages

Business	
Amount of business damage associated from the hazard	
1	Less than 3 businesses closed for only a day
2	More than 3 businesses closed for a week
3	More than 3 businesses closed for a few months
4	More than 3 businesses closed indefinitly or relocated
5	A top-10 local employer closed indefinitly

Probability	
Likelihood of the hazard occurring within a given span of years	
1	Less than once every 10 years
2	About once every 5-10 years
3	About once every 2-5 years
4	About once a year
5	More than once a year

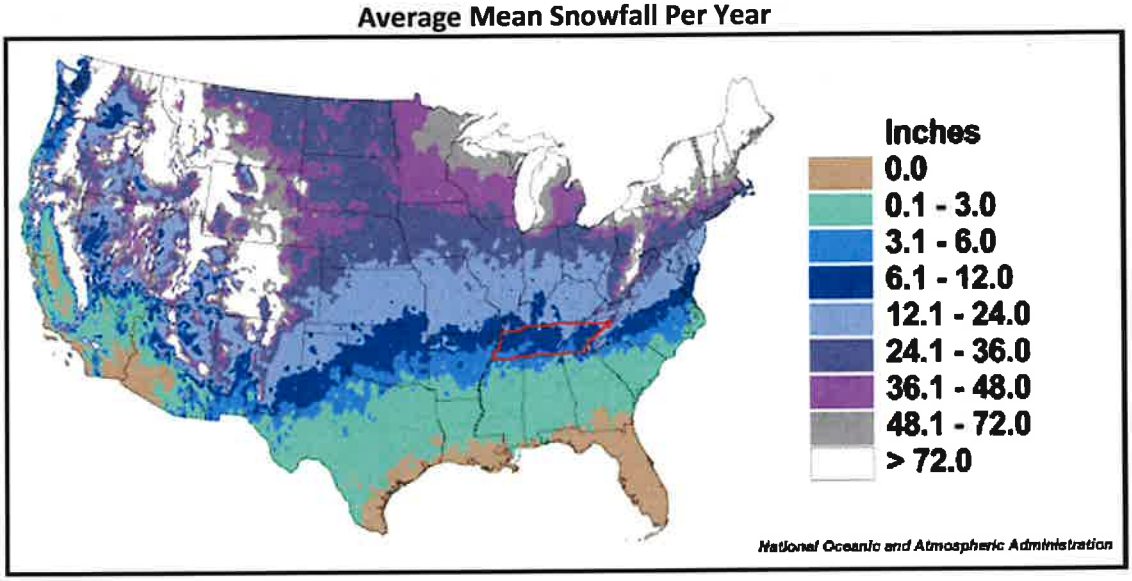
Winter Weather

A freeze occurs when temperatures are below 32 degrees Fahrenheit for a period. These temperatures can damage agricultural crops, burst water pipes, and create layers of "black ice." Winter storms are events that can range from a few hours of moderate snow to blizzard-like circumstances that can affect driving conditions and impact communications, electricity, and other services. In Hamblen County, all jurisdictions are vulnerable to freezes and moderate winter storms, but not to the severity level seen in much of the northern U.S.

Based on previous occurrences, Hamblen County can experience multiple winter weather events in one year affecting all jurisdictions within equally.

The severity of winter storms is commonly measured by inches of snowfall. It is possible for snowfall to accumulate up to 30 inches in Hamblen County and/or ice accumulations to cause for hazardous conditions due to its proximity in and around the mountains. The average mean snowfall per year in Hamblen County is between 4-8 inches (as seen on the map below).

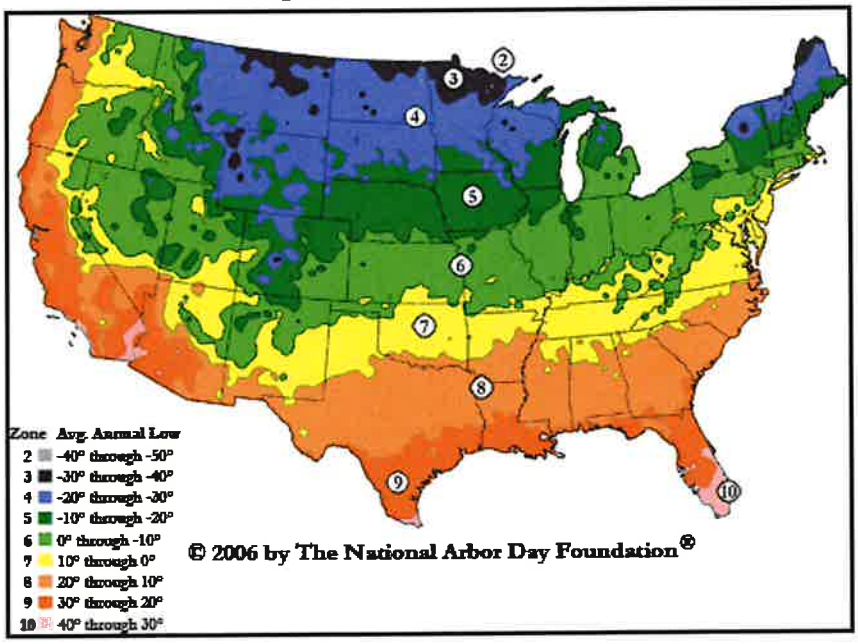
Average Mean Snowfall Per Year



Source: NOAA

Hamblen County can experience temperatures between 15 to 5 degrees Fahrenheit, thus causing multiple freeze conditions during the winter months (see the following map for other average lows).

Average Annual Low Temperatures



Source: NOAA

The following chart provides winter storm event information for Hamblen County between 1950 and 2022. The following information was obtained by accessing the NOAA database. https://www.ncdc.noaa.gov/stormevents/. This information represents all the events and extent of

the Winter Weather hazard experienced by Hamblen County, including the jurisdictions located within, and is the only source of data accessible. The information provided for Hamblen County also applies to the school district due to the geographic distribution of the schools throughout the County.

Winter Storm Impacts in Hamblen County: 1950 - 2022

Date	Event Type	Deaths	Injuries	Property Damage	Extent/Impact Description
1/6/1996	Winter Storm	0	0	0	Numerous trees and power lines fell. Many roads became impassable shutting down schools and businesses across the area. Numerous auto accidents. There were also isolated incidents of collapsed roofs.
1/11/1996	Winter Storm	0	0	0	Heavy snow accumulations of 4 to 8 inches caused numerous power outages and car accidents. Numerous trees fell as well. Schools and businesses were closed.
2/2/1996	Winter Storm	0	0	0	Numerous minor traffic accidents were reported though no major accidents. Some specific snow amounts reported were: Hamblen 12-16 inches. Hamblen County Boat Dock reported collapsed rooves due to the weight of the snow and a number of boats were damaged or sunk.
12/18/1996	Winter Storm	0	0	0	A strong upper level disturbance brought heavy snow showers to the area resulting in widespread icy roads and hazardous driving conditions. Across northeast Tennessee, amounts were generally between 1 and 2 1/2".
1/10/1997	Winter Storm	0	0	0	Snowfall amounts were 2-4 inches across the northern Cumberland plateau and central east Tennessee, and 3-5 inches in northeast Tennessee.
12/30/1997	Winter Storm	0	0	0	A series of fast-moving upper level disturbances caused heavy snow shower activity across East Tennessee. Amounts were generally 2 to 5"
12/22/1998	Ice Storm	0	0	0	The ice storm left minor accumulations of ice in valley locations due to warm ground temperatures. Most of the ice was on trees and bridges. Most roads were only wet. In higher elevations, the ice was much heavier.
1/6/1999	Winter Storm	0	0	0	Generally less than 2 inches of snow fell across East Tennessee, resulting in numerous school closings and traffic accidents. In Hamblen County, a school bus skidded 250 feet on snow-slickened Nightingale Road, traveled across Collinson Ford Road, then rolled down an embankment. None of the 32 students was injured.

3/13/1999	Winter Storm	0	0	0	A very wet weather system brought heavy amounts of rain to East Tennessee. Heavy rain began early Saturday morning, changed to heavy snow in some places during the day Saturday, back to rain Saturday night, then finally to snow Sunday night. There were also isolated reports of freezing rain. The snow was confined to northeast Tennessee, generally northeast of Knoxville. Rainfall amounts across much of East Tennessee was 1-2 inches. Snowfall amounts in northeast Tennessee averaged 1-3 inches.
3/26/1999	Winter Storm	0	0	0	A very early spring snowstorm brought a wide range of snowfall amounts to the central valley counties of East Tennessee. Amounts ranged from 1-3 inches in most locations, to 4-6 inches across Sevier, Cocke and Hamblen counties.
1/22/2000	Winter Storm	0	0	0	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.
12/2/2000	Winter Storm	0	0	0	Widespread snow fell across East Tennessee. Amounts varied widely. In northeast Tennessee, snowfall amounts averaged 1 to 3 inches, with a few spots in the mountains reporting 2 to 4 inches. In central East Tennessee, amounts ranged between 1 and 3 inches, with a few isolated reports of 3 to 5 inches.
12/18/2000	Winter Storm	0	0	0	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.
1/1/2001	Winter Storm	0	0	0	Amounts were generally 1/2 inch to 2 inches. There were a few isolated reports of 3 inches, mainly near the mountains.
1/20/2001	Winter Storm	0	0	0	Low pressure moved northeast across the southern Appalachians, bringing light snow to the region. 1 to 3 inches fell in the higher elevations of the 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.
1/5/2002	Winter Storm	0	0	0	A winter storm brought a wide range of amounts to East Tennessee. The heaviest amounts were on the northern Cumberland Plateau, where amounts averaged 3-6 inches. Across northeast Tennessee, amounts average between a dusting and a half inch. In central East Tennessee, amounts were generally 2-4 inches, with a few spots receiving as much as 5 inches, and as little as a half inch.

1/5/2003	Heavy Snow	0	0	0	Widespread snows over northern East Tennessee...and all of the mountain regions brought 4 to 6 inches of snow between 4 A.M. and noon.
1/16/2003	Winter Storm	0	0	0	Snowfall amounts ranging from 2 to 8 inches across eastern Tennessee.
1/22/2003	Winter Storm	0	0	0	Snowfall amounts ranged from 2 to 5 inches in the lower elevations while higher elevations across the region picked up totals ranging from 5 to 8 inches.
1/9/2004	Winter Storm	0	0	0	1-2 inches snowfall
2/26/2004	Heavy Snow	0	0	0	Not provided.
1/29/2005	Ice Storm	0	0	0	Much of the region ended up with ice accumulation around one quarter inch with some locations measuring as much as one half inch of ice. Trees and power lines were downed across parts of the region due to ice accumulation.
1/29/2010	Heavy Snow	0	0	0	Four to six inches of snow was reported across the county.
12/12/2010	Heavy Snow	0	0	0	Law enforcement personnel reported 4 inches of snow at Morristown.
12/12/2010	Heavy Snow	0	0	0	The NWS observer measured 4.0 inches of snow 5 miles west of Morristown.
1/17/2013	Heavy Snow	0	0	0	Four inches of snow was reported three miles north of Morristown.
1/17/2013	Heavy Snow	0	0	0	Four inches of snow was reported at Morristown.
1/17/2013	Heavy Snow	0	0	0	Five inches of snow was reported in the vicinity of Russellville on Little Mountain.
2/13/2014	Heavy Snow	0	0	0	A NWS employee reported 7.2 inches of snow fell 1 mile northwest of Morristown.
2/13/2014	Heavy Snow	0	0	0	NWS employee reported 7.0 inches of snow fell 2 miles of Morristown.

2/16/2015	Ice Storm	0	0	0	Emergency management personnel reported trees and powerlines were downed from heavy ice in Morristown.
2/16/2015	Winter Storm	0	0	0	A NWS employee reported freezing rain produced 0.25 inches of ice accumulation in Morristown.
2/21/2015	Heavy Snow	0	0	0	The public reported 5 inches of snow 4 miles east of Morristown.
2/21/2015	Heavy Snow	0	0	0	The official observation at Morristown was 4 inches of snow.
1/20/2016	Heavy Snow	0	0	0	Three and a half inches of snow was measured at the National Weather Service office in Morristown.
1/20/2016	Heavy Snow	0	0	0	Four inches of snow was reported at Russellville.
1/20/2016	Heavy Snow	0	0	0	A snowfall total of 4.3 inches was measured one mile northwest of Morristown.
1/22/2016	Heavy Snow	0	0	0	A snowfall total of 3.5 inches was reported at the National Weather Service Office in Morristown.
1/22/2016	Heavy Snow	0	0	0	A snowfall total of 6 inches was reported at Morristown.
1/6/2017	Heavy Snow	0	0	0	A snowfall depth of 4 inches was measured four miles west of Morristown.
1/6/2017	Heavy Snow	0	0	0	A snowfall depth of 3.5 inches was measured three miles west southwest of Bulls Gap.
12/9/2018	Heavy Snow	0	0	0	Three inches of snow was reported at radio station WCRK in Morristown.
12/9/2018	Heavy Snow	0	0	0	Three inches of snow was reported at Russellville.
12/9/2018	Heavy Snow	0	0	0	Three inches of snow was reported at Russellville.
12/9/2018	Heavy Snow	0	0	0	Four inches of snow was reported at Morristown.

12/24/2020	Heavy Snow	0	0	0	Parts of the central and northern Valley reported between 4 and 7 inches of snow.
1/3/2022	Heavy Snow	0	0	0	Near Morristown, 4 inches of snow was measured.
3/12/2022	Heavy Snow	0	0	0	Snow amounts between 2.5 and 4 inches were reported across the county.

The committee shared their personal experiences of winter weather events that have. The following is transcribed from their thoughts.

None

Hamblen County uses a ranking system to determine each jurisdiction's vulnerability to freezes/winter storm events. This system is based off simple arithmetic which analysis's potential impacts to determine vulnerabilities and then analysis's the probability of a freeze/winter storm event occurring to calculate a risk ranking for each jurisdiction.

Jurisdiction	Impacts			Vulnerability
	Human	Property	Business	H+P+B=#; #/3=V
Hamblen County Unincorporated	2.56	2.67	1.89	2.37
City of Morristown	3.29	3.00	2.14	2.81

Jurisdiction	Vulnerability	Probability	Risk V+P=R
Hamblen County Unincorporated	2.37	3.89	6.26
City of Morristown	2.81	4.25	7.06

Scale	
Low	2-3.6
Moderate	3.7-5.2
Medium	5.3-6.8
High	6.9-8.4
Severe	8.5-10

Human	
Risk of injuries and deaths from the hazard	
1	Death very unlikely, injuries are unlikely
2	Death unlikely, injuries are minimal
3	Death unlikely, injuries may be substantial
4	Death possible, injuries may be substantial
5	Deaths probable, injuries will likely be substantial

Property	
Amount of residetial property damage associated from the hazard	
1	Less than $500 in damages
2	$500-$10,000 in damages
3	$10,000-$500,000 in damages
4	$500,000-$2,000,000 in damages
5	More than $2,000,000 in damages

Business	
Amount of business damage associated from the hazard	
1	Less than 3 businesses closed for only a day
2	More than 3 businesses closed for a week
3	More than 3 businesses closed for a few months
4	More than 3 businesses closed indefinitly or relocated
5	A top-10 local employer closed indefinitly

Probability	
Likelihood of the hazard occurring within a given span of years	
1	Less than once every 10 years
2	About once every 5-10 years
3	About once every 2-5 years
4	About once a year
5	More than once a year

Sinkholes

According to the Geologic Hazards Map of Tennessee, because of the potential for property damage if a structure is located over a cavern, it is imperative to study existing karst features and associated hydrologic conditions during the planning and investigative stages of a construction program. It is believed increased sinkhole activity in the Hamblen County area has increased because of new infrastructure construction. Already stated in this plan is Hamblen County's flood risk. When Hamblen County floods, there is risk to the karst's in the area flooding as well. The flooding of a karst causes an imbalance between surface runoff into the sinkhole and discharge into the underlying cavern system. Consideration must be given, therefore, to the flood history of a depression before a structure is located.

Both the City of Morristown and Hamblen County have begun to see a rise in the occurrence of sink holes in both jurisdictions in recent years. This has affected our infrastructure, transportation, and our own public works and road departments. There is some possible contemplation that our rapid economic growth in certain areas has just revealed these with our karst geological structure in certain parts of our jurisdiction. Because of the costs and time associated with repairing the sink holes, we would like to try and mitigate through study where we are vulnerable to these sinkholes and if certain areas have the risk to more developing.

Land subsidence is the loss of surface elevation and occurs when large amounts of groundwater have been withdrawn from certain types of rocks, such as fine-grained sediments. The rock compacts because the water is partly responsible for holding the ground up. When the water is withdrawn, the rock falls in on itself. Subsidence may occur abruptly or over many years. It can occur uniformly over large areas or as localized sinkholes.

Data of occurrences from past five years (2012-2017)

Date of Sinkhole	Work Completed to Fix Sinkhole	Location
7/2/12	12/30/16	MORRISTOWN AIRPORT
5/29/13	6/4/13	COMMERCE BLVD.
8/7/13	8/16/13	RESOURCE DRIVE
12/2/13	12/3/13	SOUTH ECONOMY
5/16/14	5/21/14	HUNTER ROAD
8/8/2014	8/13/2014	MORNINGSIDE DRIVE
7/16/15	6/17/16	AMESBURY DRIVE
8/28/15	8/28/15	MORTON STREET
12/18/15	2/20/17	EAST INDUSTRIAL PARK *
12/28/15	12/31/16	VANTAGE VIEW DRIVE
9/16/16	9/16/16	VETERANS PARKWAY
12/8/16	12/9/16	MARTIN LUTHER KING BLVD.

9/26/17	9/27/17	SUPERIOR DRIVE

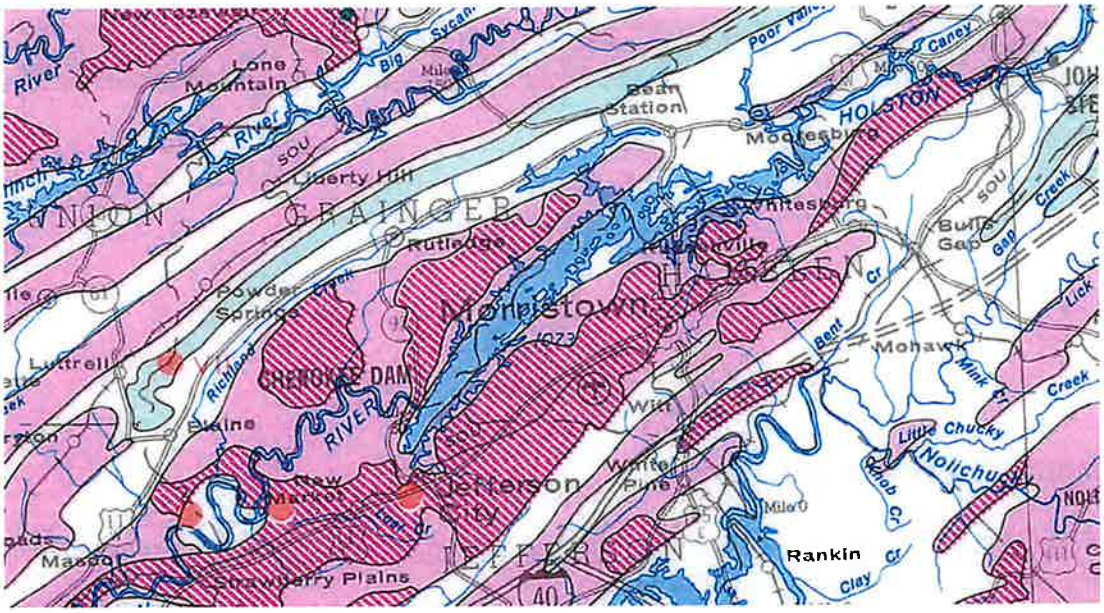
* The East Industrial Park sinkhole took 2 years to fix at a cost of $360,795.52.

