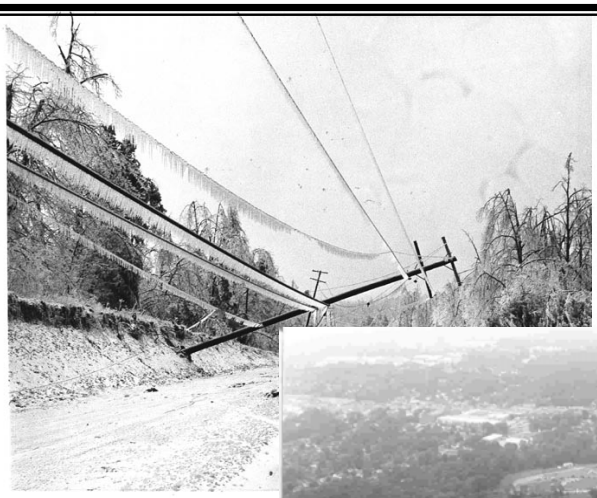
Hamilton County, Tennessee
Natural Hazards Mitigation Plan



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Purpose

This plan seeks to develop a comprehensive strategy to reduce the impacts of natural hazards in Hamilton County. The rising costs and apparent increase in the rate of occurrence of natural disasters has led to the need to identify additional ways to reduce the County's vulnerability to natural hazards—before the next disaster actually occurs.

Disasters can exact a heavy toll. In the past, natural hazards in Hamilton County have caused injury and loss of life, severe property damage, interruption of the delivery of vital goods and services, disruption of local economies, and harm to the natural environment. Natural hazards are an inevitable fact. Human ingenuity can do nothing to stop a tornado or winter storm from occurring. Planning for natural hazards and implementing mitigation measures, however, can reduce the impact of such events when they do occur. Monetary losses can be reduced. Personal injury and loss of life can be reduced. The economic and social impact on the community as a whole can be reduced. The purpose of this plan, therefore, is to outline a strategy with specific programs and policies that can be implemented by Hamilton County and local units of government within Hamilton County to reduce the impact of natural hazards on people, structures, and the natural environment.

Background

Hamilton County is the fourth largest County in Tennessee with an estimated 2003 population of 309,510. The City of Chattanooga is the fourth largest city in the state with an estimated 2003 population of 154,887. Principal towns, in addition to Chattanooga, are Red Bank, Soddy-Daisy, Collegedale, East Ridge, Lookout Mountain, Walden, Ridgeside, Lakesite, and Signal Mountain (Map 1).

Hamilton County is located in southeastern Tennessee and is bordered on the north by Rhea and Meigs counties, Tennessee; on the east by Bradley County, Tennessee; on the west by Bledsoe, Marion, and Sequatchie Counties, Tennessee; and on the south by Dade, Walker, and Catoosa Counties, Georgia. The major city in the county is Chattanooga, which serves as a major trade and industrial center in the southeast.

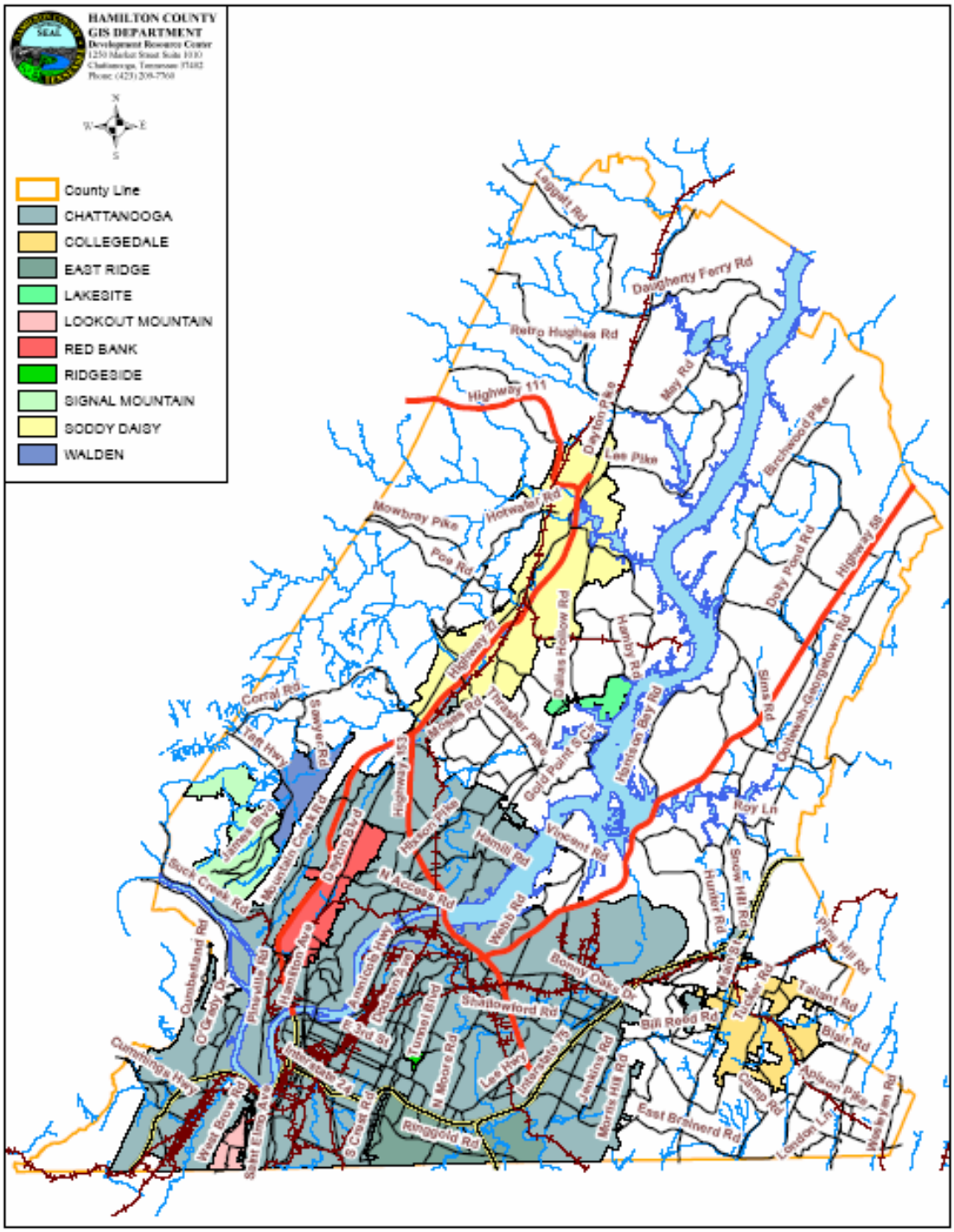
The county covers approximately 575 square miles or 368,479 acres. Hamilton County is divided from north to south by the Tennessee River and the Chickamauga and Nickajack Reservoirs.

Hamilton County includes two distinct geographic areas, the Cumberland Plateau and Mountains and the Southern Appalachian Ridges and Valleys. In winter, valleys in Hamilton County are very cool with occasional cold and warm spells. Upper slopes and Mountaintops are generally cold. In summer, the valleys are very warm and frequently hot, and mountains that are warm during the day become cool at night. Precipitation is heavy and evenly distributed throughout the year. Summer precipitation falls mainly as thunderstorms.

Major transportation corridors include Interstates 24 and 75; U.S. Routes 11, 27, 41, 54, 72, and 127; State Routes 27, 29, and 58; and the CSX and Norfolk Southern Railway.

Colleges and universities in Hamilton County include the University of Tennessee at Chattanooga, Chattanooga State Technical Community College, Southern Adventist University, and Tennessee Temple University.

Map 1



History

Hamilton County

As early as 200 BC the Cherokee nation inhabited the area around Lookout Mountain and the Chattanooga Valley and called it Chatanuga, or "rock rising to a point." Creek, Choctaw, and Shawnee tribes also inhabited the land, but the overwhelming majority of the population was the Cherokee people.

The Tennessee General Assembly created Hamilton County on October 25, 1819. Rhea, Marion, and Bledsoe Counties bounded the new county, and it extended south to the state line. The creation of the new county on the southwestern frontier was brought about by a treaty with the Cherokees in 1817. By the terms of the Hiwassee Purchase, the Indians yielded large sections of Alabama and Georgia, as well as the Sequatchie Valley and the area that became Hamilton County. Initially, Hamilton County did not extend south of the Tennessee River. This area, including the site of Cherokee Chief John Ross's landing in present-day Chattanooga, did not become a part of the county until the disputed Treaty of 1835 that led to Indian removal and the "Trail of Tears." The county was named in honor of Alexander Hamilton, secretary of the treasury in George Washington's administration. Hamilton was the name of the district of which this section had formerly been a part.

At the time of the 1820 census, Hamilton County counted 821 residents, including 16 free blacks and 39 slaves. Approximately 100 Cherokees lived on six private family reserves. The settlers were clustered mainly at Sale Creek, at Poe's Crossroads (Daisy) and at the farm of Asahel Rawlings (Dallas). The courts were later moved nearby to the farm of John Mitchell before a log courthouse was built at Dallas on the Tennessee River. The county seat was shifted across the river to the new town of Harrison in 1840. Chattanooga, whose growth far outstripped that of Harrison, became the seat of government in 1870.

Chattanooga

Chattanooga's future as a railroad center was assured when the Western and Atlantic Railroad selected it as its northern terminus. This line reached the city in 1849, and the Nashville and Chattanooga Railroad was completed in 1854. The East Tennessee, Virginia and Georgia Railroad, the Cincinnati Southern, and other rail lines later were extended to the growing city.

A rail center and the "Gateway to the South," Chattanooga became a focal point in the Civil War, especially in the summer and fall of 1863. The Army of Tennessee under General Braxton Bragg fell back from the city and fought a bloody battle at nearby Chickamauga, Georgia, on September 19 and 20, 1863. From the surrounding mountains, the Confederate forces besieged Chattanooga until the arrival of Union forces under General Ulysses S. Grant and General William T. Sherman. The Union won victories at Wauhatchie and Lookout Mountain prior to the famous charge up Missionary Ridge on November 25, 1863.

After the Civil War, Chattanooga experienced a cholera epidemic in 1873 and a yellow fever scourge five years later. There were also devastating floods in 1867 and 1886. The city still managed to develop as a manufacturing center and underwent a real estate boom in the late

1880s. Later, it became the site of the first Coca-Cola bottling franchise and the headquarters for several major insurance companies. The Krystal hamburger, the Moon Pie, and the Double-Cola soft drink originated and have their corporate headquarters in Chattanooga.

A recent focus has been development of the downtown riverfront, including erection of the Tennessee Aquarium, the Children's Discovery Museum, the IMAX Theater, and the Chattanooga Visitors Center. The Walnut Street Bridge was restored as a popular pedestrian walkway, and the Tennessee Riverwalk was built along the river. Chattanooga, which had a remarkable cleanup of its polluted air, is developing a reputation as "the environmental city," featuring electric buses, greenways, and an expanded convention center with an environmental design.

Collegedale

Collegedale was incorporated in 1968. The name was derived from the presence of Southern College, which has now gained University status. O.D McKee, founder of McKee Foods, which produces Little Debbie Snack Foods, is one of the areas prominent residents. McKee Foods is the areas largest employer.

East Ridge

The Town of East Ridge was incorporated under Private Acts 1921, Chapter 569 on January 12, 1954. The citizens of the town voted to become a home rule municipality on November 3, 1970. Voters elected to change the name from the Town of East Ridge to the City of East Ridge. East Ridge was named for the area “East of Missionary Ridge,” the site of a major Civil War Battle.

Lakesite

In the 1950’s William Hunt developed the Lakesite subdivision on Lake Chickamauga. In 1970 the subdivision and surrounding area was incorporated as the City of Lakesite.

Lookout Mountain

Lookout Mountain was the site of the Civil War “Battle above the Clouds” on November 25, 1863. A National Military Park was dedicated to commemorate the event in 1934. Lookout Mountain was incorporated as a town in 1890. The Incline Railway (1896) and National Military Park make Lookout Mountain a popular tourist destination.

Redbank

Red Bank began as an early rural suburb of Chattanooga running along the Dayton Pike from Stringer's Ridge to Daisy, TN. Its growth began by a housing boom following World War I. Early settlements sprang up along the stops of the Chattanooga Traction Company trolley line. By 1945, the population in the area of Red Bank had grown to over 4,000 and thoughts of becoming a new city began to arise as an option that was seriously being considered by many of its residents. Red Bank-White Oak was chartered in 1955. On January 7, 1967, the city of Red Bank-White Oak officially became Red Bank.

Ridgeside

In 1929, the residents of Ridgeside (also known as Shepherd Hills) voted against annexation by the city of Chattanooga. Ridgeside has held fast to its independence and remains a small enclave surrounded by the city of Chattanooga.

Signal Mountain

During the Civil War Battle of Chattanooga in the fall of 1863, the Union Army used Signal Point as a communications station to signal various locations in the Chattanooga area. Development of the area began in 1878 when Charles E. James bought 4,400 acres of land in the signal point area. He constructed a streetcar track up the mountain and built Signal Mountain Inn, which opened in 1913. By 1925, two hundred houses had been built within a few blocks of the Inn. The Town of Signal Mountain received its charter from the State of Tennessee on April 4, 1919. The town's charter was changed in 1990 to convert to a Council/manager form of government.

Soddy-Daisy

William Sodder established a trading post at Soddy around 1770. This post spawned an enclave in the wilderness in which continental soldiers settled in 1789. Perhaps the biggest boon to development in the area was the discovery of coal in the ridges.

For years, mining was the primary economic activity in the northern part of Hamilton County. In 1867, the Soddy Coal Company began operation. With the establishment of the mining industry, the town of Soddy began to grow. The majority of housing and business in the developing town was company-owned.

The Daisy Community was also involved in mining operations, but on a somewhat smaller scale. While both Soddy and Daisy were successful coal mining communities, the decline and eventual closing of the mines in the 1930's forced businesses to close and some people to move elsewhere in search of employment. To make things worse for Soddy was the 1947 construction of US 27, which by-passed the business district of the town. However, the road went through the Daisy Community. Because of the highway, a hosiery mill, and a turpentine plant Daisy held onto some of its population. In April of 1969, the communities of Soddy and Daisy incorporated to form the city of Soddy-Daisy. Since then, several occurrences have shaped the physical character of the City. Among these are the construction of US 27 / State 29, which bisects the city east, and west. The Sequoyah Nuclear Power Plant has spawned development in the eastern portion of the City.

Walden

Walden received its Charter from the State of Tennessee on August 11, 1975 with an initial population of 1,118 residents. Walden is located on Walden's ridge at an altitude of approximately 2,080 feet. It is primarily a rural residential area with several small businesses and churches.

Natural Hazard Overview

A review of past natural disasters in Hamilton County, and across the State of Tennessee highlights thirteen hazards as presenting a significant potential risk to the communities of Hamilton County. These hazards include flood, winter storms, thunderstorms and associated hail, lightning, tornado, and high wind, as well as landslide and erosion, earthquake, drought, wildfire and fog.

The most costly natural hazard in Hamilton County is flooding. Since 1936, TVA regulation of the Tennessee River has substantially reduced the frequency and magnitude of Tennessee River floods and backwater flooding of local tributaries. However, flooding remains a serious concern. Since 1993, the National Climatic Data Center (NCDC) has documented 28 flood events in Hamilton County producing an annual average of 7.2 million dollars of property damage. A major flood event in May of 2003 was the areas worst flood since 1973 and caused approximately 24 million dollars in property damage.

Thunderstorms and related hail, lightning, and high winds are the most frequent natural hazard to affect Hamilton County. Since 1950, The NCDC has documented 294 significant thunderstorm related weather events causing an average of $97,440 in annual property damage. Tornadoes are a less frequent natural hazard associated with thunderstorms, but a far more devastating and costly one. The National Weather Service Forecast Office in Morristown, Tennessee provided documentation of nine tornadoes that have affected the County since 1950. The most recent on March 29, 1997 was categorized as an F-3 and caused $45,000,000 in property damage with 44 injuries.

Although infrequent, winter storms, particularly ice storms, are a serious hazard. Damage associated with winter weather events occurs mainly as traffic accidents, downed utility lines, and fallen trees. The Ice Storm of March 1960 caused approximately 30 million dollars of property damage and shut down the towns of Walden, Signal Mountain, and Lookout Mountain for up to seven days. The “Blizzard of March 1993” dropped up to 3 feet of snow in the upper elevations and caused approximately fifty thousand dollars in property damage.

The many hillsides and steep slopes in Hamilton County present areas potentially susceptible to landslide and erosion. Past landslide events have been associated with heavy rain, denuding slopes of vegetation or roadway construction. Area stream banks are also susceptible to severe erosion following heavy rains.

Historic records for earthquake events are very limited in comparison to the geologic time scale. Hamilton County is in the East Tennessee Seismic Zone, the second most active seismic zone east of the Rocky Mountains. On April 29, 2003 a 4.9 magnitude earthquake with an epicenter located in Fort Payne, Alabama was felt in Hamilton County. There is a small but potentially serious risk from earthquake events.

According to the NCDC, Hamilton County averages between 20 to 40 days a year with heavy fog (visibility of ¼ mile or less). Impaired visibility affects traffic, increasing the risk of accidents. Areas located in upper elevations are particularly susceptible to fog.

Finally, the impacts of drought are considered because of the potential for wildfire in the forested areas of Hamilton County. Forested steep slopes and bluff lines are particularly vulnerable to wildfire because of the difficulty of controlling once ignited.

What is Hazard Mitigation?

Mitigation refers to the policies and activities that will reduce the area's vulnerability to damage from future disasters. Generally, these measures are ones that can be put in place before a disaster occurs. There are a multitude of different types of mitigation programs that can be put in place. In general, mitigation activities can be broken into two categories, structural and non-structural.

> *Structural mitigation* measures try to minimize the effect of hazards on people, buildings, and infrastructure. This includes actions such as building dams and levees, flood-proofing homes, constructing tornado shelters, and instituting building codes that require wind resistant construction.
>
> *Non-structural mitigation* measures typically concentrate on identifying hazard-prone areas and limiting their use. Examples include land use zoning, the selection of building sites, tax incentives, insurance programs, relocation of residents to remove them from the path of a hazard, the establishment of warning systems, and planning for at-risk populations.

Plan Requirements

This plan is designed to meet the requirements of the Federal Disaster Mitigation Act of 2000 (DMA 2000). The DMA 2000 established new hazard mitigation project funding mechanisms and new state and local planning requirements as conditions of project funding eligibility. The DMA 2000 also provides specific criteria for the preparation and adoption of multi-jurisdictional, "all-hazards" mitigation plans by local governments to meet these requirements. The Hamilton County Natural Hazard Mitigation Plan was prepared to support the requirements of a mitigation plan for all participating local governments in the County. DMA requirements specify that the following elements must be included in the plan:

- Adoption by the local governing body. The plan must include documentation that the local governing body has formally adopted the plan. In a multi-jurisdictional plan, all participating local units of government seeking plan approval must individually adopt the plan.
- All local units of government included in the plan must participate in the planning process.
- The plan must document how the plan was prepared and who was involved in the planning process. Public involvement is essential.
- A risk assessment section should include:
    - Identification of the hazards likely to affect the area, noting data limitations and providing an explanation for eliminating hazards from further consideration.
    - A discussion of past events and description of their severity and resulting effects.

- A description of the local vulnerability to the described hazards in terms of the types and numbers of buildings, infrastructure, and critical facilities located in the potentially affected areas.
- A description of the potential dollar losses to the vulnerable structures identified and a description of the methods used to calculate the estimate.
- A description of the vulnerability in terms of land use and development so that mitigation options can be considered in future land-use decisions.

➢ The plan must include a hazard mitigation strategy describing:
- Goals to reduce or avoid long-term vulnerabilities to the identified hazards.
- A range of specific mitigation actions and projects to be considered, with particular emphasis on new and existing buildings and infrastructure.
- An action plan identifying how the actions will be prioritized, implemented, and administered by the local jurisdiction. Prioritization must include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.
- For multi-jurisdictional plans, there must be identifiable actions items specific to the jurisdiction requesting FEMA approval of the plan.
- Provisions for reviewing, monitoring, and evaluating progress of the plan's implementation. The plan must also be updated at least every five years and re-approved.

FEMA Hazard Mitigation Project Funding

After November 1, 2004 cities, towns, and counties not having a FEMA approved hazard mitigation plan will be ineligible for certain types of disaster assistance. Under the terms of the DMA, local governments affected by a federally declared disaster are still eligible for emergency aid without having a plan in place. However, those local units would be ineligible for FEMA funds to support hazard mitigation projects that are a part of the normal rebuilding and recovery process.

In addition to post-disaster mitigation funding, local preparation and FEMA approval of a mitigation plan provides participants the opportunity to apply for FEMA administered pre-disaster mitigation project funding. This is a competitive, national grant program designed to reduce over-all risks to the population and structures, as well as reducing the future reliance on federal funding for recovery after a disaster.

In addition to simply identifying and describing natural hazards, the plan also analyzes vulnerability to each hazard. The vulnerability assessment describes not only the physical characteristics of each hazard, but also the potential impact of each hazard on people, buildings, and the social and economic infrastructure of the communities of the County.

Using the vulnerability assessment as the basis for planning, and with the involvement of local units of government, Hamilton County has prepared this multi-jurisdictional natural hazard mitigation plan. The plan identifies goals, information, and measures for hazard mitigation and risk reduction to make communities more disaster resistant and sustainable. In addition, mitigation actions can protect critical community facilities, reduce exposure to liability, and minimize community disruption. Information in the plan can also be used to

help guide and coordinate mitigation activities and local policy decisions for future land use decisions within communities.

Chapter 2- Natural Hazards Mitigation Planning Process

In July of 2004, the Hamilton County Mitigation Steering Committee was formed to guide the process of developing a Natural Hazards Mitigation Plan (NHMP) for Hamilton County and participating local jurisdictions.

The Hamilton County Mitigation Planning Group, organized in August of 2004, is comprised of local community leaders and department representatives. Bill Tittle, Chief of Hamilton County Emergency Management, personally contacted local jurisdictions by telephone to explain the purpose of the NHMP and to strongly urge their participation in the planning process. A copy of the initial contact list is included in the appendix. All local jurisdictions with the exception of Ridgeside joined in the planning process.

Hamilton County Natural Hazard Mitigation Planning Group Participants		
Steering Committee		
Bill Tittle	Chief of HCEMS	Hamilton County Emergency Services
Yuen Lee	Director,Information and Research	Chattanooga-Hamilton County Regional Planning Agency
Greg Helms	Planner, Information and Research	Chattanooga-Hamilton County Regional Planning Agency
Ron Esdaile	Zoning Inspector/CFM	City of Chattanooga
James Larsen	GIS	Hamilton County GIS
Planning Committee		
Mark Dempsey	Chief Building Officer	City of East Ridge
Eddie Philips	Public Safety Director	City of East Ridge
Wayne Hamill	Public Works	City of Redbank
Art Parry	Engineer	Town of Signal Mtn.
Loretta Hopper	Engineer Tech	Town of Signal Mtn.
Don Nanney	Sr. Mgr. Systems Analysis and Control	EPB
Cris Hughes	Civil Engineer	TVA
Roger Milstead	Flood Risk Mgr.	TVA
Randy Kerr	Mgr, River Forecast	TVA
Don Drumm	Transmission/Power supply	TVA
Bob Clark	Mayor	Town of Lookout Mtn.
Ansley Moses	City Manager	Town of Lookout Mtn.
Bill Renfro	Public Works Director	City of Soddy Daisy
Janice Cagle	City Manager	City of Soddy Daisy
Peter Hetzler	Mayor	Town of Walden
Carol Mason	City Manager	City of Collegedale
Bill Payne	Stormwater manager	City of Chattanooga
Jerry Stewart	Waste Resources	City of Chattanooga
Naveed Minhas	Engineer	City of Chattanooga
Jerry Mitchell	Parks and Recreation	City of Chattanooga
Mike Howard	Waste Waster Treatment Authority	Hamilton County
Mike Hendricks	Engineer	Hamilton County
David Edwards	City Manager	City of Lakesite

The Mitigation Steering Committee developed, from materials provided by the Federal Emergency Management Agency (FEMA), a mitigation planning process. This process involved the following steps and to be completed by the Planning Group:

- Develop consensus on potential hazards.
- Develop information concerning each hazard.

- Prioritize hazards.
- Establish plan goals and objectives.
- Develop and prioritize mitigation alternatives.
- Prepare draft Mitigation Plan.
- Review the draft plan within the Planning Group.
- Present the draft plan to the public for comment.
- Revise the plan.
- Present the revised plan to the public for final comment.
- Adopt the plan.
- Submit plan to the State of Tennessee.

Meeting 1- July 22, 2004:

Bill Tittle, Chief of Hamilton County Emergency Management, opened the meeting with introductions and an explanation of the requirement for Hamilton County to prepare a Natural Hazards Mitigation Plan (NHMP) by November 2004, in order to meet federal and state mandates. Mr. Tittle explained that the Office of Emergency Management was devoting a significant amount of time and resources to Homeland Security issues and that assistance was needed in preparing the plan.

Yuen Lee suggested that the group act as the Steering Committee for the plan and develop a timeline for plan elements including public participation, formation of a Planning Group, involvement of local municipalities, and submittal of plan drafts. The Chattanooga-Hamilton County Regional Planning Agency (CHCRPA) agreed to write the NHMP, with input from a Planning Group consisting of representatives from participating jurisdictions and entities.

Greg Butler introduced the FEMA HAZUS model and indicated that James Larsen of Hamilton County GIS had received training on the model and would join the group in Greg's place at the next meeting.

Greg Helms agreed to begin researching materials necessary for the plans development. Greg also discussed plans to begin collecting data on natural hazard descriptions and historic events for Hamilton County.

Meeting 2 - July 27, 2004:

The Steering Committee met to discuss a timeline and delegation of responsibilities regarding the plan. The Committee identified candidates for the Planning Group and developed a questionnaire for local jurisdictions and government departments to gather preliminary information and feedback for the plan. The Committee drafted a letter to notify adjoining local governments that Hamilton County was in the process of developing a Natural Hazards Mitigation Plan and to invite their participation.

Meeting 3 - August 10, 2004:

The third meeting focused on identifying hazards and possible mitigation actions. Representatives from the Engineering and Public Works Departments of Chattanooga and Hamilton County attended the meeting to begin the process of identifying/prioritizing hazards and possible mitigation actions. The Electric Power Board and the Tennessee Valley Authority were identified as key participants in developing mitigation strategies. A general discussion of hazards in Hamilton County led to a consensus that the top risks are flooding and storm damage. Secondary risks were identified as wildfire, earthquake, and landslide/erosion. Dam safety is associated with major flood and earthquakes and dam safety was considered to be under the responsibility of the Tennessee Valley Authority. It was decided that this plan would not address dam safety due to current security concerns. The group discussed current mitigation efforts including the Astor Avenue buyout of repetitive loss properties, the Brainerd levee, reverse 911 call system, greenways, and wetland construction. Future mitigation ideas discussed included the feasibility of floodgates and the need for more stream gauges. The impact of development in northern Catoosa County, Georgia on flooding of South Chickamauga Creek was discussed.

Meeting 4 - August 13, 2004:

The Steering Committee met to review materials for the Planning Group Kickoff Meeting scheduled for August 16. An information packet containing a community hazard survey, a summary of plan requirements, a plan timeline, and maps illustrating flood hazard areas in the County was prepared for distribution to the Planning Group participants. The Committee also discussed application of the HAZUS model to develop a vulnerability assessment of flood risk areas.

Meeting 5 – August 16, 2004:

The Planning Committee Kickoff meeting began with an explanation and discussion of the purpose and scope of the Natural Hazard Mitigation Plan. Representatives from each jurisdiction were given an information packet that included a summary of the plans requirements, a community hazard survey, and maps of the May 2003 flood. The Planning Committee reached a general consensus on the hazards on which to focus. The process for completing the plan was discussed and members of the Planning Committee exchanged contact information. The Planning Committee discussed a schedule for future meetings. In order to expedite the completion of the Plan before the November 2004 deadline it was decided to complete the final tasks (Develop Mitigation Strategy, Establish Goals and Objectives, Develop Evaluation/Priority Criteria, and Prioritize Mitigation Actions) at the jurisdiction level. Each jurisdiction would submit the necessary information to the CHCRPA for preparation of a draft plan. Each jurisdiction would review and prepare comments on the draft plan. Comments from each jurisdictions as well as public input would be incorporated into a Final draft.

Problem Statements and Goals

The community hazard surveys were collected by the CHCRPA. The community hazard survey required plan participants to prioritize hazards and develop problem statements to support the development of overall plan goals, objectives, and specific mitigation actions. Jurisdictions were required to identify possible or desired actions to mitigate hazards of concern. Fog was a hazard that was not listed as a potential hazard in the survey, but that was identified by several respondents as a significant hazard. Natural Hazards are prioritized based on hazard impact ranking by each jurisdiction (Table 1).

Table 1

Hamilton County, Tennessee Natural Hazard Risk Assessment Matrix

	Unincorporated County	Chattanooga	East Ridge	Red Bank	Soddy-Daisy	Collegedale	Signal Mountain	Lookout Mountain	Walden	Lakesite	Hazard Score
100 Year Floodplain	3	3	3	3	3	3	0	0	0	1	19
Flash Flood	3	3	3	2	3	3	1	0	1	1	20
Non flood zone flood	2	3	3	1	1	3	0	0	0	1	14
Ice storm	2	3	2	2	3	3	3	3	2	2	25
High wind	2	3	3	2	2	2	3	2	2	2	23
Winter Storm	2	2	2	2	3	2	2	3	2	2	22
Stream Bank Erosion	3	3	3	3	3	3	1	0	0	1	20
Thunderstorm	2	2	3	0	3	2	2	1	1	2	18
Lightning	1	3	3	2	1	1	2	2	1	2	18
Tornado	2	1	3	2	1	3	1	1	1	2	17
Wildfire	2	0	2	2	1	1	1	3	1	2	15
Landslide	1	1	1	0	2	3	3	0	1	2	14
Hail	1	1	1	2	1	2	1	1	1	2	13
Earthquake	1	1	1	2	1	1	1	1	1	1	11
High/Low Temperature	1	1	1	1	1	1	1	0	0	1	8
Municipal Score	28	30	34	26	29	33	22	17	14	24	257

Risk Scale: Severe=3, Moderate=2, Low=1, None=0

The CHCRPA researched the history of natural hazards in Hamilton County and prepared a table documenting the past frequency, and estimated recurrence interval (probability of occurrence) for each hazard with a documented history. For example, the following table indicates that Hamilton County will experience a tornado every 5.33 years. (Table 2).

Table 2

Hazard Frequencies for Hamilton County, Tennessee

Hazard	*Total Events*	*Years in Record*	*Recurrence Interval*	*Hazard Frequency*
Wind	196	53.25	0.27	3.68
Flooding	29	10	0.34	2.90
Winter Storm	18	10	0.56	1.80
Hail	94	53.25	0.57	1.77
Tornado	10	53.25	5.33	0.19

Source: NOAA National Climatic Data Center

Flooding: Flooding causes the most significant amount of reoccurring damage in Hamilton County. Flooding primarily affects properties located in the Tennessee Valley, although mountaintop communities are susceptible to flash flood events.

- Tributaries of the Tennessee River are prone to backwater flooding.
- Flooding continues to damage properties both inside and outside of the 100-year floodplain.
- Residents often drive through standing floodwater.
- Flooding repeatedly damages some structures in the 100-year floodplain.
- Inadequate infrastructure is unable to handle stormwater in some areas of Hamilton County.
- There is a lack of comprehensive area rain gauging and stream flow monitoring capabilities.
- Flood and flash flood events exacerbate stream bank erosion.
- Drainage basin modeling and the creation of potential flood maps have not been created in most developing areas.
- There is no requirement for stream buffers in local ordinances.
- There is no early warning system to notify flood zone residents of imminent flooding due to headwater rainfall.
- Power failure may shut down sanitary and stormwater pump stations without backup power, increasing the magnitude of flood events.
- Development in Catoosa County, Georgia has the potential to increase the frequency and magnitude of flooding of the South Chickamauga Creek.

GOAL: Protect lives and property by reducing the occurrence and severity of flood events in Hamilton County.

Winter Storms: Hamilton County is vulnerable to ice storms, snowstorms, and extreme weather change in the winter.

- The most common effects of winter storms are power and communication outages, and traffic accidents.
- Mountainous areas experience yearly difficulty with winter weather.
- Winter storms cause some areas to become inaccessible for extended periods of time.

- There is not an adequate plan in some jurisdictions to provide shelter for residents who lose power and heat during winter weather events.

GOAL: Reduce potential damages and increase public preparedness.

Severe Storms: Severe storms with high winds, lightening, hail, and heavy rain are possible throughout the year in Hamilton County.

- High winds cause falling limbs and trees that damage power lines and public utilities.
- Heavy rain overwhelms stormwater drainage capacity and leads to flooding of problem areas.
- Lightening has destroyed or damaged buildings by igniting fires.

GOAL: Minimize the impact of severe storms on area property and lives.

Tornadoes: Tornadoes are associated with severe thunderstorms and although infrequent, may cause substantial property damage and loss of life.

- There is no tornado warning siren system in Hamilton County.
- There are no identified tornado shelters within Hamilton County.
- There is a substantial risk of property damage and loss of life for residents of mobile homes.

GOAL: Save lives, reduce property damage, and increase awareness of the danger of tornadoes.

Landslide/Erosion: Stream banks, steep slopes, and slopes cut for roads have the potential for failure.

- Removal of vegetation in hazard areas increases the potential for landslides.
- Heavy rain increases the probability of slope failure.
- Residents may be unaware of the potential hazard of landslides.
- Severe stream bank erosion in several areas, particularly along North Chickamauga Creek, is threatening property and structures.

GOAL: Identify high hazard areas and identify techniques to minimize risk.

Drought/Wildfire- Wildfire is the main threat associated with drought conditions.

- There is a lack of public awareness of how droughts increase the potential for wildfire.
- No public education exists on how to minimize fire risk to property located in the wildland/urban interface.
- Fire suppression on steep slopes and bluff lines is especially difficult.
- Water capacity of Lookout Mountain, Signal Mountain, and Walden is not sufficient to fight a major wildfire.

GOAL: Reduce the threat of wildfire.

Earthquakes: Earthquakes are common in the East Tennessee Seismic Zone, but rarely noticeable. A major earthquake could result in significant loss of property and life.

- There is a lack of public education on earthquake hazards and preparedness.
- Older buildings and infrastructure may be severely damaged in the event of a significant earthquake.
- Hamilton County contains several critical facilities that increase the potential danger of a major earthquake.
- Steep slopes and hillsides could become unstable in the event of a major earthquake.

GOAL: Save lives, reduce potential property damage and increase public awareness.

Fog: Hamilton County experiences serious visibility reducing fog 20 to 40 days a year.

- Serious traffic accidents have resulted from heavy fog on roadways.
- There are no warning systems or signs to notify drivers of fog hazards.

GOAL: Increase driver awareness and reduce accidents.

Development of Mitigation Alternatives

The Planning Committee developed mitigation alternatives in response to problem statements. The following mitigation alternatives form the basis for preferred actions discussed in Chapter 4.

Flooding
Emphasis will be to seek Federal Mitigation Grants and/or other funding sources to:

- ✓ Purchase or relocate repetitive loss structures
- ✓ Educate residents in high-risk areas
- ✓ Notification program for evacuation
- ✓ Educate property owners of responsibility for stream maintenance
- ✓ Increase stream gauging systems and early notification systems
- ✓ Develop map of problem non-flood zone areas
- ✓ Continue to develop basin modeling
- ✓ Apply basin modeling and flood mapping to evaluate the impact of new development projects
- ✓ Improve GIS capabilities to include real time modeling and projections of flood areas
- ✓ Increase capacity of stormwater drainage system in problem areas
- ✓ Evaluate the potential for uniform countywide stormwater and floodplain regulation
- ✓ Evaluate the potential for a countywide stream buffer ordinance
- ✓ Acquire backup power generators for stormwater and sewage pumping stations, where needed
- ✓ Continue public/private collaboration to expand greenway system countywide

Winter Storm

- ✓ Evaluate feasibility of underground utilities for problem areas and new developments

Severe Storm

- ✓ Early warning system
- ✓ Evaluate multi-jurisdictional emergency communication system
- ✓ Evaluate feasibility of underground utilities for problem areas and new developments
- ✓ Place weather alert radios in each school and day center as well government agencies

Tornado

- ✓ Identify public buildings for use as tornado shelters
- ✓ Public Service Announcements for mobile home residents
- ✓ Evaluate building codes and enforcement

Landslide/Erosion

- ✓ Develop a countywide map of high risk areas
- ✓ Evaluate regulation of vegetation removal and development on steep slopes
- ✓ Evaluate the potential for a countywide stream buffer ordinance
- ✓ Continue public/private collaboration for greenway system land acquisition
- ✓ Development restrictions in susceptible areas

Drought/Wildfire

- ✓ Evaluate and map urban/wildland interface
- ✓ Public education on responsible water use during severe drought
- ✓ Public education on landscaping and building techniques to reduce property vulnerability to wildfire

Earthquake

- ✓ Retrofit existing buildings which are not compliant with current standards
- ✓ Evaluate critical infrastructure
- ✓ Public education of hazard and preparedness

Fog

- ✓ Warning signs to notify drivers of fog conditions

Meeting 6 – September 29, 2004:

The Planning Group met to review the first Plan draft. The Group also discussed the format for the public meeting scheduled for October 7, 2004. The Group decided on an open house format with copies of the plan as well as large format presentation of maps and information available for public review. Representatives from each participating jurisdiction were available to address questions and concerns of their constituents.

