# Roane County Natural Hazard Mitigation Plan

## Roane County

## City of Harriman

## City of Kingston

## City of Rockwood

## Town of Oliver Springs

**September 30, 2010**

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# Section 1
## Introduction and Background

***Purpose***

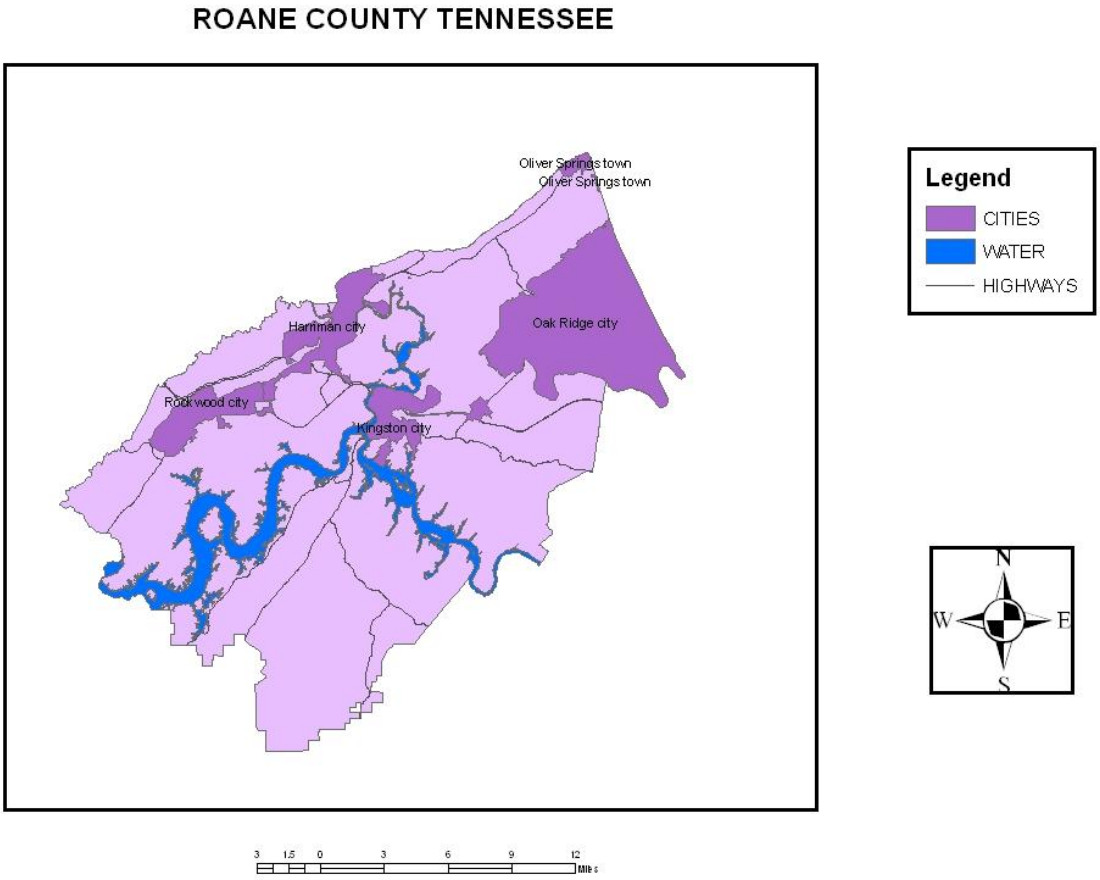
Mitigation refers to the policies and activities that will reduce the area's vulnerability to damage from future disasters. Generally, these measures are those that can be put in place before a disaster occurs. There are many different types of mitigation measures that can be put in place. In general, mitigation activities can be divided 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.

This plan seeks to develop a comprehensive strategy to reduce the impacts of natural hazards in the cities of Harriman, Kingston, Rockwood and the town of Oliver Springs and the unincorporated areas of Roane 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.

In the past, natural hazards in Roane County have caused injury and loss of life, severe property damage, and interruption of the delivery of vital goods and services, disruption of local economies, 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. However, planning for natural hazards and implementing mitigation measures can reduce the impact of such events when they 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 Roane County, the City of Harriman, the City of Kingston, the City of Rockwood and the Town of Oliver Springs to reduce the impact of natural hazards on people, structures, and the natural environment. All natural hazards are similar throughout all of Roane County.

**Map 1**




***Background***

Roane County is the fourteenth largest county in Tennessee with an estimated 2000 population of 51,910. The City of Harriman is the largest city in the county with an estimated 2000 population of 6,788. The other cities in Roane County are Kingston, the county seat, with a 2000 population of 5,264 and Rockwood with 2000 population of 5,774. The other town is Oliver Springs with only a portion of its town's limits in Roane County. Oliver Springs' 2000 population in Roane County was 942. Other unincorporated communities in Roane County are Midtown, Blue Springs, Bradbury, Cardiff, Clax Gap, Elverton, Emory Heights, Emory Gap, Eureka, Glen Alice, Midway, New Hope, Oral, Paint Rock, Pattie Gap, Poplar Springs, Swan Pond, Sugar Grove and Whites Cheek. Roane County is located in central southeastern Tennessee and is bordered on the north by Anderson and Morgan Counties; on the east by Loudon County; on the west by Cumberland County; and on the south by Meigs, McMinn and Rhea Counties.

The county covers approximately 395 square miles or 252,800 acres. The total land area is 360.98 square miles or 231,027.3 acres. Roane County includes three distinct geographic areas, Tennessee and Clinch River Basins and Walden Ridge (western slope of the Cumberland Plateau). In winter, valleys in Roane County are moderately cool with occasional cold and warm spells. In summer, the valleys are very warm and frequently hot, and the Ridge is four to five degrees cooler. Precipitation is heavy and evenly distributed

throughout the year. Summer precipitation falls mainly as thunderstorms. The major transportation corridor is Interstate 40. Other transportation routes include; U.S. Routes 70 and 27; State Routes 61, 62, 58, 72, 327, 299, 304, 29, and 382; and the Norfolk Southern Railway.

Colleges and universities in Roane County include the Roane State Community College.

### *History of Roane County*

### Early Times

The first Roane Countians were Paleo-Indians who first inhabited this area 10,000 to 15,000 years ago. Evidence of these ice-age hunters includes fluted spear points and other stone tools. The Paleo-Indians were followed by other cultures-Archaic, Woodland, Mississippian and, finally, Cherokee.

Although the evidence is only circumstantial, some believe that the first Europeans to visit the area were Spaniards from the Hernando de Soto expedition about 1540. Serious settlements would not come, however, until more than two centuries later at the end of the French and Indian War. The treaty of 1763 gave the English all the lands east of the Mississippi. Free of what one historian called “the French menace”, settlers from the English Colonies moved west into the territory that would eventually become Tennessee. North Carolina claimed ownership of this territory and provided a certain amount of support to the early settlers.

Fort Southwest Point and Beginnings of the County

In 1789, North Carolina ceded the Tennessee territory to the U.S. federal government. The next year, the ceded region became known as the “Territory South of the River Ohio” with William Blount as the appointed governor. Early on, the Cherokees’ dissatisfaction with various treaties led to Indian raids on settlers and travelers. To quell the attacks, Governor Blount called out the militia under Brig. Gen. John Sevier. In 1792, Gen. Sevier established his headquarters, which included a blockhouse and stockade, at Southwest Point, a wedge of high ground at the confluence of the Tennessee and Clinch rivers. Two years later, Congress authorized a fort at Southwest Point, which was established in 1797. Fort Southwest Point was the genesis of Kingston and Roane County. Settlements, complete with trading posts and inns, grew up around the Fort. By 1799, the Fort’s garrison numbered over 400 men; it had become one of the most important military posts on the American frontier. That same year, just three years after Tennessee was admitted to the Union, the Tennessee legislature chartered the town of Kingston. Two years later, the legislature created Roane County with Kingston as its seat.

Transportation was the key to developing the western frontier, and Roane County was a center of transportation flow. The confluence of the Tennessee, Clinch, and Emory rivers made the county a focus for river transport. Early roads to the west, including Avery Trace and the Walton Road, went through the county.

## County Development

The County experienced steady economic and social development up to the Civil War. Religion was a strong part of the social fabric, so the organization of formal churches was a high priority. The economic foundation was agriculture, much of which was based on the fertile river bottom lands. Cotton was the dominant crop, and with corn as the raw material, the distillation of spirits was one of the leading industries. Another early industry, and the largest by the beginning of the Civil War, was iron production. Iron furnaces were in operation as early as 1796 in the Whites Creek area near the southern boundary of Roane County.

A recurring issue, and one that took five treaties and 28 years to dispose of, was the Cherokees' claims to land wanted by the settlers. Forked tongue diplomacy was the norm in dealing with this issue, but it was elevated to a new art form in 1807. In an earlier treaty, the Cherokee had been led to believe that if they ceded the land in and around Kingston to the government, Kingston would become the capital of Tennessee. And true to the agreement, Kingston did become the capital of Tennessee for one day. On Monday, September 21, 1807, the first session of the seventh General Assembly of the state of Tennessee convened in Kingston. At the end of the day, the Senate and the House of Representatives resolved to "….adjourn forthwith from Kingston, to meet on Wednesday the 23rd at eleven o'clock, A.M. at the courthouse in Knoxville.

## The Civil War

By 1860, things were looking bright for the county. A handsome new courthouse had been completed in 1854 to handle the increasing needs of county government. Agriculture, which was increasingly based on scientific methods, showed remarkable progress both in the variety and quantity of products. Four iron furnaces were in operation producing products for local consumption and for export to other states. But the beginning of the Civil War and the end of good times were at hand.

Like most East Tennesseans, a large majority of Roane Countians supported the Union. That remained true even after the firing on Fort Sumter had turned most Middle and West Tennesseans into ardent secessionists. In the June 1861, statewide referendum, Roane County rejected secession by a margin of more than three-to-one. Although hundreds of Roane Countians served in the Confederate Army, which controlled the area during the first two years of the war, many more fled through the mountains into Kentucky, where they were organized into Union Army units.

Several Roane Countians served as regimental and even brigade commanders in the Union and Confederate armies. This division of loyalties tore apart communities, churches, and even families. Tensions were worsened by several changes in control of the area by Union and Confederate forces and by raids and guerrilla warfare activities. The result was economic and social chaos as crops and animals were confiscated; men of military age were conscripted; and churches, public buildings, and private homes were occupied by military units or destroyed.

There were frequent large scale troop movements into and through the county. The famous Confederate cavalry commander, General Nathan Bedford Forrest, maintained his

headquarters in Kingston for a two-month period during the summer of 1863. His command departed just one day before a large Union force under the command of General Ambrose Burnside passed through Kingston en route to the "liberation" of Knoxville and East Tennessee, one of President Lincoln's prime objectives.

Although no major battles were fought in Roane County, there were numerous skirmishes and a larger engagement on November 24, 1863, when a Union infantry brigade stationed in Kingston repelled an attack by a Confederate cavalry brigade led by another famous Rebel commander, General Joe Wheeler.

**End of Civil War to Beginning of World War II**

Recovery from the War

At the end of the Civil War, Roane County was economically bankrupt and socially disorganized. Schools were either damaged or destroyed, churches were closed, farms were stripped bare of livestock and crops, homes and businesses had fallen in disarray, and the few industries still remaining lay idle. Soldiers, who had fought on both sides in the conflict, returned home with hearts filled with animosity toward those who had fought on the opposite side. The population as a whole was demoralized.

Considering the poor state of the county, recovery started rather quickly as people began to repair the damage from war and neglect. Within two years, merchants had reopened their stores and professional men were back in business. Churches and schools were repaired and reopened, and social life moved toward normality. Kingston was once again host to the riverboats that plied the rivers carrying mail, passengers, and cargo. Kingston was not, however, the center of post-war economic development. That took place in Oliver Springs and in communities that did not exist prior to the war, places like Rockwood and Harriman. For the most part, the impetus for post-war development came from northern entrepreneurs and industrialists. To say that Roane Countians welcomed these "Carpetbaggers" would be a stretch. But come they did. And with them came expertise, capital, ideas and prosperity.

Iron, Temperance, and the Lost City

Union General John Wilder, who had commanded the famous "Lightning Brigade" of mounted infantry, was among the first to arrive. He had passed through Roane County during the war and had noted the iron ore and coal resources. He, along with W.O. Rockwood and other northern industrialists, formed the Roane Iron Company in 1867. One year later, the new town of Rockwood was founded. Rockwood epitomized the "company town" since it was the result of one large industry upon which most of the population depended for its livelihood. The company store provided life's necessities.

Just over 20 years later more northerners, in the form of the East Tennessee Land Company, were discovering Roane County. The Land Company was chartered May 25, 1889, for the express purpose of creating a "Utopia of Temperance and Industry." The company purchased Colonel Robert King Byrd's plantation, including the Byrd mansion and 10,000 acres, from his widow for $36,000. The plantation was cut up into lots and sold at the "Great Land Sale" on February 28, 1890. The sale was preceded by a national

advertising campaign. Three thousand prohibitionists came from 18 states and paid $604,705 for 573 lots in the yet-to-be city of Harriman. The town mushroomed out of the soil within a crescent formed by the Emory River. Within two years, it was a thriving city with streets lined with brick retail establishments, magnificent homes, and an industrial base consisting of 29 businesses. Schools, churches, and social clubs were organized by well-educated people who were strict prohibitionists. Whether the reason was the absence of "Demon Rum" or the presence of an industrious people, Harriman prospered. In 1893 the American Temperance University was founded. The beautiful "Temperance Building" which housed the University, still stands.

Two months after the founding of Harriman, the town of Cardiff was promoted as another industrial center. Responding to national advertising, buyers flocked to by lots in the new town. The land brought over a million dollars in just three days. Sadly, the town failed in just a few years, and few traces now remain of "The Lost Town of Cardiff."

The Coming of the Railroad

One of the largest economic and social impacts on Roane County was the completion of the Cincinnati-Southern Railroad from Cincinnati to Chattanooga in 1879. The road entered Roane County through the Emory River Gap in Walden's Ridge. The point at which the railroad crossed the river became the principal distribution point for agricultural products up and down the Cincinnati line. Steamboats coming from Knoxville, Chattanooga, and Kingston made two trips a week up the Emory River laden with corn, hay, and other products. Since the railroad passed through the mineral rich portion of the county, markets for coal, iron ore, and iron products; they were greatly expanded. During the first decade of its existence, the Roane Iron Company depended exclusively on the river as the outlet for its pig iron. Eventually, every major community in the county, except Kingston, would have both freight and passenger service.

Economic Diversification

Coal and timber formed the early economic base of the community first called Winter's Gap and, later, Oliver Springs. The community attained national prominence thanks to another natural resource: mineral springs, the water from which was alleged to have healing properties. Richard Oliver, the first postmaster and the man for whom the town was named, first commercialized the springs by transporting guests from his inn to the springs by horse and buggy. Large scale development took place in 1894 when the Richards family built a four-story hotel boasting its own electric and water plants, nearly 200 rooms, an Italian orchestra, a dance pavilion, elevators, a billiard room, wine cellars, bowling alleys, and tennis courts. The magnificent hotel attracted guests from all across the United States. But it burned in 1905, ending forever the resort era of Oliver Springs.

In the meantime, Harriman was prospering and Rockwood was moving to a more diversified economic base with the establishment of several new manufacturing industries just after the turn of the century. These included the Rockwood Hosiery Mill and the Rockwood Stove Works, both of which were highly successful. The early 1900s also brought the peach industry. By the 1920s, Kingston was the "Peach Capital of the United States." Peaches from thousands of trees on dozens of farms were shipped across the country.

The Crash

The year 1929 was one of the blackest in the history of Roane County. In March of that year, the Great Emory Flood wiped out large portions of Harriman including the manufacturing industries along the river. Just after the flood, blight struck the peach orchards. Within three years the Roane County peach industry was dead. The year 1929 also brought the Great Depression and that, among other things, led to the demise of the Roane Iron Company in January 1930. Unemployment in the county was rampant. Many moved away. Others staved; but most persevered. On the horizon was the Tennessee Valley Authority, World War II, and the Manhattan Project.

**Beginning of World War II to Present**

National Programs and Roane County

The war years form 1941 to 1945 transformed Roane County in many different ways. Like every American community, the war took away most of the young men and reversed the economic environment of the 1930s. Too few jobs for too many people changed rapidly to a home-front labor shortage. But there were changes in Roane County that went far beyond what a typical American community experienced. These impacts came from two national programs that had a direct focus on the county. The Tennessee Valley Authority, which was formed in 1933 as one of the New Deal programs, completed Watts Bar dam in 1942 with the results that the face of county was literally changed. The lake created by the dam uprooted people from their lands and took away some of the best river bottom farms in the county. In the trade, the people of the region got more electricity, a year-round navigable waterway all the way to Knoxville, and one of the most beautiful lakes and recreation areas in the country. The second national initiative, the Manhattan Project, not only changed the face of the county but its heart, soul, and intellect as well.

The year was 1939, and the Nazis were doing well. Their war machine was overrunning Europe and their scientists had just discovered fission. News of the discovery reached the United States within weeks. The implications were apparent to the nuclear physics community in Germany, the United States, England, and elsewhere. It might be possible to build a bomb, based on fission, of unimaginable energy and destructive power. The scientists that understood this possibility were terrified at the prospects for the world if the Hitler regime built the bomb first. It was also very clear that the Nazis were ahead.

In July 1939, at the suggestion of physicists Eugene Wigner (later to be Research Director at Roane County's Oak Ridge National Laboratory) and Leo Szilard, Albert Einstein wrote a letter to President Franklin Roosevelt urging him to start a research program on the feasibility of making a nuclear weapon; the recommendation was accepted. On June 13, 1942, approximately six months after the Japanese attack on Pearl Harbor and America's entry into the war, Roosevelt received the report. Scientists had concluded that an atomic bomb was feasible and recommended that a full-scale project be started. The report was approved by the President four days later. The Manhattan Engineer District (MED) was formed under the Army Corps of Engineers to develop the atomic bomb. The project was headed by Colonel [later, Major General] Leslie R Groves. On September 19, 1942, two days after his appointment, Groves chose a reservation carved out of Roane and

Anderson Counties for [1] demonstrating the feasibility of producing relatively large amounts of plutonium in a nuclear reactor and separating it from the irradiated reactor fuel and [2] separating the fissionable isotope U-235 from natural uranium. One factor in the decision was the availability of a large amount of TVA-generated electricity from the just completed Watts Bar Dam and from other TVA facilities.

Places Called K-25, Y-12, and X-10

The Corp of Engineers moved quickly to file a "declaration of taking" in federal court to get immediate possession of 56,000 acres in Roane and Anderson Counties. At first, the residents thought the people running around with surveying instruments were just more TVA men. Later they wished they were TVA men. The Corps tried to give the resident six weeks to clear out, but some got only two. Sometimes people would get home to find an eviction notice tacked to their door or to a tree in the front yard. Schools, churches, and roads were closed. Whole communities disappeared in a matter of weeks. In contrast to the TVA policy of assisting displaced residents in finding new land and quarter, the Corps of Engineers just kicked them out. One fellow observed that "….the only difference is when the Yankees came before, we could shoot at them." As harsh as the actions were, there was justification. General Groves and officials of the Manhattan Project were determined to beat the Nazis to the atomic bomb. Nothing was allowed to stand in the way of that objective.

The Corps of Engineers operation in East Tennessee was, in the beginning, called the Kingston Demolition Range. Later, it was officially designated the Clinton Engineer Works, which would eventually consist of three main facilities: the K-25 gaseous diffusion plant, the Y-12 electromagnetic separations plant, and the X-10 reactor and associated chemical facilities. K-25 and X-10 were constructed in Roane County and Y-12 in Anderson County. Construction and operation of these facilities required a work force that reached 80,000. Workers came from local communities and from across the nation. Only top officials and scientists had any idea of the objectives. Some thought it was just another New Deal social experiment. One local man, who quit in disgust, said that "…whatever it was the government was making over there, it would be cheaper if they went out and bought it." The project had an insatiable appetite for labor, materials, and equipment. They paid high wages and siphoned away labor from local farms, businesses, and industry. Complaints were widespread. The Roane County Farm Bureau protested that the project was grabbing up all the farm machinery in the area as well as taking away farm labor. Except for those making good money from the project, it did not enjoy great local popularity. One person commented that "Tons and tons of stuff goes in but nothing ever comes out."

The truth, of course, was that something did come out. On August 6, 1945 the city of Hiroshima, Japan was devastated by a single bomb. Three days later, the city of Nagasaki experienced the same fate. The Japanese surrendered on August 14, 1945, bringing to a close the costliest war in history. The uranium in the Hiroshima bomb came mostly from the Y-12 electromagnetic separations plant, but a small quantity came from the K-25 plant in Roane County. The plutonium in the Nagasaki bomb was produced from a process developed at Roane County's X-10 plant.

The Post War and New Roane County

The end of World War II brought the beginning of the cold war and continued activities for the Oak Ridge facilities. K-25 geared up to produce the enriched uranium needed for the growing stockpile of nuclear weapons and for nuclear weapons components. X-10 became the Oak Ridge National Laboratory with diverse research agenda. To satisfy the need for power at K-25 and elsewhere, TVA constructed new coal-fired plants, including what was at that time the world's largest at Kingston. The war created a new Roane County with new capabilities and new opportunities. But the price was high. Of the fine young men the county sent to war, over 120 never came home.

*(History of Roane County was provided by the Roane County Chamber of Commerce. There was no mention of the author of this article.)*

### *Demographic Overview*

**Roane County**
The population of Roane County in 2006 is estimated at 53,293. Roane County is ranked 26th in population among the other counties of Tennessee. (See Table 1)

**City of Harriman**
The 2000 census reported that the City of Harriman had a population of 6,744. During the period 2000 to 2006, Harriman's population was estimated to decline by 0.4 percent.

**City of Kingston**
The 2000 census reported that the City of Kingston had a population of 5,264. During the period 2000 to 2006, Kingston's population was estimated to grow by 5.5 percent.

**City of Rockwood**
The 2000 census reported that the City of Rockwood had a population of 5,774. During the period 2000 to 2006, Rockwood's population was estimated to decline by 5.6 percent.

**City of Oak Ridge**
The 2000 census reported that the City of Oak Ridge had a population of 2,777 (Roane County portion only). *Oak Ridge was included in the Anderson County Plan. No representative was sent to the planning meetings.*

**Town of Oliver Springs**
The 2000 census reported that the Town of Oliver Springs had a population of 965 (Roane County portion only).

**Table 1**

## *Roane County, Tennessee – Demographic Overview*

| People QuickFacts | Roane County | Tennessee |
|---|---|---|
| Population, 2006 estimate | 53,293 | 6,038,803 |
| Population, percent change, April 1, 2000 to July 1, 2006 | 2.7% | 6.1% |
| Population, 2000 | 51,910 | 5,689,283 |
| Persons under 5 years old, percent, 2006 | 5.0% | 6.6% |
| Persons under 18 years old, percent, 2006 | 20.7% | 23.9% |
| Persons 65 years old and over, percent, 2006 | 16.8% | 12.7% |
| Female persons, percent, 2006 | 51.3% | 51.1% |
| White persons, percent, 2006 (a) | 95.1% | 80.4% |
| Black persons, percent, 2006 (a) | 2.7% | 16.9% |
| American Indian and Alaska Native persons, percent, 2006 (a) | 0.3% | 0.3% |
| Asian persons, percent, 2006 (a) | 0.5% | 1.3% |
| Native Hawaiian and Other Pacific Islander, percent, 2006 (a) | Z | 0.1% |
| Persons reporting two or more races, percent, 2006 | 1.3% | 1.0% |
| Persons of Hispanic or Latino origin, percent, 2006 (b) | 0.9% | 3.2% |
| White persons not Hispanic, percent, 2006 | 94.3% | 77.5% |
| Living in same house in 1995 and 2000, pct 5 yrs old & over | 62.3% | 53.9% |
| Foreign born persons, percent, 2000 | 1.2% | 2.8% |
| Language other than English spoken at home, pct age 5+, 2000 | 2.0% | 4.8% |
| High school graduates, percent of persons age 25+, 2000 | 74.8% | 75.9% |
| Bachelor's degree or higher, pct of persons age 25+, 2000 | 14.8% | 19.6% |
| Persons with a disability, age 5+, 2000 | 12,720 | 1,149,693 |
| Mean travel time to work (minutes), workers age 16+, 2000 | 26.0 | 24.5 |
| Housing units, 2006 | 24,360 | 2,681,150 |
| Homeownership rate, 2000 | 77.6% | 69.9% |
| Housing units in multi-unit structures, percent, 2000 | 10.6% | 18.7% |
| Median value of owner-occupied housing units, 2000 | $86,500 | $93,000 |
| Households, 2000 | 21,200 | 2,232,905 |
| Persons per household, 2000 | 2.42 | 2.48 |
| Median household income, 2004 | $38,172 | $38,945 |
| Per capita money income, 1999 | $18,456 | $19,393 |
| Persons below poverty, percent, 2004 | 14.7% | 15.0% |

| Business QuickFacts | Roane County | Tennessee |
|---|---|---|
| Private nonfarm establishments, 2005 | 720 | 133,098[1] |
| Private nonfarm employment, 2005 | 9,290 | 2,378,754[1] |
| Private nonfarm employment, percent change 2000-2005 | 10.7% | -0.5%[1] |
| Non-employer establishments, 2005 | 3,236 | 422,761 |
| Total number of firms, 2002 | 3,412 | 454,366 |
| Black-owned firms, percent, 2002 | F | 5.9% |
| American Indian and Alaska Native owned firms, percent, 2002 | F | 0.8% |
| Asian-owned firms, percent, 2002 | F | 1.6% |
| Native Hawaiian and Other Pacific Islander owned firms, percent, 2002 | F | S |
| Hispanic-owned firms, percent, 2002 | F | 0.9% |
| Women-owned firms, percent, 2002 | 17.4% | 26.0% |
| Manufacturers shipments, 2002 ($1000) | D | 109,293,454 |
| Wholesale trade sales, 2002 ($1000) | D | 97,792,030 |
| Retail sales, 2002 ($1000) | 379,060 | 60,136,403 |
| Retail sales per capita, 2002 | $7,255 | $10,382 |
| Accommodation and foodservices sales, 2002 ($1000) | 36,261 | 8,024,900 |
| Building permits, 2006 | 134 | 46,003 |
| Federal spending, 2004 ($1000) | 416,630 | 45,440,543[1] |

| Geography QuickFacts | Roane County | Tennessee |
|---|---|---|
| Land area, 2000 (square miles) | 360.98 | 41,217.12 |
| Persons per square mile, 2000 | 143.8 | 138.0 |

1: Includes data not distributed by county.
F: Fewer than 100 firms
Z: Value greater than zero but less than half unit of measure shown

***Natural Hazard Overview***

A review of past natural disasters in Roane County, and across the State of Tennessee highlights fourteen hazards as presenting a significant potential risk to the communities of Roane County. These hazards include flooding (including dam failure), winter storms, thunderstorms (and associated hail, lightning, and high winds), tornado activity, as well as extreme high temperatures, landslides and erosion, earthquakes, drought, wildfires and fog.

Since 1954, the National Climatic Data Center (NCDC) and the local newspaper records have documented 31 flood events in Roane County. Local records show that the floods in 2003 and 2004 caused estimated property damage of $374,615.15. Since 1993, Roane County had $32,089.03 total loss from repetitive flood damage. Roane County

experienced its worst flooding in March 2002 with $578,604.80 in damages. There were several claims since 1993 which resulted in a total in losses of $955,219.95

Severe storms and the related hail, lightning, and high winds are the most frequent natural hazard to affect Roane County. Since 1955, the National Climatic Data Center (NCDC) has documented 139 severe storms including winter storm events causing an average of $124,067 in annual property damage.

Although infrequent, winter storms are a serious hazard. Damage associated with winter weather events occurs mainly as traffic accidents, downed utility lines, and fallen trees.

Tornadoes are a less frequent natural hazard associated with thunderstorms, but a far more devastating and costly one. The most recent on February 21, 1993 was categorized as an F-1 and caused $50,000 in property damage in the Cave Creek area of Roane County.

Both the communities and the rural areas of Roane County have concerns about drought. Drought affects agriculture, water supplies, and causes dry conditions in forested areas. The impacts of drought are considered high because of the potential for wildfire in the forested areas of Roane County. Forested steep slopes and bluff lines are particularly vulnerable to wildfire because of the difficulty of controlling once ignited.

Area stream banks are susceptible to erosion during heavy rains, especially in the developed areas.

Extreme high temperatures can be hazardous when extended periods of hot weather persist during the summer months. The elderly and infirm are especially at risk during extreme high temperatures.

Historic records for earthquake events are very limited in comparison to the geologic time scale. Roane County is in the East Tennessee Seismic Zone. In 1993, an additional fault zone was identified in East Tennessee running roughly parallel to I-75 between Chattanooga and Knoxville. In 1995, an earthquake was reported in an area 25 miles east of Athens, TN. The risk associated with the seismic faulting in East Tennessee has not been quantified as of the date of this plan.

The many hillsides and steep slopes in Roane County present areas potentially susceptible to landslide and land subsidence. Landslide events are associated with heavy rain or roadway construction. Land subsidence and sinkholes are also a problem, due to the underlying geology of Roane County.

Although Roane County has not been the scene of serious accidents relating to fog along the Interstate-40 corridor, the potential for such an accident does exist.

Roane County lies downstream of several Tennessee Valley Authority dam facilities along the Tennessee and Clinch rivers. Although a failure has never occurred, the potential does exist for flooding to the entire County.

***What is Mitigation?***

Mitigation refers to the policies and activities that will reduce the area's vulnerability to damage from future disasters. These measures are generally put into place before a disaster occurs. There are two basic categories of mitigation:

> Structural mitigation measures are aimed at minimizing 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 enforcing building codes that require wind resistant construction.
>
> Non- structural mitigation measures typically concentrated on identifying hazard-prone areas and limiting their use. Examples: 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.

***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 Roane 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:
  - Identifying 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 Federal Emergency Management Agency (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, Roane 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 Roane County and its 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.

***Capability Assessment***

Local departments, agencies, and organizations have a direct impact through specifically delegated responsibility to carry out mitigation activities or hazard control tasks.

**City and County 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 street construction and maintenance, and recycling. The Cities of Harriman,

Kingston, Rockwood and the Town of Oliver Springs also provide street cleaning, brush collection and urban forestry.

Codes and Inspection Departments are responsible for enforcing the regulatory building codes and ordinances adopted by Harriman, Kingston, Rockwood, Oliver Springs and Roane County. These offices of Inspection issue permits governing building, construction, electrical, plumbing, mechanical, gas, sign installation and septic systems. These offices are also responsible for enforcing zoning regulations.

The Zoning Offices/Planning Commission (County and Cities) are responsible for maintaining records on and overseeing city and county projects. Records are kept on the location of storm sewers, right-of-ways, construction schedule, topographic and flood maps, subdivision plats, street, and property information.

Kingston, Harriman, Rockwood and Roane County Utilities are responsible for the operation and maintenance of sanitary sewer systems and the Wastewater Treatment Plants and respond to sewer stoppages and overflows.

**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 the 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 2006 International 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 Roane County Planning Commission is a voluntary body made up of nine members that are appointed by the County Executive and approved by the County Commission to serve two-year terms. The Commission has the authority to approve subdivision plat requests, and uses on review. Rezoning requests are reviewed by the Commission and recommendations are made for the County Commission's approval.

**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 Regulations provide a powerful tool for local government to direct development away from environmentally sensitive/hazardous areas such as floodplains and steep slopes.

It is the intent of all jurisdictions involved in this plan to adopt and/or enact the same regulations and plans in the future to allow for consistency on a county wide basis.

**Long-range Planning**

Long-range planning is conducted by the Roane County Planning Committee, Zoning Office and The Budget Committee each year during the budgetary cycle. When identifying capital expenditures as related to infrastructure, community development and other budgetary factors; mitigation strategies and objectives derived from the planning process are considered for cost benefit analysis.

**Property Appraisal**

The Roane County Property Assessor's Office sets the property assessment values under the guidelines of the State of Tennessee. The appraisal totals are as follows: Land: $1,705,997, 700.00, Improvements: $2,842,477,600.00. The total real property value for all of Roane County is $4,548,475,300.00. The reappraisal was completed in 2010.

Roane County (Total County and Cities)

- Resident: $3,408,306,300.00
- Commercial: $333,048,800.00
- Industrial: $214,697,100.00
- Agriculture: $166,136,500.00
- Farm: $278,323,600.00

Roane County Unincorporated:

- Residential: $1,143,629,400.00
- Commercial: $346,188,700.00
- Industrial: $155,750,800.00
- Agricultural: $162,811,200.00
- Farm: $249,645,300.00

Harriman:

- Residential: $178,073,300.00
- Commercial: $136,479,000.00
- Industrial: $4,350,300.00
- Agricultural: $1,119,100.00
- Farm $7,242,800.00

Kingston:

- Residential: $402,910,400.00
- Commercial: $102,743,300.00
- Industrial: $7,705,800.00
- Agricultural: $1,255,700.00
- Farm: $4,512,600.00

Oak Ridge:

- Residential: $387,171,500.00
- Commercial: $19,787,800.00
- Industrial: $135,016,700.00
- Agricultural: $0.00
- Farm: $12,988,800.00

Oliver Springs:

- Residential: $29,683,300.00
- Commercial: $5,551,500.00
- Industrial: $0.00
- Agricultural: $23,800.00
- Farm: $179,800.00

Rockwood:

- Residential: $145,790,900.00
- Commercial: $81,617,100.00
- Industrial: $8,678,000.00
- Agricultural: $926,700.00
- Farm: $1,754,300.00

**Over the past five year property values have generally increased 1-2% in Roane County annually.*

# Section 2
## Natural Hazard Mitigation Planning Process

***Purpose***
Mitigation and mitigation planning is and will continue to be an ongoing endeavor in Roane County. However, the current mitigation planning effort is in direct response to the planning requirement as stated in the Disaster Mitigation Act of 2000. The subsequent process is based on planning documents provided by Tennessee Emergency Management Agency (TEMA) and the Federal Emergency Management Agency (FEMA).

**Mitigation Planning Team**

| Name | Organization |
|---|---|
| William H. Rose Jr.* | Roane County Office of Emergency Services (OES), Director |
| B. Scott Stout* | Roane County OES, Asst. Director |
| Sherry Tipton* | Roane County OES, Admin. Asst. |
| S. William Gordon* | City of Kingston Representative |
| Chase Tedder* | City of Harriman Representative |
| Dudley Evans* | City of Rockwood Representative |
| David Bolling* | Town of Oliver Springs Representative |
| Gail Okulczyk | Community Member |
| Stacy Redwine | Community Member |
| Glen Cofer* | Roane County Building Codes Director |
| Kay Christopher* | Roane County Zoning Officer |
| Jean Meredith | Roane County Planning Commission |
| Nancy Sweat | Community Member |
| Dave Wesolowski | Community Member |
| James Burnham* | Harriman Utility Board |
| | |

* Core Committee Members

Officials from all concerned jurisdictions attended meetings or were actively involved in the drafting process of the plan through final draft review except for the representative from the town of Oliver Springs. Mr. Bolling had conflicting schedules each time the core group met. Mr. Bolling was consulted via phone concerning the Town of Oliver Springs. Town Alderman James Brummett was made aware of the Hazard Mitigation Plan with a personal conversation with Assistant Director, Scott Stout in January 2008

The Roane County Hazard Mitigation Team developed, from materials provided by the Tennessee Emergency Management Agency (TEMA) and Federal Emergency Management Agency (FEMA), a mitigation planning process. This process involved the following steps to be completed by members of the Mitigation Team:

- Identify potential natural hazards in Roane County, Harriman, Kingston, Oliver Springs and Rockwood.
- Gather information concerning each hazard, including historical data.
- Prioritize hazards based on information gathered.
- Establish Hazard Vulnerabilities
- Establish plan goals.
- Develop mitigation alternatives.
- Determine the preferred mitigation objectives and actions
- Determine the responsible agency or agencies for each preferred action
- Determine an estimated time schedule for actions to be implemented.
- Prepare draft Natural Mitigation Plan.
- Review the draft plan within the Mitigation Team.
- Present the draft plan to the public for review and comment.
- Revise the plan.
- Present the revised plan to the public for final review and comment.
- Adopt the plan.
- Submit plan to the State of Tennessee.

***Organization and Planning Meeting Timeline with Details***

**December 2007**

An organizational meeting convened to discuss the planning process with local government officials and determine how to proceed in order to develop a Natural Hazards Mitigation Plan for Roane County, the City of Kingston, the City of Harriman, the City of Rockwood and the Town of Oliver Springs. It was decided that a multi-jurisdictional approach was the best alternative for Roane County.

**December 2007**

Roane County OES began establishing the Core Mitigation team that would consist of representatives from all disciplines. Individual meetings were conducted to explain the mitigation approach and how each agency was needed in developing the mitigation plan. Some of the meetings were conducted in person and some of the meetings were conducted by phone. Tom Cloud, state planner with the Tennessee Emergency Management Agency, was contacted to be an advisor.

**December 2007**

Roane County OES decided to facilitate the planning process and document the planning process. The Roane County News published an article on January 7, 2008 that explained mitigation and announced the initiation of the planning process. The article explained that

the public is invited to participate in the planning process and that public participation is essential to assure that a successful plan is developed. Notices were posted on the Public Notice Board at the Roane County Courthouse.

**January 2008 - Kick-off / Public Meeting Minutes**

Roane County Emergency Management Director, William H Rose Jr., welcomed everyone to this Public Meeting at the Roane State Community College.

ROANE COUNTY
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AND
HOMELAND SECURITY

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Fax: 717-0615

**ROANE COUNTY HAZARD MITIGATION PLAN**
**FIRST MEETING**

**Date & Time:** January 22, 2008; 6:30-7:30 P.M.
**Location:** Roane State Community College
Walden Ridge Conference Room
276 Patton Lane
Harriman, TN 37748

**Present:** Dudley Evans, Rockwood City Designee
Chase Tedder, Harriman City Designee
Howie Rose, EMA Director
Scott Stout, EMA Assistant Director
Sherry Tipton, EMA Administrative Assistant
Dale Kendrick, Roane State Community College
Stacy Redwine, Roane County Resident
Gail Okulczyk, Roane County Resident

**Welcome:** Howie Rose welcomes everyone and introductions are made.

**Opening Comments:** Scott Stout states the benefits of the Hazard Mitigation Plan and explains the four steps that must be followed to achieve this goal:

1. **Identifying the hazards of Roane County**
2. **Profiling hazard events**
3. **Inventory assets**
4. **Estimate losses**

The Hazard Mitigation Plan must be complete and submitted to TEMA by June 15, 2008

**Roane County Hazards:** Howie Rose asks the committee what hazards are prevalent to Roane County. Flooding, wind and utility failure was discussed. The committee agrees to continue the discussion at the next meeting, set for February 4th 2008 at 6:30 P.M.

**Closing:** Howie adjourns the meeting at 7:30 P.M.

The committee was asked to do research on potential natural hazards significant to Roane County. They were instructed to place the natural hazards in order of most catastrophic to least catastrophic and report at the next meeting on February 4.

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**ROANE COUNTY HAZARD MITIGATION PLAN**
**SECOND MEETING**

**Date & Time:** February 4, 2008: 6:30-7:30 P.M.
**Location:** Roane State Community College
Walden Ridge Conference Room
276 Patton Lane
Harriman, TN 37748

**Attendees:**
Howie Rose, EMA Director
Sherry Tipton, EMA
William Gordon, Kingston Fire Department
Kay Christopher, Roane County Zoning Officer
Stacy Redwine, Citizen
Nancy Sweat, ORNL
Jean Meredith, Zoning
Glen Cofer, Roane County Codes
Gail Okulczyk, Citizen
Leesa Laymance, Citizen
Dave Wesolowski, Citizen
James Burnham, Harriman Utility Board
Robert Bailey, Roane County Historian

**Welcome:** Howie welcomes everyone and introductions are made.

Howie begins the meeting by giving each member a Roane County Natural Hazards Mitigation Plan Survey. This survey will give background information on the community's history and allows each member to have an opinion on what they feel is the worst natural hazard Roane County faces.