The following page provides information in reference to sinkholes since the last plan update. The data is from 2017 to 2022.

SINKHOLES REPAIRED				
2018	2019	2020	2021	2022
COMMERCE DRIVE	160 @ 25E	25E AT E. CROXDALE	AIR PARK BLVD. @ SOCCER FIELD	160 HWY. ABOVE VALLEY HOME @WSCC
JEFFREY LANE	ASPEN AVE.	DALTON CIRCLE	OLD HIGHWAY 11E 5140	25E @ RAMP
MAID INDUSTRIAL PARK	BARTON SPRINGS	HUNTER ROAD	RESOURCE DRIVE 1621	BUELL ROAD
MEADOWLARK DRIVE	BERKLINE DRIVE	MERCHANTS GREENE	S. JACKSON @ W. MORRIS BLVD	COMMERCE BLVD. 5650
NORMAN DRIVE	BLUEGRASS 514	ONTARIO CIRCLE	SANDSTONE DRIVE @ DRAIN TILE	E. THIRD N. STREET 1008
OLD LIBERTY HILL ROAD	BUELL ST. 5985	S. BELLWOOD @ RR		GAMMON AVENUE
SUPERIOR DRIVE	COMMERCE BLVD. 5943	S. CUMBERLAND @ HAYTER DR.		HWY. 160 @ COOPER DRIVE
	CROCKETTS TRACE	S. JAMES STREET 324		MLK PARKWAY 220
	E. MORRIS BLVD. 4285	SOUTH I.D. PARK CHEROKEE FLYERS		OLD HWY. 25E 5238
	FRESHOUR ST. 1059	SUPERIOR DRIVE 5715		OLD HWY. 25E 5140
	MAIN STREET 700			RESOURCE DRIVE 1621
	N. BELLWOOD RD.			S. DAISY STREET 284
	S. BELLWOOD RD.			S. JACKSON @ W. MORRIS BLVD.
	SUPERIOR DRIVE 5707			SMYTHVIEW DRIVE 1517
	VETERANS PARKWAY 625			W. ANDREW JOHNSON HIGHWAY 3980
	WARREN DRIVE			

According to the Tennessee Hazard Mitigation Plan (2018), Hamblen County has had 1,491 sinkholes varying in depth and width.

The following map was retrieved by the Geologic Hazards Map of Tennessee.



Karst areas (areas with caves, sinkholes and disappearing streams)

Areas with a high density of karst features

The above chart provided details about Hamblen County's sinkhole history which totals 131 work days to fix the area affected. Significant sinkholes which require repair occur about 3 to 5 times per year, on average. Accurate data on the extent of sinkholes, in units of measurement, is not currently available. Units of measurement are not gathered by those who remediate sinkholes because there is yet to be a standard established in reference to the overall documentation of the issue.

The committee shared their personal experiences of winter weather events that have. The following is transcribed from their thoughts.

None

Jurisdiction	Impacts			Vulnerability
	Human	Property	Business	H+P+B=#; #/3=V
Hamblen County Unincorporated	2.13	3.13	1.63	2.29
City of Morristown	2.00	3.14	1.71	2.28

Jurisdiction	Vulnerability	Probability	Risk V+P=R
Hamblen County Unincorporated	2.29	4.00	6.29
City of Morristown	2.28	4.14	6.42

Scale	
Low	2-3.6
Moderate	3.7-5.2
Medium	5.3-6.8
High	6.9-8.4
Severe	8.5-10

Presidential Disaster Declarations

The source of this information came from https://www.fema.gov/disasters. All disasters included in the table below that were provided on this website.

FEMA DR	Date	Hazard			PA	IA
4427	4/17/2019	Flooding	Landslide	Mudslide	yes	no
4211	4/2/2015	Winter Storm	Flooding		yes	no
1965	3/31/2011	Severe Storms	Tornadoes	Flooding	yes	no
3095	3/14/1993	Winter Storm			yes	no
3217	9/5/2005	Hurricane Katrina			yes	no
424	4/4/1974	Tornadoes			yes	Yes
366	5/15/1972	Heavy Rains	Flooding		yes	Yes
1022	4/14/1994	Heavy Rains	Flooding		no	Yes
1215	4/20/1998	Severe Storms	Tornadoes	Flooding	No	Yes

PA = Public Assistance
IA = Individual Assistance

Section 4: Mitigation Strategy

Mitigation Goals

The purpose for developing a set of Goals is to clearly state the community's overall vision for hazard mitigation and to provide a path towards building a safer, more resilient community. The Hamblen County Hazard Mitigation Committee identified the following goals to be the forefront in the overall development of this plan. All actions/projects recommended as mitigation efforts for the Hazard Mitigation Plan must first meet or further at least one of these goals. The goals are provided in a ranked order where the first goal is paramount.

Goal 1: Protect the lives and health of citizens from the effects of natural hazards.

Goal 2: Emphasize mitigation planning to decrease vulnerability of existing and new structures.

Goal 3: Encourage public support and commitment to hazard mitigation, by communicating mitigation benefits.

Identification and Prioritization of Mitigation Projects

Hamblen County has developed a comprehensive range of mitigation projects. These projects were solicited and identified by the different entities who make up the Hamblen County Hazard Mitigation Committee. Once the proposed projects attained a sponsoring agency and the details of the projects were discussed by the committee, the committee then proceeded to prioritize the mitigation projects.

The prioritization process was important since most mitigation projects represent a large investment of financial and personal resources. By evaluating each project's degree of feasibility and the level of costs versus benefits, Hamblen County was able to determine when and which projects should be implemented based on available funding and time.

The Hamblen County Hazard Mitigation Committee used the SAFE-T method to prioritize these projects. This approach was adopted from the successful methodology used by other counties in FEMA Region 4. This rating system uses five variables to evaluate the overall feasibility and appropriateness: Societal, Administrative, Financial, Environmental, and Technical. A focus on this methodology emphasizes the use of a cost-benefit review to maximize benefits.

Project Prioritization Method: SAFE-T			
	Variable	**Value**	**Description**
S	**Societal**: The public must support the overall implementation strategy and specified mitigation actions. The projects will be evaluated in terms of community acceptance and societal benefits.	1	Low community priority, few societal benefits
		2	Moderate community acceptance/priority
		3	High community acceptance/priority
A	**Administrative**: The projects will be evaluated for anticipated staffing and maintenance requirements to determine if the jurisdiction has the personnel and administrative capabilities necessary to implement the project or whether outside help will be needed.	1	High staffing, outside needed
		2	Some staffing, help may be needed
		3	Low staffing, no outside help needed
F	**Financial**: The projects will be evaluated on their general cost-effectiveness and whether additional outside funding will be required.	1	Somewhat cost-effective
		2	Moderately cost-effective
		3	Very cost-effective
E	**Environmental**: The projects will be evaluated for any immediate or long-term environmental impacts caused by their construction or operation.	1	Many environ. impacts, possibly long-term
		2	Some environ. Impacts, some possibly long-term
		3	Few, if any, environ. impacts
T	**Technical**: The projects will be evaluated on their ability to reduce losses in the long-term, whether there are secondary impacts, and whether the proposed project solves the associated problem or if additional components are necessary.	1	Other actions are needed or short-term fix
		2	Other actions may be needed for long-term fix
		3	Other actions not needed, long-term fix

Committee members ranked the projects as a group by determining the value for each variable and then by adding the variables rates up for a project sum value. All the project rankings can be seen on the Hamblen County Hazard Mitigation Project List.

Hamblen County Project List

The following Project List provides an overview of all the Hamblen County Multi-Jurisdictional Hazard Mitigation Committee projects. This includes potential funding sources, implementation timeframes, the project's responsible agency, and other information. The committee went into extensive discussion surrounding projects that would be beneficial for our community.

Hamblen County Project List

Hazard Mitigated	Project #	Hamblen County Action/Project Name	Priority Rank	Addresses New or Existing Buildings/Infra?	Responsible Agency	Possible Funding Source(s)	Timeframe
Flooding	9	Flood Reduction: McClister Road	3	Existing	Hamblen Co. Road Department	BRIC, HMGP, FMA	1-5 years
	10	Flood Reduction: Brady Drive	3	Existing	Hamblen Co. Road Department	BRIC, HMGP, FMA	1-5 years
	11	Flood Reduction: Robin Circle	3	Existing	Hamblen Co. Road Department	BRIC, HMGP, FMA	1-5 years
	12	Flood Reduction: Kidwell Ridge Road	3	Existing	Hamblen Co. Road Department	BRIC, HMGP, FMA	1-5 years
	13	Flood Reduction: Scarlett Drive	24	Existing	Hamblen Co. Road Department	BRIC, HMGP, FMA	1-5 years
	14	All Hazards Public Education	20	Existing	Morristown-Hamblen EMA	HMGP, LOCAL BUDGET	1-5 years
	16	Repetitive/Severe Repetitive Loss Property Buy-out	24	Existing	City of Morristown-Planning & Finance	BRIC, HMGP, FMA	1-5 years
	17	Flood reduction: Dalton Ford and Reeds Chapel Rd.	21	Existing	Hamblen Co. Road Department	BRIC, HMGP, FMA	1-5 years
	18	Flood reduction: Old Russellvile Pike (Hwy 344)	3	Existing	Tennessee Department of Transportation	BRIC, HMGP, FMA	1-5 years
	19	Flood reduction: Tara subdivision	16	Existing	Hamblen Co. Road Department	BRIC, HMGP, FMA	1-5 years
	20	Flood reduction: Old Kentucky Rd. at Jaybird	3	Existing	Hamblen Co. Road Department	BRIC, HMGP, FMA	1-5 years

	21	Flood reduction: Russellville Primary School	3	Existing	Tennessee Department of Transportation	BRIC, HMGP, FMA	1-5 years
Tornado/Wind	14	All Hazards Public Education	20	Existing	Morristown-Hamblen EMA	HMGP, LOCAL BUDGET	1-5 years
	22	Highway Dept. Generator	1	Existing	Hamblen Co. Road Department	BRIC, HMGP	1-5 years
	23	Tornado Safe Room for all schools	12	Existing	Hamblen County School System	BRIC, HMGP	1-5 years
	25	911 building generator	11	Existing	Hamblen County Emergency Communications District	BRIC, HMGP	1-5 years
Winter Weather	14	All Hazards Public Education	20	Existing	Morristown-Hamblen EMA	HMGP, LOCAL BUDGET	1-5 years
	23	Highway Dept. Generator	1	Existing	Hamblen Co. Road Department	BRIC, HMGP	1-5 years
	25	911 building generator	11	Existing	Hamblen County Emergency Communications District	BRIC, HMGP	
Sinkholes	14	All Hazards Public Education	20	Existing	All Agencies	HMGP, LOCAL BUDGET	1-5 years
	15	Engineering study to address public right of ways and public property sinkhole issues	2	Existing	City of Morristown Engineering & Morristown Public Works	BRIC, HMGP	1-5 years

Hazard Mitigated	Project #	City of Morristown Action/Project Name	Priority Rank	Addresses New or Existing Buildings/Infra?	Responsible Agency	Possible Funding Source(s)	Timeframe
Flooding	1	Flood Reduction: S Cumberland Rd (near Barkley Landing)	13	Existing	Morristown Public Works	BRIC, HMGP, FMA	1-5 years
	2	Flood Reduction: W Economy Rd (near Rural King)	19	Existing	Morristown Public Works	BRIC, HMGP, FMA	1-5 years
	3	Flood Reduction: Debbie Circle (near creek)	3	Existing	Morristown Public Works	BRIC, HMGP, FMA	1-5 years
	4	Flood Reduction: Cherokee Dr (near Lockmere S/D)	16	Existing	Morristown Public Works	BRIC, HMGP, FMA	1-5 years
	5	Flood Reduction: Central Church Rd (near Parke Villas)	21	Existing	Morristown Public Works	BRIC, HMGP, FMA	1-5 years
	6	Flood Reduction: Sunrise Ave (near creek and S Henry St)	13	Existing	Morristown Public Works	BRIC, HMGP, FMA	1-5 years
	7	Flood Reduction: Panther Creek Rd (near Bullard Dr	3	Existing	Hamblen Co. Road Department	BRIC, HMGP, FMA	1-5 years
	8	Flood Reduction: Old Stage Rd (near Panther Creek Rd)	3	Existing	Hamblen Co. Road Department	BRIC, HMGP, FMA	1-5 years
	14	All Hazards Public Education	20	Existing	Morristown-Hamblen EMA	HMGP, LOCAL BUDGET	1-5 years
	16	Repetitive/Severe Repetitive Loss Property Buy-out	24	Existing	City of Morristown-Planning & Finance	BRIC, HMGP, FMA	1-5 years
Tornado/Wind	14	All Hazards Public Education	20	Existing	Morristown-Hamblen EMA	HMGP, LOCAL BUDGET	1-5 years
	24	Utilities Generator	15	Existing	Morristown Utilities	BRIC, HMGP	1-5 years

Winter Weather	14	All Hazards Public Education	20	Existing	Morristown-Hamblen EMA	HMGP, LOCAL BUDGET	1-5 years
	24	Utilities Generator	15	Existing	Morristown Utilities	BRIC, HMGP	
Sinkholes	14	All Hazards Public Education	20	Existing	All Agencies	HMGP, LOCAL BUDGET	1-5 years
	15	Engineering study to address public right of ways and public property sinkhole issues	2	Existing	City of Morristown Engineering & Morristown Public Works	BRIC, HMGP	1-5 years

Project List Update

The Hamblen County Hazard Mitigation Committee reviewed the actions/projects in the 2018 plan. The decision to keep, discard or change is noted below.

- Drainage projects at flash flooding site – This committee kept this concept but names specific sites that need to be addressed.
- All Hazard Educational Program Regarding Mitigation – kept/renamed
- Road elevation/culvert – Kept but renamed to specific areas that need flood reduction measures.
- Tree limb removal on public right of ways – removed due to not being eligible under the hazard mitigation grant programs.
- Engineering study for sinkholes – kept and moved forward to 2023 plan.
- South Cumberland at Railroad – removed; completed in 2021
- Dalton Ford & Reeds Chapel Rd. – kept
- Old Russellville Pike (Hwy 344) – kept
- South Cumberland at Parker Rd. – kept
- Tara Subdivision – kept
- Old Kentucky Rd. at Jaybird - Kept
- Russellville Primary School – kept
- Debie Circle (Stubblefield Creek) – kept
- Russellville Intermediate School – Completed in 2020

National Flood Insurance Program Compliance

The National Flood Insurance Program (NFIP) is a pre-disaster flood hazard mitigation and insurance protection program which has reduced the increasing cost of disasters. The intent of the program is to: require new and substantially improved structures be designed and constructed to minimize or eliminate future flood damage; provide floodplain residents and business owners with financial insurance assistance in the form of insurance after floods, and it transfers most of the cost of private property flood losses from the taxpayers to floodplain property owners through flood insurance premiums. Participation in the NFIP is based on an agreement between communities and FEMA.

Currently, Hamblen County unincorporated, and the City of Mountain City are NFIP participants. FEMA has listed these jurisdictions to have a current effective map date of July 3, 2006. Below is an overview of NFIP policy and loss data for Hamblen County.

According to the National Flood Insurance Program, repetitive flood loss is defined as a facility or structure that has experienced two or more insurance claims of at least $1,000 in any given 10-year period since 1978. Within the NFIP, repetitive flood loss properties are usually considered the most vital structures to mitigate. There is one non-residential property that is a repetitive loss in the City of Morristown. None are listed for Hamblen County. However, the information obtained for repetitive/severe repetitive loss is from data from 2019. FEMA has not established the ability to obtain updated data in a reasonable timeframe to complete this plan update.

The chart below provides a summary of their NFIP policy and loss data. The first table provides a description of the columns located within the NFIP policy data.

Adjuster Expense	The total amount paid to adjusters for all claims within the community and/or county. It includes all special expenses, allocated loss adjusted expense, and allocated ICC expense.
Building Coverage	Building coverage for a policy or claim (whole dollars)
Building Payments	The total amount paid for all losses for building,
Community Name	The official NFIP name of the community in which the claim or policy exists.
Community Number	The 6 character community ID in which the claim or policy exists.
Contents Coverage	Contents coverage for a policy or claim (whole dollars)
Contents Payments	The total amount paid for all losses for contents
County Name	The official FIPS county name for the claim or policy. It is determined by geocoding of the policy or claim address, rather than the historical method of using the community to look up the county.
Data as of Date	The date of the most recent validated data upon which the report is based.
ICC Coverage	ICC coverage for a policy or claim (whole dollars)
ICC Payments	The total amount paid for all losses for ICC
Number of Losses	The number of losses (claims) reported within that community and/or county.
State	The state in which the policy or claim exists. The value is determined by the geocoded data first, and in the absence of geocoding, by the community state.
Total Policy Count	The total number of policies reported within the community and/or county in force as of the given date. All condo units are counted for each condo master policy.
Total Premium and Policy Fee	The policy premium and associated policy fee for the policies.
WYO or Direct	An indicator of whether the policy or claim is administered by NFIP Direct ("Direct") or a Write-Your-Own Company ("WYO")

Community Name (Number)	Direct Premium and FPF	WYO Premium and FPF	Total Premium and FPF	Direct Policy Count	WYO Policy Count	Total Policy Count	Direct Coverage (in Thousands)	WYO Coverage (in Thousands)	Total Coverage (in Thousands)	Direct Losses	WYO Losses	Total Losses	Direct Dollars Paid	WYO Dollars Paid	Total Dollars Paid	Adjuster Expense
MORRISTOWN, CITY OF (470070)	$ -	$ -	$ -	-	-	-	$ -	$ -	$ -	-	6	6	$ -	$ 867,051	$ 867,051	$ 20,518
HAMBLEN COUNTY * (470346)	$ 793	$ 4,273	$ 5,066	3	10	13	$ 364	$ 2,070	$ 2,434	2	1	3	$ 54,785	$ 962	$ 55,746	$ 6,035
MORRISTOWN, CITY OF (470070)	$ 4,413	$ 64,237	$ 68,650	5	44	49	$ 1,155	$ 9,408	$ 10,563	9	9	18	$ 59,838	$ 41,376	$ 101,214	$ 9,687

To continue compliance with the NFIP, the jurisdictions have identified, analyzed, and prioritized three mitigation strategies to stay active with the program.

1. Continue to evaluate improved standards that are proven to reduce flood damage.

2. Maintaining supplies of FEMA/NFIP materials to help homeowners evaluate measures to reduce damage.

3. Maintaining a map of areas that flood frequently and prioritizing those areas for inspection immediately following heavy rains or flooding event.

Section 5: Plan Maintenance

Monitoring, Evaluating, and Updating

The Hamblen County Hazard Mitigation Committee is designated to monitor and evaluate the mitigation plan. This committee is chaired by Hamblen County Emergency Management who leads the monitoring, evaluating, and updating process.

Monitoring activities will involve Hamblen County Emergency Management setting up a committee meeting to be held on an annual basis. Hamblen County Emergency Management will prepare a brief annual report of the meeting's findings by addressing mitigation progress and shortfalls within the county.

The plan is to be evaluated annually and after any significant disaster causing human, infrastructure, and property losses. Following each annual informal evaluation of the plan by emergency management staff, any proposed revisions or recommendations will be brought before the Mitigation Committee to be incorporated into the plan. Potential updates to the plan will address changes to the hazard assessment, the critical facilities list, the repetitive loss list, the committee membership list, and the project priority list.

The plan will be formally updated every five years in accordance with 44 CFR 201.6(d)3, which states that the plan shall be reviewed, revised, and resubmitted for approval within five years to continue eligibility for HMGP grant funding. For the five-year update, Hamblen County Emergency Management will notify the jurisdictional governments and the Hamblen County Hazard Mitigation Committee approximately one year prior to the plan's expiration date. The review of the plan will include updating the planning process, the hazard profiles, the risk assessment, the vulnerability assessment, the mitigation strategies, and the plan maintenance descriptions.