Public Notification and Involvement

A notice of a public meeting was placed in the Chattanooga Times Free Press to notify the public of a meeting on October 7, 2004 to discuss and comment on the first draft of the Hamilton County Natural Hazards Mitigation Plan. Representatives from each jurisdiction participating in the plan were present to address specific questions and issues raised by their constituents. The draft plan was also posted on the CHCRPA website and made available at the Development Resource Center to allow access for members of the public unable to attend the meeting. The Participants were encouraged to submit written comments on the plan. Written public comments are included in the section twelve of the Appendix. Public comment on the plan resulted in the incorporation of new information regarding streambank erosion. Streambank erosion has been an especially frustrating for property owners who noted the long history of problem with no significant action taken. Representatives of the South Chickamauga Creek Greenway Alliance and the North Chickamauga Creek Conservancy advocated protection of watershed floodplains and wetlands as a natural, ecologically beneficial, and low cost alternative to man made flood control measures that become increasingly necessary when floodplain development occurs. Prior to adoption by local jurisdictions, a copy of the draft plan and the final plan were maintained on the CHCRPA website for public comment from October 2004 through April 2005. The plan was also available for review and comment by local businesses, agencies, colleges, universities, nonprofits, and other interested parties.

Previous Plans and Studies

In preparing this plan, information from the following plans, policies, and studies was reviewed and incorporated where appropriate.

Flood Insurance Study for Hamilton County, Tennessee (FEMA 2002): This study was used to determine historic flood events and principal flooding problems that exist in the county. The study contains flood profiles and elevation data for area streams that will be used in future modeling of flood events.

Development Trends 1990 to 2000 (CHCRPA 2001): This study conducted by the Information and Research Division of the CHCRPA was incorporated into the discussion of development trends in Hamilton County.

Hamilton County Urban Growth Plan (1999): This plan was reviewed to determine county development goals and policies relevant to Natural Hazard Mitigation.

Hamilton County Local Hazard Mitigation Plan (October 1999): Background information on natural hazards in Hamilton County from the October 1999 plan was reviewed, updated, and incorporated into this document.

Reconnaissance Study - Section 905(b) (WRDA 86) Preliminary Analysis - Ecosystem Restoration and Flood Damage Reduction Study - North Chickamauga Creek Watershed - Hamilton and Sequatchie Counties, TN (Army Corps of Engineers (1998): This study was requested by the city of Soddy Daisy and Hamilton County to determine mitigation alternatives for severe stream bank erosion and flooding problems on North Chickamauga Creek. Information from this study was used to document the history and probable causes of streambank erosion in the North Chickamauga Creek Watershed.

Floods on North Chickamauga, Mountain, and Lookout Creeks (TVA 1961); Floods on the Tennessee River, Chattanooga & Dry Creeks, and Stringers Branch (TVA 1959); Floods on the South Chickamauga, West Chickamauga, and Spring Creeks (TVA 1958): TVA studies of flooding on area creeks contributed historic documentation of flood events in Hamilton County. Data contained in the study may be useful to determine the effects of urbanization on area watersheds.

Notification of Adjoining Counties

A notification letter was sent to adjoining counties stating that Hamilton County had begun the process of preparing a Natural Hazards Mitigation Plan. The letter invited the participation of interested parties. A copy of the letter and list of recipients is included in the appendix.

Plan Adoption

Each participating jurisdiction was required to formally adopt the Hamilton County Natural Hazards Mitigation Plan in order to satisfy requirements of the Disaster Mitigation Act of 2000. All participating jurisdictions (Chattanooga, Collegedale, East Ridge, Lakesite, Lookout Mountain, Hamilton County, Signal Mountain, Soddy-Daisy, and Walden) have adopted the plan. Resolutions to adopt the plan for each participating jurisdiction are included in section thirteen of the appendix.

Evaluation of the Planning Process

Hamilton County and participating communities have cooperated to develop a Natural Hazards Mitigation Plan that represents a starting point for responsible mitigation planning. This plan represents a significant improvement on past planning efforts for mitigation of natural hazards. However, it is critical to expand and strengthen participation in the planning process. Local businesses and commercial interests, the academic community, citizen groups, and relevant government agencies must be encouraged to participate in future revisions of the plan.

The Hamilton County Office of Emergency Services was given the task of preparing this plan. Bill Tittle did a commendable job in coordinating the planning effort. However, it is clear that the resources available to the Office of Emergency Services are not sufficient to support and coordinate the continued process of maintaining, evaluating, and updating the plan. There is much work left to address natural hazard mitigation in Hamilton County including but not limited to a vulnerability assessment of existing structures and critical infrastructure with potential dollar losses, updating risk assessments, feasibility studies to establish the cost benefit ratio of mitigation actions, as well as coordination of plan maintenance, evaluation, and updates for multiple jurisdictions.

Chapter 3 - Hazard Analysis

The Impacts of Natural Disasters

Images of the destructive impacts of natural disasters have become commonplace in the newspapers and evening newscasts across the country. These images often portray the direct impacts of a disaster, people are killed, many others are injured, and homes, office buildings, shopping centers, and other physical structures are destroyed. In large-scale disasters, the destruction can severely interrupt work, traffic, and the daily routine of the area for months and in some cases years after the event.

Natural hazards addressed in this plan include flood, winter storms, thunderstorms and associated hail, lightning, and high wind, as well as tornadoes, earthquakes, landslide/erosion, drought/wildfire, and fog. Natural hazards were determined through review of past events and discussion within the Planning Group. Although hurricanes affect Hamilton County, they are not addressed as a separate hazard in this plan. The Planning Group agreed that hazards that will be addressed in the plan such as severe storms, erosion, and flooding incorporate the affects of hurricane remnants that may reach our area.

Terminology

The terminology of hazard analysis is often confused by inconsistent usage of key terms. Hazard, vulnerability, and risk in many cases are used almost interchangeably; however these terms all have distinct meanings. *Hazard* refers to the occurrence of the actual event that threatens human development. *Vulnerability* refers to the susceptibility of human development to harmful impacts of that hazard. *Risk* refers to the likelihood of suffering harm from the hazard in question.

An assessment can be conducted at three levels of sophistication:

1. *Hazard identification:* Define the severity and likelihood of the natural hazards that may occur in the County.
2. *Vulnerability assessment:* Evaluate the people and property exposed to the hazard and the extent of injury and damage that may result from a hazardous event of a given intensity occurring over a certain geographic area.
3. *Risk analysis:* Incorporate the estimation of probability of a hazard occurring with the vulnerability to damage and injury.

Experts in the field of disaster management often use an array of terms with fine distinctions to describe the impacts of natural hazards. Where appropriate this plan will use terms as defined by the National Research Council in its 1999 publication entitled, “The Impacts of Natural Disasters: A Framework for Loss Estimation.”

- The *impact of a disaster is* the broadest term, and includes both market based and non-market effects. For example, market-based impacts include destruction to property and a reduction in income and sales. Non-market effects include environmental consequences and psychological effects suffered by individuals

involved in a disaster. In principle, individual impacts can be either negative or positive, though obviously the impacts of disasters are predominantly undesirable.

- The *losses* of a disaster represent market-based negative economic impacts. These consist of direct losses that result from the physical destruction of buildings, crops, and natural resources and indirect losses that represent the consequences of that destruction, such as temporary unemployment and business interruption.

- The *costs* of a disaster, as the term is conventionally used, typically refer to cash payouts by insurers and governments to reimburse some (and in certain cases all) of the losses suffered by individuals and businesses.

- The *damages* caused by a disaster refer to physical destruction, measured by physical indicators, such as the numbers of deaths and injuries or the number of buildings destroyed. When valued in monetary terms, damages become direct losses.

Methodology

This plan represents the initial effort of Hamilton County and participating jurisdictions to collaborate in the process of developing a Natural Hazards Mitigation Plan. The plan is not a static document, but one that represents the beginning of a continuing process. The following methodology is designed to serve as a framework to guide the continuing assessment of vulnerability. As capabilities are enhanced and new information is obtained, vulnerabilities can be analyzed in greater detail.

The vulnerability assessment is the basis of the County's hazard mitigation strategy. As used here, v*ulnerability assessment* means the evaluation of the impact of natural hazards on the human-built environment. FEMA recommends an analysis based on critical facilities and the potential for future economic losses.

The vulnerability assessment is essential so that the County and communities within the County can develop targeted strategies to reduce their exposure and potential for loss. In general, the following methodology for assessing vulnerability was used:

1. *Assess the hazards.* This assessment includes a profile of the hazard and a discussion of past history, frequency of occurrence, severity, geographic areas that could be affected and time factors such as predictability and speed of onset.

2. *Assess vulnerabilities.* Based on the potential impacts, the vulnerability of exposed structures, infrastructure, and people are described and mapped.

3. *Determine potential for future losses.* The particular method for determining the future loss potential varies from hazard to hazard. In general, however, the potential for future losses is an estimate of possible monetary losses based on a most probable case scenario and the impact analysis and vulnerability assessment for each hazard.

4. *Rank the hazard vulnerabilities*. Based on the information compiled in the vulnerability assessment, the planning group ranked the hazards to allow for quantitative comparison. This ranking was then used to assign priorities to the general mitigation goals and objectives.

Note: The improved value of property was used to calculate the potential for damages to structures that might be impacted. Improved value represents an assessor's estimate in a point in time of the price a seller could receive for the structure in a fair market transaction. From the perspective of a local unit of government, improved value represents tax base. If a building is destroyed, the tax base decreases. Improved value is not an estimate of replacement value of the structure.

When assessing vulnerability and designing mitigation programs, it is also useful to distinguish between the physical destruction caused by the disaster and the consequences of that destruction. There are other ways to break this down even further:

- *Primary direct losses* are those resulting from the immediate destruction of the event itself, such as water damage from a flood or structural damage from high winds.

- *Secondary direct losses* are those additional impacts that occur as a result of the primary damage, such as tornado damage resulting in a hazardous materials release or downed overhead power lines as a result of falling tree limbs after an ice storm.

- *Indirect losses* are those losses that result from the consequences of the actual physical destruction. Indirect losses include business losses due to direct physical damage to commercial structures or loss of infrastructure, loss of wages to employees, rippling effects due to the loss of wages as employees reduce their spending on other consumer products and services, the loss of function of critical facilities such as schools or health care facilities, and environmental damages.

Loss estimates from past events and projections for future losses serve as the basis for hazard mitigation efforts. Because mitigation can be costly, it is important for policymakers at all levels of government to be aware of the total *losses* of disasters—and ideally of the extent to which those losses can be reduced by various mitigation strategies—so cost-effective mitigation strategies can be designed and implemented.

Existing and Emerging Conditions

Population

Except for East Ridge and Ridgeside, all municipalities and Hamilton County as a whole experienced a gain in population between 1990 and 2000. It should be noted that some municipalities gained population by annexation.

Most of the population gain occurred in the outlying areas, such as Collegedale, Lakesite, Soddy-Daisy, and the unincorporated area of the Hamilton County.

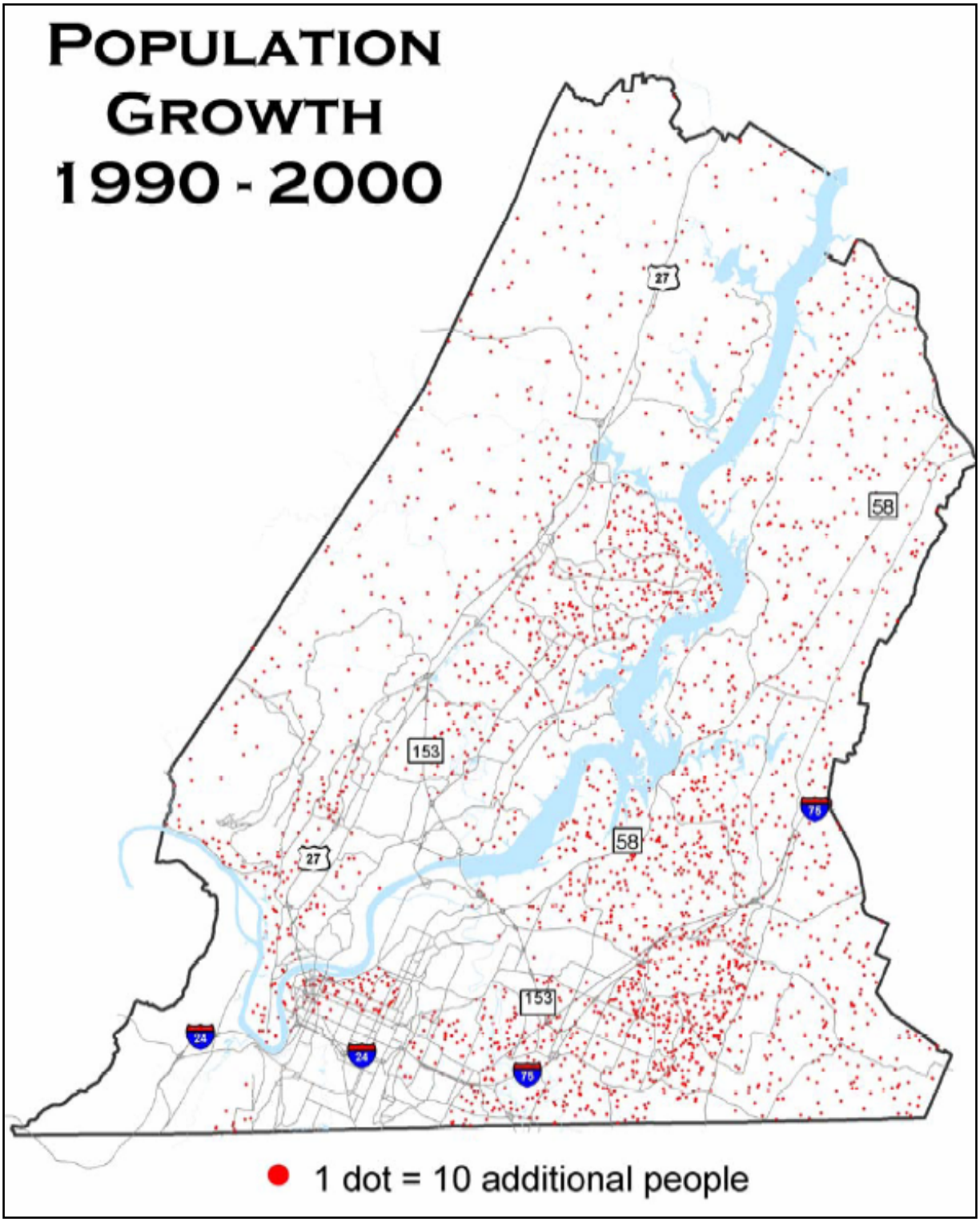
Table 3 illustrates population growth by jurisdiction from 1980 to 2000.

Table 3

Hamilton County Population 1980 to 2000 by Jurisdiction										
	CENSUS	% of	CENSUS	% of	CENSUS	% of	Growth 1980 - 1990		Growth 1990 - 2000	
Jurisdiction	1980	County	1990	County	2000	County	Number	% Change	Number	% Change
Chattanooga	169,565	58.9%	152,466	53.4%	155,554	50.5%	-17,099	-10%	3,088	2%
Collegedale	4,607	1.6%	5,049	1.8%	6,514	2.1%	442	10%	1,465	29%
East Ridge	21,236	7.4%	21,105	7.4%	20,640	6.7%	-131	-1%	-465	-2%
Lakesite	651	0.2%	732	0.3%	1,845	0.6%	81	12%	1,113	152%
Lookout Mountain	1,886	0.7%	1,901	0.7%	2,000	0.6%	15	1%	99	5%
Red Bank	13,297	4.6%	12,322	4.3%	12,418	4.0%	-975	-7%	96	1%
Ridgeside	417	0.1%	400	0.1%	389	0.1%	-17	-4%	-11	-3%
Signal Mountain	5,818	2.0%	7,035	2.5%	7,429	2.4%	1,217	21%	394	6%
Soddy-Daisy	8,388	2.9%	8,242	2.9%	11,530	3.7%	-146	-2%	3,288	40%
Walden	1,293	0.4%	1,523	0.5%	1,960	0.6%	230	18%	437	29%
Unincorporated	60,582	21.1%	74,761	26.2%	87,617	28.5%	14,179	23%	12,856	17%
County Total	287,740	100.0%	285,536	100.0%	307 896	100.0%	-2,204	-1%	22,360	8%
Source: U.S. Census 1980,1990, 2000.										

Analyses of the Census indicated population increased generally in a crescent shape from East Brainerd, Ooltewah, Hunter Road, Wolftever Creek areas, and crossed the Tennessee River to the Middle Valley and Sequoyah areas in the last decade. The analysis also showed some growth in the downtown and UTC areas. (Map 2)

Map 2


POPULATION
GROWTH
1990 - 2000
27
58
153
27
58
153
24
24
75
75
1 dot = 10 additional people

Population estimates for areas in Hamilton County indicate a continuance of recent population trends. Chattanooga, East Ridge, and Red Bank have experienced a slight decline in population, while Soddy-Daisy and the unincorporated county continue to grow. Table 4 illustrates recent population trends for each jurisdiction of Hamilton County.

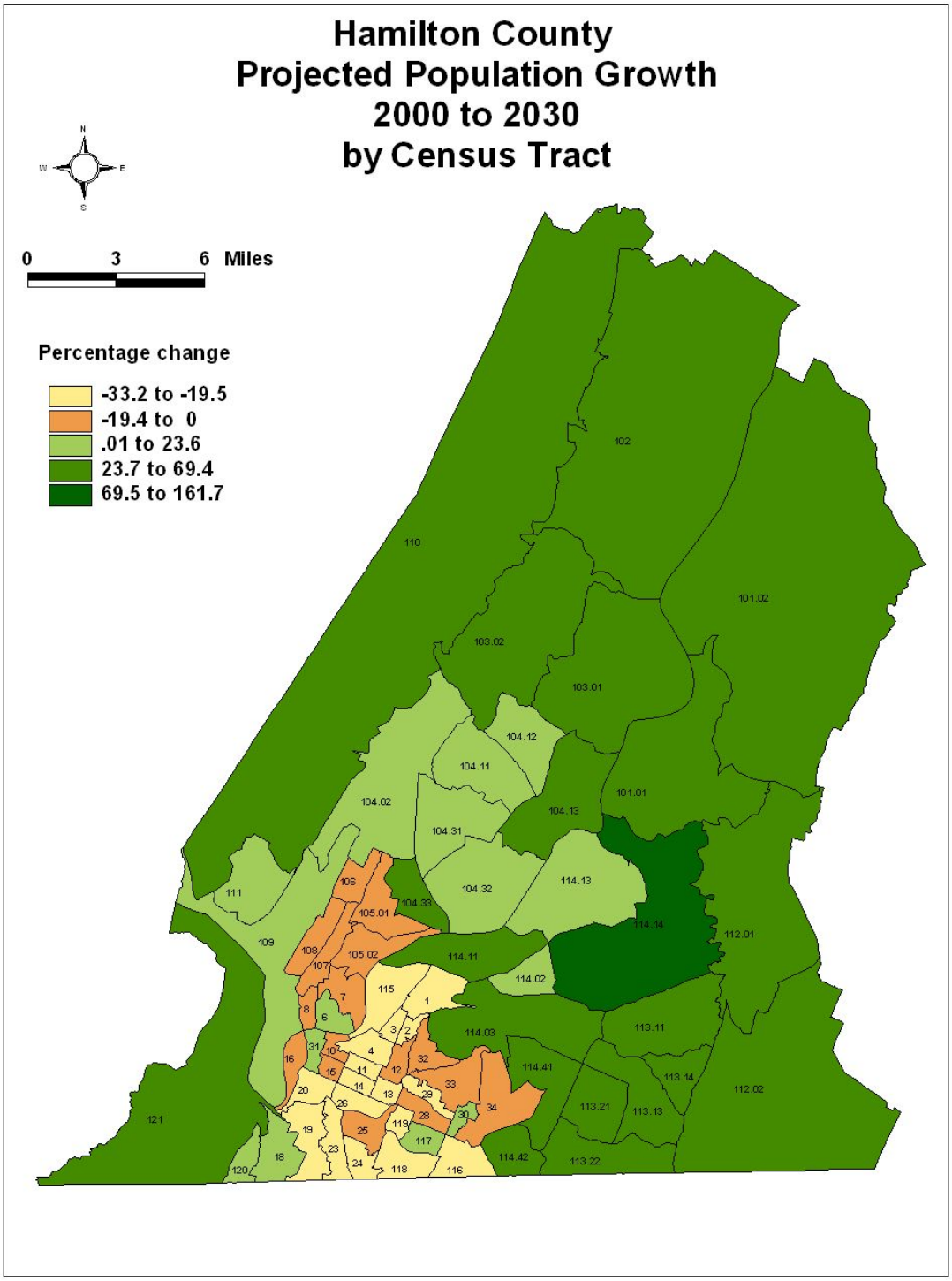
Table 4

Annual Estimates of the Population for Areas in Hamilton County, TN: April 1, 2000 to July 1, 2003						
Area	**Resident Population Estimate (July 1)**				**Resident Population Census Estimates Base April 1, 2000**	**Census 2000 Population**
	2003	**2002**	**2001**	**2000**		
Chattanooga city (pt.)	154,886	155,383	155,304	155,596	155,681	155,554
Collegedale city	7,129	7,098	6,917	6,611	6,535	6,514
East Ridge city	20,003	20,202	20,387	20,589	20,642	20,640
Lakesite city	1,888	1,843	1,838	1,843	1,845	1,845
Lookout Mountain town	1,921	1,950	1,972	1,994	2,000	2,000
Red Bank city	12,013	12,137	12,256	12,393	12,429	12,418
Ridgeside city	382	383	385	388	389	389
Signal Mountain town	7,265	7,321	7,343	7,416	7,435	7,429
Soddy-Daisy city	11,967	11,860	11,767	11,567	11,517	11,530
Walden town	1,969	1,961	1,958	1,959	1,960	1,960
Unincorporated Hamilton County	90,087	89,086	88,289	87,624	87,463	87,617
Total	309,510	309,224	308,416	307,980	307,896	307,896
Source: Population Estimates Branch, U.S. Census Bureau						

The total projected 2030 population for Hamilton County is 362,334. This represents an increase of 54,437 people, or 17.7% over the 2000 base year population from the U. S. Census. This projection was provided by the Tennessee Department of Transportation (TDOT), and was developed by the Center for Business and Economic Research (CBER) at the University of Tennessee. This projection was used by the CHCRPA as the base for population projections by traffic analysis zone (TAZ) for long-range transportation planning purposes. The same projections are also being used in the update of the Comprehensive Plan for Hamilton County. A detailed explanation of the population projection methodology is included in the Appendix.

Map 3 illustrates the projected population growth of Hamilton County by census tract through the year 2030.

Map 3



Density is important in determining an areas vulnerability to certain hazards. For example, a tornado that occurs in the unincorporated county will affect fewer people and structures than if the same tornado occurs in the more densely populated city of East Ridge. Table 5 presents a summary of the density of area population and housing units.

Table 5

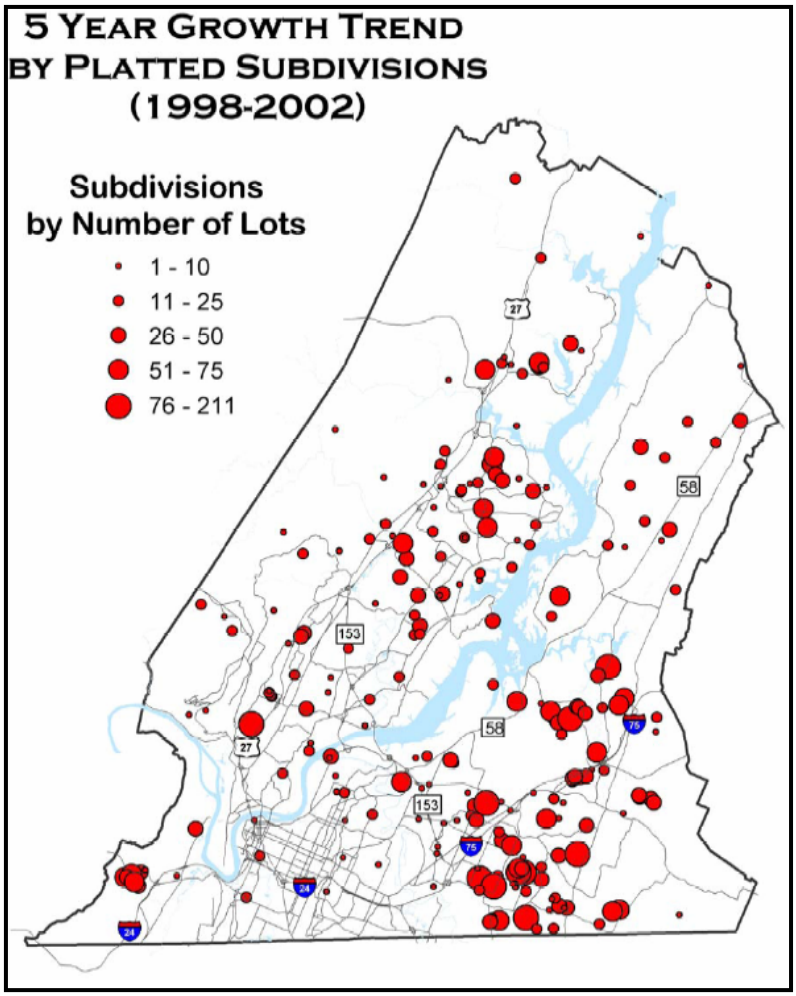
2000 Hamilton County Area and Density							
			Square Miles			Density/Sq. Mile of Land Area	
Area	Population	Housing Units	Total Area	Water Area	Land Area	Population	Housing Units
Hamilton County	307,896	134,692	575.72	33.28	542.44	567.6	248.3
Unincorporated	87,617	33,723	372.24	24.53	347.71	161.5	62.2
Chattanooga	155,554	72,108	143.17	7.96	135.21	1,150.5	533.3
Collegedale	6,514	2,199	8.33	0.0	8.33	782.0	264.0
East Ridge	20,640	9,876	8.26	0.0	8.26	2,498.8	1,195.6
Lakesite	1,845	706	1.72	0.0	1.72	1,072.7	410.5
Lookout Mtn	2,000	836	1.26	0.0	1.26	1,587.3	663.5
Red Bank	12,418	6,443	6.44	0.0	6.44	1,928.3	1,000.5
Ridgeside	389	162	0.17	0.0	0.17	2,288.2	952.9
Signal Mtn	7,429	3,054	6.68	0.0	6.68	1,112.1	457.2
Soddy-Daisy	11,530	4,809	23.82	0.79	23.03	500.7	208.8
Walden	1,960	776	3.63	0.0	3.63	539.9	213.8
Source: U.S. Census 2000							

Land Use and Development Trends

The subdivision trend (See Map 4) shows that residential growth is expected to continue in the northern and eastern parts of Hamilton County in the next five years. Major areas likely to continue growing are:

- Soddy Daisy and areas farther to the north
- Middle Valley and Sequoyah area
- Areas north and northeast of the VAAP property (Enterprise South)
- Areas around Wolftever and Savannah Creeks
- East Brainerd and Ooltewah areas
- Lookout Valley

Map 4



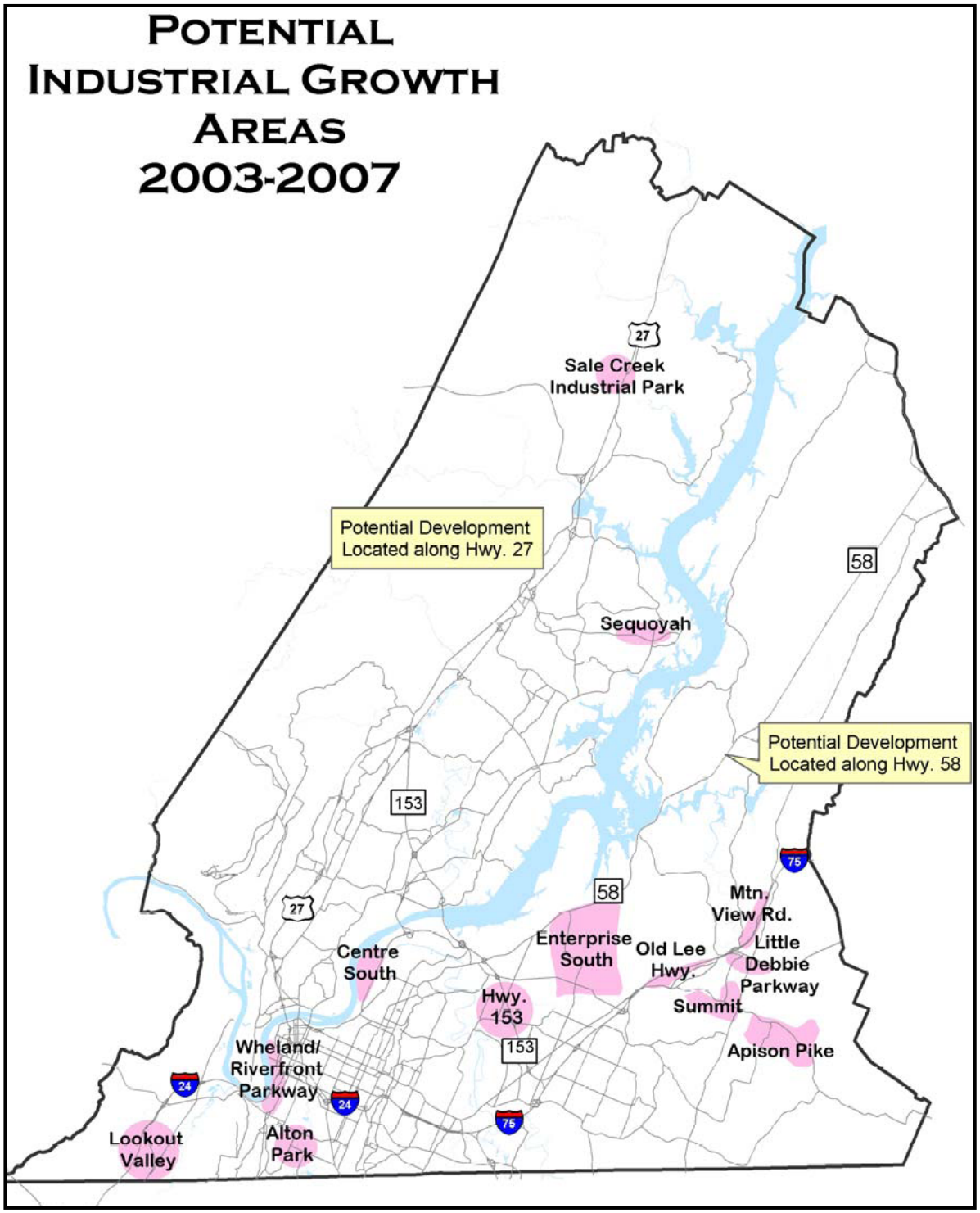
Commercial development, particularly retail and services, tends to occur along the major corridors in residential growth areas. The same areas cited above as residential growth areas are likely candidates for further commercial development/expansion.

The principal areas for possible industrial and business development/expansion (See Map 5) are:

- Lookout Valley
- Alton Park
- Wheland property/Riverfront Parkway
- Centre South
- Highway 153/Shallowford Industrial Park area
- Enterprise South
- Area adjacent to Sequoyah Nuclear Plant
- Areas along Highways 58 and 27, and the Sale Creek area

- Summit area along Old Lee Highway and Little Debbie Parkway

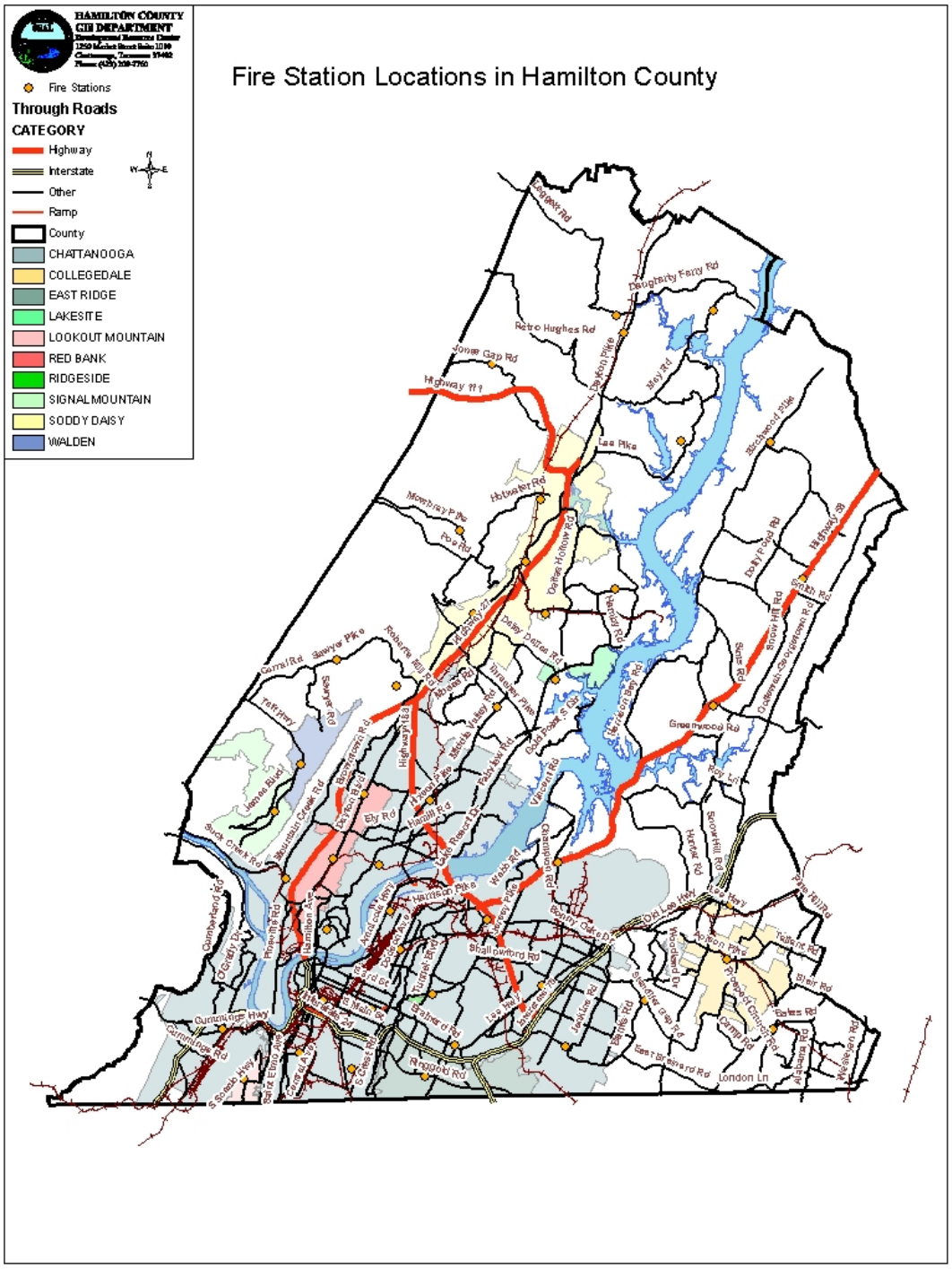
Map 5



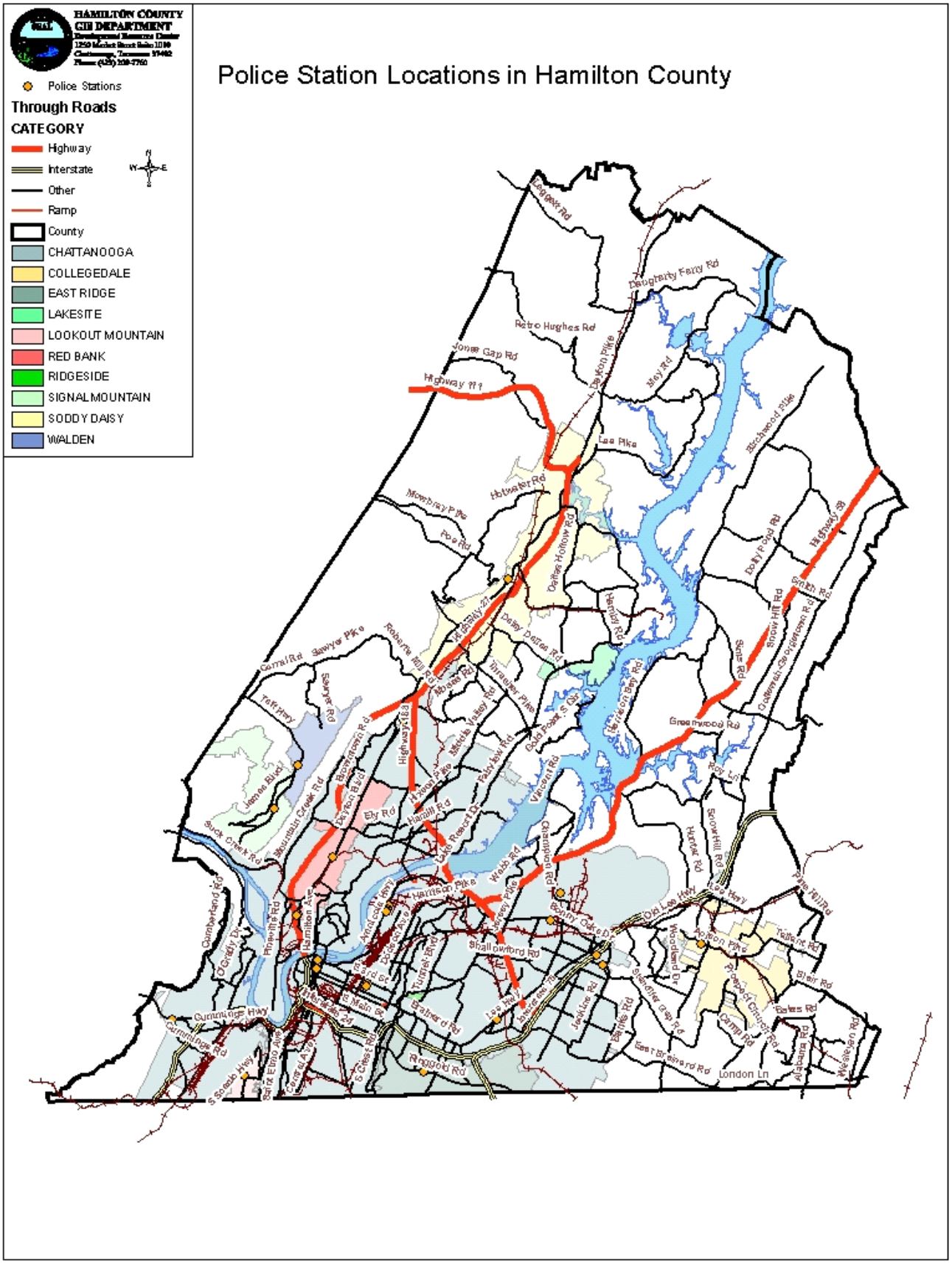
Critical Facilities

Maps six through nine show the location of critical facilities, including fire stations, police stations, emergency medical stations, schools, and city halls. All critical facilities are vulnerable to non-site specific hazards such as severe storms. No critical facilities were identified in the community hazard survey as being vulnerable to flooding.

