

Metropolitan Nashville-Davidson County Multi-Hazard Mitigation Plan

January 2015

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Metropolitan
Nashville-Davidson County
Multi-Hazard Mitigation Plan

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Multi-Hazard Mitigation Plan
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LIST OF ACRONYMS

BCEGS	Building Code Effectiveness Rating Scale
BFE	Base Flood Elevation
BMP	Best Management Practice
CAD	Computer Aided Dispatch
CBD	Central Business District (in downtown Nashville)
CEMP	Comprehensive Emergency Management Plan (by OEM)
CPC	Climate Protection Center
CPT	Community Planning Team
CRS	Community Rating System
DMA	Disaster Mitigation Act of 2000
ECC	Emergency Communications Center
ETSZ	East Tennessee Seismic Zone
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
GIS	Geographic Information System
MOM	Multi-Objective Management
MSA	Metropolitan Statistical Area
MPW	Metropolitan Public Works
MWS	Metro Water Services
NIBS	National Institute of Building Sciences
NES	Nashville Electric Service
NFD	Nashville Fire Department
NFIP	National Flood Insurance Program
NMSZ	New Madrid Seismic Zone
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
OEM	Nashville's Office of Emergency Management
PDM	Pre-Disaster Mitigation
PDSI	Palmer Drought Severity Index
PIAC	Public Input Advisory Committee
RSDE	Residential Substantial Damage Estimator
SASZ	Southern Appalachian Seismic Zone
SBA	Small Business Administration
SFHA	Special Flood Hazard Areas
SR2C	Stormwater Regulations Review Committee
TDEC	Tennessee Department of Environment and Conservation
TEMA	Tennessee Emergency Management Agency
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture

USGS	United States Geological Survey
WCT	Wind Chill Temperature

Multi-Hazard Mitigation Plan

1.0 Introduction

As part of the overall community planning effort for hazard mitigation, the Metropolitan Government of Nashville and Davidson County, Tennessee, (Metro) has prepared a Multi-Hazard Mitigation Plan pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390).

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

Hazard Mitigation Planning is a requirement for state and local governments in order to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs. Metro is both a community at risk and a community that has benefited from federal mitigation funding programs.

PURPOSE AND NEED

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

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

FEMA, the Federal Emergency Management Agency, now a part of the Department of Homeland Security, has made reducing losses from natural disasters one of its primary goals. Hazard Mitigation Planning and the subsequent implementation of the projects, measures, and policies developed through those plans, is the primary mechanism in achieving this goal. Success in reducing disaster damages has been the result of mitigation projects that were implemented as a result of hazard mitigation planning.

This plan was revised pursuant to the Disaster Mitigation Act of 2000 (DMA) and the regulations published in the *Federal Register* Volume 67, Number 38, Tuesday, February 26,

2002. Section 104 of DMA revises the Robert T. Stafford Disaster Relief and Emergency Assistance Act by adding Section 322, which provides emphasis on hazard mitigation, including a requirement for local mitigation plans, and the required revision every 5 years. These local mitigation planning regulations are implemented through 44 CFR Part 201.6.

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

SCOPE

This Multi-Hazard Mitigation Plan identifies goals and measures for hazard mitigation and risk reduction in order to make communities less vulnerable and more disaster resistant and sustainable. Information in this plan should be used to help guide and coordinate mitigation activities and local policy decisions for future land use decisions. This Plan covers the jurisdiction of the Metropolitan Government of Nashville and Davidson County which includes the satellite cities listed on page 3-4.

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

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

This Plan also uses the guidelines from FEMA's Local Mitigation Plan Review Guide, published October 2011.

Although not required under the Disaster Mitigation Act of 2000, the Metropolitan Government of Nashville and Davidson, along with the Community Planning Team recognizes the need to integrate human-caused hazards into the natural hazard mitigation planning process. Although not inclusive of all potential hazards, the most likely hazards in both categories are addressed here in order to necessitate a more effective mitigation planning process and strategy.

Multi-Hazard Mitigation Plan

2.0 Community Profile

GEOGRAPHY – LOCATION AND AREA

Metropolitan Nashville-Davidson County is located in middle Tennessee along the banks of the Cumberland River. The community encompasses 533 square miles. Three major interstate highways I-40, I-65, and I-24 converge in Nashville. Nashville is positioned within 600 miles and less than one day's drive from 50 percent of the United States population. It is also less than a 6 hour drive to 13 other states, Nashville enjoys a prime geographic location (See Figure 2-1).

The City of Nashville was settled in 1779 and became the state capital in 1843. The City of Nashville and Davidson County governments were consolidated into one entity, Metropolitan Nashville-Davidson County, in April 1963.

Figure 2-1: Metropolitan Nashville-Davidson County Location Map

CLIMATE

Nashville has a mild climate that is common throughout the southeastern part of the United States with four distinct seasons and light snowfall in the winter. Mean annual temperatures range from 38 to 79 degrees Fahrenheit with an average July high temperature of 89 degrees and an average winter January high of 47 degrees. The average annual precipitation is 47.3 inches and the average annual humidity is 70 percent. Table 2-1 presents normal climate statistics for the community.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Days with Precipitation	10	10	11	11	12	10	10	8	8	8	10	11
Wind Speed (mph)	8.4	8.5	8.8	8.2	7.1	6.4	6.3	5.9	6.2	6.5	7.6	8.1
Humidity (%)	70	69	65	63	70	70	73	73	74	69	70	71
Sunshine (%)	45	48	52	59	60	64	63	63	61	62	48	43
Days Clear of Clouds	6	7	8	8	8	8	8	10	11	13	9	7
Partly Cloudy Days	6	6	7	9	10	13	13	12	9	8	7	7
Cloudy Days	19	16	16	13	13	10	10	9	10	10	14	17
Snowfall (in)	2.1	2.3	0.7	0	0	0	0	0	0	0.1	0	1.0

Table 2-1: Normal Climate Statistics for Nashville-Davidson County, Tennessee, National Weather Service

PHYSICAL FEATURES AND LAND USE

Nashville-Davidson County contains 532 square miles of land and is situated in a natural basin. The County has three eco-regions – the Inner Central Basis, the Outer Central Basin, and the Western Highland Rim – and is surrounded by wooded hills with five types of forest habitat, including cedar glades (unique to this part of the world). The County has over 58,000 acres of conserved open space, although only 3 percent of that is designated parks. Overall, Nashville-Davidson County is developed in a mixture of urban, suburban and rural land uses.