The five-year plan update will also include soliciting other interested persons/agencies to join the Mitigation Committee and a review of what has been accomplished in the past 5 years. The Hamblen County Hazard Mitigation Committee's goal is to have at least 5 meetings within this time span; dates, public notices, and objectives for these meetings will be determined by Hamblen County Emergency Management.

Five months prior to the plan's expiration date, Hamblen County Emergency Management will submit the revised plan to the Tennessee Emergency Management Agency for preliminary review. Upon approval by the state, TEMA will submit the updated plan to FEMA for review.

Once Hamblen County has attained the designation of the plan's approval pending adoption, each jurisdiction will adopt the plan through a resolution within a year.

Incorporation into Planning Mechanisms

By incorporating the Hamblen County Multi-Jurisdictional Hazard Mitigation Plan into other planning documents and mechanisms, the information contained in the mitigation plan can help fill in missing gaps in existing documents, can contribute to already existing mitigation-based projects, and can create a strengthened stance of mitigation implementation and awareness within the county and its jurisdictions.

The committee discussed incorporating this plan into other plans that exist within the County and all jurisdictions within, and due to other jurisdictional priorities and demands (especially during this COVID-19 pandemic), no other plans or options were identified by the members. What you see below is what was discussed and documented. As required, this will be discussed within the committee during the next plan update.

Some of the mechanisms that the Hamblen County Multi-Jurisdictional Hazard Mitigation Plan could be incorporated into include:

- Hamblen County Emergency Operations Plan
- Building Codes
- Floodplain management

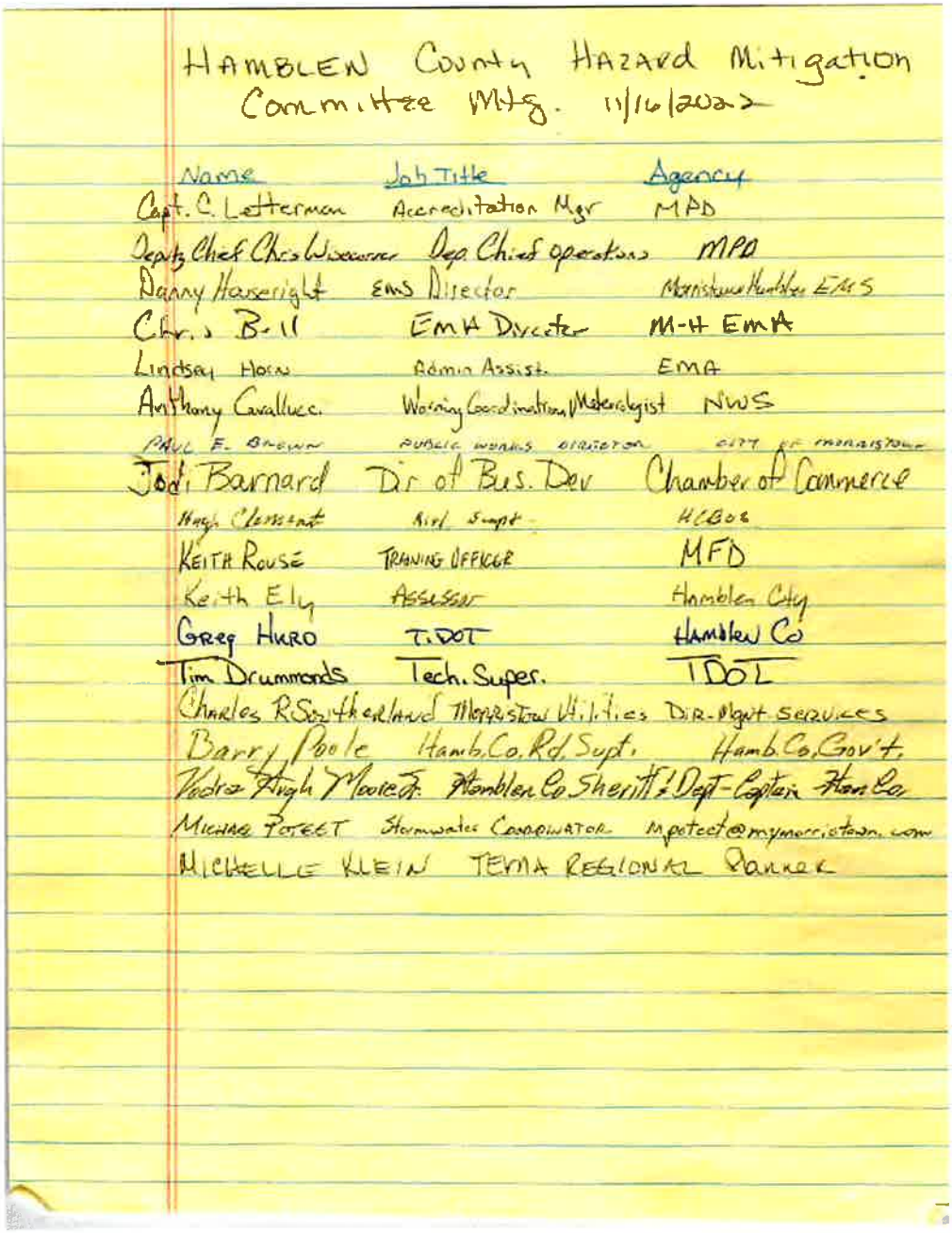
The process of incorporating the hazard mitigation plan into other plans will begin during the other plan's update cycles. Hamblen County Emergency Management will first review the plans side-by-side, and where deemed necessary, Emergency Management will make notes on how mitigation concepts and actions can be incorporated into the other plans. These recommendations will be submitted to the lead agencies of the other planning mechanisms for them to place relevant information within the documents.

Continued Public Participation

The Hamblen County Mitigation Committee will strive to involve the public in future mitigation activities. This will be accomplished by continuing to post Mitigation Committee Meeting dates in the local newspaper, by attempting to have a public mitigation meeting once a year, by providing public access to copies of the Hamblen County Multi-Jurisdictional Hazard Mitigation Plan in the local emergency management office, and by soliciting other interested persons to participate in the mitigation planning process. By implementing these methods, the public will have an opportunity to comment on the plan during the update drafting stage and prior to plan approval.

Appendix 1

Attendance Sheet Meeting #1

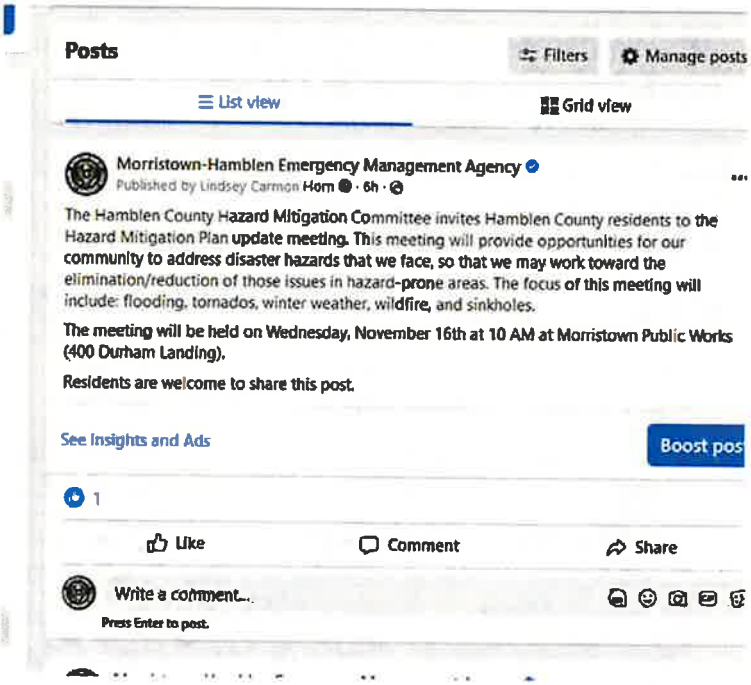


HAMBLEN County Hazard Mitigation Committee Mtg. 11/16/2022

Name	Job Title	Agency
Capt. C. Letterman	Accreditation Mgr	MPD
Deputy Chief Chris Wiseman	Dep. Chief Operations	MPD
Danny Hauseright	EMS Director	Morristown Hamblen EMS
Chris Bell	EMA Director	M-H EMA
Lindsay Horn	Admin Assist.	EMA
Anthony Cavallucci	Warning Coordination Meteorologist	NWS
PAUL E. BROWN	PUBLIC WORKS DIRECTOR	CITY OF MORRISTOWN
Jodi Barnard	Dir of Bus. Dev	Chamber of Commerce
Hugh Clemmant	Asst Supt	HCBOE
KEITH ROUSE	TRAINING OFFICER	MFD
Keith Ely	ASSESSOR	Hamblen City
GREG HURD	T.DOT	Hamblen Co
Tim Drummonds	Tech. Super.	TDOT
Charles R Southerland	Morristown Utilities	DIR-Mgmt SERVICES
Barry Poole	Hamb. Co. Rd Supt.	Hamb. Co. Gov't.
Yadira Hugh Mercado	Hamblen Co Sheriff's Dept-Captain	Ham Co
MICHAEL POTEET	Stormwater Coordinator	mpoteet@mymorristown.com
MICHELLE KLEIN	TEMA REGIONAL PLANNER	

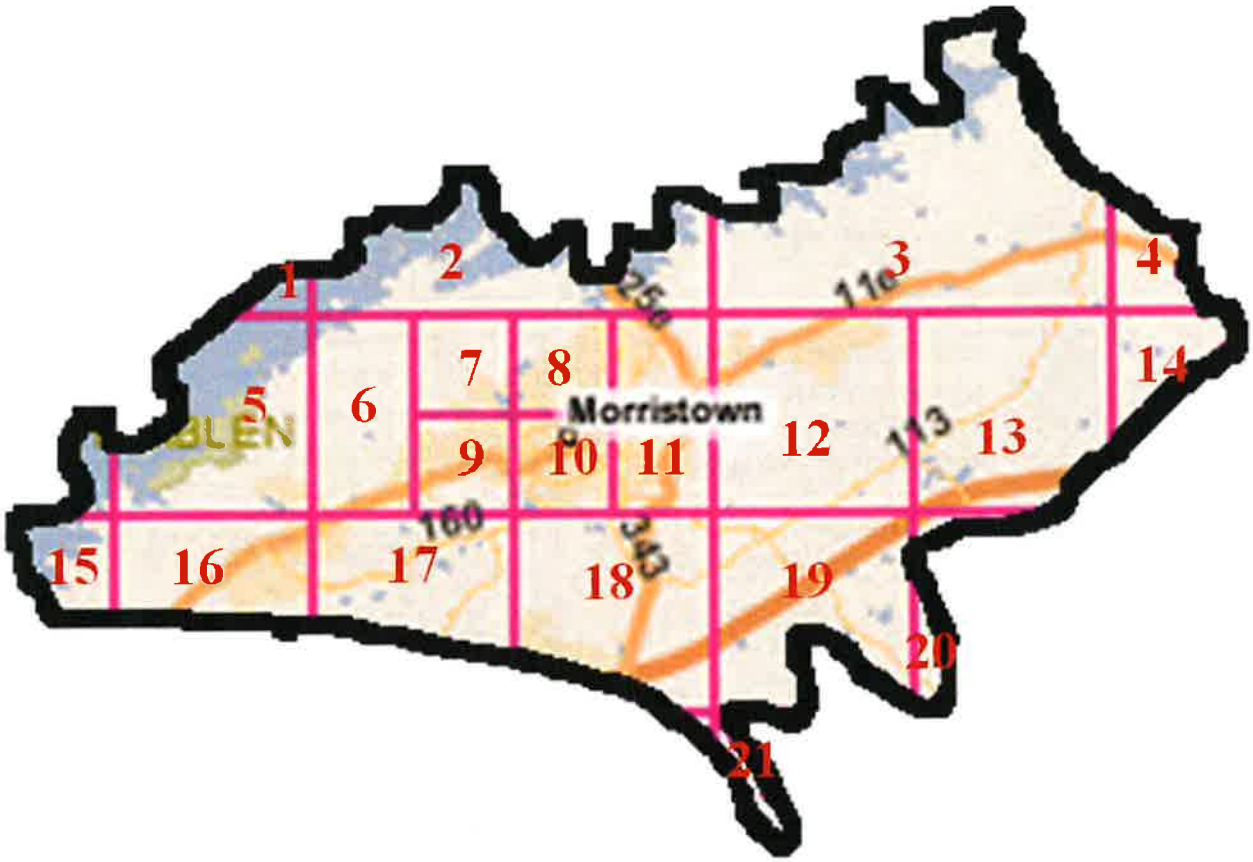
Appendix 2

Public Notices

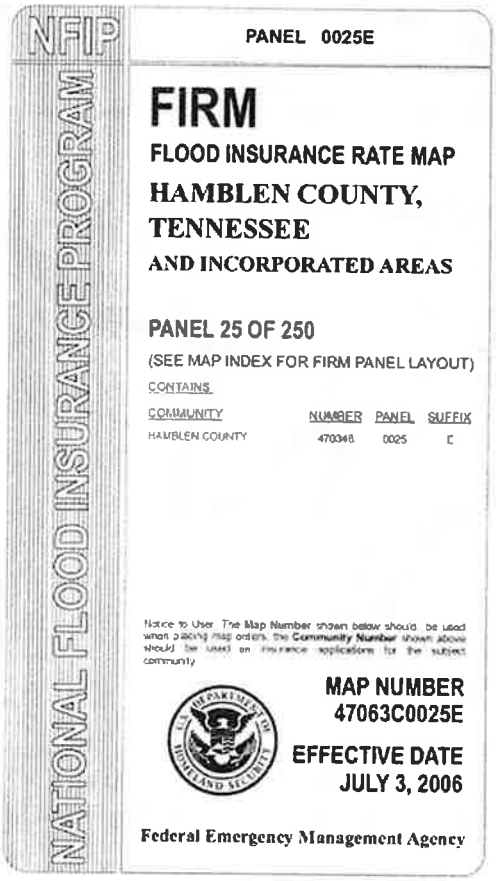


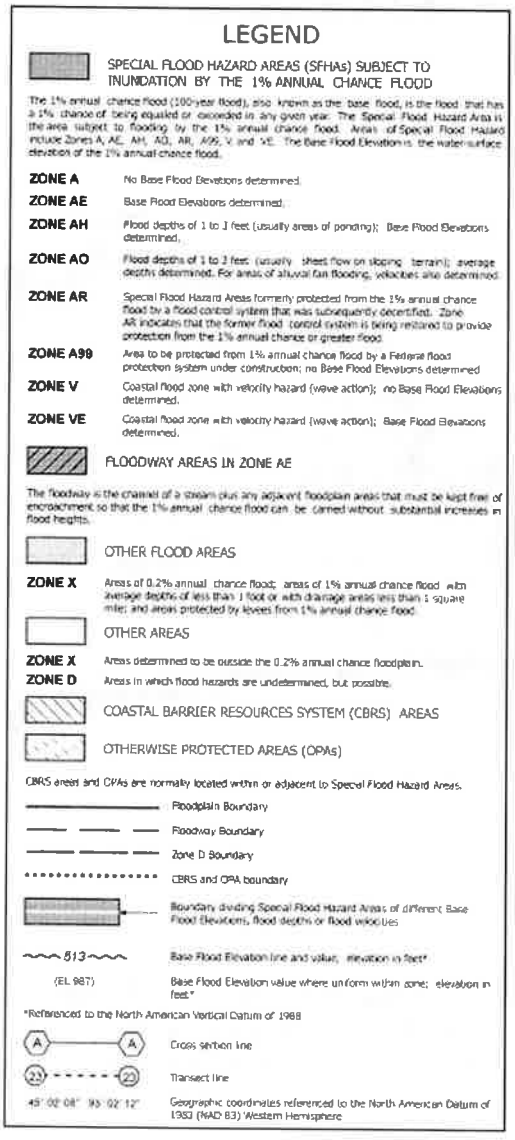
Appendix 3

Flood Insurance Rate Maps for Hamblen County

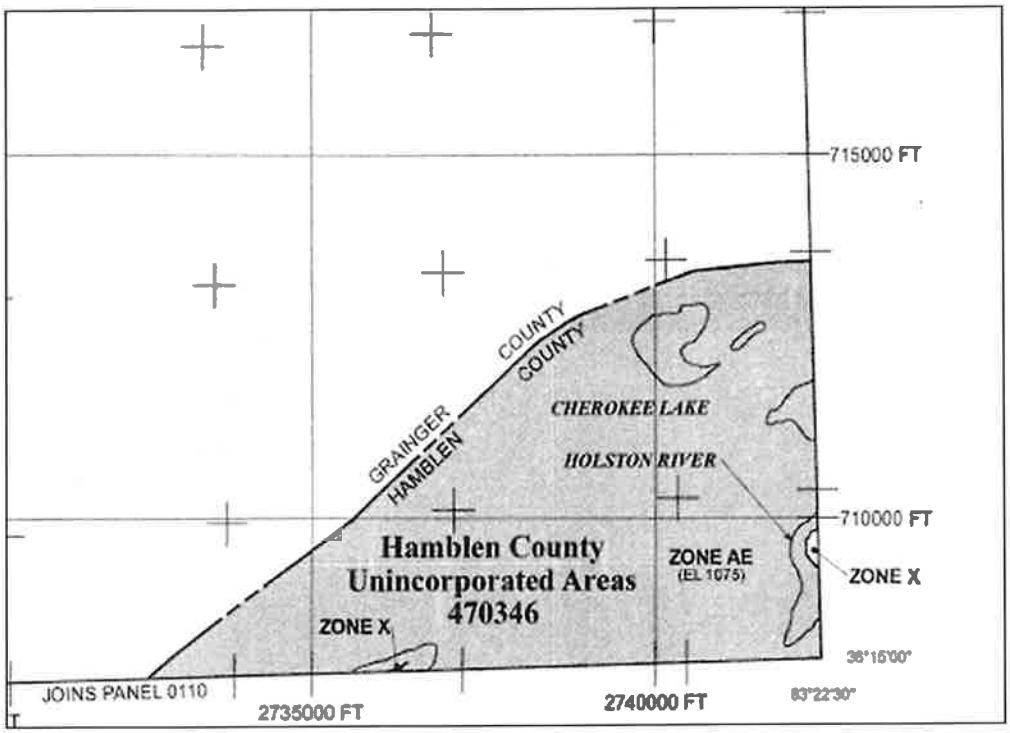


The above map shows Hamblen County broken into FIRM Panels with numeric labeling. The following maps show a close-up of each Panel Label indicating the area's 100 year floodplains through shading. These maps were produced on July 3, 2006 and are available from the FEMA Map Service Center.