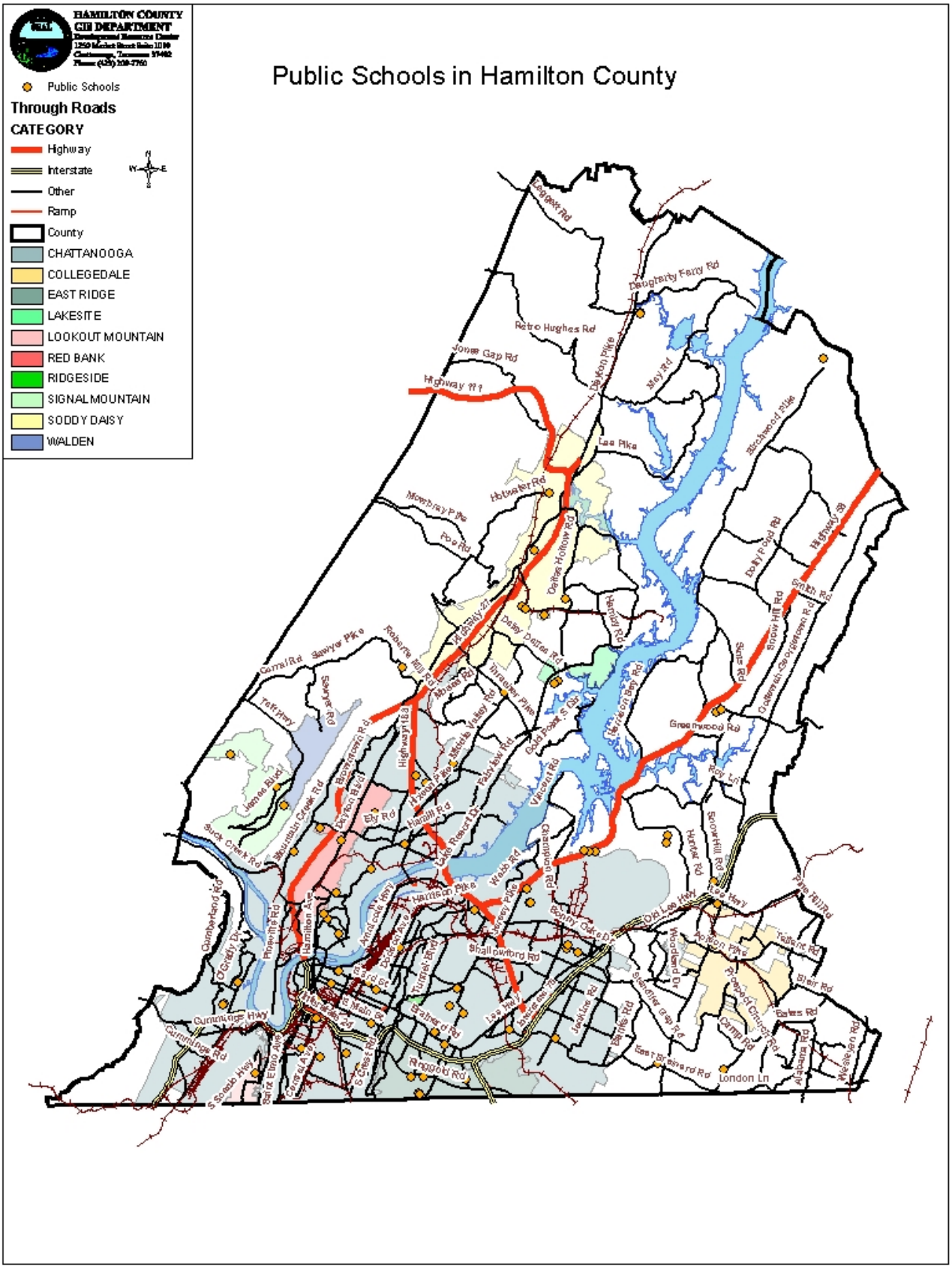
Map 6



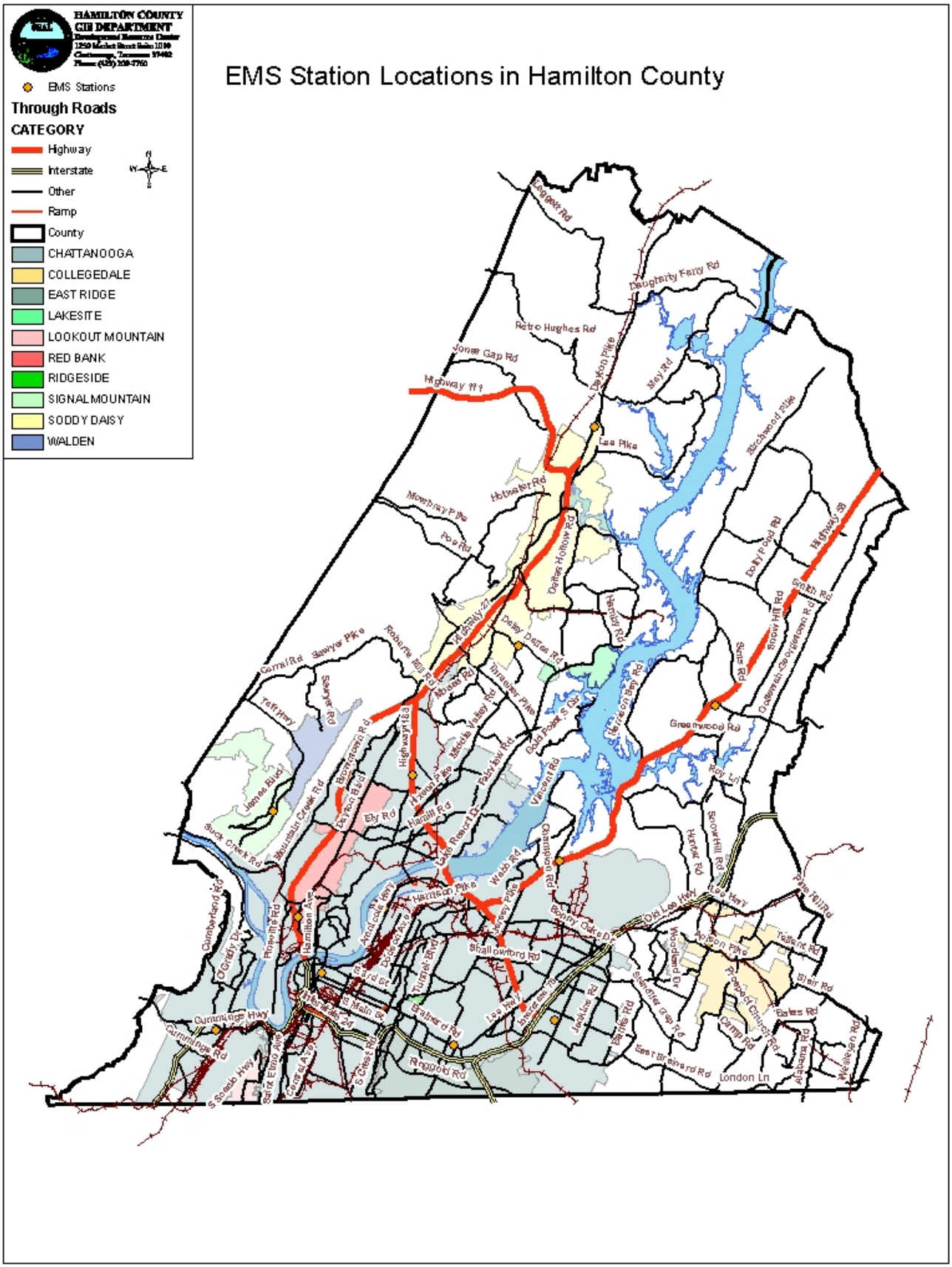
Map 7


HAMILTON COUNTY
GIS DEPARTMENT
Police Stations
Through Roads
CATEGORY
Highway
Interstate
Other
Ramp
County
CHATTANOOGA
COLLEGEDALE
EAST RIDGE
LAKESITE
LOOKOUT MOUNTAIN
RED BANK
RIDGESIDE
SIGNAL MOUNTAIN
SODDY DAISY
WALDEN
Police Station Locations in Hamilton County

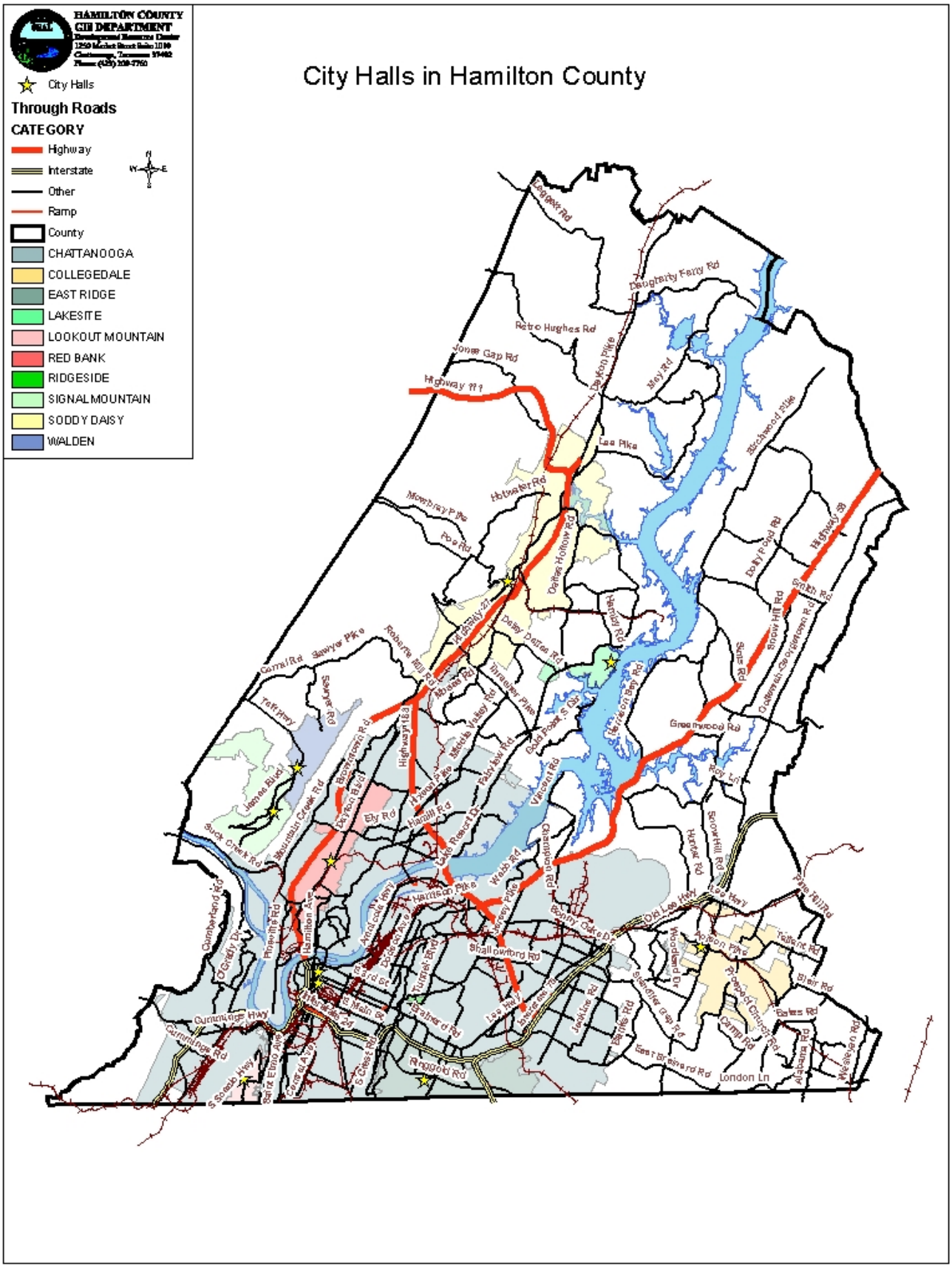
Map 8


HAMILTON COUNTY
GIS DEPARTMENT
Public Schools in Hamilton County
Public Schools
Through Roads
CATEGORY
Highway
Interstate
Other
Ramp
County
CHATTANOOGA
COLLEGEDALE
EAST RIDGE
LAKESITE
LOOKOUT MOUNTAIN
RED BANK
RIDGESIDE
SIGNAL MOUNTAIN
SODDY DAISY
WALDEN

Map 9


HAMILTON COUNTY
GIS DEPARTMENT
EMS Stations
Through Roads
CATEGORY
Highway
Interstate
Other
Ramp
County
CHATTANOOGA
COLLEGEDALE
EAST RIDGE
LAKESITE
LOOKOUT MOUNTAIN
RED BANK
RIDGESIDE
SIGNAL MOUNTAIN
SODDY DAISY
WALDEN
EMS Station Locations in Hamilton County

Map 10


HAMILTON COUNTY
GIS DEPARTMENT
City Halls
Through Roads
CATEGORY
Highway
Interstate
Other
Ramp
County
CHATTANOOGA
COLLEGEDALE
EAST RIDGE
LAKESITE
LOOKOUT MOUNTAIN
RED BANK
RIDGESIDE
SIGNAL MOUNTAIN
SODDY DAISY
WALDEN
City Halls in Hamilton County

Hazards, Vulnerability, and Risk

The evaluation of natural hazards must consider the differential probability, historic occurrence, and likely impact of each hazard by jurisdiction (table 6).

The **Probability of Occurrence** is based on available historic data as well assumptions derived from available hazards literature.

Probability of Occurrence

- ***High*:** Greater than 20 percent probability each year, or at least one chance in the next 5 years
- ***Moderate*:** Between a 5 and 10 percent probability in the next year, or at least one chance in the next 10 years
- ***Low*:** Between a 1 and 5 percent probability in the next year, or at least one chance in the next 20 to 100 years

Historic Occurrence is based on documentation of past events.

Historic Occurrence

- ***High:*** At least once every five years
- ***Moderate:*** At least once every 10 years
- ***Low:*** At least once in the last 20 to 100 years
- ***Unknown:*** Historic data was not available for evaluation

The **Likely Extent/Magnitude** of each hazard is inferred from past events or surmised from a worst-case scenario.

Likely Extent/Magnitude (one or more criteria may be met)

- ***Serious*:** Severe injuries, loss of life, significant property damage, evacuations and provision of emergency shelter.
- ***Moderate*:** Some injuries, property damage; disruption of area for more than 24 hours.
- ***Minimal*:** Minor injuries, disruption of the area for less than 24 hours, minor property damage.

Table 6				
Hazard	Jurisdiction	Probability of Occurrence	Historic Occurrence	Likely Extent/Magnitude
Flood	Unincorporated County	High (Valley) Moderate (Plateau)	High (Valley) Moderate (Plateau)	Moderate
	Collegedale	High	Moderate	Moderate
	Chattanooga	High	High	Serious
	East Ridge	High	High	Serious
	Lakesite	Low	Low	Minimal
	Lookout Mountain	Moderate	Moderate	Minimal
	Red Bank	High	High	Moderate
	Soddy-Daisy	High	High	Moderate
	Signal Mountain	Moderate	Moderate	Minimal
	Walden	Moderate	Moderate	Minimal
Severe Storms (wind, hail, lightening)	Unincorporated County	High	High	Moderate
	Collegedale	High	High	Moderate
	Chattanooga	High	High	Moderate
	East Ridge	High	High	Moderate
	Lakesite	High	High	Moderate
	Lookout Mountain	High	High	Moderate
	Red Bank	High	High	Moderate
	Soddy-Daisy	High	High	Moderate
	Signal Mountain	High	High	Moderate
	Walden	High	High	Moderate
Winter Storms	Unincorporated County	High (Plateau) Moderate (Valley)	High (Plateau) Moderate (Valley)	Moderate (Plateau) Moderate (Valley)
	Collegedale	Moderate	Moderate	Moderate
	Chattanooga	Moderate	Moderate	Moderate
	East Ridge	Moderate	Moderate	Moderate
	Lakesite	Moderate	Moderate	Moderate
	Lookout Mountain	High	High	Moderate
	Red Bank	Moderate	Moderate	Moderate
	Soddy-Daisy	Moderate	Moderate	Moderate
	Signal Mountain	High	High	Moderate
	Walden	High	High	Moderate

Hazard	Jurisdiction	Probability of Occurrence	Historic Occurrence	Likely Extent/Magnitude
Tornado	Unincorporated County	Moderate	Moderate	Serious
	Collegedale	Moderate	Moderate	Serious
	Chattanooga	Moderate	Moderate	Serious
	East Ridge	Moderate	Moderate	Serious
	Lakesite	Moderate	Low	Serious
	Lookout Mountain	Moderate	Low	Serious
	Red Bank	Moderate	Moderate	Serious
	Soddy-Daisy	Moderate	Low	Serious
	Signal Mountain	Moderate	Low	Serious
	Walden	Moderate	Low	Serious
Wildfire/Drought	Unincorporated County	Moderate	Moderate	Serious
	Collegedale	Moderate	Low	Moderate
	Chattanooga	Moderate	Low	Moderate
	East Ridge	Moderate	Low	Moderate
	Lakesite	Moderate	Low	Moderate
	Lookout Mountain	Moderate	Moderate	Serious
	Red Bank	Moderate	Low	Moderate
	Soddy-Daisy	Moderate	Low	Serious
	Signal Mountain	Moderate	Low	Serious
	Walden	Moderate	Low	Serious
Erosion (Streambank)	Unincorporated County	High	High	Serious
	Collegedale	High	Moderate	Minimal
	Chattanooga	Low	Low	Minimal
	East Ridge	High	High	Moderate
	Lakesite	Low	Low	Minimal
	Lookout Mountain	Low	Low	Minimal
	Red Bank	Moderate	Moderate	Moderate
	Soddy-Daisy	High	High	Serious
	Signal Mountain	Low	Low	Minimal
	Walden	Low	Low	Minimal

Hazard	Jurisdiction	Probability of Occurrence	Historic Occurrence	Likely Extent/Magnitude
Earthquake	Unincorporated County	Low	Low	Serious
	Collegedale	Low	Low	Serious
	Chattanooga	Low	Low	Serious
	East Ridge	Low	Low	Serious
	Lakesite	Low	Low	Serious
	Lookout Mountain	Low	Low	Serious
	Red Bank	Low	Low	Serious
	Soddy-Daisy	Low	Low	Serious
	Signal Mountain	Low	Low	Serious
	Walden	Low	Low	Serious
Landslide	Unincorporated County	Moderate	Unknown	Moderate
	Collegedale	Moderate	Unknown	Moderate
	Chattanooga	Moderate	Low	Moderate
	East Ridge	Moderate	Unknown	Moderate
	Lakesite	Low	Unknown	Minimal
	Lookout Mountain	Moderate	Unknown	Moderate
	Red Bank	Moderate	Unknown	Moderate
	Soddy-Daisy	Moderate	Unknown	Moderate
	Signal Mountain	Moderate	Low	Moderate
	Walden	Moderate	Unknown	Moderate
Fog	Unincorporated County	High	High	Minimal (Valley) Moderate (Plateau)
	Collegedale	High	High	Minimal
	Chattanooga	High	High	Minimal
	East Ridge	High	High	Minimal
	Lakesite	High	High	Moderate
	Lookout Mountain	High	High	Moderate
	Red Bank	High	High	Minimal
	Soddy-Daisy	High	High	Minimal
	Signal Mountain	High	High	Moderate
	Walden	High	High	Moderate

Flood

Panoramic view of Chattanooga during the flood of 1917. Source: Hamilton County Public Library, Paul *A. Hiener Collection*

A flood is a natural event for rivers and streams. Excess water from snowmelt and rainfall accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers and lakes that are subject to recurring floods (Map 5). Flooding is the most common and costly hazard in Hamilton County, and thousands of households are located within floodplains. Floods can occur at any time of the year, and at any time of day or night. Most injuries and deaths occur when people are swept away by flood currents, often when attempting to traverse floodwaters in a vehicle. Most property damage results from inundation by sediment-filled water, or by debris in floodwaters that acts as "battering rams."

Floods generally fall into two categories: *flash floods*, the product of heavy localized precipitation in a short period over a given location, or caused by a dam break or levee failure; and *general floods*, which can occur in riverine and urban settings.

Flash Flooding: Flash floods occur within a few minutes or hours of heavy amounts of rainfall or from a dam or levee failure. In Hamilton County, most flash flooding is caused by slow-moving thunderstorms or repeated thunderstorms in a local area. Areas subject to rapid floodwater inundation pose special threats to life and property because there is insufficient time for warning, evacuation, emergency floodproofing, or other protective measures. Flash floods can destroy buildings and bridges, uproot trees, and scour out new drainage channels. Heavy rains that produce flash floods can also trigger mudslides. Suddenness is a serious problem in the following areas:

- Steep rivers and streams in mountainous or hilly areas subject to sudden rainfall and rapid runoff;
- Areas with steep slopes and little or no vegetative ground cover;
- Areas behind dams or levees subject to failure or overtopping;
- Urban areas where much of the ground is covered by impervious surfaces, or where fixed drainage channels may be unable to contain the runoff that is generated by intense rainfall events.

Riverine Flooding: Riverine flooding occurs when stream flow exceeds the capacity of the normal watercourse, and is a function of precipitation levels and water runoff volumes within the watershed of the stream or river. The severity of a flooding event is determined by a combination of river basin physiography, local thunderstorm movement, past soil moisture conditions, and the degree of vegetative clearing. Abnormal weather patterns may also contribute to flooding of a local area.

Urban Flooding: Urban flooding occurs where there has been development within stream floodplains. Floodplains are often considered attractive for development since they provide flat areas for building. The price of this accessibility and convenience has been increased flooding of the ensuing urban areas. Urbanization increases the magnitude and frequency of floods by increasing impermeable surfaces, increasing the speed of drainage collection, reducing the carrying capacity of the land, and occasionally, overwhelming sanitary sewer systems.

***High Risk Factors*:**
The following conditions may exacerbate the effects of floods: impermeable surfaces, steeply sloped watersheds, constrictions, obstructions, debris, contamination, soil saturation, and velocity.

Impermeable surfaces: Excessive amounts of paved areas or other surfaces upstream or in the community can increase the amount and rate of water runoff. Development affects the runoff of stormwater when buildings and parking lots replace the natural vegetation, which normally would absorb water. When rain falls in an undeveloped area, as much as 90 percent of it will infiltrate the ground; in a highly developed area, as much as 90 percent of rainfall will run off.

Steeply sloped watersheds: In hilly and mountainous areas, a flood may occur minutes after a heavy rain. These flash floods allow little or no warning time, and are characterized by high velocities.

Constrictions: Re-grading or filling within or on the edge of floodplains obstructs flood flows, backing up floodwaters onto upstream and adjacent properties. It also reduces the floodplain's ability to store excess water, sending more water downstream and causing floods to rise to higher levels. This also increases floodwater's velocity downstream of the constriction.

Obstructions: Bridges, culverts and other obstructions can block flood flow and trap debris, causing increased flooding upstream and increased velocity downstream.

Debris: Debris from the watershed, such as trees, rocks, and parts of damaged buildings, increases the hazard posed by moving water. Moving water will float, drag or roll objects, which then act as battering rams that can knock holes in walls and further exacerbate the effects of debris.
Contamination: Few floods have clear floodwater, and the water will pick up whatever was on the ground within the floodplain, such as soil, road oil, farm and lawn chemicals, and animal waste. In addition, if a wastewater treatment plant was inundated, the floodwaters will likely include untreated sewage. Contamination is also caused by the presence of hazardous

material storage in the floodplain and in the community, as well as upstream from the community.

Soil saturation: Rainfall in areas already saturated with water will increase the runoff.

Velocity: Flood velocity is the speed of moving water, measured in feet per second. Velocity is determined by slope, waves, and several other factors. The damage potential of flood waters increases dramatically, sometimes exponentially, with velocity. High velocities (greater than 5 feet per second) can erode stream banks, lift buildings off their foundations, and scour away soils around bridge supports and buildings.

Significant Events

Major flood events in 1973 and 2003 affected floodplain properties along the Tennessee River, all creeks, and unnamed tributaries.
Flash flooding in 1996 and 2001 occurred along Gadd Road from the base of the ridge to North Chickamauga Creek. The Forest Plaza area from Ely and Delashmitt Roads to Hixson Pike was also affected.

<u>March 20 1973</u>
700 homes, 200 business and 12 factories were damaged by Tennessee River floodwaters.

Entrance to Brainerd Village shopping center (5786 Brainerd Road) during 1973 flood. Source: Daniel, Michael L.

<u>October 5 1995</u>
Rains from the remnants of Hurricane Opal caused widespread flooding countywide. A circus was left stranded at a campground and had to be evacuated. A number of residences

and businesses were also surrounded by water and occupants had to be evacuated. There was significant flooding of the Lookout Valley/Tiftonia section of Chattanooga.

August 11 1996
Heavy rain fell within a few hours on ground already saturated from previous rains. Seventy-six homes, twenty-six businesses, four public buildings, and three churches were heavily damaged in Red Bank and Hixson. Many people were evacuated to emergency shelters. Numerous streets were flooded stranding cars and motorists.

May 6 2003
Record flooding on the South Chickamauga Creek, near record flooding on the Tennessee River, wide spread flooding, road closures, damage, and evacuations.

May 2003 View of Lee Highway looking northeast near South Chickamauga Creek and Lovell Field.

September 16-18 2004
Remnants of Hurricane Ivan moved through the area bringing heavy rain and high winds. High winds caused downed trees and limbs that led to widespread power outages. The Electric Power Board (EPB) reported approximately $900,000 in damage to power lines and public utilities in the Tennessee Valley.

There was minor and moderate flooding throughout the county. In Soddy-Daisy, a 50-foot section of Back Valley road was washed out by overflow from Possum Creek. Hamilton County road officials estimated around $500,000 in damage to area roads and bridges. The

South Chickamauga reached a maximum stage of 25.1 feet, 7.1 feet above flood stage, causing evacuations and road closures in some of the low-lying areas around Spring Creek in East Ridge. There was extensive flooding of the north end of the airport. Several area creeks sustained major bank erosion that threatened homes and roadways.

September 17, 2004, Rossville Boulevard: Photograph by Blaine Headrick

Flood events for Hamilton County from 1990 to 2003, including estimated property damage, are presented in Table 7. From 1990 to 2003, Hamilton County experienced 28 flood events causing approximately 94.3 million dollars in property damage. This equals a yearly average of approximately 7.3 million dollars in property damage.

Data obtained from the National Climatic Data Center does not document flood events prior to 1993. A list of flood events dating to 1950 was assembled by surveying local sources, and reviewing past newspaper articles and TVA reports. This list is included in the Appendix.

Table 7

Hamilton County Flood Events 1990 to 2003					
Location or County	Date	Type	Death	Injury	Property Damage
East Ridge	6/12/1990	Flood	0	0	$1,000,000.00
Countywide	3/23/1993	Flash Flood	0	0	$5,000.00
Chattanooga /East Ridge	3/27/1994	Flash Flood	0	0	$50,000,000.00
Chattanooga /East Ridge	4/15/1994	Flash Flood	0	0	$5,000.00
Chattanooga /East Ridge	6/26/1994	Flash Flood	0	0	$5,000.00
East Ridge	2/16/1995	Flooding	0	0	$1,000.00
Countywide	10/5/1995	Flood	0	0	$20,000.00
Chattanooga	3/6/1996	Flash Flood	0	0	$15,000.00
Red Bank	8/11/1996	Flash Flood	0	0	$2,000,000.00
Chattanooga	6/21/1997	Flash Flood	0	0	NA
Countywide	10/26/1997	Flash Flood	0	0	NA
Countywide	1/7/1998	Flood	0	0	NA
East Ridge	2/3/1998	Flash Flood	0	0	NA
East Ridge	1/23/1999	Flash Flood	0	0	NA
Chattanooga	6/30/1999	Flood	0	0	NA
Hixson	6/30/1999	Flood	0	0	NA
Red Bank	7/2/1999	Flood	0	0	NA
Hixon	7/2/1999	Flood	0	0	NA
Red Bank	4/3/2000	Flood	0	0	NA
Hixson	4/3/2000	Flood	0	0	NA
East Ridge	4/3/2000	Flood	0	0	NA
Chattanooga	7/28/2001	Flash Flood	0	0	NA
Chattanooga	6/4/2002	Flash Flood	0	0	NA
Region/Countywide	2/14/2003	Flood	0	0	$18,100,000.00
Countywide	2/16/2003	Flash Flood	0	0	NA
Countywide	2/21/2003	Flood	0	0	NA
Countywide	5/6/2003	Flood	0	0	NA
Countywide	5/8/2003	Flood	0	0	$23,200,000.00
1990 to 2003 Total documented property damage					$94,351,000.00
1990 to 2003 yearly average property damage					$7,257,769.23
Source: National Climatic Data Center					

Mitigation efforts

Hamilton County and all local jurisdictions with the exceptions of Walden, and Ridgeside are participants in the National Flood Insurance Program (NFIP).

The following section documents specific actions undertaken by local governments.

East Ridge:

1. The City requested the Corps of Engineers undertake Planning, Engineering, and Design of flood control measures along Spring Creek. The locally preferred plan was "residential nonstructural" corrective measures which would include raising structures in place or removing them completely from hazard areas. There was a 25 percent local cost-sharing requirement.

2. The City also was involved with an acquisition project to purchase land and 13 repetitive loss structures from the current owners and clear the land to be held as open space at a cost of approximately $800,000.

Chattanooga:

1. Flood Control Gate – Spring Creek and N. Terrace Road
2. North Terrace Pump Station and detention pond– 314 S. Howell Avenue at N. Terrace Road
3. Earl Lane Pump Station and underground storage – 808 Lower Mill Road in the unopened ROW of Marsh Road
4. Valleybrook Pump Station and levee – 113 Valleybrook Circle
5. Brainerd Levee – Along S. Chickamauga Creek from N. Moore Road to I-75.
6. McCutcheon Road Detention Pond – 2444 Hickory Valley Road
7. Lookout Valley Detention Pond – 301 Labeling Way
8. Implementation of Routine Maintenance Practices to keep the drainage system open and flowing.
9. Require new and re-development projects to install detention measures to prevent increases in stormwater runoff from the site.
10. Buy out of repetitive loss properties along Aster Avenue.
11. Basin modeling and creation of new flood mapping techniques.
12. Joined CRS and CTP programs
13. Adopted stormwater and floodplain ordinances
14. Installed rain gauges and flow meters at key locations in the drainage system.
15. Capital planning program
16. Dual power sources for the Moccasin Bend Waste Water Treatment Plant
17. Moccasin Bend Waste Water Treatment Plant and system wide pump station infrastructure built above 100-year flood elevation.
18. All Plant, pump station controls, and CSO facilities controls now located above 100-year flood elevation.

Collegedale

1. The city works to maintain drainage capacity of Wolftever Creek by periodic inspection and removal of debris.

Development Trends

Population projections and subdivision trends indicate that growth will occur primarily in unincorporated portions of the county, downtown Chattanooga, the area around the University of Tennessee at Chattanooga, and in Soddy-Daisy. New development has the potential to alter drainage characteristics of watersheds (Map 12) possibly increasing the frequency and magnitude of flood events. Floodplain ordinances regulate but do not prohibit development within the 100-year floodplains.

Vulnerability

Hamilton County has 107 repetitive loss structures, according to FEMA Region IV records (Map 13). Repetitive loss structure is a term associated with the National Flood Insurance Program (NFIP). Chattanooga and East Ridge have the largest number of repetitive loss structures and associated payments (Table 8). For Flood Mitigation Assistance (FMA) program purposes, a repetitive loss structure is one that is covered by a flood insurance contract under the NFIP, that has suffered flood damage on two or more occasions over a 10-year period, ending on the date when a second claim is made, in which the cost to repair the flood damage, on average, equals or exceeds 25% of the market-value of the structure at the time of each flood loss event. For the Community Rating System (CRS) of the NFIP, a repetitive loss property is any property, which the NFIP has paid two or more flood claims of $1,000 or more, in any given 10-year period since 1978. A repetitive loss structure is important to the NFIP, since structures that flood frequently put a strain on the flood insurance fund. It should also be important to a community because of the disruption and threat to residents' lives by the continual flooding.