Robert Bailey presents history of the 1929 Flood in Roane County. This is the worst natural disaster Roane County has had to face. Maps and pictures were presented for viewing.

The Committee will continue discussion of Roane County's Natural Hazards at the next meeting.

**Closing:** Howie adjourns the meeting at 7:30 P.M.

Since the committee was assigned to list the natural hazards in order of importance the survey was quickly completed by the members who were at the previous meeting. The committee was asked at the end of the meeting to talk to residents who have lived in Roane County for many years to give them history data.

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**ROANE COUNTY HAZARD MITIGATION PLAN**
**THIRD MEETING**

**Date & Time:** March 31, 2008: 6:30-7:30 P.M.
**Location:** Roane State Community College
Walden Ridge Conference Room
276 Patton Lane
Harriman, TN 37748

**Attendees:** Scott Stout, EMA Assistant Director
Sherry Tipton, EMA
Jean Meredith, Planning Committee
Stacy Redwine, Citizen
James Burnham, Harriman Utility Board

**Welcome:** Scott welcomes everyone and introductions are made.

Scott begins the meeting by having the members discuss the probability of occurrence of hazards in Roane County. Drought, flooding, and thunderstorms were discussed as probabilities. Flooding was ranked high based on present and historical data.

The Roane County Hazard Mitigation Planning Committee has chosen flooding for the objective of the Plan.

The Committee will focus on the project location at the next meeting.

**Closing:** Scott adjourns the meeting at 7:30 P.M.

The committee selected flooding as a high probability and a costly occurrence. The committee also selected flooding because of potential mitigation projects that could be chosen to save lives, protect property and the environment. The committee was asked to pick potential projects in their communities and Roane County as a whole. This assignment will be discussed at the next meeting.

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**ROANE COUNTY HAZARD MITIGATION PLAN**
**FOURTH MEETING**

**Date & Time:** April 14, 2008: 6:30-7:30 P.M.
**Location:** Roane State Community College
Walden Ridge Conference Room
276 Patton Lane
Harriman, TN 37748

**Attendees:** Scott Stout, EMA Assistant Director
Sherry Tipton, EMA
James Burnham, Harriman Utility Board
Stacy Redwine, Citizen

**Welcome:** Scott welcomes everyone and introductions are made.

Scott begins the meeting by presenting flood maps of the Emory River in Harriman and Poplar Creek in Oliver Springs. These two areas flood often; making roads impassable as well as causing severe property damage.

James Burnham reports that the Harriman Utility Board's Warehouse has had severe damage due to flooding on the Emory River. The warehouse contains utility poles and electrical equipment and heavy machinery that have been completely destroyed by flooding.

Poplar Creek floods and the roads are impassable affecting several subdivisions.

The Roane County Hazard Mitigation Planning Committee has chosen flooding on the Emory River and Poplar Creek as projects for the Roane County Hazard Mitigation Plan.

The Committee will meet again in May for a final assessment of the Plan

The committee selected as one of its primary projects was move the Harriman Utility Board Warehouse that is located along the Emory River. James Burnham was asked to give information on past floods and the damage caused by these floods to be sent to the OES office.

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**ROANE COUNTY HAZARD MITIGATION PLAN**
**FINAL MEETING**

**Date & Time:** June 10, 2008: 6:30-8:00 P.M.
**Location:** Roane County EOC
Roane County Courthouse

**Attendees:** Scott Stout, OES Assistant Director
Sherry Tipton, OES
Jean Meredith, Planning Commission
Stacy Redwine, Citizen
Gail Okulczyk, Citizen

**Welcome:** Scott welcomes everyone to the final meeting.

Scott begins the meeting by introducing the completed Hazard Mitigation Plan to the Committee. The Hazard Mitigation Plan has a total of 124 pages and Scott asks the Committee to participate with questions, comments or changes that may need to be made.

Scott points out the research that concludes flooding is the main hazard in Roane County

**Closing:** Scott adjourns the meeting at 8:00 P.M.

Final review meeting of the plan was held on September 21, 2010 at the Local Emergency Planning Committee Meeting. The Hazard Mitigation Plan was given out on disk and each was asked to review. The Plan was also available for review at the Kingston Library during regular business hour from September 22-28, 2010. The notice for the review was in the Daily News Express each of these days except Sunday.

***Problem Statements and Goals***

The Roane County Hazard Mitigation Surveys were collected by the OES. Results of the survey are important for the development of problem statements and overall plan goals. A copy of the Hazard Survey is in Appendix B of this plan. The surveys also offered respondents the opportunity to identify possible or desired actions to mitigate hazards of concern.

**Table 2 Roane County, Tennessee Natural Hazard Survey Results**

| *Hazard Type* | *Unincorporated Roane County* | *Harriman* | *Kingston* | *Rockwood* | *Oliver Springs* |
|---|---|---|---|---|---|
| 100 Year Floodplain | 1.8 | 1.8 | 1.9 | 2.2 | 2.1 |
| Flash Flood | 2.3 | 2.7 | 2.4 | 2.6 | 2.5 |
| Non Flood Zone Flood | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| Ice Storm | 1.4 | 1.3 | 1.6 | 1.5 | 1.4 |
| Winter Storm | 1.9 | 1.9 | 2.0 | 1.8 | 1.9 |
| High Wind | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Thunderstorm | 2.6 | 2.6 | 2.4 | 2.5 | 2.6 |
| Lightning | 1.9 | 1.9 | 2.0 | 1.9 | 1.8 |
| Tornado | 2.1 | 2.1 | 1.9 | 1.9 | 2.0 |
| Hail | 1.7 | 1.7 | 1.4 | 1.6 | 1.6 |
| Stream Bank Erosion | 2.3 | 1.8 | 2.0 | 2.2 | 1.9 |
| Landslide | 1.3 | 1.1 | 1.3 | 1.6 | 1.3 |
| Earthquake | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| Drought/Wildfire | 1.3 | 1.0 | 1.1 | 1.3 | 1.0 |
| Fog | 2.5 | 1.5 | 1.3 | 1.8 | 1.0 |
| Dam Failure | 1.3 | 1.1 | 1.8 | 1.5 | 1.3 |
| High/Low Temperature | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |

The frequency of occurrence for those hazards that have a documented history was also evaluated in the process of determining priority (Table 3).

**Table 3 Summary of Past Hazard Events in Roane County**

| Hazard Type | # of Events | Years in Record | Recurrence Interval | Hazard Frequency |
|---|---|---|---|---|
| *Brush Fire | 9 | 21 | 2.3 | 0.4 |
| Dam Failure | 0 | N/a | 0.0 | 0.0 |
| Drought | 2 | 12 | 6.0 | 0.2 |
| Earthquake | 10 | 30 | 3.0 | 0.3 |
| **Flood | 28 | 15 | 0.5 | 1.9 |
| Fog | 0 | N/a | 0.0 | 0.0 |
| Hailstorm | 25 | 14 | 0.6 | 1.8 |
| Landslide | 3 | 14 | 4.7 | 0.2 |
| Lightning | 2 | 14 | 7.0 | 0.1 |
| Tornado | 2 | 31 | 15.5 | 0.1 |
| Tropical Depression | 2 | 13 | 6.5 | 0.2 |
| Thunderstorm | 127 | 14 | 0.1 | 9.1 |
| Windstorm | 4 | 12 | 3.0 | 0.3 |

Source: NCDC Data and Roane County News (Appendix K)

Note:

* Brush Fire in this plan will be synonymous with Wildland Fire since no distinction was made in any of the articles researched.

** Flood includes all data reported as 100-year Flood, Flash Flood and Urban/small Stream Flood in the NCDC data.

## Problem Statement and Goals

***All jurisdictions are equally at risk for all hazards in Roane County except for flooding and landslides/land subsidence. Impact of each hazard is equal per capita except for flooding and landslides/land subsidence.***

### Roane County (Unincorporated Areas):

**Flooding**: Historically, flooding has caused the most significant amount of financial impact on all jurisdictions covered by this plan when compared to all other hazards. Low lying areas and properties near waterways are more likely to flood. All areas are susceptible to flash flooding.

*Problems*

- Flooding primarily affects properties located in the Clinch River, Emory River, Whites Creek and Poplar Creek.
- Flooding repeatedly damages structures in the 100-year floodplain.
- Flooding damages properties in non-flood zones.
- Flash flooding is a serious threat to life and property.
- Residents often drive through standing floodwater.
- Existing infrastructure is unable to handle stormwater in some areas of Roane County.
- Drainage basin models and potential flood maps have not been created in most developing areas.
- There is no early warning system to notify flood zone residents of imminent flooding due to headwater rainfall.
- There is a lack of comprehensive area rain gauging and stream flow monitoring capabilities.
- Flood and flash flood events exacerbate stream bank erosion.

***GOAL: Reduce the damage from flood events in Roane County***

**Severe Storm**: The effects of severe storms with associated high winds, lightning, hail, and heavy rain, winter storms and tropical depressions are possible throughout all jurisdictions covered in this plan.

*Problems*

- Lightning caused fatalities and destroyed or damaged buildings by igniting fires.
- Hail can cause property damage.
- High winds cause trees to fall and damage structures, power and communication lines.
- Severe conditions can develop rapidly with little time for safety preparations.
- Heavy rain can exceed the capacity of stormwater drains and lead to flooding of problem areas.
- Tropical depressions and their associated wind and rain can cause property damage.
- The most common effect of winter storms is power and communication outages and traffic accidents.
- Winter storms cause some areas to become inaccessible for extended periods of time.

***GOAL: Minimize the impact of severe storms on area property and lives in Roane County.***

**Tornado**: Tornadoes are most often associated with severe thunderstorms and although infrequent, may cause substantial property damage and loss of life. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Tornadoes caused fatalities and destroyed or damaged buildings.
- There is no tornado warning system in Roane County.
- There are an inadequate number of identified tornado shelters within Roane 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.***

**Drought/Wildland Fire**: Wildland fires are the main threat associated with drought conditions. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- There is a lack of public awareness of how droughts increase the potential for wildland fires.
- No public outreach program is in place to educate residents to minimize fire risk to property located in the wildland/urban interface.
- Fire suppression on steep slopes and bluff lines is especially difficult.
- Roane County has a moderate percentage of forested lands.

***GOAL: Reduce the threat of wildland fires and increase public awareness in vulnerable areas.***

**Stream Bank Erosion**: Stream bank erosion has the potential to be a problem in developed areas as runoff increases. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Heavy rain causes high flows that can result in bank erosion.
- Removal of vegetation can increase the rate of bank erosion.

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

**Extreme Heat**: Extended periods of hot weather are common during the summer months. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Extended periods of hot weather can be dangerous for the elderly and infirm who do not have air conditioning.
- There is not an adequate plan to provide shelter for vulnerable residents during periods of extreme heat.

***GOAL: Reduce the risk of extreme heat for the vulnerable population.***

**Earthquake:** Earthquakes are common in the East Tennessee Seismic Zone, but rarely noticeable. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Older buildings and infrastructure may be severely damaged in the event of a significant earthquake.
- A strong earthquake could result in significant loss of property and life.
- There is a lack of public education on earthquake hazards and preparedness.

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

**Landslide/Land Subsidence**: Steep slopes and slopes cut for roads have the potential for failure. The underlying karst topography is prone to form sinkholes. All jurisdictions covered in this plan are susceptible to this hazard. Landslides have and will continue to be a problem for Interstate 40 between the mile markers 340 and 346 eastbound and westbound unless mitigated.

*Problems*

- Heavy rain and resulting saturated conditions increase the probability of slope failure and sinkholes.
- Residents may be unaware of the potential hazard of landslides and sinkholes.

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

**Fog**: Roane County experiences heavy fog several times each year. All jurisdictions covered in this plan are susceptible to this hazard

*Problems*

- Serious traffic accidents have resulted from heavy fog on I-40 between mile marker 340 and 347.

***GOAL: Encourage motorists to yield to the fog statement on the advisory system in place on I-40.***

**Dam Failure**: Roane County lies downstream from multiple Tennessee Valley Authority dam facilities which present the potential for severe flooding if failure occurs. All jurisdictions covered in this plan are susceptible to this hazard especially low lying areas near the Tennessee, Clinch and Emory Rivers. These maps indicating flooding due to dam failure are available from the Tennessee Valley Authority.

*Problems*

- Even though outside of Roane County, failure of Norris or Ft. Loudoun dams will result in significant flooding in Roane County.
- Heavy rain and resulting saturated conditions increase the probability of dam failure.
- Residents living in the eastern section of Roane County may be unaware of the potential hazard.

***GOAL: Identify high hazard areas and increase public awareness of the hazard.***

**City of Harriman:**

**Flooding**: Historically, flooding has caused the most significant amount of financial impact on all jurisdictions covered by this plan when compared to all other hazards. Flooding is more susceptible in low lying areas near the Emory River. All areas of Harriman are susceptible to flash flooding.

*Problems*

- Flooding primarily affects properties located on the Emory River.
- Flooding repeatedly damages structures in the 100-year floodplain.
- Flooding damages properties in non-flood zones.
- Flash flooding is a serious threat to life and property.
- Residents often drive through standing floodwater.
- Existing infrastructure is unable to handle stormwater in some areas of Harriman.
- Drainage basin models and potential flood maps have not been created in most developing areas.
- There is no early warning system to notify flood zone residents of imminent flooding due to headwater rainfall.
- There is a lack of comprehensive area rain gauging and stream flow monitoring capabilities.
- Flood and flash flood events exacerbate stream bank erosion.

***GOAL: Reduce the damage from flood events in Harriman***

**Severe Storm**: The effects of severe storms with associated high winds, lightning, hail, and heavy rain, winter storms and tropical depressions are possible throughout all jurisdictions covered in this plan.

*Problems*

- Lightning caused fatalities and destroyed or damaged buildings by igniting fires.
- Hail can cause property damage.
- High winds cause trees to fall and damage structures, power and communication lines.
- Severe conditions can develop rapidly with little time for safety preparations.
- Heavy rain can exceed the capacity of stormwater drains and lead to flooding of problem areas.
- Tropical depressions and their associated wind and rain can cause property damage.
- The most common effect of winter storms is power and communication outages and traffic accidents.

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

**Tornado**: Tornadoes are most often associated with severe thunderstorms and although infrequent, may cause substantial property damage and loss of life. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Tornadoes caused fatalities and destroyed or damaged buildings.
- There is no tornado warning system in Harriman.
- There are an inadequate number of identified tornado shelters within Harriman.
- 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.***

**Drought/Wildland Fire**: Wildland fires are the main threat associated with drought conditions.

*Problems*

- There is a lack of public awareness of how droughts increase the potential for wildland fires.
- No public outreach program is in place to educate residents to minimize fire risk to property located in the wildland/urban interface.
- Fire suppression on steep slopes and bluff lines is especially difficult.
- Harriman has a moderate percentage of forested lands along Waldens Ridge.

***GOAL: Reduce the threat of wildland fires and increase public awareness in vulnerable areas.***

**Stream Bank Erosion**: Stream bank erosion has the potential to be a problem in developed areas as runoff increases.

*Problems*

- Heavy rain causes high flows that can result in bank erosion.
- Removal of vegetation can increase the rate of bank erosion.

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

**Extreme Heat**: Extended periods of hot weather are common during the summer months. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Extended periods of hot weather can be dangerous for the elderly and infirm who do not have air conditioning.
- There is not an adequate plan to provide shelter for vulnerable residents during periods of extreme heat.

***GOAL: Reduce the risk of extreme heat for the vulnerable population.***

**Earthquake:** Earthquakes are common in the East Tennessee Seismic Zone, but rarely noticeable.

*Problems*

- Older buildings and infrastructure may be severely damaged in the event of a significant earthquake especially to Roane County's only hospital, Roane Medical Center.
- A strong earthquake could result in significant loss of property and life.
- There is a lack of public education on earthquake hazards and preparedness.

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

**Landslide/Land Subsidence**: Steep slopes and slopes cut for roads have the potential for failure. The underlying karst topography is prone to form sinkholes. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Heavy rain and resulting saturated conditions increase the probability of slope failure and sinkholes.
- Residents may be unaware of the potential hazard of landslides and sinkholes.

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

**Fog**: Harriman experiences heavy fog several times each year, especially along the Emory River.

*Problems*

- Traffic accidents have resulted from heavy fog on the bridges over the Emory River when the fog freezes.

***GOAL: Post signs to encourage motorists to travel cautiously across these bridges when fog is present, especially when freezing is possible.***

**Dam Failure**: Roane County lies downstream from multiple Tennessee Valley Authority dam facilities which present the potential for severe flooding if failure occurs.

*Problems*

- Even though outside of Harriman and Roane County, failure of Norris or Ft. Loudoun dams will result in significant flooding in Harriman.
- Heavy rain and resulting saturated conditions increase the probability of dam failure.
- Residents living and those working along the Emory River in Harriman may be unaware of the potential hazard.

***GOAL: Identify high hazard areas and increase public awareness to the hazard.***

**City of Kingston:**

**Flooding**: Historically, flooding has caused the most significant amount of financial impact on all jurisdictions covered by this plan when compared to all other hazards.

*Problems*

- Flooding primarily affects properties located on the Clinch and Tennessee Rivers.
- Flooding repeatedly damages structures in the 100-year floodplain.
- Flooding damages properties in non-flood zones.
- Flash flooding is a serious threat to life and property.
- Residents often drive through standing floodwater, especially in the 100 west block of Race Street and the corner of First Street and Spring Street.
- Existing infrastructure is unable to handle stormwater in some areas of Kingston.
- Drainage basin models and potential flood maps have not been created in most developing areas.
- There is no early warning system to notify flood zone residents of imminent flooding due to headwater rainfall.
- There is a lack of comprehensive area rain gauging and stream flow monitoring capabilities.
- Flood and flash flood events exacerbate stream bank erosion.

***GOAL: Reduce the damage from flood events in Kingston.***

**Severe Storm**: The effects of severe storms with associated high winds, lightning, hail, and heavy rain, winter storms and tropical depressions are possible throughout all jurisdictions covered in this plan.

*Problems*

- Lightning caused fatalities and destroyed or damaged buildings by igniting fires.
- Hail can cause property damage.
- High winds cause trees to fall and damage structures, power and communication lines.
- Severe conditions can develop rapidly with little time for safety preparations.
- Heavy rain can exceed the capacity of stormwater drains and lead to flooding of problem areas.
- Tropical depressions and their associated wind and rain can cause property damage.

- The most common effect of winter storms is power and communication outages and traffic accidents.

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

**Tornado**: Tornadoes are most often associated with severe thunderstorms and although infrequent, may cause substantial property damage and loss of life. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Tornadoes have caused fatalities and destroyed or damaged buildings.
- There is no tornado warning system in Kingston.
- There are an inadequate number of identified tornado shelters within Kingston.
- 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.***

**Drought/Wildland Fire**: Wildland fires are the main threat associated with drought conditions.

*Problems*

- There is a lack of public awareness of how droughts increase the potential for wildland fires.
- No public outreach program is in place to educate residents to minimize fire risk to property located in the wildland/urban interface.
- Kingston has a limited percentage of forested lands within the city limits of Kingston.

***GOAL: Reduce the threat of wildland fires and increase public awareness in vulnerable areas.***

**Stream Bank Erosion**: Stream bank erosion has the potential to be a problem in developed areas as runoff increases.

*Problems*

- Heavy rain causes high flows that can result in bank erosion.
- Removal of vegetation can increase the rate of bank erosion.

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

**Extreme Heat**: Extended periods of hot weather are common during the summer months. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Extended periods of hot weather can be dangerous for the elderly and infirm who do not have air conditioning.
- There is not an adequate plan to provide shelter for vulnerable residents during periods of extreme heat.

***GOAL: Reduce the risk of extreme heat for the vulnerable population.***

**Earthquake:** Earthquakes are common in the East Tennessee Seismic Zone, but rarely noticeable.

*Problems*

- Older buildings and infrastructure may be severely damaged in the event of a significant earthquake.
- A strong earthquake could result in significant loss of property and life.
- There is a lack of public education on earthquake hazards and preparedness.

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

**Fog**: Kingston experiences heavy fog several times each year, especially along the Clinch River.

*Problems*

- The potential for traffic accidents could result from heavy fog on the I-40 and Highway 70 bridges over the Clinch River when dense fog occurs.

***GOAL: Encourage motorists to yield to the fog statement on the advisory system in place on I-40.***

**Dam Failure**: Roane County lies downstream from multiple Tennessee Valley Authority dam facilities which present the potential for severe flooding if failure occurs. All jurisdictions covered in this plan are susceptible to this hazard, especially the downtown district.

*Problems*

- Even though outside of Kingston and Roane County, failure of Norris or Ft. Loudoun dams will result in significant flooding in Harriman.
- Heavy rain and resulting saturated conditions increase the probability of dam failure.
- Residents living and those working along the Clinch River and the Tennessee Rivers in Kingston may be unaware of the potential hazard.

***GOAL: Identify high hazard areas and increase public awareness to the hazard.***

**City of Rockwood:**

**Flooding**: Historically, flooding has caused the most significant amount of financial impact on all jurisdictions covered by this plan when compared to all other hazards.

*Problems*

- Flooding primarily affects properties located on Black Creek and South Kingston Ave. around the Kingwood Homes.
- Flooding repeatedly damages structures in the 100-year floodplain.
- Flooding damages properties in non-flood zones.
- Flash flooding is a serious threat to life and property.

- Residents often drive through standing floodwater.
- Existing infrastructure is unable to handle stormwater in some areas of Rockwood.
- Drainage basin models and potential flood maps have not been created in most developing areas.
- There is no early warning system to notify flood zone residents of imminent flooding due to headwater rainfall.
- There is a lack of comprehensive area rain gauging and stream flow monitoring capabilities.
- Flood and flash flood events exacerbate stream bank erosion.

***GOAL: Reduce the damage from flood events in Rockwood.***

**Severe Storm**: The effects of severe storms with associated high winds, lightning, hail, heavy rain, winter storms and tropical depressions are possible throughout all jurisdictions covered in this plan.

*Problems*

- Lightening has caused fatalities and destroyed or damaged buildings by igniting fires.
- Hail can cause property damage.
- High winds cause trees to fall and damage structures, power and communication lines.
- Severe conditions can develop rapidly with little time for safety preparations.
- Heavy rain can exceed the capacity of stormwater drains and lead to flooding of problem areas.
- Tropical depressions and their associated wind and rain can cause property damage.
- The most common effect of winter storms is power and communication outages and traffic accidents.

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

**Tornado**: Tornadoes are most often associated with severe thunderstorms and, although infrequent, may cause substantial property damage and loss of life. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Tornadoes have caused fatalities and destroyed or damaged buildings.
- There is no tornado warning system in Rockwood.
- There are an inadequate number of identified tornado shelters within Rockwood.
- 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.***

**Drought/Wildland Fire**: Wildland fires are the main threat associated with drought conditions.

*Problems*

- There is a lack of public awareness of how droughts increase the potential for wildland fires.
- No public outreach program is in place to educate residents to minimize fire risk to property located in the wildland/urban interface.
- Fire suppression on steep slopes and bluff lines is especially difficult.
- Rockwood has a moderate percentage of forested lands along Waldens Ridge.

***GOAL: Reduce the threat of wildland fires and increase public awareness in vulnerable areas.***

**Stream Bank Erosion**: Stream bank erosion has the potential to be a problem in developed areas as runoff increases.

*Problems*

- Heavy rain causes high flows that can result in bank erosion.
- Removal of vegetation can increase the rate of bank erosion.

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

**Extreme Heat**: Extended periods of hot weather are common during the summer months. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Extended periods of hot weather can be dangerous for the elderly and infirm who do not have air conditioning.
- There is not an adequate plan to provide shelter for vulnerable residents during periods of extreme heat.

***GOAL: Reduce the risk of extreme heat for the vulnerable population.***

**Earthquake:** Earthquakes are common in the East Tennessee Seismic Zone, but rarely noticeable.

*Problems*

- Older buildings and infrastructure may be severely damaged in the event of a significant earthquake.
- A strong earthquake could result in significant loss of property and life.
- There is a lack of public education on earthquake hazards and preparedness.

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

**Landslide/Land Subsidence**: Steep slopes and slopes cut for roads have the potential for failure. The underlying karst topography is prone to form sinkholes. All jurisdictions covered in this plan are susceptible to this hazard, especially on Old Airport Road on the down slope of the Cumberland Plateau.

*Problems*

- Heavy rain and resulting saturated conditions increase the probability of slope failure and sinkholes.
- Residents may be unaware of the potential hazard of landslides and sinkholes.

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

**Dam Failure**: Roane County lies downstream from multiple Tennessee Valley Authority dam facilities which present the potential for severe flooding if failure occurs. Some flooding will occur within the City limits, however, less damage will take place than in Harriman, Kingston and the unincorporated parts of the County.

*Problems*

- Even though outside of Rockwood and Roane County, failure of Norris or Ft. Loudoun dams will result in significant flooding in Rockwood.
- Heavy rain and resulting saturated conditions increase the probability of dam failure.
- Residents living in the eastern section of Rockwood along the Tennessee River may be unaware of the potential hazard.

***GOAL: Identify high hazard areas and increase public awareness of the hazard.***

**Town of Oliver Springs:**

**Flooding**: Historically, flooding has caused the most significant amount of financial impact on all jurisdictions covered by this plan when compared to all other hazards.

*Problems*

- Flooding primarily affects properties located in the low lying downtown district.
- Flooding repeatedly damages structures in the 100-year floodplain.
- Flooding damages properties in non-flood zones.
- Flash flooding is a serious threat to life and property.
- Residents often drive through standing floodwater.
- Existing infrastructure is unable to handle stormwater in some areas of Oliver Springs, especially in the downtown district.
- Drainage basin models and potential flood maps have not been created in most developing areas.
- There is no early warning system to notify flood zone residents of imminent flooding due to headwater rainfall.
- There is a lack of comprehensive area rain gauging and stream flow monitoring capabilities.
- Flood and flash flood events exacerbate stream bank erosion.

***GOAL: Reduce the damage from flood events in Oliver Springs.***

**Severe Storm**: The effects of severe storms with associated high winds, lightning, hail, and heavy rain, winter storms and tropical depressions are possible throughout all jurisdictions covered in this plan.

*Problems*

- Lightning has caused fatalities and destroyed or damaged buildings by igniting fires.
- Hail can cause property damage.
- High winds cause trees to fall and damage structures, power and communication lines.

- Severe conditions can develop rapidly with little time for safety preparations.
- Heavy rain can exceed the capacity of stormwater drains and lead to flooding of problem areas.
- Tropical depressions and their associated wind and rain can cause property damage.
- The most common effect of winter storms is power and communication outages and traffic accidents.

***GOAL: Minimize the impact of severe storms on area property and lives in Oliver Springs.***

**Tornado**: Tornadoes are most often associated with severe thunderstorms and although infrequent, may cause substantial property damage and loss of life. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Tornadoes caused fatalities and destroyed or damaged buildings.
- There is no tornado warning system in Oliver Springs.
- There are an inadequate number of identified tornado shelters within Oliver Springs.
- 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.***

**Drought/Wildland Fire**: Wildland fires are the main threat associated with drought conditions.

*Problems*

- There is a lack of public awareness of how droughts increase the potential for wildland fires.
- No public outreach program is in place to educate residents to minimize fire risk to property located in the wildland/urban interface.
- Fire suppression on steep slopes and bluff lines is especially difficult.
- Oliver Springs has a small percentage of forested lands along Waldens Ridge.

***GOAL: Reduce the threat of wildland fires and increase public awareness in vulnerable areas.***

**Stream Bank Erosion**: Stream bank erosion has the potential to be a problem in developed areas as runoff increases.

*Problems*

- Heavy rain causes high flows that can result in bank erosion.
- Removal of vegetation can increase the rate of bank erosion.

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

**Extreme Heat**: Extended periods of hot weather are common during the summer months. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Extended periods of hot weather can be dangerous for the elderly and infirm who do not have air conditioning.
- There is not an adequate plan to provide shelter for vulnerable residents during periods of extreme heat.

***GOAL: Reduce the risk of extreme heat for the vulnerable population.***

**Earthquake:** Earthquakes are common in the East Tennessee Seismic Zone, but rarely noticeable.

*Problems*

- Older buildings and infrastructure may be severely damaged in the event of a significant earthquake.
- A strong earthquake could result in significant loss of property and life.
- There is a lack of public education on earthquake hazards and preparedness.

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

**Landslide/Land Subsidence**: Steep slopes and slopes cut for roads have the potential for failure. The underlying karst topography is prone to form sinkholes. All jurisdictions covered in this plan are susceptible to this hazard.

*Problems*

- Heavy rain and resulting saturated conditions increase the probability of slope failure and sinkholes.
- Residents may be unaware of the potential hazard of landslides and sinkholes.

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

**Existing Plans and Studies**

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

- Flood Insurance Study, Roane County, Tennessee. Prepared by Federal Emergency Management Agency, September 2007.
  This study was conducted to investigate the existence and severity of flood hazards in the unincorporated areas of Roane County. This study aids the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The study contains flood profiles and elevation data for area streams that will be used in future modeling of flood events.

- U.S. Census Bureau: Tennessee Quickfacts, Prepared by the U.S. Census Bureau, accessed February 2008. Demographic material for Roane County was drawn from this source.

***Contributing Government Ordnances and Plans***

- Roane County Regional Growth Plan
- Roane County Land Use Regulations
- Tennessee Department of Economic and Community Development Subdivision Guidelines
- Roane County Basic Emergency Operations Plan
- TVA Dam Safety Emergency Operations Plan
- City of Kingston Land Use Ordinance
- City of Harriman Land Use Ordinance
- City of Rockwood Land Use Ordinance

** These documents were made available to the committee*

***Mitigation Alternatives***

The Natural Hazard Mitigation Plan Survey offered participants the opportunity and time to develop 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, raise or relocate repetitive loss structures.
- Educate residents in high-risk areas.
- Develop a notification program for evacuation.
- Develop map of problem non-flood zone areas.
- Increase capacity of stormwater drainage system in problem areas.
- Improve GIS capabilities to include real time modeling and projections of flood areas.
- Enhance local rain gauge monitoring and steam flow monitoring capabilities

**Severe Storm** (including high winds, lightning, hail, and heavy rain and tropical depressions and winter storms)

- Investigate the feasibility of an early warning system.
- Routinely trim tree limbs in the right of way.
- Maintain weather alert radios in each school and day care center as well as government agencies.
- Update the program to educate the public about the risks involved with these types of hazards.
- Evaluate feasibility of underground utilities for problem areas and new developments.
- Identify and publicize local facilities that can be used as temporary shelters during winter storms.

**Tornado**

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

- Investigate the feasibility of a tornado warning system in Roane County.

- Identify more public buildings for use as tornado shelters.
- Investigate the feasibility of providing weather radios for mobile home residents.
- Provide Public Service Announcements.

**Drought/Wildland Fires**
- Public education on the potential threat of wildland fires during severe drought.

**Stream Bank Erosion**
- Promote awareness of the detrimental effects that vegetation removal can have on bank erosion rates.

**Extreme Heat**
- Investigate the development of a program to establish temporary shelters for the vulnerable community during extended periods of extremely high temperatures.

**Earthquake**
- Retrofit existing buildings which are not compliant with current standards.
- Evaluate critical infrastructure.
- Public education of earthquake hazards and preparedness.

**Landslide/Erosion**
- Evaluate regulations concerning limiting of vegetation removal
- Evaluate the potential for a countywide stream buffer ordinance
- Development restrictions in susceptible areas
- Increase awareness through education about the potential dangers.

**Dam Failure**
- Develop a notification program for potential evacuation
- Development restrictions / notifications of properties in susceptible areas
- Increase awareness through education about the potential dangers

**Notification of Adjoining Counties**
A notification letter was sent to adjoining counties and local governments stating that Roane 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 is included in Appendix C. A phone conference was also held with the OES directors of Anderson, Cumberland, Meigs, Rhea and Morgan counties on January 17, 2008 concerning Roane County's intent to prepare this plan. Anderson and Cumberland expresses interest and offered any help we might need. Lin Chilcoat of Anderson EMA made herself available for any questions since she was the person responsible for overseeing Anderson County's Hazard Mitigation Plan.

**Public Notification and Involvement**

An article in The Roane County News invited the public to a meeting in the Roane State Community College on January 22, 2008 for the purpose of announcing that the process to develop a comprehensive Natural Hazard Mitigation Plan has begun in Roane County. A copy of the article is located in Appendix E. All planning team meetings were open to the public.

On May 28, 2008 a notice was published in The Roane County News announcing that the Final Roane County Hazard Mitigation Plan was available for public review and comment (Appendix F).

A draft of this plan is currently available for public viewing at the public library. Upon adoption by the local governing authorities, the Natural Hazard Mitigation Plan will be available for public viewing at the public library, City and County Planner's offices, Roane County OES, and at each respective municipal building. The adopted plan will also be available for viewing at the Roane County OES website with public comments being accepted by e-mail along with conventional methods.

Public Draft Plan comments (if any) are noted in Appendix H.

Plan Adoption will be voted on by resolution by the Roane County Commission and the City Councils' and/or appropriate legislative body of each jurisdiction represented in this document for approval upon the approval by the Federal Emergency Management Agency.

Each resolution of each jurisdiction will be place Appendix I of the Roane County Natural Hazard Mitigation Plan.

**WAIVE 12 DAY RULE**

**RESOLUTION # 10-05-13 (As Amended)**

**IN THE COUNTY COMMISSION FOR ROANE COUNTY, TENNESSEE**

**A RESOLUTION** that requests the Roane County Office of Emergency Management and Homeland Security to perform an assessment for the County Commission.

**WHEREAS,** said office will report back to the County Commission on the assessment within a period of six months, and

**SECTION 1.** All resolutions in conflict herewith be and the same are repealed insofar as such conflict exists.

**SECTION 2.** This resolution shall become effective upon passage, the public welfare requiring it.

**MOTION** to adopt as amended was made by **Commissioner Collier** with second by **Commissioner Wicks.**

**THEREUPON,** the County Chairman announced to the Commission that said resolution had received a constitutional majority and ordered same spread of record.

Una Coffman
County Chairman

The foregoing resolution was submitted to the County Mayor for his consideration this 12th day of October, 2005.

**ATTESTED:**

Dorothy M. Marshall Lt
County Clerk

I approve/veto the foregoing resolution this the 12 day of Oct, 2005.

County Mayor

SUBMITTED BY COMMISSIONER BOBBY COLLIER FOR THE EMERGENCY MANAGEMENT COMMITTEE

**RESOLUTION NO. 7-6-12-2**

**A RESOLUTION TO APPOINT A REPRESENTATIVE TO SERVE ON A CORE COMMITTEE TO DEVELOP A HAZARD MITIGATION PLAN FOR ROANE COUNTY**

WHEREAS, the Roane County Office of Emergency Management and Homeland Security is currently reviewing the County's Hazard Mitigation Plan; and,

WHEREAS, the Hazard Mitigation Plan will identify the natural hazards in Roane County as well as objectives in planning to prevent or reduce the effects of unavoidable hazards that may occur; and,

WHEREAS, the city of Kingston has been asked to appoint a representative to serve on the core committee which will work with the EMA office to achieve the completion of Roane County's Hazard Mitigation Plan.

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF KINGSTON that Willie Gordon be and he is hereby appointed as Kingston's representative to the core committee established by the Roane County Office of Emergency Management and Homeland Security for the purpose of working with the EMA office to achieve the completion of Roane County's Hazard Mitigation Plan.

W. Troy Beets
Mayor

ATTEST:

Eloanna Neal
City Clerk

ADOPTED June 12, 2007

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**Resolution # 07-17**

Appointment of city representative to the
Roane County Hazard Mitigation Plan

WHEREAS, the Roane County Office of Emergency Management and Homeland Security is currently reviewing the county's Hazard Mitigation Plan, and

WHEREAS, a letter dated May 17, 2007 from Roane County Mayor, Mike Farmer, requests that each city have a representative appointed by resolution, and

WHEREAS, FEMA (Federal Emergency Management Agency) has guidelines that require a Hazard Mitigation Plan for Roane County,

WHEREAS, a core committee is being formed composed of representatives from across the county.

**NOW THEREFORE, THIS RESOLUTION:**

**BE IT RESOLVED** that the Rockwood City Council supports the Mayor's appointment of Councilman Dudley Evans to represent the City of Rockwood on the core committee being formed to study Roane County Hazard Mitigation Plan.

**This resolution is adopted on this the 18th day of June 2007.**

Mike Miller, Mayor

Attest: James Hines, City Recorder

# Section 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 flooding, severe storms including ; winter storm, remnants of costal / tropical storms, and thunderstorm (and associated hail, lightning, and high wind); as well as tornadoes, drought/wildland fire, stream bank erosion, extreme heat, earthquake, landslide/land subsidence, dam failure and fog hazards. Natural hazards were determined through review of past events and discussion within the Planning Team. The Planning Team recognized the potential for all natural hazards to affect most all Roane County equally in occurrence.

Common FEMA recognized hazards not addressed by this plan include avalanche, coastal storm / erosion, hurricane, and tsunami which have historically never affected this region and hold little to no probability of occurring in Roane County due to geographical location.

***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.

***Methodology***
This plan represents the initial effort of Roane County and the cities of Kingston, Harriman, Rockwood and the town of Oliver Springs 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, vulnerability assessment means the evaluation of the impact of natural hazards on the human-built environment.

The vulnerability assessment is essential so that Roane County and the cities of Kingston, Harriman, Rockwood and the town of Oliver Springs can develop targeted strategies to reduce their exposure and potential for loss. In general, the following methodology for assessing vulnerability was used:

1. Assessment of the Hazards. This process relied heavily on the information provided by the National Climatic Data Center (NCDC), a review of scrapbooks maintained by the OES and the local newspaper records as well as 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. Vulnerability Assessment. Potential dangers of each hazard, including the vulnerability of exposed structures, people, and infrastructure are discussed 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 past history, the 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 Mitigation Planning Team ranked the hazards. This ranking was then used to assign priorities to the general mitigation goals and objectives.

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 by keeping detailed records. Furthermore, it would be very advantageous to note the extent to which losses could be reduced by various mitigation strategies so cost-effective mitigation strategies can be designed and implemented. It is the intent of this plan to pursue the most cost

effective strategy in our mitigation efforts. It is also recognized that additional staff work will be required to formulate and evaluate mitigation actions when compared to historical and anticipated losses from noted hazards.

The initial step in the risk assessment was the identification of hazards that could possibly occur in Roane County. In order to gain insight into the nature and magnitude of natural hazards in the county, the National Climatic Data Center's (NCDC) historical weather hazard information was used along with a review of the emergency/hazard event scrapbooks maintained by the Roane County Office of Emergency Services and local newspaper articles. These provided the basis for the hazard identification process. Additionally, a survey was distributed to the public and to members of local community groups and governments to enhance the public involvement. Results from the hazard surveys were used to determine perception of hazards in Roane County.

Table 4. Probability of Hazards

| Hazard | Probability of Occurrence | Perception of Hazard | Historical Occurrence Y/N | Sources |
|---|---|---|---|---|
| Dam Failure | L | L | N | TVA |
| Drought | L | L | Y | NCDC, RCN |
| Earthquake | L | M | Y | USGS, RCN |
| Erosion | U | M | Y | TVA, RCN |
| Extreme Heat | U | N | N | |
| Flood | H | H | Y | NCDC, RCN |
| Fog | M | M | Y | NCDC, CBD |
| Hailstorm | H | M | Y | NCDC, RCN |
| Land Subsidence | L | L | Y | RCN |
| Severe Storm | H | H | Y | NCDC, RCN |
| Tornado | M | M | Y | NCDC, RCN |
| Wildland Fire | L | L | Y | RCN |
| Windstorm | H | M | Y | NCDC, RCN |
| Winter Storm | H | M | Y | NCDC, RCN |

Note: H = High, M = Moderate, L = Low, U = Unknown (no historical data available)
NCDC = National Climatic Data Center, USGS = United States Geologic Survey, RCN = Roane County News, TVA = Tennessee Valley Authority Dam Safety Program.