Topography ranges from 385 feet above sea level to 1,160 feet and includes flatter floodplain lands, rolling hills, picturesque valleys, and steep bluffs. Development patterns in Davidson County are closely related to its topography. Much of what remains as undeveloped, open space is located in the northwest and southwest portions of the County where the terrain is hilly and difficult to develop, with slopes at grades of 20 percent or more. Steeply sloping land is normally considered suitable for only very low intensity development, particularly in Davidson County, where such slopes are also covered by unstable soils and are often composed of fragile geological formations. In addition to providing wildlife habitat, steeply sloping areas with mature forests are important headwater areas, slowing down and absorbing water runoff and filtering water to improve water quality.

The Cumberland River and its numerous tributaries – approximately 24 acres and 350 miles of waterways – flow through a series of 14 watersheds in the County. Davidson County also has three large man-made lakes – J. Percy Priest, Old Hickory and Radnor Lakes. Throughout the County, over 38,000 acres of land are in the floodplain. Undisturbed, vegetated floodplain areas along streams remove pollutants from the water, reduce soil erosion, and protect against flash flooding by slowing down stormwater runoff. Additionally, there are also numerous natural wetlands. In some portions of the County, mainly in the east and southeast, sinkholes, where over time water erodes the underlying bedrock, are also present.

In 1988, Nashville was divided into 14 communities for planning purposes (Figure 2-2). Each of the 14 community plans creates a vision for the community's future preservation, growth, development, guiding land uses, urban design, streets, parks, and civic uses. These policies are then used to judge future preservation and development decisions. For each community, the physical features and land use are summarized on the following pages.

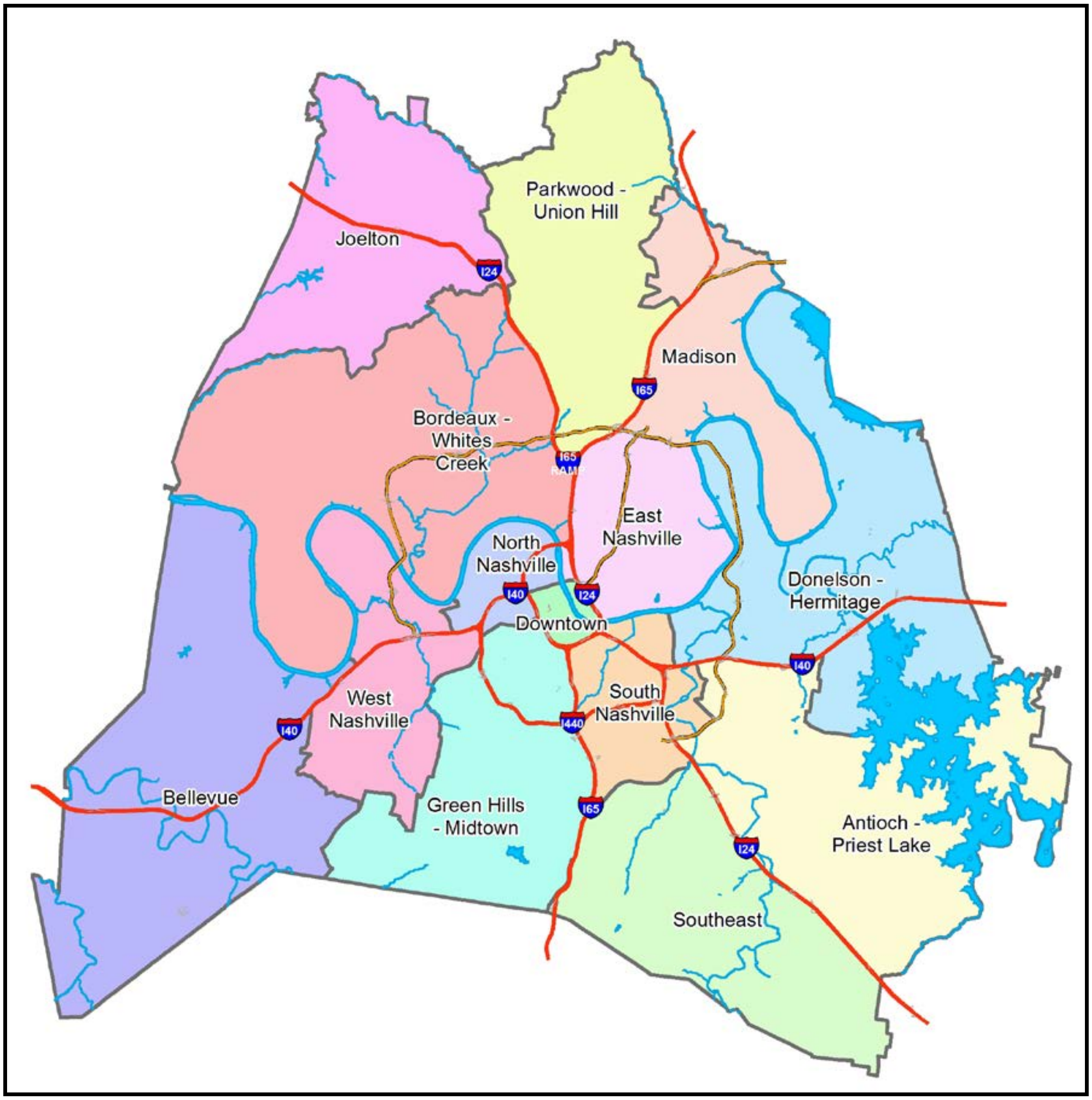

Figure 2-2: Community Location Map

ANTIOCH – PRIEST LAKE

(including Una, the Crossings, Hickory Hollow, and Nashville International Airport)

The Antioch-Priest Lake community is located in southeastern Davidson County and encompasses an area spanning from Interstate 24 to the west, J. Percy Priest Lake to the east, the Airport to the north and the Rutherford County line to the south.