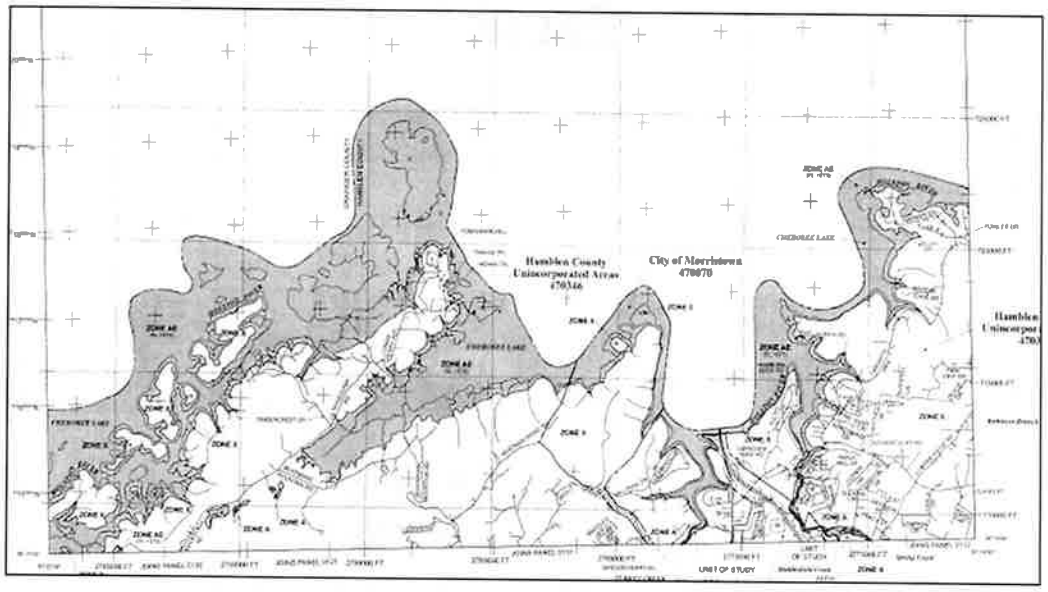

NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0025E
FIRM
FLOOD INSURANCE RATE MAP
HAMBLEN COUNTY, TENNESSEE
AND INCORPORATED AREAS
PANEL 25 OF 250
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS
COMMUNITY NUMBER PANEL SUFFIX
HAMBLEN COUNTY 470048 0025 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
47063C0025E
EFFECTIVE DATE
JULY 3, 2006
Federal Emergency Management Agency


LEGEND
SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD
The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.
ZONE A No Base Flood Elevations determined.
ZONE AE Base Flood Elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
FLOODWAY AREAS IN ZONE AE
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.
OTHER FLOOD AREAS
ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
OTHER AREAS
ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.
COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS
OTHERWISE PROTECTED AREAS (OPAs)
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
Floodplain Boundary
Floodway Boundary
Zone D Boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities
513
Base Flood Elevation line and value; elevation in feet*
(EL 987)
Base Flood Elevation value where uniform within zone; elevation in feet*
*Referenced to the North American Vertical Datum of 1988
A
A
Cross section line
23
23
Transect line
45° 02' 08", 93° 02' 12"
Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

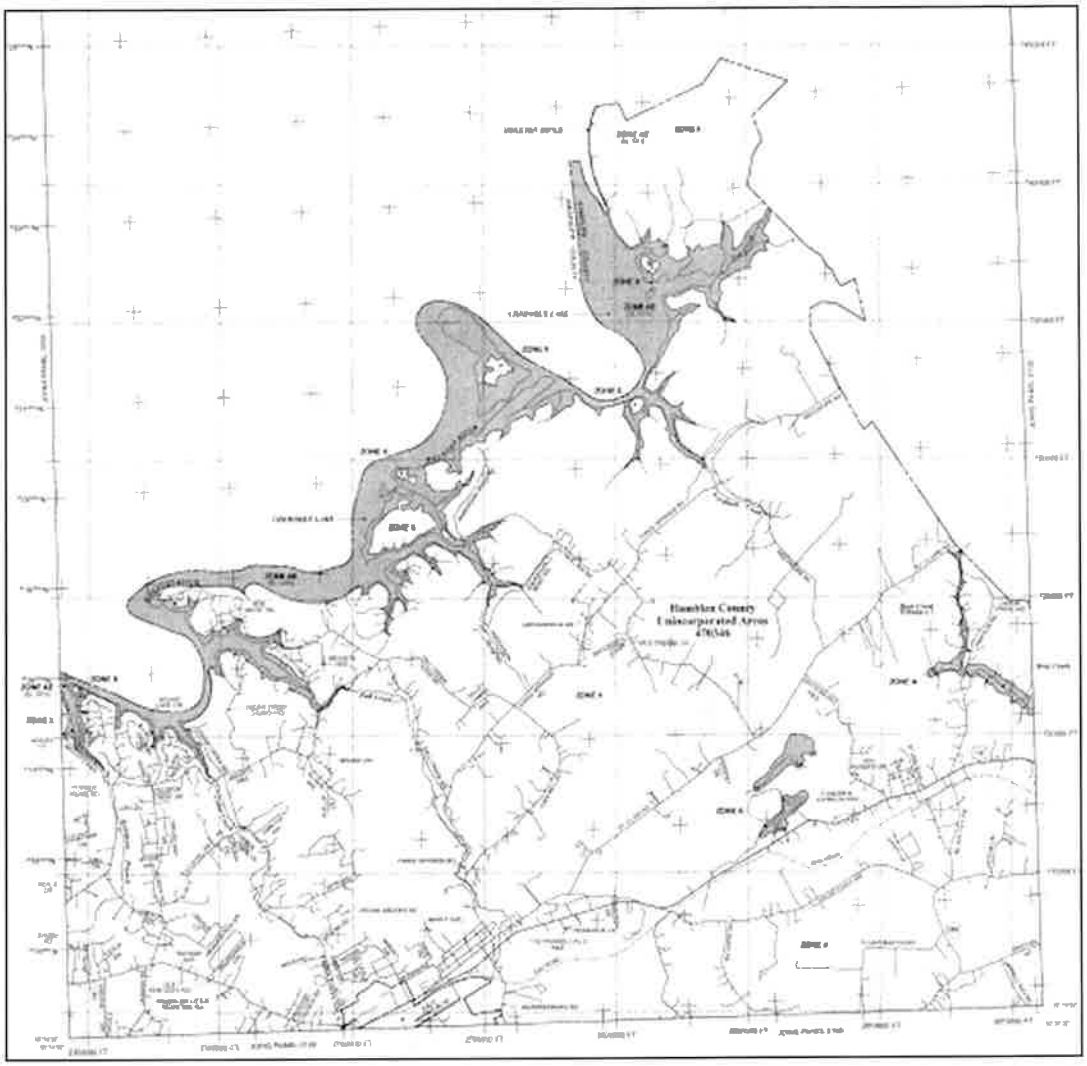
Panel 1


715000 FT
GRAINGER COUNTY
HAMBLEN COUNTY
CHEROKEE LAKE
HOLSTON RIVER
710000 FT
Hamblen County
Unincorporated Areas
470346
ZONE AE
(EL 1075)
ZONE X
ZONE X
36°15'00"
JOINS PANEL 0110
2735000 FT
2740000 FT
83°22'30"

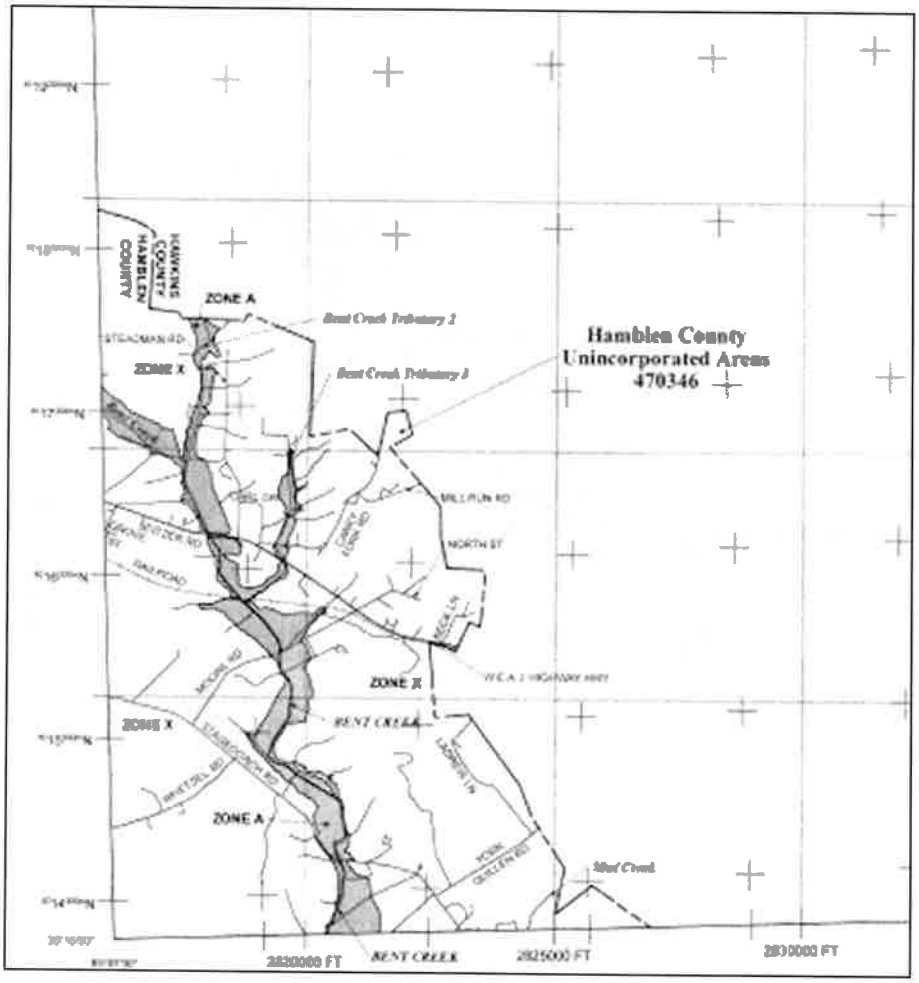
Panel 2


Hamblen County
Unincorporated Areas
470346
City of Morristown
470070
CHEROKEE LAKE
UNIT OF STUDY

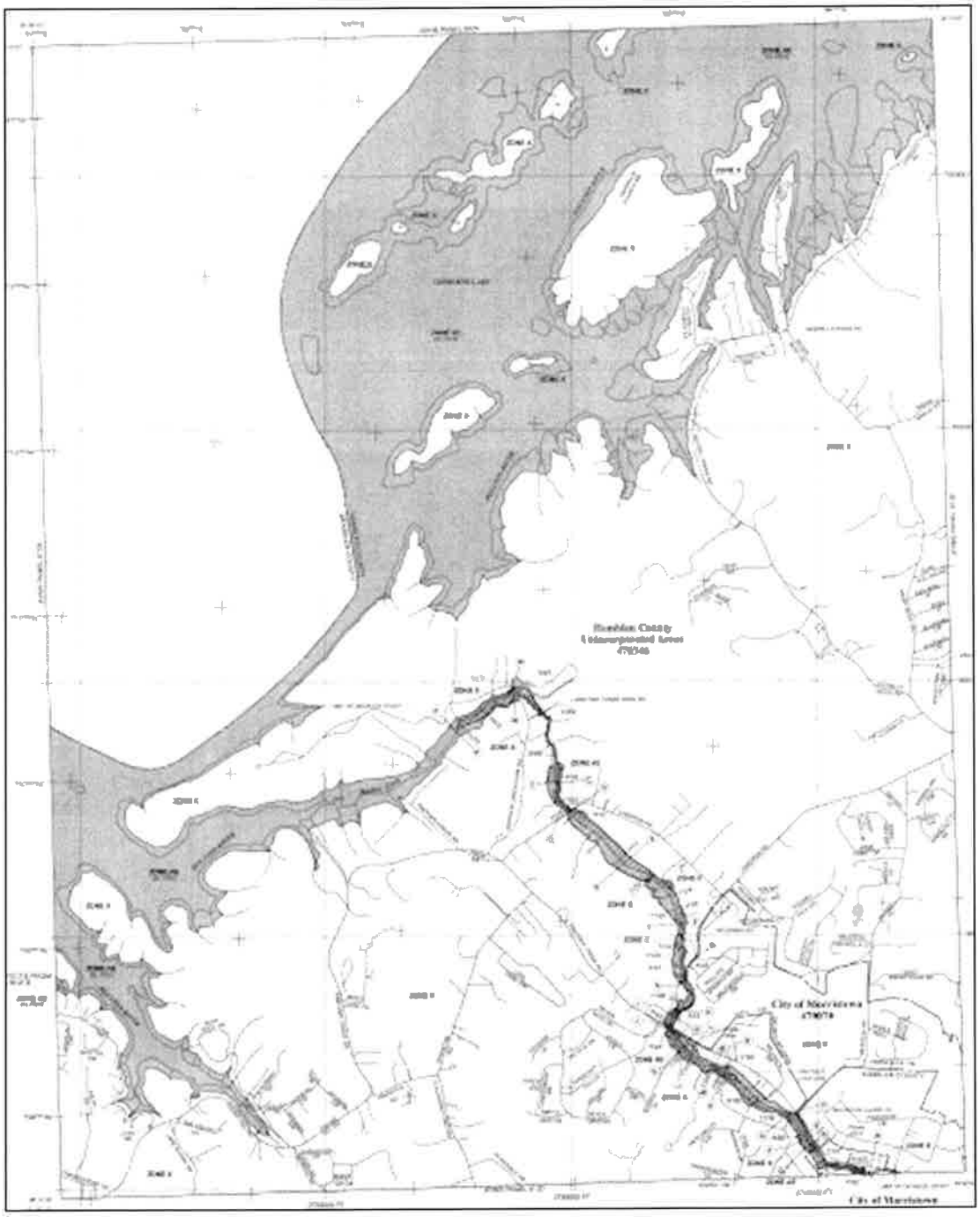
Panel 3



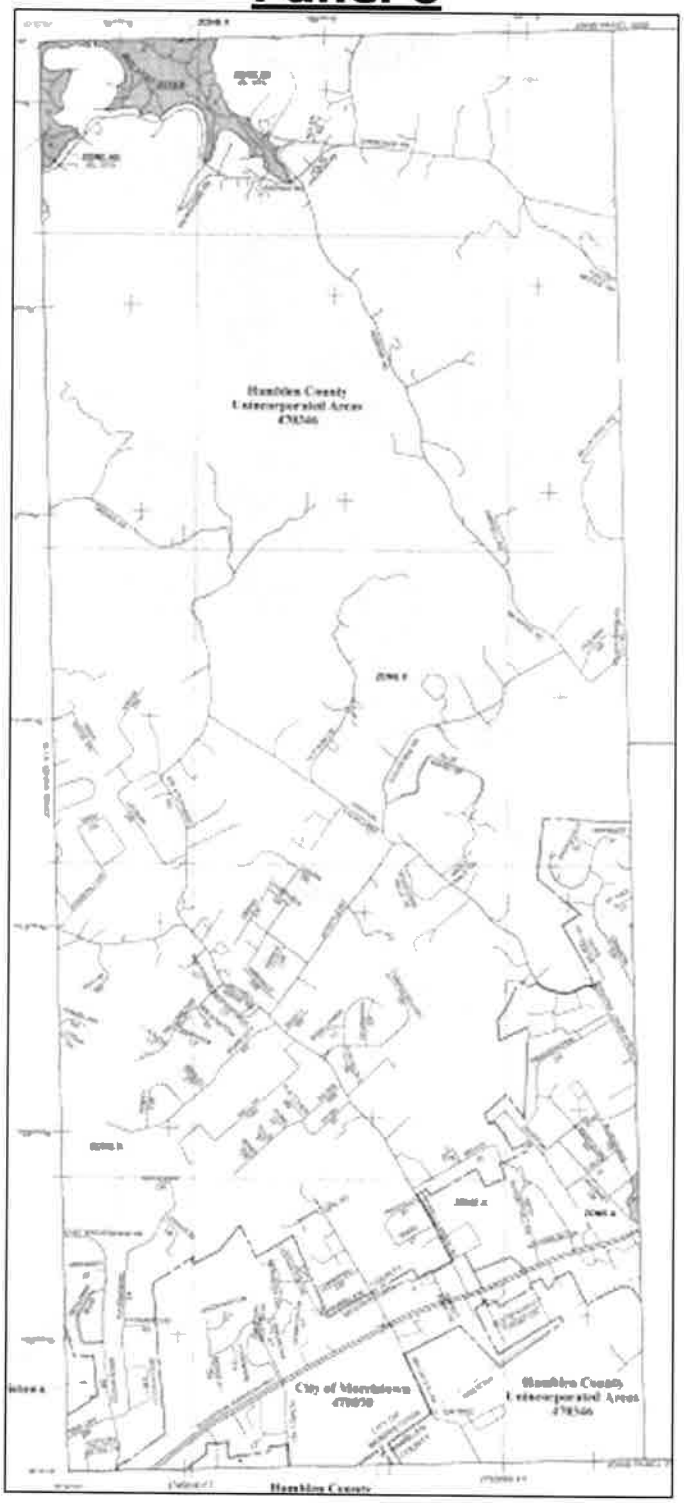
Panel 4


HAMBLEN COUNTY
HAWKINS COUNTY
ZONE A
Bent Creek Tributary 2
Bent Creek Tributary 3
ZONE X
Hamblen County
Unincorporated Areas
470346
MILL RUN RD
NORTH ST
ZONE X
ZONE X
BENT CREEK
ZONE A
Mud Creek
2830000 FT
BENT CREEK
2825000 FT
2820000 FT

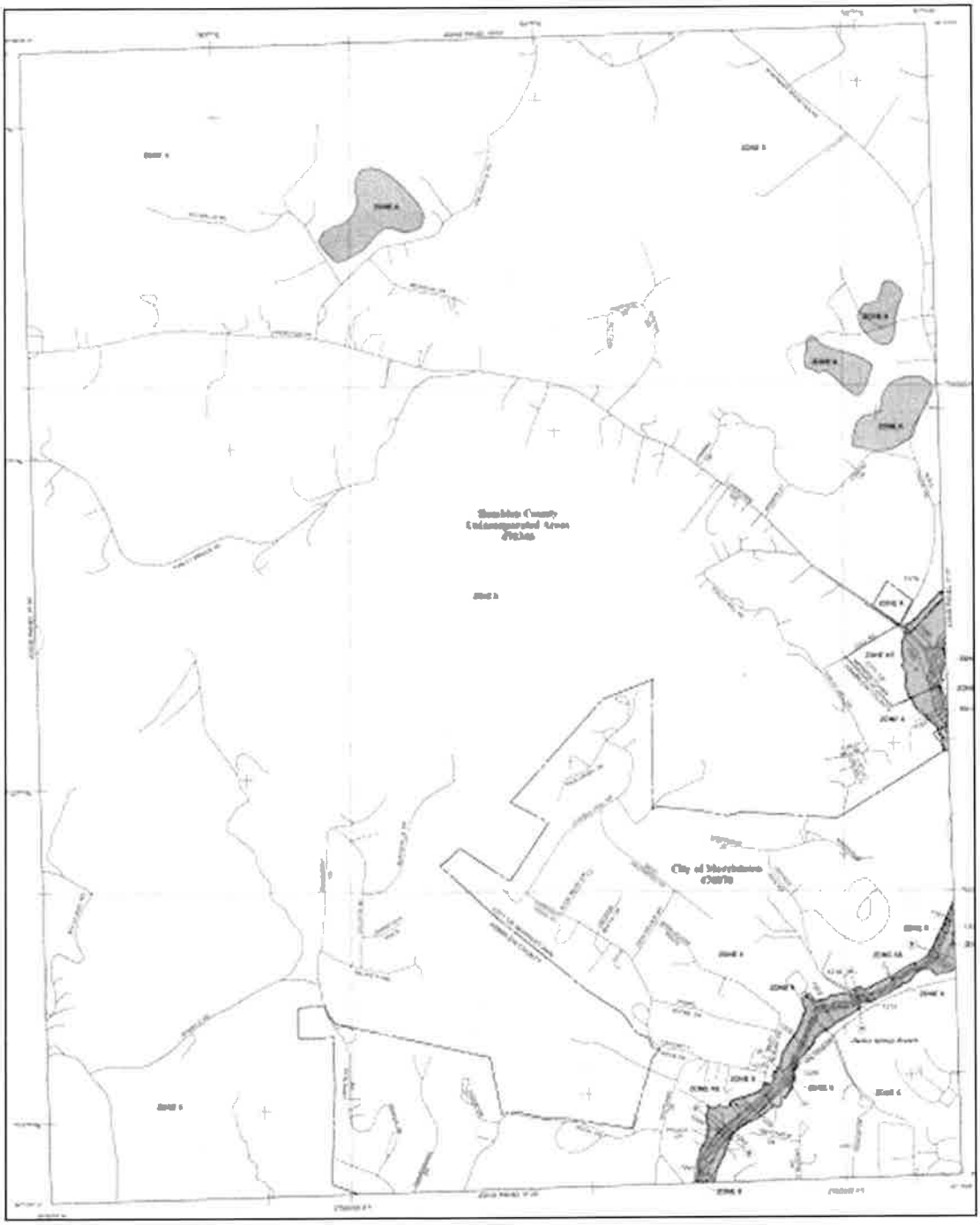
Panel 5



Panel 6


Hamblen County
Unincorporated Areas
470346
City of Morristown
470070
Hamblen County
Unincorporated Areas
470346
Hamblen County