Probability of Occurrence Scale:

High = 1 event per five years
Moderate = 1 event per 6 to 10 years
Low = 1 event every 20 years or more

Perception of Hazard Scale was derived from the natural hazards survey results:

2.5 - 3 = Serious Concern (H)
1.6 – 2.4 = Moderate Concern (M)
0.6 – 1.4 = Low Concern (L)
0 - 0.5 = No Concern (N)

**Table 5 Hazard Prioritization Summary**

| Hazard | DF | D/W | Eq | E | EH | F | Fo | LS/L | SS/H/L/W | T | WF |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Rank | 1 | 4 | 7 | 5 | 6 | 1 | 8 | 7 | 2 | 3 | 4 |

Note: DF = Dam Failure, DW = Drought / Wildfire, Eq = Earthquake, E = Erosion, EH = Extreme Heat, F = Flood, Fo = Fog, H = Hailstorm, LS = Land Subsidence, L = Landslide, SS/H/L/W = Severe Storm (Includes Thunderstorm/Hail/Lightning/Windstorm), T = Tornado, WF = Wildland Fire.

**Although dam failure received top priority, however, flooding due to a rain event was the committee's top concern.*

Through a collaborative process involving all stakeholders, each hazard was identified and ranked. The mitigation objectives for each hazard were prioritized to save lives and property.

***Existing and Emerging Conditions***
**Population**

**Table 6 Population Growth by Jurisdiction from 1980 to 2000.**

| Roane County Population 1980 to 2000 by Jurisdiction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Growth 1980 - 1990 | | Growth 1990 - 2000 | |
| Jurisdiction | Census 1980 | % of County | Census 1990 | % of County | Census 2000 | % of County | Number | % Change | Number | % Change |
| **County Total** | **47715** | **100** | **47227** | **100** | **51910** | **100** | **-488** | **-1.0** | **4683** | **9.9** |

**Table 7 Population Growth Estimates for Jurisdictions 2000 – 2020**

| Jurisdiction | 2000 Population | 2005 Population | 2010 Population | 2015 Population | 2020 Population |
|---|---|---|---|---|---|
| Kingston | 5,264 | 5,498 | 5,784 | 6,044 | 6,270 |
| Harriman | 6,744 | 6,892 | 7,222 | 7,510 | 7,760 |
| Rockwood | 5,774 | 5,910 | 6,195 | 6,443 | 6,660 |
| Oliver Springs(pt.) | 942 | 965 | 1,010 | 1,049 | 1,082 |
| Oak Ridge (pt.) | 2,777 | 2,934 | 3,097 | 3,242 | 3,370 |
| Unincorporated Area | 30,409 | 32,025 | 33,734 | 35,316 | 36,693 |
| Total County | 51,910 | 54,224 | 57,042 | 59,604 | 61,835 |
| Source: Population Estimates Branch US Census Bureau | | | | | |

Density is important in determining an area's 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 Kingston, Harriman and Rockwood areas. Table 8 presents a summary of the density of area population and housing units.

**Table 8**

| **2000 Roane County Jurisdiction Area and Population Density** | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | Square Miles | | | Density/Sq. Mi. Land Area | |
| Area | Population | Housing Units | Total Area | Water Area | Land Area | Population | Housing Units |
| Roane County | 51910 | 23369 | 395 | 34 | 361 | 144.0 | 65 |
| Unincorporated | 30409 | 13185 | 325.48 | 32.72 | 293.48 | 103.6 | 44.9 |
| Kingston | 5264 | 2478 | 7.3 | 0.8 | 6.5 | 803.7 | 378.4 |
| Harriman | 6744 | 3309 | 10.2 | 0.2 | 10 | 671.5 | 329.5 |
| Rockwood | 5774 | 2729 | 7.9 | 0.1 | 7.8 | 731.4 | 345.7 |
| Oak Ridge (pt.) | 2777 | 1361 | 43.04 | 0.9 | 42.14 | 65.9 | 32.3 |
| Oliver Springs(pt.) | 942 | 307 | 1.08 | 0 | 1.08 | 872.2 | 284 |
| Source: U. S. Census 2000 | | | | | | | |

(pt.) The part of the City that is in Roane County
*Some information gather for Oak Ridge and Oliver Springs was submitted by the Roane County Property Assessors Office.*

**Land Use Trends**

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 and for possible industrial and business development/expansion. The City of Harriman major growth area is along Highway 70 at the 350 exit on I-40. This area will include a new hospital constructed by Covenant Health with 50+ beds with a cost of $20,000,000+. Once the hospital is built, expected in 2014 or 2015, there will be 20 to 30 additional retail businesses established around the interstate exchange. This is the only critical facility planned for the next

The major growth area for the City of Rockwood is the area around Dr. Tom Fuller Park on Pumphouse Road. Although plans have been designed for this project, the Tennessee Valley Authority has denied some of the needed permits.

In the southwestern portion of Roane County is a new development, Grand Vista Bay, with a total of 246 parcels. The appraisal value of this development is $44,601,000 (land and residential structures). The value should increase at a rate of 20% each year for the next 5 years.

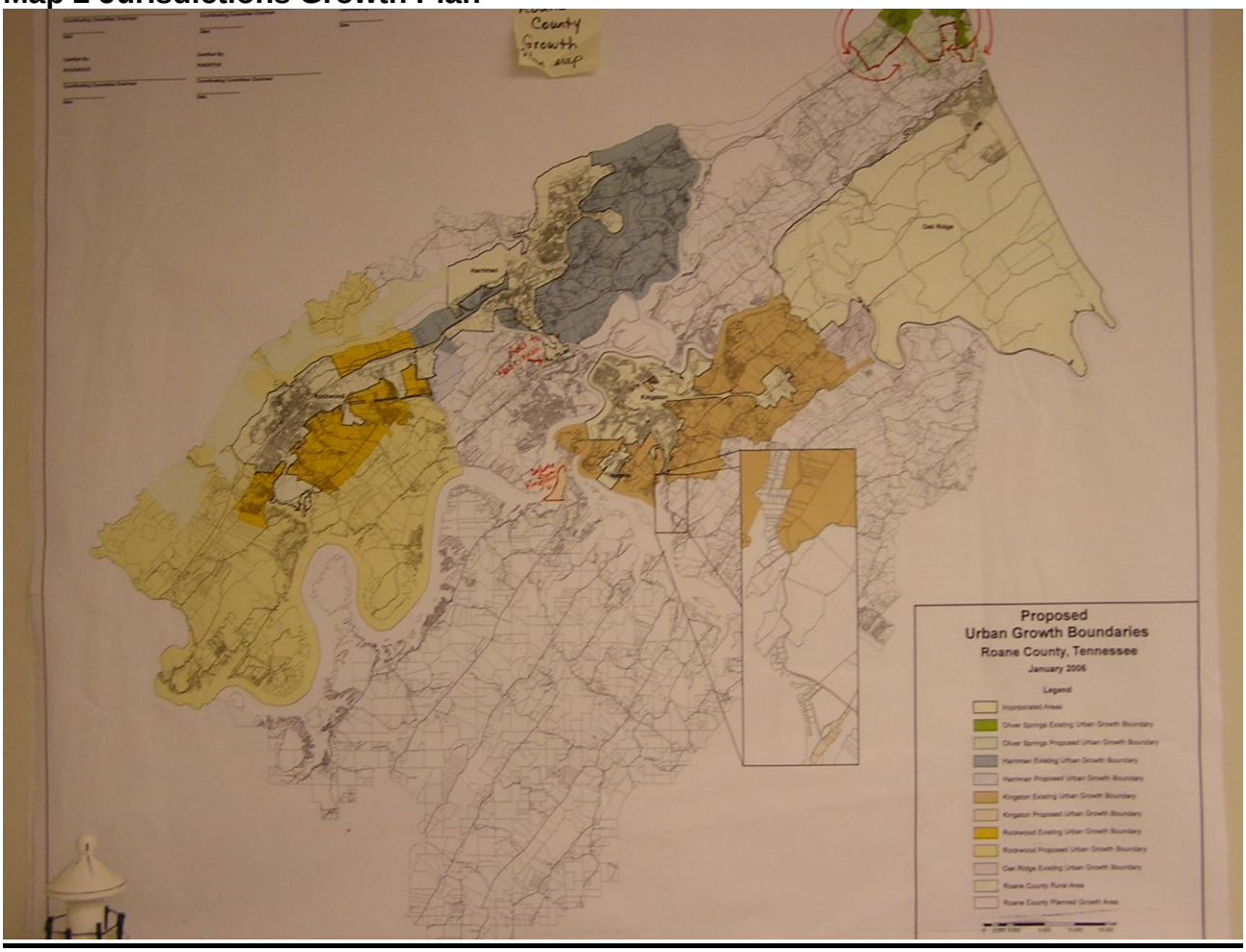
Three miles to the north of Grand Vista Bay is the development of Docks at Caney Creek with a total of 206 parcels. The appraisal value of this development is $15,992,800, mainly land value only. The value should increase at a rate of 20% each year for the next 5 years.

Approximately 5 miles to the south of Kingston is the Highland Reserve development with a total of 116 parcels. The appraisal value of this development is $11,497,200, mainly land value only. The value should increase at a rate of 20% each year for the next 5 years.

There are many acres that are still undeveloped in Roane County. The possibilities for future residential development are great.

At present, no proposed growth areas exist for the Roane County portion of the Town of Oliver Springs.

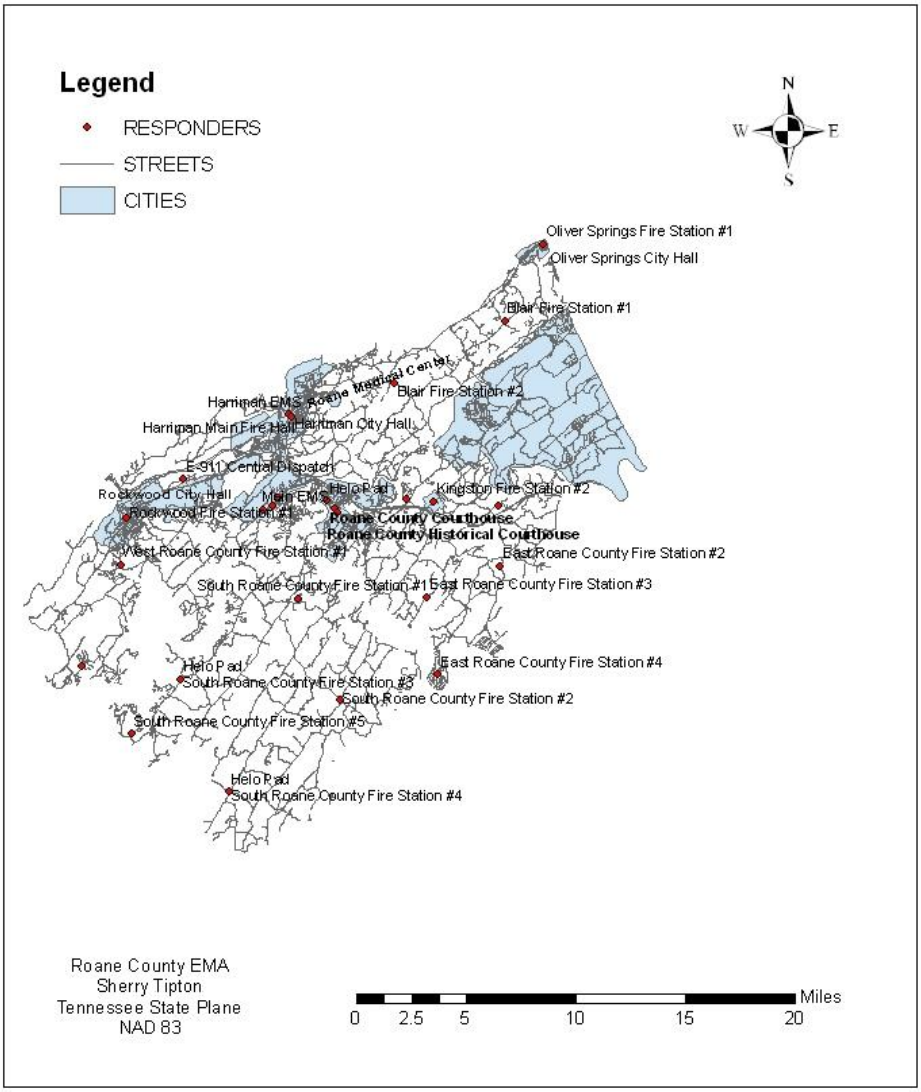
**Map 2 Jurisdictions Growth Plan**



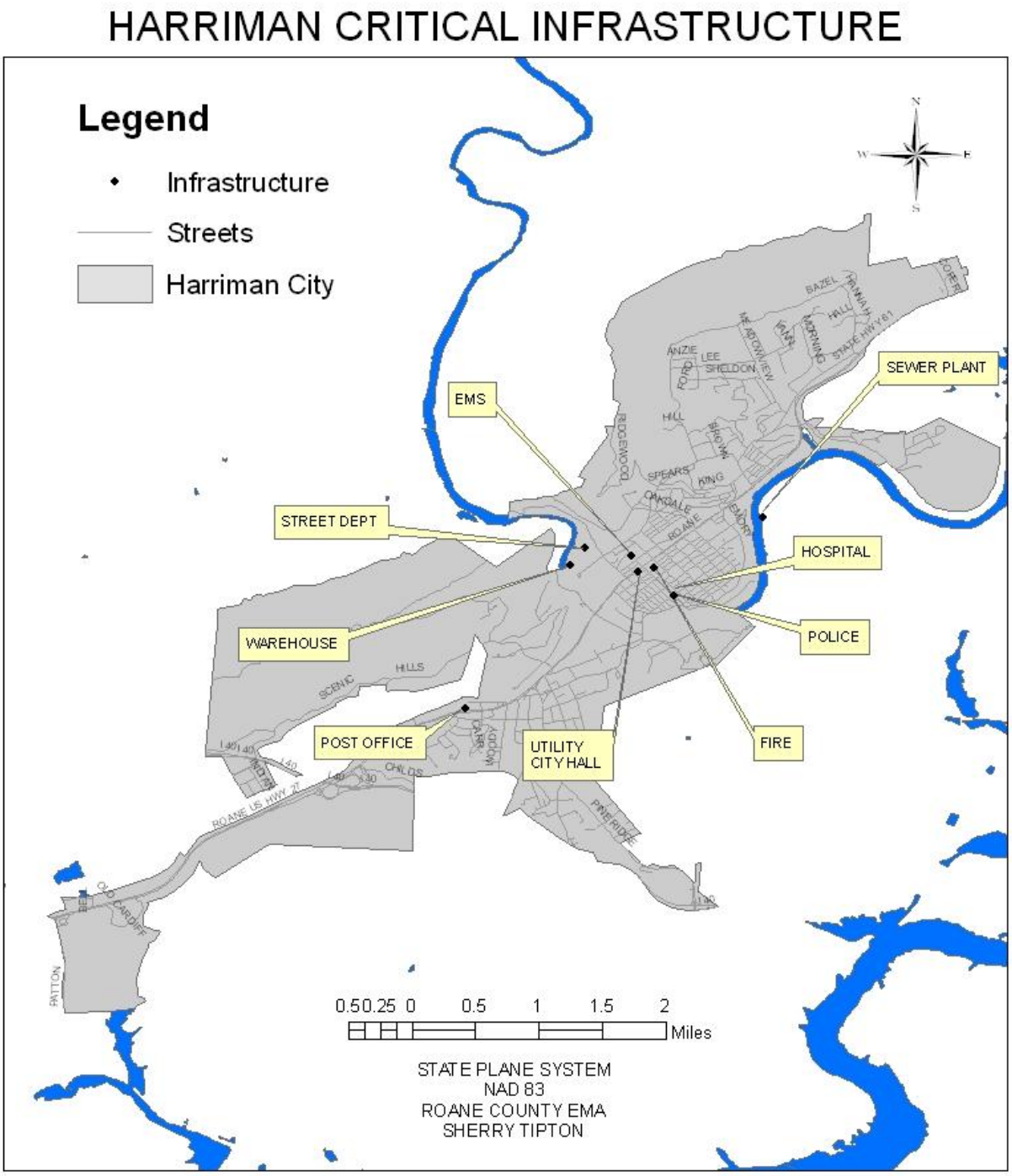
**Critical Facilities**
The following maps show the location of critical facilities, including fire stations, police stations, emergency medical stations, city halls, utilities, hospitals and historic areas. All critical facilities are vulnerable to non-site specific hazards such as severe storms and earthquakes.

**Map 3**

ROANE COUNTY CRITICAL INFRASTRUCTURE

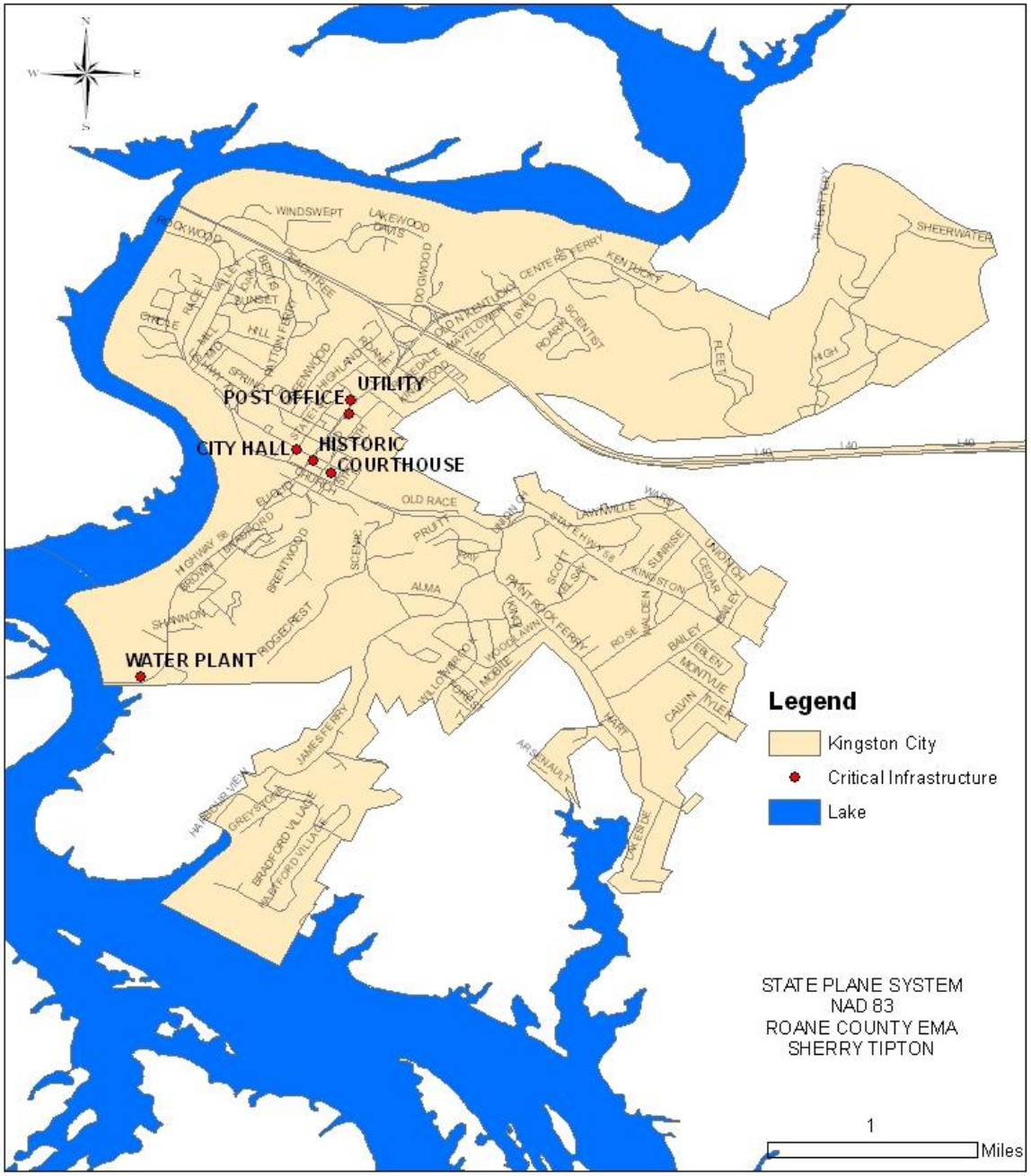


**Map 4**


HARRIMAN CRITICAL INFRASTRUCTURE
Legend
Infrastructure
Streets
Harriman City
SEWER PLANT
EMS
STREET DEPT
HOSPITAL
WAREHOUSE
POLICE
POST OFFICE
UTILITY
CITY HALL
FIRE
0.50.25 0 0.5 1 1.5 2
Miles
STATE PLANE SYSTEM
NAD 83
ROANE COUNTY EMA
SHERRY TIPTON

**Map 5**

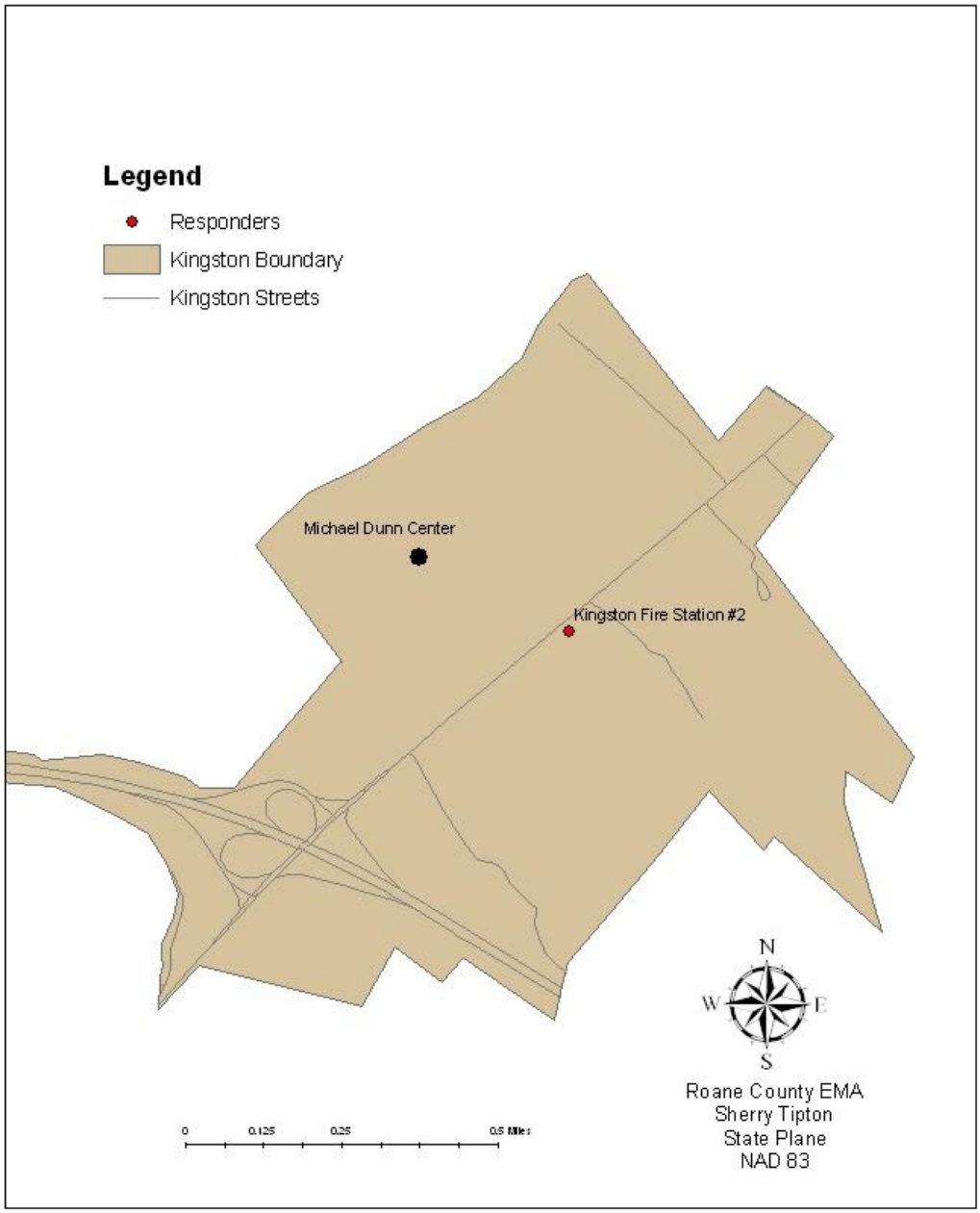
# KINGSTON CRITICAL INFRASTRUCTURE




- ***City Hall houses the fire department, police department and EMS unit*.**
- ***** Courthouse houses the Office of Emergency Services and the Emergency Operation Center.***

**Map 6**

# KINGSTON INFRASTRUCTURE
# GALLAHER ROAD EXTENSION



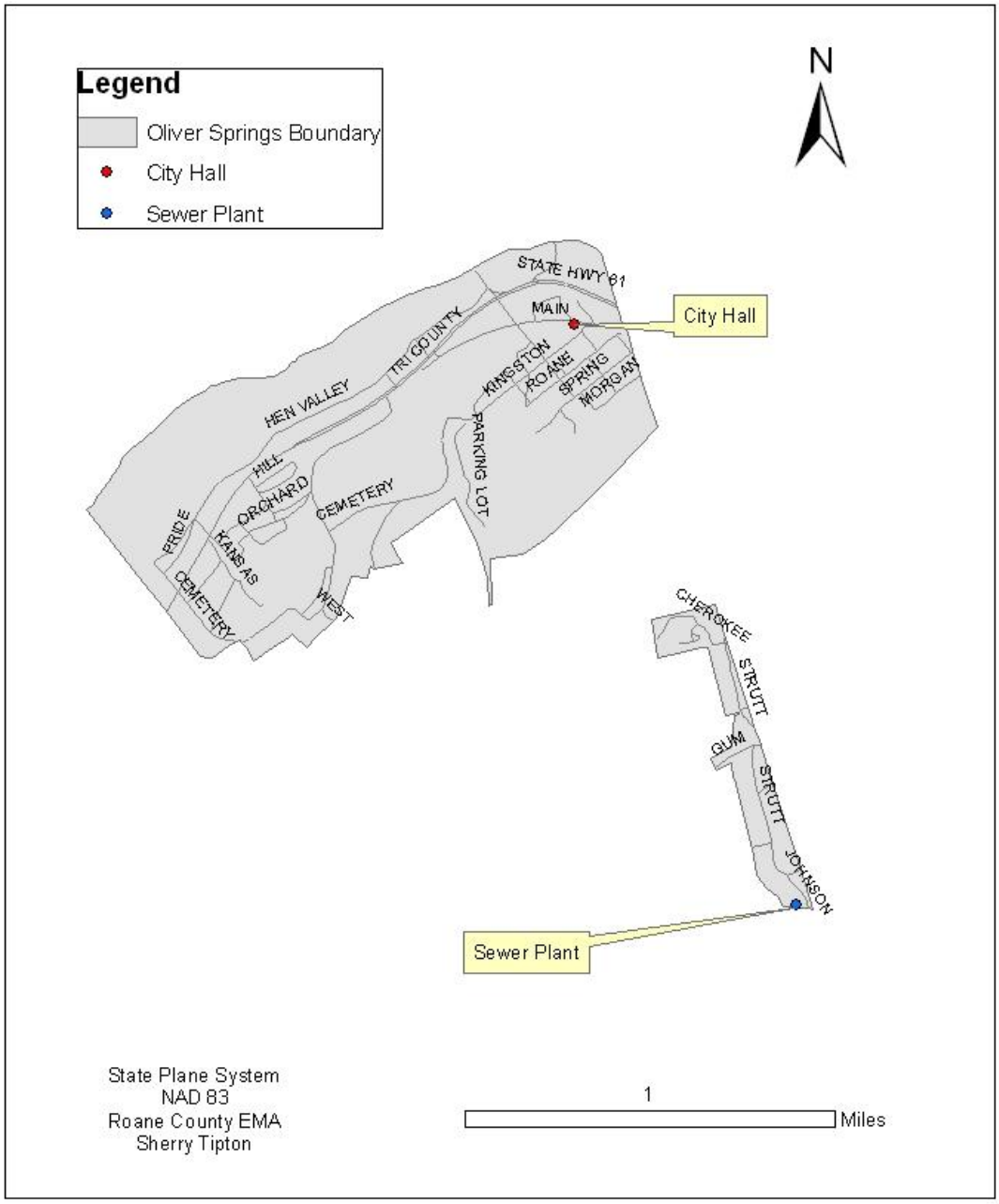
**Map 7**

***** ***City Hall houses the fire department, police department and EMS unit*****.**

*****Rockwood Airport is mainly in Cumberland County. It is a property of Rockwood City.***

**Map 8**

# OLIVER SPRINGS CRITICAL INFRASTRUCTURE



**** City Hall houses the fire department, and police department*.**

## *Hazards, Vulnerability, and Risk*

### *FLOODS*

### General Description

A flood is a natural event for rivers and stream. Excess water from snowmelt and rainfall accumulates and overflows onto the banks and adjacent floodplains. Floods are the most common and costly hazard in Roane County, and hundreds 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 or 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 Roane County, most flash floods floodwater inundation pose special threats to life and property because there is insufficient time for warning, evacuation, emergency flood proofing, 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 downstream of dams or levees subject to failure or overtopping;
- Urban areas where much of the ground is covered by impervious 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 when 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.

**Flood - 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 the 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.

**Flood - Major Flood Events**

The records kept for flooding date back to 1902. Roane County experienced three major floods between the turn of the century and 1990s. The worst flood to impact Roane County was March 23, 1929. Thirteen boy scouts and their scoutmaster were killed on Whites Creek, south of the City of Rockwood. On this same date in Harriman, the Emory River floods most of the downtown area; twenty-three people lost their lives and $3 million in damages occurred. The Emory River and stream reached their highest stages ever recorded. The Emory River rose 22 feet in three and half hours (TVA).

Between July 5 and July 7, 1967 over 10 inches of rain fell in Roane County causing the third worst flood for the county. U.S. Highway 61 was blocked by flood waters. Crops and gardens were heavily damaged with several road closures. The downtown portion of Oliver Springs was under as much as 7 feet of water.

The second worst flood in Roane County since records have been kept was May 27 and May 28, 1973. Much of the City of Rockwood was less than 4 to 5 feet of water. One death occurred with this flood along the East Fork Black Creek. Harriman received damage of $347,000, although no loss of life.

***Other floods of note since 1989:***

June 19, 1989
Heavy rains caused flooding in downtown Rockwood. Black Creek overflowed flooding Front Street, Chamberlain Ave., Wheeler Ave., and Rockwood Street. Wheeler Ave. was the worst flooded road with water knee deep, according to the Roane County News. Residents living in the city owned apartments behind the Rockwood library were evacuated. One business affected by the flood was Junior's Restaurant where the flood waters entered the back door of the business and flowed out the front door. A mudslide on Interstate 40 at mile marker 342 closed the interstate. Motorists detoured at Exit 347, traveled south on Highway 27, then west on Highway 70, reentering the interstate at the entrance ramp 338.

December 23, 1990
Parts of Oliver Springs and Harriman were completely under water. Residents in these areas were evacuated. Highway 61 from Harriman to Oliver Springs was closed, as well as, Highway 95 near a D.O.E. facility, K-25. One of the hardest hit areas was Harriman, including Walnut Hill, Fisk Heights, Meadowview Gardens and Webster Pike. The Harriman Utility Board's (HUB) warehouse and water treatment plant received flood damage and were shut down. The city gas pumps located near the HUB's warehouse were completely immersed. The old Harriman Bridge was closed to prevent vehicles from washing into the Emory River. Rockwood was also flooded. Black Creek overflowed its banks, reaching the middle of Gateway Ave. (Highway 27 and 70). Businesses and homes were damaged due to flooding.

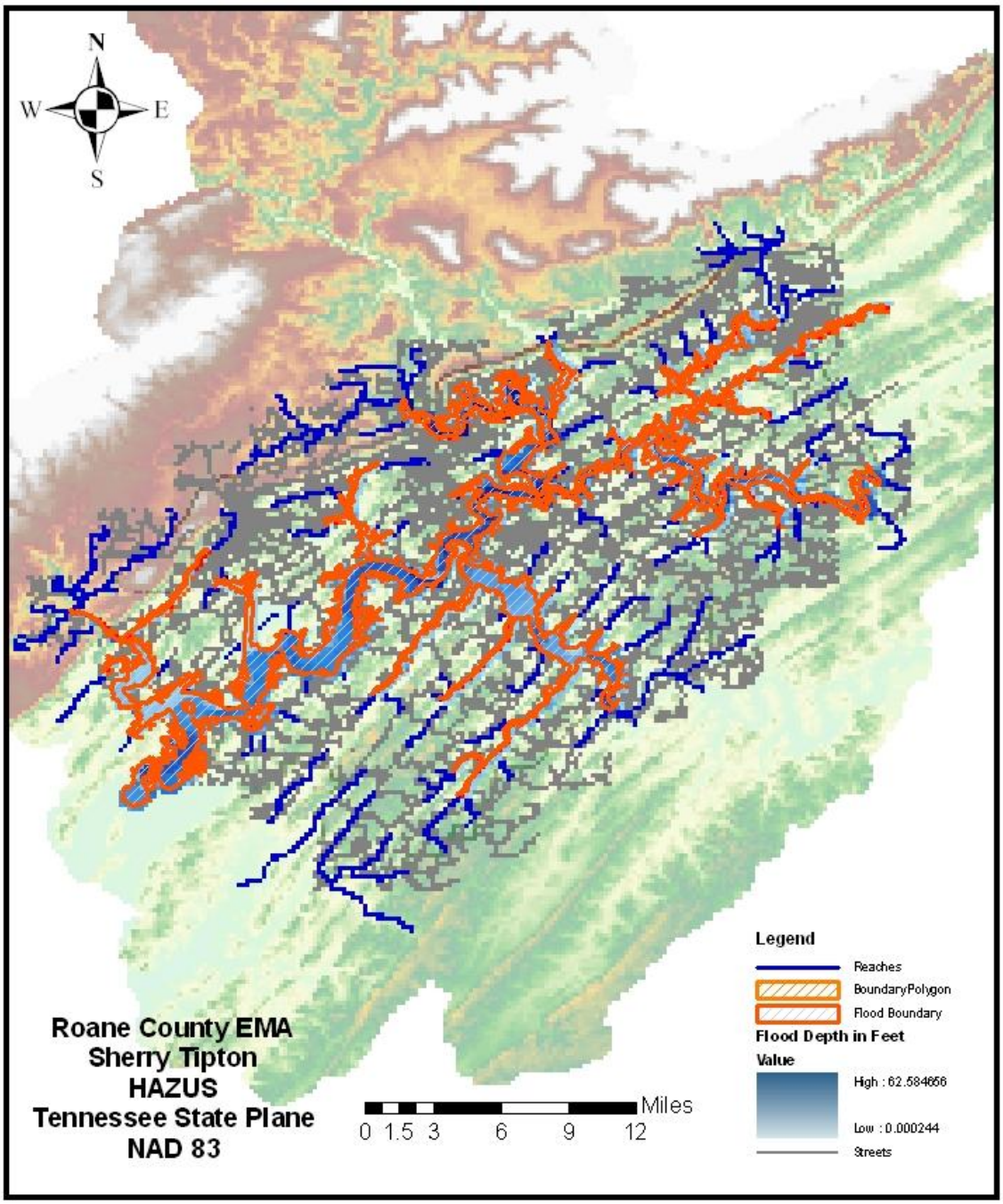
March 17, 2002
Nearly five inches of rain fell over the weekend and washed out several roads, resulting in one completely isolated neighborhood in the Paint Rock Community. Schools were cancelled for two days. Nine or ten houses were flooded along Meadowlark Road in the Brown Ellis area. Riggs Chapel and Myers Roads were closed due to flooding. Areas along Black Creek and Mountain View in Rockwood were also reported flooded according to the Roane County News.

February 14, 2003
Flooding occurred in Roane County due to 8 inches of rainfall in a three day period. Poplar Creek overflowed, closing Blair Road to traffic. Highways 95 and 58 were closed in the City of Oak Ridge. According to the Roane County News, Larry Mitchell, General Manager of Rockwood Electric Utility, reported problems due to lightning strikes. Four transformers were struck by lightning, creating power outages for several residents. The flood created problems for the Rockwood's sewer system being inundated with water. Two mudslides were reported; one on Eureka Road and the other on Black Hollow Road in Rockwood. In Kingston, the Clinch River was approximately six feet above normal summer levels. Several roads received damage due to flooding; Tanglewood Road in Harriman and Shady Road in Oliver Springs. A small bridge washed away on Martin Hollow Road in Harriman.

May 5, 2003
Flooding caused Watts Bar Lake to rise seven feet above normal summer levels. Boats and docks broke loose at Caney Creek Marina. The rain and wind toppled a tree on a power substation in Kingston; however, electricity was rerouted with assistance of the Harriman Utility Board resulting in power being out for only an hour. Damaged roads included Clay Hollow Road on the Roane County and Loudon County line, Post Oak Valley Road in Rockwood and Emory Gap Road in Harriman. The Emergency Management Director, William H. Rose Jr., opened a shelter at Roane State Community College.