Table 8

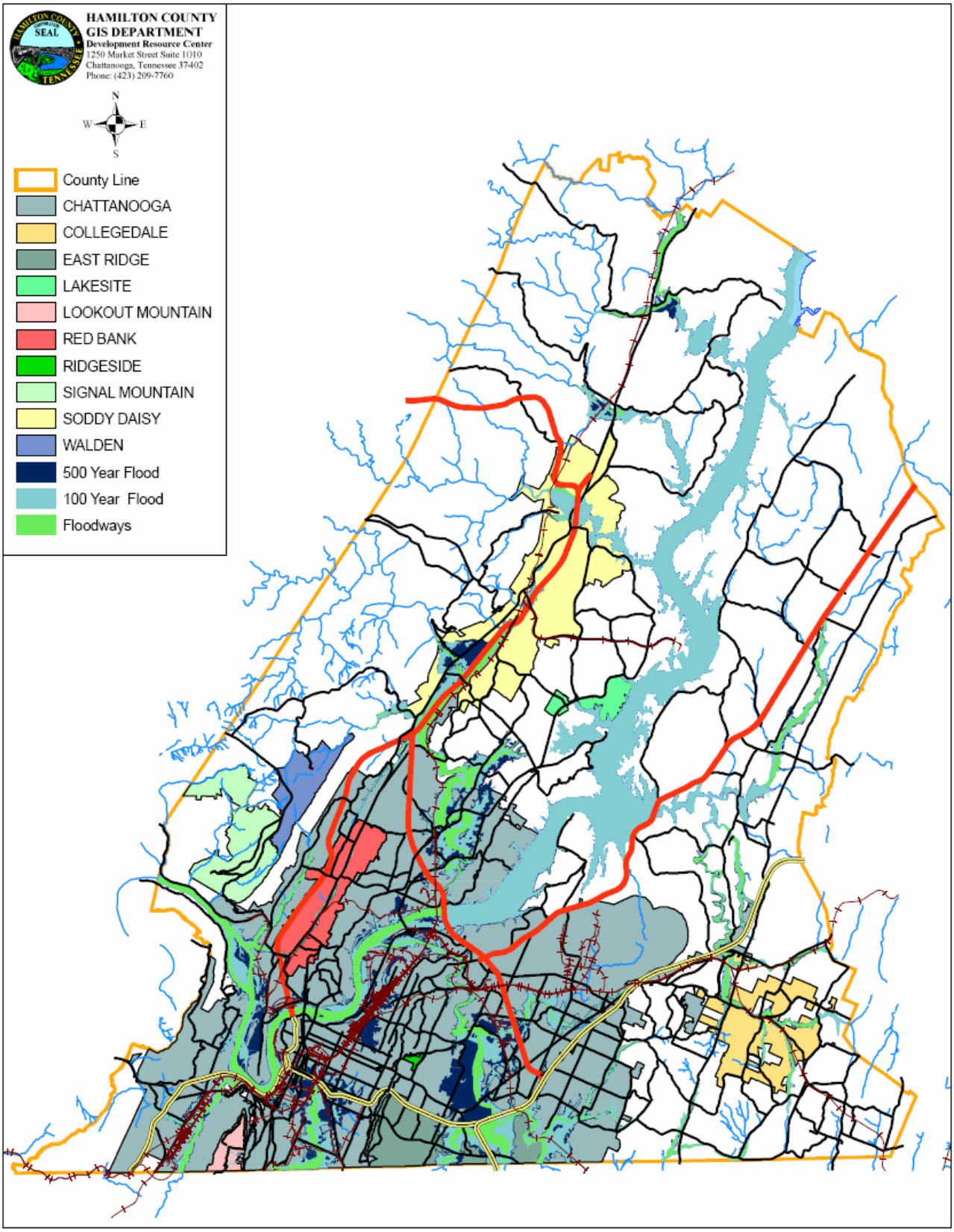
Repetitive Loss Properties			
Area	# Structures	Amount Paid	Average Claim
Chattanooga	55	$1,971,509	$13,571
East Ridge	34	$1,042,192	$10,872
Unincorporated	12	$316,865	$11,774
Red Bank	4	$129,581	$16,198
Soddy-Daisy	2	$28,989	$4,831
Total	107	$3,489,135	
Source: FEMA Region IV			

Table 9 illustrates the number and appraised value of buildings within the 100-year floodplains of Hamilton County. This provides a general estimate of total exposure to flood hazards. Without building elevation data, it is difficult to estimate losses. The CHCRPA is currently working to acquire a database of building elevation from the TVA. Building elevation data will allow the development of predictive flood models to estimate property damage from various flood event scenarios. Past events currently provide the best estimate of damage and losses that may occur as the result of future flood events. A major event such as the May 2003 floods could be expected to cause upwards of twenty million dollars in direct losses.

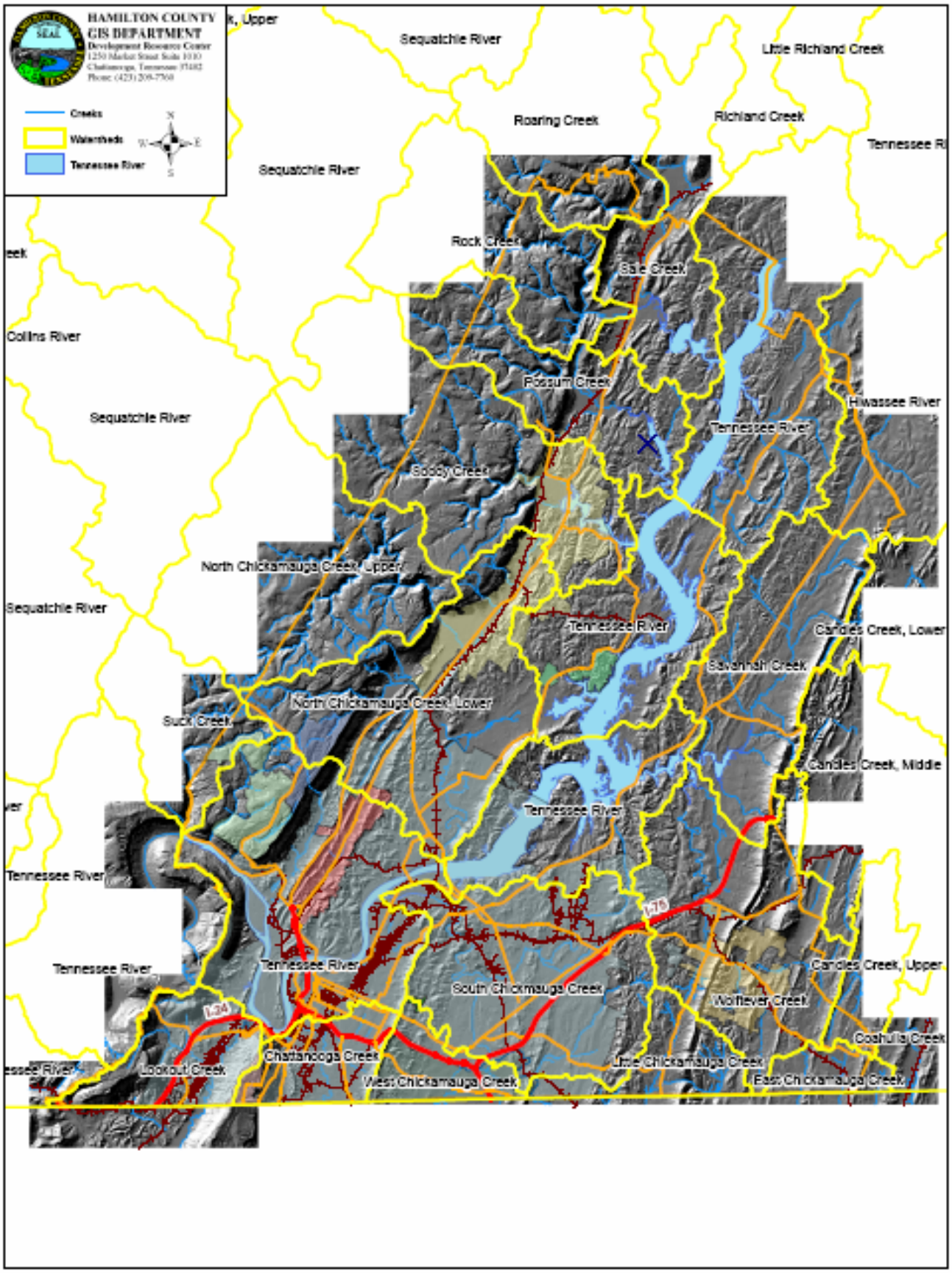
Table 9

Structures in the 100 Year Floodplain			
Area	# Buildings	Building Value	Housing Units
Chattanooga	4,866	$1,415,155,170	4,163
East Ridge	1,655	$289,774,020	1,589
Unincorporated	1,238	$131,190,500	963
Soddy Daisy	1,461	$102,420,000	1,245
Collegedale	80	$102,259,400	16
Red Bank	687	$60,886,900	530
Lakesite	29	$7,456,300	16
Lookout Mountain	10	$2,628,100	6

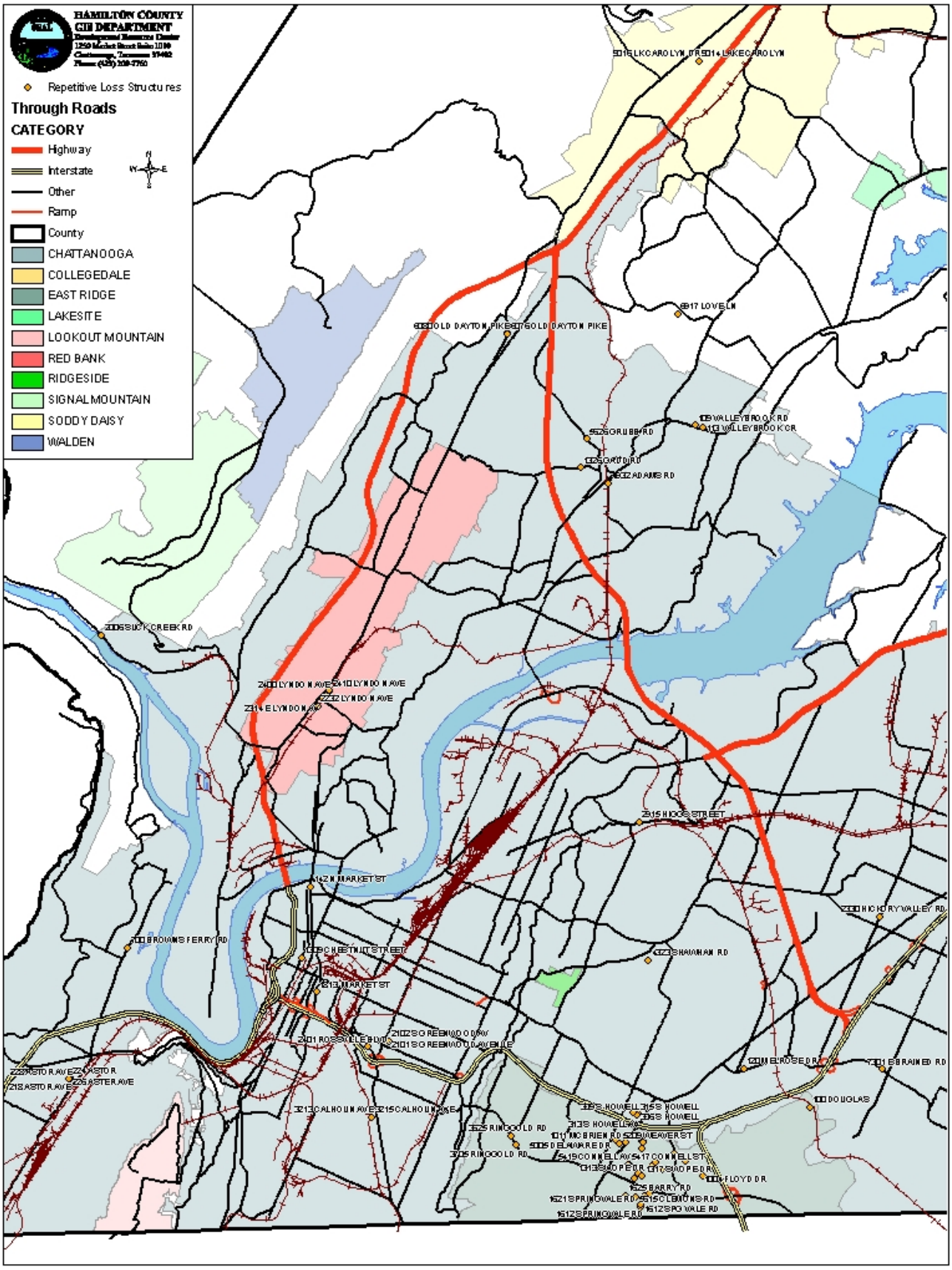
Map 11


HAMILTON COUNTY
GIS DEPARTMENT
Development Resource Center
1250 Market Street Suite 1010
Chattanooga, Tennessee 37402
Phone: (423) 209-7760
N
W
E
S
County Line
CHATTANOOGA
COLLEGEDALE
EAST RIDGE
LAKESITE
LOOKOUT MOUNTAIN
RED BANK
RIDGESIDE
SIGNAL MOUNTAIN
SODDY DAISY
WALDEN
500 Year Flood
100 Year Flood
Floodways

Map 12


HAMILTON COUNTY
GIS DEPARTMENT
Development Resource Center
Creeks
Watersheds
Tennessee River
Sequatchie River
Little Richland Creek
Roaring Creek
Richland Creek
Rock Creek
Sale Creek
Collins River
Possum Creek
Hiwassee River
Tennessee River
Soddy Creek
North Chickamauga Creek, Upper
Tennessee River
Candies Creek, Lower
Savannah Creek
North Chickamauga Creek, Lower
Suck Creek
Candies Creek, Middle
Tennessee River
Tennessee River
Tennessee River
Tennessee River
Candies Creek, Upper
South Chickamauga Creek
Wolftever Creek
Coahulla Creek
Chattanooga Creek
Lookout Creek
Little Chickamauga Creek
West Chickamauga Creek
East Chickamauga Creek

Map 13


HAMILTON COUNTY
GIS DEPARTMENT
Repetitive Loss Structures
Through Roads
CATEGORY
Highway
Interstate
Other
Ramp
County
CHATTANOOGA
COLLEGEDALE
EAST RIDGE
LAKESITE
LOOKOUT MOUNTAIN
RED BANK
RIDGESIDE
SIGNAL MOUNTAIN
SODDY DAISY
WALDEN

Severe Storms/Thunderstorms

Thunderstorms are the result of convection in the atmosphere. They are typically the by-product of atmospheric instability, which promotes the vigorous rising of air parcels that form cumulus and, eventually, the cumulonimbus (thunderstorm) cloud.

These storms can become severe, producing strong winds, frequent lightning, hail, downbursts, and even tornadoes. A typical thunderstorm may be three miles wide at its base, rise to between 40,000 to 60,000 feet in the troposphere, and contain half a million tons of condensed water. Conglomerations of thunderstorms along cold fronts (with squall lines) can extend for hundreds of miles.

According to the National Weather service, a severe thunderstorm is one that produces tornadoes, hail 0.75 inches or more in diameter, or winds of 50 knots (58 mph) or more. Structural wind damage may imply the occurrence of a severe thunderstorm. Hail, formed by the accretion of supercooled liquid water on ice particles in a thunderstorm updraft, can pose a serious threat to agriculture and exposed objects. Likewise, strong winds can potentially wreak havoc on fragile or flimsy structures, or yield secondary damage through the downing of trees. Lightning associated with thunderstorms poses a threat to people and animals in unsheltered areas. The tornado, however, is by far the greatest natural hazard threat associated with severe thunderstorms.

Thunderstorms and related hail, lightning, and high winds are the most frequent natural hazard to affect Hamilton County. Since 1950, The NCDC has documented 294 significant thunderstorm related weather events causing an average of $97,440 in annual property damage.

Significant Events

September 1 1995

A thunderstorm downburst caused a marina to collapse and sink or damage 20-25 boats. This storm also knocked down several trees and electrical lines. One tree fell on a residence.

July 4 1997

Two-inch hail was reported between Chattanooga and Collegedale. One-inch hail was reported in East Brainerd. Trees were down countywide and approximately 50,000 residents were without power after the storm.

June 10 1999

Lightning ignited a 3-Alarm fire, destroying the 50-year old East Ridge Presbyterian Church

Mitigation efforts

- There is countywide tree trimming in utility right of ways.
- Hamilton County Office of Emergency Services has the capability to monitor weather systems, as well as the potential intensity of the storms, via NWS and other electronic means.
- The National Weather Service issues watches and warnings to the public and government agencies.

Development Trends
Severe storms are a non-site specific hazard; therefore, current development trends have no effect. However, population growth and new development increase the number of persons and property that could be impacted by storm events.

Vulnerability
Thunderstorms are a random occurrence. Historic events documented by the National Climatic Data Center (NCDC) were examined to determine past damages. Since 1950, The NCDC has documented 294 significant thunderstorm related weather events causing an average of $97,440 in annual property damage.

Data provided by the National Weather Service office in Morristown, TN indicates the probability that Hamilton County will experience approximately four major thunderstorm events each year with damaging winds and/or hail.

Winter Storms
Hamilton County is vulnerable to ice storms, snowstorms, and extremely cold weather. The most common effects of winter storms are power failure and traffic accidents. In 1993, Tennessee experienced a winter storm killing 18 people and causing $22 million in damage. The Hamilton County area experienced serious damage to the power grid causing many residents to be without power for up to three weeks. Ice storms in 1994 and 1995 caused power outages in mountainous areas and left many residents isolated for up to ten days. Lookout Mountain, Signal Mountain, and Walden experience some difficulty with winter storms every year. Icing of roadways limits access to residences and services. Power and communication outages and debris caused by fallen trees and limbs are common occurrences.

March 3, 1960 Ice storm on Walden's Ridge, Signal Mountain, Tennessee. Paul A. Hiener Collection

Mitigation efforts
All local jurisdictions stockpile sand and salt for use in winter storm events. There is also countywide tree trimming in utility right of ways to reduce the potential for damage to utilities.

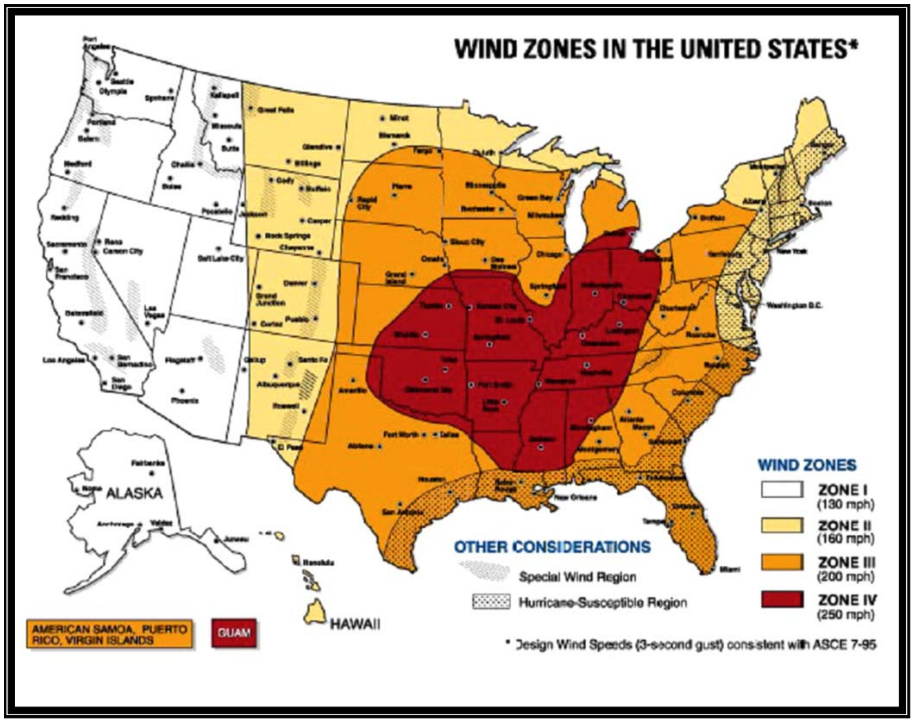
Development Trends
Winter storms are a non site-specific hazard; therefore, current development trends have no effect. However, population growth and new development increase the number of persons and property that could be impacted by storm events.

Vulnerability
Winter storms are a random event that can affect any or all parts of the County. However, Lookout Mountain, Signal Mountain, Walden, and unincorporated areas located in mountain areas are at increased risk.

Analysis of data provided by the Morristown, TN. National Weather Service office indicates the probability that Hamilton County will experience two major winter storms each year.

Tornadoes
A tornado is a violently rotating column of air extending to the ground. The following wind map of the United States shows that Hamilton County is in Zone IV, with potential wind speeds of 250 mph or more. Damage paths can be in excess of 1 mile wide and 50 miles long. Tornadoes are among the most unpredictable of weather phenomena. Tornado season runs ordinarily from March through August; however, tornadoes can strike at any time of the year if the essential conditions are present.

Map 14



Cause of Tornadoes:

Thunderstorms and hurricanes spawn tornadoes when cold air overrides a layer of warm air, causing the warm air to rise rapidly. The winds produced from wildfires have also been known to produce tornadoes. The nature of tornadoes is that they strike at random. Predicting exactly what parts of Hamilton County have a greater chance of being struck by a tornado is difficult if not impossible.

Analysis of historical events documented by the National Weather Service in Morristown, TN. indicates an 18 percent yearly probability for a tornado event in Hamilton County.

The Fujita Tornado Scale (or the "F Scale") is the definitive scale for estimating wind speeds within tornadoes based upon the damage done to buildings and structures. It is used extensively by the National Weather Service in investigating tornadoes (all tornadoes are now assigned an F scale), and by engineers in correlating damage to building structures and techniques with different wind speeds caused by tornadoes

The Fujita Wind Damage Scale

Classification	Wind Speed (MPH)	Damage
F0	72	LIGHT
F1	73-112	MODERATE
F2	113-157	CONSIDERABLE
F3	158-206	SEVERE
F4	207-260	DEVASTATING
F5	260-319	INCREDIBLE

Tornadoes are classified by wind speed and damage according to the Fujita Scale

Table 10 summarizes tornadoes that have occurred in Hamilton County since 1950.

Table10

Hamilton County TN Tornadoes since 1950

Date	Time (EST)	Dead	Injured	Path Length (miles)	Rating	Damage	Location
3-Apr-74	3:50 PM	0	2	5.9	F1	$25,000.00	near New Point
12-Aug-77	7:30 PM	0	0	0.1	F0	$25,000.00	Chattanooga
24-Jun-80	4:20 PM	0	0	?	F0	$25,000.00	East Brainerd
4-Oct-90	8:15 AM	0	0	1.8	F1	$250,000.00	Chattanooga
15-Apr-94	11:30 AM	1	2	2	F3	NA	Birchwood
21-Apr-95	1:20 AM	0	0	0.1	F0	NA	Red Bank
21-Apr-95	1:25 AM	0	0	5	F2	NA	Chattanooga to Hixson
21-Apr-95	1:30 AM	0	0	1	F1	$ 100,000.00	Chattanooga
29-Mar-97	1:10 AM	0	44	8	F3	$45,000,000.00	Chattanooga
Total			48			$45,425,000.00	
				Yearly Average		$841,203.70	

Source: National Weather Service Forecast Office, Morristown TN

Significant Events

April 21 1995
A tornado touched down over parts of suburban Chattanooga. The tornado caused most of its damage in a 16-block area. Overall 80 buildings were damaged. Of the 80 buildings damaged, 50 of them were homes and 30 of the buildings were businesses. Several apartments suffered roof damage and 43 persons were evacuated.

February 29 1997
An F3 tornado first touched down in the Tiftonia area just west of downtown Chattanooga. As the tornado moved due east across the southern part of Hamilton county, 50 homes were completely destroyed. Another 600 homes and 1 business were heavily damaged. Forty-four people were injured and property damage was estimated at 45 million dollars. Most of the damage area was concentrated in the East Brainerd area. Approximately 200,000 homes were without power after the storm.

Mitigation efforts

- Hamilton County Office of Emergency Services has the capability to monitor weather systems, as well as the potential intensity of the storms, via NWS and other electronic means.
- The National Weather Service issues watches and warnings to the public and government agencies.

Development Trends
Tornadoes are a non site-specific hazard; therefore, current development trends have no effect. However, population growth and new development increase the number of persons and property that could be impacted by a tornado.

Vulnerability
Since tornadoes are a random event, vulnerability was assessed by review of past tornadoes and the impact in relation to appraised property value. Assuming that an F3 tornado similar to the February 1997 tornado occurred in 2004, total loss of .295 percent of the appraised property value in Hamilton County would equal approximately 52.3 million dollars.

Drought/Wildfire

Both urban and rural areas of Hamilton County are vulnerable to drought or prolonged periods without rainfall. Drought affects agriculture, urban water supply, and causes dry conditions in forested areas, which increases the risk of wildfires. The entire state of Tennessee, including Hamilton County, has the potential for a significant drought every 15 years.

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed and spread quickly and are usually signaled by dense smoke that fills the air for miles around. Naturally occurring and non-native species of grasses, brush, and trees fuel wildfires. On average, local fire departments

respond to five wildfires a month during the summer months. The fires are normally contained within a four-hour period.

A wildland fire is a wildfire in an area in which development is essentially nonexistent, except for roads, railroads, power lines, and similar facilities.

An Urban-Wildland Interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

Causes of Wildfires
People start more than four out of every five wildfires, usually as debris burns, arson, or carelessness. Lightning strikes are the next leading cause of wildfires.

Factors Affecting Wildfire Behavior
Wildfire behavior is based on three primary factors: fuel, topography, and weather.

Fuel: The type and amount of fuel, as well as its burning qualities and level of moisture affect wildfire potential and behavior. The continuity of fuels, expressed in both horizontal and vertical components is also a factor, in that it expresses the pattern of vegetative growth and open areas.

Topography (slope) is important because it affects the movement of air (and thus the fire) over the ground surface. The slope and shape of terrain can change the rate of speed at which the fire travels. In general terms, the steeper the slope of the land, the faster a fire can spread up the slope.

Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity, and wind (both short and long term) affect the severity and duration of wildfires.

Significant Events
During the drought of 1987, wildfires destroyed over 10,000 acres in Hamilton County. Drought conditions caused the Chattanooga Tennessee American Water Company to set up a number of public water distribution points.

Mitigation efforts
As a result of the drought of 1987, local drought preparedness procedures and plans were developed. Water utility provider inter-connect agreements developed by local governments provide a means of supplying potable water to utility districts that exhaust their supply. Signal Mountain has an “Emergency Plan for Water System,” which includes a *water shortage ordinance* with procedures for drought or interruption of water distribution.

Current Development Trends
Development in rural areas is increasing the urban/wildland interface. Population projections indicate substantial growth will occur in the unincorporated portions of Hamilton County, possibly increasing the urban/wildland interface. Economic development and population growth will also increase the demand for water, increasing the impact of drought conditions.

Vulnerability
The entire county may be affected by a serious drought. Lookout Mountain, Signal Mountain, and Walden are located in areas where steep forested slopes are vulnerable to the risk of wildfire.

Landslides and Erosion

Common throughout the mountainous Appalachian region, landslides are described as downward movement of a slope and materials under the force of gravity. The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Landslides are influenced by human activity (mining and construction of buildings, railroads, and highways), and natural factors (geology, precipitation, and topography).

Causes of Landslides:
Landslides occur when masses of rock, earth, or debris move down a slope. Therefore, gravity acting on an overly steep slope is the primary cause of a landslide. They are activated by storms, fires, and by human modifications to the land. New landslides occur as a result of rainstorms, earthquakes, and various human activities such as clear-cutting.

Predicting Landslides:
The best predictor of future landslides is past landslides because they tend to occur in the same places. Existing or old landslides may be found in the following areas:

• On or at the base of slopes
• In or at the base of minor drainage hollows
• At the base or top of an old fill slope
• At the base or top of a steep cut slope
• Developed hillsides where leach field septic systems are used

High Risk Factors:
The following conditions may exacerbate the effects of landslides:

• Erosion: Erosion caused by rivers create overly steep slopes.

• Unstable Slopes: Rock and soil slopes are weakened through saturation by snowmelt or heavy rains.

• Earthquakes: The shaking from earthquakes creates stress that makes weak slopes fail.

• Vibrations: Machinery, traffic, blasting, and even thunder may cause vibrations that trigger failure of weak slopes.

• Increase of Load: Weight of rain/snow, fills, vegetation, stockpiling of rock or ore from waste piles, or from man-made structures may cause weak slopes to fail.

• Hydrologic Factors: Rain, high water tables, little or no ground cover, numerous freeze/thaw cycles may cause weak slopes to fail.

• Human Activity: These include development activities such as cutting and filling along roads and removal of forest vegetation. Such activities are capable of greatly altering slope form and ground water conditions, which can cause weak slopes to fail.

• Removal of Lateral and Underlying Support: Erosion, previous slides, road cuts and quarries can trigger failure of weak slopes.

• Increase of Lateral Pressures: Hydraulic pressures, tree roots, crystallization, swelling of clay soil may cause weak slopes to fail.

• Regional Tilting: Geologic movements can trigger weak slopes to fail.

Streambank Erosion

All natural stream channels shift the location of their channels to some degree over time. In a channel migration hazard area, a stream is likely to move laterally which can result in property being damaged or destroyed. A house may be on a high bank above the 100-year flood elevation, yet it can still be endangered when the river erodes the ground and undercuts the bank beneath the house.

Streambank erosion has been identified as a serious problem on North Chickamauga Creek, Falling Water Creek, Rock Creek, and Big Soddy Creek. These creeks are located on highly erodible alluvial deposits consisting of a mixture of silt, sand, gravel, and cobble (a rock fragment between 64 and 256 millimeters in diameter, especially one that has been naturally rounded).

North Chickamauga Creek serves as the most striking example of the problem. The area near the Dayton Pike Bridge has been especially problematic. The U.S. Army Corps of Engineers (USACE) has documented, through analysis of aerial photography, the extent, and progress of erosion occurring above and below the bridge since 1953 (Table 11). The USACE study (1998) documented the following structures and areas at risk: the Dayton Pike bridge abutment and approach, two TVA transmission towers, the Soddy-Daisy Industrial Park, and several homes in the Willow Creek subdivision. Since this study was conducted, two homes in the Willow Creek subdivision have been abandoned due to undermining and the threat of imminent collapse.

Table 11

Streambank Erosion on North Chickamauga Creek					
Date of Aerial Photo	Extent of Erosion Upstream of the Dayton Pike Bridge (feet)	Channel Widths at Selected Locations Upstream and Downstream of the Dayton Pike Bridge (feet)			
		2000 feet above	1000 feet above	At bridge	1000 feet below
1953	500	60	190	190	150
1968	2340	120	240	240	200
1976	2550	215	260	260	220
1985	2680	160	260	260	220
1996	*	*	250	250	220
Source: USACE 1998					*no photo available

Probable causes of stream channel instability cited in the 1998 USACE study include catastrophic flooding, construction of the Dayton Pike Bridge, or past mining of cobble from the streambed.

Because floodplain maps only show inundation areas, Hamilton County should begin to map areas at risk due to stream bank erosion. Channel migration hazard areas should be mapped along the North Chickamauga Creek, Falling Water Creek, Big Soddy Creek, and Rock Creek.

Significant Events

August 17 1982
Signal Mountain Road was closed due to a mudslide.

February 16 2003
Twenty-two roads closed due to high water with mudslides on Signal Mountain

September 16-18 2003
Erosion associated with flooding from the remnants of Hurricane Ivan damaged area roads. Back Valley Road in Soddy-Daisy was washed out. Several homes in the Willow Creek subdivision lost as up to 50 feet of property as the stream bank eroded and undercut foundations. The appraised value of the homes that are now unlivable is approximately $256,000. Area road damage from floodwater erosion was estimated in excess of $500,000.

Back Valley Road at Sale Creek 9/17/2004, Photograph by Amy Maxwell

Streambank erosion in Willow Creek Subdivision on North Chickamauga Creek

Mitigation efforts

The city of Soddy-Daisy is currently evaluating alternatives to stabilize stream banks susceptible to erosion. In 1998, the city of Soddy Daisy and Hamilton County requested a study by the U.S. Army Corps of Engineers to evaluate flood damage on North Chickamauga Creek.

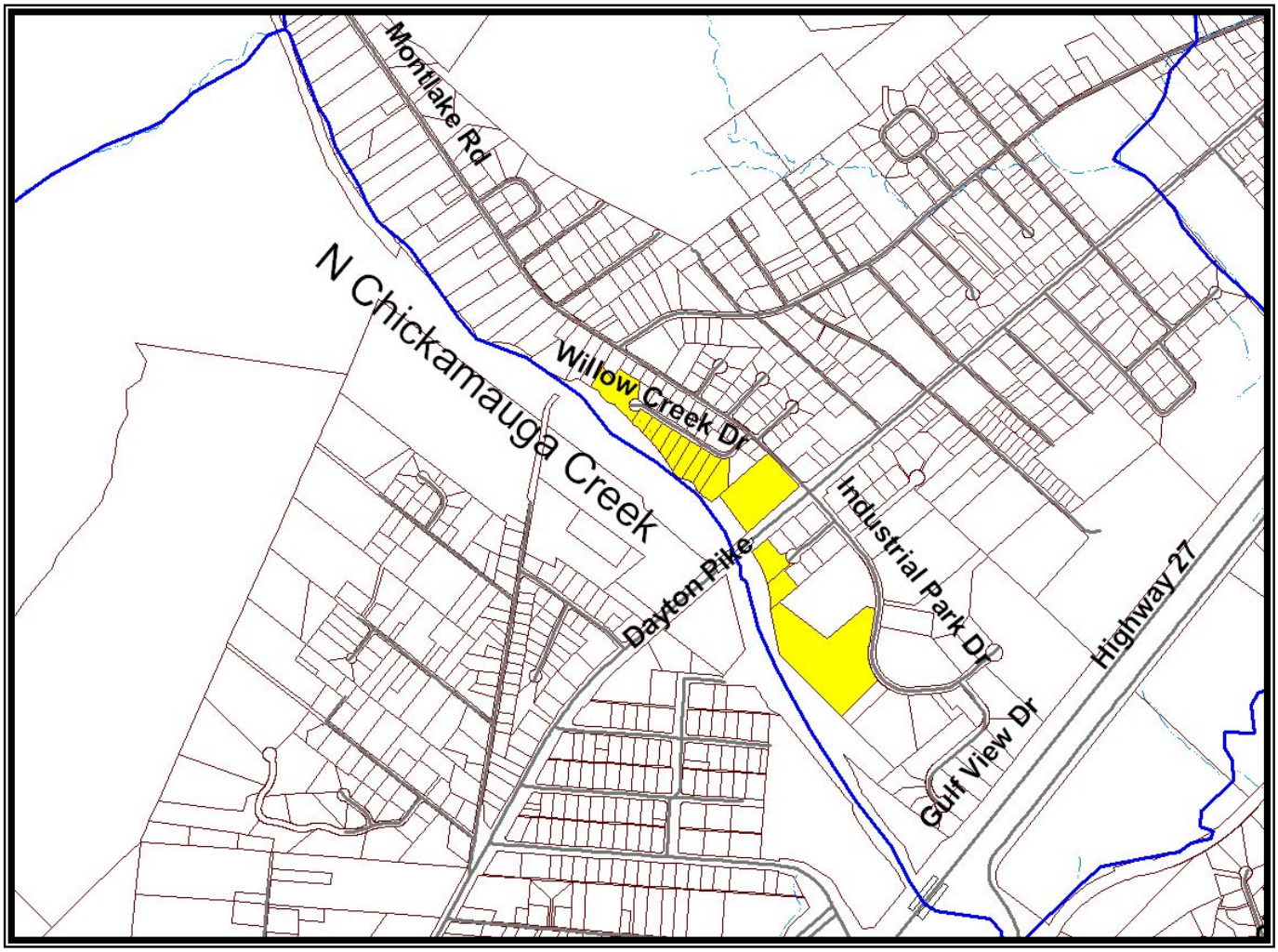
Current Development Trends

Population projections indicate growth will occur in the unincorporated portions of Hamilton County. Residential development occurring on steep slopes may increase the potential for slope destabilization and landslides. Continuing development of property along area streams with highly erodible banks will increase the number of vulnerable structures.

Vulnerability

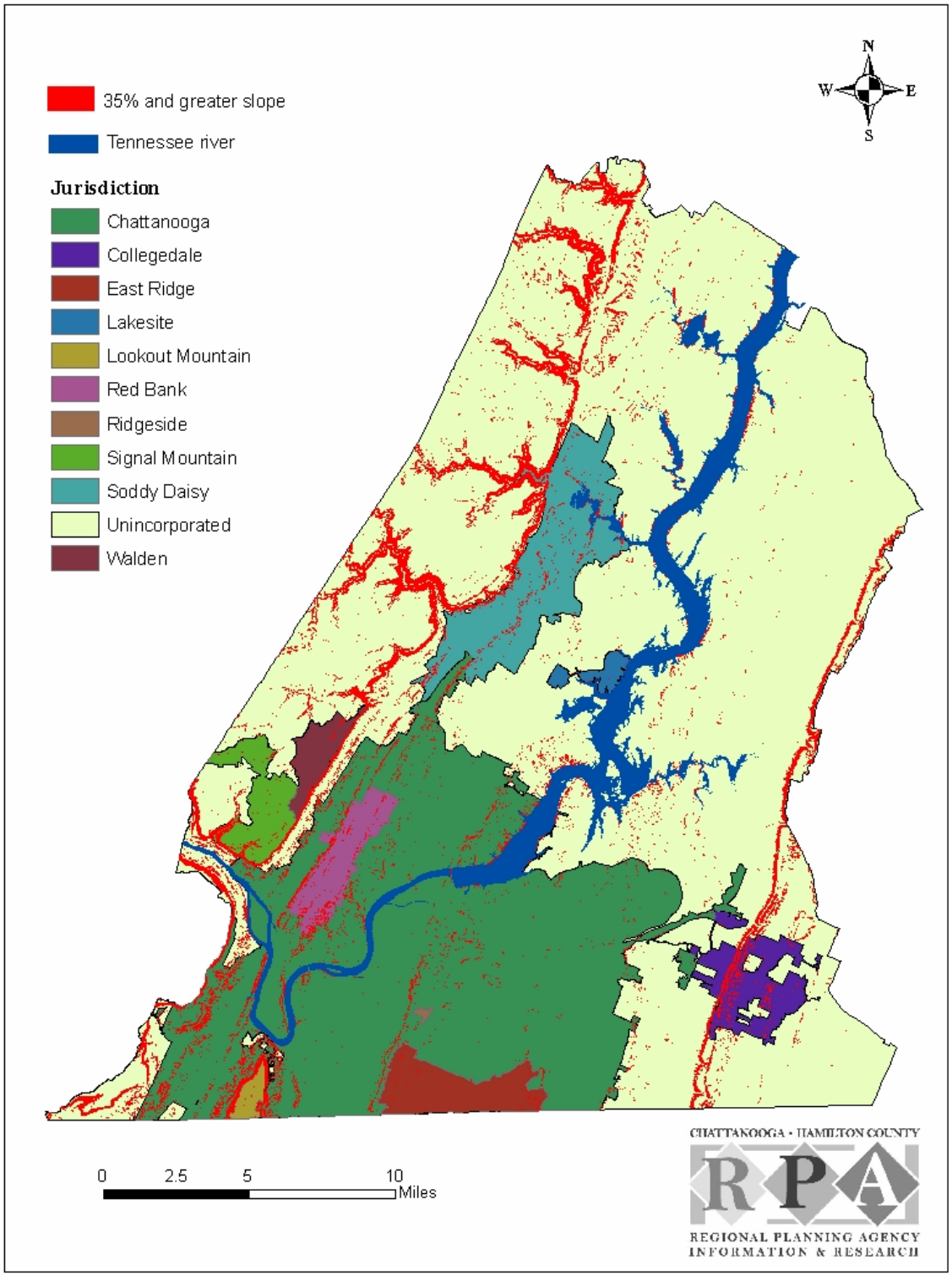
The appraised value of vulnerable property near Dayton Pike in Soddy Daisy is 2.65 million dollars. The shaded area on Map 15 indicates vulnerable property identified in the USACE 1998 study. Two homes with a combined appraised value of $256,000 are currently unlivable.