Antioch has small area of steep slopes (20 percent and greater) mainly in the northwestern and western portions of the planning area. Approximately 3 percent (1,215 acres) has steep topography.

Significant waterways in the community plan area include Mill Creek, J. Percy Priest Lake, Hurricane Creek, McCrory Creek, Hamilton Creek, Sorghum Branch, Whittemore Branch and Savage Branch. There are known sinkholes in the southeastern portion of the community, mainly around J. Percy Priest Lake and cedar glade areas. Wetlands are found throughout the community but are generally found within the floodplains of Mill Creek and J. Percy Priest Lake. Approximately, 26 percent (9,905 acres) of the area's land is within defined floodplain areas.

The area is primarily a residential community. Residential subdivisions range in age and style from the 1950s to the present, and numerous multi-family complexes are located along Bell Road and around Hickory Hollow. Large industrial areas are found around the Nashville International Airport and in the southern portion of the community adjacent to La Vergne. Out of approximately 38,307 acres, 34 percent of the community's land use is residential; 23 percent is vacant (17 classified vacant residential); 28 percent is civic and public benefit (including parks); 8 percent is industrial; 3 percent is commercial; and 3 percent is used for office.

BELLEVUE ***(including Centenary, Linton, Newsom Station, Pasquo, and Whites Bend)***

The Bellevue community is located in the southwestern corner of Davidson County and encompasses an areas spanning to the Cumberland River to the north and northeast, I-40, Percy Warner Park and the CSX railroad to the east, the Williamson County line to the south, and the Cheatham County line to the west.

Almost half of the community plan area's terrain is steeply sloping (20 percent and greater) with mature forests. More level areas are located along the Harpeth, South Harpeth and Cumberland Rivers. Approximately 48 percent (22,066 acres) of the area has steep topography.

The area has numerous rivers and streams. Significant waterways in this area include the Cumberland River, Harpeth River, South Harpeth River, Cub Creek, Indian Creek, Overall Creek, Buffalo Creek, Beech Creek, Poplar Creek, Flat Creek, Trace Creek, East Fork,

Newsoms Branch and Linton Branch. Approximately 13 percent (6,050 acres) of the area is within the defined floodway and floodplain area.

The community plan area's hills, rivers and farmland give an overall rural feel. The southwest and northern portions of the area are primarily rural, while the southeastern portion is predominantly suburban in character. Commercial and services uses are located primarily in nodes along the Old Hickory Boulevard, Charlotte Pike, Highway 70 and Highway 100 corridors. Out of approximately 45,530 acres, 52 percent of the subarea's land use is residential; 41 percent is vacant (40 percent classified vacant residential); 5 percent is civic and public benefit (including parks); and 2 percent is used for office, commercial and industrial purposes.

BORDEAUX – WHITES CREEK *(including Bells Bend and Scottsboro)*

The Bordeaux-Whites Creek community is located in northwest Davidson County, stretching from the Cumberland River in the south to Little Marrowbone Road/Old Hickory Boulevard in the north, I-24 to the east, and the Cheatham County line to the west.

The northern and western portions of the area consist of mainly steep slopes (20 percent and greater) along with unstable soils and fragile geological formation. The southeastern portion of the area is gently rolling or relatively level. Approximately 50 percent (22,560) acres of the community has steep topography.

Significant waterways in this area include the Cumberland River, Little Marrowbone Creek, Bull Run Creek, Whites Creek, Eatons Creek, Ewing Creek, Carney Creek, Tranham Creek, Back Creek, Little Creek, Dry Fork, Earthman Fork, Drakes Branch and Pages Branch.

The area is largely categorized by rural land and older suburban development with some commercial and industrial uses around Historic Talbot's Corner. Out of 45,720 acres, approximately 52 percent of the community's land use is residential; 35 percent is vacant (34 percent classified vacant residential); 8 percent is civic and public benefit (including parks); and 4 percent is used for office, commercial and industrial purposes.

DONELSON – HERMITAGE – OLD HICKORY *(including Opry Mills, Lakewood, and Pennington Bend)*

The Donelson-Hermitage-Old Hickory community is located in eastern Davidson County, generally bounded by Spence Lane on the west, the Cumberland River to the north, the Wilson County line on the east, and Percy Priest Lake, Couchville Pike and I-40 to the south.

While land is mostly level to moderately sloping in the community plan area, there are areas with some steep terrain (20 percent and greater), unstable soils and sinkholes. Concentrations of steep slopes can be found in the Hermitage area, east of Old Hickory Boulevard to Wilson County, between Lebanon Pike and I-40; in the bend of the Stones River; and in the Pleasant Hill Road area north of Couchville Pike.

Major waterways in this community include the Cumberland River, J. Percy Priest Lake, Stones River, Stoners Creek, Mill Creek, and McCrory Creek. Approximately 17 percent (6,160 acres) of the community's planning area is within the 100-year floodplain area.

Three distinct communities exist in this part of Davidson County. Donelson is a stable, older postwar suburban area with established residential areas. Hermitage is generally a newer suburban community, but is steeped in the history of President Andrew Jackson. Old Hickory was founded as a company town for DuPont and is more traditional in character. The area has a diverse range of land uses and development patterns, including older and newer suburban residential, large employment and retail centers. Out of approximately 39, 749 acres, 47 percent of community's land use is residential; 22 percent is vacant (19 percent classified vacant residential); 18 percent is civic and public benefit (including parks); 5 percent is industrial; 5 percent is commercial; and 2 percent is used for office purposes.

DOWNTOWN NASHVILLE

The Downtown Nashville community is located in the center of Davidson County. Downtown has long been the seat of state and local government, a destination for people joining or enjoying the entertainment industry, and the economic center of Middle Tennessee. The community is bounded to the north by Jefferson Street; to the east by I-65/I-24; and to the south and west by I-40. The Cumberland River splits the community, with approximately 25 percent of the area on the east bank.