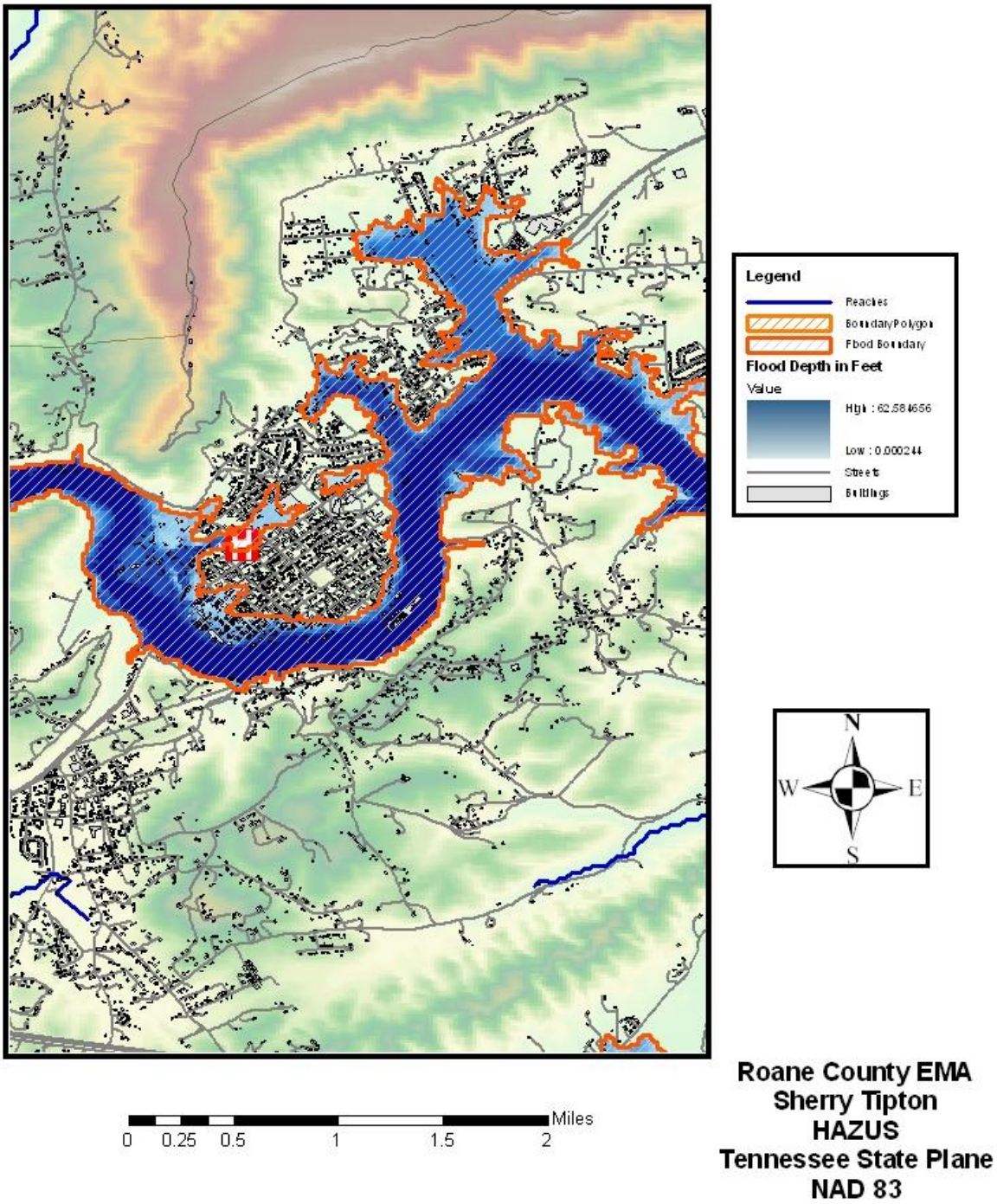
**Map 9**

## ROANE COUNTY 100 YEAR FLOOD



**Map 10**

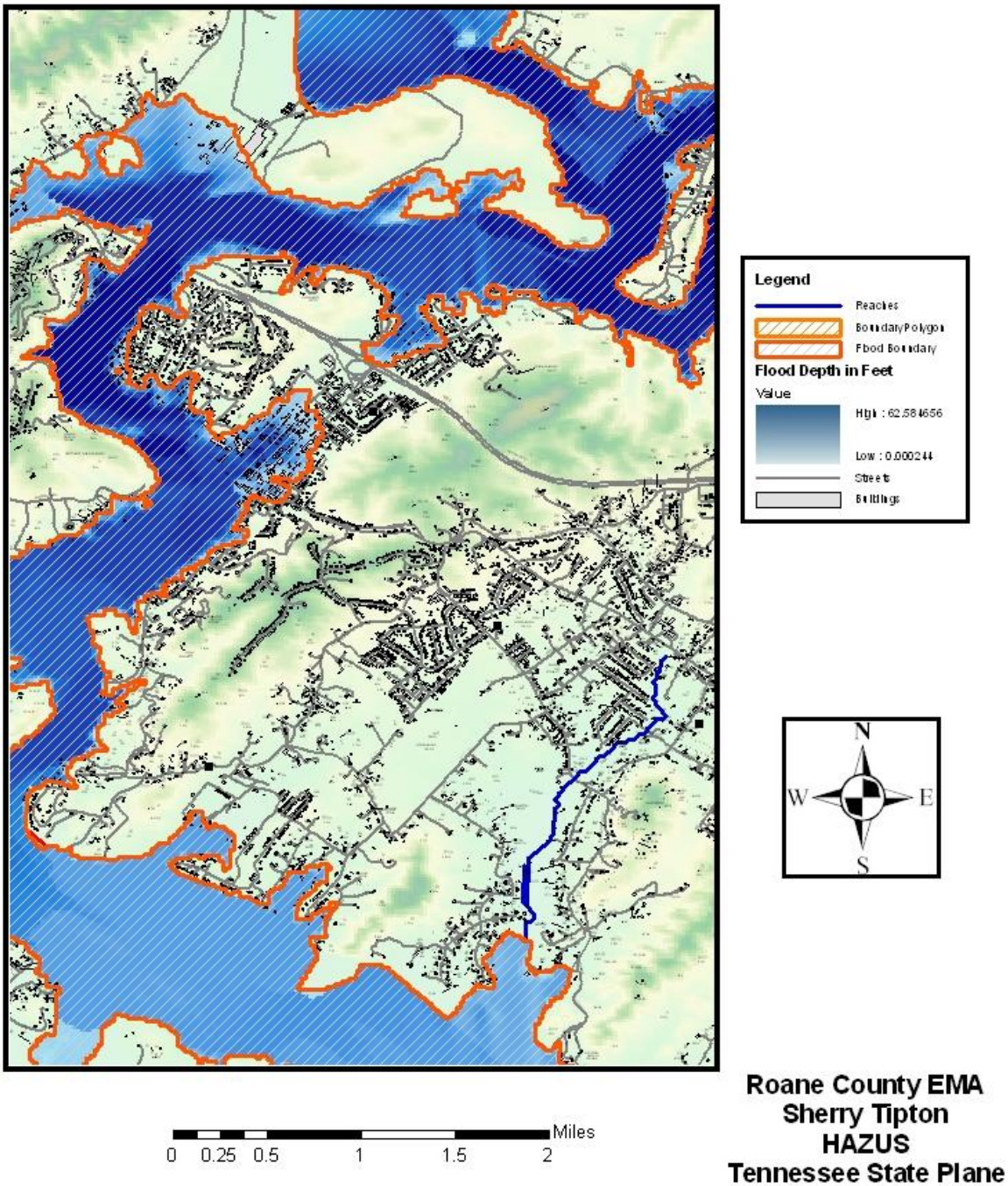
## HARRIMAN 100 YEAR FLOOD




**Roane County EMA**
**Sherry Tipton**
**HAZUS**
**Tennessee State Plane**
**NAD 83**

**Map 11**

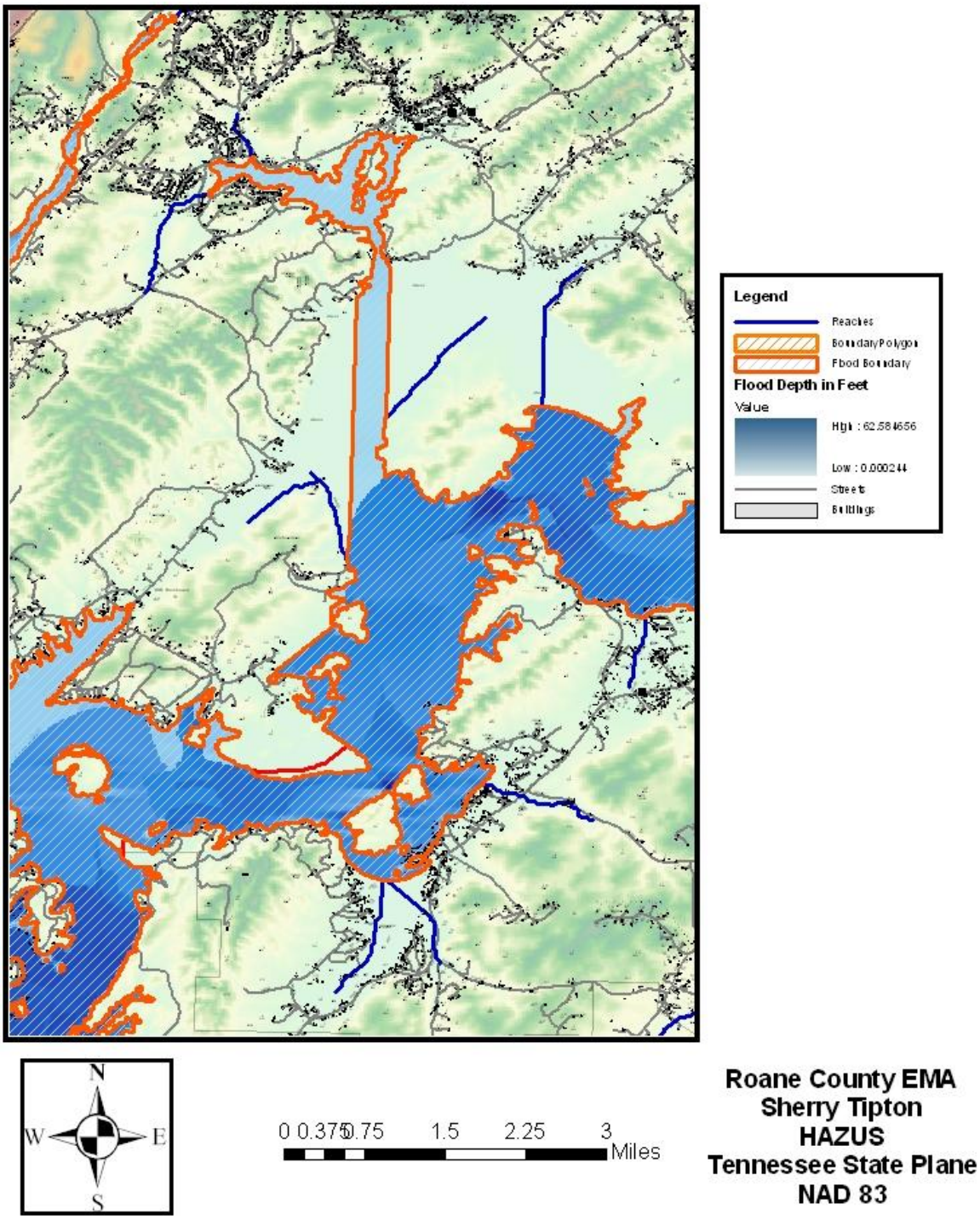
## KINGSTON 100 YEAR FLOOD




**Roane County EMA**
**Sherry Tipton**
**HAZUS**
**Tennessee State Plane**
**NAD 83**

**Map 12**

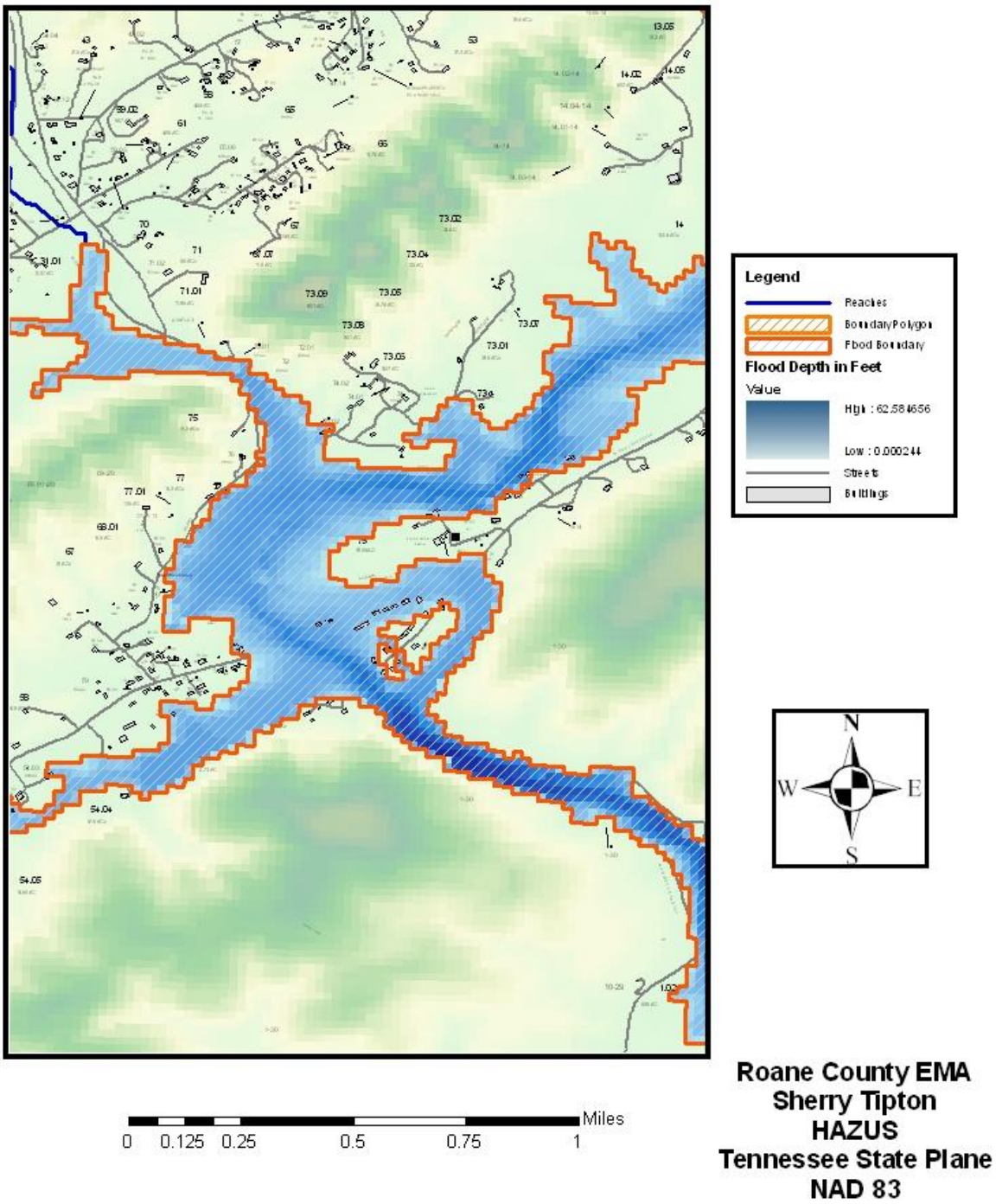
# ROCKWOOD 100 YEAR FLOOD




**Roane County EMA**
**Sherry Tipton**
**HAZUS**
**Tennessee State Plane**
**NAD 83**

**Map 13**

## POPLAR CREEK 100 YEAR FLOOD
## OLIVER SPRINGS




**Roane County EMA**
**Sherry Tipton**
**HAZUS**
**Tennessee State Plane**
**NAD 83**

**Flood - Significant Events**

Since 1936, TVA regulation of the Tennessee River has substantially reduced the frequency and magnitude of Tennessee River floods. However, flooding remains a serious concern in Roane County and especially in the Poplar Creek and Emory River watersheds. Since 1954, the National Climatic Data Center (NCDC) and local newspaper records have documented 31 flood events in Roane County. Local records show that the floods in 2003 and 2004 caused estimated property damages of $374,615.15.

There are several different types of floods in Roane County: flash, river, and urban. Regardless of the type of flood, the cause can almost always be attributed to excessive rainfall, either in the flood area or upstream. A revised "Flood Insurance Study" for the Cities of Harriman, Kingston, Rockwood and unincorporated areas of Roane County (note the Town of Oliver Springs is included in the Anderson County FIS report) by FOES in September, 2007, said that "past history of flooding at the City of Rockwood and Harriman indicates that flooding may occur throughout the year, but most floods occur between December and April. The principal sources of flooding are Tennessee River, Clinch River, Emory River, Little Emory River, Whites Creek, Black Creek, Caney Creek, Pawpaw Creek, Poplar Creek, Indian Creek, and East Fork Poplar Creek." Flooding records go back to 1902. Three of the worst floods occurred in 1929, 1967 and1973.

The Harriman Utility Board (HUB) warehouse complex is located within the 100-year floodplain at mile 12.5 on the Emory River and experienced loss during several flood events. The flood levels for the Emory River mile 12.5 at the HUB warehouse and the water plant intake is: 10 year 757.8 ft., 50 year 765.8 ft., 100 year 769.7 ft., and 500 year 777.5 ft. This HUB complex of buildings exists at an elevation of 762 feet above mean sea level (MSL) and consists of the following operations:

Offices for all of the HUB maintenance and construction crews
Offices for material and inventory staff
Office for night dispatch
Storage/Parking for vehicles and equipment for maintenance and construction activities
Facility that houses the right-of-way crews and equipment
Pole yard for utility pole storage
Storage of all material for utility operations
Fuel storage center for both gasoline and diesel vehicles

Until 1993, the HUB water treatment plant was located on the Emory River at an elevation 762 feet MSL. In 1993 a new plant was built at a site above the 100 flood level. The raw water intake structure and associated pumps are presently located at the river bank.

Until 2000 the Harriman District substation was located in the Emory River flood plain at an elevation of 762 feet MSL. The substation sustained repeated flooding until it was relocated.

During these events, the department from this facility was relocated to other city-owned properties which were accessible. Continuing operation of the Harriman Utility Board was

diminished due to the fact of the relocation. Some equipment suffered minor damage to total loss during this time.

**Flood: Mitigation Efforts**

*Roane County*

- NFIP Participation
- Zoning Ordinance
- Land Use Ordinance provides uniform countywide stormwater and floodplain regulation.
- In the process of enhancing the storm water system to eliminate local flooding problems with new bridges, culverts and ditches.

*City of Harriman*

- NFIP Participation
- Zoning Ordinance
- Land Use Ordinance provides uniform countywide stormwater and floodplain regulation.

*City of Kingston*

- NFIP Participation
- Zoning Ordinance
- Land Use Ordinance provides uniform countywide stormwater and floodplain regulation.

*City of Oak Ridge*

- NFIP Participation
- Zoning Ordinance
- Land Use Ordinance provides uniform countywide stormwater and floodplain regulation.

*City of Rockwood*

- NFIP Participation
- Zoning Ordinance
- Land Use Ordinance provides uniform countywide stormwater and floodplain regulation.

**Flood: Development Trends**

Participation in the Nation Flood Insurance Program (NFIP) and the associated building restrictions constitutes the main influence for floodplain development. All cities are committed to staying in the NFIP and commits to remain a member in good standing. A new Stormwater Ordinance is currently in development stages by Roane County. It will promote development that will not exacerbate flooding problems.

**Flood: Vulnerability**
**Repetitive Loss Structures**

Structures and associated payments are on file at the Roane County Emergency Services Office and this information is used for floodplain administration only and will not be included in this document due to the Public Privacy Act. 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.

Roane County had two structures with repetitive losses. One structure had claims in 1994, 2002 and 2003. The other structure had claims in 1999 and 2002. The total that FEMA paid was $32,089.03. Roane County has two additional structures that have the potential to be multiple losses in future flood events.

**Table 9 Flood Losses**

**Flood Report**

**Roane County**

| Date | # Prop. | Total $ Per Event |
|---|---|---|
| Aug-94 | 1 | $2,000.00 |
| Mar-02 | 17 | $578,604.80 |
| Feb-03 | 6 | $215,730.74 |
| May-03 | 11 | $78,807.08 |
| Sep-04 | 2 | $13,077.33 |
| | | **$888,219.95** |

**City of Harriman**

| | | |
|---|---|---|
| Feb-94 | 1 | **$1,000.00** |

**City of Kingston**

| | | |
|---|---|---|
| Jul-04 | 2 | **$10,000.00** |

**Town of Oliver Springs**

| Date | # Prop. | Total $ Per Event |
|---|---|---|
| Mar-93 | 1 | **$5,000.00** |

**City of Rockwood**

| | | |
|---|---|---|
| Mar-94 | 6 | **$50,000.00** |

**Records from the Roane County Office of Emergency Services*

**Total Losses from Flooding: $955,219.95**

***Severe Storms***

**General Description**

A severe storm is an atmospheric disturbance resulting in one or more of the following phenomena: High wind, hail, thunderstorms, rain, snow (winter storm), or other mixed precipitation. A typical thunderstorm may be three miles wide at its base, rise to between 40,000 and 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.

For this plan winter storms have been included in the severe storm classification. Events with precipitation in the forms of snow and ice storms, wind, and extreme cold are especially hazardous in terms of closing emergency routes, creating power and utility system failures, and immobilizing economic activity. Although infrequent, a threat to life and health is also associated with cold temperatures during winter storms and can be exacerbated by power outages and impassable roads. In March, 1993, snow began falling

on a Friday afternoon and continued all weekend in Roane County, dumping 17 inches of snow.

Roane County is geographically within the range of impact from strong tropical depressions, usually waning hurricanes. The dangers associated with tropical depressions are basically the same as a severe thunderstorm, including the associated strong winds and heavy rain. These heavy rains however, have caused serious floods in Roane County and throughout southeastern Tennessee.

**Severe Storm - Significant Events**

July 10, 1985
High winds and lightning knocked out power for many county residents. According to officials with the Harriman Utility Board, ninety percent of the reason for the electrical outage was due to high winds and lightning. Rockwood Electric Utility saw a loss in electricity when a TVA transmission line was downed due to the storm. A tree fell on a residence on Old Rockwood Highway in Midtown, causing light to moderate damage. Two horses were killed due to lightning on Bernard Narrows Road in the South Roane County District.

June 3, 1987
A severe thunderstorm hit the City of Harriman downing power lines and trees. Emory Heights Road and Riggs Chapel Road were blocked by trees and debris. Power was out for several residents. A large tree fell on a house on Clinton Street causing moderate damage.

August 29, 1990
Although most of Roane County received reports of damage due to a strong thunderstorm, Rockwood was the hardest hit. The ranger's station on Mount Roosevelt reported winds in excess of 75 m.p.h. Several homes and businesses in Rockwood reported broken windows and power outages. Douglas Ave. sustained the most damage. Other areas with damage included; Camp Buck Toms, Black Jack Road, New Hope Community and Molyneux Subdivision.

May 18, 1995
Two storms came through Roane County with reports of funnel clouds. One of the funnel clouds was reported in Rockwood, the other was in the Blair Community. Trees and power lines were knocked down during the storm.

November 11, 1995
A powerful storm with strong winds swept across Roane County causing power to be lost to many residences and businesses. TVA lost its 161,000 KV breaker for an hour and 10 minutes. Many in Rockwood and the Roane County Industrial Park were without power for over two hours. Carl Brandt, General Manager of Rockwood Electric Utility, said, "eight transformers and a number of poles were destroyed due to large trees falling across utility equipment", reported by the Roane County News on November 13, 1995. Harriman Utility Board also had similar problems.

June 11, 1996
Rockwood was severely damage as a strong storm ripped through the area. Rockwood Public Works estimated it could take two months to clear all the debris. Thousands in the Rockwood area were without power. One residence in the Caney Creek Community lost the roof to his barn. A home in the same area received moderate damage due to a downed tree.

November 28, 2005
A severe storm with straight line winds swept across the Blair District and the Town of Oliver Springs with damage in both Roane County and Anderson County. The damage started around Poplar Creek Road in Roane County and crossed Ollis Road, traveled northeast along Joel Road, and then across Johnson Road. At this point the damage path entered Anderson County. The damage indicates that the wind speed was generally between 70 and 80 m.p.h. One house in Roane County was completely destroyed. Between 15-20 houses received moderate damage. Some residences were without electricity for 48 hours. No deaths or serious injuries were reported.

**Severe Storms: Mitigation Efforts**
**Roane County**

- Roane County is designated as a Storm Ready Community by the National Weather Service.
- There is a program to educate the public about the dangers of severe weather hazards that is provided by the public school system and OES.
- The OES placed weather alert radios in each school and daycare center, as well as government agencies throughout Roane County
- OES 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.
- All local jurisdictions stockpile sand and salt for use in winter storm events. There is countywide and utility tree trimming in road right of ways to reduce the potential for downed power lines and road closures.
- Building Codes that include wind speed and snow load tolerances of 90 mph and 10 lbs/sq. ft. respectively.

*City of Harriman*

- There is a program to educate the public about the dangers of severe weather hazards that is provided by the public school system and OES.
- The OES placed weather alert radios in each school and daycare center, as well as government agencies throughout Roane County
- All local jurisdictions stockpile sand and salt for use in winter storm events. There are city and utility tree trimming in road right of ways to reduce the potential for downed power lines and road closures.
- Building Codes that include wind speed and snow load tolerances of 90 mph and 10 lbs/sq. ft. respectively.

*City of Kingston*

- There is a program to educate the public about the dangers of severe weather hazards that is provided by the public school system and OES.
- The OES placed weather alert radios in each school and daycare center, as well as government agencies throughout Roane County
- All local jurisdictions stockpile sand and salt for use in winter storm events. There are city and utility tree trimming in road right of ways to reduce the potential for downed power lines and road closures.
- Building Codes that include wind speed and snow load tolerances of 90 mph and 10 lbs/sq. ft. respectively.

*City of Rockwood*

- There is a program to educate the public about the dangers of severe weather hazards that is provided by the public school system and OES.
- The OES placed weather alert radios in each school and daycare center, as well as government agencies throughout Roane County
- All local jurisdictions stockpile sand and salt for use in winter storm events. There are city and utility tree trimming in road right of ways to reduce the potential for downed power lines and road closures.
- Building Codes that include wind speed and snow load tolerances of 90 mph and 10 lbs/sq. ft. respectively.

*Town of Oliver Springs*

- There is a program to educate the public about the dangers of severe weather hazards that is provided by the public school system and OES.
- The OES placed weather alert radios in each school and daycare center, as well as government agencies throughout Roane County.
- All local jurisdictions stockpile sand and salt for use in winter storm events. There are town and utility tree trimming in road right of ways to reduce the potential for downed power lines and road closures.
- Building Codes that include wind speed and snow load tolerances of 90 mph and 10 lbs/sq. ft. respectively.

**Severe Storm - 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.

**Severe Storm - Vulnerability**

Severe storms are a random occurrence. Severe storms including thunderstorms, hail, lightning, and high wind are the most frequent natural hazard to affect Roane County. Since 1955, when the NCDC began recording thunderstorms and hail events, there have

been 139 and 31 events respectively. Although records were not well kept until 1994 there have been 127 thunderstorms and 25 hail events. Since 1993 the number of events of high winds, tropical depressions and lightning are recorded as 4, 2, and 2, respectively. The average annual property damage total for these events is $124,067. The most common effects of a severe storm in Roane County are power and communication outages from downed trees. While these severe storms do not rise to a declaration level, most occurrences typically cost the county approximately $100,000 and additional $100,000 incurred by the utility companies.

***Tornado***

**General Description**

A tornado is a violently whirling column of air extending downward to the ground with winds as high as 300 miles per hour. Roane County is subject to a tornado at least once every 10 years. Since tornado statistics began in 1916, more than 525 tornadoes have impacted the State of Tennessee - 126 of which have killed roughly 450 individuals. The springtime months, from mid-March through the first of June, are the peak months for tornado activity; however, tornadoes can and have occurred in every month of the year.

**Tornado: Causes**

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 wildland fires have also been known to produce tornadoes. The nature of tornadoes is that they strike at random. Predicting exactly what parts of Roane County have a greater chance of being struck by a tornado is difficult if not impossible.

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 damage**. Some damage to chimneys; branches broken off trees; shallow rooted trees pushed over; signboards damaged. |
| F1 | 73 – 112 | **Moderate damage**. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads. |
| F2 | 113 – 157 | **Considerable damage**. Roofs torn off houses; mobile homes demolished; large trees snapped or uprooted; light-objected missiles generated; cars lifted off ground. |
| F3 | 158 – 206 | **Severe damage**. Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown. |
| F4 | 207 – 260 | **Devastating damage**. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated. |
| F5 | 261 - 318 | **Incredible damage**. Strong frame houses leveled off foundations and swept away; automobile sized missiles fly through air in excess of 100 meters; trees debarked; incredible phenomena will occur. |

Source: NOAA

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

**Table 10 - Summary of Tornadoes that Occurred in Roane County Since 1950**

| Roane County, TN Tornadoes Since 1950 | | | | | | |
|---|---|---|---|---|---|---|
| Date | Time (EST) | Dead | Injured | Rating | Damage | Location |
| 10/01/1977 | 11:15 PM | 0 | 0 | F0 | $25,000 | County |
| 2/21/1993 | 4:05 PM | 0 | 0 | F1 | $50,000 | Cave Creek |
| 2/21/1993 | 3:40 | 0 | 0 | F1 | 109,000* | South Roane County |
| **Total** | | **0** | **0** | **Total Damage** | **$184,000** | |

***4 houses damaged – insured loss***

Source: National Climatic Data Center

**Tornado: Significant Events**

*October 1, 1977*

According to the Roane County News, a tornado struck the county on the evening of October 1, 1977. The unpopulated area of east Roane County was hit by the tornado with trees toppled and power line downed. There were no injuries or deaths due to this event. Approximately $25,000 in damages resulted from this tornado.

*February 21, 1993*

On February 21, 1993 an F1 tornado hit the Cave Creek area of Roane County. There were no injuries and no deaths. This tornado caused $50,000 in damages.

**Tornado: Mitigation Efforts**

- Roane 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.

**Tornado: 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.

**Tornado: Vulnerability**

Tornadoes are among the most unpredictable of weather phenomena. Since tornadoes are a random event, vulnerability was assessed by review of past tornadoes.

***Stream Bank Erosion***

General Description

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.

**Stream Bank Erosion: Causes**
One probable cause of stream bank erosion is increased storm water runoff due to development and the removal of native riparian vegetation when development encroaches on streams.

Because floodplain maps only show inundation areas, Roane County should begin to map areas at risk due to stream bank erosion. Channel migration hazard areas should be mapped along Poplar Creek and Whites Creek.

**Steam Bank Erosion: Mitigation Efforts**
Implementation of the county-wide Stormwater Program will serve to control the quality of stormwater as it relates to future development. The requirements in the new stormwater program should reduce the development of future erosion problems

**Stream Bank Erosion: Current Development Trends**
The new Storm Water Program includes regulations to mitigate the increased runoff due to development. Also the issues relating to the degradation of water quality are addressed in the Storm Water Program.

**Stream Bank Erosion: Vulnerability**
Area stream banks are also susceptible to erosion following heavy rains, especially in the developed areas of the county. Although no significant events of stream bank erosion have occurred, TVA representatives have noted that efforts to control and abate stream bank erosion in the urbanized portion of the county are needed.
It is noted that communities need to keep records regarding stream bank erosion damages, especially for the purposes of reducing or mitigating the hazard in the future.

***Drought/Wildland Fires***
**Description**
Both urban and rural areas of all concerned jurisdictions are vulnerable to drought or prolonged periods without rainfall. Drought affects agriculture, urban water supply and causes dry conditions in forested areas. The entire state of Tennessee, including Roane County, has the potential for a significant drought every 15 years.

A wildland fire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. This also is a concern of all jurisdictions due to the population expansion over the past decade into previously undeveloped areas, In an attempt to improve community aesthetics, many developments are leaving areas in their natural state which an promote wildfire conditions in developed areas. They often begin unnoticed and spread quickly and are usually signaled by dense smoke that fills the air for miles. Native and non-native species of grasses, brush, and trees fuel wildland fires.

A wildland fire is a fire 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 fire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

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

**Factors Affecting Wildland Fire Behavior**

Wildland fire 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 wildland fire potential and behavior. The continuity of the 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 wildland fires and has a significant effect on its behavior. Temperature, humidity, and wind (both short and long term) affect the severity and duration of wildland fires.

**Wildland Fire / Drought: Significant Events**

1966-1967, 1969-1971, 1980-1981, 1985-1986, 1988, 1991, 1998 and 2007
Drought reportedly affected Roane County.

**Wildland Fire / Drought: Mitigation Efforts**

Fire preparedness continues in Roane County with purchase of new equipment, and regulations being enforced concerning burning. The Tennessee Department of Forestry continues with controlled burning in specific locations to minimize high risk areas.

**Wildland Fire / Drought: Current Development Trends**

Development in rural areas is increasing the urban/wildland interface. Population projections indicate that population growth will occur in the unincorporated portions of Roane County which will increase the threat of wildfire risk. Economic development and population growth will also increase the demand for water, increasing the impact of drought conditions.

**Wildland Fire / Drought: Vulnerability**

The impacts of drought are considered because of the potential for wildland fire in the forested areas of Roane County. The western city limits of Harriman and Rockwood are located in area subject to wildland fires. Forested steep slopes and bluff lines are particularly vulnerable to wildland fire because of the difficulty of controlling once ignited. There are also pockets of development within these forested areas, making the potential danger to life and health even more serious. A critical infrastructure lies in a wooded area on Mount Roosevelt on Walden Ridge above Rockwood. This critical infrastructure is the emergency communications repeater for the fire and law enforcement dispatch. Other communications towers (cell phone and a state communications repeater) are also in this area.

***Extreme Heat***

**Description**

Prolonged Periods of extreme heat are rare in Tennessee and there were no specific events found in the local newspaper research. However, they have occurred in years past and will occur again.

**Extreme Heat: Development Trends**

Extreme heat is a non site-specific hazard; therefore, current development trends have no effect. However, population growth and new development increase the number of persons that could be affected by extreme heat.

**Extreme Heat: Vulnerability**

The problems associated with extreme heat are not a matter of building structures, but rather pose problems for people, agriculture and some areas of infrastructure; i.e. power production. Inadequate information was available to quantify damages from past periods of extreme heat.

***Earthquake***

**General Description**

An earthquake is the sudden motion or trembling in the earth caused by an abrupt release of slowly accumulating strain. This sudden release results in ground shaking, surface faulting, and/or ground failures. Most earthquakes result in little or no damage, but they are potentially the most dangerous of all natural hazards affecting this jurisdiction. There is a small but potentially serious risk from earthquake events.

Roane 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 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.

In 1995, reports of earthquakes have been reported in Greene County, in an area 25 miles east of Athens, TN., and also several in Western Carolinas. The risk associated with the fault in East Tennessee has not been quantified as of the date of this plan

The Center for Earthquake Research and Information (CERI) at the University of Memphis, maintains a database of earthquake events in the Central United States.

**Earthquake: Significant Events**

August 30, 1984

On August 30, 1984 there was a 3.2 trembler in Roane County. At about 5:26 p.m., there was minor shaking that lasted about 10 seconds. The tremor was centered 4 km east of Kingston. No damage was reported.

March 27, 1987
An earthquake was reported with an epicenter just 8 km north of Kingston, Tennessee. The earthquake registered 4.3, however, there were no reports of damage.

May 10, 2006
An earthquake was reported with an epicenter just 8 km north of Kingston. The earthquake registered 3.2, again no damage was reported.

**Earthquake: Mitigation Efforts**
There is countywide application of the 2006 Standard Building Code.

**Earthquake: 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.

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

Downtown Harriman, Kingston, Rockwood and Oliver Springs have several multi-story buildings. Many of these buildings were constructed prior to the enforcement of seismic building code requirements. Local concerns are critical infrastructures such as Roane Medical Center in Harriman and the Roane County Courthouse, which was built in the early 1970s. All of the city halls were built before the 1960s except for Rockwood. Most of the utilities are in buildings dating back to the 1950s and 1960s. Harriman and Rockwood have several houses built before 1900 and their downtown district has several building built before 1930. The Historic Roane County Courthouse is also a real concern since it was built in the 1840s. A large earthquake could damage the two 1,000+ feet Kingston TVA Fossil Fuel Steam Plant's smoke stacks. However, these stacks will be going off-line sometime in 2008 but will continue to stand. The Town of Oliver Springs has many historic houses and buildings.

The risk associated with the East Tennessee Seismic Zone has not been quantified as of the date of this plan.

**Earthquake: HAZUS ROESRKS**
FOES software (HAZUS) was used to estimate the affect of a 5.0 magnitude earthquake with an epicenter in Kingston. The following discussion presents the results.
HAZUS estimates that about 18,830 buildings would be damaged and 6 would 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 would be 4 ignitions that would burn about .04 square miles, .02% of the region's total area. The model also estimates that the fires would displace about 9 people.

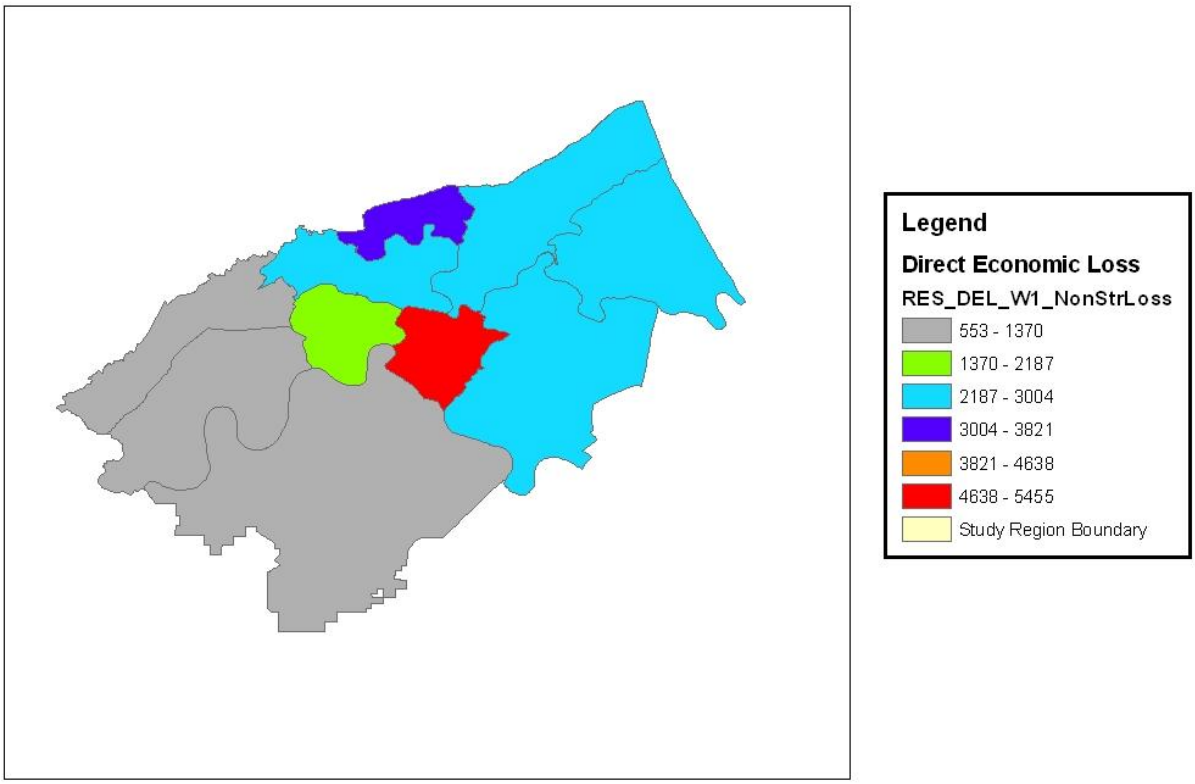
The building losses are broken down into two categories: direct building losses, and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of 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 35.586 million dollars; 6% of the estimated losses were related to business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which made up over 91% of the total loss.

**Earthquake HAZUS DATA Included in Appendix L:**

**Map 14**

DIRECT ECONONMIC LOSS



***Landslide and Land Subsidence***

**Landslide**

**General Description**

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 the shearing forces exceed the resisting forces of the earth material and 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.

**Land Subsidence**

**Description**

Much of Roane County is underlain by karst topography (i.e. beds of relatively soft limestone and dolomite that can easily be dissolved by the dilute organic acids invariably present in water that has percolated downward through soil humus and surface vegetation). In places, such rock is honeycombed with cracks, fissures and sizable cavern systems. These underground passages are commonly connected to the surface by funnel-shaped depressions called sinkholes.

Incidence of subsidence is a danger to property, dams, factories, and utility lines, and when they occur quickly they can also threaten lives. Areas of Roane County are susceptible to land subsidence and sinkholes have formed, some hazardous events have been recorded.

Sinkhole formation is usually a very slow process. Sinkholes generally form in farm fields, woodlands, and other such terrain however, they may occasionally form along city streets, highways, in parking lots, or beneath buildings.

**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

**Predicting Land Subsidence:**
The best predictor of future land subsidence or sinkhole formation is often the topography of the area or the past land use.

- Large depressions from which drainage cannot escape.
- Old mine sites are prone to cave in and subsidence.

**Landslide/ Land Subsidence: High Risk Factors:**
The following conditions may exacerbate the effects of landslides:

- Erosion: Erosion caused by rivers creates 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, and 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, construction activities, 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.
- Geologic areas underlain with karst topography

**Landslide/ Land Subsidence: Mitigation Efforts**
A countywide map is being developed that identifies the areas at risk for landslides in Roane County. This map was developed with the help of the Roane County Highway Department, Office of Emergency Management and Planning Commission Office.

**Landslide/ Land Subsidence: Current Development Trends**
Development in areas identified as at risk for landslide and land subsidence will likely increase as population continues to grow in Roane County.

**Landslide/ Land Subsidence: Vulnerability**
Based on the research of the Roane Highway Department, 3 landslides occurred in Roane County in the past 17 years. Each of the landslides happened in the aftermath of heavy rains, due to the saturated conditions. Debris had to be removed from a road on two, but no other damage was reported. In the other incident part of the road had to be closed and replaced. Also 3 houses were moved off their foundations; the houses were condemned.

**Landslide/ Land Subsidence: Significant Events**
Heavy rain over several days caused a landslide to occur on Airport Road in Rockwood on January 3, 2003. The road was closed because a one-hundred-foot section of the road was destroyed and slid down the side of the hill. Three residential homes were moved off of their foundations and were condemned by the codes official of Rockwood. Two hundred fifty thousand dollars ($250,000) in structure damage cost and five hundred thousand dollars ($500,000) in response, recovery asset and content damage costs were assessed to this incident.