Panel 7



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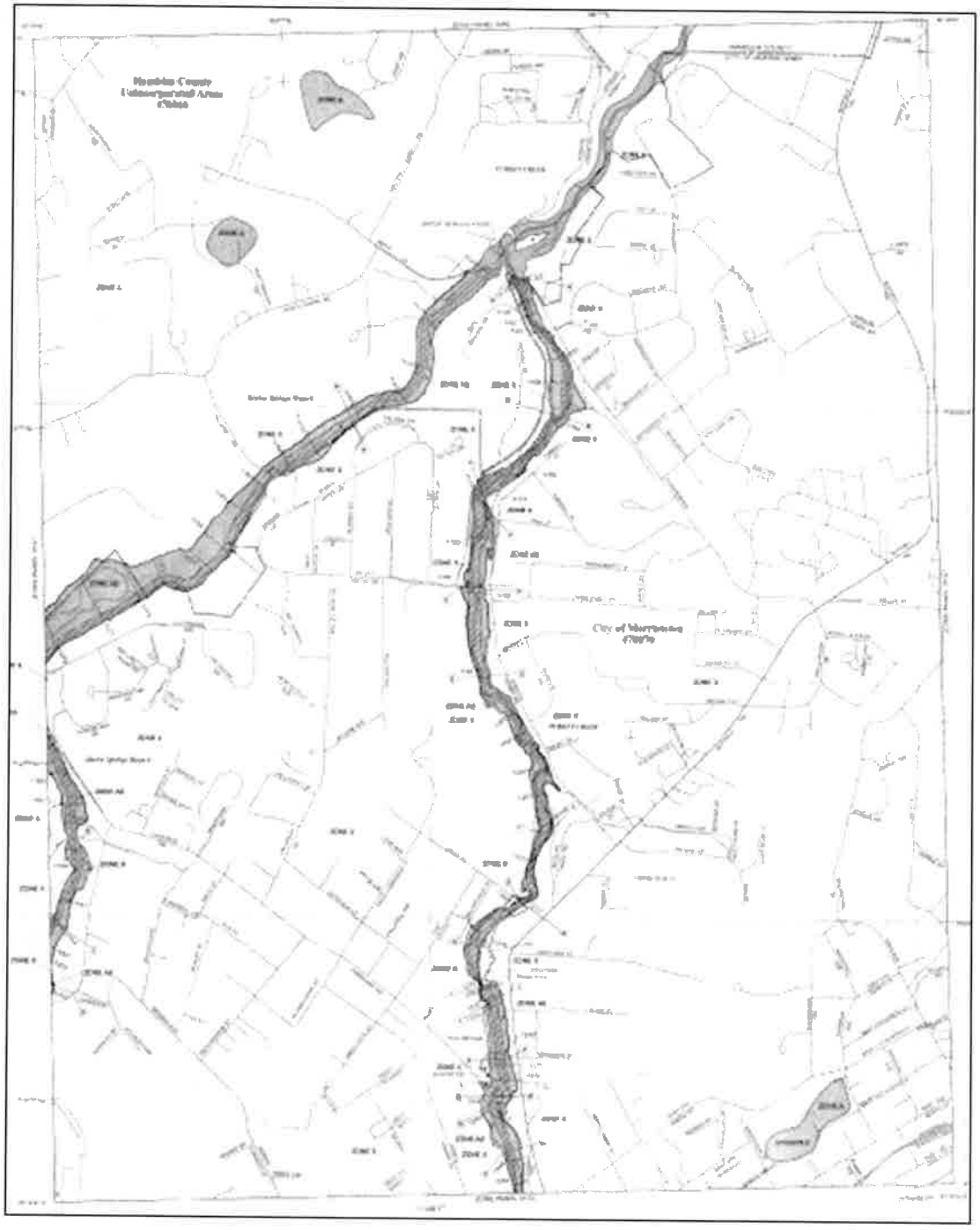

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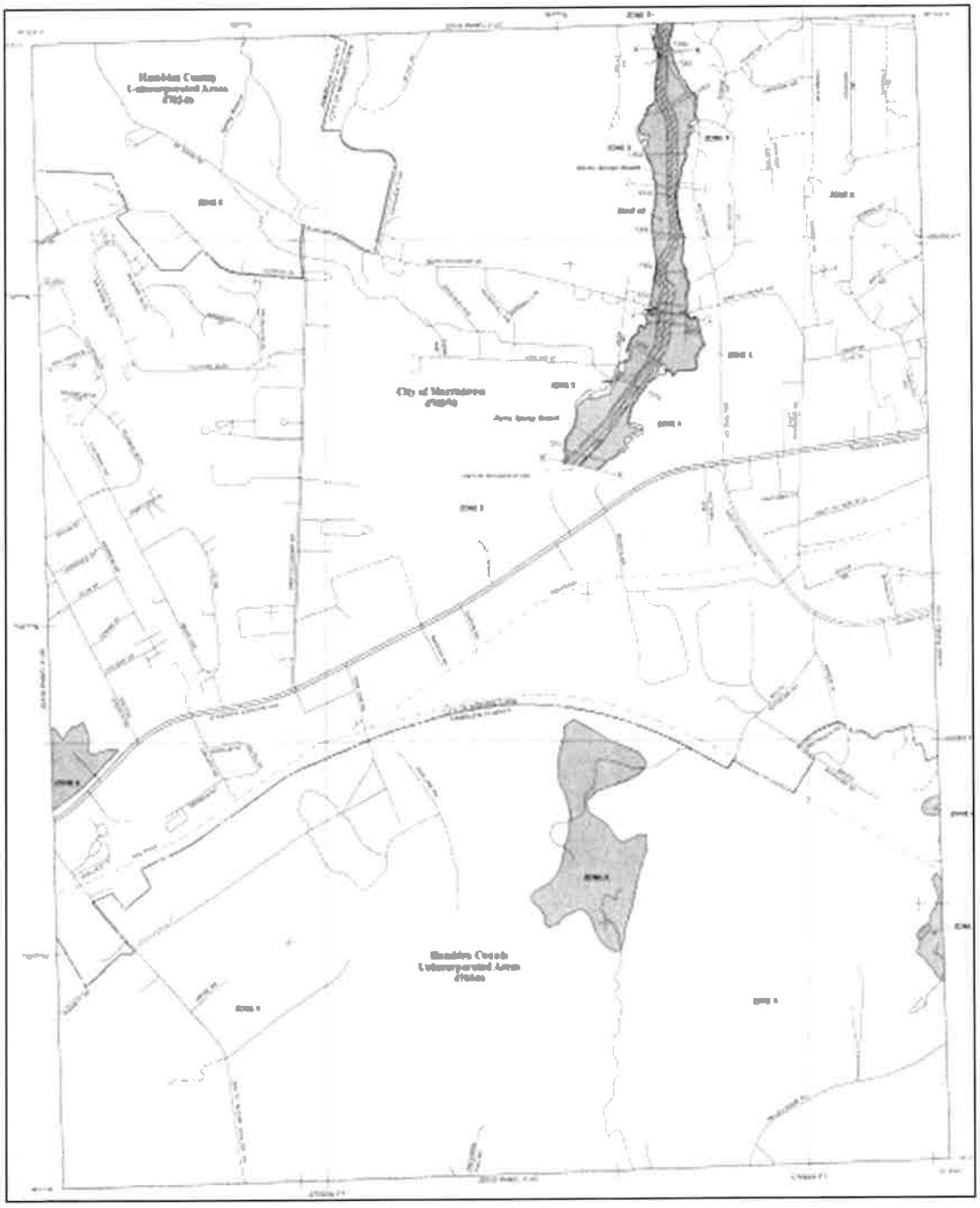

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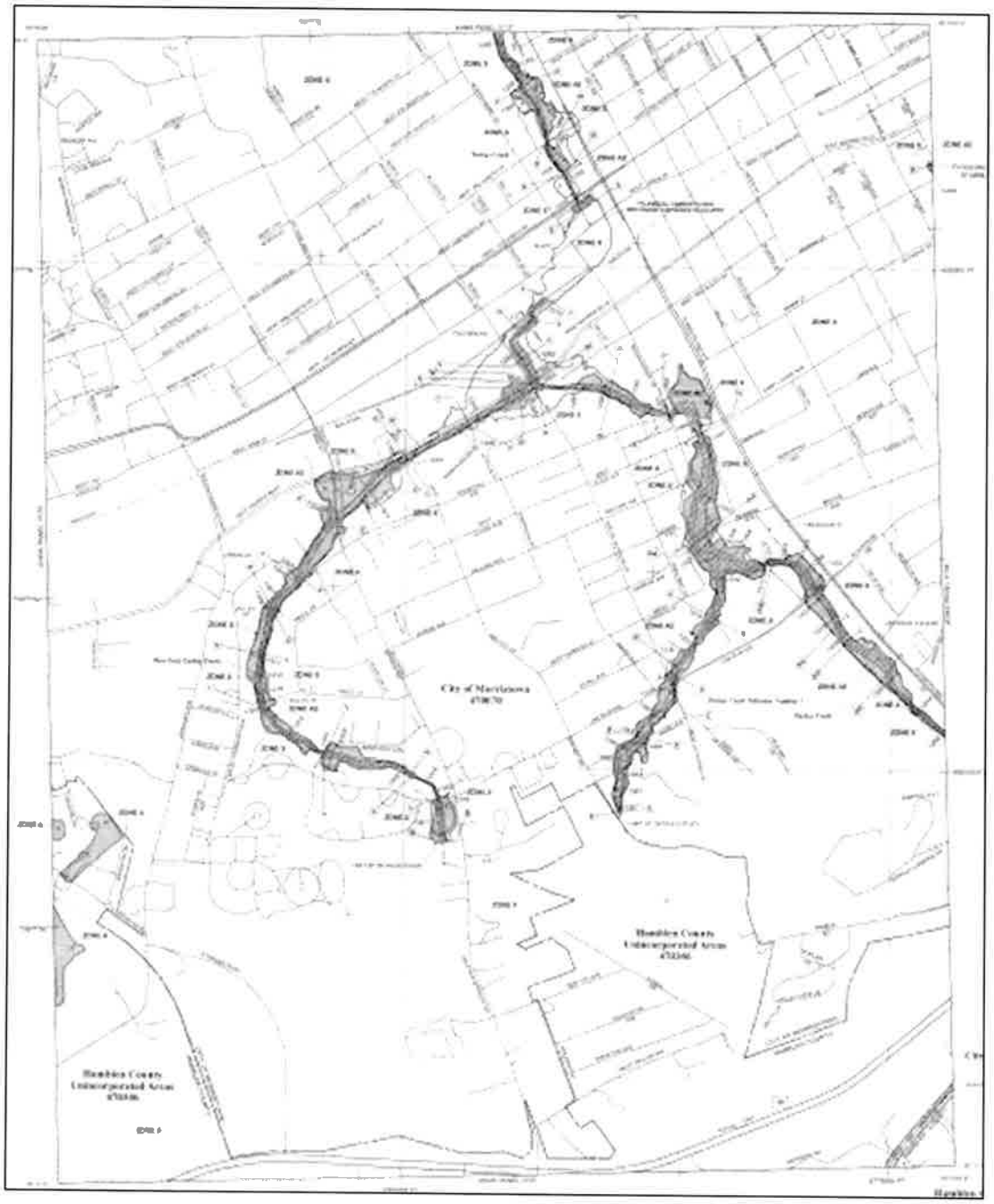
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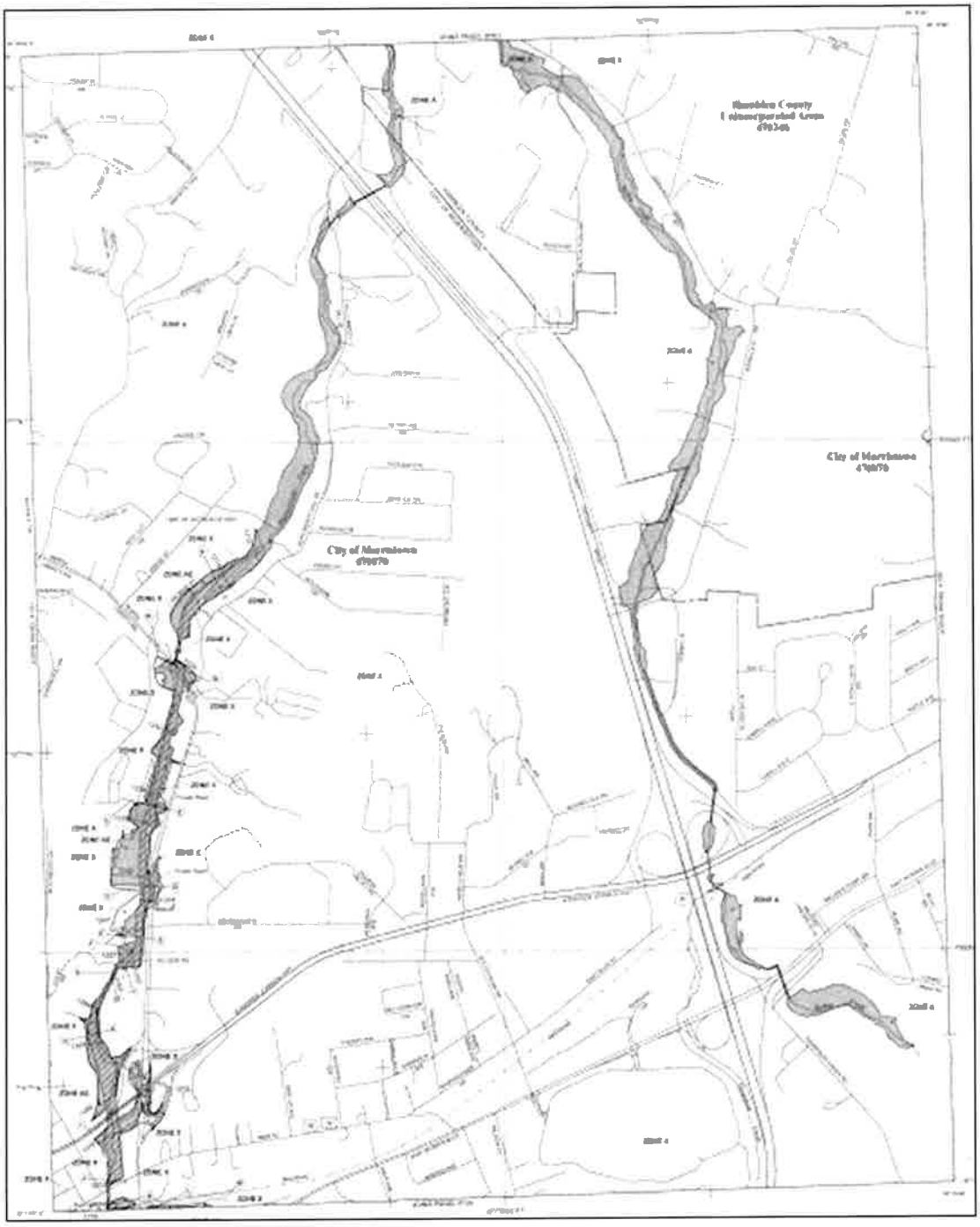
Hamblen County
Unincorporated Areas
Hamblen County
Unincorporated Areas

Panel 11A



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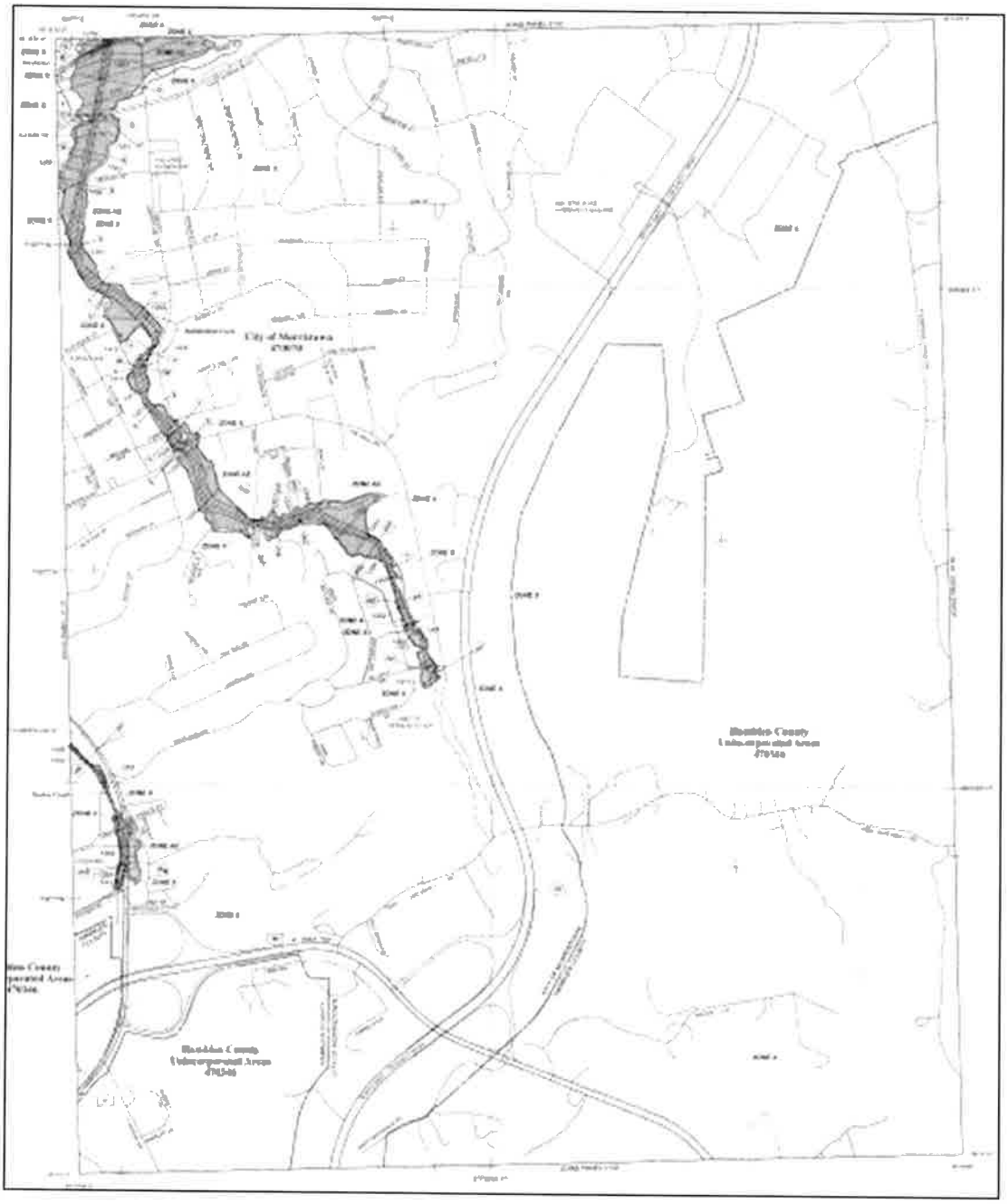