While Downtown is the most intense urban setting in Davidson County, it retains physical attributes including hills, bluffs, and the Cumberland River. Topography on the east bank is low and flat, while topography of the west bank is elevated with bluffs rising above the normal flow elevation of the river. Capitol Hill rises to an elevation of 555 feet and Rutledge Hill reaches 536 feet. Downtown has areas of steep slopes (20 percent and greater).

The community plan area's only significant waterway is the Cumberland River, 500 feet in width as it moves through Downtown. Due to its lower elevation, the east bank is more severely impacted by the flooding of the Cumberland River than the west bank.

The community contains Nashville's Central Business District, the Tennessee State Capitol, Bicentennial Mall, older and newer skyscrapers, historic buildings, museums, and numerous entertainment venues, including the Second Avenue and Broadway corridors. In recent years, Downtown continues to increase its proportion of residential uses. Out of approximately 1,217 acres, 19 percent of the subarea's land use is industrial; 14 percent is office; 13 percent is commercial; 7 percent of the subarea's land use is residential; 15 percent is vacant; 16 percent is civic and public benefit (including parks); and 16 percent is used for parking purposes.

EAST NASHVILLE ***(including Inglewood and Northeast Nashville)***

The East Nashville community is located in the central portion of the county, just across the Cumberland River from Downtown. It is bounded to the north by Briley Parkway; to the east and south by the Cumberland River; and to the west by I-65.

Most of the community plan area's terrain is relatively flat to gently rolling. The hilliest area is along the Ellington Parkway corridor in the northwestern quadrant of the subarea. Most other steep slopes are hillsides of valleys associated with tributaries to the Cumberland River in the southeastern section of the area. Other than the Cumberland River, the most significant waterways are Ewing Creek, Cooper Creek, and Pages Branch.

This is a developed community, consisting primarily of historic urban residential areas. Commercial and service uses are concentrated along the Gallatin Pike, Dickerson Pike and Trinity Lane corridors. In recent years, redevelopment within existing neighborhoods has been significant and the community's commercial pikes are a focus for more residential and commercial density in the future. Out of 13,125 acres, approximately 59 percent of the subarea's land use is residential; 11 percent is vacant (8 percent classified vacant residential); 16 percent is civic and public benefit (including parks); 5 percent is commercial; 5 percent is industrial; and 2 percent is used for office purposes.

GREEN HILLS-MIDTOWN ***(including Hillsboro Village, Music Row, Forest Hills and Oak Hill)***

The Green Hills-Midtown community is located in the south central portion of the County. It is bounded to the north by the inner loop of I-40; to the east by I-65; to the south by the Williamson County line; and to the west by the Belle Meade city limits, Charlotte Pike, and CSX Railroad.

Most of the northern half of the community is either gently rolling or relatively level. In contrast, a significant portion of the southern half of the community, mainly south of Harding Place/Battery Lane, has steeply sloping terrain (20 percent and greater).

Significant waterways include Radnor Lake, Richland Creek, Browns Creek, Otter Creek, Sugartree Creek and Bosley Spring. Approximately 5 percent (1,173 acres) of the community's land area is within defined 100-year floodplain.

The community plan area ranges from a rapidly redeveloping Midtown and Vanderbilt University area, through older urban residential areas experiencing redevelopment, a strong regional commercial center and large-lot and estate suburban development. Out of approximately 24,952 acres, 64 percent of the subarea's land use is residential; 8 percent is vacant (7 percent classified vacant residential); 23 percent is civic and public benefit (including parks); 3 percent is office; 2 percent is commercial; and less than 1 percent is used for industrial purposes.

JOELTON

The Joelton community is located in the northwestern part of Davidson County. It is bounded to the north by the Robertson County line; to the east by Ivy Point Road and Crocker Springs Road; to the south by Little Marrowbone Drive and Old Hickory Boulevard; and to the west by the Cheatham County line.

The community plan area is almost evenly divided into two distinct topographic areas. In a crescent that curves from the southwestern portion to the northeastern portion of the area, steep slopes (20 percent and greater), narrow ridges and valleys are the predominant features. In the northwestern and central portions of the community, level to rolling land is the predominant feature along with occasional steep-sided ravines with streams at the bottom. Approximately 41 percent (10,425 acres) of the area's land has steep topography.

Significant waterways in this area include Marrowbone Lake, Marrowbone Creek, Little Marrowbone Creek, Long Creek, Claylick Creek, Sycamore Creek, Earthman Fork, and Sulphur Branch.

The area's historically rural, large lot development pattern is evident in its land use. Out of 25,321 acres, approximately 56 percent of the subarea's land use is residential; 40 percent is vacant residential land; 1 percent is civic and public benefit (including parks); and less than 1 percent is used for office, commercial and industrial purposes.

MADISON (including Goodlettsville, Neelys Bend, and Rivergate)

The Madison community is located in the northeastern section of the county. It is bounded to the north by the Sumner County line; to the east and south by Briley Parkway and the Cumberland River; and to the west by the City of Goodlettsville.

The community's terrain is predominately level, with some areas of steep slopes (20 percent and greater) primarily in Goodlettsville and Neelys Bend. Approximately 7 percent (1,254 acres) of the subarea has steep topography.

Significant waterways in this area include the Cumberland River, Mansker Creek, Dry Creek, Gibson Creek, and Loves Branch. Approximately 12 percent (1,985 acres) of the area is in flood-prone areas.

The community plan area is predominately developed with older suburban development and rural development in Neelys Bend. Commercial and service uses are located along Gallatin Pike and the Rivergate Mall area with industrial uses located along Myatt Drive. Out of approximately 17,073 acres, 58 percent of the subarea's land use is residential; 21 percent is vacant (18 percent classified vacant residential); 7 percent is civic and public benefit (including parks); 7 percent is commercial; 4 percent is industrial; and 3 percent is used for office purposes.

NORTH NASHVILLE (including MetroCenter)

The North Nashville community is located to the north and northwest of Downtown. The area is bounded to the north, east and west by the Cumberland River; and to the south by Jefferson Street, the CSX Railroad, I-40, and Charlotte Avenue.