That same year in May, a landslide occurred on Riggs Chapel road in the county outside of the city Harriman. Debris removal was the major affect of the landslide. Two hundred fifty thousand dollars ($250,000) in structure damage cost and five hundred thousand dollars ($500,000) in response, recovery asset and content damage costs were assessed to this incident.

In the 1980s a sinkhole was discovered in the Rockwood High School's parking lot near the gymnasium. The sinkhole was about 6-8 feet wide and 10-12 feet deep.

***Dam Failure***
**General Description**
Failure of a dam facility presents a potential for downstream flooding. Damage in the inundation path initially includes high level flooding of low-lying areas along existing waterways, damage to buildings and to the critical infrastructures (utilities, roadways). After the initial surge of water, river/stream levels are expected to remain elevated for an extended period of time, causing continued interruption of critical services to inundated areas.

**Dam Failure: Significant Events**
There has been no history of dam failure affecting Roane County.

**Dam Failure: Mitigation Efforts**
There are currently no ongoing mitigation efforts underway in relation to this hazard.

**Dam Failure: Current Development Trends**
As the population of Roane County continues to expand, limited growth is anticipated in the inundation prone areas. This is a result of the majority of these areas being previously identified as "at risk" area for flooding (100 and 500 year floodplains).

**Dam Failure: Vulnerability**
Roane County currently has a total of 3 state monitored dams and/or retained farm ponds within its boundaries. The State of Tennessee, Division of Water Supply, Safe Dams Program is responsible for the regulation and inspection of these earthen dams.
Of these 3 dams, none are classified as a Category 1 dam, that in the event of failure, could result in one of the following: loss of human life; excessive economic loss due to damage of downstream properties; excessive economic loss, public hazard, or public inconvenience due to loss of impoundment and/or damage to roads or any public or private utilities.

Roane County has two rivers within its boundaries, the Tennessee River and the Clinch River, which are managed by multiple TVA dam facilities that lie upstream from Roane County. Because of the distance that exists between these facilities, limited loss of life is anticipated with proper notification; however, property damage is expected to be high.

Even though there is no historical context to assess the vulnerability to this hazard, estimates provided by TVA's inundation maps show that in the unlikely event of a dam failure extensive flooding will occur in the majority of Roane County, including the entire Cities of Kingston and Harriman. Several areas in the City of Rockwood and the Town of Oliver Springs could be in excess of the established 100 and 500 year flood zones.

***Fog***

**Description**

The traffic accidents on I-40 have increased the awareness of the fog hazard in Roane County. It was determined that the effects of moist air coming into contact with the cool Clinch River causes this fog mainly at the I-40 bridge near Kingston. The hazard is created when the high speed traffic along the interstate suddenly encounters the foggy conditions. Off of the interstate, where traffic speeds are greatly reduced, the fog is not a problem.

Due to repeated traffic accidents associated with fog and the high rate of speed on Interstate 40, Tennessee Department of Transportation implemented a visual alert system on the western portion of the interstate extending into Cumberland County.

**Fog: Current Development Trends**

New development in the county along the I-40 would not be subject to high speed roads and therefore would not increase the risk of accidents from fog.

# Section 4

## Mitigation Goals, Objectives, and Recommended Strategies

The Federal emphasis for hazard mitigation is on reducing payouts from disaster declarations. This is a natural extension of the previously discussed trends. 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 sitting public facilities in hazardous locations is necessary, communities can incorporate hazard reduction measures into the design or require retrofits where economically feasible. Public facility sitting 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. Repetitive flood losses for all jurisdictions over the past 13 years total $955,219.95 which historically constitutes an annual loss to the community of roughly $73,478.46.

- 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 for All Jurisdictions**

*Flood:*

**Protect lives and property by reducing the damage from flood events throughout Roane County.**

*Severe Storms:*

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

*Tornadoes:*

**Reduce the potential for property damage, loss of life and increase public awareness of the danger of tornadoes.**

*Drought/Wildland fire:*

**Reduce the threat of wildfire and increase public awareness in vulnerable areas.**

*Stream Bank Erosion*

**To minimize risk identify high hazard areas and identify techniques.**

*Extreme Heat*

**Reduce the risk of extreme heat for the vulnerable population.**

*Earthquakes:*

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

*Landslide/Land Subsidence*

**To minimize risk identify high hazard areas and identify techniques.**

*Dam Failure*

**To protect lives and property identify at risk areas and increase public awareness of potential hazard.**

- ***In prioritizing mitigation actions, a thorough cost-benefit analysis will be performed to identify the fiscal feasibility of each project by the jurisdiction***

**Objectives and Actions**

***Harriman:***

Objectives

1. Pursue funding methods for ongoing Harriman Utility Board warehouse flooding project.
2. Continually review existing ordinances and/or create ordinances to support mitigation plan goals for existing and new structures and infrastructures.
3. Decrease the number of repetitive loss structures in the 100-year flood zone.
4. Upgrade inadequate infrastructure.
5. Minimize power and communication outages.
6. Increase basin modeling and flood mapping capabilities.
7. Increase scrutiny of proposed developments and preclude developments in known floodplains and floodways.
8. Protect area streams from the effects of development.
9. Increase public awareness of potential dangers of natural hazards
10. Increase capabilities to warn flood zone residents of imminent flooding due to headwater rainfall and / or dam failure.
11. Investigate the feasibility of an early warning system to notify residents of imminent severe weather and tornados.
12. Locate, identify, and publicize community shelters.

Preferred Actions

1. Relocate and rebuild a critical infrastructure, the Harriman Utility Board warehouse, to make more resistant to flooding.
    a. Responsible Department: Harriman Utility Board
    b. Time Frame: In progress
    c. Funding Source: Hazard Mitigation Grant
2. Review and revise ordinances necessary to strengthen mitigation efforts.
    a. Responsible Department: All departments
    b. Time Frame: Immediately
    c. Funding Source: Existing budget
3. Buy out repetitive flood structures.
    a. Responsible Department: Mayor/City Council
    b. Time Frame: Not known
    c. Funding Source: Hazard Mitigation Grant
4. Routinely trim limbs in the right-of-ways.
    a. Responsible Department: Harriman Utility Board and Harriman St. Dept.
    b. Time Frame: On going
    c. Funding Source: Existing budget
5. Investigate feasibility of underground utilities for problem areas and new developments.
    a. Responsible Department: Harriman Utility Board
    b. Time Frame: Within 3 years
    c. Funding Source: Not Known
6. Continue development of basin modeling and creation of flood mapping in developing areas.
    a. Responsible Department: Harriman City Planning Commission
    b. Time Frame: In progress

   c. Funding Source(s): Hazard Mitigation Grant
7. Investigate the feasibility of an early warning system to notify residents of imminent severe weather, tornados and / or upstream dam failure.
   a. Responsible Department: OES
   b. Time Frame: Within one year
   c. Funding Source: Hazard Mitigation Grant/ other sources
8. Identify additional public building for use as tornado shelters.
   a. Responsible Department: OES
   b. Time Frame: Within three years
   c. Funding Source: Existing budget

***Kingston:***

Objectives

1. Continually review existing ordinances and/or create ordinances to support mitigation plan goals for existing and new structures and infrastructures.
2. Decrease the number of repetitive loss structures in the 100-year flood zone.
3. Upgrade inadequate infrastructure.
4. Minimize power and communication outages.
5. Increase basin modeling and flood mapping capabilities.
6. Increase scrutiny of proposed developments and preclude development in known floodplains and floodways.
7. Protect area streams from the effects of development.
8. Increase public awareness of potential dangers of natural hazards
9. Increase capabilities to warn flood zone residents of imminent flooding due to headwater rainfall and/or dam failure.
10. Investigate the feasibility of an early warning system to notify residents of imminent severe weather and tornados.
11. Locate, identify, and publicize community shelters.

Preferred Actions

1. Review and revise ordinances necessary to strengthen mitigation efforts.
   a. Responsible Department: All departments
   b. Time Frame: Immediately
   c. Funding Source: Existing budget
2. Buy out repetitive flood structures.
   a. Responsible Department: Mayor/City Council
   b. Time Frame: Not known
   c. Funding Source: Hazard Mitigation Grant
3. Routinely trim limbs in the right-of-ways.
   a. Responsible Department: Rockwood Electric Utility and Kingston St. Dept.
   b. Time Frame: On going
   c. Funding Source: Existing budget
4. Investigate feasibility of underground utilities for problem areas and new developments.
   a. Responsible Department: Rockwood Electric Utility
   b. Time Frame: Within 3 years
   c. Funding Source: Not Known
5. Continue development of basin modeling and creation of flood mapping in developing areas.

   a. Responsible Department: Kingston City Planning Commission
   b. Time Frame: In progress
   c. Funding Source(s): Hazard Mitigation Grant
6. Investigate the feasibility of an early warning system to notify residents of imminent severe weather, tornados and / or upstream dam failure.
   a. Responsible Department: OES
   b. Time Frame: Within one year
   c. Funding Source: Hazard Mitigation Grant/ other sources
7. Identify additional public building for use as tornado shelters.
   a. Responsible Department: OES
   b. Time Frame: Within three years
   c. Funding Source: Existing budget

***Rockwood:***

Objectives

1. Continually review existing ordinances and/or create ordinances to support mitigation plan goals for existing and new structures and infrastructures.
2. Decrease the number of repetitive loss structures in the 100-year flood zone.
3. Upgrade inadequate infrastructure.
4. Minimize power and communication outages.
5. Increase basin modeling and flood mapping capabilities.
6. Increase scrutiny of proposed developments and preclude developments in known floodplains and floodways.
7. Protect area streams from the effects of development.
8. Increase public awareness of potential dangers of natural hazards
9. Increase capabilities to warn flood zone residents of imminent flooding due to headwater rainfall and / or dam failure.
10. Investigate the feasibility of an early warning system to notify residents of imminent severe weather and tornados.
11. Locate, identify, and publicize community shelters.

Preferred Actions

1. Review and revise ordinances necessary to strengthen mitigation efforts.
   a. Responsible Department: All departments
   b. Time Frame: Immediately
   c. Funding Source: Existing budget
2. Buy out repetitive flood structures.
   a. Responsible Department: Mayor/City Council
   b. Time Frame: Not known
   c. Funding Source: Hazard Mitigation Grant
3. Routinely trim limbs in the right-of-ways.
   a. Responsible Department: Rockwood Electric Utility and Rockwood St. Dept.
   b. Time Frame: On going
   c. Funding Source: Existing budget
4. Investigate feasibility of underground utilities for problem areas and new developments.
   a. Responsible Department: Rockwood Electric Utility
   b. Time Frame: Within 3 years
   c. Funding Source: Not Known

5. Continue development of basin modeling and creation of flood mapping in developing areas.
    a. Responsible Department: Rockwood City Planning Commission
    b. Time Frame: In progress
    c. Funding Source(s): Hazard Mitigation Grant
6. Investigate the feasibility of an early warning system to notify residents of imminent severe weather, tornados and / or upstream dam failure.
    a. Responsible Department: OES
    b. Time Frame: Within one year
    c. Funding Source: Hazard Mitigation Grant/ other sources
7. Identify additional public building for use as tornado shelters.
    a. Responsible Department: OES
    b. Time Frame: Within three years
    c. Funding Source: Existing budget

***Oliver Springs:***

Objectives

1. Investigate the feasibility of an early warning system for flooding secondary to heavy rainfall and / or dam failure.
2. Review existing ordinances to support mitigation plan goals for existing and new structures and infrastructures.

Preferred Actions

1. Relocate critical facilities within the flood prone areas.
    a. Responsible Department: Mayor/Aldermen
    b. Time Frame: Not Known
    c. Funding Source(s): Hazard Mitigation Grant
2. Eliminate repetitive damage to property in the 100-year floodplain
    a. Responsible Department: Town Council
    b. Time Frame: Not Known
    c. Funding Source(s): Hazard Mitigation Grant
3. Investigate the feasibility of an early warning system to notify residents of imminent severe weather, tornados and/or upstream dam failure.
    a. Responsible Department: OES
    b. Time Frame: Within one year
    c. Funding Source: Hazard Mitigation Grant/other sources
4. Amend existing or enact new ordinances to achieve mitigation goals.

***Unincorporated Roane County***

Objectives

1. Continually review existing ordinances and/or create ordinances to support mitigation plan goals for existing and new structures and infrastructures.
2. Decrease the number of repetitive loss structures in the 100-year flood zone.
3. Minimize power and communication outages.
4. Increase basin modeling and flood mapping capabilities.
5. Upgrade inadequate infrastructure.

6. Increase scrutiny of proposed developments and preclude developments in known floodplains and floodways.
7. Protect area streams from the effects of development.
8. Increase public awareness of potential dangers of natural hazards
9. Increase capabilities to warn flood zone residents of imminent flooding due to headwater rainfall and/or dam failure.
10. Investigate the feasibility of an early warning system to notify residents of imminent severe weather and tornados.
11. Locate, identify and publicize community shelters.
12. Pursue funding methods for ongoing Poplar Creek and Riggs Chapel flooding projects.
13. Pursue funding methods for ongoing Old Airport Road land subsidence project.

Preferred Actions

1. Review and revise ordinances necessary to strengthen mitigation efforts.
    a. Responsible Department: All departments
    b. Time Frame: Immediately
    c. Funding Source: Existing budget
2. Buy out repetitive flood structures.
    a. Responsible Department: County Commission
    b. Time Frame: Not known
    c. Funding Source: Future Hazard Mitigation Grant
3. Routinely trim limbs in the right-of-ways.
    a. Responsible Department: Highway Department
    b. Time Frame: On going
    c. Funding Source: Existing budget
4. Investigate feasibility of underground utilities for problem areas and new developments.
    a. Responsible Department: Roane County Planning Commission
    b. Time Frame: Within 3 years
    c. Funding Source: Not Known
5. Continue development of basin modeling and creation of flood mapping in developing areas.
    a. Responsible Department: Roane County Planning Commission
    b. Time Frame: In progress
    c. Funding Source(s): Hazard Mitigation Grant
6. Educate the public of the potential dangers of natural hazards.
    a. Responsible Department: OES/Public Schools
    b. Time Frame: Within one year
    c. Funding Source: Existing budget
7. Educate residents in high-risk areas.
    a. Responsible Department: OES
    b. Time Frame: Within one year
    c. Funding Source: Existing budget
8. Investigate the feasibility of an early warning system to notify residents of imminent severe weather, tornados and/or upstream dam failure.
    a. Responsible Department: OES
    b. Time Frame: Within one year

c. Funding Source: Existing budget

9. Identify additional public building for use as tornado shelters.
   a. Responsible Department: OES
   b. Time Frame: Within one year
   c. Funding Source: Existing budget

All responsible parties in reviewing and implement the preferred actions in the mitigating efforts must decide if the projects are cost effective in maximizing the cost benefit for the resident of Roane County. Each objective and preferred action will be prioritized according to the greatest benefit for the most people affected by the hazard. Preferred action should be technically feasible for accomplishing the corrective goals.

# Section 5

## Monitoring, Evaluating, Public Involvement, and Updating the Plan

Roane County Office of Emergency Services (OES) through the Local Emergency Planning Committee (LEPC) will establish a program to update the mitigation activities for all participating communities in the County on a five-year cycle. OES will maintain a file of any mitigation programs or activities that they review and will report annually to the Tennessee Emergency Management Agency (TEMA) on the progress of meeting the requirements of the Hazard Mitigation Plan. OES will also monitor the plan for compliance, for inclusion of other existing plans and for mitigation project completion. Roane County Office of Emergency Services will keep the chief elected official informal of all changes to the Hazard Mitigation Plan.

The Roane County Natural Hazard Mitigation Plan will be considered and implement where applicable into the Roane County Regional Growth Plan, Roane County Storm water and Run-off Plan, Roane County's and the cities Land Use Regulations and the Roane County Basic Emergency Operations Plan. Each committee for each of the plans mentioned above will review the Hazard Mitigation Plan as they review and update their plans. These Committees will give recommendation for any changes needed for the Hazard Mitigation Plan.

On an annual basis in August, the Roane County Office of Emergency Services and the Roane County Local Emergency Planning Committee will review the Natural Hazard Mitigation Plan, prepare a summary of any changes or completed actions that have occurred during the previous year that would affect elements of the Plan or those actions and/or activities that are proposed for subsequent year(s) that are not included in the Plan and draft a proposed amendment to the Natural Hazard Mitigation Program (NHMP). A review of the Natural Hazard Mitigation Plan will also be conducted post incident and any elements identified will be processed for amendment as with the annual review. All proposed changes/updates will be reviewed by the Roane County Office of Emergency Services Committee and the Mitigation Planning Team then a notice of amendments to the Plan, including a summary of the proposed amendment, will be provided by the team to local media for publication and to the local participating governments.

Comments from the public and participating governments will be solicited during this timeframe and the proposed amendment(s) modified, as appropriate, in response to these comments. The Roane County Natural Hazard Mitigation Plan, upon final approval from the Federal Emergency Management Agency, will also be made available to the public by electronic means via the internet on the Roane County Government website (www.roanegov.org). Public comment will also solicited by electronic means via this website.

At the end of the five-year planning cycle, any amendments to the Plan will be incorporated into an update to the Plan. Also, in conjunction with this 5 year cycle, review of other local plans and ordnances that contribute to the mitigation efforts undertaken by this plan will be conducted. These contributing plans and policies shall also be updated, in accordance with local procedure, as needed to ensure that the Plan remains valid.

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# Appendix A. Definitions

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.

Bank full Stage/Elevation:

An established river stage/water surface elevation at a given location along a river which is intended to represent the maximum water level that will not overflow the river banks 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 occurring in a stream during a given flood event.

Detention Basins:

Structures which 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 which 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 Flood proofing:

A dry flood proofed 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, whether 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 Flood proofing:

An approach to flood proofing that usually is a last resort. Flood waters are intentionally allowed into the building to minimize water pressure on the structure. Wet Flood proofing can include moving a few valuable items to a higher place or completely rebuilding the floodable area. Wet flood proofing 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 which 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 crests 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 passes 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 watercourse overtops its banks and begins to cause damage to any portion of the defined reach. Flood stage is usually higher than or equal to bankfull 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 stream flow 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. Flood proofing can be divided into wet and dry flood proofing. 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 flood-proofed 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 stream flow 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 levied, 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 flood-flow 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 non-additive 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 which 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.

## Appendix B Natural Hazards Mitigation Plan Survey

Please attach information if the space provided is insufficient.
Roane County Natural Hazards Mitigation Plan Survey

*Please attach information if the space provided is insufficient.*

1. Community or Department 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).
_____
_____
_____
_____
_____

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)?
_____
_____
_____
_____
_____

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.
_____
_____

_____
_____
_____
_____

8. 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
___Wildland fires
Other
___Fog
___Dam Failure

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

_____
_____
_____

10. 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)

_____
_____

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

_____
_____
_____
_____

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

_____
_____
_____
_____

13. List the overall goals that your community hopes to achieve through the Roane County Natural Hazard Mitigation Plan.
Example: Reduce flood damage in Roane County.

_____
_____
_____

14. Please list any specific objectives that your community hopes to achieve through the Roane County Natural Hazard Mitigation Plan.
Example: Minimize future damage due to flooding of the Emory River.

_____
_____
_____
_____
_____

15. Please list any specific actions that your community would recommend to alleviate natural hazards.
Example: Work with existing floodplain residents to elevate or flood-proof their structures, including obtaining funding assistance and technical guidance.

_____
_____
_____
_____
_____
_____

# Appendix C. Regional Notice

ROANE COUNTY
OFFICE
OF
EMERGENCY MANAGEMENT
AND
HOMELAND SECURITY

Roane County Courthouse
200 East Race Street
Suite 18
P.O. Box 1196
Kingston, TN 37763
(865) 717-4115
Fax: 717-0615

January 8, 2008

Attention: Emergency Management Directors of Anderson, Cumberland, Loudon, Meigs, Morgan and Rhea Counties

Re: Natural Hazard Mitigation Plan for Roane County

We are in the process of developing a Natural Hazard Mitigation Plan for Roane County. I would like to have input in to this plan from our neighboring counties. We are planning a conference call on Thursday, January 17, 2008 at 1:30 p.m. Please call (865) 717-4115 to share your thoughts on this very important matter.

Sincerely,

William H. Rose Jr.
Director

A phone conference was held with the OES directors of Anderson, Cumberland, Meigs, Rhea and Morgan counties on January 17, 2008 concerning Roane County's intent to prepare this plan. Anderson and Cumberland expresses interest and offered any help we might need. Lin Chilcoat of Anderson EMA made herself available for any questions since she was the person responsible for overseeing Anderson County's Hazard Mitigation Plan.

# Appendix D. Newspaper Articles Announcing Public Meetings

LEGAL NOTICE

**ROANE COUNTY HAZARD MITIGATION PLAN**

The Roane County Office of Emergency Management and Homeland Security is currently reviewing the county's Hazard Mitigation Plan. The Hazard Mitigation Plan will identify the natural hazards in Roane County as well as objectives in planning to prevent or reduce the effects of unavoidable hazards that may occur in our county, such as severe thunderstorms, flooding, tornadoes and wildfires.

There will be four steps in acheiving this goal, identifying hazards, profiling hazard events, inventory assets and estmate losses. Roane County EMA is asking the citizens of Roane County to participate in one or all four steps of this process by joining a committee or comment by mail at P.O. Box 1196, Kingston, TN 37763.

The Hazard Mitigation Planning Committee will meet January 22, 2008 at 6:30 in the Walden Ridge Conference Room at Roane State Community College, adjacent to the Student Lounge in the main building.

The Hazard Mitigation Plan must be complete and pass FEMA'S guidlines and approval before Roane County or its municipalities will be able to receive disaster grant money.

# City & County Meetings

**MONDAY, FEB. 4**

• Roane County Hazard Mitigation Plan Committee will meet at 6:30 p.m. in the Walden Ridge Conference Room at Roane State Community College. The Roane County Office of Emergency Management and Homeland Security is asking county residents to participate in a hazard mitigation plan committee or comment by mail at P.O. Box 1196, Kingston, TN 37763.

• Harriman Parks and Recreation Committee will meet in monthly session at 7 p.m. in the Harriman Police Department training room.

**TUESDAY, FEB. 5**

• Kingston City Council will meet in regular monthly workshop session at 6 p.m. in Kingston Community Center.

• Harriman City Council will meet in regular session at 7:30 p.m. in the conference room of Harriman Municipal-Utility Building. The city's fire board will meet at 6:30.

**WEDNESDAY, FEB. 6**

• Roane County Commission's budget committee will meet at 5 p.m. in the Qualls Commission Room of Roane County Courthouse, Kingston

**THURSDAY, FEB. 7**

• Roane County Commission's environmental review board will meet at 6 p.m. in the Qualls Commission Room of Roane County Courthouse, Kingston.

• Harriman Golf Board will meet in regular monthly session at 6:30 p.m. in the mayor's office in the Temperance Building.

**TUESDAY, FEB. 12**

• Roane County Board of Health will meet at noon in the conference room of Roane County Health Department at 1362 N. Gateway Ave., Rockwood.

• Roane County Commission's fire board will meet in regular monthly session at 7 p.m. in the Qualls Commission Room of Roane County Courthouse, Kingston.

• Kingston City Council will meet in regular monthly session at 7 p.m. in Kingston Community Center.

• Harriman City Council will meet in regular session at 7:30 p.m. in the conference room of Harriman Municipal-Utility Building. The city's police board will meet at 6:30.

**THURSDAY, FEB. 14**

• Roane County Commission's industrial liaison committee will meet at 5:30 p.m. in the Qualls Commission Room in Roane County Courthouse, Kingston.

**SATURDAY, FEB. 16**

• Kingston City Council will have a goal-setting session from 8 a.m. to noon in Kingston Community Center.

**WEDNESDAY, FEB. 20**

• Harriman Regional Planning Commission will meet in regular monthly session at 5:30 p.m. in the Harriman Police Department training room.

**THURSDAY, FEB. 21**

• Kingston Regional Planning Commission will meet in regular monthly session at 6 p.m. in Kingston Community Center.

**THURSDAY, FEB. 28**

• Harriman City Council will meet in regular monthly workshop session at 6 p.m. in the Harriman Police Department training room.

Friday, February 22, 2008 • **Page 7A**

# City & County Meetings

**FRIDAY, FEB. 22**

• Rockwood City Court will convene at 9 a.m. in Rockwood City Hall.

• Roane County Board of Education will meet in a retreat at 1 p.m. in Oak Tree Lodge, Sevierville/Pigeon Forge. Purpose of the retreat is to discuss school facilities. Call 376-5592 for details.

**SATURDAY, FEB. 23**

• Roane County Board of Education will meet in a retreat at 8 a.m. n Oak Tree Lodge, Sevierville/Pigeon Forge. Purpose of the retreat is o discuss school facilities. Call 376-5592 for details.

**MONDAY, FEB. 25**

• Roane County Commission's in-lieu-of-tax committee will meet at :30 p.m. in the Qualls Commission Room of Roane County Court-ouse, Kingston.

• Rockwood Water, Wastewater and Natural Gas Board will meet n regular monthly session at 6 p.m. in Rockwood City Hall.

• Roane County Hazard Mitigation Plan Committee will meet at :30 p.m. in the Walden Ridge Conference Room on the main campus f Roane State Community College.

**TUESDAY, FEB. 26**

• Rockwood Electric Utility Board will meet in regular monthly ses-ion at 5:30 p.m. in Rockwood City Hall. (Meeting postponed from eb. 19.)

**THURSDAY, FEB. 28**

• Roane County Commission's board of public utilities will meet at p.m. in the Qualls Commission Room of Roane County Courthouse, ingston.

• Harriman City Council will meet in regular monthly workshop ession at 6 p.m. in the Harriman Police Department training oom.

Roane County News

# City & County Meetings

**WEDNESDAY, MARCH 19**

• Roane County Commission's long-range planning committee will meet at 1 p.m. in the county executive's conference room of Roane County Courthouse, Kingston.

• Harriman Regional Planning Commission will meet in regular monthly session at 5:30 p.m. in the Harriman Police Department training room.

**THURSDAY, MARCH 20**

• Kingston Regional Planning Commission will meet in regular monthly session at 6 p.m. in Kingston Community Center.

• Roane County Commission's building inspector, code and review committee will meet at 7 p.m. in the county executive's conference room of Roane County Courthouse, Kingston.

**MONDAY, MARCH 24**

• Rockwood Water, Wastewater and Natural Gas Board will meet in regular monthly session at 6 p.m. in Rockwood City Hall.

**TUESDAY, MARCH 25**

• Roane County Commission's courthouse and courtroom security committee will meet at 5 p.m. in the Qualls Commission Room of Roane County Courthouse, Kingston.

**THURSDAY, MARCH 27**

• Roane County Commission's safety committee will meet at 5 p.m. in the emergency management office of Roane County Courthouse, Kingston.

• Harriman City Council will meet in regular monthly workshop session at 6 p.m. in the Harriman Police Department training room.

• Roane County Commission's board of public utilities will meet at 6 p.m. in the Qualls Commission Room of Roane County Courthouse, Kingston.

• Roane County Commission's emergency management committee will meet at 6 p.m. in the emergency management office of Roane County Courthouse, Kingston.

**FRIDAY, MARCH 28**

• Rockwood City Court will convene at 9 a.m. in Rockwood City Hall.

**MONDAY, MARCH 31**

• Roane County Hazard Mitigation Plan Committee will meet at 6:30 p.m. in the Walden Ridge Conference Room at Roane State Community College.

# City & County Meetings

**MONDAY, JUNE 9**

• Rockwood Zoning Board and Regional Planning Commission will meet in regular monthly session at 6:30 p.m. in Rockwood City Hall.

**TUESDAY, JUNE 10**

• Kingston City Council will meet in regular monthly sesson at 7 p.m. in Kingston Community Center.

• Harriman City Council will meet in regular monthly session at 7:30 p.m. in the conference room of Harriman Municipal-Utility Building. The city's police board will meet at 6:30.

• The Roane County Fire Board will meet at 7 p.m. in the Qualls Commission room on the second floor of the Roane County Courthouse, Kingston.

• The Roane County Hazard Mitigation Plan Committee will meet at 6:30 p.m. in the Roane County Emergency Operation Center on the third floor of the Roane County Courthouse,

Kingston. This is the final meeting for the proposed Hazard Mitigation Plan.

**WEDNESDAY, JUNE 11**

• The Roane County Jail Oversight Committee will meet at 4 p.m. in the county executive's conference room on the first floor of the Roane County Courthouse, Kingston.

**THURSDAY, JUNE 12**

• Roane County Board of Education will meet in a budget workshop session and special-called meeting at 6 p.m. in the E.E. Williams Education Building at 105 Bluff Road, Kingston.

• Harriman Golf Board will meet in regular monthly session at 6:30 p.m. in the mayor's office in the Temperance Building.

• Rockwood Civil Service Board will meet in regular monthly session at 7 p.m. in Rockwood City Hall.

**FRIDAY, JUNE 13**

• The Roane County Board of Public Utilities will meet with representative(s) of Veolia Water N.A. at 2 p.m. in the County Execu-

## Appendix E. Public Notices

ROANE COUNTY
OFFICE
OF
EMERGENCY MANAGEMENT
AND
HOMELAND SECURITY

Roane County Courthouse
200 East Race Street
Suite 18
P.O. Box 1196
Kingston, TN 37763
(865) 717-4115
Fax: 717-0615

# PUBLIC NOTICE

There will be a Hazard Mitigation Planning Meeting to be held on January 22, 2008 at Roane State Community College in the Walden Ridge Conference Room adjacent to the student lounge in the Dunbar Building at 6:30 p.m.

The Hazard Mitigation Plan will identify the natural hazards in Roane County as well as objectives in planning to prevent or reduce the effects of unavoidable hazards that may occur in our county, such as, severe thunderstorms, flooding, tornadoes, wildland fires, etc.

Roane County Office of Emergency Management is asking the residents of Roane County to participate in this planning process. Your input is very important in the development of this document.

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(865) 717-4115
Fax: 717-0615

# PUBLIC NOTICE

There will be a Hazard Mitigation Planning Meeting to be held on February 4, 2008 at Roane State Community College in the Walden Ridge Conference Room adjacent to the student lounge in the Dunbar Building at 6:30 p.m.

The Hazard Mitigation Plan will identify the natural hazards in Roane County as well as objectives in planning to prevent or reduce the effects of unavoidable hazards that may occur in our county, such as, severe thunderstorms, flooding, tornadoes, wildland fires, etc.

Roane County Office of Emergency Management is asking the residents of Roane County to participate in this planning process. Your input is very important in the development of this document.

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(865) 717-4115
Fax: 717-0615

# PUBLIC NOTICE

There will be a Hazard Mitigation Planning Meeting to be held on February 25, 2008 at Roane State Community College in the Walden Ridge Conference Room adjacent to the student lounge in the Dunbar Building at 6:30 p.m.

The Hazard Mitigation Plan will identify the natural hazards in Roane County as well as objectives in planning to prevent or reduce the effects of unavoidable hazards that may occur in our county, such as, severe thunderstorms, flooding, tornadoes, wildland fires, etc.

Roane County Office of Emergency Management is asking the residents of Roane County to participate in this planning process. Your input is very important in the development of this document.

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(865) 717-4115
Fax: 717-0615

# PUBLIC NOTICE

There will be a Hazard Mitigation Planning Meeting to be held on March 31, 2008 at Roane State Community College in the Walden Ridge Conference Room adjacent to the student lounge in the Dunbar Building at 6:30 p.m.

The Hazard Mitigation Plan will identify the natural hazards in Roane County as well as objectives in planning to prevent or reduce the effects of unavoidable hazards that may occur in our county, such as, severe thunderstorms, flooding, tornadoes, wildland fires, etc.

Roane County Office of Emergency Management is asking the residents of Roane County to participate in this planning process. Your input is very important in the development of this document.

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(865) 717-4115
Fax: 717-0615

# PUBLIC NOTICE

There will be a Hazard Mitigation Planning Meeting to be held on April 14, 2008 at Roane State Community College in the Walden Ridge Conference Room adjacent to the student lounge in the Dunbar Building at 6:30 p.m.

The Hazard Mitigation Plan will identify the natural hazards in Roane County as well as objectives in planning to prevent or reduce the effects of unavoidable hazards that may occur in our county, such as, severe thunderstorms, flooding, tornadoes, wildland fires, etc.

Roane County Office of Emergency Management is asking the residents of Roane County to participate in this planning process. Your input is very important in the development of this document.

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Kingston, TN 37763
(865) 717-4115
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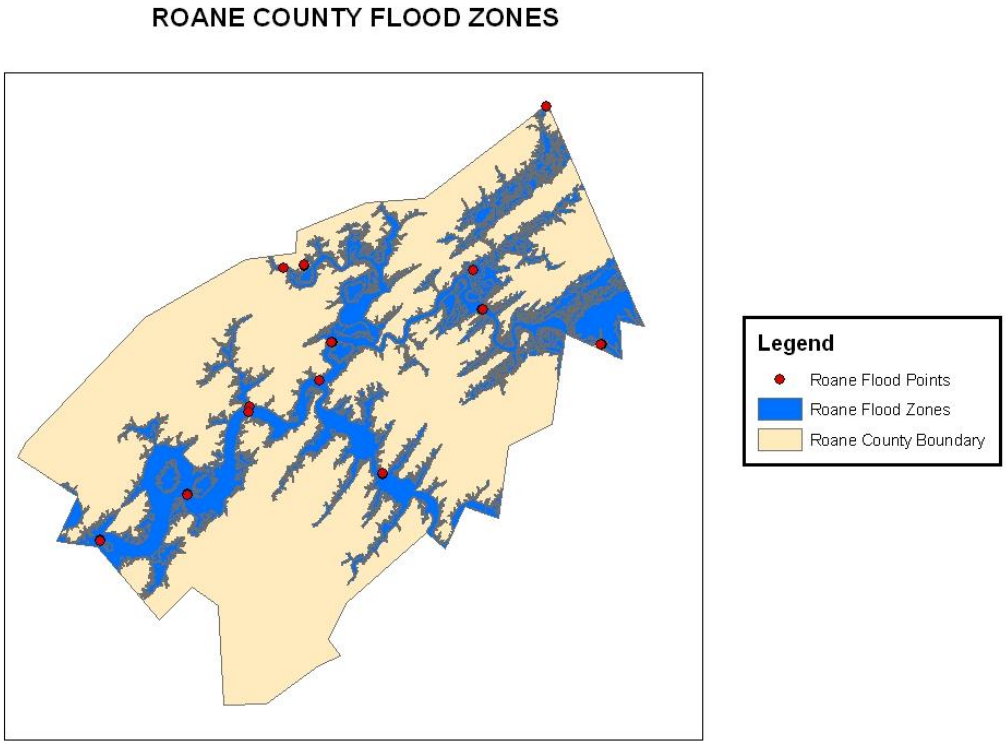
# PUBLIC NOTICE

There will be a Final Hazard Mitigation Planning Meeting to be held on June 10, 2008 at the Roane County Courthouse in the Emergency Operations Center on the third floor at 6:30 p.m.

# Appendix F. Problem Flood Areas




**Harriman**
Stormwater
From surveys these locations were identified as problem areas for flooding
List below: Street - Quadrant of City - Possible solutions that would require state and Federal funding.

1. Margrave Street - W Quadrant – Harriman Utility Board Warehouse and the City Refueling Depot – Relocation of the facilities.
2. Garrett Street SW Quadrant – Very low lying area – Buyout homes through Federal buyout program
3. Baumgartner Road – SE Quadrant – Flooding due to road construction – Several small streams run along this road. Possible solutions: widening of the streams, Higher and wider bridge, buyout homes through Federal buyout program in lower laying areas.

## Kingston

1. Intersection of Spring Street and First Street – NW Quadrant– Possible solution is to raise the road. This is the primary flooding area in Kingston
2. Loveliss Street – NW Quadrant – Possible solution is to raise the street. Flooding is due to TVA backing up water from the Clinch River.
3. James Ferry Road –SE Quadrant - Middle Section of the length of the road. The solution is to install bigger drainage tiles.
4. Intersection of Kentucky Street (Hwy 58) and Race Street (Hwy 70) – Center Point Quadrant – Additional drainage structures

## Rockwood

1. Front Street from Rockwood Street south to Rathburn Street– SW Quadrant – This Street has always flooded because it was built too low below Black Creek. Unknown how to correct the problem.
2. Gateway Avenue and parallel Kingston Avenue from Rathburn Street to Nelson Street. SE Quadrant – Five to Six houses flood during heavy rains. Buyout homes through Federal buyout program.
3. Elm Street – NE Quadrant – Buyout homes through Federal buyout program.
4. Rockwood Street between Front Street and North Wilder Avenue – Center West Quadrant. Flooding to business district during 100 year floods. Several projects have been done in this area, however, flooding still occurs. Unknown how to completely correct the problem.

### Unincorporated Roane County

From Surveys these locations were identified as problem areas for flooding

1. Riggs Chapel at the railroad trestle
2. NW Side of Blair Road
3. Poplar Creek Road at Poplar Creek and Indian Creek
4. Keylon Drive
5. Mountain View Road near the entrance of U.S. Highway 70
6. McNew Road near the Roane County Animal Shelter
7. Martin Road
8. Main Street between Shenandoah Drive and Foothills Drive in Webster Subdivision

# Appendix G. Public Comments

During the final meeting the people who reviewed the plan thought everything was in order. The consensus was this was a good plan.

# Appendix H. Work Cited

No work cited. Credit for articles and information used was given throughout the plan.

# Appendix I. Plan Approval

Plan Adoption will be voted on by resolution by the Roane County Commission and the City Councils' and/or appropriate legislative body of each jurisdiction represented in this document (Harriman, Kingston, Oliver Springs and Rockwood) for approval upon the approval by the Federal Emergency Management Agency.

Each resolution of each jurisdiction will be place Appendix I of the Roane County Natural Hazard Mitigation Plan.

# Appendix J. NCDC and Newspaper Research

http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms - BEG#BEG

DOC >NOAA >NESDIS >NCDC Search Field: Search NCDC

## I. Query Results

**243** event(s) were reported in **Roane County, Tennessee** between **01/01/1950** and **02/28/2008** (**High Wind limited to speed greater than 0 knots)**.