Map 15
Existing North Chickamauga (Soddy Daisy) Erosion Hazard Area



Areas of the Hamilton County with slopes of 35 percent and greater are potentially vulnerable to landslide (Map 16).

Map 16

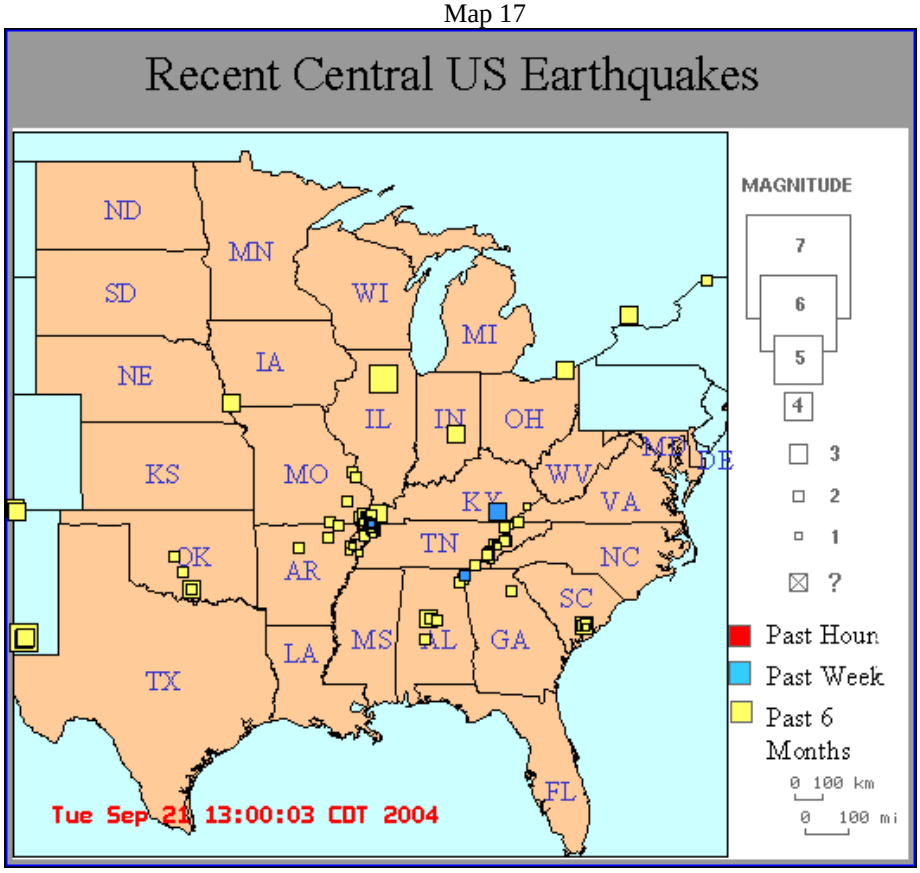


Earthquakes

Hamilton County is in the East Tennessee Seismic Zone (ETSZ), the second most active seismic zone east of the Rocky Mountains. The greatest danger from earthquakes comes from structural failures, disruption of utilities, and falling objects. Secondary effects include fires and dam failures. In 1993, a fault zone was identified in East Tennessee running roughly parallel to Interstate 75 between Chattanooga and Bristol.

The Center for Earthquake Research and Information (CERI) at the University of Memphis, maintains a database of earthquake events in the Central United States. The following map of earthquake events within a six-month period illustrates the activity in the ETSZ.

Map 17



Significant Events

Middle Hamilton County was the epicenter for two minor earthquakes in 1998. Minor structural damage was reported as a result of these events.

April 29, 2003

A 4.9 magnitude earthquake with an epicenter located in Fort Payne, Alabama was felt in Hamilton County.

June 28, 2004
A micro earthquake occurred at 6:44:18 PM (EDT). The magnitude 2.2 event occurred five miles east of Collegedale, TN.

Mitigation efforts
There is countywide application of 1999 Standard Building Code.

Current Development Trends
Earthquakes are a non site-specific hazard; therefore, current development trends have no affect. However, population growth and new development increase the number of persons and property that could be impacted by an earthquake.

Vulnerability
The entire county would be affected by a major earthquake. Critical infrastructure, including Chickamauga Dam and the Sequoyah Nuclear Power Plant are of particular concern. The Tennessee Valley Authority (TVA) maintains rigorous design and inspection requirements for its facilities. TVA also regularly conducts emergency drills to prepare for such events.

Downtown Chattanooga has a large number of multistory buildings. Many of these buildings were constructed prior to the enforcement of seismic building code requirements.

FEMA software (HAZUS) was used to estimate the affect of a 5.0 magnitude earthquake with an epicenter in North Chattanooga. The following discussion presents the results.

HAZUS estimates that about 2,732 buildings will be at least moderately damaged. This is over 2% of the total number of buildings in the region. There are an estimated 36 buildings that will be completely destroyed.

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 18 ignitions that will burn about 0.18 square miles, 0.03 % of the region's total area. The model also estimates that the fires will displace about 237 people and burn approximately 18 million dollars of building value.

The total economic loss estimated for the earthquake is 849.82 million dollars, which includes building and infrastructure 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 earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 728 million dollars; 6 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which made up over 64 % of the total loss.

The probability of a major earthquake is assumed to be small. However because the underlying fault lines and geology of the ETSZ are not fully understood, the potential for a major earthquake should be taken seriously.

Fog:

Hamilton County averages between 20 to 40 days a year with heavy fog (visibility of ¼ mile or less). Fog starts to form when air is cooled below the dew point. As moisture condenses and gathers around microscopic particles, fog is formed. Heavy fog occurs frequently in the mountains and along the area's rivers and streams.

The major problem associated with fog is low visibility that affects transportation and contributes to vehicular and river traffic accidents.

Significant Events

November 5, 1978
Dense fog on I-75 led to an accident involving 62 vehicles. Forty-six persons were injured.

1990
Over 100 vehicles were involved in a crash on I-75. Dozens were seriously injured; there were 12 fatalities. It was later determined that a Bowater pulp mill intensified the development of fog in the area.

Mitigation efforts
Lookout Mountain has placed reflective markers in roadways. The National Weather Service and local media issue public notification of fog conditions that limit visibility on area roads and waterways.

Current Development Trends
Fog may occur anywhere in the county but is most prevalent in upper elevations and near area surface water. Development in these areas is likely and will increases traffic volume in areas susceptible to heavy fog.

Capability Assessment

Local departments, agencies, and organizations have a direct impact through specifically delegated responsibility to carry out mitigation activities or hazard control tasks. Chattanooga has the following government divisions that have responsibilities for hazard mitigation. These responsibilities are also carried out through departments of public works in other jurisdictions.

Chattanooga Divisions

Citywide Services are responsible for providing daily logistical planning, resource and personnel management services, and oversight of the implementation of various services. These include sewer construction and maintenance, street construction and maintenance, emergency response, solid waste and sanitation, brush collection, recycling, street cleaning and urban forestry.

Codes and Inspection is responsible for enforcing the regulatory building codes and ordinances adopted by the City. The Office of Inspection issues permits governing building, construction, electrical, plumbing, mechanical, gas and sign installation. This office is also responsible for enforcing zoning regulations.

Engineering / Storm Water / Technical Information Center is responsible for maintaining records on and overseeing city projects. Records are kept on the location of sanitary and storm sewers, right-of-ways, construction schedule, topographic and flood maps, subdivision plats, street, utility, and property information.

Waste Resources is responsible for the operation and maintenance of sanitary sewer systems and the Wastewater Treatment Plant, responds to sewer stoppages, operates the Birchwood Landfill, and the operational maintenance of storm water pumping stations at the Brainerd Levee and orchard Knob area.

Legal Authority

Enabling legislation in Tennessee delegates legal authority to local governments to implement regulatory measures. The basis for much of this authority is the police power designed to protect public health, safety, and welfare. This authority enables local officials to enact and enforce ordinances and to define and abate nuisances. As hazard mitigation is a form of protecting public health, safety, and welfare, it falls under the general regulatory powers of local governments. Enabling legislation also extends to building codes and inspections, land use, acquisition, and floodway regulation.

Building Codes and Inspections

Building codes and inspections provide local governments with the means to maintain structures that are resilient to natural hazards. The 1999 Standard Building Code, applied countywide, prescribes minimum standards for building construction that ensures structures are built to standards that have a high wind resistance and developed within flood-proofing measures. Local governments are permitted to adopt additional codes as long as the

regulations are at least as stringent as the state standards. State-enabling legislation authorizes local governments to carry out building inspections to ensure local structures adhere to the minimum state building standards.

Land Use Planning

Through land use regulatory powers granted by the state, local governments can control the location, density, type and timing of land use and development in the community. The CHCRPA prepares land use plans for local jurisdictions and is currently in the process of updating the Comprehensive Plan for Hamilton County. The staff of the CHCRPA prepares recommendations on zoning cases and subdivision requests for the Chattanooga-Hamilton County Regional Planning Commission (CHCRPC).

The CHCRPC is a voluntary body of 15 members largely appointed by the Mayor of the City of Chattanooga and the County Executive for staggered three-year terms. Its role is to make zoning and land use recommendations to the local legislative bodies and to make final decisions on subdivision requests for Hamilton County and all municipal governments, except Collegedale, Red Bank, Signal Mountain, and Soddy-Daisy.

Zoning and Subdivision Regulations

Zoning and Subdivision Regulations are the two most common legal devices used to implement the policies of the Comprehensive Plan. The zoning ordinance divides jurisdictions into zones in which land use is regulated by specifying the permitted use of buildings and land, the density of development, and the size and location of buildings on the land. Local governments are authorized under the Tennessee Code Section 13 to regulate the subdivision of land within their jurisdiction. Subdivision regulates the division of land as well as the location, design, and installation of supporting infrastructure. Zoning and Subdivision Regulation provide a powerful tool for local government to direct development away from environmentally sensitive/hazardous areas such as floodplains and steep slopes.

Chapter 4 – Mitigation Actions and Implementation

The Federal emphasis for hazard mitigation is on reducing payouts from disaster declarations. Disaster payments are projected to increase to a point where they can no longer be sustained so it only makes sense to develop programs to bring those costs back under control. A key feature of FEMA's strategy for achieving this goal is to provide technical and financial assistance to local units of government for planning and projects to reduce overall risks to the local community. FEMA encourages local governments to use a variety of techniques to influence the location, type, intensity, design, quality, and timing of development. Many of these tools can be used to mitigate natural hazards and enhance the community's resilience and ability to recover from hazards. FEMA recommends that the following tools be used in a local mitigation strategy:

Hazard Mitigation Tools

Building standards specify how buildings are constructed. In addition to traditional building codes, building standards can include flood-proofing requirements, seismic design standards, and wind-bracing and anchoring requirements for new construction and similar requirements for retrofitting existing buildings.

Development regulations, which may include separate zoning and subdivision ordinances, regulate the location, type, and intensity of new development. Development regulations can include flood-zone regulations; setbacks from faults, steep slopes, and coastal erosion areas; and overlay zoning districts that apply additional development standards for sensitive lands, such as wetlands, dunes, and hillsides.

Capital improvement programs can be an effective way to implement mitigation throughout a community. Local public policies supporting hazard mitigation should be incorporated into these programs. Locating schools, fire stations, and other public buildings, streets, storm sewers, and other utilities outside of high hazard areas is an obvious policy. When siting public facilities in hazardous locations is necessary, communities can incorporate hazard reduction measures into the design or require retrofits where economically feasible. Public facility siting is a key determinant of the location of new privately financed growth in a community. As such, facilities, particularly roads and utilities, should not be sited where they have the potential to encourage growth in high hazard zones.

Land and property acquisition means purchasing properties in hazard-prone areas with public funds, and restricting development to uses that are less vulnerable to disaster-related damages. This can be accomplished through acquisition of undeveloped lands, acquisition of development rights, transfer of development rights to lower-risk areas, relocation of buildings, and acquisition of damaged buildings.

Taxation and fiscal policies can be used to distribute the public costs of private development of high hazard areas more equitably, specifically shifting more of the cost burden directly onto owners of such properties. Employing impact taxes to cover the public costs of development in areas of high hazards or providing tax breaks for reducing land use intensities in hazardous areas are two options.

Public awareness through information dissemination on natural hazards, and providing educational materials to the construction industry, homeowners, tenants, and businesses are also important. Included in this category are hazard disclosure requirements for the real estate industry and public information campaigns to increase awareness in all sectors of the community.

Overall Plan Goals

Flood:
Protect lives and property by reducing the occurrence and severity of flood events in Hamilton County.

Winter Storms:
Reduce potential damages and increase public preparedness.

Thunderstorms:
Minimize the impact of severe storms on area property and lives.

Tornadoes:
Save lives, reduce property damage, and increase awareness of the danger of tornadoes.

Landslide/Erosion:
Identify high hazard areas and identify techniques to minimize risk.

Drought/Wildfire:
Increase public awareness and educate property owners in techniques to reduce the threat of wildfires to property.

Earthquakes:
Save lives, reduce potential property damage and increase public awareness.

Fog:
Increase driver awareness and reduce accidents.

Objectives and Actions

Each participating jurisdiction has developed and prioritized objectives and preferred actions to mitigate natural hazards in its locality. Objectives represent measurable steps towards achievement of overall plan goals. Preferred actions are specific measures implemented to achieve the objectives of the plan. Preferred actions are prioritized at the jurisdiction level. Mitigation action priority is based on the local government capability, likelihood of implementation, and qualitative discussion of costs and benefits. The achievement of objectives and implementation of specific actions in some instances may be contingent upon the future availability of local, state, and federal resources and funding.

Countywide

1. *Installation of early warning system (Reverse 911) to notify residents of imminent danger*

Responsible Agency: Hamilton County Office of Emergency Services
Priority: High
Cost Estimate: $25,000
Benefit: Ability to target specific areas countywide for notification of imminent danger from all hazards.
Potential funding source: Hamilton County EMS has acquired a grant to fund startup of this project: maintenance of the system will be funded locally from existing budgets.
Schedule: Ongoing, expected completion within 6 months (September 2005)

2. *Increase and reinforce public awareness of natural hazards including information on preparedness.*

Responsible Agency: Hamilton County Office of Emergency Services in coordination with local media outlets
Priority: High
Cost Estimate: Existing staff and local resources
Benefit: Low cost and significant benefit in culturing an informed and prepared citizenry
Potential funding source: Existing budget
Schedule: Continuous and timely to address seasonal weather hazards. Yearly to address low probability hazards such as earthquakes.

3. *Locate all new essential and emergency service facilities outside of flood hazard areas.*

Responsible Agency: Hamilton County/Jurisdiction Administrations
Priority: High
Cost Estimate: NA
Benefit: Essential and emergency service facilities should remain accessible during flood events.
Potential funding source: Existing local budget
Schedule: Continuous as needed

4. *Appoint one person as the hazard mitigation planner/coordinator for Hamilton County and Jurisdictions*

Responsible Agency: Hamilton County/Jurisdictions
Priority: High
Cost Estimate: to be determined
Benefit: It is more cost effective and efficient to have a proactive mitigation planner/coordinator rather than local reactionary response to state and federal opportunities and planning requirements. This position would be able to facilitate the mitigation planning process, work with local jurisdictions to strengthen hazard risk and vulnerability assessment, assist local jurisdictions with development of mitigation

alternatives and actions, assist with the identification of funding resources, conduct cost benefit analysis of mitigation alternatives, and coordinate and write grant applications.

Potential funding source: Existing local budget
Schedule: One year

5. *Evaluate structural vulnerability of pre- seismic construction standards buildings to earthquake; continue enforcement of seismic standards for new construction.*

Responsible Agency: Hamilton County/Jurisdiction Building Code Enforcement
Priority: Medium
Cost Estimate: Existing staff and local resources
Benefit: Information to prioritize structures for seismic retrofit, protect lives and property
Potential funding source: Existing local budget
Schedule: Continuous as local resources allow (Complete within 5 years)

Chattanooga

Objectives

1. Continually review existing ordinances and/or create ordinances to support mitigation plan goals.
2. Increase the capability to monitor rainfall and stream flow.
3. Increase basin modeling and flood mapping capabilities.
4. Protect area streams from the effects of urban development.
5. Decrease the number of repetitive loss structures.
6. Increase scrutiny of proposed developments and monitor development in floodplains and floodways.
7. Reduce flooding of the Rossville Boulevard commercial district.
8. Increase capabilities to warn flood zone residents of imminent flooding due to headwater rainfall.
9. Reduce the impact of power outages on crucial infrastructure.
10. Upgrade inadequate infrastructure.

Preferred Actions

1. *Review and revise ordinances necessary to strengthen mitigation efforts.*

Responsible Agency: CHCRPA, Public Works: Division of Codes and Inspection, Engineering/Stormwater
Priority: High
Cost Estimate: Three months of staff time
Benefit: Reduce vulnerability, encourage responsible and sustainable development
Potential funding source: Existing budget
Schedule: Continuous

2. *Establish requirements for stream buffers.*

Responsible Agency: Public Works: Stormwater Management
Priority: High
Cost Estimate: Six months of staff time
Benefit: Improve regulatory authority, reduce vulnerability, improve water quality, decrease rate and volume of rainfall runoff.
Potential funding source: Existing budget
Schedule: within one year (2006)

3. *Implement flood control measures for Dobbs Branch Watershed*

Responsible Agency: Public Works: Engineering/Stormwater
Priority: High
Cost Estimate: Based on feasibility study
Benefit: Reduce impact of repeated flooding in the area
Potential funding source: USACE, Existing budget
Schedule: Within 5 years (2010)

4. *Installation of additional stream flow gauges in N. Chickamauga, Chattanooga, Lookout, Mountain, and Citico Creeks.*

Responsible Agency: Public Works: Stormwater Management
Priority: Medium
Cost Estimate: $200,000
Benefit: Improve prediction capabilities, increase warning time, and reduce loss of property and life
Potential funding source: PDM, HMBGP, USACE, USGS
Schedule: within 5 years (2010)

5. *Implement automatic notification from rain gauges and flow meters to Stormwater Management staff.*

Responsible Agency: Public Works: Stormwater Management
Priority: Medium
Cost Estimate: $150,000
Benefit: Improve prediction capabilities, increase warning time, and reduce loss of property and life
Potential funding source: Existing budget
Schedule: within 3 years (2008)

6. *Continue development of basin modeling and creation of flood mapping in developing areas.*

Responsible Agency: Public Works: Stormwater Management
Priority: Medium
Cost Estimate: $1,500 per river mile for approximate A zone studies; $15,000 per river mile for detailed studies

Benefit: Improve land use planning and regulation, reduce vulnerability of new development
Potential funding source: USACE, existing budget
Schedule: within 5 years (up to 10 years) (2010-2015)

7. *Seek grants to purchase homes in all floodways.*

Responsible Agency: Public Works: Engineering/Stormwater
Priority: Medium
Cost Estimate: $5,000,000
Benefit: Relocation/Removal is more cost effective than repeated losses
Potential funding source: PDM, HMGP, FMA
Schedule: within 5 years

8. *Improve GIS capabilities to include real-time modeling and better projections of flood areas.*

Responsible Agency: Public Works: Engineering/Stormwater
Priority: Medium
Cost Estimate: Existing staff
Benefit: Improve warning of flood potential, improve land use planning and regulation, avoid development of flood prone areas
Potential funding source: USACE, PDM, existing budget
Schedule: within 5 years (2010)

9. *Mountain Creek flood zone restoration.*

Responsible Agency: Public Works: Engineering/Stormwater
Priority: Low
Cost Estimate: $500,000
Benefit: Flood protection, improved water quality
Potential funding source: TDEC Mitigation Banking
Schedule: Within 5 years (2010)

10. *Citico Creek WPA channel removal and natural stream restoration.*

Responsible Agency: Public Works: Engineering/Stormwater
Priority: Low
Cost Estimate: Based on feasibility study
Benefit: Improved flood control, improved water quality
Potential funding source: PDM, HMGP, USACE, NRCS
Schedule: 5 years plus (2010+)

11. *Dual power sources or onsite generators for all sanitary and storm water pump stations.*

Responsible Agency: Waste Resources
Priority: Low
Cost Estimate: Based on site specific needs assessment

Benefit: water quality improvement, flood protection
Potential funding source: existing budgets
Schedule: 5 years plus (2010+)

12. Acquire property for greenway system.

Responsible Agency: Parks and Recreation, Public Works: Engineering
Priority: Low
Cost Estimate: Based on feasibility study
Benefit: Flood protection, Stormwater Management, utilize potential flood hazard areas for public recreation
Potential funding source: TPO (Federal Transportation Funds), Trust for Public Land
Schedule: Continuous as funding becomes available

Collegedale

Objectives

1. Improve flow capacity at the Wolftever Creek/Tallant Road bridge.
2. Reduce flooding on Apison Pike at Wolftever Creek.

Preferred Actions

1. *Routinely clean debris from support bracings under bridges.*

Responsible Agency: Public Works
Priority: High
Cost Estimate: Existing staff
Benefit: Reduce backup flooding on Apison Pike and Tallant Road
Potential funding source: Existing budget
Schedule: Continuous

2. *Raise State Route 317 at McKee Plant #2 to alleviate roadway flooding.*

Responsible Agency: Public Works, TDOT
Priority: Medium
Cost Estimate: Based on feasibility study
Benefit: Eliminate chronic flooding problem on State Route 317
Potential funding source: TDOT, existing budget
Schedule: Within 5 years (2010)

East Ridge

Objectives

1. Reduce flood damage in the Spring Creek and South and West Chickamauga Creek flood zones.
2. Reduce the amount of property damage due to stream bank erosion during flash flooding and flood event**s.**

Preferred Actions

1. *Acquire funds to flood proof (via in-place elevation) or purchase existing repetitive loss structures in the floodplain*

Responsible Agency: Public Works
Priority: High
Cost Estimate: Based on feasibility study
Benefit: Mitigation of repetitive loss structures is more cost effective than no action
Potential funding source: FMA, PDM
Schedule: Continuous as funding becomes available

2. *Evaluate alternatives to reduce rate and volume of rainfall runoff into area creeks to reduce flooding potential.*

Responsible Agency: Public Works, CHCRPA
Priority: High
Cost Estimate: Existing staff
Benefit: Flood control, stormwater management, improve water quality
Potential funding source: PDM, existing budget
Schedule: 1 year (2006)

3. *Redirect or intercept the high flow of Spring Creek at the Anderson Avenue outlet and divert into South Chickamauga Creek.*

Responsible Agency: Public Works
Priority: Medium
Cost Estimate: Based on feasibility study
Benefit: Flood control, stormwater management
Potential funding source: PDM, HMGP, USACE, existing budget
Schedule: Within 5 years (2010)

4. *Improve current storm water infrastructure to handle 2, 5, and 10-year events while minimizing erosion (especially along the John Ross/Bennett/Laredo and Marlboro Drainage System).*

Responsible Agency: Public Works
Priority: Medium
Cost Estimate: Based on feasibility study

Benefit: Flood control, stormwater management, improve water quality
Potential funding source: PDM, HMGP, USACE, existing budget
Schedule: 5 years plus (2010+)

Lakesite

Objective

1. Increase safety on area roads that are susceptible to frequent and heavy fog.

Preferred Action

1. *Acquire signs for area roads to warn of fog conditions.*

Responsible Agency: To be determined, TDOT
Priority: Medium
Cost Estimate: Based on feasibility study
Benefit: Prevent traffic accidents
Potential funding source: TDOT, existing budget
Schedule: Within 2 years (2007)

Lookout Mountain:

Objective

1. Increase the capability to mitigate the effects of drought, wildfire, fog, and severe weather events.
2. Increase the capacity to support vulnerable population in the event of natural disasters and /or utility service disruption

Preferred Actions

1. *Acquire backup source of electricity for water pumps to supply storage tanks.*

Responsible Agency: Public Works
Priority: High
Cost Estimate: Based on feasibility study
Benefit: Maintain supply of water during power outages
Potential funding source: HGMP, existing budget
Schedule: Within 2 years (2007)

2. *Identify vulnerable population and establish procedures and locations for emergency shelter in the event of natural disaster and/or utility service disruption.*

Responsible Agency: Hamilton County Office of Emergency Services, Town of Lookout Mountain
Priority: High
Cost Estimate: Existing staff time
Benefit: Increase capacity, utilization, and coordination of local resources in support of vulnerable population, protect health and safety of local residents.
Potential funding source: PDM, existing budget
Schedule: Within 2 years (2007)

3. *Establish a fireplug and hose drop for wildfire suppression on the mountainside.*

Responsible Agency: Town Fire Department
Priority: Medium
Cost Estimate: Based on feasibility study
Benefit: Enhance ability to quickly control and suppress wildfire on steep forested slopes.
Potential funding source: HGMP, existing budget
Schedule: Within 5 years (2010)

4. *Coordinate wildfire control on steep slopes with the City of Chattanooga, the National Park Service, the Tennessee Division of Forestry, and the Town Fire Department.*

Responsible Agency: Town Fire Department, Hamilton County Office of Emergency Services
Priority: Medium
Cost Estimate: Existing staff
Benefit: Enhance interagency coordination and response to wildfire on steep forested slopes.
Potential funding source: PDM, existing budget
Schedule: Within 5 years (2010)

5. *Acquire warning signs for area roads to warn of fog conditions.*

Responsible Agency: To be determined, TDOT
Priority: Low
Cost Estimate: Based on feasibility study
Benefit: Prevent traffic accidents
Potential funding source: TDOT, existing budget
Schedule: Within 5 years (2010)

Red Bank

Objective

1. Reduce flood damage associated with Stringers Branch and tributaries

Preferred Action

1. *Buy out or mitigate via in place elevation repetitive loss properties*

Responsible Agency: Public Works: Administration and Engineering
Priority: High
Cost Estimate: Based on feasibility study
Benefit: Eliminate repetitive cost of flood damage
Potential funding source: FMA, existing budget
Schedule: Continuous as funding becomes available

Signal Mountain:

Objectives

1. Reduce the occurrence of power and communication outages.
2. Reduce the occurrence of mudslides and erosion.
3. Increase the capacity to support vulnerable population in the event of natural disasters and /or utility service disruption.

Preferred Actions

1. *Evaluate the feasibility of underground utilities*

Responsible Agency: To be determined, EPB, South Central Bell
Priority: High
Cost Estimate: Based on feasibility study
Benefit: Eliminate the cost of repetitive repair of local utilities caused by frequent weather related events.
Potential funding source: PDM, HGMP, EPB, South Central Bell existing budget
Schedule: Within 2 years (2007)

2. *Identify vulnerable population and establish procedures and locations for emergency shelter in the event of natural disaster and/or utility service disruption.*

Responsible Agency: Hamilton County Office of Emergency Services, Town of Signal Mountain
Priority: High
Cost Estimate: Existing staff time
Benefit: Increase capacity, utilization, and coordination of local resources in support of vulnerable population, protect health and safety of local residents.
Potential funding source: PDM, existing budget

Schedule: Within 2 years (2007)

3. *Identify and map areas susceptible to landslide and erosion.*

Responsible Agency: Stormwater Utility, Hamilton County GIS, NRCS
Priority: Medium
Cost Estimate: Existing staff
Benefit: Identify hazard for existing and future development
Potential funding source: PDM, existing budget
Schedule: Within 5 years (2010)

4. *Acquire warning signs for area roads to warn of fog conditions.*

Responsible Agency: To be determined, TDOT
Priority: Low
Cost Estimate: Based on feasibility study
Benefit: Prevent traffic accidents
Potential funding source: TDOT, existing budget
Schedule: Within 5 years (2010)

Soddy-Daisy

Objectives

1. Protect stream banks from erosion; minimize future damage to North Chickamauga Creek banks and bridges.
2. Protect existing and future development from flood and erosion hazard.

Preferred Actions

1. *Establish requirements for stream buffers as well as review and revise ordinances necessary to strengthen mitigation efforts.*

Responsible Agency: Public Works, CHCRPA, Soddy Daisy Planning Commission
Priority: High
Cost Estimate: Existing staff
Benefit: Flood control, stormwater management, improved water quality, reduce exposure of new development to erosion hazard
Potential funding source: PDM, existing budget
Schedule: 1 year (2006)

2. *Acquire funding to protect area stream banks (especially the North Chickamauga) from erosion according to recommendations provided by the NRCS.*

Responsible Agency: Public Works
Priority: High
Cost Estimate: Based on NRCS recommendations

Benefit: Improve water quality; reduce exposure of new and existing development to erosion hazard
Potential funding source: PDM, HMGP, NRCS Emergency Watershed Protection, existing budget
Schedule: 1 year (2006)

3. *Map stream channel migration hazard areas and implement development restrictions in susceptible areas.*

Responsible Agency: Soddy Daisy Planning Commission, CHCRPA, Hamilton County GIS
Priority: High
Cost Estimate: Existing staff
Benefit: Reduce exposure of new and existing development to erosion hazard
Potential funding source: PDM, existing budget
Schedule: 1 year (2006)

4. *Remove trees and debris from creek to prevent back up flooding onto residential properties.*

Responsible Agency: Public Works
Priority: Medium
Cost Estimate: Existing staff
Benefit: Flood control
Potential funding source: Existing budget
Schedule: Continuous

Walden

Objectives

1. Reduce the occurrence of power and communication outages.
2. Increase the capacity to support vulnerable population in the event of natural disasters and /or utility service disruption.
3. Reduce traffic accidents associated with fog.
4. Reduce the occurrence of mudslides and erosion.

Preferred Actions

1. *Evaluate the feasibility of underground utilities*

Responsible Agency: To be determined, EPB, South Central Bell
Priority: High
Cost Estimate: Based on feasibility study
Benefit: Eliminate the cost of repetitive repair of local utilities caused by frequent weather related events.

Potential funding source: PDM, HGMP, EPB, South Central Bell existing budget
Schedule: Within 2 years (2007)

2. *Identify vulnerable population and establish procedures and locations for emergency shelter in the event of natural disaster and/or utility service disruption.*

Responsible Agency: Hamilton County Office of Emergency Services, Town of Walden
Priority: High
Cost Estimate: Existing staff time
Benefit: Increase capacity, utilization, and coordination of local resources in support of vulnerable population, protect health and safety of local residents.
Potential funding source: PDM, existing budget
Schedule: Within 2 years (2007)

3. *Identify and map areas susceptible to landslide.*

Responsible Agency: Hamilton County GIS, NRCS, CHCRPA
Priority: Medium
Cost Estimate: Existing staff
Benefit: Avoid development of hazardous areas; notify residents in potentially hazardous areas
Potential funding source: Existing budget
Schedule: Within 2 years (2007)

4. *Acquire warning signs for area roads to warn of fog conditions.*

Responsible Agency: To be determined, TDOT
Priority: Low
Cost Estimate: Based on feasibility study
Benefit: Prevent traffic accidents
Potential funding source: TDOT, existing budget
Schedule: Within 5 years (2010)

Unincorporated County

Objectives

1. Remediate areas and structures that experience repeated flooding
2. Encourage conservation and/or responsible development of flood and erosion hazard areas
3. Erosion protection along sections of several creeks in the northern area of Hamilton County.

Preferred Actions

1. *Acquire funds to buy and remove or relocate homes along creeks prone to flooding or stream bank erosion.*

Responsible Agency: Hamilton County Public Works: Engineering
Priority: High
Cost Estimate: Based on feasibility study
Benefit: Relocation/Removal is more cost effective than repeated losses
Potential funding source: FMA, existing budget
Schedule: Continuous as funding becomes available

2. *Map channel migration hazard areas and implement development restrictions in susceptible areas.*

Responsible Agency: Hamilton County GIS, NRCS
Priority: High
Cost Estimate: Existing staff time
Benefit: Improve water quality; reduce exposure of new and existing development to erosion hazard
Potential funding source: PDM, existing budget
Schedule: Within 2 years (2007)

3. *Establish requirements for stream buffers.*

Responsible Agency: Public Works: Stormwater Management Committee, CHCRPA
Priority: High
Cost Estimate: Six months of staff time
Benefit: Improve regulatory authority, reduce vulnerability, improve water quality, decrease rate and volume of rainfall runoff.
Potential funding source: Existing budget
Schedule: within one year (2006)

4. *Raise Roberts Mill Road from Levi Road east to the Bens in Falling Water Creek*

Responsible Agency: Hamilton County Public Works: Engineering
Priority: Medium
Cost Estimate: Based on feasibility study
Benefit: Remedy chronic flooding of this area
Potential funding source: Existing budget
Schedule: Within 5 years (2010)

5. *Mackey Branch culvert replacement and detention from Standifer Gap Road to Shallowford Road.*

Responsible Agency: Hamilton County Public Works: Engineering
Priority: Medium
Cost Estimate: Based on feasibility study
Benefit: Flood control
Potential funding source: Existing budget
Schedule: Within 5 years (2010)

6. *Raise Hunter Road in the 5800 address area.*

Responsible Agency:
Priority: Medium
Cost Estimate: Based on feasibility study
Benefit: Remedy chronic flooding of this area
Potential funding source: PDM, existing budget
Schedule: Within 5 years (2010)

Sources of Natural Hazard Mitigation and Recovery Funds

Use of General Revenue Funds from local budget
Approval of funding from the general budget of the applicable local jurisdiction.

U.S. Army Corps of Engineers
www.nwp.usace.army.mil
Constructs and operates flood control dams and other water control structures. Provides floodplain management guidance and planning assistance, streambank and shoreline protection, and aquatic ecosystem restoration. Other activities include advance measures to mitigate the impacts of natural hazards, and emergency operations. Also involved in levee inspection and rehabilitation. Flood Control Act of 1941, as amended: under "immediate threat of unusual flooding," authorized mitigation assistance of a temporary nature includes removal of waterway obstructions, actions to prevent the failure of dams, and "work necessary to prepare for abnormal snowmelt." Also, PL 84-99; 1986 Water Resources Development Act, Section 1135; and many others

Economic Development Administration
www.doc.gov/eda
Part of the Department of Commerce, the EDA provides various grants, loans, and technical assistance, especially to facilitate long-term economic recovery following a disaster. Following past disasters, the EDA has provided planning grants, assisted local governments to hire disaster recovery specialists, and provided infrastructure grants for critical public facilities. Funding is usually by special Congressional appropriation.

Environmental Protection Agency
www.epa.gov
The EPA provides funding for environmental education, wetlands protection, and clean water programs, including watershed restoration. Clean Water Action, Section 319

Farm Service Agency
www.fsa.usda.gov/pas/
Part of the U.S. Department of Agriculture, the FSA administers an ***Emergency Conservation Program*** for the rehabilitation of farmland and debris removal. In addition, it has a program that acquires conservation easements, and a program that makes emergency loans for the replacement of farm buildings, equipment, and production loss. Some of the FSA programs rely on annual Congressional appropriations.

Federal Emergency Management Agency
www.fema.gov
FEMA administers a variety of hazard mitigation, insurance, and disaster assistance programs, including the ***National Earthquake Hazards Reduction Program (NEHRP)***, ***National Flood Insurance Program (NFIP), Flood Mitigation Assistance Program, Public Assistance Program, and the Hazard Mitigation Grant Program***. The Robert T. Stafford Disaster Relief and Emergency Assistance Act ("The Stafford Act") as codified at 44 CFR: Part 206, Subparts G, H, and I define the Public Assistance Program, which provides funding

for rebuilding destroyed or damaged public facilities. Funds for hazard mitigation can be included in approved projects during the rebuilding process. Subpart M requires that as a condition of receiving federal disaster assistance, states must develop or revise hazard mitigation plans that evaluate natural hazards, and make recommendations for mitigating these hazards in the geographic areas receiving such assistance. Subpart N covers the Hazard Mitigation Grant Program (HMGP), which funds projects to substantially reduce the risk of future damage, hardship, loss, or suffering in any area affected by a major disaster. In addition, floodplain management and protection of wetlands are contained in Part 9 of 44 CFR, and environmental considerations in Part 10.