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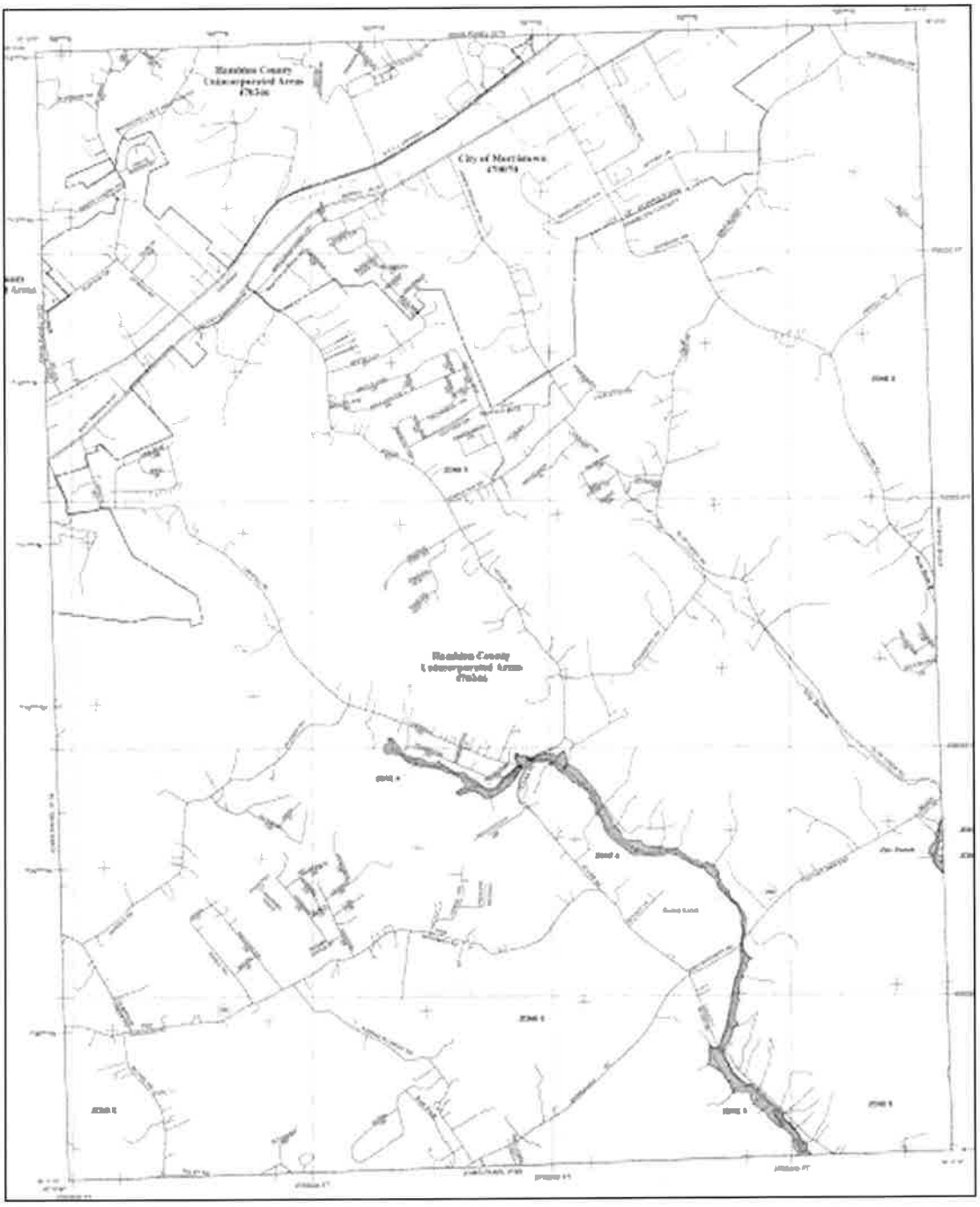

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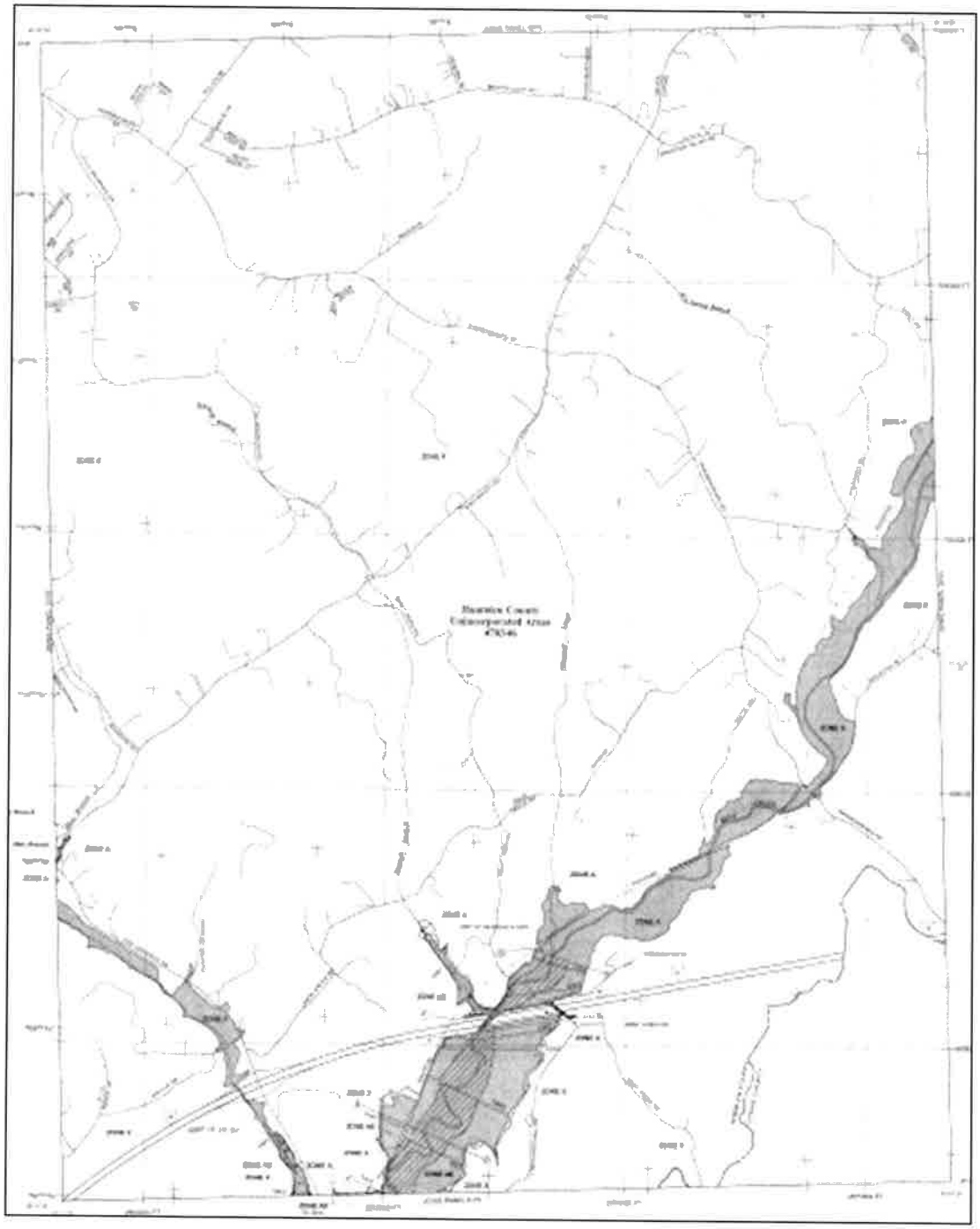

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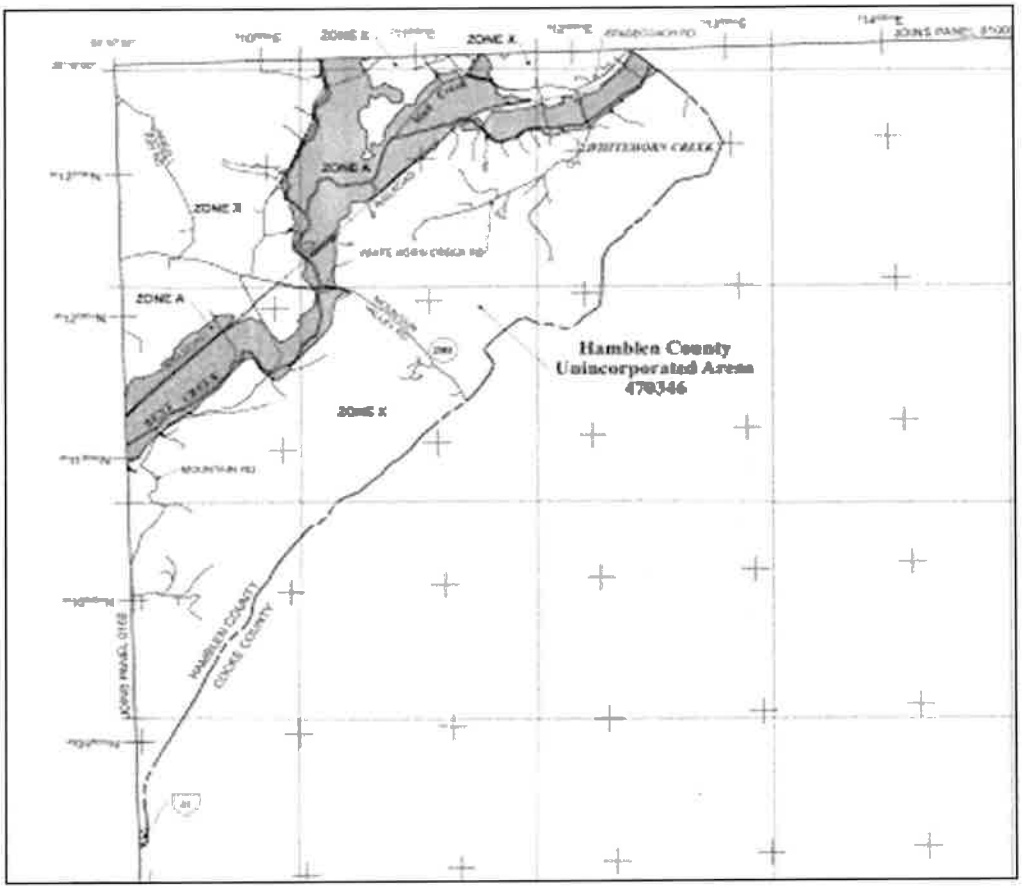
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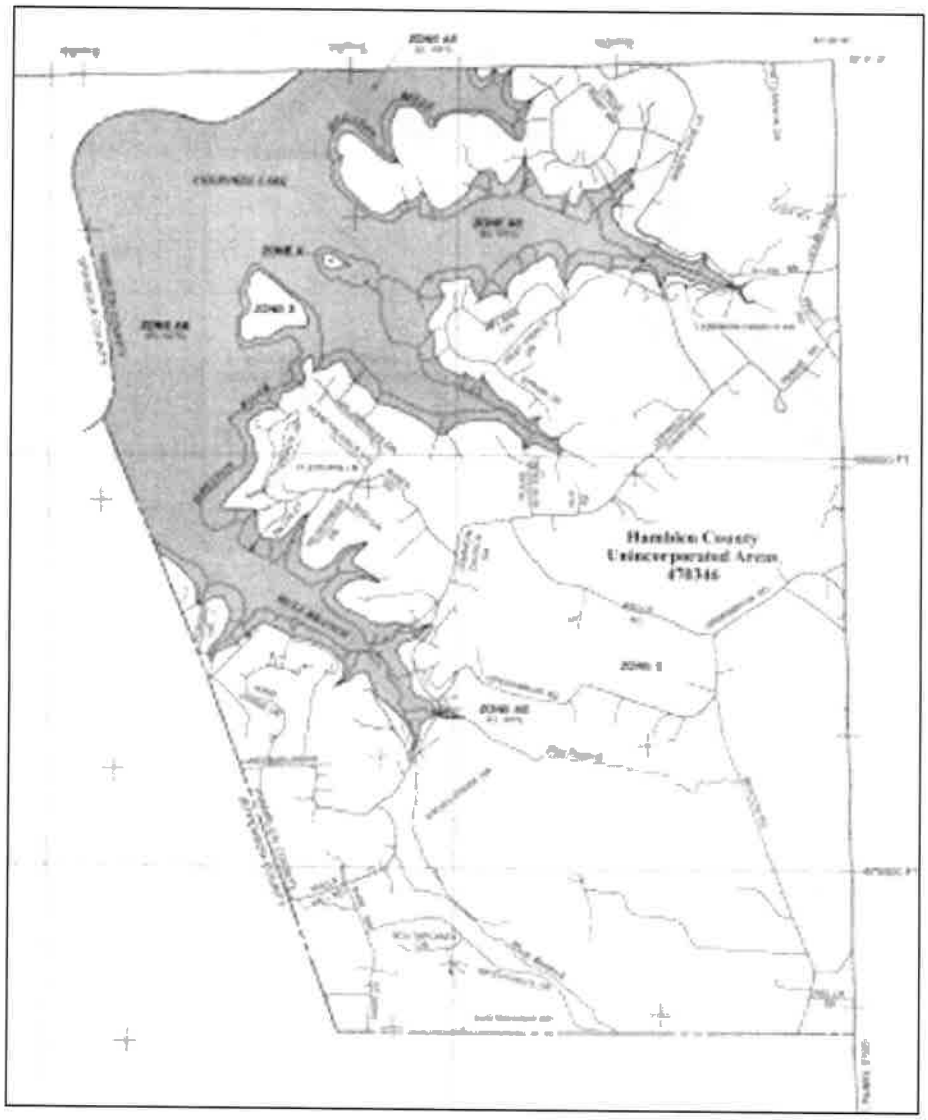
ZONE A
ZONE X
ZONE A
ZONE X
Hamblen County
Unincorporated Areas
470346
HAMBLEN COUNTY
COCKE COUNTY

Panel 15



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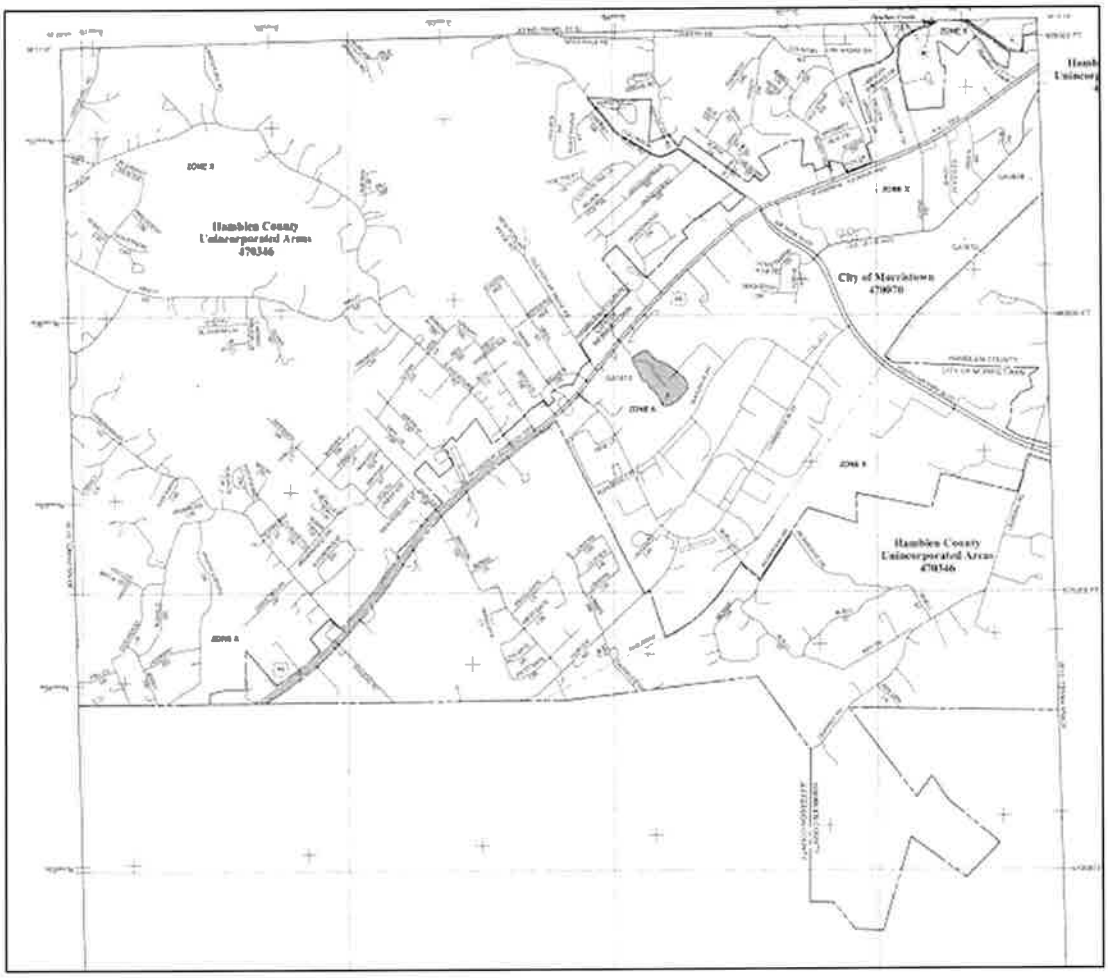
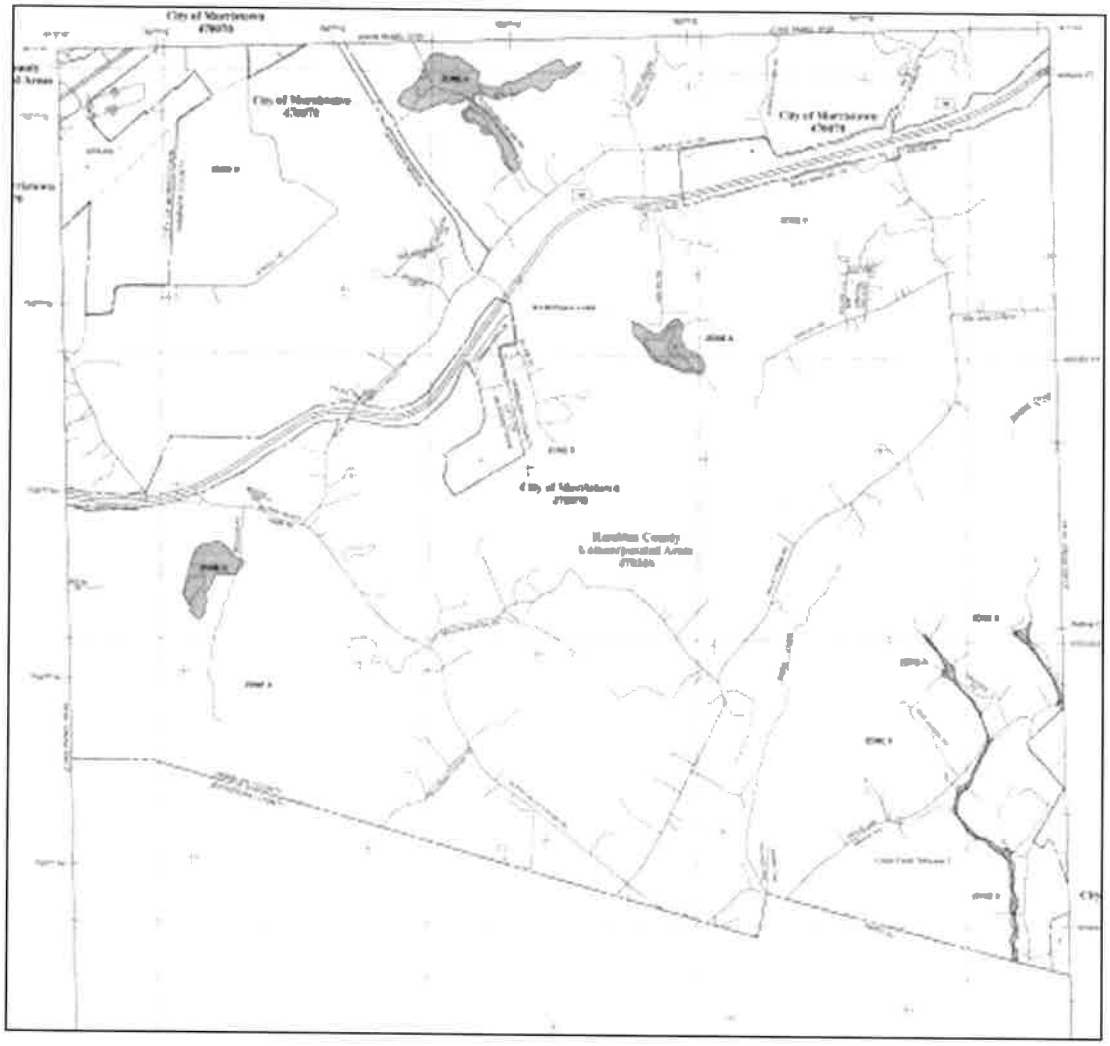