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

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

**Tennessee**

| Location or County | Date | Time | Type | Mag | Dth | Inj | PrD | CrD |
|---|---|---|---|---|---|---|---|---|
| 1 ROANE | 06/16/1957 | 1830 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 2 ROANE | 04/24/1958 | 1750 | Hail | 1.00 in. | 0 | 0 | 0 | 0 |
| 3 ROANE | 06/01/1958 | 2000 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 4 ROANE | 06/01/1958 | 2000 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 5 ROANE | 01/21/1959 | 1500 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 6 ROANE | 04/29/1963 | 1520 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 7 ROANE | 08/07/1963 | 1500 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 8 ROANE | 06/05/1975 | 1645 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 9 ROANE | 06/12/1975 | 1900 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 10 ROANE | 10/01/1977 | 2315 | Tornado | F0 | 0 | 0 | 25K | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 11 ROANE | 05/25/1978 | 1600 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 12 ROANE | 10/13/1983 | 0330 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 13 ROANE | 07/02/1984 | 1430 | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| 14 ROANE | 07/26/1984 | 1500 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 15 ROANE | 06/03/1987 | 1910 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 16 ROANE | 07/06/1990 | 1800 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 17 ROANE | 08/09/1990 | 1900 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 18 ROANE | 08/29/1990 | 1445 | Tstm Wind | 61 kts. | 0 | 0 | 0 | 0 |
| 19 ROANE | 09/01/1990 | 1400 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 20 ROANE | 06/16/1991 | 0500 | Tstm Wind | 0 kts. | 0 | 0 | 0 | 0 |
| 21 ROANE | 09/10/1992 | 1320 | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 22 Eastern Roane | 01/24/1993 | 0900 | Thunderstorm Winds | N/A | 0 | 0 | 1K | 0 |
| 23 Cave Creek | 02/21/1993 | 1605 | Tornado | F1 | 0 | 0 | 50K | 0 |
| 24 Oliver Springs | 03/23/1993 | 1000 | Flash Flood | N/A | 0 | 0 | 5K | 0 |
| 25 Kingston | 03/31/1993 | 1815 | Hail | 1.75 in. | 0 | 0 | 1K | 0 |
| 26 TNZ012>018 - 035>047 - 066>074 - 081>087 - 098>102 | 12/20/1993 | 2200 | Snow | N/A | 0 | 0 | 1K | 0 |
| 27 TNZ001>102 | 01/16/1994 | 1800 | Snow | N/A | 0 | 0 | 5K | 0 |
| 28 TNZ03>13;20>35 - | 02/09/1994 | 2000 | Ice Storm | N/A | 0 | 0 | 500K | 0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 42>66 - 75>82 - 84 - 85 - 88>97 - 100 - 101 | | | | | | | | |
| 29 Harriman | 02/11/1994 | 0130 | Flash Flood | N/A | 0 | 0 | 1K | 0 |
| 30 Rockwood | 03/27/1994 | 1400 | Flash Flooding | N/A | 0 | 0 | 50K | 0 |
| 31 Rockwood | 07/13/1994 | 2300 | Lightning | N/A | 0 | 0 | 5K | 0 |
| 32 TNZ001>102 | 02/07/1995 | 1200 | Snow | N/A | 0 | 0 | 1K | 0 |
| 33 Kingston | 05/09/1995 | 1455 | Thunderstorm Winds | N/A | 0 | 0 | 5K | 0 |
| 34 Rockwood | 05/09/1995 | 1510 | Thunderstorm Winds | N/A | 0 | 0 | 01 | 0 |
| 35 Southern Roane Co | 05/10/1995 | 2110 | Thunderstorm Winds | N/A | 0 | 0 | 1K | 0 |
| 36 Rockwood | 05/14/1995 | 0600 | Thunderstorm Winds | N/A | 0 | 0 | 2K | 0 |
| 37 Oliver Springs | 05/18/1995 | 1740 | Hail | 2.75 in. | 0 | 0 | 0.1M | 0 |
| 38 Oliver Springs | 05/18/1995 | 1745 | Thunderstorm Winds | N/A | 0 | 0 | 5K | 0 |
| 39 Rockwood | 06/11/1995 | 1515 | Thunderstorm Winds | N/A | 0 | 0 | 1K | 0 |
| 40 Kingston | 06/30/1995 | 1500 | Thunderstorm Winds | N/A | 0 | 0 | 2K | 0 |
| 41 Kingston | 08/01/1995 | 1615 | Thunderstorm Winds | N/A | 0 | 0 | 10K | 0 |
| 42 Countywide | 08/01/1995 | 1800 | Thunderstorm Winds | N/A | 0 | 0 | 10K | 0 |
| 43 West | 08/06/1995 | 1900 | Flash Flood | N/A | 0 | 0 | 2K | 0 |
| 44 TNZ036 - 039>044 - 067>074 - 083>087 - 099>102 | 10/05/1995 | 0030 | High Winds | 0 kts. | 0 | 0 | 2.0M | 0 |
| 45 TNZ013 - 036 - 040 - 041 - 047 - | 11/11/1995 | 1000 | High Winds | 0 kts. | 0 | 0 | 50K | 0 |

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|---|---|---|---|---|---|---|---|---|
| 066 - 067 - 073 - 074 - 083 - 085 | | | | | | | | |
| 46 TNZ012>018 - 034>047 - 066>074 - 083>087 - 099>102 | 01/06/1996 | 09:00 PM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 47 TNZ012>018 - 034>047 - 066>074 - 083>087 - 099>102 | 01/11/1996 | 07:00 PM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 48 TNZ012>018 - 034>047 - 066>074 - 083>087 - 099>102 | 02/02/1996 | 02:00 AM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 49 Kingston | 04/13/1996 | 02:55 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 50 Countywide | 04/20/1996 | 09:20 AM | Tstm Wind | 0 kts. | 0 | 0 | 15K | 10K |
| 51 South Part | 05/24/1996 | 11:30 PM | Tstm Wind | 0 kts. | 0 | 0 | 5K | 0 |
| 52 Countywide | 05/27/1996 | 07:00 PM | Tstm Wind | 0 kts. | 0 | 0 | 10K | 10K |
| 53 Rockwood | 06/03/1996 | 05:40 PM | Lightning | N/A | 0 | 0 | 0 | 0 |
| 54 Countywide | 08/24/1996 | 01:37 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 5K |
| 55 Kingston | 08/26/1996 | 04:20 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 56 Harriman | 09/07/1996 | 02:45 PM | Tstm Wind | 0 kts. | 0 | 0 | 50K | 0 |
| 57 Countywide | 12/01/1996 | 02:46 AM | Flash Flood | N/A | 0 | 0 | 0 | 0 |
| 58 Countywide | 12/01/1996 | 08:55 AM | Flash Flood | N/A | 0 | 0 | 0 | 0 |
| 59 TNZ015>018 - | 12/18/1996 | 04:00 | Winter Storm | N/A | 0 | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| 036>047 - 067>074 | | PM | | | | | | |
| 60 Harriman | 01/05/1997 | 01:30 AM | Tstm Wind | 0 kts. | 0 | 0 | 15K | 0 |
| 61 TNZ012>018 - 034>047 - 066>074 - 083>087 - 099>102 | 01/10/1997 | 11:00 AM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 62 Countywide | 02/21/1997 | 11:15 AM | Tstm Wind | 0 kts. | 0 | 0 | 20K | 12K |
| 63 Kingston | 06/14/1997 | 03:30 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 11K |
| 64 Kingston | 07/28/1997 | 12:20 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 65 Kingston | 08/19/1997 | 09:00 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 2K |
| 66 TNZ012>018 - 034>047 - 066>074 - 083>087 - 099>102 | 12/30/1997 | 04:00 AM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 67 Countywide | 01/07/1998 | 09:30 AM | Urban/sml Stream Fld | N/A | 0 | 0 | 0 | 0 |
| 68 TNZ012>014 - 034>035 - 045 - 066>067 - 069 - 071>072 - 083 - 100 | 02/04/1998 | 05:30 AM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 69 Rockwood | 02/17/1998 | 08:50 AM | Tstm Wind | 0 kts. | 0 | 0 | 10K | 2K |
| 70 Countywide | 03/20/1998 | 02:00 AM | Tstm Wind/hail | 0 kts. | 0 | 0 | 0 | 10K |
| 71 Kingston | 04/16/1998 | 04:45 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 6K |
| 72 Kingston | 04/16/1998 | 07:30 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 10K |
| 73 Oliver Spgs | 04/16/1998 | 07:30 | Urban/sml | N/A | 0 | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| | | PM | Stream Fld | | | | | |
| 74 Paint Rock | 04/17/1998 | 11:30 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 10K |
| 75 Poplar Spgs | 04/18/1998 | 08:25 PM | Urban/sml Stream Fld | N/A | 0 | 0 | 0 | 0 |
| 76 Countywide | 04/19/1998 | 07:45 AM | Urban/sml Stream Fld | N/A | 0 | 0 | 0 | 0 |
| 77 Kingston | 05/21/1998 | 04:15 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 78 Cave Creek | 06/10/1998 | 01:30 PM | Urban/sml Stream Fld | N/A | 0 | 0 | 0 | 0 |
| 79 Harriman | 06/15/1998 | 01:25 AM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 5K |
| 80 Kingston | 06/22/1998 | 07:40 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 19K |
| 81 TNZ012>018 - 034>047 - 066>074 - 083>087 - 099>102 | 09/01/1998 | 12:01 AM | Drought | N/A | 0 | 0 | 0 | 0 |
| 82 Kingston | 11/25/1998 | 08:45 PM | Tstm Wind | 0 kts. | 0 | 0 | 5K | 0 |
| 83 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102 | 12/22/1998 | 01:00 AM | Ice Storm | N/A | 0 | 0 | 0 | 0 |
| 84 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102 | 01/06/1999 | 07:00 AM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 85 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102 | 03/13/1999 | 04:00 AM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 86 Kingston | 05/05/1999 | 11:30 | Tstm Wind | 0 | 0 | 0 | 0 | 5K |

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|---|---|---|---|---|---|---|---|---|
| | | PM | | kts. | | | | |
| 87 Kingston | 05/13/1999 | 03:55 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 12K |
| 88 Kingston | 06/02/1999 | 05:20 PM | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| 89 Kingston | 06/02/1999 | 05:20 PM | Tstm Wind | 52 kts. | 0 | 0 | 0 | 0 |
| 90 Countywide | 07/11/1999 | 11:00 AM | Flood | N/A | 0 | 0 | 0 | 0 |
| 91 Harriman | 07/27/1999 | 05:55 PM | Tstm Wind | 0 kts. | 0 | 0 | 11K | 0 |
| 92 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102 | 01/22/2000 | 10:00 AM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 93 Countywide | 04/04/2000 | 02:00 AM | Flood | N/A | 0 | 0 | 0 | 0 |
| 94 Kingston | 05/25/2000 | 03:20 AM | Tstm Wind | 0 kts. | 0 | 0 | 9K | 5K |
| 95 Kingston | 05/27/2000 | 06:50 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 3K |
| 96 Kingston | 05/27/2000 | 07:07 PM | Tstm Wind | 69 kts. | 0 | 0 | 0 | 0 |
| 97 Rockwood | 06/26/2000 | 03:25 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 5K |
| 98 Kingston | 06/26/2000 | 04:00 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 7K |
| 99 Countywide | 11/09/2000 | 04:20 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 17K |
| 100 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102 | 12/02/2000 | 06:00 PM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 101 Rockwood | 12/16/2000 | 07:55 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 13K |

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|---|---|---|---|---|---|---|---|---|
| 102 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102 | 12/18/2000 | 06:00 PM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 103 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102 | 01/01/2001 | 02:00 AM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 104 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102 | 01/20/2001 | 03:00 AM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 105 Rockwood | 06/14/2001 | 01:36 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 14K |
| 106 Countywide | 07/04/2001 | 04:22 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 21K |
| 107 Countywide | 10/24/2001 | 11:05 PM | Tstm Wind | 0 kts. | 0 | 0 | 25K | 16K |
| 108 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102 | 01/05/2002 | 10:00 PM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 109 Countywide | 01/23/2002 | 10:30 AM | Flood | N/A | 0 | 0 | 0 | 0 |
| 110 Countywide | 01/24/2002 | 07:10 AM | Tstm Wind | 0 kts. | 0 | 0 | 20K | 0 |
| 111 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098 | 03/17/2002 | 08:45 AM | Flood | N/A | 0 | 0 | 5.0M | 0 |
| 112 Countywide | 03/17/2002 | 09:03 AM | Flash Flood | N/A | 0 | 0 | 0 | 0 |
| 113 Countywide | 04/28/2002 | 01:45 PM | Tstm Wind | 0 kts. | 0 | 0 | 5K | 0 |
| 114 Rockwood | 05/02/2002 | 05:05 | Hail | 1.00 | 0 | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| | | PM | | in. | | | | |
| 115 Rockwood | 05/02/2002 | 06:02 PM | Tstm Wind | 0 kts. | 0 | 0 | 10K | 0 |
| 116 Rockwood | 07/02/2002 | 08:05 PM | Tstm Wind | 0 kts. | 0 | 0 | 20K | 0 |
| 117 Rockwood | 07/03/2002 | 07:05 PM | Tstm Wind | 0 kts. | 0 | 0 | 20K | 0 |
| 118 Countywide | 07/30/2002 | 04:25 PM | Tstm Wind | 0 kts. | 0 | 0 | 0 | 15K |
| 119 Oak Hill | 08/02/2002 | 10:30 PM | Tstm Wind | 0 kts. | 0 | 0 | 10K | 0 |
| 120 Countywide | 08/02/2002 | 10:50 PM | Tstm Wind | 0 kts. | 0 | 0 | 15K | 0 |
| 121 Countywide | 11/10/2002 | 08:35 PM | Tstm Wind | 0 kts. | 0 | 0 | 20K | 0 |
| 122 Pine Grove | 11/10/2002 | 10:03 PM | Tstm Wind | 74 kts. | 0 | 0 | 3K | 0 |
| 123 Countywide | 11/10/2002 | 10:29 PM | Tstm Wind | 0 kts. | 0 | 0 | 30K | 0 |
| 124 Kingston | 11/10/2002 | 11:27 PM | Tstm Wind | 0 kts. | 0 | 0 | 6K | 0 |
| 125 Kingston | 11/11/2002 | 12:07 AM | Tstm Wind | 0 kts. | 0 | 0 | 15K | 0 |
| 126 Oliver Spgs | 11/11/2002 | 12:19 AM | Tstm Wind | 0 kts. | 0 | 0 | 15K | 0 |
| 127 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102 | 01/16/2003 | 01:00 PM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 128 TNZ012>018 - 035>047 - 067>074 | 01/22/2003 | 07:00 PM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 129 TNZ015>018 - 036>047 - 067>074 - 083>087 - | 02/03/2003 | 10:00 PM | Strong Wind | N/A | 0 | 0 | 33K | 0 |

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|---|---|---|---|---|---|---|---|---|
| 099>102 | | | | | | | | |
| 130 TNZ012>015 - 035>036 - 047 - 067 - 069 - 074 - 081>083 - 087 - 099 | 02/09/2003 | 07:00 PM | Heavy Snow | N/A | 0 | 0 | 0 | 0 |
| 131 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102 | 02/14/2003 | 12:00 PM | Flood | N/A | 0 | 0 | 18.1M | 0 |
| 132 Countywide | 02/16/2003 | 01:23 AM | Flash Flood | N/A | 0 | 0 | 0 | 0 |
| 133 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102 | 02/21/2003 | 11:00 AM | Flood | N/A | 0 | 0 | 0 | 0 |
| 134 Kingston | 02/22/2003 | 04:20 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 135 Kingston | 04/05/2003 | 04:50 AM | Tstm Wind | 60 kts. | 0 | 0 | 5K | 0 |
| 136 TNZ012>018 - 035>047 - 067>074 - 086>087 | 04/10/2003 | 08:00 AM | Flood | N/A | 0 | 0 | 0 | 0 |
| 137 Kingston | 04/25/2003 | 08:10 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 138 Rockwood | 04/29/2003 | 04:02 PM | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| 139 Rockwood | 04/29/2003 | 04:06 PM | Hail | 1.00 in. | 0 | 0 | 0 | 0 |
| 140 Rockwood | 04/29/2003 | 08:47 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 141 Rockwood | 04/29/2003 | 08:49 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 142 Harriman | 04/29/2003 | 08:50 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| 143 Kingston | 04/29/2003 | 08:55 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 144 Oak Hill | 05/01/2003 | 07:12 PM | Tstm Wind | 60 kts. | 0 | 0 | 6K | 0 |
| 145 Countywide | 05/05/2003 | 06:20 PM | Tstm Wind | 60 kts. | 0 | 0 | 15K | 0 |
| 146 Countywide | 05/05/2003 | 06:36 PM | Flash Flood | N/A | 0 | 0 | 2.8M | 0 |
| 147 Countywide | 05/05/2003 | 06:36 PM | Flash Flood | N/A | 0 | 0 | 2.8M | 0 |
| 148 Kingston | 05/11/2003 | 06:15 AM | Tstm Wind | 55 kts. | 0 | 0 | 8K | 0 |
| 149 Kingston | 05/15/2003 | 05:55 PM | Tstm Wind | 55 kts. | 0 | 0 | 3K | 0 |
| 150 Rockwood | 05/17/2003 | 03:50 PM | Tstm Wind | 55 kts. | 0 | 0 | 6K | 0 |
| 151 North Portion | 05/17/2003 | 05:00 PM | Flash Flood | N/A | 0 | 0 | 0 | 0 |
| 152 Rockwood | 06/11/2003 | 02:15 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 153 Rockwood | 06/11/2003 | 06:15 PM | Tstm Wind | 55 kts. | 0 | 0 | 15K | 0 |
| 154 Countywide | 06/16/2003 | 09:10 PM | Tstm Wind | 55 kts. | 0 | 0 | 15K | 0 |
| 155 Countywide | 06/18/2003 | 01:30 PM | Flash Flood | N/A | 0 | 0 | 0 | 0 |
| 156 Countywide | 07/10/2003 | 05:00 PM | Tstm Wind | 60 kts. | 0 | 0 | 0 | 0 |
| 157 Oliver Spgs | 07/13/2003 | 04:55 PM | Tstm Wind | 60 kts. | 0 | 0 | 0 | 0 |
| 158 Oliver Spgs | 07/13/2003 | 05:00 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 159 Kingston | 07/13/2003 | 05:12 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 160 Countywide | 07/13/2003 | 05:40 PM | Tstm Wind | 60 kts. | 0 | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| 161 Kingston | 08/04/2003 | 05:30 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 162 Countywide | 08/05/2003 | 01:15 AM | Tstm Wind | 60 kts. | 0 | 0 | 0 | 0 |
| 163 Oliver Spgs | 08/07/2003 | 07:45 PM | Tstm Wind | 60 kts. | 0 | 0 | 0 | 0 |
| 164 Oak Hill | 08/15/2003 | 08:10 PM | Hail | 1.50 in. | 0 | 0 | 0 | 0 |
| 165 Countywide | 08/17/2003 | 05:00 PM | Tstm Wind | 60 kts. | 0 | 0 | 0 | 0 |
| 166 Rockwood | 08/22/2003 | 08:10 PM | Tstm Wind | 60 kts. | 0 | 0 | 0 | 0 |
| 167 Kingston | 08/28/2003 | 04:15 PM | Tstm Wind | 60 kts. | 0 | 0 | 0 | 0 |
| 168 TNZ012>014 - 035>041 - 067>074 - 081>086 - 098>101 | 01/09/2004 | 12:00 AM | Winter Storm | N/A | 0 | 0 | 0 | 0 |
| 169 TNZ012>017 - 035>040 - 042 - 044 - 046 - 067 - 069>070 - 081>083 - 098 | 02/26/2004 | 12:00 PM | Heavy Snow | N/A | 0 | 0 | 0 | 0 |
| 170 Kingston | 03/20/2004 | 05:20 PM | Tstm Wind | 55 kts. | 0 | 0 | 6K | 0 |
| 171 Harriman | 05/26/2004 | 05:45 PM | Tstm Wind | 65 kts. | 0 | 0 | 25K | 0 |
| 172 Harriman | 05/26/2004 | 06:00 PM | Hail | 1.00 in. | 0 | 0 | 0 | 0 |
| 173 Harriman | 05/26/2004 | 07:50 PM | Tstm Wind | 55 kts. | 0 | 0 | 2K | 0 |
| 174 Countywide | 05/31/2004 | 02:30 AM | Tstm Wind | 60 kts. | 0 | 0 | 20K | 0 |
| 175 Harriman | 06/17/2004 | 02:20 PM | Tstm Wind | 65 kts. | 0 | 0 | 10K | 0 |
| 176 Countywide | 07/05/2004 | 04:40 | Tstm Wind | 60 | 0 | 0 | 20K | 0 |

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|---|---|---|---|---|---|---|---|---|
| | | PM | | kts. | | | | |
| 177 Kingston | 07/05/2004 | 05:00 PM | Flash Flood | N/A | 0 | 0 | 10K | 0 |
| 178 Rockwood | 07/12/2004 | 04:50 PM | Tstm Wind | 60 kts. | 0 | 0 | 8K | 0 |
| 179 Kingston | 07/13/2004 | 10:15 PM | Tstm Wind | 65 kts. | 0 | 0 | 20K | 0 |
| 180 Oliver Spgs | 07/13/2004 | 10:20 PM | Tstm Wind | 60 kts. | 0 | 0 | 35K | 0 |
| 181 Countywide | 07/13/2004 | 10:35 PM | Tstm Wind | 65 kts. | 0 | 0 | 20K | 0 |
| 182 TNZ067 | 09/16/2004 | 08:00 PM | Tropical Depression | N/A | 0 | 0 | 15K | 0 |
| 183 TNZ067 | 09/16/2004 | 08:15 PM | Tropical Depression | N/A | 0 | 0 | 15K | 0 |
| 184 Kingston | 12/10/2004 | 03:15 PM | Hail | 1.00 in. | 0 | 0 | 0 | 0 |
| 185 TNZ012>018 - 035>047 - 067>074 - 081>087 - 098>102 | 01/29/2005 | 12:00 AM | Ice Storm | N/A | 0 | 0 | 0 | 0 |
| 186 Paint Rock | 03/27/2005 | 05:30 PM | Tstm Wind | 60 kts. | 0 | 0 | 2K | 0 |
| 187 Harriman | 04/12/2005 | 10:00 PM | Tstm Wind | 60 kts. | 0 | 0 | 2K | 0 |
| 188 Kingston | 04/22/2005 | 10:22 AM | Tstm Wind | 65 kts. | 0 | 0 | 5K | 0 |
| 189 Harriman | 04/22/2005 | 10:25 AM | Tstm Wind | 65 kts. | 0 | 0 | 5K | 0 |
| 190 Kingston | 05/14/2005 | 03:25 PM | Tstm Wind | 60 kts. | 0 | 2 | 3K | 0 |
| 191 Kingston | 05/14/2005 | 03:30 PM | Tstm Wind | 60 kts. | 0 | 0 | 20K | 0 |
| 192 Countywide | 05/20/2005 | 01:30 AM | Tstm Wind | 60 kts. | 0 | 0 | 20K | 0 |

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|---|---|---|---|---|---|---|---|---|
| 193 Rockwood | 05/20/2005 | 02:40 PM | Hail | 0.88 in. | 0 | 0 | 0 | 0 |
| 194 Kingston | 06/14/2005 | 08:10 PM | Tstm Wind | 45 kts. | 0 | 0 | 1K | 0 |
| 195 Kingston | 06/14/2005 | 09:30 PM | Tstm Wind | 65 kts. | 0 | 0 | 12K | 0 |
| 196 Harriman | 06/20/2005 | 03:40 PM | Tstm Wind | 65 kts. | 0 | 0 | 10K | 0 |
| 197 Countywide | 06/27/2005 | 09:55 PM | Tstm Wind | 60 kts. | 0 | 0 | 8K | 0 |
| 198 Rockwood | 06/28/2005 | 08:15 PM | Tstm Wind | 60 kts. | 0 | 0 | 10K | 0 |
| 199 Rockwood | 07/01/2005 | 01:50 PM | Tstm Wind | 60 kts. | 0 | 0 | 25K | 0 |
| 200 Harriman | 07/27/2005 | 05:15 PM | Tstm Wind | 60 kts. | 0 | 0 | 20K | 0 |
| 201 Kingston | 08/05/2005 | 07:40 PM | Tstm Wind | 65 kts. | 0 | 0 | 20K | 0 |
| 202 Kingston | 08/05/2005 | 09:45 PM | Flash Flood | N/A | 0 | 0 | 0 | 0 |
| 203 Harriman | 10/21/2005 | 02:35 PM | Hail | 0.75 in. | 0 | 0 | 0 | 0 |
| 204 Oliver Spgs | 11/28/2005 | 10:15 PM | Tstm Wind | 65 kts. | 0 | 0 | 400K | 0 |
| 205 Countywide | 12/28/2005 | 04:05 PM | Tstm Wind | 65 kts. | 0 | 0 | 18K | 0 |
| 206 Oak Ridge | 01/02/2006 | 06:07 PM | Tstm Wind | 45 kts. | 0 | 0 | 7K | 0 |
| 207 Harriman | 04/02/2006 | 06:51 PM | Tstm Wind | 65 kts. | 0 | 0 | 17K | 0 |
| 208 Kingston | 04/03/2006 | 01:40 AM | Tstm Wind | 60 kts. | 0 | 0 | 5K | 0 |
| 209 Countywide | 04/07/2006 | 06:20 PM | Tstm Wind | 60 kts. | 0 | 0 | 10K | 0 |
| 210 Kingston | 04/07/2006 | 06:30 PM | Tstm Wind | 60 kts. | 0 | 0 | 10K | 0 |

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|---|---|---|---|---|---|---|---|---|
| 211 Rockwood | 04/21/2006 | 05:20 PM | Tstm Wind | 60 kts. | 0 | 0 | 10K | 0 |
| 212 Countywide | 04/21/2006 | 05:40 PM | Tstm Wind | 65 kts. | 0 | 0 | 15K | 0 |
| 213 Kingston | 04/26/2006 | 03:33 PM | Hail | 1.75 in. | 0 | 0 | 0 | 0 |
| 214 Kingston | 04/26/2006 | 03:58 PM | Tstm Wind | 60 kts. | 0 | 0 | 18K | 0 |
| 215 Rockwood | 05/31/2006 | 05:45 PM | Tstm Wind | 60 kts. | 0 | 0 | 25K | 0 |
| 216 Countywide | 06/01/2006 | 05:10 PM | Tstm Wind | 60 kts. | 0 | 0 | 10K | 0 |
| 217 Countywide | 06/30/2006 | 04:40 PM | Tstm Wind | 60 kts. | 0 | 0 | 10K | 0 |
| 218 Countywide | 06/30/2006 | 06:15 PM | Tstm Wind | 60 kts. | 0 | 0 | 10K | 0 |
| 219 Rockwood | 07/04/2006 | 03:40 PM | Tstm Wind | 60 kts. | 0 | 0 | 3K | 0 |
| 220 Harriman | 07/04/2006 | 03:55 PM | Tstm Wind | 60 kts. | 0 | 0 | 5K | 0 |
| 221 Harriman | 07/21/2006 | 07:00 PM | Tstm Wind | 65 kts. | 0 | 0 | 25K | 0 |
| 222 Countywide | 07/21/2006 | 07:09 PM | Tstm Wind | 65 kts. | 0 | 0 | 30K | 0 |
| 223 Kingston | 07/28/2006 | 03:17 PM | Tstm Wind | 60 kts. | 0 | 0 | 12K | 0 |
| 224 Midtown | 07/28/2006 | 03:17 PM | Tstm Wind | 60 kts. | 0 | 0 | 10K | 0 |
| 225 Countywide | 08/04/2006 | 02:10 PM | Tstm Wind | 55 kts. | 0 | 0 | 5K | 0 |
| 226 Countywide | 08/04/2006 | 03:32 PM | Tstm Wind | 60 kts. | 0 | 0 | 3K | 0 |
| 227 Paint Rock | 09/23/2006 | 03:00 PM | Flash Flood | N/A | 0 | 0 | 0 | 0 |
| 228 Paint Rock | 09/23/2006 | 11:10 AM | Flash Flood | N/A | 0 | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|
| 229 TNZ067 | 12/01/2006 | 05:15 AM | High Wind | 60 kts. | 0 | 0 | 25K | 0K |
| 230 Rockwood | 04/03/2007 | 22:13 PM | Hail | 1.00 in. | 0 | 0 | 0K | 0K |
| 231 Kingston | 06/08/2007 | 16:00 PM | Thunderstorm Wind | N/A | 0 | 0 | 15K | 0K |
| 232 Rockwood | 06/14/2007 | 15:16 PM | Thunderstorm Wind | N/A | 0 | 0 | 10K | 0K |
| 233 Rockwood | 06/15/2007 | 14:05 PM | Hail | 0.75 in. | 0 | 0 | 0K | 0K |
| 234 Kingston | 06/23/2007 | 13:50 PM | Hail | 0.75 in. | 0 | 0 | 0K | 0K |
| 235 Paint Rock | 06/25/2007 | 19:05 PM | Thunderstorm Wind | N/A | 0 | 0 | 5K | 0K |
| 236 Kingston | 06/26/2007 | 16:25 PM | Thunderstorm Wind | N/A | 0 | 0 | 5K | 0K |
| 237 Cardiff | 07/15/2007 | 13:47 PM | Thunderstorm Wind | N/A | 0 | 0 | 0K | 0K |
| 238 Harriman | 07/19/2007 | 15:32 PM | Thunderstorm Wind | N/A | 0 | 0 | 0K | 0K |
| 239 Harriman | 07/19/2007 | 16:05 PM | Thunderstorm Wind | N/A | 0 | 0 | 0K | 0K |
| 240 Harriman | 10/19/2007 | 02:25 AM | Thunderstorm Wind | N/A | 0 | 0 | 5K | 0K |
| 241 Harriman | 11/14/2007 | 19:30 PM | Thunderstorm Wind | N/A | 0 | 0 | 0K | 0K |
| 242 Rockwood | 01/29/2008 | 22:45 PM | Thunderstorm Wind | N/A | 0 | 0 | 0K | 0K |
| 243 Dyllis | 01/29/2008 | 23:00 PM | Thunderstorm Wind | N/A | 0 | 0 | 0K | 0K |
| | | | | TOTALS: | 0 | 2 | 32.983M | 245K |

1. **Top of Page**

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COVERING KINGSTON, HARRIMAN, ROCKWOOD, OLIVER SPRINGS & ROANE COUNTY

# orrential rains flood parts of Roane C

## owntown Rockwood omes, stores damaged

By CYNTHIA GARRETT
Rockwood Editor

CKWOOD — Heavy rains day caused what some said e worst flooding since 1973 to e downtown Rockwood area, ing numerous homes and sses and causing the evacua- several residents.

k Creek rose and overflowed e torrential downpour that hit unty, and waters filled Front t, Chamberlain Avenue, er and Rockwood streets like tributaries.

y rains in previous weeks fill- small creeks that snake their rough sections of downtown, the additional rainfall re to go but into the streets.

ler Avenue was one of the hardest hit, with water stan- e-deep in the road, causing cuation of residents of the city-owned apartments located behind the library. Several Chamberlain Avenue residents were also evacuated.

A "Meet the Candidates" forum scheduled that night at city hall by the Rockwood Jaycees was cancelled because entry into the building was blocked by a river that had formed on Chamberlain Avenue which flowed swiftly behind the First American National Bank building, bringing with it odorous residues that stayed behind on the parking lot after the flood waters subsided.

Businesses on Rockwood Street that appeared to be hardest hit included Junior's Restaurant, where, according to reports, the flood waters came in the back door and flowed out through the front door. Owner Junior McCullough said Fri-

Please see Rockwood, Page 2

## amage at a minimum Harriman flooding

By CHERYL DUNCAN
Harriman Editor

Although the Emory River crested Thursday afternoon at the Carr

## oding, ndslide

COUNTY — More than es of rain in a 24-hour Roane and surrounding s another flood situation ning and brought down ping landslide on In-

came to a halt on I-40 at m. Tuesday when a land- ed both of the westbound the 342-mile marker. At one lide was reported to be feet deep and 100-feet wide. bound traffic was rerouted at man exit to Highway 70, bound traffic was detoured tel area.

arly morning hours, the rtment of Transportation ed to a possible slide in the ead Gardens area of 29, which would have fore- ssers to the Chattanooga es of the second slide failed alize, however.

morning, some of the m the I-40 slide had been and DOT expected to have

e see Flood, Page 2-A

## ception honor Greene

STATE — Dr. Louise reene, a faculty member tate Community College 18 years, is retiring June ving to Hickory, N.C., e will help Roane State's sident, Cayler Dunbar, other quality institution.

who will be dean of ad- e services at Catawba hnical Community Col- ng honored with a retire- ption at Roane State on June 22, at 2 p.m. in the ing room on the Har- mpus. Members of the y are invited.

he reception, a scholar- shed to honor Greene's service to Roane State

Ideal PLUMBING CO.

**Surveying the waters**

**STOREOWNERS** of Front Street businesses in Rockwood, above, survey the flooding Tuesday that struck the downtown area. Tuesday's flooding was the second such incident in Rockwood in a week. The rains also caused a landslide, at right, at the 342-mile marker early Tuesday morning. Westbound traffic used the Harriman exit as a detour onto Highway 70, and eastbound traffic was rerouted at the Westel exit. The state Department of Transportation estimated that debris would be cleared from the area by late Tuesday. (Staff photos by Bill Hall)

## Tax increase proposed

By MARCEY FITZ
Education Editor

KINGSTON — The County mission's Budget Committee ha proved a budget for Fiscal 1989-90, which it will recomme the full commission. That b calls for a 7-cent increase in th rent property tax rate.

The budget which will be mended includes a 29-perc crease in local spending school systems. It also inclu of the Department of Energy of tax money than is usually the school system. That mo budget committee agreed, made up by an increase in perty tax.

The committee members that to reduce the amount money used this year would the county from relying source of revenue. The co action would leave about the DOE money for the ful approved by the full com

The schools had asked million, including more the amount of DOE m usually receive.

County executive K recommended the com prove a $15.8-million bu schools, using about $6 DOE money, more mo TVA, sales tax, sale not used in transporta reducing the amount of going into the general debt service.

The committee agre recommendation to reducing the amount used and increasing tax. That action did amount of money recommended the sch $15.8 million.

Yager recommend the amount of pro schools receive from to $1.45 this year. T action would incr recommendation to

The amount of pro ted to the general fu three cents to $0. and public works cents, if the budget amount of tax ann

included Junior's Restaurant, where, according to reports, the flood waters came in the back door and flowed out through the front door. Owner Junior McCullough said Fri-

Please see Rockwood, Page 2

amage at a minimum
Harriman flooding

By CHERYL DUNCAN
Harriman Editor

RIMAN — Although Har- residents prepared aves for the worst during day's heavy rains, flooding in y was at a minimum, com- o Rockwood.

e moderate flooding was d Thursday evening on Jett Road and on Margrave

Although the Emory River crested Thursday afternoon at the Carr Bridge in Oakdale, the water, swelling the banks, stayed within its boundaries in Harriman. The river did rise considerably higher than normal, however, and water rushed in a southwest direction from Oakdale to Harriman.

Only one accident was reported to the Harriman Police Department,

Please see Harriman, Page 2

MORE THAN SEVEN inches of rain in two weeks caused waters behind Watts Bar Dam to come within a foot of the top of the dam Friday morning. (Staff photo by Bill Hall)

ater rises to within
ot of Watts Bar Dam

NE COUNTY — Fast-rising which followed more than nches of rain in two weeks the waters of Watts Bar within a foot of the top of the Spring City on Friday morn-

tts Bar Dam the water was d to have climbed to 744.15 ove sea level, only .85 feet of the "top of the dam" e of 745 feet. Generally, TVA d allow development on ues below the 745-foot mark. ngston, the rainfall for the eks ending at 5 a.m. on Fri-

day was reported to have measured 7.66 inches. For the five days ending June 16 the rain measured 3.47 inches, with 2.47 inches of that coming in measurements made at 5 a.m. on Thursday and Friday. Rainfall in Kingston for June 5-10 totalled 4.19 inches, with more than an inch being recorded on three separate days.

Other rainfalls reported by TVA for June 12-16 included 4.6 inches at Wartburg, 2.8 inches at Oliver Springs, 5.4 inches at Petros, 3.5 inches at Fort Loudoun Dam, and 3.6 inches at Melton Hill.

WEATHER

ore rain is in the east for the beginning e week. Cloudy skies

Harriman Council works toward early budge

By CHERYL DUNCAN
Harriman Editor

HARRIMAN — If all goes as an-

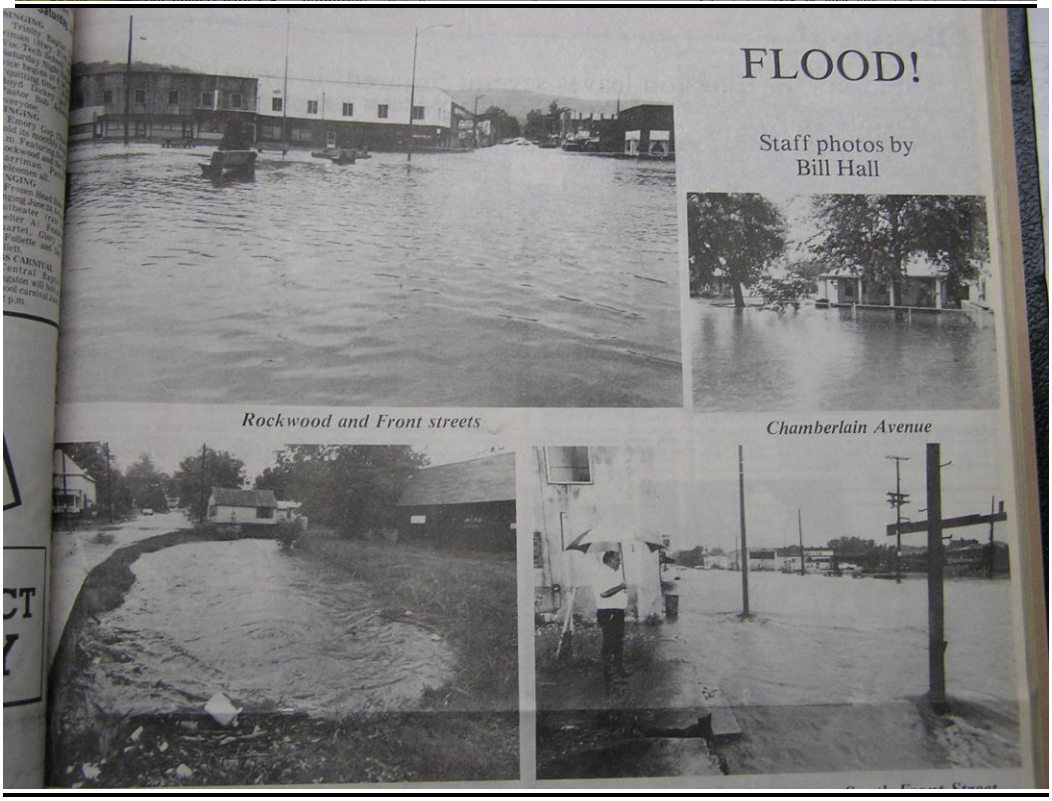
penses in this year's school budget are for a computer instructor for the elementary school, for pay increases and for keeping current pro-

"We've never really had to put a budget in by June 1 before."

Rittenhouse said the committee wants to have the budget passed by

can be paid," he said. "The reason why we should fool and delay."

Powers said that a lot of the



Black Creek
David Poole watching waters on South Front Street
Chamberlain Avenue and Wheeler Street
Mack's Upholstery on Rockwood Street
Between North Front Street and Chamberlain Avenue, below, and South Front Street, near Billings Photo, right

COVERING KINGSTON, HARRIMAN, ROCKWOOD, OLIVER SPRINGS & ROANE COUNTY, TENNESSEE — VOL. 36, NO. 1 — 16 PAGES — 35¢

# Flood

## Residents forced from their homes

By CYNTHIA GARRETT, Staff Editor

ROANE COUNTY – Rising waters caused the evacuation of Oliver Springs Saturday night and early Sunday morning, and covered houses and roads in Oakdale and Harriman.

Route 61 from Harriman to Oliver Springs was closed Sunday morning, and Highway 95 was closed the E-25 plant going to Oakdale.

Homes in Rockwood suffered damage to homes and cars, and loose propane tanks floated from Morgan County to various parts of Roane County.

Oakdale was hardest hit in Roane County. Harriman police Chuck Moore said water covered the tops of houses on Sunday morning. Areas of the town subject to extensive flooding included Walnut Hill, Fisk Hill, Meadowview Gardens and Cedar Pike.

Many gas pumps, where officials say their vehicles were totally immersed in water, were ruined. The north end of town is pretty much shopped out of gas.

No reports of accidents or injuries in Harriman was closed Sunday morning when water covered the bridge. Moore said roads and bridges were being closed to keep cars from washing out.

Harriman officers attempted to rescue at least one of four propane tanks that washed down from Morgan County into Roane County. Moore and Officer Brian Cooper got out in the river in his car and almost got washed off trying to tie off one of the tanks. He was with current and a small tree got in," Moore said.

Officers were only available officer scheduled to work in Harriman, due to members of the Tennessee Emergency Management Agency and Civil Defense. Officers helped get residents to safety as needed from Johnson Health Care, where flooding occurred, Moore said.

Oliver Springs, all the streets were flooded and residents had to get in or out of town by boat, said Officer James Cooper with the Oliver Springs Police Department. Residents of the Van Buren Court housing project were evacuated, along with residents in other isolated locations, Cooper said.