- ***Hazard Mitigation Grant Program (HMGP)***

The Federal Disaster Assistance Act provides funds authorized by the federal government and made available by FEMA for a cost-share program to states. The HMGP provides 75% of the funds while the states provide 25% of the funds for mitigation measures through the post-disaster planning process. The program is only available for areas affected by a Presidential declaration of disaster.

- ***Disaster Preparedness Improvement Grant (DPIG)***

This grant provides federal matching funds for communities to develop hazard mitigation plans, expand existing plans, update disaster preparedness plans, and to prepare the administrative plans required to qualify for HGMP grants. Funds for the DGIP are provided by FEMA and administered through TEMA.

- ***Pre-Disaster Mitigation Program (PDM)***

http://www.tnema.org/Mitigation/PDM.htm

- ***Flood Mitigation Assistance (FMA) Program***

This program provides grants for cost-effective measures to reduce or eliminate the long-term risk of flood damage to the built environment and real property. The program's main goal is to reduce repetitive losses to the National Flood Insurance Program. The FMA program is available to eligible communities every year, not just after a Presidentially declared disaster. Funds for the FMA are provided by FEMA and the Tennessee Emergency Management Agency administers the program.

- ***Public Assistance Program (PA)***

The Public Assistance Program provides federal aid to communities to help save lives and property in the immediate aftermath of a disaster and to help rebuild damaged facilities. Grants cover eligible costs associated with the repair, replacement, and restoration of facilities owned by state or local governments and nonprofit organizations. The Public Assistance program is administered by FEMA.

U.S. Fish and Wildlife Service

www.fws.gov

Directs fishery management, law enforcement, and technical support in pursuit of its mission to conserve, protect, and enhance fish and wildlife and their habitats. Provides cost-share payments, design, technical assistance, and implementation of restoration projects, and identifies and designs actions that are both flood damage responses and which minimize

impacts to fish and wildlife. Participates in "systems analysis" of floods for opportunities to implement system level fixes in order to reduce the losses that would otherwise occur in future floods. Some of these programs rely on special Congressional appropriations.

U.S. Forest Service
www.fs.fed.us
Part of the U.S. Department of Agriculture, the USFS provides leadership in the management, protection, and use of the nation's forests and rangelands. Studies and works to mitigate landslides on federal lands, with an emphasis on watershed health. Involved in urban and community forestry, making grants to help protect watersheds.

U.S. Geological Survey
www.usgs.gov
Part of the U.S. Department of Interior, the USGS provides scientific research, mapping, and technical assistance to all levels of government, private organizations, and the public; supplies scientific understanding needed to mitigate the effects of natural hazards; collects, interprets, and disseminates hydrologic data, including interpretation of magnitude and frequency of past and expected water flows.

Federal Highway Administration
www.fhwa.dot.gov
Provides ***Emergency Relief (ER)*** funds for the repair of Federal Aid System (FAS) highways and roads that have been seriously damaged by natural disasters. The use of ER funds for natural hazards mitigation is limited. This use must be justified based on an analysis of the cost of the added or improved feature(s) versus the projected savings in costs to the ER program should future disasters occur. Hazard mitigation is normally accomplished using regular federal highway funds. Title 23, USC, Section 125, Federal Aid Highway Program, as amended, includes formula and project grants intended "to foster safe highway design" and "to replace or rehabilitate deficient or obsolete bridges," including activities related to capital improvement projects for safety reasons.

U.S. Department of Housing and Urban Development
www.hud.gov
Programs to help people buy homes, to create affordable rental housing, to spur community and economic development, and to enforce fair housing laws. HUD funds, especially ***Community Development Block Grant (CDBG)*** funds, are sometimes used in conjunction with other hazard mitigation funding sources to implement projects including elevation, relocation, or acquisition of structures. HUD funds utilized for hazard mitigation projects often come from special Congressional appropriations.

Bureau of Land Management
www.blm.gov/nhp/
An agency within the U.S. Department of the Interior, BLM is responsible for managing large areas of public lands. BLM provides technical assistance regarding watershed restoration, and implements watershed restoration on public lands under its jurisdiction.

National Parks Service
www.nps.gov
The NPS provides technical assistance to all levels of government, nonprofit organizations, community groups, Native Americans, and others regarding conservation assistance, greenway planning, and the restoration of waterfront recreational projects.

Natural Resources Conservation Service
www.nrcs.usda.gov
An agency of the U.S. Department of Agriculture, the NRCS provides assistance to private landowners in the conservation and enhancement of natural resources. Authorized through the ***Emergency Watershed Protection (EWP) Program*** to assist in relieving imminent hazards to life and property from floods and erosion, including floodplain easements, streambank protection, debris removal, and sediment and erosion control. Through its ***Watershed Protection and Flood Prevention Program***, provides technical assistance, and constructs improvements (e.g.: levees and other water control structures) to protect, develop, and utilize land and water resources in small watersheds under 250,000 acres. NRCS is also involved in wetlands preservation.

Rural Development
www.rurdev.usda.gov/ocd/
Rural Development is an agency within the U.S. Department of Agriculture. It provides loans and grants for water and waste disposal facilities, and other essential community facilities including public safety facilities, health care facilities, etc. It endeavors to ensure that its funds to small rural communities after disaster events take into consideration reducing the likelihood of similar damage occurring in the future. Rural Development also makes direct loans to qualified lower income rural families to meet emergency assistance needs resulting from natural disasters or improve dwellings in rural areas.

Small Business Administration
www.sbaonline.sba.gov/disaster
Provides low interest, long-term loans with various terms to homeowners, renters, businesses, and private nonprofit organizations following natural disasters; a certain percentage of loan proceeds can go towards hazard mitigation measures. Small Business Act of 1953, as amended and others: provides low interest, long-term loans to repair/replace damaged personal and real property. Loans may be increased up to 20% for mitigating devices to protect real property from future disasters of the same kind.

Chapter 5 – Monitoring, Evaluation, Updating the Plan, and Public Involvement

The Chattanooga-Hamilton County Regional Planning Agency (CHCRPA) will establish a program to monitor the mitigation activities for all participating jurisdictions in the County on a yearly cycle. CHCRPA will maintain a file of mitigation actions or activities that they review and will report annually to the Tennessee Emergency Management Agency (TEMA) on the progress in meeting the requirements of the Hazard Mitigation Plan.

The CHCRPA will work to facilitate expansion of the Hazard Mitigation Planning Committee to include representatives of local businesses and commercial interests, the academic community, citizen groups, and relevant government agencies. The community of Ridgeside will be encouraged to join in the planning process and be included in the plan update. The Committee will review the Natural Hazard Mitigation Plan on an annual basis. Updates to the plan will be posted on the Regional Planning Agency website for public review and comment. A notice of updates to the Plan, including a summary of the proposed update, will be provided to the local media for publication and to participating local governments. Comments from the public and participating governments will be solicited and the proposed update modified, as appropriate, to respond to these comments. Administrative changes, wording corrections, hazard analysis, or other such portions of the Mitigation Plan, should not require additional action by local elected bodies. However, changes that may have a significant impact or significant expenditure of non-budgeted funds may require action by respective elected bodies. Because of the accelerated planning process required to meet the November 2004 deadline (Hamilton County began development of this plan in late July of 2004), the first update of the plan shall be completed within one year of initial approval by FEMA. Thereafter, the plan will be updated every five (5) years by the Hazard Mitigation Planning Committee and or as required under 44CFR201.6(c) (4) (i). Plan updates will be submitted to the Tennessee State Hazard Mitigation Officer and FEMA for approval.

The Hamilton County Natural Hazards Mitigation Plan will be evaluated by the CHCRPA and the Planning Committee annually to access how effective implemented mitigation strategies have been. Monitoring will be an ongoing process of compiling information on the outcomes that result from implementing the hazard mitigation strategies contained in this plan. Monitoring will measure the success of implementation of each strategy. The CHCRPA will be responsible for monitoring the plan.

Changes in development, technology or the capability of local jurisdictions to implement the actions adopted in the plan could necessitate the need for revisions in the plan. There are many issues that the monitoring and evaluation process should include:

- The adequacy of jurisdiction resources to implement the strategies as adopted
- Any redundancy among strategies that can be eliminated to free-up resources
- Whether adequate funding is available for implementation of the strategies as adopted
- Any technical, legal or coordination problems associated with implementation
- Whether mitigation actions are being implemented according to the prioritization scope

However, the primary issue that monitoring and evaluation should address is whether vulnerability has decreased as a result of the actions adopted in the plan. Where vulnerability has decreased, the Committee should determine why and consider implementing successful mitigation actions in other locations. Where vulnerability has remained constant or increased, the Committee should identify whether additional measures might be more successful or whether revisions should be made to existing measures. As previously noted, changes in development, technology or the capability of the planning area to implement the strategies adopted in the plan could alter the ability of the planning area to implement the mitigation strategies identified and adopted in their plan or could necessitate the need for new strategies to be identified. As a result, update and revision is a necessary part of the Hazard Mitigation planning process. While monitoring and evaluation are ongoing processes, update and revision will occur at regularly scheduled intervals.

Implementation through Existing Programs

Hamilton County and local jurisdictions address planning goals and legislative requirements through its Land Use Plans, Flood Hazard Ordinances, Stormwater Management Plans, Zoning Ordinances, Building Codes, and Capital Improvement Plans. The Hamilton County Natural Hazards Mitigation Plan provides a series of goals, objectives, and actions that are closely related to the goals and objectives of these existing planning programs. Hamilton County and local jurisdictions will have the opportunity to implement adopted mitigation strategies through existing programs, procedures and land use plan updates.

Land Use Plans are updated on a cyclical basis and will incorporate information from the NHMP as appropriate. Plans currently maintained by the CHCRPA include: Avondale (2004), Alton Park (2000), Brainerd Hills Plan (2002), Brainerd Road / Lee Highway Revitalization Plan (1994), Brainerd Town Center (1998), Bush town (2000), Comprehensive Plan 2030 (in progress), Downtown (2004), East Brainerd (1990), East Brainerd Corridor Community Plan (2003), East Chattanooga Area Plan (2004), Eastdale (1998), Glenwood / Churchville / Orchard Knob Neighborhood Plan (2002), Hamilton Place Community Plan (2000), Highland Park (2000), Highway 58 Community Plan (2002), Hill City - Northside (2003), Hixson - North River Community Plan (2004), Lookout Valley (2003), Mountain Creek Greenway Plan (2003), North Brainerd Area Plan (2004), North Suburban Area (1991), Oak Grove Neighborhood Plan (2004), Ridgedale (1998), Rossville Boulevard Community Plan (2004), Shallowford Road - Lee Highway Area Plan (2005), Soddy-Daisy Comprehensive Plan 2020, Southside (1997), St. Elmo (2001) 2020 Plan (2001), TransPlan 2030.

Continued Public Involvement

The public will be kept informed of proposed changes, modifications, reviews and updates to the plan by advertising that such updates, modifications and reviews are being considered. This advertisement shall be in the form of newspaper articles, legal notices (as required), radio, local television and via internet. The public will be invited to participate in keeping with the open meetings laws of Tennessee. Public comments, suggestions, recommendations, and other input will be received by the CHCRPA or during public meetings, as local ordinance requires. Copies of the plan will be distributed to local libraries and seats of local government. In addition, a copy of the plan will be maintained on the CHCRPA website.

Appendix

1. Definitions

(Not all terms are used in the current version of the plan, but are included for future reference)

Annual Flood:
The maximum discharge peak during a given water year (October 1 - September 30).

Attenuation:
The process where the flood crest is reduced as it progresses downs

Backflow:
The backing up of water through a conduit or channel in the direction opposite to normal flow.

Backwater Flooding:
Upstream flooding caused by downstream conditions such as channel restriction and/ or high flow in a downstream confluence stream.

Bankfull Stage/Elevation:
An established river stage/water surface elevation at a given location along a river that is intended to represent the maximum water level that will not overflow the riverbanks or cause any significant damages from flooding.

Base Flood:
The national standard for floodplain management is the base, or one percent chance flood. This flood has at least one chance in 100 of occurring in any given year. It is also called a 100-year flood.

Daily Flood Peak:
The maximum mean daily discharge occuring in a stream during a given flood event.

Detention Basins:
Structures that are built upstream from a populated area so that precipitation flows do not flood and cause the loss of life or property. They are normally dry, but are designed to detain surface water temporarily during, and immediately after a runoff event. Their primary function is to attenuate the storm flows by releasing flows at a lower flow rate. There are no gates or valves allowed on the outlet so that water can never be stored on a long-term basis. Typical detention times in such a basin would be on the order of 24 to 72 hours although some are as long as 5 to 10 days.

Drought:
A period of abnormally dry weather sufficiently prolonged from the lack of precipitation to cause a serious hydrologic imbalance.

Drought Index:

Computed value that is related to some of the cumulative effects of a prolonged and abnormal moisture deficiency. (An index of hydrological drought corresponding to levels below the mean in streams, lakes, and reservoirs.)

Dry Floodproofing:

A dry floodproofed building is sealed against floodwaters. All areas below the flood protection level are made watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings like doors windows, sewer lines and vents are closed, wether permanently, with removable shields, or with sandbags. The flood protection level should be no more than 2 or 3 feet above the top of the foundation because the buildings walls and floors cannot withstand the pressure of deeper water.

Wet Floodproofing:

An approach to floodproofing that usually is a last resort. Floodwaters are intentionally allowed into the building to minimize water pressure on the structure. Wet Floodproofing can include moving a few valueable items to a higher place or completely rebuilding the floodable area. Wet floodproofing has an advantage over other approaches: not matter how little is done, flood damage will be reduced. Thousands of dollars in damage can be avoided just by moving furniture and appliances out of the flood-prone area.

Flash Flood:

A flood which follows within a few hours (usually less than 6 hours) of heavy or excessive rainfall, dam or levee failure, or the sudden release of water impounded by an ice jam.

Flash Flood Guidance (FFG):

An internal product produced by the RFC's containing rainfall threshold values that must be exceeded in order to produce a flash flood.

Flash Flood Statement (FFS):

A statement by the NWS, which provides follow-up information on flash flood watches and warnings.

Flash Flood Table:

A table of pre-computed forecast crest stage values for small streams for a variety of antecedent moisture conditions and rain amounts. Soil moisture conditions are often represented by flash flood guidance values. In lieu of crest stages, categorical representations of flooding, e.g., minor, moderate, etc. may be used on the tables.

Flash Flood Warning (FFW):

A warning by the NWS issued to warn of flash flooding that is imminent or occurring.

Flash Flood Watch (FFA):

A statement by the NWS that alerts communities to the possibility of flash flooding in specified areas

Flood:

The inundation of a normally dry area caused by high flow, or overflow of water in an established watercourse, such as a river, stream, or drainage ditch; or ponding of water at or near the point where the rain fell. This is a duration type event with a slower onset than flash flooding, normally greater than 6 hours.

Flood Control Storage:

Storage of water in reservoirs to abate flood damage.

Flood Crest:

The Maximum height of a flood wave as it pases a location.

Flood Frequency Curve:

(1) A graph showing the number of times per year on the average, plotted as abscissa, that floods of magnitude, indicated by the ordinate, are equaled or exceeded. (2) A similar graph but with recurrence intervals of floods plotted as abscissa.

Flood Loss Reduction Measures:

The strategy for reducing flood losses. There are four basic strategies. They are prevention, property protection, emergency services, and structural projects. Each strategy incorporates different measures that are appropriate for different conditions. In many communities, a different person may be responsible for each strategy.

Flood of Record:

The highest observed river stage or discharge at a given location during the period of record keeping. (Not necessarily the highest known stage.)

Flood Plain:

The portion of a river valley that has been inundated by the river during historic floods.

Flood Plain Information Studies:

Reports usually prepared by the U.S. Army Corps of Engineers (USACE) following a survey of a flood-impacted community.

Flood Potential Outlook (ESF on AFOS) (FPO for Acronym):

An NWS outlook that is issued to alert the public of potentially heavy rainfall that could send area rivers and streams into flood or aggravate an existing flood.

Flood Prevention:

Measures that are taken in order to keep flood problems from getting worse. Planning, land acquisition, river channel maintenance, wetlands protection, and other regulations all help modify development on floodplains and watersheds to

reduce their susceptibility to flood damage. Preventive measures are usually administered by the building, zoning, planning and/ or code enforcement offices of the local government.

Flood Problems:

Problems and damages that occur during a flood as a result of human development and actions. Flood problems are a result from: **1)** Inappropriate development in the floodplain (e.g., building too low, too close to the channel, or blocking flood flows); **2)** Development in the watershed that increases flood flows and creates a larger floodplain, or; **3)** A combination of the previous two.

Flood Profile:

A graph of elevation of the water surface of a river in flood, plotted as ordinate, against distance, measured in the downstream direction, plotted as abscissa. A flood profile may be drawn to show elevation at a given time, crests during a particular flood, or to show stages of concordant flows.

Flood Routing:

Process of determining progressively the timing, shape, and amplitude of a flood wave as it moves downstream to successive points along the river.

Flood Stage:

A gage height at which a watercouse overtops its banks and begins to cause damage to any portion of the defined reach. Flood stage is usually higher than or equal to bankful stage.

Flood Statement (FLS):

A statement issued by the NWS to inform the public of flooding along major streams in which there is not a serious threat to life or property. It may also follow a flood warning to give later information.

Flood Warning (FLW):

A release by the NWS to inform the public of flooding along larger streams in which there is a serious threat to life or property. A flood warning will usually contain river stage (level) forecasts.

Flood Wave:

A rise in streamflow to a crest and its subsequent recession caused by precipitation, snowmelt, dam failure, or reservoir releases.

Floodproofing:

The process of protecting a building from flood damage on site. Floodproofing can be divided into wet and dry floodproofing. In areas subject to slow-moving, shallow flooding, buildings can be elevated, or barriers can be constructed to block the water's approach to the building. These techniques have the advantage of being less disruptive to the neighborhood. It must be noted that during a flood, a floodproofed building may be isolated and without utilities and therefore unusable, even though it has not been damaged.

Floodwall:

A long, narrow concrete or masonry embankment usually built to protect land from flooding. If built of earth the structure is usually referred to as a levee. Floodwalls and levees confine streamflow within a specified area to prevent flooding. The term "dike" is used to describe an embankment that blocks an area on a reservoir or lake rim that is lower than the top of the dam.

Floodway:

(1) A part of the flood plain, otherwise leveed, reserved for emergency diversion of water during floods. A part of the flood plain which, to facilitate the passage of floodwater, is kept clear of encumbrances.(2) The channel of a river or stream and those parts of the flood plains adjoining the channel, which are reasonably required to carry and discharge the floodwater or floodflow of any river or stream.

Major Flooding:

A general term including extensive inundation and property damage. (Usually characterized by the evacuation of people and livestock and the closure of both primary and secondary roads.)

Moderate Flooding:

The inundation of secondary roads; transfer to higher elevation necessary to save property -- some evacuation may be required.

Minor Flooding:

A general term indicating minimal or no property damage but possibly some public inconvenience.

One Percent Chance Flood (One Hundred Year Flood):

flood magnitude that has one chance in 100 of being exceeded in any future 1-year period. The occurrence of floods is assumed to be random in time, or regularity of occurrence is implied. The exceeding of a 1-percent chance is no guarantee, therefore, that a similar size flood will not occur next week. The risk of experiencing a large flood within time periods longer than 1 year increases in a nonadditive fashion. For example, the risk of exceeding a 1-percent chance flood one or more times during a 30-year period is 25 percent and during a 70-year period is 50 percent.

Palmer Drought Severity Index:

An index whereby excesses or deficiencies of precipitation are determined I relation to average climate values. The index takes in to account precipitation, potential and actual evapotransporation, infiltration of water into the soil, and runoff.

Upstream Slope:

The part of the dam that is in contact with the reservoir water. On earthen dams, this slope must be protected from the erosive action of waves by rock riprap or concrete.

Urban Flash Flood Guidance:

A specific type of flash flood guidance, which estimates the average amount of rain needed over an urban area during a specified period of time to initiate flooding on small, ungaged streams in the urban area.

Urban Flooding:

Flooding of streets, underpasses, low lying areas, or storm drains. This type of flooding is mainly an inconvenience and is generally not life threatening.

Storm Hydrograph:

A hydrograph representing the total flow or discharge past a point.

Stormwater Discharge:

Precipitation that does not infiltrate into the ground or evaporate due to impervious land surfaces but instead flows onto adjacent land or water areas and is routed into drain/sewer systems.

Regulatory Floodway :

Some maps show an area where construction regulations require special provisions to account for this extra hazard. This is a regulatory floodway

Recurrence Interval :

The average amount of time between events of a given magnitude. For example, there is a 1% chance that a 100- year flood will occur in any given year.

Reach :

The distance between two specific points outlining that portion of the stream, or river for which the forecast applies. This generally applies to the distance above and below the forecast point for which the forecast is valid.

2. Contact list for Planning Committee participation

Hamilton County Mitigation Plan
Planning Committee

Bill Tittle *Hamilton County Emergency Management*	209-6900
Ron Esdaile *City of Chattanooga*	757-5228
Yuen Lee *Regional Planning Agency*	757-5216
Greg Helms *Regional Planning Agency*	757-5216
James Larsen *Hamilton County GIS*	209-7772
Mark Dempsey *City of East Ridge*	867-7711
Wayne Hamill *City of Red Bank*	877-1103 Ext. 4
Bill Renfro *City of Soddy Daisy*	332-5323
Dr. C. Robert Clark *City of Lookout Mountain*	821-1226
Rodney Keaton *City of Collegedale*	396-3135
David Edwards *City of Lakesite*	842-2533
Peter Hetzler *Town of Walden*	886-4362

3-14-05

Every person on this list was called personally by me. I explained the Mitigation process and invited each to our meetings. Dates & times were given to them.

Bill Tittle

Hamilton County Mitigation Plan
Planning Committee

Billy Cooper *City of Ridgeside*	622-7219
Art Perry *City of Signal Mountain*	886-3301
Mike Hendrix *Hamilton County Unincorporated Areas*	209-7830
Chris Hughes *TVA Water Levels*	
Don Drumm *TVA Power*	
Don Nanney *Electric Power Board*	

3. Planning Process Timeline and Responsibilities

Natural Hazard Mitigation Plan Proposed Tasks and Schedule

Task Items	Dept	7/19/04	7/26/04	8/2/04	8/9/04	8/16/04	8/23/04	8/30/04	9/6/04	9/13/04	9/20/04	9/27/04	10/4/04	10/11/04	10/18/04	10/25/04
Steering Committee Meeting	EM	☆														
Data Gathering																
Historic Hazard Events	RPA															
Map the historic events	GIS															
Planning Group Initial Meeting	EM					8/16/04										
Risk Assessment & Hazard Identification	PG															
Type & Numbers of Existing & Future Buildings, infrastructures in identified Hazard area	GIS															
Estimates of potential dollar losses	GIS															
Land use and development trends	RPA															
Planning Group Second Meeting							8/27/04									
Develop Mitigation Strategy	PG															
Establish Goal and Objectives	PG															
Develop Alternatives Evaluation Criteria	PG															
Evaluate Alternatives	PG															
Prepare Draft Plan	RPA															
Planning Group Final Meeting											☆					
Public Meetings	EM															
Finalize the Draft Plan	RPA															
Plan Adoption	EM															
Plan Submittal	EM															☆

EM	Emergency Management
GIS	Hamilton County GIS
PG	Planning Group
RPA	Regional Planning Agency

4. Hamilton County Natural Hazards Mitigation Plan Survey

Please attach information if the space provided is insufficient.

1. Community Name
_____

2. Name, phone number, fax and e-mail address of contact person(s) for your community information:

_____

_____

_____

3. Does your community have a web site? If yes, what is the URL address?
_____
___

4. Please provide background information on your community's "history," such as when it was organized, when it became a city, interesting people from your community, how it got its name and any other important or interesting facts?
_____

_____

_____

_____

5. Please list significant historical natural events that occurred in your community including the location and estimated cost of damage (if available).

_____

_____

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___

6. What infrastructure concerns does your community have as it relates to flooding (for example, please list any intersections, culverts, and or bridges that have systemic flooding issues)?

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7. Please provide a list of addresses/phone numbers of all your critical facilities? Critical facilities are defined as hospitals, schools, nursing homes, fire and police stations, government building, prisons etc.

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8. Does your community have any facilities that have the ability to hold large crowds such as arenas, sporting events, etc.? If yes, please give the name and location of these facilities.

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_____

_____

_____

_____

9. Does your community have any type of early warning detection system(s)?
Please describe:

_____

_____

_____

_____

_____

10. Are any of the following natural hazards a serious concern in your community?
Please rank based on severity with:

3 -serious concern
2 - moderate concern
1 - low concern
0 – not a concern

Floods
___100-year Floodplain Floods - *defined with the NFIP Maps*
___ Flash Floods - *defined as flooding that follows heavy rain*
___ Non-Flood Zone Floods - *defined as flooding that occurs in areas not defined as floodplains, usually in areas that have been developed at a fast rate.*

Tornadoes
___ Tornadoes

Severe Storm
___ Ice Storms
___ Hail
___ Winter Storms
___ Thunderstorms
___ High and Low Temperatures

___ Lightning
___ High Winds

Erosion
___ Stream Bank
___ Landslide

Earthquakes
___ Earthquakes

Droughts
___Wildfires

11. Are there other natural hazards not mentioned above that your community has experienced?

_____

_____

_____

_____

_____

12. Please provide the following documents if available.
1. Comprehensive Plan(s)
2. Floodplain Ordinance(s)
3. Land Use Ordinance(s)

Are there any other documents you think we should look at? (please provide)

_____

_____

_____

13. Please describe actions that your community has taken or plans to take to mitigate the impact of natural hazards.

_____

_____

_____

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_____

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_____

14. Please list mitigation actions that your community would like to take, but would require state and/or federal funding.

_____

_____

_____

_____

_____

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_____

15. List the overall **goals** that your community hopes to achieve through the Hamilton County Natural Hazard Mitigation Plan.
Example: Reduce flood damage in _____.

_____

_____

_____

_____

_____

_____

16. Please list any specific **objectives** that your community hopes to achieve through the Hamilton County Natural Hazard Mitigation Plan.
Example: Minimize future damage due to flooding of Spring Creek.

_____

_____

_____

_____

_____

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_____

17. Please list any specific **actions** that your community would recommend to alleviate natural hazards.

Example: Work with existing floodplain residents to elevate or floodproof their structures, including obtaining funding assistance and technical guidance.

_____

_____

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5. 2030 POPULATION PROJECTIONS METHODOLOGY

The starting point for these projections was the total projected population for Hamilton County. This projection was provided by the Tennessee Department of Transportation (TDOT), and was developed by the Center for Business and Economic Research (CBER) at the University of Tennessee. The total projected 2030 population for Hamilton County is 362,334. This represents an increase of 54,437 people, or 17.7% over the 2000 base year population from the U. S. Census.

The following steps were used to estimate the projected population for each of the 310 TAZs. The 2030 total projected population was allocated among the TAZs based on the same proportions in the base year of 2000. In effect, this produced a 17.7% increase in population in every TAZ. This necessitated adjustments to the TAZs based on assumed future growth patterns and historical growth rates, with the following procedures:

1. Hamilton County population data was obtained for Census years 1970, 1980, 1990 and 2000 normalized to the 2000 Census Tract boundaries. This data was obtained from a demographics firm, SRC, LLC. which offers services such as “Demographics Now” and “Free Demographics.”
2. Historical growth trends were analyzed for each Census Tract, and the growth pattern in a particular Census Tract was assigned to the TAZs within that tract. For instance, if a tract had experienced population decreases from 1970 to 1980, from 1980 to 1990, and from 1990 to 2000, its growth pattern was designated DDD (meaning Decrease, Decrease, Decrease). Similarly, the designation of III would indicate a growth pattern of Increases in each of the three decades from 1970 to 2000. The TAZs within each Census Tract were assigned the same pattern as the Census Tract.
3. The allocated 2030 population (from Step 1) was then assigned an adjustment factor based on past growth rates and expected future growth or decline patterns, current land use, topographical features, available developed land, and subdivision and building permit trends. These adjustment factors ranged from 0.65 to 1.45, which translate into percentage growth rates of -24% to +71%. When the adjustment factor was multiplied by the allocated 2030 population, an adjusted 2030 population figure and a 2000-2030 growth rate was established.
5. Further adjustments were made to TAZ’s in selected Census Tracts based on growth patterns in surrounding tracts. For instance, a particular tract initially may have been assigned a higher or lower adjustment factor/growth rate (based on past growth) than its neighboring tracts. If there was no specific information to justify its pattern being different from its neighboring tracts, the adjustment factor was changed to be more in line with the neighboring tracts.
6. These adjustments resulted in a total 2030 population projection for all the 310 TAZs of 362,330, or 4 less than the total Hamilton County projection of 362,334.
7. Population projections by TAZ were summed for each Census Tract

6. Regional Notice

HAMILTON COUNTY
OFFICE OF THE COUNTY MAYOR
208 Courthouse
Chattanooga, Tennessee 37402

CLAUDE RAMSEY
County Mayor

September 9, 2004

County Mayor Gregg Ridley
P. O. Box 149
Pikeville, TN 37367

Re: Countywide Natural Hazards Mitigation Plan

Dear Mayor Ridley:

The purpose of this letter is to notify adjacent county governments that Hamilton County, Tennessee is actively developing a Natural Hazards Mitigation Plan. The purpose of this plan is to allow Hamilton County and all of the jurisdictions contained therein to better plan for and reduce the impact of natural hazard events. This plan will meet the mandates of the Federal Disaster Mitigation Act of 2000.

We have been advised to notify adjacent counties of this activity. Therefore, let this letter serve as notification that Hamilton County is actively preparing a Natural Hazards Mitigation Plan.

If you have any questions or wish to attend the next public meeting please contact Bill Tittle at 423/209-6900.

Sincerely,

Claude Ramsey
County Mayor

Letter sent to Marion County, Sequatchie County, Bledsoe County, Rhea County, Meigs County, Bradley County, Dade County, Walker County, Catoosa County

7. Public Notice

TO: Sharon Graham
Chattanooga Times Free Press
(Legal Ad Department)

FROM: Ann Sitton
Administrative Secretary

DATE: September 30, 2004

SUBJECT: PUBLIC NOTICE FOR A REVIEW OF THE DRAFT OF THE HAMILTON COUNTY NATURAL HAZARDS MITIGATION PLAN (NHMP)

I am attaching a public notice for your review and publication. Would you please publish this notice in the Chattanooga Times Free Press?

Please send the billing for this notice to Mr. Bill Tittle, Chief of Emergency Management, Office of Emergency Services, 317 Oak Street, Suite 302, Chattanooga, TN 37403; Telephone No. 423/209-6900.

Sharon, I appreciate very much your help with the RPA's legal notices. Have a great day!

/aps

Attachment

PUBLIC NOTICE

The public is invited to review and comment on a draft of the Hamilton County Natural Hazards Mitigation Plan (NHMP). A public open house will be held Thursday, October 7, 2004, from 3:00 p.m. to 6:00 p.m., in Room 1-A of the Development Resource Center, 1250 Market Street, Chattanooga, Tennessee.

A copy of the draft Plan will be available for public review and comments at the Development Resource Center, beginning October 5, 2004, from 8:00 a.m. until 4:30 p.m., Monday through Friday. The public may also view a PDF of the Plan online at www.chcrpa.org.

The purpose of the Plan is to outline a strategy with specific programs and policies that can be implemented by Hamilton County and local units of government within Hamilton County to reduce the impact of natural hazards on people and property.

For more information, contact Greg Helms at 423/757-5216 or by e-mail, Helms_greg@mail.chattanooga.gov.

PUBLIC NOTICE

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For more information, contact Greg Helms at 423/757-5216 or by e-mail, helmsgreg@mail.chattanooga.gov.