Terrain in this area is predominately flat to moderately sloping, with scattered areas of steep slopes (20 percent and greater) found in the southeastern and southwestern portions of the community. Approximately 6 percent (286 acres) of the area has steep topography.

The community's only significant waterway is the Cumberland River, which forms much of boundary of the subarea. Approximately 28 percent (1,344 acres) of the area is within the defined floodway and floodplain area.

The community is developed and contains numerous historic urban neighborhoods, the historic Jefferson Street Corridor, industrial areas along the Cumberland River, several universities, and some suburban areas at its western edge near Tennessee State University. Out of approximately 4,884 acres, 30 percent of the subarea's land use is residential; 12 percent is vacant (6 percent classified vacant residential); 34 percent is civic and public benefit (including parks); 12 percent is industrial; 5 percent is commercial; and 5 percent is used for office purposes.

PARKWOOD-UNION HILL (including Bellshire)

The Parkwood-Union Hill community is located in the north-central part of the county. It is bounded to the north by the Robertson and Sumner County lines; to the east by the Goodlettsville city limits and I-65; to the south by I-65 and I-24; and to the west by I-24 and Crocker Springs Road.

Most of the community plan area's terrain, 41 percent, consists of heavily forested steep slopes (20 percent and greater) and narrow ridges and valleys. Generally, land south of Old Hickory Boulevard is more level. Approximately 41 percent (11,015 acres) of the area has steep topography.

Significant waterways in this community include Whites Creek, Ewing Creek, Mansker Creek, Little Creek, Dry Creek, Lickton Creek, and Bakers Creek. Approximately 6 percent (1,612 acres) of the area is within the defined floodway and floodplain area.

The community plan area is predominantly rural (in the north) with large farms and open land, and suburban residential (in the south) with scattered commercial development along Dickerson Pike and concentrated near Skyline Medical Center. Out of 26,865 acres, 62 percent of the subarea's land use is residential; 32 percent is vacant (31 percent classified vacant farm and residential); 3 percent is civic and public benefit (including parks); and less than 2 percent is used for office, commercial and industrial purposes.

S*OUTHEAST** ***(including Crieve Hall, Cane Ridge, Lenox Village, and portions of Brentwood)

The Southeast community is located in southeastern Davidson County. It is bounded to the north by the CSX Railroad; to the east by I-24 and the Rutherford County line; to the south by the Williamson County line; and to the west by I-65.

While there are small areas with steep slopes scattered throughout the community plan area, most of the land is either gently rolling or relatively level. The only concentration of steep slopes is an area west of Nolensville Pike and south of Old Hickory Boulevard.

Significant waterways in this community include Mill Creek and Sevenmile Creek. There are known sinkholes in the areas north and south of Harding Place and around Mill Creek. Wetlands are found throughout the area, but are generally found within the floodplains of Mill Creek and Sevenmile Creek.

The area is largely a suburban community with a rural fringe, but has a range of land uses and development patterns, including older and newer suburban residential, significant retail centers, and a large rural area. Out of approximately 27,312 acres, 64 percent of the subarea's land use is residential; 27 percent is vacant (25 percent classified vacant residential); 5 percent is civic and public benefit (including parks); 2 percent is commercial; 1 percent is office; and less than 1 percent is used for industrial purposes.

SOUTH NASHVILLE ***(including Berry Hill and the Fairgrounds)***

The South Nashville community is centrally located, extending from the edge of Downtown southward about five miles to the Nashville Zoo at Grassmere. It is bounded to the north by the Cumberland River; to the east by I-24; to the south by the CSX Railroad; and to the west by I-65.

Although the area contains numerous hills, it does not have any large concentrations of land with slopes that are 20 percent or greater. Fort Negley Park in the northwest corner of the community contains some steeply sloping terrain. The remaining naturally steep terrain is found mainly along the banks of the major creeks and streams.

Significant waterways include the Cumberland River, Mill Creek, and Browns Creek. About 10 percent (1,216 acres) of the subarea is in the 100-year floodplain.

The community plan area is a mix of land uses and ranges from large industrial areas along the Cumberland River and railroads to urban and suburban residential areas with significant commercial development lining Nolensville Pike. Out of approximately 9,875 acres, 35 percent of the subarea's land use is residential; 8 percent is vacant (4 percent classified vacant residential); 18 percent is civic and public benefit (including parks); 22 percent is industrial; 12 percent is commercial; and 3 percent is used for office purposes.

WEST NASHVILLE ***(including Cockrill Bend, West Meade and Belle Meade)***

The West Nashville community is located to the west and southwest of downtown Nashville. It is bounded to the north by the Cumberland River; to the east by the CSX Railroad and the City of Belle Meade; to the south by Percy Warner Park and West Meade's ridgetops; and to the west by I-40.

Terrain in this area ranges from flat to moderately sloping, with some very steep slopes (20 percent and greater) found in the north, central and southwestern portions of the subarea. Approximately 11 percent (1,747 acres) of the community has steep topography.

In addition to the Cumberland River, significant waterways include Richland Creek, Sandy Creek, Jocelyn Hollow Branch, Ewin Branch, and Vaughns Gap Branch. Approximately 13 percent (2,146 acres) of the area is within the defined floodway and floodplain area.

The community plan area is developed with a mix of uses, ranging from urban neighborhoods along the Charlotte Pike corridor, to industrial in Cockrill Bend, to suburban neighborhoods along Highway 70 and Highway 100. Out of approximately 16,250 acres, 56 percent of the subarea's land use is residential; 6 percent is vacant (4 percent classified vacant residential); 26 percent is civic and public benefit (including parks); 9 percent is industrial; 3 percent is commercial; and 1 percent is used for office.

POPULATION

Since its settlement in 1779, Nashville has grown to become Tennessee's second largest city. Together, Nashville and Davidson County contain a population of 626,681, according to the US Census Bureau. A recent estimate for 2013 is a 5.1% increase to 658,602 people as noted in Table 2-2.