Cooper said a few cars had been "washed out" but no one had reported as of Sunday morning. However, houses and businesses were damaged from being

Morgan County Sheriff's Office said Oakdale was hardest hit Sunday morning, with water reaching the tops of houses and completely covering some. Police closed certain areas of Morgan County due to traffic, including Lansing, Stony Hump and Montgomery Bend.

The bridge to Oakdale was closed when water covered and completely covered the bridge. The only route to Oakdale was by lower Rockwood Road, the dispatcher said. No accidents or injuries had been reported Sunday morning.

In Rockwood, water was already rescuing Sunday morning, said firefighter Tim Martin with the Rockwood Fire Department. Areas receiving flood damage in-

Please see Flood, page 3-A

THE BACK YARDS of Kingwood Homes houses look like a small pond has formed due to flooding in downtown Rockwood Sunday morning. The homes are located between Gateway Avenue and Kingston Avenue on the south end of town. Businesses and homes downtown were damaged due to flooding. Harriman and Oliver Springs were hard hit by the flooding, with some homes covered to the roofs with water. Some Oliver Springs residents were evacuated. Highways, roads and bridges were closed in various parts of the county due to flooding. (Staff photo by Bill Hall)

## Harriman water plant shut down

By CYNTHIA GARRETT, Rockwood Editor

HARRIMAN – Harriman's water plant was shut down Sunday morning due to extreme flooding, and equipment was evacuated from the operations center near the Emory River, said Harriman Utility Board Manager Henry Grigsby.

"Early Sunday the city's substation would have to be shut down extended along with food waters later Sunday afternoon. "Earlier this morning we were afraid we would lose the substation, but the river receded and we are out of danger," Grigsby said Sunday.

Utility crews dealt with isolated power problems over the weekend. Crews waited for flood waters to subside in the Riggs Chapel area, where they were unable to reach a circuit that had gone out, Grigsby added.

"Compared with what we were facing this morning, we came out in pretty good shape," he said.

Harriman's water supply "should be in pretty good shape," even though the water plant was shut down. "We have one-and-a-half days of storage in our reservoirs. We store 1.9 million gallons and we use 1.2 million gallons a day. We should be OK."

Rumors that the city's water supply was contaminated were "totally false. When the flooding began, we quit pumping water into the reservoirs. When the water recedes, we'll go down there and clean it up and start it back up," Grigsby said.

## Broken light injures tournament attendees

By DAVID JOHNSON, Chief Sports Writer

ROCKWOOD – Several persons attending the Ridgeview Christmas Basketball tournament here Thursday night required medical attention after being exposed to harmful rays from a broken Mercury Vapor light.

Alan Reed, coach of the Rockwood boys basketball team, said the lights in the gymnasium are covered with a protective shell. When the shell is broken, harmful rays can leak from the light and cause injury to eyes.

Robert Johnson, a referee at the tournament, said, "At one area of the gym it was noticeably better than the other areas. When I went home, after the game, my face was extremely hot."

Alan Reed said, "We believe the light was broken during physical education class. Whoever broke the light probably swept up the mess quickly and nobody ever knew."

## Coleman remembers Christmas in Saudi desert

By CHERYL DUNCAN, Harriman Editor

HARRIMAN – Spending the holidays away from home can be a depressing thought, but spending them in Saudi Arabia is particularly distressing, as Kurt Coleman can attest.

A retired U.S. Air Force master sergeant, Coleman spent the Christmas of 1989 as an air-traffic controller stationed on the Iran Air Force Base in Saudi Arabia. And it was an experience he does not care to repeat.

"There were two bad places to go (Saudi Arabia and Greenland), and I went to the hot one," laughed the Harriman City Council member. "I didn't think I'd be going to either one. I thought, with all these people in the military, my chances will be remote. Then, I'll be dogged if my first overseas assignment was in Saudi Arabia."

Coleman remembers Saudi Arabia as being hot and dry.

"There was not a cloud in the sky, he related. "It seemed like every day, it was in the 100s. At night, we slept in air-conditioned barracks. If we ever had a power failure, we woke up immediately, dripping with sweat."

Like today's troops, Coleman and his fellow servicemen found water to be a problem.

"You can't drink the water," he said. "It's not potable. In the base, we had some kind of refinery that solved our water problem. In the tower and at our radar site, there was no water fountain. We also had to take salt tablets regularly – three or four times a day."

Coleman's first impression of the Middle East country was that I'd gone back in time 1,000 years. There were no street lights, no neon signs and no electricity of any kind.

"It's just like going back and reading a portion of the Bible or seeing a French foreign movie."

Any type of religion besides Moslem was practically non-existent in Saudi Arabia. They're extremely religious," he said. "I remember in every village there was a mosque. Every day about noon, this guy would go in the mosque and chant."

The natives held prayer about five times daily, Coleman noted. During their prayers, they always faced Mecca, and they dispelled any problem with, "Have no fear – Allah will take care of us.

"They really believe in Allah," he said. "It's almost fanatical."

Servicemen spent their leisure time in a club where alcohol was prohibited. "All we had was coffee, tea, milk and Pepsi," Coleman said.

He remembered one incident which provided a bit of irony. "I became friendly with one of the guys. We were out in the desert on this mesa, and this boy was throwing rocks to run this burro out of the tall grass.

"I asked my friend, 'Why is he trying to run that burro out of the grass? And that's what it was – grass. It was marijuana.

"Marijuana was over there – fields of marijuana. It's funny how alcohol is not allowed and marijuana is wide-open.

"Punishment for crimes is also severe, Coleman said. "They've got public executions there. When I say public, I mean public.

"They provided us free transportation to the execution site," he

Please see Coleman, page 3-A

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### OBITUARIES


David Larry Ferguson
Alice C. Jones
Timothy Eugene Long
George Powell Jr.
Lewis "Lewie" Swicegood
(Please see Page 2-A)

Roane County News, Wednesday, December 26, 1990 — PAGE 3-A

Roane county

SCANDLYN LUMBER CO.

## Flood waters cover county

BLACK CREEK overflowed its banks in Rockwood Sunday morning, reaching the middle of Gateway Avenue in front of Scandlyn Lumber Co., above. Businesses and homes downtown were damaged due to flooding. (Staff photo by Bill Hall)

BEAULES WEBB of Harriman watches as water rises in front of his home on Carter Street. Harriman was hit hard by the weekend rain, which covered some homes and automobiles and caused roads to be blocked until the rain subsided. (Staff photo by Bill Hall)

BOATS are carried through the flooded streets of Harriman near Reed and Seed. Much of Harriman was under water Sunday due to continuous heavy rains and flooding. (Staff photo by Bill Hall)


VOLUNTEER MEDICAL CLINIC
IMMEDIATE GYN CARE

1991 Kick Off Sale of the Season
Sugar Bowl At Algies
January 1, 1991
Lucia & That's Me 50% off and more
One rack Lucia & That's Me - Mix-n-Match (odd sizes) 75%
Fire Islander: Jackets, Skirts, Pants, Sweaters (sizes 38-46)
One rack of 50% Cotton 50% Polyester (sizes 38-46)
Jackets $13.50 Skirts $10.00
$5.00 & $10.00 and $12.00

# Residents forced from their homes

CYNTHIA GARRETT
Rockwood Editor

ROANE COUNTY – Rising waters caused the evacuation of parts of Oliver Springs Saturday night and early Sunday morning and covered houses and businesses in Oakdale and Harriman. Highway 61 from Harriman to Oliver Springs was closed Sunday morning and Highway 95 was closed near the K-25 plant going to Oak Ridge.

Downtown Rockwood suffered flood damage to homes and businesses, and loose propane tanks washed from Morgan County to various parts of Roane County.

Harriman was hardest hit in Roane County. Harriman police officer Chuck Moore said water reached the tops of houses and cars Sunday morning. Areas affected due to excessive flooding included Walnut Hill, Fisk Heights, Meadowview Gardens and Webster Pike.

The city gas pumps, where officers gas up their vehicles, were completely immersed in water, Moore said. "The north end of town is pretty much stopped. We've closed it off."

Moore reported no accidents as of Sunday morning. The old bridge in Harriman was closed Sunday morning when water reached the bridge. Moore said roads and bridges were being closed "to keep cars from washing into the river."

Harriman officers attempted to rescue at least one of four propane tanks that washed down from Morgan County into Roane County. Moore said Officer Brian Farmer "got out in the river in his boots and almost got washed off" trying to tie off one of the tanks. "It's a swift current and a small boat can't get it," Moore said.

Almost every available officer was called to work in Harriman, as well as members of the Tennessee Emergency Management Agency and Civil Defense. Officers also helped get residents to the hospital as needed from Johnston Health Care, where flooding occurred, Moore said.

In Oliver Springs, all the streets were flooded and residents couldn't get in or out of town by any route, said Officer James Cissom with the Oliver Springs Police Department. Residents of the Van Buren Court housing project were evacuated, along with residents from other isolated locations, Cissom said.

He said a few cars had been "drowned out" but no one had been injured as of Sunday morning. However, houses and businesses were damaged from rising water.

The Morgan County Sheriff's Office said Oakdale was badly flooded Sunday morning, with water reaching the tops of houses and completely covering some. Police closed certain areas of Morgan County to traffic, including Lancing, Granny Hump and Montgomery Road.

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Please see **Flood**, page 2-A

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Early fears the city's substation would have to be shut down subsided along with flood waters later Sunday afternoon. "Earlier this morning we were afraid we would lose the substation, but the river receded and we are out of danger," Grigsby said Sunday.

Utility crews dealt with isolated power problems over the weekend. Crews waited for flood waters to subside in the Riggs Chapel area, where they were unable to reach a circuit that had gone out, Grigsby added.

"Compared with what we were facing this morning, we came out in pretty good shape," he said.

Harriman's water supply "should be in pretty good shape," even though the water plant was shut down. "We have one-and-a-half days of storage in our reservoirs. We store 1.8 million gallons and we use 1.2 million gallons a day. We should be OK."

Rumors that the city's water supply was contaminated were "totally false. When the flooding began, we quit pumping water into the reservoirs. When the water recedes, we'll go down there and clean it up and start it back up," Grigsby said.

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By CHERYL DUNCAN
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HARRIMAN, ROCKWOOD, OLIVER SPRINGS & ROANE COUNTY, TENNESSEE — VOL. 36, NO. 1 — 18 PAGES

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Broken light injures tournament attendees

Roane County News

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Serving Harriman, Kingston, Midtown, Oliver Springs, Rockwood and Roane County, Tennessee
Volume 50 Number 24

Monday – Tuesday
February 24-25, 2003

# Rains lead to crumbling roads

## County crews issue plea for patience

TIFFANY PETERS
Staff Writer

Roane Newspapers/TIFFANY PETERS
Flood waters washed away a large chunk of asphalt on Shady Lane in Oliver Springs, making the road impassible. Barricades keep motorists from the bad section.

Roane Newspapers/TIFFANY PETERS
...ge from recent flooding can be found all over the Roane County. County Road Supervisor Tom Hamby measures how far ...n of cracked asphalt has slid on Tanglewood Road in Harriman. Hamby closed the road Monday due to large fissures ...asphalt - the result of flooding and erosion.

# Area swamped by 8-inch rainfall

## Flooding closes Hwy. 61, overwhelms sewers

GIBSON

...newspapers ...inches of rain over a ...period last week... ...mudslides, flooded ...uprooted trees, as well ...blocked roads for local ...workers and utility ...workers.

...National Weather ...reported 2.24 inches ...between 7 a.m. ...Sunday and 7 a.m. ...5.1 inches between ...morning and ...another .6 inch... Sunday and ...

...results were pre...

...very really busy with ...said local 911 Director ...

...had reports of water ...into residences, roads ...washed out, culverts washed ...was all over the coun...

...said the 911 dis... ...received more than 300 ...between Saturday night ...Sunday, about twice ...for that time period. ...serious injuries were ...Hooks said.

...flooding wrought ...with the schedules of ...Tennessee Department ...Transportation workers.

...from the Harriman ...worked from midnight ...through Sunday ...as well as the better ...the day Monday.

...closed a portion of ...from midnight until ...a.m. Sunday. ...highways, 95, 58, and ...Road) were also ...impassable.

...Harriman Street ...Superintendent Daryl ...reported that five ...Department employees stayed out all night Saturday tending to storm and water damage.

One of the primary trouble spots was on Lower Margrave Road, Langley said, where torrents of rain washed away parts of the road and damaged water lines.

"There was debris to move, mud on the road, trees down, lots of driveways washed away," Langley said. "I think we were actually lucky compared to lots of other places."

General Manager Larry Mitchell of Rockwood Electric Utility reported problems related to lightning as well as rain.

Lightning strikes took out four transformers Saturday, creating power outages for a handful of households.

Mitchell also said mudslides caused damage in the REU district.

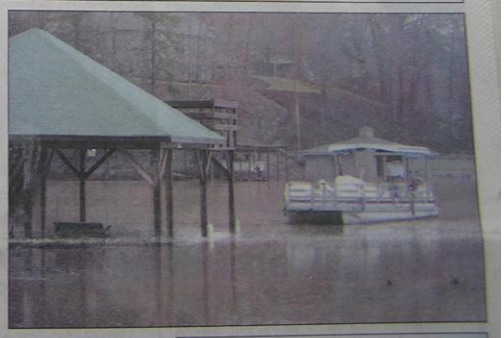
A mudslide on Eureka Road caused trees to fall, threatening power lines, and a slide on Black Hollow Road nearly toppled a service pole at a manufactured home.

"We were able to cut a lot of trees before they could damage the power lines," Mitchell said. "We had scattered incidents all night long."

City workers in Rockwood had their hands full as the city's sewer system was inundated with water.

At one point Saturday night, water sprayed up from around manhole covers. Rockwood's impromptu fountains reached a foot or more in height.

Ditches couldn't hold all of the water draining from the hills nearby and sheets of water spilled across streets and roadways in town.



While some areas experienced flooding on streets and roadways, people with lakefront property around Kingston watched water rise into gazebos, docks and play areas. About eight inches of rain fell from Friday through Sunday, saturating the ground and overflowing ditches and drainage systems.

Roane Newspapers/ DARRELL RICHARDSON

# Oliver Springs cut off by flooding

County."

again."

Ferguson said Frist is

K through 12, I am not going to take anyone off

*317.*

# Rain

From Page 1

said. Areas along Black Creek and Mountain View were also reported flooded.

The National Weather Service issued several flash flood warnings and watches for Roane County and the surrounding areas Sunday and Monday.

Superintendents Gary Collins of Roane County Schools and Candace Lett of Harriman Schools have both indicated during previous school closings that safety was priority in the decision that included students who drive personal vehicles as well as the bussed students.

*John D. Griffin can be reached at 376-3481, ext. 318.*

between the town and the

Collins told Police Chie
Ken Morgan he would help

# Wet week

Roane Newspapers/
**Matt Clary**

**Most of Roane County became a series of puddles Monday as the rain poured down continuously throughout the day. Roane County schools closed Tuesday as a result. Below, Adam Headrick clears a storm drain in the Food Lion parking lot in Rockwood.**

# Heavy rains leave trail

Roane Newspapers/KRIS JOHNSON

Roscoe the dog looks on as Roane County Highway Department crews work to rescue a six-foot culvert from a rain- swollen creek in south Roane County on Monday morning. Homes in the Melton Lane area were cut off because of the flooding that forced Roane County and Harriman schools to close Monday and Tuesday.

## Roads, schools closed after five inches of rain pelt area

By JOHN D. GRIFFIN
*Roane Newspapers*

KINGSTON — Nearly five inches of rain over the weekend washed out several county roads resulting in one completely isolated neighborhood and canceled classes Monday and Tuesday for Roane County and Harriman city schools.

Six-inch tiles along Melton Lane in the Paint Rock area were completely washed out, said Roane County Highway Supervisor Tom Hamby. About six families were cut off from outside services because of the downpour.

"Also about nine or 10 houses were flooded along Meadowlark Road in the Brown Ellis area," Hamby said. "I also had to close Riggs Chapel Road and Myers Road because of flooding."

Crews from the county highway department had been working since 1 a.m. Monday morning, Hamby

•See RAIN, Page 2-A

## Party kicks off campaign

*Democrats show passionate fervor for 2002 elections*

By PRESTON FLANDERS
*Roane Newspapers*

KINGSTON — Local Democrats were fired up during the Democratic Party Rally last Saturday at the Roane County High School cafeteria.

At 8 a.m., a country breakfast was served and those in attendance enjoyed fellowship with neighbors and elected and political hopefuls, then the candidates took the spotlight to discuss a variety of issues.

U.S. Rep. candidate Lincoln Davis spoke about the importance of homeland security.

"We need to make sure that what happened on Sept. 11 does not happen again," he said.

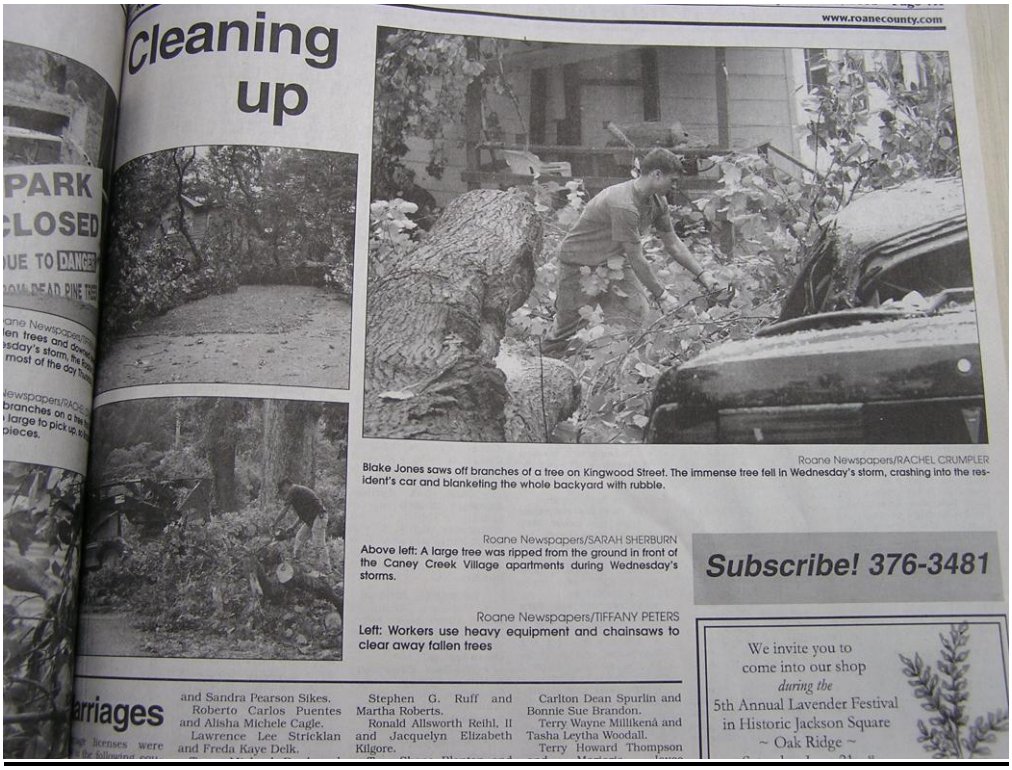
Davis said he would look past party lines to protect the freedom of the country.

"I doesn't matter whether it's Democrat or Republican, I am going to work and commit to those individuals who want to work to protect the freedom of this country whatever the problems may be," he said.

Davis said there were some instances he would take a strong stance on.

"I am not going to work that poll when they want to take healthcare benefits away from our elderly. I am not going to be the person to take money out of education," he said.

•See PARTY, Page 2-



www.roanecounty.com

# Cleaning up

Roane Newspapers/RACHEL CRUMPLER

Blake Jones saws off branches of a tree on Kingwood Street. The immense tree fell in Wednesday's storm, crashing into the resident's car and blanketing the whole backyard with rubble.

Roane Newspapers/SARAH SHERBURN

Above left: A large tree was ripped from the ground in front of the Caney Creek Village apartments during Wednesday's storms.

Roane Newspapers/TIFFANY PETERS

Left: Workers use heavy equipment and chainsaws to clear away fallen trees

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We invite you to come into our shop *during the* 5th Annual Lavender Festival in Historic Jackson Square ~ Oak Ridge ~

## Marriages

and Sandra Pearson Sikes.
Roberto Carlos Puentes and Alisha Michele Cagle.
Lawrence Lee Stricklan and Freda Kaye Delk.
Stephen G. Ruff and Martha Roberts.
Ronald Allsworth Reihl, II and Jacquelyn Elizabeth Kilgore.
Carlton Dean Spurlin and Bonnie Sue Brandon.
Terry Wayne Millikena and Tasha Leytha Woodall.
Terry Howard Thompson

ect either
vn, Patton

our water plant and the closing of K-25 may cause serious problems for the city. We need all the expertise and experience we can get during this critical time."

Leffew's rationale, based on the June election results, was, "The public has spoken."

In crowded council chambers, several citizens spoke their convictions. All the comments favored giving the seat to the next person on the ballot of the last city election — Brown.

FRANKLIN MADDOX said, "If we do the right thing, the one appointed should be the next runner-up. If council doesn't feel like that, they're wrong. Maybe you don't want a woman on there. Why, I don't know.

"The people voted 449 votes for Betty Brown. We elected you to represent the people. We thought you had sound judgment. Sometimes I'm sorry I live here.

"Council ought not to hold a grudge. Some of you are holding a grudge because of this thing on the charter. This is a new day. If you are not there to serve the people, you

(See Either, page 2-A)

ellor drops
lawsuit

Williams dismissed the suit because state law says that any time a public official is charged with wrongdoing and someone attempts to remove him from office, the district attorney general must become a part of the proceedings.

Charles Hawk, the district at-

THIS TREE FELL across the home of Charlotte Bowles, old Rockwood highway, Midtown, Tuesday afternoon in a thunderstorm. Bowles said she did not hear the tree falling. "I saw this big flash out front and it was followed just instantly by a big boom," which she thought was a transformer near her home. She realized it was a tree that had fallen on the rear of the house when she saw willow leaves in the air. The tree caused about a six inch hole in the roof, she said. (Staff photo by Bill Hall)

# Storm rips through county

High winds and lightning knocked out power for many county residents and many Harriman area residents were still without power Thursday morning after Wednesday night's hour-long thunderstorm.

Harriman Utilities Board reported power was still out in several areas Thursday morning. Residents in the Emory River Road area of Sugar Grove Valley, Poplar Creek, Flatfork community, Emory Heights, Dyllis and Boswell Chapel were still all without electricity at 9 a.m. Thursday.

Officials at HUB said the power went out about 10 p.m. Wednesday. The reason for 90 percent of the electricity outage was due to the high winds and lightning that accompanied the storm. Some trees were knocked down.

Rockwood Electric Utilities also saw a great deal of activity during the Wednesday night storm.

TVA lost a transmission line to the Kingston substation around 10 p.m. Wednesday night. "About half of our

TWO HORSES owned by County Commissioner Clyde Houston were killed in the severe electrical and rain storm them. Houston found them lying under the tree. Houston said the mare and colt were worth at least $1,500. (Staff photo by

STER!
Limit 3
With $10.00 or more
3 Dozen For $1.00
Sausage Hot or Mild $1.39 pound
Potted Meat 5/$1.00

nashes
rea

THE UPPER PART OF Ralph Magill Jr.'s house in Harriman was crushed in Wednesday night's storm. The large tree fell onto the Clinton Street home, hitting Magill's son's bedroom between 9 and 9:15 p.m. No one was in the room. (Staff photo by Bill Hall)

Jesse
given
and

# Rockwood hit hard by storm

CYNTHIA GARRETT
kwood Editor

OANE COUNTY — The worst m since the ice storm of 1982 kill- power to well over half the kwood area Wednesday shortly re 5 p.m., keeping some dents in the dark until Thursday ning or later.

ockwood Electric Utility crews e still working on repairing the nsive damage caused by high ds and heavy rain Thursday ernoon. A report from the ger's station atop Mount nevelt clocked winds up to 75 h.

ockwood was hardest hit by the rm, although Kingston suffered ttered damage in several areas. rriman utility officials also orted scattered problems.

eighboring Crossville was also d hit, with unconfirmed reports at least one tornado touching n. Scattered reports said that ts had been ripped off trailers, s were damaged and windows re shattered throughout the town.

Rockwood, the downtown area ceived substantial damage, ecially around the Douglas nue area. Other areas without er included Daysville, Camp k Toms, Eureka, Westel, Pine hard, Dry Hill, Mountain View, ck Jack, New Hope, Eagle dge, Millstone Mountain, kerise, Molyneux subdivision various other areas.

y 10 a.m. Thursday, power had s restored to most of those areas s mostly scattered outages left to repaired, according to REU nager Charles Johnson.

500-KVA pad mount was burned at the Rockwood Municipal Complex, leaving them on generator power all night. Police Chief Leon Miller said radios were in use, and lights were on in the front of the police station, but the fire department, jail and some offices were without power. Power had not yet been restored Thursday morning.

In the Kingston area, power was out in the Bluff Road, Lawnville Road, Leisure Meadows, Colonial Drive, Buck Creek Road and Ladd Ridge Road areas, along with various other trouble spots.

Please see Storm, Page 2-A

## Worst for Volunteer

By PAUL PAGE
Assistant Editor

ROANE COUNTY — Volunteer Electric Cooperative, headquartered at Decatur, said some of its 30-year employees called Wednesday's storm the worst they had ever seen. At one time, as many as 25,000 of the cooperative's 70,000 customers were without service, said Erbin Baumgardner, public affairs representative.

"We've brought in everybody we can find to work in the restoring of service," he said, estimating that as many as 50 persons were in the field. He reported some Volunteer employees were brought in from

Please see Volunteer, Page 2-A

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By CHERYL
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from page 1

## Storm

Most of the problems encountered by crews involved downed power lines caused by high winds, trees falling across lines, blown or tripped transformers, blown fuses and a host of other minor problems. As Johnson pointed out, it often takes more time to locate the trouble than it does to fix it.

As darkness fell, crews began having difficulty finding the trouble without the aid of spotlights, which were delivered to them during the night when lights on hand began to burn out. They also ran out of such items as wire, fuses, cutouts, barrels and transformers.

They were hindered further by having to do everything from wading through creeks to plowing through overgrown bushes and woods to find the source of the outages.

After working an entire day and night without stopping and grabbing bites of food whenever they could, crews were beginning to get tired and hungry by Thursday morning.

Nineteen employees — every available outside crew member — were on the job dealing with each call on a priority basis, taking care of the three-phase lines, single-phase lines and individual transformers, in that order. In addition, a three-man tree-trimming crew was called in to clear the way for utility crews in many areas.

From the time the lights went out, customers kept the phone lines busy at the utility reporting problems and outages. Complaints ranged from mild to severe, with callers exhibiting attitudes ranging from calm understanding to irritated anger.

Some complained that they couldn't set their electric alarm clocks for work the next day or take showers, run hair dryers, wash dishes, cook dinner and a host of other necessities. As one caller said, "I guess maybe we rely too heavily on electricity."

Others complained that meat in their freezers was going bad, they had hungry children to feed and get in bed, they were hot because they couldn't run their air conditioner, and the complaints went on and on.

Several other legitimate health complaints were received, including difficulty breathing and inability to run monitoring machines.

Operating superintendent Don White said the system held up fairly well under the circumstances. "Fifteen years ago, it would be a week getting all the problems fixed. With 75 mph winds, we would've had all of Kingston and Rockwood out," White said.

White complimented the crews working throughout the night, saying, "They haven't complained at all. When the chips are down, they're there. I'll put them up against anybody anywhere."

Johnson also felt his crews performed up to par. "They've done a super job. They've been out all night and are still working. It's amazing the way they work under trouble conditions. They put out 200 percent."

Utility Board Chairman James Neal, who was out with the crews during part of the night, expressed the same sentiment. "Hanging transformers and stringing lines is tough. In the dark, they make one wrong move and they're dead. With the rain and lightning, I don't even see how they find the trouble.

"I appreciate everything those people do. It's a thankless job, and the only time we notice them is when the power goes out, which mine did for about five hours last night. But I wouldn't trade the whole crew for any other crew in the whole country if my power was off."

## Volunteer

counties which escaped heavy damage and that others came from contractors in Chattanooga.

He declined to estimate when full service would be restored. "We're doing all we can as fast as we can," he said.

The service area for Volunteer extends from points north and west of Crossville to Hamilton County. At one time, it was the largest electric cooperative in the nation and still ranks among the biggest.

Baumgardner described the damage in the Volunteer area as "general" and "extensive" but added he was not aware of the actual destruction of any homes or buildings. He said there were many, many cases of power lines being pulled from residences by fallen trees and broken limbs.

The storm struck in the Crossville area about 5 p.m. (EST) and left a long trail of scattered damage as it moved through Spring City and Rhea County into the southern portion of Roane County. At one time, it was reported Highway 58 was blocked several miles north of the Meigs line by fallen trees and lines. Most of the damage in Roane was in the Paint Rock and Mann Hollow Road areas, Baumgardner said.

He also reported he could see through his office window a large trailer truck which had been overturned by the winds and that the bank at Decatur was still without power at mid-morning on Thursday. Volunteer's operations also were handicapped, he said, when lightning struck the telephone switchboard there. "It cost some valuable time in receiving calls and in making our adjustments," he said.

"It was just a mean lick," Baumgardner said of the storm. "It will be a while before we will know the full extent of our damage and loss.

He pointed out the storm struck about 5 p.m., the normal quitting time for the crews, but they simply "stayed on the job and have been at it more than 24 hours."

Volunteer serves that portion of Roane County south of Branham Road at Southwest Point Golf Club in Kingston to the Meigs County line.

Roane County

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Serving Harriman, Kingston, Oliver Springs, Rockwood and Roane County, Tennessee•Volume 40 Number 61

MONDAY•TUESDAY
MAY 22—MAY 23

# Funnel clouds reported during thunderstorm

JOHN LINDSEY/Roane Newspapers

**Storms blow through Roane County**

...the Roane County Chamber of Commerce lawn in the wake of two major storm fronts that passed through Roane County Thursday night. Two funnel clouds were spotted in Roane County during the storms, but they did not touch down and were unconfirmed by the National Weather Service.

By MICHELLE LONG
*Roane Newspapers*

Thunderstorms roared across Roane County Thursday night, but apparently county residents got off lightly compared to others in East Tennessee.

Radio and television stations continuously tracked two storms which downed trees and powerlines during the evening hours Thursday. In addition to heavy rain and high winds, conditions were favorable for tornadoes and funnel clouds — several of which were reported during the storm.

Although there were no confirmed reports of funnel clouds in Roane County, E-911 Director Bill Taylor said one was reported in Rockwood and one in the Blair community during the storms. Neither funnel cloud touched down.

Taylor said E-911 workers were "in almost constant contact" with the National Weather Service from about 7 p.m. to midnight, tracking the storm.

"They were very helpful to us," Taylor said of the Weather Service. "We were on the phone at one point, after the funnel cloud was reported in Rockwood, and they said conditions were favorable for such an occurrence, but they were unable to determine if there were actual funnel clouds in the area or not."

Jason Wright of the National Weather Service said there were reports of softball-sized hail in Oliver Springs and countywide tree damage, which are characteristics of severe thunderstorms.

Wright said actual tornadoes were produced in Crossville, Jefferson and Hamblin counties and in the Fountain City portion of Knoxville. No official reports of tornadoes were confirmed for Roane, he added.

Taylor said his department received numerous calls concerning power outages, downed trees and powerlines — and at least one accident in North Roane County was reported during the storm. Taylor said there was also a report of a tree falling on a house on West Buttermilk Road.

• See Storm, Page 5

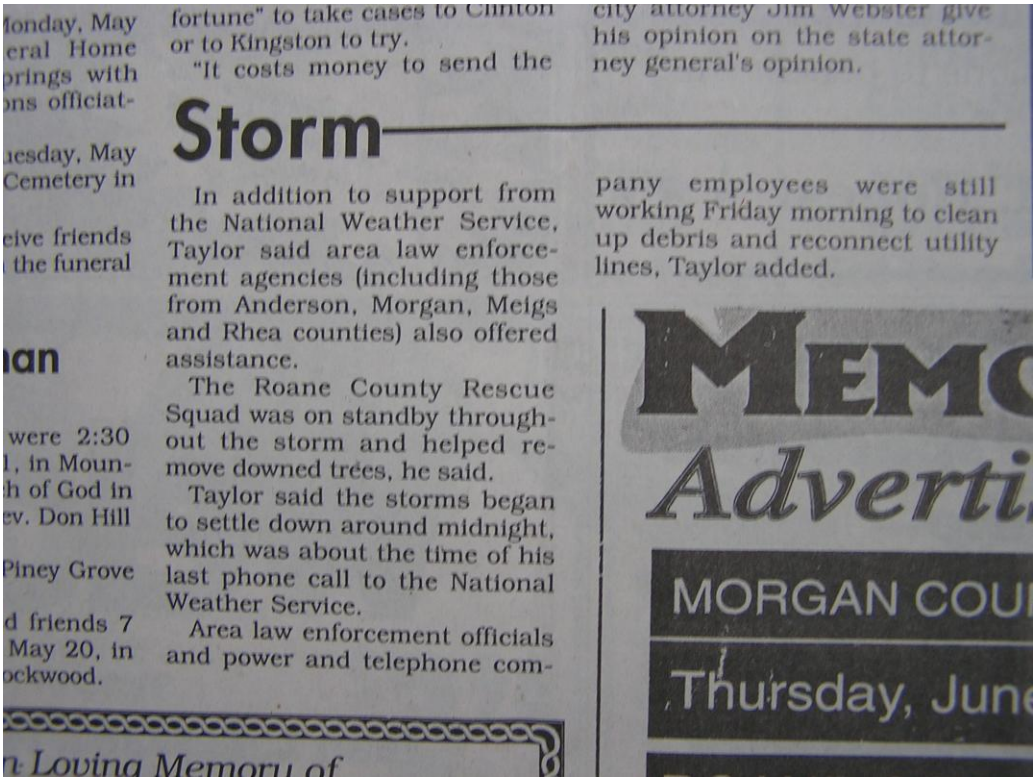
*In Oliver Springs—*

# Cases ordered tried in Anderson

By MICHELLE LONG
*Roane Newspapers*

**OLIVER SPRINGS** – According to an opinion handed down by the state attorney general, criminal cases which originate in the Oliver Springs portion of Anderson County must in the future be tried in Anderson County.

The Oliver Springs Board of Mayor and Aldermen approved a charter change amendment which brought Van Hook's term limit and other qualifications in line with criteria set by the state



fortune" to take cases to Clinton or to Kingston to try.

"It costs money to send the city attorney Jim Webster give his opinion on the state attorney general's opinion.

# Storm

In addition to support from the National Weather Service, Taylor said area law enforcement agencies (including those from Anderson, Morgan, Meigs and Rhea counties) also offered assistance.

The Roane County Rescue Squad was on standby throughout the storm and helped remove downed trees, he said.

Taylor said the storms began to settle down around midnight, which was about the time of his last phone call to the National Weather Service.

Area law enforcement officials and power and telephone company employees were still working Friday morning to clean up debris and reconnect utility lines, Taylor added.

3-STAR EFFORT • Roane again receives state award • Pg. 3-A

Roane County

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Serving Harriman, Kingston, Oliver Springs, Rockwood and Roane County, Tennessee•Volume 40 Number 137

WEDNESDAY•THURSDAY NOVEMBER 15—NOVEMBER 16

## Storm sweeps through Roane; damage being tallied

## 3,000 VEC customers affected by storm

## County defers Midway issue

### Workshop with school officials set

## Tis' (nearly) the season

# Squall rips through Roane County

## Thousands lose power during storm

Roane Newspapers/TIFFANY PETERS

Sherman Minton and his daughter, Melissa Goedeke survey the damage done to his home off of Caney Creek Road in Midway. A thunderstorm "super cell" Wednesday night produced numerous funnel clouds and winds exceeding 70-miles-per-hour. Even a steel sign post in Rockwood was no match for the twisting winds of the storm. Power was out in many homes and businesses across the county, even the following day. National Weather Service meteorologist said Roane may not have suffered the storm's worst. They are investigating reports of tornado touchdowns in Sevier County east of Knoxville.

**More storm photos on pages 6A and 7A**

## Husband sleeps as trees come crashing down

### Family just grateful nobody was hurt

BY TIFFANY PETERS

"The words had no more than come out of that man's mouth that I turned around and saw the trees falling through my back window," Minton said.

"I heard snapping all around me. Continuous snaps, crackles and pops."

Minton quickly gathered her thoughts and went to wake her husband, Sherman, from his still-undisturbed sleep.

"I probably would have slept on through it," Sherman said.

"When you work 14 or 15 hours a day, you pretty much can sleep through anything."

The couple retreated to their basement and began calling their family for comfort and for warning.

"Mama called us to tell us about the tree damage. My husband always jokes that she exaggerates things," said the couple's daughter Melissa Goedeke.

"When he finally saw the damage today, he just said, 'you weren't exaggerating.'"

In the daylight, the home's damage is much worse than Gloria imagined.

The Mintons have been restoring the two-story antebellum home for about a year now.

The double-decker porch, part of the roof and all of their outdoor furniture has been destroyed by Wednesday's squall.

"We just repainted and redid the place," Gloria said as she surveyed the final damage Thursday morning. "Looks like we'll be doing it again."

The home was one of many in Roane County damaged by broken trees and fallen electrical lines.

Like most of the families who sustained property ruin but no personal injury, the Mintons know how lucky they are.

"I called my sisters crying, and they told me, 'Nobody got hurt, so everything will be fine,'" Gloria said.

"They're right."

But next time, the Mintons hope they can be more prepared.

"We used to live in Texas and in Texas, you can see it coming," Gloria said.

"Don't get me wrong, I saw it all, but I would have liked a few more minutes warning."

Due to the overwhelming amount of property damage in the county, the Mintons have not yet met with their insurance agent to get a damage estimate.

With the work ahead of them, the couple looks forward to getting back to their normal life.

"It was horrible but it's over," Gloria said. "So now we move on."

Roane Newspapers/JILL PICKETT

Nagji Patel, owner of the Oliver Springs Raceway station on Tri-County Boulevard, gathers trash cans and debris on Tuesday after storms blasted the store and other parts of town.

## 'Never seen anything like it'

# Winds toss Oliver Springs

### Have damage? Call county officials at 717-4115

By CINDY SIMPSON
*Roane Newspapers*

Oliver Springs took the brunt of storms that swept through Roane County overnight Monday, ripping down power lines, toppling fuel pumps at a local gas station, closing schools and sending emergency service workers out in droves.

"We went house to house at the damaged homes and looked for anyone that might be injured or trapped," said Oliver Springs Volunteer Fire Department Chief Terry Phillips.

Phillips said except for some minor bruises and bumps, no one was injured.

Oliver Springs Police Chief Ken Morgan said that officers checked on residences as well, and also directed traffic around the worst of the mess so that utility workers from Clinton Utilities Board and Harriman Utility Board could do their jobs.

Thousands of Oliver Springs residents on both the Roane and Anderson County side of the city were out of power, according to officials. A mile stretch of Dutch Valley Road was also hard hit, officials said.

"The utilities are telling us they should have power back on by this evening," Morgan said.

Norwood Elementary School and Norwood Middle School were closed because of the power outage.

The most severe damage visible to a single structure was at the Raceway on Tri-County Boulevard, where the canopy over the fuel pumps had been ripped away and four fuel pumps were uprooted. The store also had broken windows and roof damage.

Owners Nagji and Sam Patel appeared stunned by the damage as they stood inside the emergency tape around the gas pumps Tuesday morning.

Sam was working around 10:30 a.m. when the severe weather hit.

"When the wind blew up the canopy, Sam turned the gas switch off immediately," Nagji Patel said, explaining how a gasoline spill was prevented.

"We think it was just wind, but we do not know," he added. "Never seen anything like it."

Officials said the damage probably wasn't from a tornado, according to Roane County Emergency Management Agency's Scott Stout.

Stout said that tornadoes typically leave twisted trees and other such damage in their wake.

Stout said trees were snapped as if they had been pushed down in one direction.

"That is not to downplay what happened," Stout explained. "Straight-line winds can do as much or more severe damage as tornadoes."