8. Repetitive Loss Structures

Hamilton County Repetitive Loss Structures					
Area	Insured	Address	# Losses	Paid	Average
CHATTANOOGA, CITY OF	NO	7301 E BRAINED RD	2	30,333.39	15,166.70
CHATTANOOGA, CITY OF	NO	1109 HARVARD ST	2	8,814.14	4,407.07
CHATTANOOGA, CITY OF	NO	5615 CLEMONS RD	2	11,837.77	5,918.89
CHATTANOOGA, CITY OF	YES	5801 WENTWORTH AVE	2	14,697.82	7,348.91
CHATTANOOGA, CITY OF	NO	214 ASTER AVE	4	16,694.51	4,173.63
CHATTANOOGA, CITY OF	NO	218 ASTOR AVE	2	33,778.64	16,889.32
CHATTANOOGA, CITY OF	NO	226 ASTER AVE	3	57,951.51	19,317.17
CHATTANOOGA, CITY OF	NO	228 ASTOR AVE	6	143,629.21	23,938.20
CHATTANOOGA, CITY OF	NO	6076 B OLD DAYTON PARK	2	3,180.96	1,590.48
CHATTANOOGA, CITY OF	YES	700 BROWNS FERRY RD	2	6,256.69	3,128.35
CHATTANOOGA, CITY OF	NO	1309 CHESTNUT STREET	2	12,702.99	6,351.50
CHATTANOOGA, CITY OF	YES	3215 CALHOUNE AVENUE A&B	2	20,195.93	10,097.97
CHATTANOOGA, CITY OF	NO	5415 CONNELL STREET	2	44,227.03	22,113.52
CHATTANOOGA, CITY OF	NO	100 DOUGLAS	2	3,687.85	1,843.93
CHATTANOOGA, CITY OF	NO	2101 S GREENWOOD AVENUE	3	46,963.37	15,654.46
CHATTANOOGA, CITY OF	NO	2102 S GREENWOOD AV	4	49,756.15	12,439.04
CHATTANOOGA, CITY OF	NO	2915 HIGGS STREET	2	64,807.68	32,403.84
CHATTANOOGA, CITY OF	NO	2330 HICKORY VALLEY RD	2	21,744.34	10,872.17
CHATTANOOGA, CITY OF	NO	306 S HOWELL	2	38,865.72	19,432.86
CHATTANOOGA, CITY OF	YES	309 S HOWELL	2	31,214.77	15,607.39
CHATTANOOGA, CITY OF	YES	315 S HOWELL	2	31,168.67	15,584.34
CHATTANOOGA, CITY OF	NO	313 S HOWELL AV	3	47,762.48	15,920.83
CHATTANOOGA, CITY OF	YES	317 S HOWELL AVE	2	15,976.83	7,988.42
CHATTANOOGA, CITY OF	NO	2314 E LYNDON AV	2	5,345.95	2,672.98
CHATTANOOGA, CITY OF	YES	00 MCCUTCHEON RD # 68	3	46,688.50	15,562.83
CHATTANOOGA, CITY OF	NO	316 S ST MARKS	3	54,903.97	18,301.32
CHATTANOOGA, CITY OF	YES	142 N MARKET ST	2	4,026.41	2,013.21
CHATTANOOGA, CITY OF	NO	1813-15 S MARKET ST	2	40,257.02	20,128.51
CHATTANOOGA, CITY OF	NO	6076 OLD DAYTON PIKE	2	51,488.05	25,744.03
CHATTANOOGA, CITY OF	NO	6026 PECK DR	2	12,678.78	6,339.39
CHATTANOOGA, CITY OF	NO	3705 RINGGOLD RD	3	21,542.69	7,180.90
CHATTANOOGA, CITY OF	NO	1517 SPRINGVALE RD	2	5,644.39	2,822.20
CHATTANOOGA, CITY OF	YES	1524 SPRINGVALE RD	2	7,559.33	3,779.67
CHATTANOOGA, CITY OF	NO	1623 SPRINGVALE RD	3	7,658.25	2,552.75
CHATTANOOGA, CITY OF	NO	1628 SPRINGVALE ROAD	2	8,010.50	4,005.25
CHATTANOOGA, CITY OF	YES	950 SPRING CREEK RD	2	301,341.73	150,670.87
CHATTANOOGA, CITY OF	NO	312 S ST MARKS AV	4	27,188.11	6,797.03
CHATTANOOGA, CITY OF	NO	314 S ST MARKS AV	3	42,177.15	14,059.05
CHATTANOOGA, CITY OF	NO	4323 SHAWHAN RD	2	4,142.87	2,071.44
CHATTANOOGA, CITY OF	YES	5804 WELLWOTH AVE	2	7,540.06	3,770.03
CHATTANOOGA, CITY OF	NO	1813 15TH S ST MARKET	2	12,750.20	6,375.10
CHATTANOOGA, CITY OF	NO	224 ASTOR	4	58,411.77	14,602.94
CHATTANOOGA, CITY OF	NO	120 MELROSE DR	3	22,794.67	7,598.22
CHATTANOOGA, CITY OF	YES	1304 PLEASANT ST	3	17,340.20	5,780.07
CHATTANOOGA, CITY OF	NO	2401 ROSSVILLE BLVD.	2	30,493.83	15,246.92
CHATTANOOGA, CITY OF	NO	6080 B OLD DAYTON PIKE	4	126,526.45	31,631.61
CHATTANOOGA, CITY OF	NO	1014 BLANTON DR	2	3,947.73	1,973.87
CHATTANOOGA, CITY OF	YES	3213 CALHOUN AVE	3	20,169.55	6,723.18
CHATTANOOGA, CITY OF	YES	310 S HOWELL AVE	2	27,820.18	13,910.09
CHATTANOOGA, CITY OF	NO	1612 SPG VALE RD	2	4,133.30	2,066.65
CHATTANOOGA, CITY OF	NO	4932 ADAMS RD	4	59,303.07	14,825.77

CHATTANOOGA, CITY OF	YES	5626 GRUBB RD	3	26,719.00	8,906.33
CHATTANOOGA, CITY OF	NO	113 VALLEYBROOK CR	5	74,892.07	14,978.41
CHATTANOOGA, CITY OF	YES	109 VALLEYBROOK RD	7	44,048.73	6,292.68
CHATTANOOGA, CITY OF	YES	1326 GADD RD	2	37,715.78	18,857.89
EAST RIDGE, CITY OF	NO	5419 CONNELL AV	2	64,874.22	32,437.11
EAST RIDGE, CITY OF	YES	1312 PLEASANT ST	2	27,080.22	13,540.11
EAST RIDGE, CITY OF	YES	905 ALTAMAHA ST	3	15,016.55	5,005.52
EAST RIDGE, CITY OF	NO	1216 WEST END	2	52,214.42	26,107.21
EAST RIDGE, CITY OF	NO	1214 WEST END AVE	2	53,742.71	26,871.36
EAST RIDGE, CITY OF	NO	1011 MC BRIEN RD	2	10,000.80	5,000.40
EAST RIDGE, CITY OF	YES	6123 NOTTINGHAM DR	2	6,477.60	3,238.80
EAST RIDGE, CITY OF	YES	1302 PLEASANT ST	3	23,919.78	7,973.26
EAST RIDGE, CITY OF	NO	1307 PLEASANT ST	2	21,582.19	10,791.10
EAST RIDGE, CITY OF	YES	1311 PLEASANT ST	2	35,615.38	17,807.69
EAST RIDGE, CITY OF	YES	3625 RINGGOLD RD	5	158,533.43	31,706.69
EAST RIDGE, CITY OF	NO	1611 SPRINGVALE RD	6	52,837.34	8,806.22
EAST RIDGE, CITY OF	NO	1614 SPRINGVALE RD	5	78,485.00	15,697.00
EAST RIDGE, CITY OF	NO	1620 SPRINGVALE RD	4	54,618.45	13,654.61
EAST RIDGE, CITY OF	NO	1625 SPRINGVALE ROAD	2	8,647.50	4,323.75
EAST RIDGE, CITY OF	NO	906 SUNNYDELL CIRCLE	2	17,911.12	8,955.56
EAST RIDGE, CITY OF	YES	910 SUNNY DELL CIR	2	13,236.36	6,618.18
EAST RIDGE, CITY OF	NO	6003 WELLWORTH AV	2	30,860.27	15,430.14
EAST RIDGE, CITY OF	NO	1526 LOCKHART LANE	5	48,220.12	9,644.02
EAST RIDGE, CITY OF	YES	6010 WELLWORTH AVE.	2	7,067.00	3,533.50
EAST RIDGE, CITY OF	YES	1004 FLOYD DR	2	11,984.75	5,992.38
EAST RIDGE, CITY OF	NO	1313 SWOPE DR	4	46,000.92	11,500.23
EAST RIDGE, CITY OF	NO	1311 SWOPE DR	2	8,632.18	4,316.09
EAST RIDGE, CITY OF	NO	5005 DELAWARE DR	2	4,964.40	2,482.20
EAST RIDGE, CITY OF	NO	5524 OAKDALE AVE	2	28,639.71	14,319.86
EAST RIDGE, CITY OF	YES	1317 SWOPE DR	2	3,447.64	1,723.82
EAST RIDGE, CITY OF	YES	1000 SPRING VALLEY DR	2	14,337.46	7,168.73
EAST RIDGE, CITY OF	NO	1621 SPRINGVALE RD	4	39,716.71	9,929.18
EAST RIDGE, CITY OF	NO	1623 SPRINGVALE RD	2	19,505.03	9,752.52
EAST RIDGE, CITY OF	YES	908 SUNNY DELL CIRCLE	2	7,505.60	3,752.80
EAST RIDGE, CITY OF	YES	5504 SUNNY DELL LN	2	15,909.76	7,954.88
EAST RIDGE, CITY OF	NO	1615 SPRINGVALE RD	2	9,024.11	4,512.06
EAST RIDGE, CITY OF	YES	904 SUNNY DELL CIRCLE	2	11,382.79	5,691.40
EAST RIDGE, CITY OF	NO	1610 SPRINGVALE RD	3	40,200.15	13,400.05
HAMILTON COUNTY *	NO	1625 BARRY RD	2	11,060.90	5,530.45
HAMILTON COUNTY *	YES	5417 CONNELL ST	2	52,653.61	26,326.81
HAMILTON COUNTY *	YES	2330 HICKORY VALLEY RD	2	79,577.81	39,788.91
HAMILTON COUNTY *	YES	1532 SPRINGVALE RD	2	3,925.60	1,962.80
HAMILTON COUNTY *	NO	1612 SPRINGVALE RD	3	39,618.37	13,206.12
HAMILTON COUNTY *	YES	2006 SUCK CREEK RD	2	17,622.76	8,811.38
HAMILTON COUNTY *	YES	912 SUNNY DELL CIR	3	39,095.03	13,031.68
HAMILTON COUNTY *	NO	6008 WELLWORTH AVE	3	24,175.78	8,058.59
HAMILTON COUNTY *	YES	1527 SPRINGVALE AVE	2	6,974.00	3,487.00
HAMILTON COUNTY *	YES	1409 SEWANEE DR	2	16,989.79	8,494.90
HAMILTON COUNTY *	YES	5209 WEAVER ST	2	18,362.44	9,181.22
HAMILTON COUNTY *	YES	6917 LOVE LN	2	6,808.94	3,404.47
RED BANK, CITY OF	YES	2232 LYNDON AVE	2	17,800.00	8,900.00
RED BANK, CITY OF	YES	2400 LYNDON AVE	2	31,046.80	15,523.40
RED BANK, CITY OF	YES	2410 LYNDON AVE	2	15,708.65	7,854.33
RED BANK, CITY OF	YES	2414 LYNDON AVE BLDG 1	2	65,025.46	32,512.73
SODDY-DAISY, CITY OF	YES	9016 LK CAROLYN DR	3	10,889.99	3,630.00
SODDY-DAISY, CITY OF	YES	9014 LAKE CAROLYN	3	18,098.75	6,032.92

9. Problem Flood Areas

Chattanooga

Stormwater

1. Brown's Ferry Road @ Parker Lane
2. Astor Avenue near pump station
3. Wauhatchie Pike @ Cummings Road
4. North Moss Avenue @ Center Street
5. Manning Street @ Stringer Street
6. Mountain Creek Road @ Cross Street (private)
7. Brown's Ferry Road @ Waterfront Drive
8. Dayton Boulevard and Old Dayton Pike
9. 680 Signal Mountain Road
10. Cummings Highway (Broad Street to Church Street)
11. Church Street (Cummings Highway to West 38th Street)
12. West 38th Street (St. Elmo Avenue to Dead End)
13. Main Street @ Railroad Underpass
14. Vine Street (Georgia Avenue to Douglas Street)
15. Market Street (4th Street to 8th Street)
16. 10th and 11th Streets (Park Avenue to Douglas Street)
17. West 33rd Street (Between Broad Street and Alton Park Blvd.)
18. 20th Street @ Washington Street
19. 800 Hooker Road
20. Workman Road
21. 900 East 11th Street
22. 1500 East 23rd Street
23. Rossville Boulevard (Interstate 24 area)
24. 23rd Street @ 4th Avenue
25. Forest Plaza Subdivision
26. Birmingham Drive
27. Atlanta Drive
28. Memphis Drive
29. 109 Valleybrook Road
30. Valleybrook Subdivision
31. 409 Valleybrook Road
32. Gadd Road @ Hixson Recreation Center
33. Adams Road @ Crescent Club Drive
34. Grubb Road @ School Drive
35. Boy Scout Road
36. Austin Road @ Orchard Business Park
37. 1499 Lower Mill Road
38. 1244 Village Green Drive
39. 5613 Winding Lane
40. 1317 Windbrook Lane
41. 4121 Hixson Pike
42. Highway 153 and Hamil road
43. Ely Road and Delashmitt Road
44. Taylor Street and Dodson Avenue

45. Amnicloa Highway and Crotchfield Street
46. Shallowford Road and Wilcox Boulevard
47. Lyerly Street @ Ivy Street
48. 3510 and 3515 Taylor Street
49. Brainerd Road @ Brainerd Village
50. Brainerd Road @ East Brainerd Road
51. Chickamauga Road
52. Brainerd Road @ Provence Street
53. Dodson Avenue and 3rd Street
54. Brainerd section of town bounded by the Brainerd Levee on the east, Kenwood on the west, Interstate 24 on the south, to Brainerd High School on the north
55. Lee Highway and Shallowford Road (between Robinson Drive and Jordan Drive)
56. Hickory Valley Road @ Hickory Brook Drive
57. Davidson Road @ Mackey Road
58. East Brainerd Road @ Mackey Avenue
59. 7000 block of Lee Highway
60. 520 and 900 Airport Road
61. 7300 Standifer Gap Road
62. 7200 Noah Reid Road
63. Bonny Oaks Drive @ Redlands Drive
64. Bonny Oaks Drive @ Jersey Pike
65. Hickory Brook Road
66. Noah Reid Road @ Shallowford Road
67. Oakwood Drive @ Highway 58
68. Oakwood Drive @ Jersey Pike
69. Standifer Gap @ Friars Branch
70. 2330 Hickory Valley Road
71. Alton Park Area (Polk, Fagan, and Dorris Streets)

Waste Resources

1. Combined Sewer System and related CSO Facilities
2. South Chickamauga Creek Interceptor Sewer and related collection sewers
3. North Chickamauga Creek Interceptor Sewer and related collection sewers
4. Mountain Creek Interceptor Sewer and related collection sewers
5. Chattanooga Creek Interceptor Sewer and related collection sewers
6. Riverview sewers through Chattanooga Golf and Country Club
7. Engle Stadium area
8. Vine Street and Lindsey
9. 23rd Street
10. City Yards

Parks and Recreation

1. Culvert @ N. Chickamauga Creek Greenway ¼ mile north of Hamill Rd.
2. Culvert @ Rivermont Park @ driveway to Champions Club
3. Parking area @ Heritage Park
4. Tennis Courts, Fieldhouse @ Warner Park
5. Landscaping @ Coolidge Park
6. Structure & Playing Field @ Engel Stadium

Soddy-Daisy

1. Chickamauga Creek Bridge
2. Dayton Pike
3. Daisy Dallas Road
4. O'Sage Drive

East Ridge

1. Severe over bank flooding of Spring Creek
2. Upstream of Ringgold Rd along Springvale Rd
3. Upstream of Spring Creek Rd along Graston Ave, Wentworth Avenue, and Wellworth Avenue.
4. Downstream of Ringgold Rd along Swope Drive, Oakdale Avenue, West End Avenue, Marion Avenue, Pleasant Street, Connell Street, and Merida Street.

Collegedale

1. 4-Corners Intersection
2. Tucker Road
3. Old Camp Road
4. Sunrise Meadows Subdivision
5. Landrum Subdivision
6. Tallent and Edgmon Road

Red Bank

1. Memorial Drive Bridge at Dayton Boulevard/Lyndon Avenue

Signal Mountain

1. Headwater flooding across US 127
2. Groundwater has pulled fines out of backfill in utility trenches leading to collapse

Unincorporated County

1. Middle Valley Road between Eagle Drive and Thrasher Pike
2. Roberts Mill Road from Levi Road east to the bend in Falling Water Creek
3. Mackey Branch from Standifer Gap Road to Shallowford Road
4. Hunter Road in the 5800 address area
5. Erosion along Rock Creek and Falling Water Creek

10. Natural Hazards Internet Resources: A Guide for Hamilton County Communities

With the rapid expansion of information available on the Internet, the search for information on a specific topic is often laborious and frustrating. This guide provides a listing of pertinent natural hazards web pages in an effort to make the search for hazards information easier. Web pages are included with the potential use of local government officials and community leaders in mind. Web page citations include the title, web page address, and a brief description. Web pages are grouped into the following categories:

- Natural Hazards Preparedness: Includes web pages dedicated to disaster planning, safety tips and contingency planning.
- Natural Hazards Response: Includes web pages of organizations dedicated to immediate response in the wake of a natural disaster.
- Natural Hazards Mitigation: Includes web pages dedicated to reducing the vulnerability of properties and lives to repetitive loss due to successive natural hazards events.
- Natural Hazards Information: Includes web pages that generally describe natural hazards.
- Natural Hazards Literature: Includes web pages that provide information on natural hazards publications, databases, networks, and other relevant links on the Internet.
- Natural Hazards Research Tools: Includes web pages that offer technical tools used for understanding the spatial and temporal characteristics of natural hazards and their impacts.
- Specific Natural Hazards Categories: Includes web pages dedicated to providing information and resources related to the following specific natural hazards: earthquakes, floods, weather hazards (with climate resources), and wildfire.

Natural Hazards Preparedness:

Tennessee Emergency Management Agency
http://www.tnema.org/
Hazard information for the state of Tennessee

Clemson University
www.clemson.edu/special/hugo/index.htm
Clemson University presents information on this website on what homeowners can do to make their homes stronger against high winds.

Disaster Resources Guide
http://www.disaster-resource.com/
Guide to business continuity planning.

USA Today: Natural Disaster Safety Tips
http://www.usatoday.com/weather/wsafe0.htm
General information about natural hazard event preparedness, including links to key state/federal web sites.

DERA: Disaster Preparedness and Emergency Response Association
http://www.disasters.org/
Disaster preparedness information in several languages.

Institute for Business and Home Safety
http://www.ibhs.org/
Resource for insurers and reinsurers to reduce harm caused by natural disasters.

National Emergency Management Association
http://www.nemaweb.org/
National coordinating body for state comprehensive emergency management leaders.

Southern Building Code Congress International
http://www.sbcci.org/
Building Code technical, educational, and administrative support for government agencies.

FEMA: Region IV Office
http://www.fema.gov/regions/iv/index.shtm
Regional office of FEMA for the southeastern United States, including Tennessee.

Small Business Administration: Disaster Information
http://www.sba.gov/disaster_recov/index.html
Disaster preparedness and recovery information focused on small businesses, including disaster loan program.

Natural Hazards Response:

American Red Cross
http://www.redcross.org/
National relief agency for victims of natural and man-made disasters in the United States.

Salvation Army: Southern Region
http://www.uss.salvationarmy.org/uss/www_uss.nsf
National relief agency for victims of natural and man-made disasters in the United States.

US FEMA: Federal Emergency Management Agency
http://www.fema.gov/
Homepage for the Federal Emergency Management Agency: Current information and links.

Natural Hazards Mitigation:

Hazard Mitigation in North Carolina
http://www.ncem.org/mitigation/index.htm
Mitigation resources and publications.

Massachusetts, Hazard Mitigation Section
http://www.state.ma.us/dem/programs/mitigate/
Mitigation efforts for the State of Massachusetts.

US Department of Energy: CESD: Wingspread Principles
http://www.sustainable.doe.gov/wingspread2/wingprin.html
Principles for mitigation and sustainable development for local communities.

FEMA: Mitigation
http://www.fema.gov/mit/
Mitigation home page for FEMA, providing current information and links.

USGS: Subcommittee on Natural Disaster Reduction
http://www.usgs.gov/sndr/
Federal agencies working to create a sustainable society, resilient to natural hazards, through information exchange.

Natural Hazards Information:

Natural Hazards Research and Information Center: Natural Hazards Observer
http://www.colorado.edu/hazards/o/
Newsletter of the Natural Hazards Research and Applications Information Center.

US Department of Interior Natural Hazards
http://www.doi.gov/nathaz/index.html
Guide to natural hazards information, including weather hazards and landslides.

NOAA: Natural Hazards Data Resources
http://www.ngdc.noaa.gov/seg/hazard/
Natural hazards resource with an emphasis of geophysical hazards, including earthquakes.

Natural Hazards Literature:

Cambridge Scientific Abstracts: Natural Disasters- Prepare, Mitigate, Manage
http://www.csa2.com/hottopics/ndht/home.html
Bibliography and topic review of disaster prevention, management, and historical accounts of natural disasters.

National Hazards Research and Applications Information Center: Bibliography
http://www.colorado.edu/hazards/library/
Bibliography of social science literature focusing on natural disaster preparation, recovery and mitigation.

FEMA: USFA: Publications
http://www.usfa.fema.gov/usfapubs/online.htm
Bibliography and on-line report access to technical issues related to fire.

NASA: Natural Disaster Reference Database
http://ndrd.gsfc.nasa.gov/

Bibliography on use of satellite remote sensing for disaster mitigation.

Natural Hazards Research Tools:

Tennessee Geographic Information Resources
http://www.tngis.org/
Geographic information for Tennessee.

Earthquakes/Landslides

Center for Earthquake Education and Research
http://www.ceri.memphis.edu/
Public information, seismic data, and links from the University of Memphis.

American Red Cross: Earthquake Preparedness
http://www.crossnet.org/disaster/safety/earth.html
Earthquake preparedness information.

Building Seismic Safety Council
http://www.bssconline.org/
Organization responsible for developing and promoting building earthquake risk mitigation regulatory provisions.

Earthquake Information Network
http://www.eqnet.org/
Links to earthquake information and databases, with a focus on mitigation efforts.

USGS: Earthquake Hazards and Preparedness
http://quake.wr.usgs.gov/hazprep/index.html
Information on earthquake hazards, preparedness and fact sheets on scientific research.

USGS: Geologic Hazards Team
http://geohazrds.cr.usgs.gov/
USGS information on geologic hazards, including earthquakes and landslides.

USGS: National Earthquake Information Center
http://wwwneic.cr.usgs.gov/
Information on USGS earthquake data, research and current activity.

USGS: Geologic Hazards: Landslides
http://landslides.usgs.gov/landslide.html
Landslide publications, research, and recent events.

Floods

Association of State Floodplain Managers
http://www.floods.org/
Organization interested in floodplain management, flood hazard mitigation, NFIP, and flood preparedness, warning and recovery.

Floodplain Management Association
http://www.floodplain.org/
Information on floodplains and general information on floods.

National Association of Flood and Stormwater Management Agencies
http://www.nafsma.org/
Current information on legislative activity related to public policy on stormwater, flood control, watersheds and floodplains.

US Army Corps of Engineers
http://www.usace.army.mil/
Homepage for the U.S. Army Corps of Engineers: Current information and links.

FEMA: National Flood Insurance Program (NFIP)
http://www.fema.gov/nfip/
Homepage for FEMA's National Flood Insurance Program.

USGS: Water WebServer Team
http://h2o.usgs.gov/public/realtime.html
Real-time hydrologic data for stream gages throughout the United States.

Weather Hazards/Climate Resources

Tornado Project
http://www.tornadoproject.com/
Comprehensive collection of tornado statistics and resources for meteorological interests and emergency managers.

NOAA: AOML: Hurricanes and Natural Disaster Brochures
http://www.aoml.noaa.gov/general/lib/hurricbro.html
Information on natural hazards, including hurricanes tornadoes, lightning, floods, thunderstorms and hail.

NOAA: Climate Prediction Products
http://nic.fb4.noaa.gov/products/predictions/
Climate forecasts and outlooks for the U.S. from 6-10 days to seasonal to ENSO predictions.

NOAA: National Climatic Data Center
http://www.ncdc.noaa.gov/

Access to Climate data for the U.S., including surface data, radar and satellite data, plus climate extremes/weather event summaries.

NOAA: NCDC: Climate Data Visualization
http://www.ncdc.noaa.gov/onlineprod/drought/xmgr.html
Climate visualization tool for national weather service, climate division, and selected global information.

NOAA: Southern Regional Climate Center
http://www.srcc.lsu.edu/
Climate services and data for the Southern U.S.

USDA: Agricultural Weather and Climate
http://www.usda.gov/oce/waob/jawf/poplinks.htm
Climate impact information for the U.S. with an emphasis on agricultural impacts.

Project SafeSide: Keeping You Ahead of the Storm
http://www.weather.com/safeside/
General information about natural hazards, preparedness, and disaster assistance.

NOAA: Interactive Weather Information Network
http://iwin.nws.noaa.gov/iwin/graphicsversion/main.html
A comprehensive link to current National Weather Service advisories, forecasts, and forecast discussions.

NOAA: National Hurricane Center: Tropical Prediction Center
http://www.nhc.noaa.gov/
Hurricane forecasts, as well as historical and general information, including a glossary of terms.

NOAA: Tornadoes: Nature's Most Violent Storms
http://www.nssl.noaa.gov/NWSTornado/
Background information on tornadoes, plus preparedness information.

NOAA: Weather Radio
http://www.nws.noaa.gov/nwr/nwrbro.htm
NOAA weather radio transmitter information for all fifty states and U.S. territories.

USDA: Weekly Weather and Crop Bulletin
http://www.usda.gov/oce/waob/jawf/wwcb.html
Weekly report on precipitation, Palmer Drought Indices, agricultural summaries and related weather information.

Wildfires/Drought

Wildfire: Are You Prepared?
http://www.disasterrelief.org/Library/Prepare/wildfire.html

Guide to wildfire safety and preparedness for an international audience.

US National Interagency Fire Center
http://www.nifc.gov/
Current information on wildland fire, fire safety, and science/technology applications to fire fighting.

U.S. Fire Administration
http://www.usfa.fema.gov/
Response and mitigation agency for fire provides fire safety information related to hurricanes and floods.

USDA: Forest Management: Fire
http://www.fs.fed.us/land/
Response to fire in forest service lands, including fire reporting.

11. Hamilton County Natural Hazard Events

Location or County	Date	Type	Magnitude	Death	Injury	Property Damage
1 HAMILTON	8/18/1956	Hail	2.00 in.	0	0	0
2 HAMILTON	8/19/1956	Tstm Wind	0 kts.	0	0	0
3 HAMILTON	9/14/1957	Tstm Wind	0 kts.	0	0	0
4 HAMILTON	1/21/1959	Tstm Wind	65 kts.	0	0	0
5 HAMILTON	1/21/1959	Tstm Wind	60 kts.	0	0	0
6 HAMILTON	8/7/1962	Tstm Wind	50 kts.	0	0	0
7 HAMILTON	8/7/1962	Tstm Wind	50 kts.	0	0	0
8 HAMILTON	5/11/1963	Tstm Wind	50 kts.	0	0	0
9 HAMILTON	7/29/1963	Tstm Wind	0 kts.	0	0	0
10 HAMILTON	4/28/1964	Hail	2.25 in.	0	0	0
11 HAMILTON	4/15/1965	Hail	1.00 in.	0	0	0
12 HAMILTON	5/18/1965	Tstm Wind	50 kts.	0	0	0
13 HAMILTON	11/21/1965	Hail	0.75 in.	0	0	0
14 HAMILTON	4/23/1967	Hail	1.50 in.	0	0	0
15 HAMILTON	5/7/1967	Tstm Wind	0 kts.	0	0	0
16 HAMILTON	4/23/1968	Hail	1.25 in.	0	0	0
17 HAMILTON	7/2/1968	Tstm Wind	0 kts.	0	0	0
18 HAMILTON	8/19/1968	Tstm Wind	0 kts.	0	0	0
19 HAMILTON	5/10/1969	Tstm Wind	0 kts.	0	0	0
20 HAMILTON	4/22/1970	Hail	1.75 in.	0	0	0
21 HAMILTON	4/22/1970	Tstm Wind	0 kts.	0	0	0
22 HAMILTON	1/25/1971	Hail	0.75 in.	0	0	0
23 HAMILTON	1/30/1971	Hail	1.75 in.	0	0	0
24 HAMILTON	6/6/1972	Tstm Wind	0 kts.	0	0	0
25 HAMILTON	5/27/1973	Tstm Wind	0 kts.	0	0	0
26 HAMILTON	6/6/1973	Tstm Wind	0 kts.	0	0	0
27 HAMILTON	6/15/1973	Tstm Wind	56 kts.	0	0	0
28 HAMILTON	7/23/1973	Tstm Wind	0 kts.	0	0	0
29 HAMILTON	8/11/1973	Tstm Wind	0 kts.	0	0	0
30 HAMILTON	4/1/1974	Tstm Wind	0 kts.	0	0	0
31 HAMILTON	4/3/1974	Hail	0.75 in.	0	0	0
32 HAMILTON	4/3/1974	Tornado	F1	0	2	25K
33 HAMILTON	7/3/1974	Tstm Wind	0 kts.	0	0	0
34 HAMILTON	8/28/1974	Tstm Wind	50 kts.	0	0	0
35 HAMILTON	1/10/1975	Tstm Wind	0 kts.	0	0	0
36 HAMILTON	3/24/1975	Tstm Wind	50 kts.	0	0	0
37 HAMILTON	6/19/1975	Hail	1.50 in.	0	0	0
38 HAMILTON	6/20/1975	Tstm Wind	0 kts.	0	0	0
39 HAMILTON	1/13/1976	Tstm Wind	0 kts.	0	0	0
40 HAMILTON	3/20/1976	Tstm Wind	0 kts.	0	0	0
41 HAMILTON	5/28/1976	Hail	0.75 in.	0	0	0
42 HAMILTON	6/21/1976	Hail	1.00 in.	0	0	0
43 HAMILTON	6/29/1976	Tstm Wind	0 kts.	0	0	0
44 HAMILTON	7/27/1976	Hail	0.75 in.	0	0	0
45 HAMILTON	7/27/1976	Tstm Wind	0 kts.	0	0	0
47 HAMILTON	6/6/1977	Hail	0.75 in.	0	0	0

Location or County	Date	Type	Magnitude	Death	Injury	Property Damage
46 HAMILTON	6/6/1977	Tstm Wind	59 kts.	0	0	0
48 HAMILTON	7/16/1977	Tstm Wind	0 kts.	0	0	0
49 HAMILTON	8/12/1977	Tornado	F0	0	0	25K
50 HAMILTON	8/30/1979	Hail	0.75 in.	0	0	0
51 HAMILTON	8/30/1979	Tstm Wind	65 kts.	0	0	0
52 HAMILTON	6/16/1980	Tstm Wind	0 kts.	0	0	0
53 HAMILTON	6/24/1980	Tornado	F0	0	0	25K
54 HAMILTON	6/10/1981	Tstm Wind	0 kts.	0	0	0
55 HAMILTON	3/25/1982	Hail	0.75 in.	0	0	0
56 HAMILTON	7/2/1982	Tstm Wind	0 kts.	0	0	0
57 HAMILTON	7/1/1983	Tstm Wind	0 kts.	0	0	0
58 HAMILTON	7/16/1983	Hail	0.75 in.	0	0	0
59 HAMILTON	7/25/1983	Tstm Wind	52 kts.	0	0	0
60 HAMILTON	8/6/1983	Tstm Wind	0 kts.	0	0	0
61 HAMILTON	9/11/1983	Tstm Wind	0 kts.	0	0	0
62 HAMILTON	9/12/1983	Tstm Wind	0 kts.	0	0	0
63 HAMILTON	5/3/1984	Hail	0.75 in.	0	0	0
64 HAMILTON	5/7/1984	Hail	0.75 in.	0	0	0
65 HAMILTON	5/28/1984	Tstm Wind	0 kts.	0	0	0
66 HAMILTON	6/30/1984	Hail	1.00 in.	0	0	0
67 HAMILTON	4/5/1985	Hail	1.00 in.	0	0	0
70 HAMILTON	4/5/1985	Hail	0.75 in.	0	0	0
68 HAMILTON	4/5/1985	Tstm Wind	56 kts.	0	0	0
69 HAMILTON	4/5/1985	Tstm Wind	0 kts.	0	0	0
71 HAMILTON	6/7/1985	Hail	1.75 in.	0	0	0
72 HAMILTON	6/7/1985	Hail	1.75 in.	0	0	0
73 HAMILTON	6/17/1985	Tstm Wind	0 kts.	0	0	0
74 HAMILTON	4/20/1986	Tstm Wind	0 kts.	0	0	0
75 HAMILTON	8/7/1986	Tstm Wind	0 kts.	0	1	0
76 HAMILTON	4/14/1987	Hail	1.00 in.	0	0	0
77 HAMILTON	4/14/1987	Hail	0.75 in.	0	0	0
78 HAMILTON	7/6/1987	Tstm Wind	0 kts.	0	0	0
79 HAMILTON	9/8/1987	Tstm Wind	0 kts.	0	0	0
80 HAMILTON	5/14/1988	Hail	1.75 in.	0	0	0
81 HAMILTON	6/25/1988	Tstm Wind	0 kts.	0	0	0
82 HAMILTON	7/16/1988	Tstm Wind	0 kts.	0	0	0
83 HAMILTON	8/3/1988	Tstm Wind	0 kts.	0	0	0
84 HAMILTON	11/5/1988	Tstm Wind	0 kts.	0	0	0
85 HAMILTON	5/20/1989	Tstm Wind	0 kts.	0	0	0
86 HAMILTON	11/15/1989	Tstm Wind	0 kts.	0	0	0
87 HAMILTON	5/1/1990	Tstm Wind	0 kts.	0	0	0
88 HAMILTON	5/3/1990	Hail	1.00 in.	0	0	0
89 HAMILTON	5/27/1990	Tstm Wind	0 kts.	0	0	0
90 HAMILTON	6/22/1990	Tstm Wind	0 kts.	0	0	0
91 HAMILTON	7/10/1990	Tstm Wind	0 kts.	0	0	0
92 HAMILTON	7/11/1990	Tstm Wind	0 kts.	0	0	0
93 HAMILTON	7/12/1990	Hail	0.75 in.	0	0	0
94 HAMILTON	7/22/1990	Tstm Wind	0 kts.	0	0	0
95 HAMILTON	8/4/1990	Tstm Wind	0 kts.	0	0	0

Location or County	Date	Type	Magnitude	Death	Injury	Property Damage
96 HAMILTON	8/5/1990	Tstm Wind	0 kts.	0	0	0
97 HAMILTON	8/9/1990	Hail	1.75 in.	0	0	0
98 HAMILTON	8/9/1990	Hail	1.25 in.	0	0	0
99 HAMILTON	8/9/1990	Tstm Wind	52 kts.	0	0	0
100 HAMILTON	8/20/1990	Tstm Wind	0 kts.	0	0	0
101 HAMILTON	8/21/1990	Hail	0.75 in.	0	0	0
102 HAMILTON	8/29/1990	Tstm Wind	0 kts.	0	0	0
103 HAMILTON	9/7/1990	Tstm Wind	0 kts.	0	0	0
104 HAMILTON	9/10/1990	Hail	1.00 in.	0	0	0
105 HAMILTON	10/4/1990	Tornado	F1	0	0	250K
106 HAMILTON	2/13/1991	Hail	0.88 in.	0	0	0
107 HAMILTON	9/18/1991	Tstm Wind	0 kts.	0	0	0
108 HAMILTON	3/19/1992	Hail	0.75 in.	0	0	0
109 HAMILTON	3/19/1992	Hail	0.75 in.	0	0	0
110 HAMILTON	3/19/1992	Tstm Wind	0 kts.	0	0	0
112 HAMILTON	4/24/1992	Hail	0.75 in.	0	0	0
113 HAMILTON	4/24/1992	Hail	0.75 in.	0	0	0
111 HAMILTON	4/24/1992	Tstm Wind	0 kts.	0	0	0
114 HAMILTON	6/18/1992	Tstm Wind	0 kts.	0	0	0
115 HAMILTON	6/20/1992	Tstm Wind	0 kts.	0	0	0
116 HAMILTON	6/20/1992	Tstm Wind	0 kts.	0	0	0
117 HAMILTON	6/20/1992	Tstm Wind	0 kts.	0	0	0
118 HAMILTON	7/5/1992	Tstm Wind	0 kts.	0	0	0
119 HAMILTON	7/14/1992	Tstm Wind	0 kts.	0	0	0
120 HAMILTON	8/10/1992	Tstm Wind	0 kts.	0	0	0
121 HAMILTON	11/22/1992	Hail	1.75 in.	0	0	0
122 HAMILTON	11/22/1992	Hail	1.75 in.	0	0	0
123 HAMILTON	11/22/1992	Tstm Wind	0 kts.	0	0	0
124 Chattanooga	1/24/1993	High Winds	36 kts.	0	0	1K
125 Soddy Daisy	2/21/1993	Thunderstorm Winds	N/A	0	0	5K
126 HAMILTON	3/23/1993	Flash Flood	N/A	0	0	5K
127 Chattanooga	3/23/1993	Thunderstorm Winds	N/A	0	0	5K
129 Soddy Daisy	4/15/1993	Hail	0.75 in.	0	0	0
128 Soddy Daisy	4/15/1993	Thunderstorm Winds	N/A	0	0	1K
Countywide	12/20/1993	Snow	N/A	0	0	1K
Countywide	1/28/1994	High Winds	0 kts.	0	0	500K
132 Chattanooga	3/21/1994	Lightning	N/A	0	0	5K
133 Chattanooga	3/27/1994	Flash Flooding	N/A	0	0	50.0M
134 Chattanooga	4/15/1994	Flash Flooding	N/A	0	0	5K
135 Birchwood	4/27/1994	Hail	0.75 in.	0	0	0K
136 Birchwood	4/27/1994	Thunderstorm Winds	N/A	0	0	1K
137 Red Bank	5/15/1994	Thunderstorm Winds	N/A	0	0	5K
139 Hamilton	6/2/1994	Hail	0.75 in.	0	0	0
140 Chattanooga	6/2/1994	Hail	0.88 in.	0	0	0
138 Chattanooga	6/2/1994	Lightning	N/A	0	0	5K
143 Chattanooga	6/26/1994	Flash Flooding	N/A	0	0	5K
141 Sale Creek	6/26/1994	Thunderstorm Winds	N/A	0	0	1K
142 Ooltewah	6/26/1994	Thunderstorm Winds	N/A	0	0	1K
144 Soddy Daisy	7/21/1994	Thunderstorm Winds	N/A	0	0	1K

Location or County	Date	Type	Magnitude	Death	Injury	Property Damage
Countywide	1/17/1995	Heavy Snow	N/A	0	0	0
Countywide	1/17/1995	Ice	N/A	0	0	500K
147 Signal Mountain	1/28/1995	Hail	0.75 in.	0	0	0K
148 East Ridge	2/16/1995	Flooding	N/A	0	0	1K
150 Chattanooga	4/21/1995	Thunderstorm Winds	N/A	0	0	0.0M
149 Redbank	4/21/1995	Tornado	F2	0	0	0.1M
151 Hixson	5/14/1995	Hail	1.75 in.	0	0	5K
152 Chattanooga	5/14/1995	Hail	1.75 in.	0	0	5K
153 Sale Creek	5/16/1995	Hail	0.75 in.	0	0	0K
154 Sale Creek	5/16/1995	Thunderstorm Winds	N/A	0	0	5K
155 Chattanooga	5/18/1995	Thunderstorm Winds	N/A	0	0	2
156 Chattanooga	6/6/1995	Thunderstorm Winds	N/A	0	0	2K
157 Middle Valley	6/11/1995	Thunderstorm Winds	N/A	0	0	0.0M
158 Chattanooga	6/26/1995	Hail	0.75 in.	0	0	0K
159 Chattanooga	7/3/1995	Thunderstorm Winds	N/A	0	0	2K
160 Chattanooga	7/4/1995	Thunderstorm Winds	N/A	0	0	2K
161 Chattanooga	7/16/1995	Thunderstorm Winds	N/A	0	0	5K
162 Chattanooga	8/1/1995	Thunderstorm Winds	N/A	0	0	20K
163 Sale Creek	8/7/1995	Thunderstorm Winds	N/A	0	0	1K
164 Salt Creek	9/1/1995	Thunderstorm Winds	N/A	0	0	5K
165 Countywide	9/1/1995	Thunderstorm Winds	N/A	0	0	10K
166 Chattanooga	9/1/1995	Thunderstorm Winds	N/A	0	0	500K
168 Countywide	10/5/1995	Flood	N/A	0	0	20K
167 TNZ036 - 039>044 - 067>074 - 083>087 - 099>102	10/5/1995	High Winds	0 kts.	0	0	2.0M
169 TNZ012>018 - 034>047 - 066>074 - 083>087 - 099>102	1/6/1996	Winter Storm	N/A	0	0	0
170 TNZ012>018 - 034>047 - 066>074 - 083>087 - 099>102	1/11/1996	Winter Storm	N/A	0	0	0
171 TNZ012>018 - 034>047 - 066>074 - 083>087 - 099>102	2/2/1996	Winter Storm	N/A	0	0	0
172 Chattanooga	3/6/1996	Flash Flood	N/A	0	0	15K
173 Chattanooga	3/6/1996	Tstm Wind/hail	75 kts.	0	0	20K
174 Countywide	4/13/1996	Tstm Wind	51 kts.	0	0	0
175 North Portion	4/20/1996	Tstm Wind	52 kts.	0	0	0
176 East Ridge	5/6/1996	Lightning	N/A	0	0	0
177 North Part	5/24/1996	Hail	1.75 in.	0	0	0
178 North Part	5/24/1996	Tstm Wind	0 kts.	0	0	0
179 Northwest Part	5/27/1996	Tstm Wind	0 kts.	0	0	0
180 North Part	5/28/1996	Tstm Wind	0 kts.	0	0	0
181 Chattanooga	6/3/1996	Tstm Wind	0 kts.	0	0	2K
182 Ooltewah	7/23/1996	Tstm Wind	0 kts.	0	0	0
183 Red Bank	8/11/1996	Flash Flood	N/A	0	0	2.0M
184 Collegedale	8/26/1996	Tstm Wind	0 kts.	0	0	0
185 Countywide	1/5/1997	Hail	0.75 in.	0	0	0
186 TNZ012>018 - 034>047 - 066>074 -	1/10/1997	Winter Storm	N/A	0	0	0