Population Growth 1970 to 2013			
Year	**Total Population**	**Population Change**	**Percent Change**
1970	448,003	---	---
1980	477,811	29,808	6.7%
1990	510,784	32,973	6.9%
2000	569,891	59,107	11.6%
2010	626,681	56,790	10.0%
2013 estimate	658,602	31,921	5.1%

Table 2-2: Population Growth (Source: Metro Planning Department and US Census Bureau)

VULNERABLE POPULATIONS:

According to the 2010 US Census and US Census QuickFacts

Median Age: 33.9*

Race:

White: 65.8%
Black/African American: 28.1%
Hispanic or Latino: 9.9%
Other: 4.9%
Asian: 3.2%
American Indian and Alaska Native: 0.5%
Native Hawaiian & Other Pacific Islander: 0.1%
Two or more races: 2.3%

Language other than English spoken at home: 15.5%*

Total Households: 255,887*

Households with individuals under 18 years: 27.6%*
Households with individuals 65 years and over: 16.7%*

Owner-occupied housing units: 55.4%
Renter-occupied housing units: 44.6%

Median household income: $47,676

Persons below poverty level: 18.5%

Long Term Care Facilities/Nursing Homes etc:

Assisted Living Facilities: 21
Nursing Homes: 22
Assisted Living/Nursing Homes combined: 6
Elderly High Rises: 7
Home for the Aged: 8
Home Health: 17
Hospice: 12

Hospitals: 10

Monroe Carell Jr. Children's Hospital at Vanderbilt
Nashville General Hospital at Meharry
St. Thomas Midtown Hospital
St. Thomas West Hospital
TriStar Centennial Medical Center
TriStar Skyline Medical Center
TriStar Southern Hills Medical Center
TriStar Summit Medical Center
Vanderbilt University Medical Center
Veterans Administration Nashville Campus
Approximate total licensed hospital bed capacity of 3,754

Jail maximum occupancy: ~4,300
Prison maximum occupancy: 3,098

Charles Bass Correctional Complex	757
Riverbend Maximum Security	736
TN Prison for Women	805
Lois M. DeBerry Special Needs Facility	800

Police stations: 9 including headquarters
Fire Stations: 40 including headquarters
County Emergency Operations Center: 1
County Public Safety Answering Point: 1

Because a large portion of the population of the area surrounding Nashville is dependent on Nashville as a place to work or live, Nashville is the center of the Nashville Metropolitan Statistical Area (MSA). The Nashville MSA comprises 14 counties including Davidson, Cannon, Cheatham, Dickson, Hickman, Macon, Maury, Robertson, Rutherford, Smith, Sumner, Trousdale, Williamson and Wilson. The estimated 2013 MSA population is 1,726,693 people. *source: US Census Bureau, 2008-2012 American Community Survey Estimates

ECONOMIC DEVELOPMENT

Nashville is the capital of Tennessee and a vital transportation, business, and tourism center for North America. In addition to the thirteen counties included in the Nashville MSA, the Nashville Economic Market contains two additional counties (Maury and Montgomery). The Region's economy is diverse and mirrors the national economy. The area benefits from low unemployment, consistent job growth, substantial outside investment and expansion, and a growing labor force.

Nashville is known as “Music City USA” because of its vast musical heritage and ever-growing musical industry. It serves as the headquarters for more than a dozen major record labels and over 70 smaller labels, approximately 200 recording studios, 130 music publishing companies, 200 booking agents, 10 record manufacturers, and 33 record promotion companies. Although music is the City’s most popular industry, it’s not the largest. Nashville is a leader in the areas of publishing and printing, finance and insurance, healthcare, higher education, and tourism. All of these industries have helped to build a strong local economy.

Major companies with headquarters or plants in metropolitan Nashville include auto manufacturer Nissan North America; the nation’s largest small-box discount retailer Dollar General; national health care providers HCA Holdings Inc. and Community Health System; health care providers Vanderbilt University and Medical Center and Saint Thomas Health Services; skilled nursing and homecare provider National HealthCare Corporation; tire manufacturer Bridgestone Americas Inc.; State of TN government; restaurants Cracker Barrel Old Country Store and Shoney's Inc.; religious affiliated publishers Thomas Nelson Inc., Baptist Sunday School Board and United Methodist Publishing. Higher education is also a large contributor to the local economy with several large universities such as Vanderbilt University, Belmont University and TN State University. Boasting a multitude of world-class companies, Nashville has become a destination for a young, progressive generation of families. Over the past decade, Nashville has seen tremendous increases in several areas including: population growth in the region to 39th in the United States. The median household income of the county is estimated at $46,676 from 2008-2012.

Year	Projection Population	Percent Change
2010	626,681	----
2015	657,627	4.9%
2020	688,587	4.7%
2025	720,056	4.6%
2030	751,314	4.3%
2035	782,194	4.1%
2040	813,297	4.0%

Table 2-3: Population Projections

(Source: Woods & Poole Economics, Inc. Data provided by the Nashville Area MPO)

MAJOR UTILITY REACH

Metro Water Services (MWS)

Metro Water Services (MWS) serves approximately 700,000 customers within a service area of 208 square miles. The customer base is primarily located in Davidson County, with both direct and satellite customers also located in the surrounding counties including the cities of Goodlettsville, Hendersonville, Ridgetop, Millersville, Brentwood, Belle Meade, Mt. Juliet, La Vergne, and the White House Utility Districts. (Since last report, Old Hickory Utility District is now MWS). The wastewater system consists of approximately 3000 miles of both gravity pipelines and force mains ranging in size from 3-inch diameter to 16.5-feet in diameter, and three treatment plants located on the Cumberland River at Whites Creek, Dry Creek, and the Central Plant located north of the central business district in downtown Nashville. Approximately 224 miles, or 7%, of the wastewater collection system is combined, handling both sanitary and storm water flows from the downtown area. The remaining system is separated, which is not intended to handle storm water flows.