He said one house around Mahoney Drive and Joel Road was nearly flattened.

National Weather Service officials weren't ready to make a declaration on what kind of winds came through.

"We are still out there looking at it," said Derek Eisentrout, a weather service representative. "Howard Waldron (with the National Weather Service) is assessing the damage."

Several residences were heavily damaged, and the wind ripped the roof off and knocked down a wall of one home.

The Appalachian Chapter of the American Red Cross brought food and drinks for work crews, and Beech Park Baptist Church opened a shelter but had no takers, officials said.

Howie Rose, Roane County's emergency management agency director, is asking anyone with property damage to contact his office at 717-4115.

The county is seeking a disaster declaration to help pay some of the expenses involved in the cleanup.

Roane Newspapers/JILL PICKETT

Raceway station sustained some of the worst visible damage from the storms, with a toppled gas pump among the damages to the business.

Roane Newspapers/JILL PICKETT

Electrical workers work to restore power to the Oliver Springs area after storms blew through.

## Jr. Burney di

By CINDY SIMPSON
*Roane Newspapers*

Junior Burney, who served as mayor of Oliver Springs from 1967 to 1971, is dead at 82.

He died on Thanksgiving Day.

Oliver Springs residents remember him not only for for his polished look and easygoing demeanor, but for his efforts during floods in 1967 and for improving the town's volunteer fire department.

"His shoes were always shining — no scuffs — and he was so neat in dress," Oliver Springs historian C.S. Harvey said. "It always impressed me."

"He was probably one of the most congenial people to ever live here," Harvey continued.

"He was referred to as 'Mayor Burney' by people here until the day he died."

Burney was serving his first year as mayor when the floods hit.

Indian Creek was a frequent problem for the city, according to Burney's grandson, Ray, a lieutenant for Blair Volunteer Fire Department.

"He was very in in getting Indian channeled," Ray B

Burney was al tablish Oliver Spr Authority. Burney public housing a for him.

For all he d Springs, Junior best be known ence in firefight

While servin for the K-25 S ment, Burney teers for Oliver

Oliver Spri corder and Van Hook wa when he first as a volunte mayor.

The stude each Monday primarily by the fire ala they were a to help fight

"Dad wa spected pe Burney sai

"He tri right and boys wh wrong."

## Black Frida so testy at R County bus

By CINDY SIMPSON
*Roane Newspapers*

There were no fights over merchandise, and no arguments.

There probably was a little grumbling, but for the most part, the busiest shopping day of the year passed peacefully in Roane County.

At Wal-Mart Supercenter in Rockwood, the lines were long before 4 a.m.

Many customers waiting for a particularly coveted item, a Hewlett-Packard notebook computer.

Some in the line claimed to have gotten to the store as early as 6 p.m. the previous day to get in line.

A handful of sheriff's deputies and Rockwood police stood next to the computers to deter potential mischief.

A few did some shopping of their own before leaving, one scanning the jewelry counter after the computers were sold.

"In four minutes the laptops were gone," said Alvin Hagermaker, a Wal-Mart manager.

"Maybe we are keeping people (shopping) in Roane County."

Most seemed to leave in good spirits, coming to the store for the first hit befor moving on to other shoppin

## Storm blows p

The threat of bad weat resulted in Kingston postp ing its Christmas parade o inally set for Monday night

The parade has b rescheduled for 7 p.m. Th day, Dec. 8.

The Roane County Her Commission parade-day house at the historic R County Courthouse also been moved to that day.

It will begin at 6 p.m

# Oliver Springs drying up

## May have to get all water from Anderson

CINDY SIMPSON
he Newspapers

liver Springs, still struggling depleting water supplies from year's drought, may have to elsewhere for its entire municiwater supply.

liver Springs Town Manager d Bolling told the Oliver Springs d of Aldermen last week that water plant is pumping the g that is the town's source of r as low as it can.

e town has been supplementhat ever-decreasing supply by hasing water from the AnderCounty Utility Board.

things get worse, the city may to rely solely on ACUB, acing to Bolling.

We're still not in the worst shape nd," Oliver Springs Mayor Chris er said.

ther Tennessee towns are strug- as a result of the drought. notably in East Tennessee is ville, which has implemented e water restrictions.

liver Springs officials still have no move to restrict residents using water. They did, howevssue a plea last month asking residents to conserve.

Alderman Paul Fox, at Thursday's town meeting, noted that other areas are asking for emergency assistance with their water needs.

Bolling responded that, in order for Oliver Springs to qualify, mandatory restrictions might be required.

In Maryville, the restrictions requires car wash facilities to cease operation and plant nurseries and landscaping facilities cease irrigation.

It also requires a mandatory cutback of at least 5 percent of daily consumption by large industrial customers and large nonresidential health care commercial customers. Also prohibited is watering lawns and landscapes at homes and businesses and car washing at residences.

While Oliver Springs may be struggling with its dwindling water supply, people continue to request to hook on.

Benny Phillips, who lives on Cove Lane, said he and a neighbor have property they want to develop that sits at the end of the city water lines.

He approached the water board to see about the possibility of connecting.

Phillips said he wants to make his portion of the property a campground with around 10 sites.

Phillips said the line ends at his driveway. He already has electrical hookup approved for the area.

He and the other property owner are looking at sharing the cost of developing the area.

Bolling suggested that Phillips and his neighbor work together with officials to make sure they get all the state requirements under way.

Even so, whether they will be allowed to connect is not guaranteed, Bolling warned.

In other business, Gene Lackey, a local surveyor, brought a preliminary plan to provide sewer to the Green Acres community, which includes Green Acres Trailer Park. Lackey proposed another pump station would need to be built, and the whole end of town get sewer.

Bolling said officials at the water department had recommended to him to do a flow survey. He said the city should wait until the wet season for accurate results.

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16 Pages
The Roane County NEWS
Published Three Times A Week From The County Seat
Wednesday

# e-laden trees fall, causing many power outages

ages scattered throughout kept some houses in the dark utility workers fought to er.

n that pulled down power her lines iced over from et storm were the causes e problem, according to rs.

ntime, Tuesday's warm he county and state road ar slick roads, although y Monday was attributed ed bridge on Interstate ggsbee of Kingston was skidded out of control per with her remained dition Tuesday. (See

rm began Monday a o'clock in sub- What began as sleet ground, turned inow; roads were

County Sheriff's d that its deputies alls Monday due to Rockwood and rtments were also the Harriman

Police Department reported only one request for assistance Monday. Police Dispatcher Don Day said, "We were looking for (a lot of calls), but didn't get it." He said two cars had to be towed Monday.

**COUNTY ROAD SUPERINTENDENT** Bob Collier estimated that almost an inch and a half of sleet, snow and ice accumulated in Roane County Tuesday morning he said he still had workers out salting and spreading gravel on the roads, mostly on back roads and shady hills.

The big problem, however, was trees falling across roads, often pulling down power lines as they fell. Collier said his department's radios were knocked out when power was cut off to the antennae in Kingston Heights.

"The trees were already frozen," said Collier. When ice builds up, the trees or branches break and fall. "It's as much a power problem as a problem with ice on the roads," he said.

He reported trees down in several areas, including Black Creek and Ables Valley, both south of Rockwood, Smalley Lane, and Sugar Valley. Power was knocked out in Sugar Valley around 8 p.m. Monday.

Collier said a warm rain Tuesday would "help better than anything." Tuesday's high temperature was expected to reach 45 degrees, according to *The Knoxville Journal*.

**DISTRICT ENGINEER** Don Lane with the State Department of Transportation (DOT) agreed with Collier that the one major problem was trees falling on the roads. Although most roadways were in good shape by Tuesday, Lane said bridges on state roads gave them trouble.

Lane said even though it started to rain Monday, the temperature was still low, causing many of the roads and bridges to ice over.

He reported trees down on several state roads, including State Routes 62 and 116 in Morgan County, and on Highway 27 below Rockwood.

Over 300 tons of salt mixture were spread over state roads in Roane County, according to Lane. Roane County's DOT district includes Morgan, Loudon and Monroe counties. Lane said Roane and Morgan counties were hit the worst by the storm.

Lane also said Tuesday's rain was "helping quite a bit". He added that when the temperature rises, more traffic gets out on the roads, reducing the ice and slush and relieving some of his men from their night-long efforts.

**UTILITY WORKERS** continued their around-the-clock battle Tuesday, working to restore power to areas scattered throughout Roane County.

Several power outages were reported, some lasting an hour, some lasting from 8 p.m. Monday through Tuesday. Outages were reported in much of the area south of Kingston, and in the south end of Rockwood (Rockwood City Council's meeting was interrupted by power failure; a generator was turned on to provide electricity — see story this page).

Jack Howard, Manager of the Harriman Utility Board (HUB), said there were power outages "everywhere", some starting 7 p.m. Monday. He, also, attributed the damage to trees icing up and falling on power lines.

Howard partially listed power outages as including parts of Midtown, Harriman city, Swan Pond, Liberty Church Road, Dyllis, Oliver Springs and Crab Orchard. He said HUB workers, including two ext were called in, began we Monday. They were still w Tuesday, and "We'll stay get it," said Howard.

After resurveying Tuesday afternoon, problem areas would nee He expected most areas restored by Wednesday.

"I hope it doesn't st again," said Howard out."

This tranquil winter scene belies the damage done to power lines as trees, heavy with ice, fell on the lines and knocked out power in many parts of Roane C photo by Bill Hall)

# illed, two injured in wreck

59, of 508 Point n, was killed 1977 Chevrolet n ice-covered

cKenzie said sed the 6:30 rred during a

er, Riggsbee e interstate ontrol of her er the But- McKenzie pavement, k onto the

McKenzie said that as the car came up on the eastbound lane, it was hit by a U.P.S. van, driven by Carl E. Sharp, 32, of Route 2, Harriman. The van struck the Riggsbee vehicle on the driver's side, knocking it back into the median.

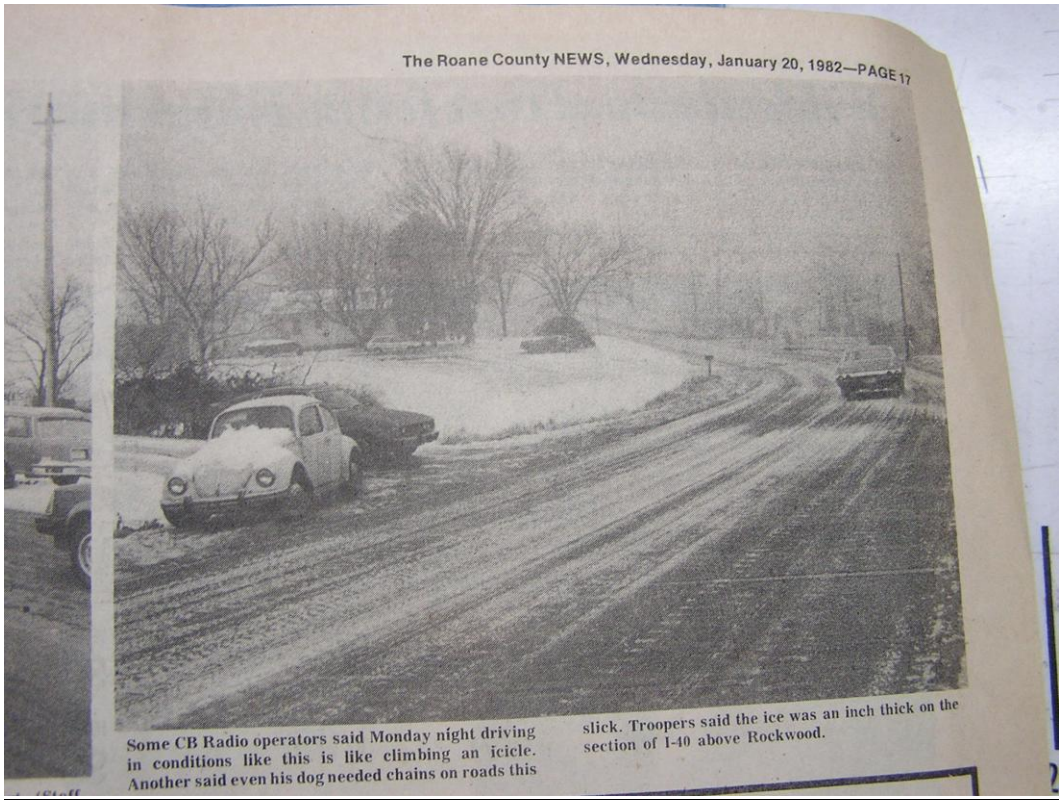
Members of the Roane County Rescue Squad used the Jaws of Life to free Mrs. Riggsbee from the wreckage.

A passenger in the Riggsbee vehicle, Billie Dean Arms, 41, of 56 Lake Circle Drive, West Shore Estates, Harriman, was transported to Park West Hospital in Knoxville where she was admitted to the intensive

condition Tuesday.

Sharp was also admitted to Park West for treatment of severe lacerations to the face and head. He is listed in satisfactory condition.

Both women in the vehicle were employees of the J.C. Penney Company department store at the West Town Mall in Knoxville. Trooper McKenzie said he understood Mrs. Riggsbee had a doctor's appointment Monday afternoon, and the two women apparently had done some Christmas shopping after her appointment.



The Roane County NEWS, Wednesday, January 20, 1982—PAGE 17

Some CB Radio operators said Monday night driving in conditions like this is like climbing an icicle. Another said even his dog needed chains on roads this slick. Troopers said the ice was an inch thick on the section of I-40 above Rockwood.

This truck of pigs was stranded in Kingston early Tuesday after a traffic accident in which some of them reportedly were injured. The car managed to move along as the ice was beginning to turn to slush.

DAVIDSON STARES down the barrel of a .12 gauge shotgun as officers quickly handcuff him. From left, TACT Squad Leader Lt. Thomas Edwards, Sgt. Lester Jackson of TACT, Kingston Policeman Dale Brown, Harriman Police Chief Don Day and Deputy Robert Billings. (Staff photo by Bill Hall)

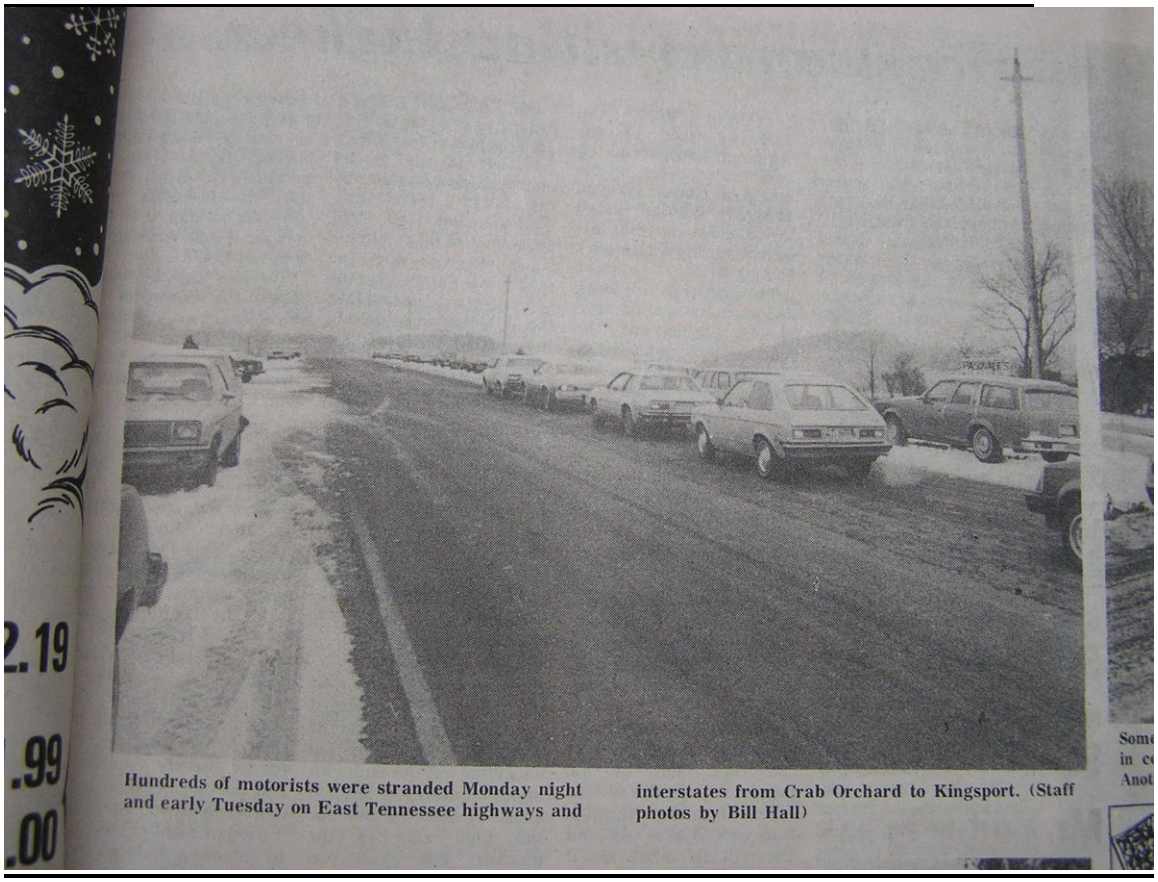
## Frozen

WEATHER — BAD weather — was again a dominant factor in Roane life Friday. Forecasts called for ice and snow over the county and much of East Tennessee and residents reacted quickly — perhaps in response to the previous two weeks of miserable weather.

By early Friday afternoon schools throughout the area had been closed and residents were scurrying to prepare for bad conditions. Area grocery stores were full in the middle of the day as residents "stocked up."

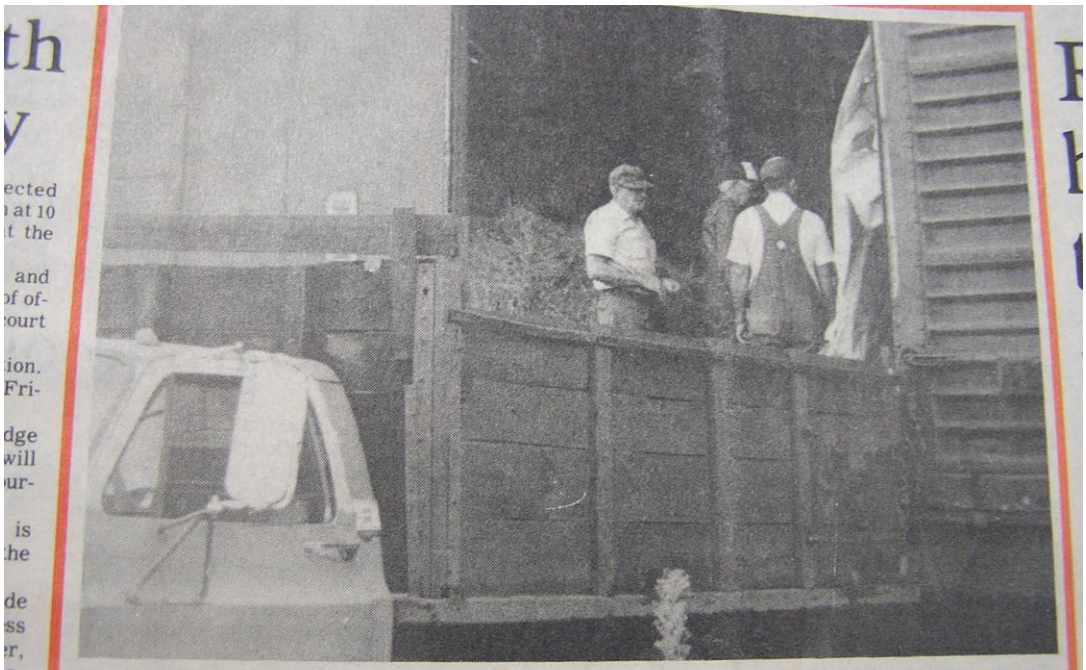
However, the forecasts were premature, this time. A coating of ice covered the ground, but travel was easy by mid-morning Saturday. Roane County just barely missed getting a treacherous covering, and Interstate 40 across Rockwood mountain was closed Friday night as numerous wrecks occurred, including one involving two tractor-trailer trucks. (Staff photo by Bill Hall)

## Woman, 85, shot in face



Hundreds of motorists were stranded Monday night and early Tuesday on East Tennessee highways and interstates from Crab Orchard to Kingsport. (Staff photos by Bill Hall)

Some stranded motorists were lucky enough to be able to leave their cars abandoned in parking lots during Monday night's ice storm. Hundreds of others on Interstate-40 were stalled in the middle of the road and had to wait inside for hours.



**THREE LOCAL FARMERS** view the free hay that arrived Wednesday night in Harriman. Although it was described as poor quality, many were glad to get their share, since the recent drought and heat have stunted some local corps. (Staff photo by Richard Wall)

# Appendix K. Flood Event Report

## Building Inventory

### General Building Stock

HAZUS estimates that there are 20,735 buildings in the region which have an aggregate total replacement value of 2,390 million (2002 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Study Case respectively. Appendix B provides a general distribution of the building value by State and County.

**Table 1**
**Building Exposure by Occupancy Type for the Study Region**

| Occupancy | Exposure ($1000) | Percent of Total |
|---|---|---|
| Residential | 2,135,680 | 89.4% |
| Commercial | 158,994 | 6.7% |
| Industrial | 55,468 | 2.3% |
| Agricultural | 862 | 0.0% |
| Religion | 21,868 | 0.9% |
| Government | 5,316 | 0.2% |
| Education | 11,559 | 0.5% |
| Total | 2,389,747 | 100.00% |

**Table 2**
**Building Exposure by Occupancy Type for the Study Case**

| Occupancy | Exposure ($1000) | Percent of Total |
|---|---|---|
| Residential | 1,072,463 | 86.7% |
| Commercial | 108,473 | 8.8% |
| Industrial | 25,850 | 2.1% |
| Agricultural | 690 | 0.1% |
| Religion | 15,013 | 1.2% |
| Government | 5,316 | 0.4% |
| Education | 9,796 | 0.8% |
| Total | 1,237,601 | 100.00% |

### Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 85 beds. There are 23 schools, 10 fire stations, 7 police stations and no emergency operation centers.

## Appendix L. Earthquake Event Report

# HAZUS-MH: Earthquake Event Report

**Region Name:** ROANE COUNTY

**Earthquake Scenario:** Kingston 5.0

**Print Date:** August 18, 2008

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

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

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## General Description of the Region

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

The earthquake loss estimates provided in this report was based on a region that includes 1 county from the following state(s):

Tennessee

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

The geographical size of the region is 394.83 square miles and contains 10 census tracts. There are over 21 thousand households in the region and has a total population of 51,910 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 21 thousand buildings in the region with a total building replacement value (excluding contents) of 3,016 (millions of dollars). Approximately 98.00 % of the buildings (and 77.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 803 and 615 (millions of dollars), respectively.

# Building and Lifeline Inventory

## Building Inventory

HAZUS estimates that there are 21 thousand buildings in the region which have an aggregate total replacement value of 3,016 (millions of dollars). Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 71% of the building inventory. The remaining percentage is distributed between the other general building types.

## Critical Facility Inventory

HAZUS breaks critical facilities into two (2) groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there is 1 hospital in the region with a total bed capacity of 85 beds. There are 23 schools, 10 fire stations, 7 police stations and 0 emergency operation facilities. With respect to HPL facilities, there are 2 dams identified within the region. Of these, 0 of the dams are classified as 'high hazard'. The inventory also includes 99 hazardous material sites, 0 military installations and 0 nuclear power plants.

## Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 2 and 3.

The total value of the lifeline inventory is over 1,418.00 (millions of dollars). This inventory includes over 214 kilometers of highways, 38 bridges, and 4,573 kilometers of pipes.

**Table 2: Transportation System Lifeline Inventory**

| System | Component | # Locations/ # Segments | Replacement value (Millions of dollars) |
|---|---|---|---|
| **Highway** | | | |
| | Bridges | 38 | 67.30 |
| | Segments | 63 | 639.70 |
| | Tunnels | 0 | 0.00 |
| | | Subtotal | **707.00** |
| **Railways** | Bridges | 1 | 0.10 |
| | Facilities | 3 | 5.80 |
| | Segments | 96 | 81.50 |
| | Tunnels | 0 | 0.00 |
| | | Subtotal | **87.40** |
| **Light Rail** | Bridges | 0 | 0.00 |
| | Facilities | 0 | 0.00 |
| | Segments | 0 | 0.00 |
| | Tunnels | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Bus** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Ferry** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Port** | Facilities | 2 | 3.90 |
| | | Subtotal | **3.90** |
| **Airport** | Facilities | 1 | 4.80 |
| | Runways | 0 | 0.00 |
| | | Subtotal | **4.80** |
| | | Total | **803.00** |

**Table 3: Utility System Lifeline Inventory**

| System | Component | # Locations / Segments | Replacement value (Millions of dollars) |
|---|---|---|---|
| **Potable Water** | Distribution Lines | NA | 45.70 |
| | Facilities | 5 | 146.50 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **192.30** |
| **Waste Water** | Distribution Lines | NA | 27.40 |
| | Facilities | 8 | 468.90 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **496.30** |
| **Natural Gas** | Distribution Lines | NA | 18.30 |
| | Facilities | 0 | 0.00 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **18.30** |
| **Oil Systems** | Facilities | 0 | 0.00 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Electrical Power** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Communication** | Facilities | 5 | 0.40 |
| | | Subtotal | **0.40** |
| | | Total | **707.30** |

## Earthquake Scenario

HAZUS uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

| | |
|---|---|
| **Scenario Name** | Kingston 5.0 |
| **Type of Earthquake** | Arbitrary |
| **Fault Name** | NA |
| **Historical Epicenter ID #** | NA |
| **Probabilistic Return Period** | NA |
| **Longitude of Epicenter** | -84.48 |
| **Latitude of Epicenter** | 35.90 |
| **Earthquake Magnitude** | 5.00 |
| **Depth (Km)** | 10.00 |
| **Rupture Length (Km)** | NA |
| **Rupture Orientation (degrees)** | NA |
| **Attenuation Function** | CEUS Event |

## Building Damage

### Building Damage

HAZUS estimates that about 693 buildings will be at least moderately damaged. This is over 3.00 % of the total number of buildings in the region. There are an estimated 6 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 4 below summaries the expected damage by general occupancy for the buildings in the region. Table 5 summaries the expected damage by general building type.

**Table 4: Expected Building Damage by Occupancy**

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| **Agriculture** | 8 | 0.04 | 1 | 0.05 | 1 | 0.09 | 0 | 0.20 | 0 | 0.17 |
| **Commercial** | 214 | 1.11 | 28 | 1.48 | 14 | 2.24 | 3 | 4.71 | 0 | 5.05 |
| **Education** | 11 | 0.06 | 1 | 0.07 | 1 | 0.11 | 0 | 0.23 | 0 | 0.34 |
| **Government** | 15 | 0.08 | 2 | 0.09 | 1 | 0.13 | 0 | 0.26 | 0 | 0.40 |
| **Industrial** | 49 | 0.25 | 6 | 0.29 | 3 | 0.49 | 1 | 0.98 | 0 | 0.68 |
| **Other Residential** | 3,906 | 20.32 | 593 | 31.47 | 310 | 49.75 | 20 | 31.41 | 1 | 14.5 |
| **Religion** | 34 | 0.18 | 5 | 0.24 | 2 | 0.38 | 1 | 0.85 | 0 | 1.14 |
| **Single Family** | 14,989 | 77.96 | 1,248 | 66.30 | 291 | 46.80 | 40 | 61.37 | 5 | 77.6 |
| **Total** | **19,227** | | **1,883** | | **623** | | **64** | | **6** | |

**Table 5: Expected Building Damage by Building Type (All Design Levels)**

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| **Wood** | 14,158 | 73.63 | 1079 | 57.32 | 179 | 28.80 | 12 | 17.85 | 0 | 3.59 |
| **Steel** | 101 | 0.52 | 11 | 0.59 | 7 | 1.05 | 1 | 1.83 | 0 | 0.42 |
| **Concrete** | 30 | 0.16 | 3 | 0.16 | 1 | 0.21 | 0 | 0.24 | 0 | 0.06 |
| **Precast** | 28 | 0.15 | 3 | 0.16 | 3 | 0.43 | 1 | 1.20 | 0 | 0.28 |
| **RM** | 16 | 0.08 | 1 | 0.08 | 1 | 0.19 | 0 | 0.42 | 0 | 0.04 |
| **URM** | 1,483 | 7.71 | 247 | 13.14 | 140 | 22.51 | 34 | 52.41 | 5 | 88.87 |
| **MH** | 3,411 | 17.74 | 538 | 28.55 | 291 | 46.81 | 17 | 26.04 | 0 | 6.75 |
| **Total** | **19,227** | | **1,883** | | **623** | | **64** | | **6** | |

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

## Essential Facility Damage

Before the earthquake, the region had 85 hospital beds available for use. On the day of the earthquake, the model estimates that only 61 hospital beds (72.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 84.00% of the beds will be back in service. By 30 days, 96.00% will be operational.

**Table 6: Expected Damage to Essential Facilities**

| | | # Facilities | | |
|---|---|---|---|---|
| **Classification** | **Total** | **At Least Moderate Damage > 50%** | **Complete Damage > 50%** | **With Functionality > 50% on day 1** |
| **Hospitals** | 1 | 0 | 0 | 1 |
| **Schools** | 23 | 0 | 0 | 23 |
| **EOCs** | 0 | 0 | 0 | 0 |
| **PoliceStations** | 7 | 0 | 0 | 7 |
| **FireStations** | 10 | 0 | 0 | 10 |

## Transportation and Utility Lifeline Damage

Table 7 provides damage estimates for the transportation system.

**Table 7: Expected Damage to the Transportation Systems**

| System | Component | | Number of Locations | | | |
|---|---|---|---|---|---|---|
| | | Locations/ Segments | With at Least Mod. Damage | With Complete Damage | With Functionality > 50 % | |
| | | | | | After Day 1 | After Day 7 |
| **Highway** | Segments | 63 | 0 | 0 | 63 | 63 |
| | Bridges | 38 | 0 | 0 | 38 | 38 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| **Railways** | Segments | 96 | 0 | 0 | 96 | 96 |
| | Bridges | 1 | 0 | 0 | 1 | 1 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 3 | 2 | 0 | 3 | 3 |
| **Light Rail** | Segments | 0 | 0 | 0 | 0 | 0 |
| | Bridges | 0 | 0 | 0 | 0 | 0 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 0 | 0 | 0 | 0 | 0 |
| **Bus** | Facilities | 0 | 0 | 0 | 0 | 0 |
| **Ferry** | Facilities | 0 | 0 | 0 | 0 | 0 |
| **Port** | Facilities | 2 | 0 | 0 | 2 | 2 |
| **Airport** | Facilities | 1 | 0 | 0 | 1 | 1 |
| | Runways | 0 | 0 | 0 | 0 | 0 |

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 8-10 provide information on the damage to the utility lifeline systems. Table 8 provides damage to the utility system facilities. Table 9 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 10 provides a summary of the system performance information.

**Table 8 : Expected Utility System Facility Damage**

| System | # of Locations | | | | |
|---|---|---|---|---|---|
| | Total # | With at Least Moderate Damage | With Complete Damage | with Functionality > 50 % | |
| | | | | After Day 1 | After Day 7 |
| Potable Water | 5 | 4 | 0 | 1 | 5 |
| Waste Water | 8 | 4 | 0 | 2 | 8 |
| Natural Gas | 0 | 0 | 0 | 0 | 0 |
| Oil Systems | 0 | 0 | 0 | 0 | 0 |
| Electrical Power | 0 | 0 | 0 | 0 | 0 |
| Communication | 5 | 2 | 0 | 5 | 5 |

**Table 9 : Expected Utility System Pipeline Damage (Site Specific)**

| System | Total Pipelines Length (kms) | Number of Leaks | Number of Breaks |
|---|---|---|---|
| Potable Water | 2,287 | 12 | 3 |
| Waste Water | 1,372 | 9 | 2 |
| Natural Gas | 915 | 10 | 3 |
| Oil | 0 | 0 | 0 |

**Table 10: Expected Potable Water and Electric Power System Performance**

| | Total # of Households | Number of Households without Service | | | | |
|---|---|---|---|---|---|---|
| | | At Day 1 | At Day 3 | At Day 7 | At Day 30 | At Day 90 |
| Potable Water | 21,200 | 0 | 0 | 0 | 0 | 0 |
| Electric Power | | 9,648 | 5,121 | 1,502 | 196 | 13 |

## Induced Earthquake Damage

### Fire Following Earthquake

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 4 ignitions that will burn about 0.04 sq. mi 0.01 % of the region's total area.) The model also estimates that the fires will displace about 8 people and burn about 0 (millions of dollars) of building value.

### Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0.00 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 69.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

## Social Impact

### Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 18 households to be displaced due to the earthquake. Of these, 4 people (out of a total population of 51,910) will seek temporary shelter in public shelters.

### Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum; the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 11 provides a summary of the casualties estimated for this earthquake

**Table 11: Casualty Estimates**

| | | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|---|---|---|---|
| **2 AM** | Commercial | 0 | 0 | 0 | 0 |
| | Commuting | 0 | 0 | 0 | 0 |
| | Educational | 0 | 0 | 0 | 0 |
| | Hotels | 0 | 0 | 0 | 0 |
| | Industrial | 0 | 0 | 0 | 0 |
| | Other-Residential | 4 | 0 | 0 | 0 |
| | Single Family | 7 | 1 | 0 | 0 |
| | **Total** | **11** | **1** | **0** | **0** |
| **2 PM** | Commercial | 4 | 1 | 0 | 0 |
| | Commuting | 0 | 0 | 0 | 0 |
| | Educational | 2 | 0 | 0 | 0 |
| | Hotels | 0 | 0 | 0 | 0 |
| | Industrial | 1 | 0 | 0 | 0 |
| | Other-Residential | 1 | 0 | 0 | 0 |
| | Single Family | 2 | 0 | 0 | 0 |
| | **Total** | **10** | **2** | **0** | **0** |
| **5 PM** | Commercial | 4 | 1 | 0 | 0 |
| | Commuting | 0 | 0 | 0 | 0 |
| | Educational | 0 | 0 | 0 | 0 |
| | Hotels | 0 | 0 | 0 | 0 |
| | Industrial | 0 | 0 | 0 | 0 |
| | Other-Residential | 1 | 0 | 0 | 0 |
| | Single Family | 3 | 0 | 0 | 0 |
| | **Total** | **9** | **1** | **0** | **0** |

## Economic Loss

The total economic loss estimated for the earthquake is 186.76 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

### Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the 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 86.62 (millions of 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 62 % of the total loss. Table 12 below provides a summary of the losses associated with the building damage.

**Table 12: Building-Related Economic Loss Estimates**

(Millions of dollars)

| Category | Area | Single Family | Other Residential | Commercial | Industrial | Others | Total |
|---|---|---|---|---|---|---|---|
| **Income Loses** | | | | | | | |
| | Wage | 0.00 | 0.13 | 1.70 | 0.05 | 0.18 | 2.06 |
| | Capital-Related | 0.00 | 0.06 | 1.41 | 0.03 | 0.05 | 1.55 |
| | Rental | 0.44 | 0.45 | 0.89 | 0.02 | 0.07 | 1.87 |
| | Relocation | 0.05 | 0.02 | 0.06 | 0.00 | 0.03 | 0.15 |
| | **Subtotal** | **0.49** | **0.66** | **4.05** | **0.10** | **0.33** | **5.63** |
| **Capital Stock Loses** | | | | | | | |
| | Structural | 2.05 | 0.80 | 1.23 | 0.18 | 0.55 | 4.81 |
| | Non_Structural | 23.66 | 7.03 | 8.68 | 1.97 | 3.39 | 44.73 |
| | Content | 15.77 | 2.97 | 7.44 | 1.55 | 3.01 | 30.74 |
| | Inventory | 0.00 | 0.00 | 0.23 | 0.45 | 0.03 | 0.71 |
| | **Subtotal** | **41.49** | **10.80** | **17.59** | **4.15** | **6.97** | **80.99** |
| | **Total** | **41.98** | **11.45** | **21.64** | **4.25** | **7.30** | **86.62** |

## Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 13 & 14 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 15 presents the results of the region for the given earthquake.

**Table 13: Transportation System Economic Losses**
(Millions of dollars)

| System | Component | Inventory Value | Economic Loss | Loss Ratio (%) |
|---|---|---|---|---|
| **Highway** | Segments | 639.66 | $0.00 | 0.00 |
| | Bridges | 67.34 | $0.03 | 0.04 |
| | Tunnels | 0.00 | $0.00 | 0.00 |
| | Subtotal | **707.00** | **0.00** | |
| **Railways** | Segments | 81.48 | $0.00 | 0.00 |
| | Bridges | 0.13 | $0.00 | 0.00 |
| | Tunnels | 0.00 | $0.00 | 0.00 |
| | Facilities | 5.76 | $1.48 | 25.73 |
| | Subtotal | **87.40** | **1.50** | |
| **Light Rail** | Segments | 0.00 | $0.00 | 0.00 |
| | Bridges | 0.00 | $0.00 | 0.00 |
| | Tunnels | 0.00 | $0.00 | 0.00 |
| | Facilities | 0.00 | $0.00 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Bus** | Facilities | 0.00 | $0.00 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Ferry** | Facilities | 0.00 | $0.00 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Port** | Facilities | 3.88 | $0.89 | 22.81 |
| | Subtotal | **3.90** | **0.90** | |
| **Airport** | Facilities | 4.80 | $0.40 | 8.27 |
| | Runways | 0.00 | $0.00 | 0.00 |
| | Subtotal | **4.80** | **0.40** | |
| | **Total** | **803.00** | **2.80** | |

**Table 14: Utility System Economic Losses**
(Millions of dollars)

| System | Component | Inventory Value | Economic Loss | Loss Ratio (%) |
|---|---|---|---|---|
| **Potable Water** | Pipelines | 0.00 | $0.00 | 0.00 |
| | Facilities | 146.50 | $25.95 | 17.71 |
| | Distribution | 45.70 | $0.05 | 0.12 |
| | **Subtotal** | **192.25** | **$26.01** | |
| **Waste Water** | Pipelines | 0.00 | $0.00 | 0.00 |
| | Facilities | 468.90 | $71.18 | 15.18 |
| | Distribution | 27.40 | $0.04 | 0.16 |
| | **Subtotal** | **496.30** | **$71.23** | |
| **Natural Gas** | Pipelines | 0.00 | $0.00 | 0.00 |
| | Facilities | 0.00 | $0.00 | 0.00 |
| | Distribution | 18.30 | $0.05 | 0.25 |
| | **Subtotal** | **18.29** | **$0.05** | |
| **Oil Systems** | Pipelines | 0.00 | $0.00 | 0.00 |
| | Facilities | 0.00 | $0.00 | 0.00 |
| | **Subtotal** | **0.00** | **$0.00** | |
| **Electrical Power** | Facilities | 0.00 | $0.00 | 0.00 |
| | **Subtotal** | **0.00** | **$0.00** | |
| **Communication** | Facilities | 0.40 | $0.06 | 13.89 |
| | **Subtotal** | **0.44** | **$0.06** | |
| | **Total** | **707.29** | **$97.34** | |

**Table 15. Indirect Economic Impact with outside aid**
(Employment as # of people and Income in millions of $)

| | LOSS | Total | % |
|---|---|---|---|
| **First Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (1) | -0.17 |
| **Second Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (2) | -0.52 |
| **Third Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (2) | -0.67 |
| **Fourth Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (2) | -0.67 |
| **Fifth Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (2) | -0.67 |
| **Years 6 to 15** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (2) | -0.67 |

## Appendix A: County Listing for the Region

Roane, TN

## Appendix B: Regional Population and Building Value Data

| State | County Name | Population | Building Value (millions of dollars) | | |
|---|---|---|---|---|---|
| | | | Residential | Non-Residential | Total |
| **Tennessee** | | | | | |
| | Roane | 51,910 | 2,322 | 694 | 3,016 |
| **Total State** | | **51,910** | **2,322** | **694** | **3,016** |
| **Total Region** | | **51,910** | **2,322** | **694** | **3,016** |