Hamblen County
Unincorporated Areas
470346
City of Morristown
470070
Hamblen County
Unincorporated Areas
470346

Panel 17



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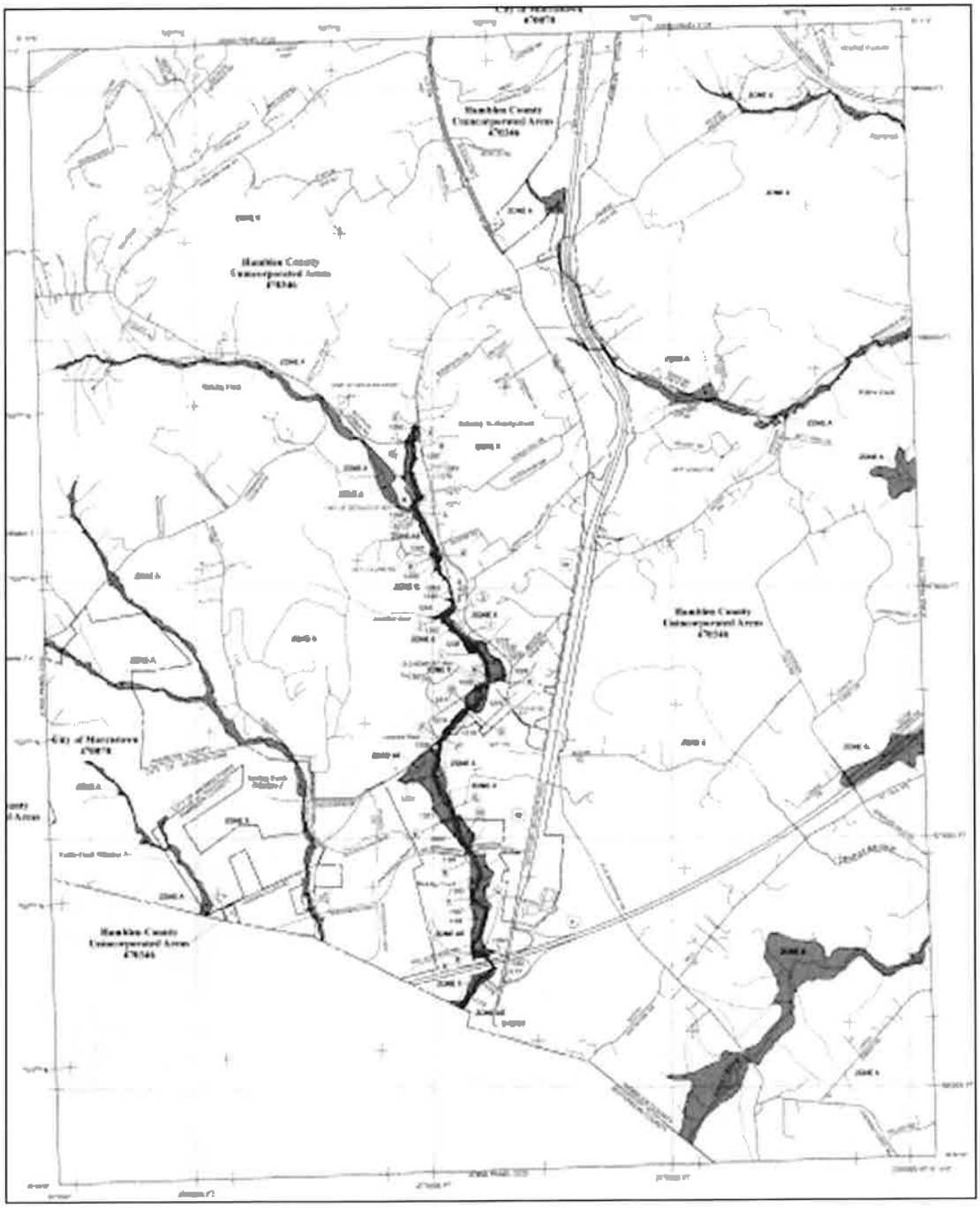

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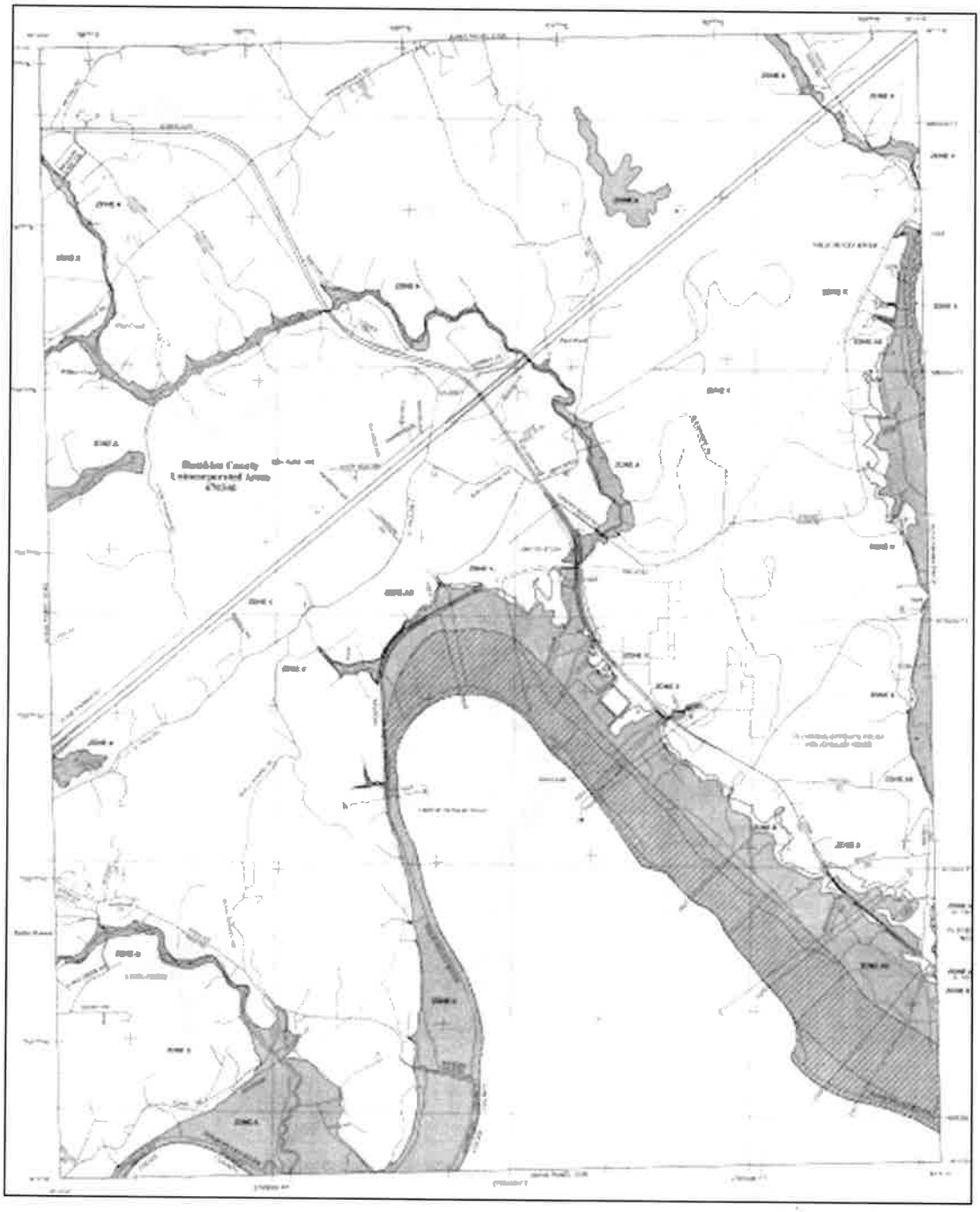

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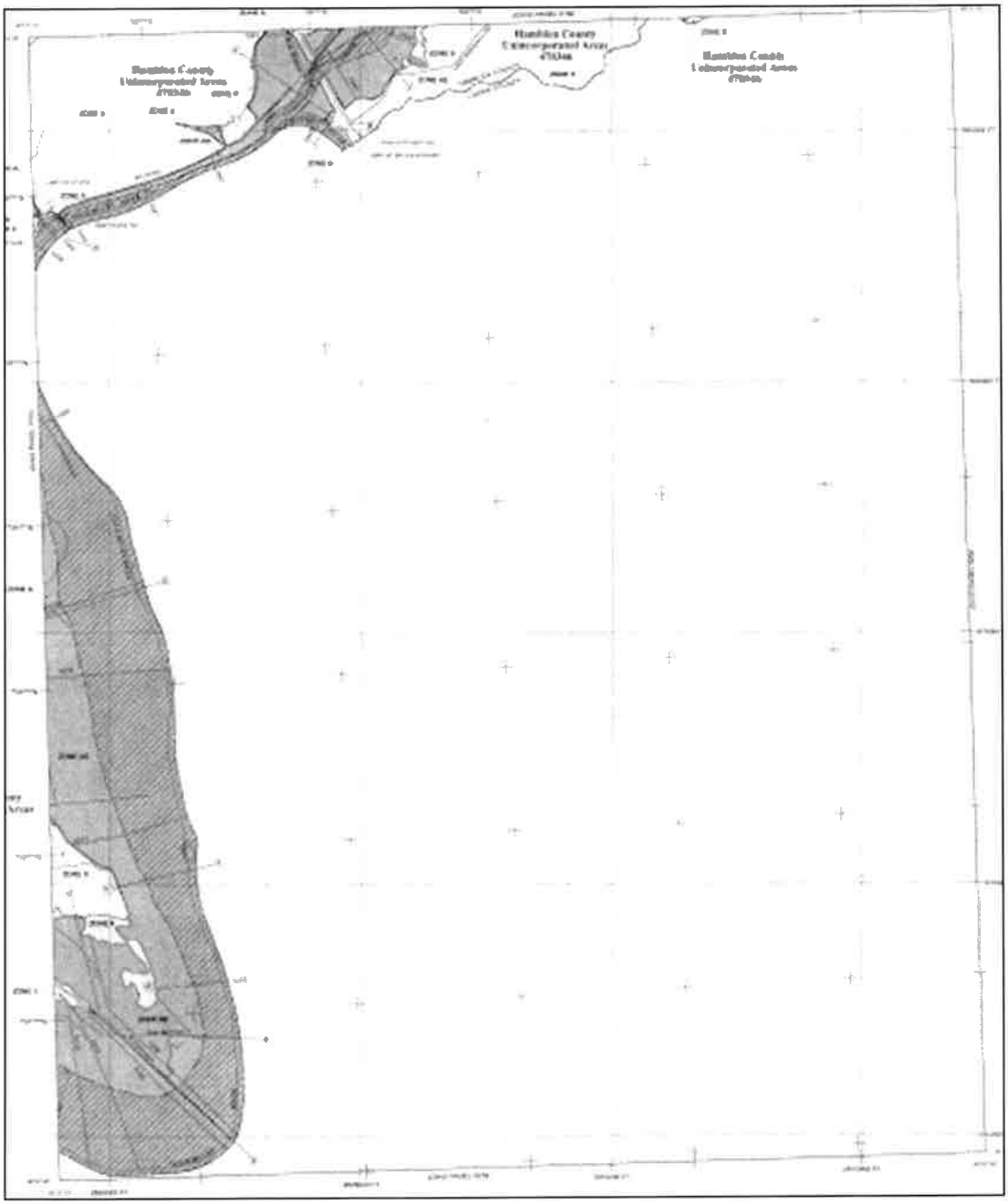

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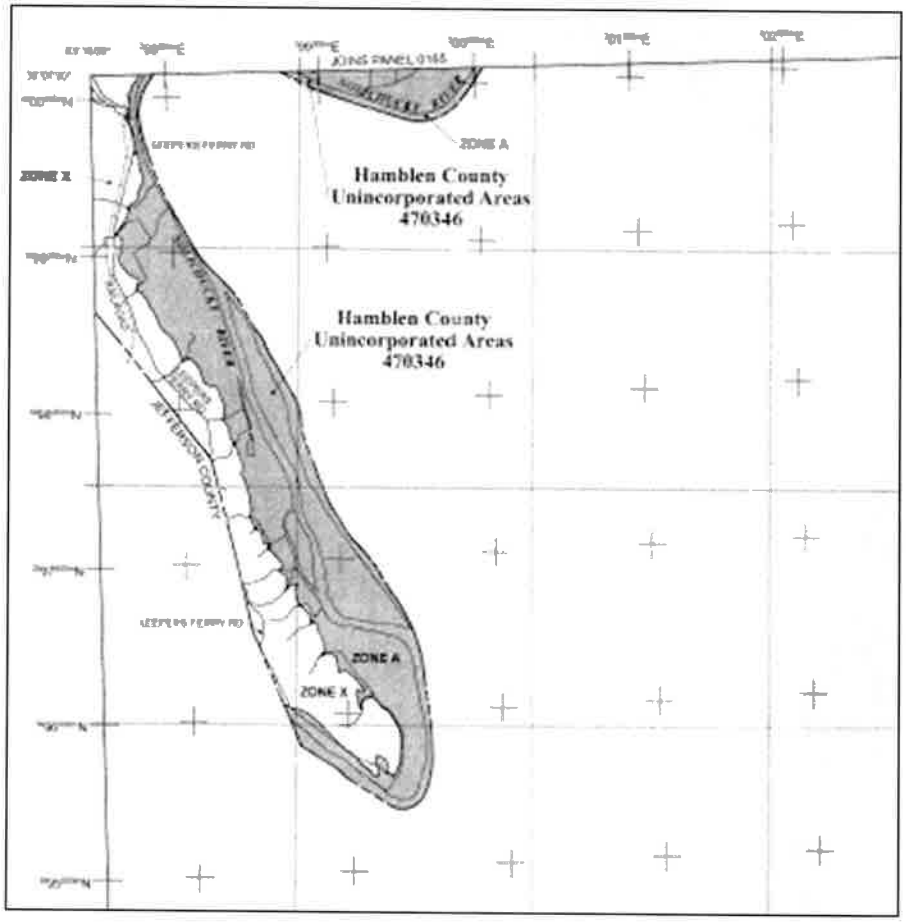

JOINS PANEL 0165
ZONE A
ZONE X
Hamblen County
Unincorporated Areas
470346
Hamblen County
Unincorporated Areas
470346
ZONE A
ZONE X

Hazus: Flood Global Risk Report

Region Name: Hamblen_Co_100yr

Flood Scenario: Hamblen_County_100yr

Print Date: Tuesday, November 8, 2022

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

FEMA

RiskMAP
Increasing Resilience Together

HAZUS
EARTHQUAKE · WIND · FLOOD · TSUNAMI

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Tennessee

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is approximately 176 square miles and contains 2,321 census blocks. The region contains over 25 thousand households and has a total population of 62,544 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 26,439 buildings in the region with a total building replacement value (excluding contents) of 6,190 million dollars. Approximately 91.55% of the buildings (and 68.35% of the building value) are associated with residential housing.

General Building Stock

Hazus estimates that there are 26,439 buildings in the region which have an aggregate total replacement value of 6,190 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	4,230,384	68.3%
Commercial	1,035,597	16.7%
Industrial	654,083	10.6%
Agricultural	18,120	0.3%
Religion	126,114	2.0%
Government	34,066	0.6%
Education	91,255	1.5%
Total	**6,189,619**	**100%**

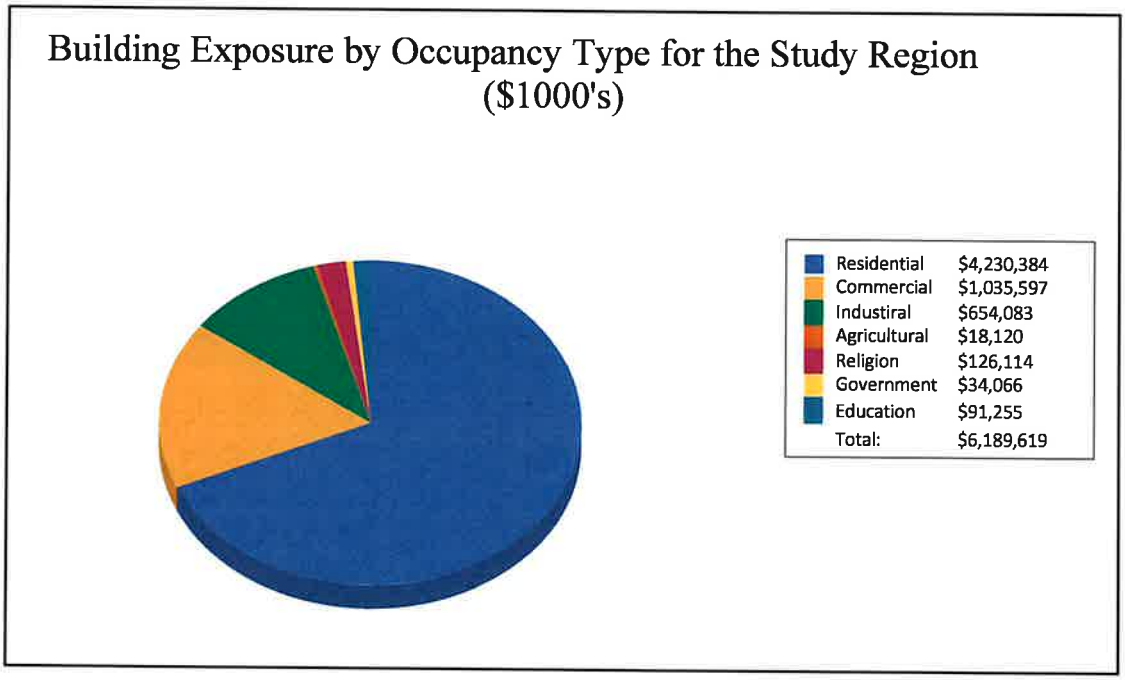
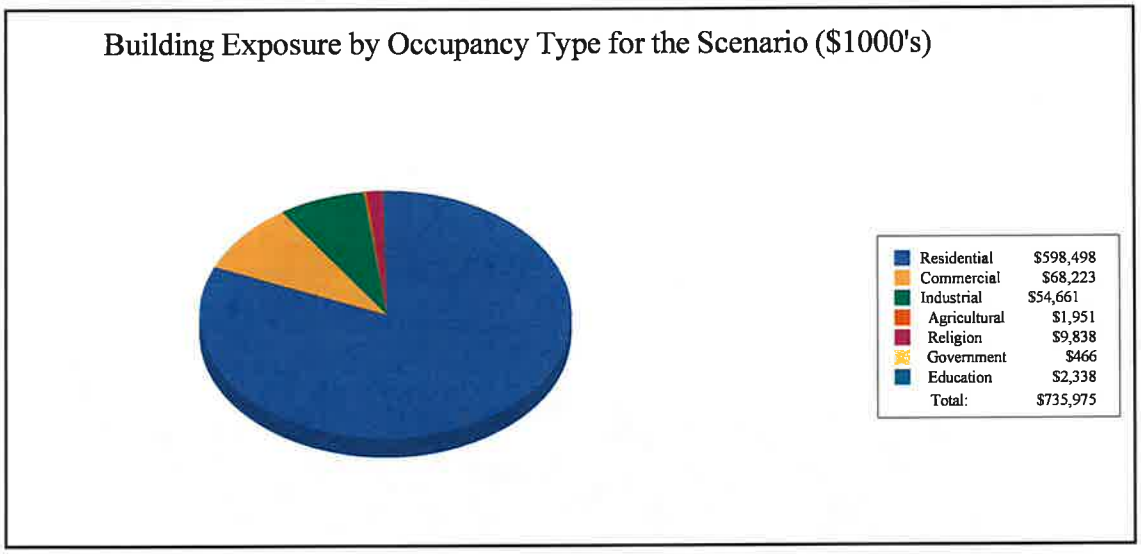


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	598,498	81.3%
Commercial	68,223	9.3%
Industrial	54,661	7.4%
Agricultural	1,951	0.3%
Religion	9,838	1.3%
Government	466	0.1%
Education	2,338	0.3%
Total	**735,975**	**100%**



Essential Facility Inventory

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 278 beds. There are 28 schools, 10 fire stations, 5 police stations and 1 emergency operation center.