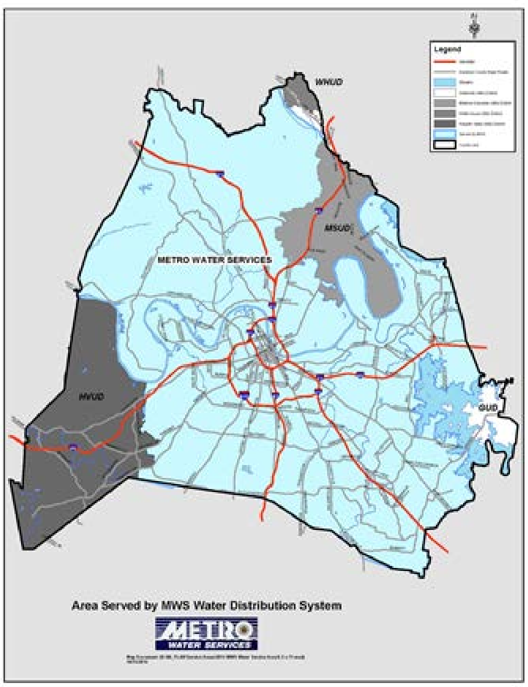

Figure 2-3: MWS Water Distribution Reach

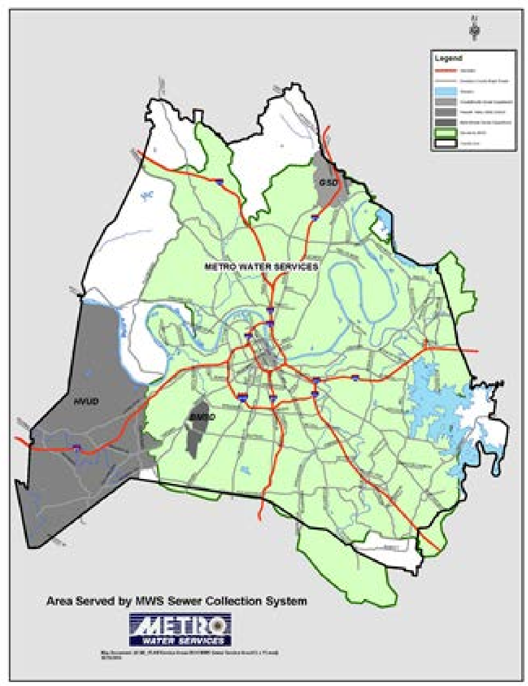

Figure 2-4: MWS Sewer Service Area Reach

Nashville Electric Service (NES)

Nashville Electric Service (NES) serves an area approximately 700 square miles. While most of the current customer extent is in Davidson County, part of the area is in the surrounding 6 counties of Cheatham, Robertson, Rutherford, Sumner, Williamson and Wilson, including all or parts of cities such as Hendersonville, Brentwood and Smyrna. Of the approximately 365,000 electric customers, 86% of them are inside Davidson County, while 14% are in the surrounding counties. NES has almost 6,000 miles of overhead and underground distribution and transmission lines with 83% of them in Davidson County.

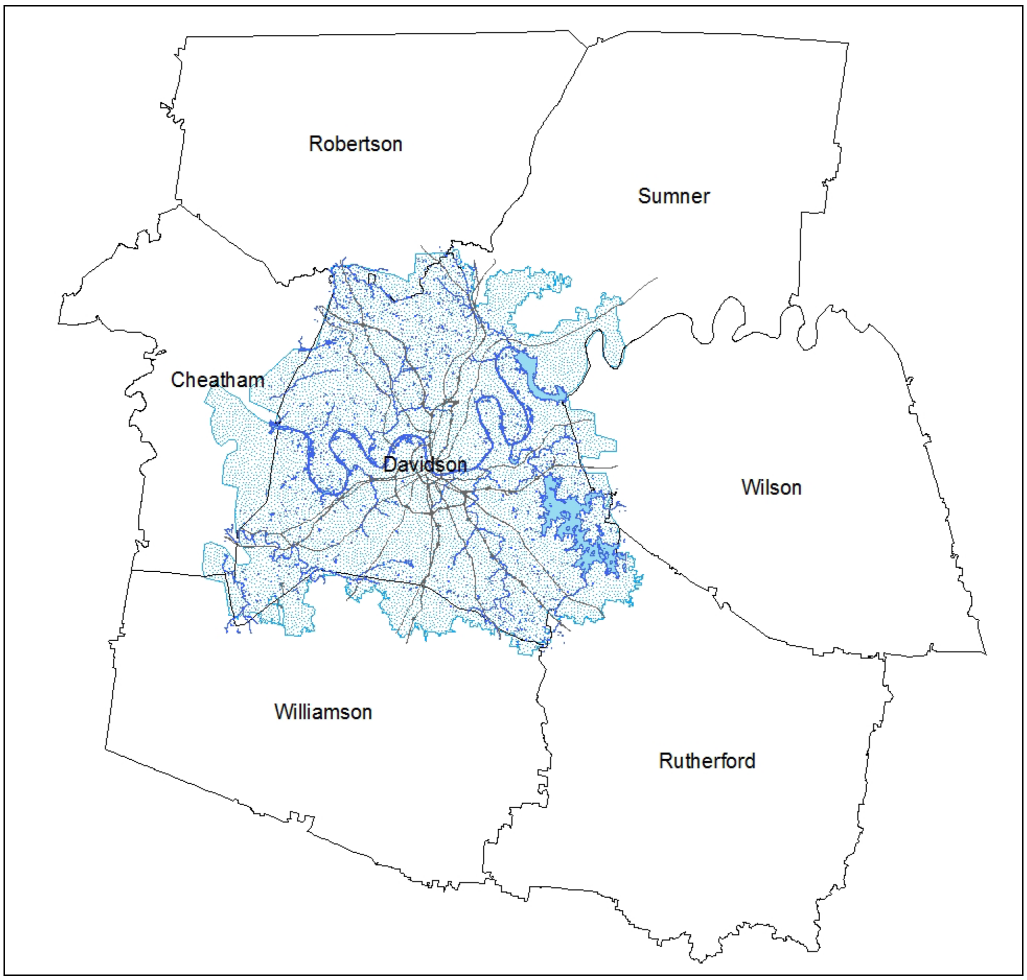

Figure 2-5: NES Reach

Piedmont Natural Gas (PNG)

Piedmont Natural Gas (PNG) is a publicly held company that provides natural gas service to more than 165,000 industrial, commercial and residential customers in the Middle Tennessee area.