Location or County	Date	Type	Magnitude	Death	Injury	Property Damage
083>087 - 099>102						
187 Chattanooga/East Brainard	3/29/1997	Tornado	F3	0	44	45.0M
188 Mowbray	4/19/1997	Hail	0.75 in.	0	0	0
189 Soddy Daisy	4/21/1997	Tstm Wind	0 kts.	0	5	0
190 Lookout Mtn	4/28/1997	Hail	0.75 in.	0	0	0
191 Chattanooga	6/1/1997	Tstm Wind/hail	75 kts.	0	0	20K
192 Sale Creek	6/13/1997	Tstm Wind	0 kts.	0		
193 Bakewell	6/13/1997	Tstm Wind	0 kts.	0	0	15K
194 Lookout Mtn	6/14/1997	Hail	0.75 in.	0	0	0
196 Chattanooga	6/21/1997	Flash Flood	N/A	0		0
195 Red Bank	6/21/1997	Tstm Wind/hail	75 kts.	0	0	0
197 Countywide	7/4/1997	Tstm Wind/hail	200 kts.	0	0	300K
198 East Brainerd	7/28/1997	Tstm Wind	0 kts.	0	0	10K
199 Signal Mtn	10/25/1997	Hail	1.00 in.	0	0	0
200 East Brainerd	10/25/1997	Hail	0.75 in.	0	0	20K
201 Countywide	10/26/1997	Flash Flood	N/A	0	0	0
202 Soddy Daisy	11/30/1997	Hail	0.75 in.	0	0	0
203 TNZ012>018 - 034>047 - 066>074 - 083>087 - 099>102	12/30/1997	Winter Storm	N/A	0	0	0
205 TNZ034 - 066 - 099	1/7/1998	Flood	N/A	0	0	0
204 Countywide	1/7/1998	Urban/sml Stream Fld	N/A	0	0	0
206 East Ridge	2/3/1998	Flash Flood	N/A	0	0	0
207 Birchwood	2/17/1998	Tstm Wind	0 kts.	0	0	10K
208 Soddy Daisy	3/20/1998	Tstm Wind/hail	100 kts.	0	0	0
209 Sale Creek	4/3/1998	Funnel Cloud	N/A	0	0	0
210 Sale Creek	4/3/1998	Tstm Wind	0 kts.	0	0	0
211 Countywide	4/16/1998	Hail	0.75 in.	0	0	0
212 Harrison	4/16/1998	Hail	1.00 in.	0	0	0
213 Hixon	4/18/1998	Hail	0.75 in.	0	0	0
215 Lookout Mtn	4/18/1998	Hail	0.88 in.	0	0	0
216 Chattanooga	4/18/1998	Hail	0.88 in.	0	0	0
214 Countywide	4/18/1998	Urban/sml Stream Fld	N/A	0	0	0
217 Sale Creek	5/7/1998	Hail	0.75 in.	0	0	0
218 Birchwood	5/7/1998	Hail	1.75 in.	0	0	0
219 Chattanooga	6/9/1998	Tstm Wind	0 kts.	0	0	0
224 Chattanooga	6/10/1998	Hail	1.00 in.	0	0	0
220 Chattanooga	6/10/1998	Tstm Wind	0 kts.	0	0	20K
221 Chattanooga	6/10/1998	Tstm Wind	0 kts.	0	0	22K
222 Sale Creek	6/10/1998	Tstm Wind	0 kts.	0	0	0
223 Chattanooga	6/10/1998	Tstm Wind	0 kts.	0	0	0
225 Chattanooga	6/15/1998	Hail	0.75 in.	0	0	0
226 Lookout Mtn	7/22/1998	Tstm Wind	0 kts.	0	0	5000
227 TNZ012>018 - 034>047 - 066>074 - 083>087 - 099>102	9/1/1998	Drought	N/A	0	0	0
228 Chattanooga	9/6/1998	Tstm Wind	0 kts.	0	0	0
229 TNZ012>018 -	12/22/1998	Ice Storm	N/A	0	0	0

Location or County	Date	Type	Magnitude	Death	Injury	Property Damage
035>047 - 067>074 - 081>087 - 098>102						
230 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102	1/6/1999	Winter Storm	N/A	0	0	
231 Signal Mtn	1/18/1999	Hail	1.00 in.	0	0	0
232 Chattanooga	1/18/1999	Hail	1.25 in.	0	0	0
234 East Ridge	1/23/1999	Flash Flood	N/A	0	0	0
233 Chattanooga	1/23/1999	Tstm Wind	0 kts.	0	0	0
235 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102	3/13/1999	Winter Storm	N/A	0	0	0
236 Countywide	5/6/1999	Tstm Wind	0 kts.	0	0	20000
237 Ooltewah	5/6/1999	Tstm Wind	0 kts.	0	0	0
238 East Ridge	5/13/1999	Hail	1.00 in.	0	0	0
239 Lookout Mtn	6/4/1999	Hail	0.88 in.	0	0	0
240 Signal Mtn	6/4/1999	Hail	0.75 in.	0	0	0
241 East Ridge	6/10/1999	Lightning	N/A	0	0	1M
242 Chattanooga	6/30/1999	Flood	N/A	0	0	0
243 Hixon	6/30/1999	Flood	N/A	0	0	0
244 Red Bank	7/2/1999	Flood	N/A	0	0	0
245 Hixon	7/2/1999	Flood	N/A	0	0	0
246 Soddy Daisy	7/6/1999	Tstm Wind	0 kts.	0	0	12K
247 Hixon	7/24/1999	Tstm Wind	0 kts.	0	0	10K
248 Hixon	7/24/1999	Tstm Wind	53 kts.	0	0	20K
249 Chattanooga	8/23/1999	Tstm Wind	0 kts.	0	0	5K
250 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102	1/22/2000	Winter Storm	N/A	0	0	0
251 Chattanooga	2/13/2000	Tstm Wind	0 kts.	0	0	15K
252 Signal Mtn	2/13/2000	Tstm Wind	0 kts.	0	0	0
253 Red Bank	4/3/2000	Flood	N/A	0	0	0
254 Hixon	4/3/2000	Flood	N/A	0	0	0
255 East Ridge	4/3/2000	Flood	N/A	0	0	0
256 Mowbray	4/20/2000	Hail	1.00 in.	0	0	0
257 Soddy Daisy	4/20/2000	Hail	0.75 in.	0	0	0
258 Chattanooga	5/27/2000	Tstm Wind	0 kts.	0	0	0
259 Soddy Daisy	6/25/2000	Hail	1.75 in.	0	0	0
260 Soddy Daisy	7/6/2000	Hail	0.75 in.	0	0	0
261 Countywide	7/6/2000	Tstm Wind	0 kts.	0	0	15K
262 Signal Mtn	7/28/2000	Tstm Wind	0 kts.	0	0	0
264 Hixon	7/29/2000	Hail	0.75 in.	0	0	0
263 Chattanooga	7/29/2000	Tstm Wind	0 kts.	0	0	10K
265 Hixon	7/29/2000	Tstm Wind	0 kts.	0	0	0
266 Harrison	7/29/2000	Tstm Wind	52 kts.	0	0	0
267 Chattanooga	7/30/2000	Tstm Wind	0 kts.	0	0	0
268 Red Bank	8/10/2000	Hail	0.88 in.	0	0	0
269 Harrison	8/10/2000	Hail	0.75 in.	0	0	0
270 East Ridge	11/9/2000	Tstm Wind	0 kts.	0	0	12K
271 TNZ012>018 - 035>047 - 067>074 -	12/2/2000	Winter Storm	N/A	0	0	0

Location or County	Date	Type	Magnitude	Death	Injury	Property Damage
081>087 - 098>102						
272 Countywide	12/16/2000	Tstm Wind	0 kts.	0	0	3K
273 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102	12/18/2000	Winter Storm	N/A	0	0	0
274 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102	1/1/2001	Winter Storm	N/A	0	0	0
275 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102	1/20/2001	Winter Storm	N/A	0	0	0
276 Signal Mtn	2/16/2001	Tstm Wind	0 kts.	0	0	0
277 East Ridge	2/16/2001	Tstm Wind	0 kts.	0	0	0
278 Birchwood	4/15/2001	Tstm Wind	0 kts.	0	0	0
279 Chattanooga	5/24/2001	Hail	0.75 in.	0	0	0
280 Chattanooga	5/24/2001	Hail	0.75 in.	0	0	0
281 Chattanooga	6/4/2001	Tstm Wind	57 kts.	0	0	0
282 Red Bank	6/4/2001	Tstm Wind	52 kts.	0	0	0
283 Red Bank	6/4/2001	Tstm Wind	53 kts.	0	0	0
284 Chattanooga	6/15/2001	Tstm Wind	0 kts.	0	0	0
285 Hixon	6/15/2001	Tstm Wind	0 kts.	0	0	0
286 Chattanooga	6/15/2001	Tstm Wind	0 kts.	0	0	25K
287 Red Bank	6/26/2001	Hail	1.75 in.	0	0	0
289 Soddy Daisy	6/26/2001	Hail	0.75 in.	0	0	0
288 Signal Mtn	6/26/2001	Tstm Wind	0 kts.	0	0	0
290 Soddy Daisy	6/26/2001	Tstm Wind	0 kts.	0	0	12K
291 Chattanooga	7/4/2001	Tstm Wind	0 kts.	0	0	1K
292 Countywide	7/4/2001	Tstm Wind	0 kts.	0	0	23K
293 Chattanooga	7/28/2001	Flash Flood	N/A	0	0	0
294 Chattanooga	8/19/2001	Hail	0.75 in.	0	0	0
296 Bakewell	10/24/2001	Hail	1.00 in.	0	0	0
297 Hixon	10/24/2001	Hail	0.75 in.	0	0	0
295 Countywide	10/24/2001	Tstm Wind	0 kts.	0	0	14K
298 Red Bank	10/24/2001	Tstm Wind	0 kts.	1	1	75K
299 Chattanooga	10/24/2001	Tstm Wind	0 kts.	0	0	26K
300 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102	1/5/2002	Winter Storm	N/A	0	0	0
301 Countywide	1/24/2002	Tstm Wind	0 kts.	0	0	5K
302 Chattanooga	5/13/2002	Tstm Wind	0 kts.	0	0	12K
303 Red Bank	5/13/2002	Tstm Wind	0 kts.	0	0	20K
307 Chattanooga	6/4/2002	Flash Flood	N/A	0	0	0
304 Hixon	6/4/2002	Hail	0.75 in.	0	0	0
305 Chattanooga	6/4/2002	Tstm Wind	0 kts.	0	0	40K
306 Hixon	6/4/2002	Tstm Wind	0 kts.	0	0	10K
308 Harrison	6/30/2002	Tstm Wind	0 kts.	0	0	20K
309 Signal Mtn	7/10/2002	Tstm Wind	0 kts.	0	0	15K
310 East Brainerd	8/2/2002	Tstm Wind	0 kts.	0	0	20K
311 Chattanooga	8/26/2002	Tstm Wind	58 kts.	0	0	0
312 Red Bank	11/10/2002	Hail	0.75 in.	0	0	0

Location or County	Date	Type	Magnitude	Death	Injury	Property Damage
313 Signal Mtn	11/10/2002	Tstm Wind	0 kts.	0	0	10K
314 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102	1/16/2003	Winter Storm	N/A	0	0	0
315 TNZ015>018 - 036>047 - 067>074 - 083>087 - 099>102	2/3/2003	Strong Wind	N/A	0	0	33K
316 TNZ018 - 041 - 043 - 045 - 047 - 072 - 074 - 083 - 099	2/7/2003	Heavy Snow	N/A	0	0	0
317 TNZ012>015 - 035>036 - 047 - 067 - 069 - 074 - 081>083 - 087 - 099	2/9/2003	Heavy Snow	N/A	0	0	0
318 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102	2/14/2003	Flood	N/A	0	0	18.1M
319 Countywide	2/16/2003	Flash Flood	N/A	0	0	0
320 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102	2/21/2003	Flood	N/A	0	0	0
321 East Ridge	3/19/2003	Hail	0.75 in.	0	0	0
323 Grasshopper	4/25/2003	Hail	0.88 in.	0	0	0
322 Countywide	4/25/2003	Tstm Wind	60 kts.	0	0	10K
324 Chattanooga	4/29/2003	Tstm Wind	60 kts.	0	0	5K
325 Mowbray	4/30/2003	Tstm Wind	60 kts.	0	0	5K
326 Countywide	5/1/2003	Tstm Wind	60 kts.	0	0	3K
328 Red Bank	5/5/2003	Hail	0.75 in.	0	0	0
330 Red Bank	5/5/2003	Hail	1.00 in.	0	0	0
331 Chattanooga	5/5/2003	Hail	0.88 in.	0	0	0
327 Countywide	5/5/2003	Tstm Wind	60 kts.	0	0	15K
329 Countywide	5/5/2003	Tstm Wind	60 kts.	0	0	15K
332 Countywide	5/5/2003	Tstm Wind	60 kts.	0	0	15K
333 Countywide	5/5/2003	Tstm Wind	60 kts.	0	0	12K
334 Countywide	5/6/2003	Flash Flood	N/A	0	0	23.2M
335 Countywide	5/8/2003	Flash Flood	N/A	0	0	23.2M
336 Chattanooga	6/11/2003	Tstm Wind	60 kts.	0	0	10K
337 Chattanooga	6/11/2003	Tstm Wind	55 kts.	0	0	18K
338 Red Bank	6/11/2003	Tstm Wind	55 kts.	0	0	20K
339 Soddy Daisy	7/10/2003	Tstm Wind	60 kts.	0	0	0
340 Soddy Daisy	7/10/2003	Tstm Wind	60 kts.	0	0	0
341 East Ridge	7/10/2003	Tstm Wind	60 kts.	0	0	0
344 Ooltewah	7/13/2003	Hail	0.75 in.	0	0	0
342 Birchwood	7/13/2003	Tstm Wind	60 kts.	0	0	0
343 Soddy Daisy	7/13/2003	Tstm Wind	60 kts.	0	0	0
345 Ooltewah	7/13/2003	Tstm Wind	60 kts.	0	0	0
346 Ooltewah	7/22/2003	Tstm Wind	60 kts.	0	0	0
347 Collegedale	8/4/2003	Tstm Wind	60 kts.	0	0	0
348 Sale Creek	8/22/2003	Tstm Wind	60 kts.	0	0	0
349 Countywide	8/22/2003	Tstm Wind	60 kts.	0	0	0
350 Chattanooga	8/27/2003	Tstm Wind	60 kts.	0	0	0

Location or County	Date	Type	Magnitude	Death	Injury	Property Damage
351 Soddy Daisy	11/18/2003	Tstm Wind	70 kts.	0	0	20K
352 TNZ012>014 - 035>041 - 067>074 - 081>086 - 098>101	1/9/2004	Winter Storm	N/A	0	0	0
353 Sale Creek	3/20/2004	Tstm Wind	55 kts.	0	0	15K
	Source					
TOTALS:	Total			1	48	167.686M

Source: NOAA National Climatic Data Center

Comments on First Draft of Hamilton County Natural Hazard Mitigation Plan

By Dr. Diane Halstead, University of Tennessee at Chattanooga
Former Resident of 170 Willow Creek Dr., Soddy Daisy, TN 37379
October 14, 2004

My primary concern about the plan is the extreme lack of emphasis on erosion issues, especially in the N. Chickamauga Creek area.

I hope the information forwarded to Greg Helms will be added to the plan, especially the data from the 1998 U.S. Army Corps of Engineers (Nashville District) study. This comprehensive review includes **extensive** history, background, and empirical data on:

1) the extent of the erosion in N. Chick. Area (in feet)
2) the financial costs of the erosion to homeowners, municipalities, industrial parks, public assets (e.g., Dayton Pike bridge and now the cul de sac on Willow Creek Dr. in Soddy Daisy)
3) the environmental costs related to erosion (e.g., substantial declines in water quality, negative impact on fish and wildlife habitat, loss of forested wetlands, etc.—p. 22)
4) the causes of the erosion (which are important in order to provide solutions), and
5) the large number of government-sponsored studies of the erosion and related hazards in this watershed, especially the 1989 Hamilton County Flood Insurance Study by FEMA.

Of particular concern is the lack of information in the plan about the LONG-STANDING knowledge of this problem (since 1928) and continual measurement via aerial photos, etc. I refer specifically to Table 1 on p.15 of the Corps of Engineers plan.

Some of this info was also documented in many other studies and plans, most recently the application submitted by Soddy Daisy for Emergency Watershed Protection (EWP) funds. Another source is the application for the Community Development Block Grant obtained from the TN Dept. of Economic and Community Development (HUD money) for Hamilton and Rhea counties. The Southeast TN Development District completed and filed the application in 2003, and the local office should have it.

Both of these, as well as the meeting minutes from the recently formed Hamilton-Rhea County Streambank Task Force (Laura Riley of Graysville has these minutes on tape, and many task force members had extensive notes as well.

Data from the Natural Resources Conservation Service (USDA) should also be included since they have surveying data; costs of various repair options (e.g., riprap, gabion baskets and mattresses, etc.). Kathy Daugherty and Denise Watkins are the best sources for this.

Possible Solutions:

1. Stop development in watershed areas. There is almost 100 percent agreement among engineers, environmentalists, business leaders, politicians, and especially homeowners that the Willow Creek subdivision NEVER should have been built.
2. Restrict development in watershed areas via large fees imposed on developers and builders, as well as strict regulation of buffer zones, etc. Other restrictions are likely possible as well.
3. Create an insurance program (similar to National Flood Insurance Program) for erosion losses (absolutely no coverage currently exists for either homeowners or businesses—neither flood insurance, homeowners, or other hazard-type insurance covers erosion). If not a national program—a state program at least.
4. Expand FEMA coverage to erosion losses (only flooding covered currently).
5. Develop a single govt. agency or entity to handle erosion. Currently there are so many depts., agencies, individuals involved at both the city, county, state, and federal level, that it is impossible to achieve results.

Many more ideas, but I'm out of time.

EROSION losses in Hamilton (and surrounding) counties are much larger and more frequent than the plan currently addresses. I am disappointed in the lack of information provided by Soddy Daisy, especially.

October 14, 2004

Hamilton County Natural Hazards Mitigation Plan Draft Summary Comments

Regarding natural hazards, there is quite a history primarily in relation to flooding in the South Chickamauga Creek watershed during weather events. Most of these stem from our lack of means and will to protect the wetlands and flood plains in this creek's watershed. In fact, the Brainerd Levee was built in the late 1960s to protect buildings and homes that were allowed to be built in flood buffering areas only to then suffer from floodwaters.

The penchant for developing with few restrictions has led to continuing flood damage. Examples include

- the Spring Creek area in East Ridge
- extensive sedimentation shown by TVA creek monitoring in feeder streams in the Hamilton Place area
- waivers for new subdivisions to be built in many of the watershed's flood prone areas both in Catoosa County and in the City of Chattanooga
- the clearing of riparian zones along the stream corridor by business and homeowners
- the sudden clearing of numerous trees on Concord Road

These continuing assaults have led to ever-rising FEMA lines delineating 100 and 500-year flood levels. The latest FEMA documents show that the line has risen to the height of the Brainerd Levee itself.

Rather than build an extremely costly higher levee, it seems prudent to seek flood prevention solutions. We are pleased to see that this new Natural Hazards Mitigation Plan lists a number of mitigation alternatives and preferred actions with which the South Chickamauga Creek Greenway Alliance, a citizen watershed advocacy group, would concur. We would especially urge not only an evaluation of the potential for a stream buffer ordinance along with stormwater and floodplain regulation, but institution as quickly as possible.

For East Ridge, preferred actions to reduce flood damage in the Spring Creek and West Chickamauga Creek flood zones include refurbishing of infrastructure and flood proofing houses along with redirecting flows and dredging. We do not support redirecting flow or dredging as these will alter the existing ecosystem and natural hydrology of the area while taking away existing wetlands that now serve as flood buffers. There was some talk in the past of buying out the homes flooding in the Spring Creek area, but that is not listed as a possible solution.

In looking at ultimate solutions to stop damage from future flooding in South Chickamauga Creek, the prevention of further development in flood plains and wetland areas seems paramount. Tree protection, the planting of additional trees, bank stabilization, and establishment of greenway/riparian zones will also go a long way to make use of nature's way to prevent damage from floods. Further, the education of developers along with strengthened zoning regulations would be most beneficial. As an example of need for this type of education, we call attention to the request for permit to build boat docks extending into the stream near the Old Harrison Pike Bridge as part of the Water Haven Subdivision. This is an invitation to future destruction and replacement cost as every flood on South Chickamauga Creek brings its share of fallen trees and extensive debris in a high and swift current. We suggest that an educational training program could well prevent time and effort spent in considering such requests and thus prevent much natural hazards mitigation in the future.

Sandra L. Kurtz
SCCGA Co-Chairman

13. Resolutions to adopt the Hamilton County Natural Hazards Mitigation Plan

04/21/05 08:32 NO.286 P02

STATE OF TENNESSEE
Hamilton County

January 5, 2005
DATE (Month, Day, Year)

Hamilton County Board of Commissioners

RESOLUTION

No. 105-8

A RESOLUTION ADOPTING THE HAMILTON COUNTY NATURAL HAZARDS MITIGATION PLAN AND AUTHORIZING THE EMERGENCY SERVICES DEPARTMENT TO SUBMIT THE PLAN TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY

WHEREAS, the Federal Disaster Mitigation Act of 2000 requires multi-jurisdictional, "all hazard" mitigation plans as a condition of eligibility for specified support from the Federal Emergency Management Agency (FEMA); and,

WHEREAS, the Hamilton County Emergency Services Department is coordinating the countywide planning process; and,

WHEREAS, jurisdictions must formally adopt the Natural Hazards Mitigation Plan to receive certain types of natural disaster assistance after November 1, 2004; and,

WHEREAS, all municipalities, as well as the unincorporated areas of the County, are participating; and,

WHEREAS, the ongoing planning process will better enable preparedness for and recovery from natural disasters; and

NOW THEREFORE BE IT RESOLVED BY THIS LEGISLATIVE BODY IN SESSION ASSEMBLED:

Hamilton County approves the Hamilton County Natural Hazards Mitigation Plan, a copy is available on request, and the Emergency Services Department is hereby authorized to submit the Plan to FEMA and to update and amend it as needed on an ongoing basis to assure our citizens protection and recovery from natural disasters.

BE IT FURTHER RESOLVED THAT THIS RESOLUTION TAKE EFFECT AT AND FROM ITS PASSAGE, THE PUBLIC WELFARE REQUIRING IT.

EFFECTIVE LAW UNDER TEN (10) DAY PROVISION
CHAPTER 934, TENNESSEE PUBLIC ACTS OF 1978
ATTEST: Deputy County Clerk
DATE 1-18-2005

Approved: ☑ CERTIFICATION OF ACTION
Rejected: ☐ County Clerk

Approved: ☐ County Executive
Vetoed: ☐ January 5, 2004

Chattanooga

RESOLUTION NO. 24253

A RESOLUTION APPROVING THE ADOPTION OF THE HAMILTON COUNTY NATURAL HAZARDS MITIGATION PLAN 2004.

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF CHATTANOOGA, TENNESSEE, That the Hamilton County Natural Hazards Mitigation Plan 2004, a summary of which is attached hereto, be and is hereby adopted.

ADOPTED: November 9, 2004

/add

Chattanooga Council

1000 Lindsay Street
Chattanooga, Tennessee 37402
Telephone (423) 757-5196 / Fax (423) 757-4857

CAROL K. O'NEAL, CMC
Clerk of the Council

I. SHIRLEY CROWNOVER
Assistant Clerk of the Council

NOTICE OF CERTIFICATION

I, CAROL K. O'NEAL, CMC, Clerk of the City Council of Chattanooga, Tennessee, and as such keeper of the records of the City Council of said City, do hereby certify that the foregoing is a true, compared and correct copy of Resolution No. 24253 adopted at the City Council meeting of November 9, 2004.

Carol K. O'Neal, CMC

Carol K. O'Neal, CMC
Clerk of the City Council
City of Chattanooga, Tennessee

WITNESS my hand and the Seal of the City of Chattanooga, Tennessee on this 20th day of April, 2005.

RESOLUTION #274
ADOPTION OF THE HAMILTON COUNTY
NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Federal Emergency Management Agency (FEMA) has established rules and regulations under 44 CFR Parts 201.6, which requires that "For disasters declared after November 1, 2004, a local government must have a mitigation plan approved pursuant to this section in order to receive HMGP projects grants"; and

WHEREAS, in addition, it is understood that:
"For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan."; and

WHEREAS, the FEMA regulation 201.6 requires:
"Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g, City Council, County Commission). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted: and

WHEREAS, the City of Collegedale Board of Commissioners have reviewed the draft "Hamilton County Natural Hazards Mitigation Plan"; and

NOW THEREFOR BE IT RESOLVED THAT THE City of Collegedale does hereby adopt the "Hamilton County Natural Hazards Mitigation Plan, and

BE IF FURTHER RESOLVED THAT THE Hamilton County Office of Emergency Service prepare and submit to the Federal Emergency Management Agency in accordance with the draft rules and regulations published by FEMA, the Hamilton County Natural Hazards Mitigation Plan; and

BE IT FURTHER RESOLVED THAT THE City Recorder be and is hereby authorized and directed to certify copies of this resolution to the Hamilton County Office of Emergency Services.

ADOPTED at a meeting of the City of Collegedale Board of Commissioners, on this **17th day of January 2005.**

William Hulsey, Mayor

APPROVED AS TO FORM:

Sam Elliott, City Attorney

Erin Reynolds, City Recorder

I CERTIFY THIS TO BE A TRUE AND EXACT COPY.
CITY RECORDER

East Ridge

RESOLUTION NO. 1139

"A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF EAST RIDGE, TENNESSEE ADOPTING THE HAMILTON COUNTY NATURAL HAZARDS MITIGATION PLAN."

WHEREAS, the Federal Emergency Management Agency (FEMA) has established rules and regulations under 44 CFR Parts 201.6, which requires that "For disasters declared after November 1, 2004, a local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants."; and

WHEREAS, in addition it is understood that:

"For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan."; and

WHEREAS, the FEMA regulation 201.6 requires:

"Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan. For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted."; and

WHEREAS, the Council of the City of East Ridge has reviewed the draft "Hamilton County Natural Hazards Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of East Ridge, Tennessee, that the City of East Ridge does hereby adopt the Hamilton County Natural Hazards Mitigation Plan.

BE IT FURTHER RESOLVED THAT the Hamilton County Office of emergency Services prepares and submits to the Federal Emergency Management Agency in accordance with the draft rules and regulations published by FEMA, the Hamilton County Natural Hazards Mitigation Plan.

BE IT FURTHER RESOLVED THAT the City Recorder be and hereby is authorized and directed to certify copies of this resolution to the Hamilton County Office of Emergency Services.

BE IT FURTHER RESOLVED that this Resolution take affect from and after its passage the public welfare of the City requiring it.

Resolution No. 1139
Page 1 of 2

Passed this the 28th day of October 2004.

Fred Pruett

Fred Pruett, Mayor

Attest:

David Mays

David Mays, City Manager

Approved to Form:

J. Cris Helton, City Attorney

Resolution No. 1139
Page 2 of 2

RESOLUTION # 69
ADOPTING THE HAMILTON COUNTY
NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Federal Emergency Management Agency (FEMA) has established rules and regulations under 44 CFR Parts 201.6, which requires that "For disasters declared after November 1, 2004, a local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants."; and

WHEREAS, in addition, it is understood that:

"For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan."; and

WHEREAS, the FEMA regulation 201.6 requires:

"Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commission). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted ; and

WHEREAS, the Commission of the City of Lakesite, has reviewed the draft "Hamilton County Natural Hazards Mitigation Plan"; and

NOW THEREFORE BE IT RESOLVED THAT THE City of Lakesite does hereby adopt the "Hamilton County Natural Hazards Mitigation Plan, and

BE IT FUTHER RESOLVED THAT THE Hamilton County Office of Emergency Services prepare and submit to the Federal Emergency Management Agency in accordance with the draft rules and regulations published by FEMA, the Hamilton County Natural Hazards Mitigation Plan; and

BE IT FURTHER RESOLVED THAT THE Clerk of the Council be and hereby is authorized and directed to certify copies of this resolution to the Hamilton County Office of Emergency Services.

ADOPTED at a meeting of the Lakesite City Commission, on this 16th day of November, 2004.

Robert Mullin
Mayor

Roberta C. Thomas
City Recorder

I hereby certify that this is a true and correct copy of Resolution 69 passed by the Lakesite City Commission on November 16, 2004.

Roberta C. Thomas
Roberta C. Thomas, City Recorder

RESOLUTION
ADOPTING THE HAMILTON COUNTY
NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Federal Emergency Management Agency (FEMA) has established rules and regulations under 44 CFR Parts 201.6, which requires that "For disasters declared after November 1, 2004, a local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants."; and

WHEREAS, in addition, it is understood that:

"For multi-jurisdictional" plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan."; and

WHEREAS, the FEMA regulation 201.6 requires:

"Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g. City Council, County Commission). For multi-jurisdictional plans, each jurisdiction requesting approval of theplan must document that it has been formally adopted; and

WHEREAS, the Mayor and Board of Commissioners of the Town of Lookout Mountain, Tennessee have reviewed the draft "Hamilton County Natural Hazards Mitigation Plan"; and

NOW, THEREFORE BE IT RESOLVED by the Mayor and Board of Commissioners of the Town of Lookout Mountain, Tennessee, do hereby adopt the "Hamilton County Natural Hazards Mitigation Plan, and

BE IT FURTHER RESOLVED THAT THE Hamilton County Office of the Emergency Services prepare and submit to the Federal Emergency Management Agency in accordance with the draft rules and regulations published by FEMA, the Hamilton County Natural Hazards Mitigation Plan; and

BE IT FURTHER RESOLVED THAT THE Clerk Of the Town of Lookout Mountain be and hereby is authorized and directed to certify copies of this resolution to the Hamilton County Office of Emergency Services.

ADOPTED at a meeting of the Mayor and Board of Commissioners on the 9TH day of NOVEMBER, 2004.

TOWN CLERK

Date 12.14-2004

A:NaturalHazardsResolution.doc

Red Bank

RESOLUTION NO. 04-670

RESOLUTION OF THE BOARD OF COMMISSIONERS OF THE CITY OF RED BANK, TENNESSEE ADOPTING THE HAMILTON COUNTY NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Federal Emergency Management Agency (FEMA) has established rules and regulations under 44 CFR Parts 201.6, which requires that "For disasters declared after November 1, 2004, a local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants"' and

WHEREAS, in addition, it is understood that: "For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan"; and

WHEREAS, the FEMA regulation 201.6 requires: "Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g. City Council, County Commission). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted; and

WHEREAS, the City Commission of the City of Red Bank has reviewed the draft "Hamilton County Natural Hazards Mitigation Plan".

NOW THEREFORE, BE IT RESOLVED that the City Commission of the City of Red Bank, Tennessee, does hereby adopt the "Hamilton County Natural Hazards Mitigation Plan" in its present format and as hereafter amended and formatted; and

BE IT FURTHER RESOLVED that the Hamilton County Office of Emergency Services prepare and submit to the Federal Emergency Management Agency in accordance with the draft rules and regulations published by FEMA, the Hamilton County Natural Hazards Mitigation Plan; and

BE IT FURTHER RESOLVED that the City Recorder, who is, in the words of the referenced sections of the CFR, the Clerk responsible for certifying copies such as the foregoing Resolution, he and hereby is authorized and directed to certify copies of this resolution to the Hamilton County Office of Emergency Services.

Adopted and approved at a regularly scheduled meeting of the City Commission of the City of Red Bank on this 7th day of December, 2004.

CITY OF RED BANK

BY: Pat Brown
Pat Brown, Mayor

ATTEST:

Carolyn Lewis
City Recorder

APPROVED AS TO FORM:

Connel Anderson
City Attorney

03/09/2005 WED 10:15 FAX 423 877 1102 City of Red Bank 002/003

Signal Mountain

Dec 01 04 12:01p Town Of Signal Mountain 1#423#8862939 p.2

1108

A RESOLUTION R2004-37
ADOPTING THE HAMILTON COUNTY NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Federal Emergency Management Agency (FEMA) has established rules and regulations under 44 CFR Parts 201.6, which requires that "For disasters declared after November 1, 2004, a local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants."; and

WHEREAS, in addition, it is understood that:

"For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan; and

WHEREAS, the FEMA regulation 201.6 requires:

"Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commission). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted; and

WHEREAS, the Town Council of the Town of Signal Mountain, Tennessee has reviewed the draft "Hamilton County Natural Hazards Mitigation Plan";

NOW, THEREFORE, BE IT RESOLVED THAT THE Town Council of the Town of Signal Mountain, Tennessee does hereby adopt the "Hamilton County Natural Hazards Mitigation Plan, which is attached hereto as Exhibit A;

BE IT FURTHER RESOLVED THAT THE Town Manager, in connection with the Hamilton County Office of Emergency Services, shall prepare and submit to the Federal Emergency Management Agency in accordance with the draft rules and regulations published by FEMA, the Hamilton County Natural Hazards Mitigation Plan; and

BE IT FURTHER RESOLVED THAT THE Clerk of the Council be and hereby is authorized and directed to certify copies of this resolution to the Hamilton County Office of Emergency Services.

ADOPTED at a meeting of the Signal Mountain Town Council on this 25th day of October, 2004.

11085

MAYOR

RECORDER

10-25-04
DATE

10-25-04
DATE

PAN/kac

Soddy Daisy

12/01/04 11:04 ☎615 332 5048 CITY OF SODDY DA 002/002

2004-2005 RESOLUTION NO. 5
A RESOLUTION OF THE CITY OF SODDY-DAISY, TENNESSEE, ADOPTING THE HAMILTON COUNTY NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Federal Emergency Management Agency (FEMA) has established rules and regulations under 44 CFR Parts 201.6, which requires that "For disasters declared after November 1, 2004, a local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants."; and

WHEREAS, in addition, it is understood that:

"For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan."; and

WHEREAS, the FEMA regulation 201.6 requires:

"Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commission). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted; and

WHEREAS, the Board of Commissioners of the City of Soddy-Daisy has reviewed the draft "Hamilton County Natural Hazards Mitigation Plan."

NOW THEREFORE BE IT RESOLVED THAT THE City of Soddy-Daisy does hereby adopt the "Hamilton County Natural Hazards Mitigation Plan, and

BE IT FURTHER RESOLVED THAT THE Hamilton County Office of Emergency Services prepare and submit to the Federal Emergency Management Agency in accordance with the draft rules and regulations published by FEMA, the Hamilton County Natural Hazards Mitigation Plan; and

BE IT FURTHER RESOLVED THAT THE Clerk of the Council be and hereby is authorized and directed to certify copies of this resolution to the Hamilton County Office of Emergency Services.

Duly Passed and adopted at a meeting of the Board of Commissioners of the City of Soddy-Daisy, Tennessee, on this 18th day of November, 2004.

Jim Adams
Mayor Jim Adams

Sara Burris
Recorder Sara Burris

RESOLUTION 2005-388

A RESOLUTION ADOPTING THE HAMILTON COUNTY NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the Federal Emergency Management Agency (FEMA) has established rules and regulations under 44 CFR Parts 201.6, which requires that "For disasters declared after November 1, 2004, a local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants."; and

WHEREAS, in addition, it is understood that: "For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan." and

WHEREAS, the FEMA regulation 201.6 requires "Documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commission). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted; and

WHEREAS, the Board of Mayor and Aldermen of the Town of Walden have reviewed the draft "Hamilton County Natural Hazards Mitigation Plan"; and

NOW THEREFORE BE IT RESOLVED, that the Town of Walden does hereby adopt the "Hamilton County Natural Hazards Mitigation Plan on this 24th day of March 2005, and

BE IT FURTHER RESOLVED THAT THE Hamilton County Office of Emergency Services prepare and submit to the Federal Emergency Management Agency in accordance with the draft rules and regulations published by FEMA, the Hamilton County Natural Hazards Mitigation Plan; and

BE IT FURTHER RESOLVED THAT THE Recorder of the Town of Walden be and hereby is authorized and directed to certify copies of this resolution to the Hamilton County Office of Emergency Services.

YEA 2
NAY 0

J. Peter Hetzler, Mayor

Fern Lockhart, Recorder