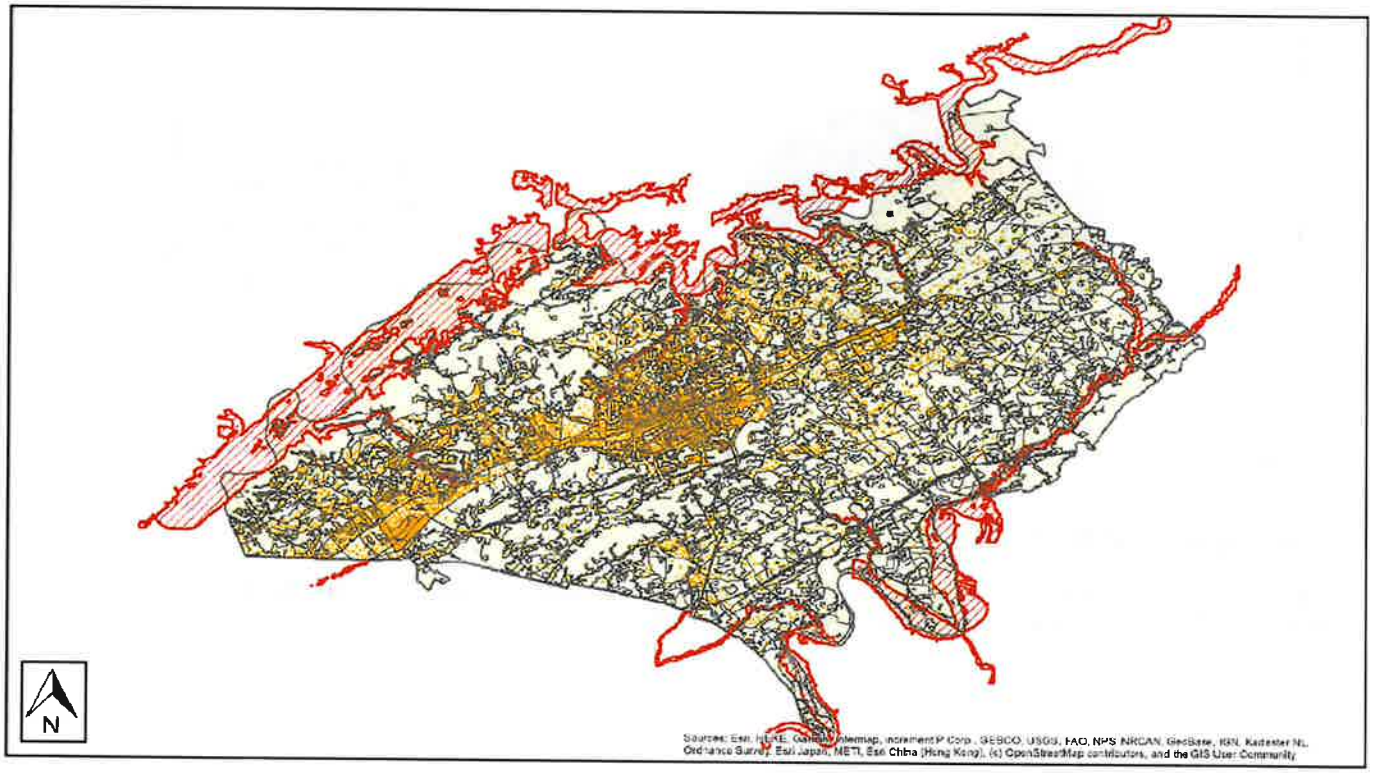
Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Hamblen_Co_100yr
Scenario Name:	Hamblen_County_100yr 100
Return Period Analyzed:	No What-Ifs
Analysis Options Analyzed:	

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



General Building Stock Damage

Hazus estimates that about 18 buildings will be at least moderately damaged. This is over 80% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

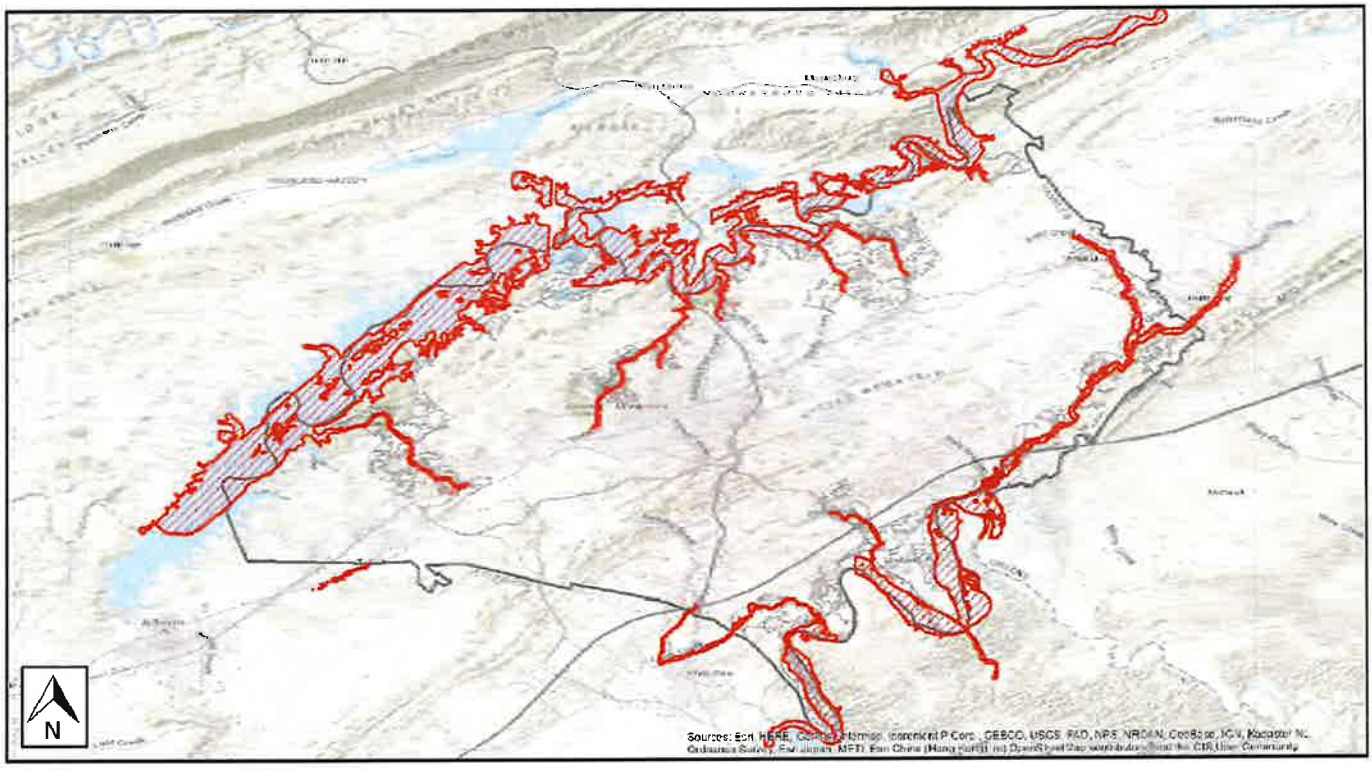


Table 3: Expected Building Damage by Occupancy

1-10			11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	1	5	10	53	5	26	3	16	0	0	0	0
Total	**1**		**10**		**5**		**3**		**0**		**0**	

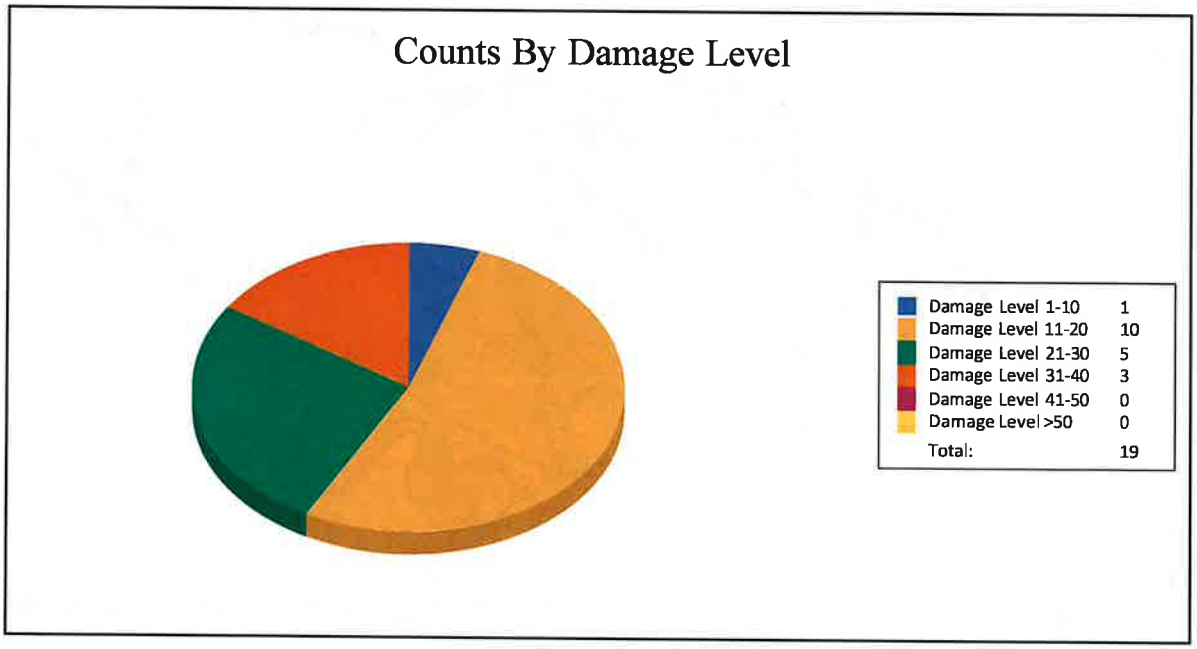


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	0	0	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	1	5	10	53	5	26	3	16	0	0	0	0

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 278 hospital beds available for use. On the day of the scenario flood event, the model estimates that 278 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	1	0	0	0
Fire Stations	10	0	0	0
Hospitals	2	0	0	0
Police Stations	5	0	0	0
Schools	28	0	0	0

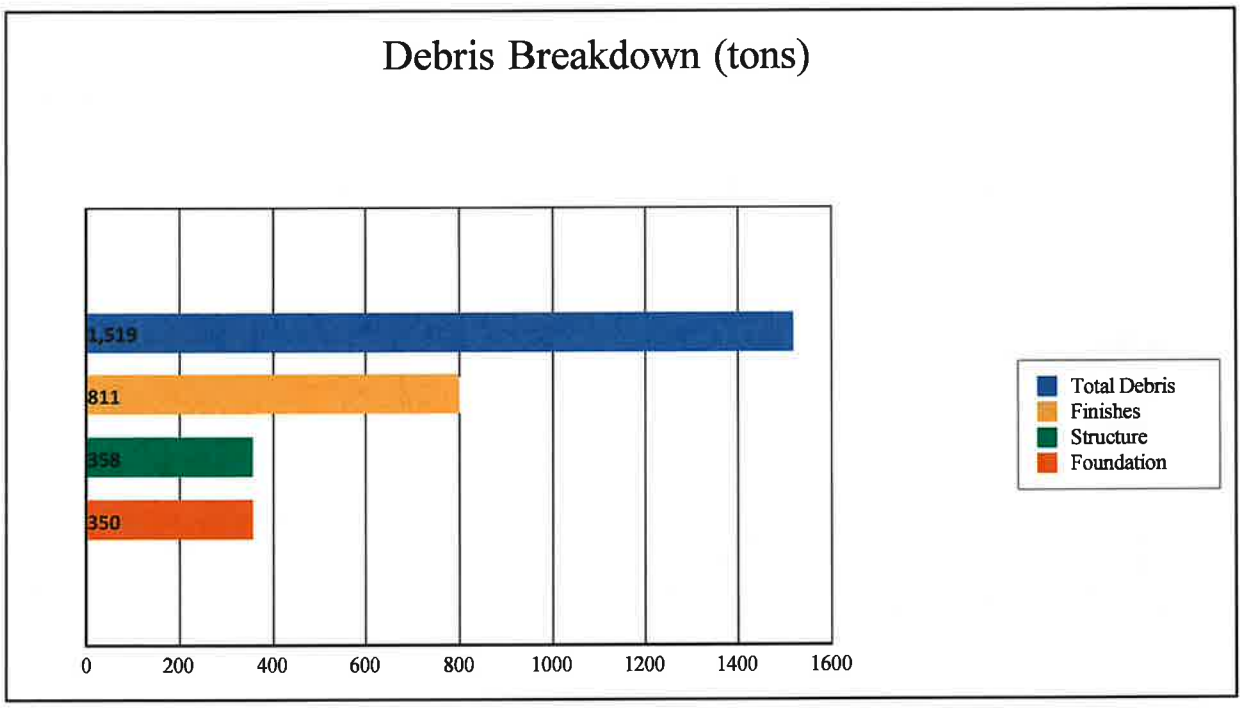
If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

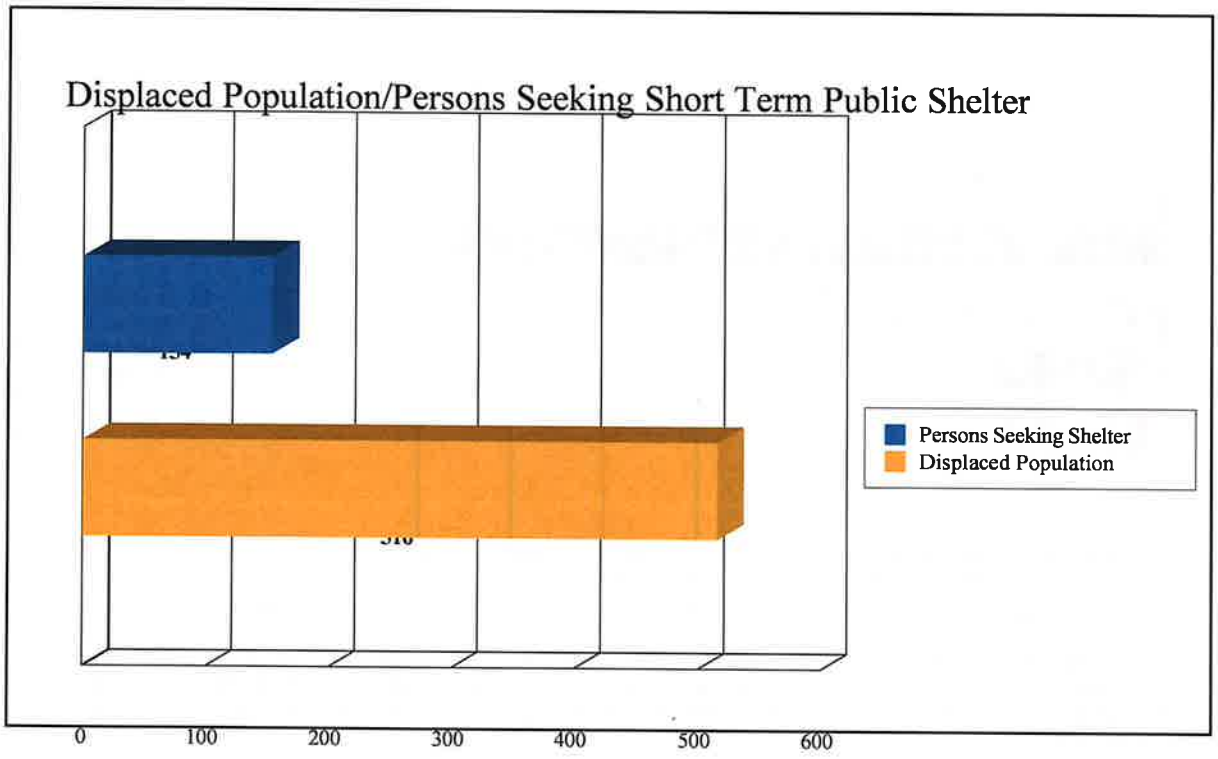


The model estimates that a total of 1,519 tons of debris will be generated. Of the total amount, Finishes comprises 53% of the total, Structure comprises 24% of the total, and Foundation comprises 23%. If the debris tonnage is converted into an estimated number of truckloads, it will require 61 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 172 households (or 516 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 154 people (out of a total population of 62,544) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 29.66 million dollars, which represents 4.03 % of the total replacement value of the scenario buildings.

Building-Related Losses

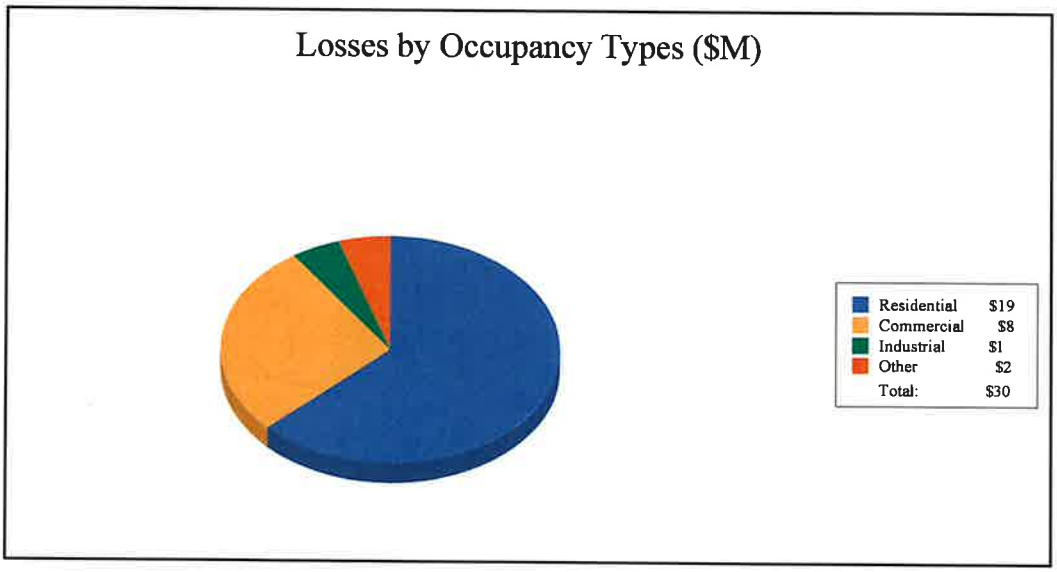
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 20.22 million dollars. 32% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 62.75% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	9.21	1.06	0.36	0.10	10.73
	Content	4.97	2.85	0.75	0.58	9.15
	Inventory	0.00	0.15	0.17	0.02	0.33
	Subtotal	**14.18**	**4.06**	**1.28**	**0.70**	**20.22**
Business Interruption						
	Income	0.26	1.43	0.01	0.24	1.94
	Relocation	2.66	0.59	0.01	0.05	3.31
	Rental Income	0.90	0.45	0.00	0.00	1.35
	Wage	0.62	1.66	0.03	0.53	2.84
	Subtotal	**4.43**	**4.14**	**0.06**	**0.82**	**9.44**
ALL	**Total**	**18.61**	**8.19**	**1.34**	**1.52**	**29.66**



Appendix A: County Listing for the Region

Tennessee

- Hamblen

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Tennessee				
Hamblen	62,544	4,230,384	1,959,235	6,189,619
Total	**62,544**	**4,230,384**	**1,959,235**	**6,189,619**
Total Study Region	**62,544**	**4,230,384**	**1,959,235**	**6,189,619**