In addition to serving Davidson County, PNG provides services to parts of eight (8) surrounding counties (Cheatham, Dickson, Robertson, Rutherford, Sumner, Trousdale, Williamson and Wilson) and has over 3,300 miles of underground transmission and distribution piping. PNG receives natural gas to supply its system from four (4) major interstate pipeline companies (EI Paso/Kinder Morgan, Columbia Gulf, Texas Eastern and East Tennessee).

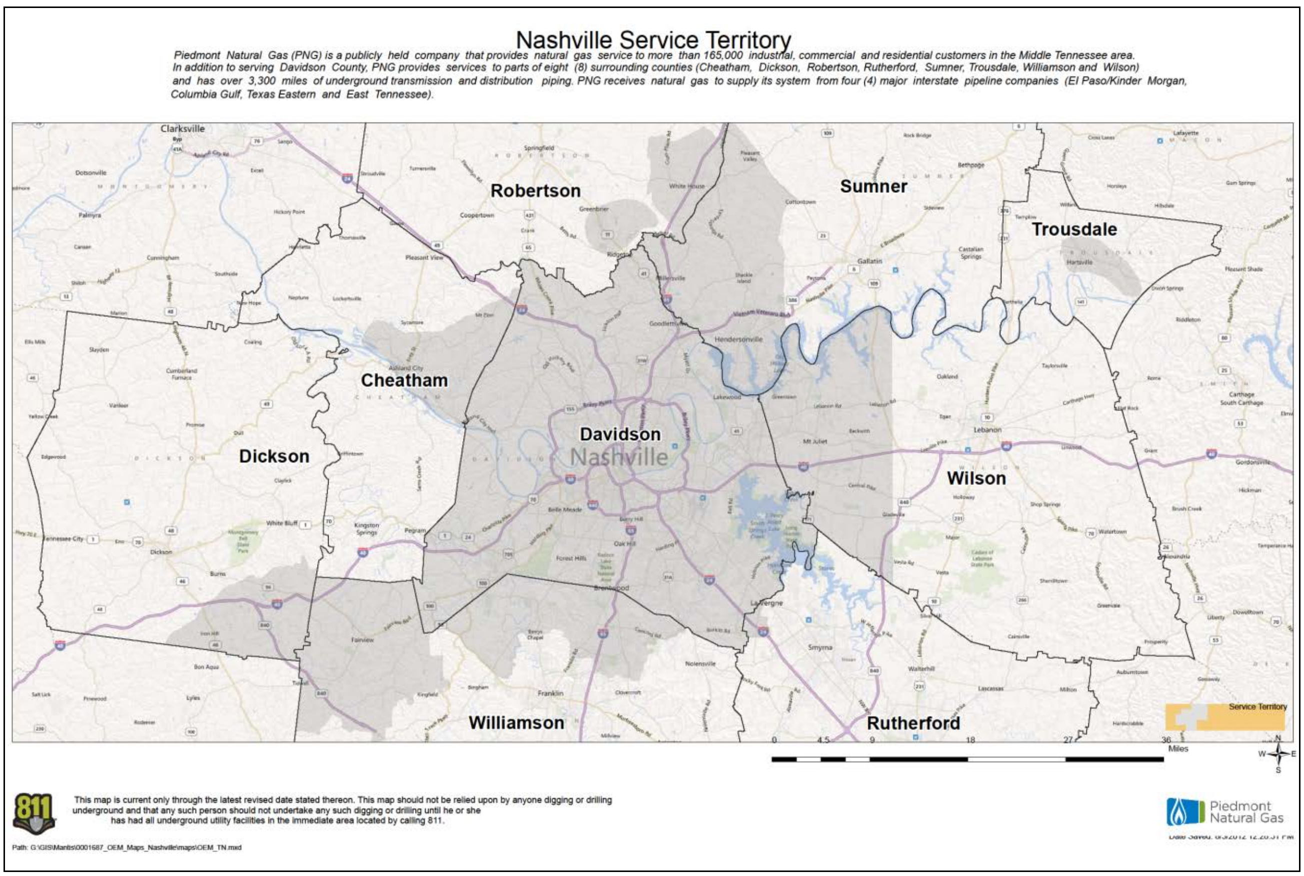

Figure 2-6: Piedmont Natural Gas Reach

Multi-Hazard Mitigation Plan
3.0 Planning Process

The Office of Emergency Management (OEM) in coordination with the community planning team facilitated revising this Multi-Hazard Mitigation Plan. The objectives were to:

- Establish a planning organization for Nashville and Davidson County and all of the participants;
- Meet all of the DMA requirements as established by federal regulations, following FEMA's planning guidance;
- Facilitate the entire planning process;
- Coordinate the DMA planning process with the Community Rating System planning process;
- Identify the data requirements that the participating counties, communities, and other FEMA "eligible applicants" could provide, and conduct the research and documentation necessary to augment that data;
- Develop and facilitate the Public Input process;
- Produce the Draft and Final Plan documents; and
- Guarantee acceptance of the final Plan by FEMA Region IV.

For the 2015 revision, funding for the planning assistance personnel time was provided "in-kind" by participants of the CPT. Many hours were spent on this effort by each of the planning team participants, as well as through the use of their facilities for meetings and actual materials provided for copying and public notices..

Metro OEM led the process for this planning effort utilizing the DMA planning requirements and FEMA's associated guidance, along with Emergency Management Accreditation Program standards. FEMA's guidance is structured around a 4-phase process. Metro OEM also integrated FEMA's Community Rating System (CRS) and Flood Mitigation Assistance (FMA) programs. Metro OEM formulated a single planning process that melds these two sets of planning requirements together and meets the requirements of six major programs: DMA, CRS, FMA, Hazard Mitigation Grant Program (HMGP), FEMA's Pre- Disaster Mitigation Program (PDM), and new flood control projects authorized by the U.S. Army Corps of Engineers (USACE). The graphics below show how the old 10-step process fits within the new four-phase process.

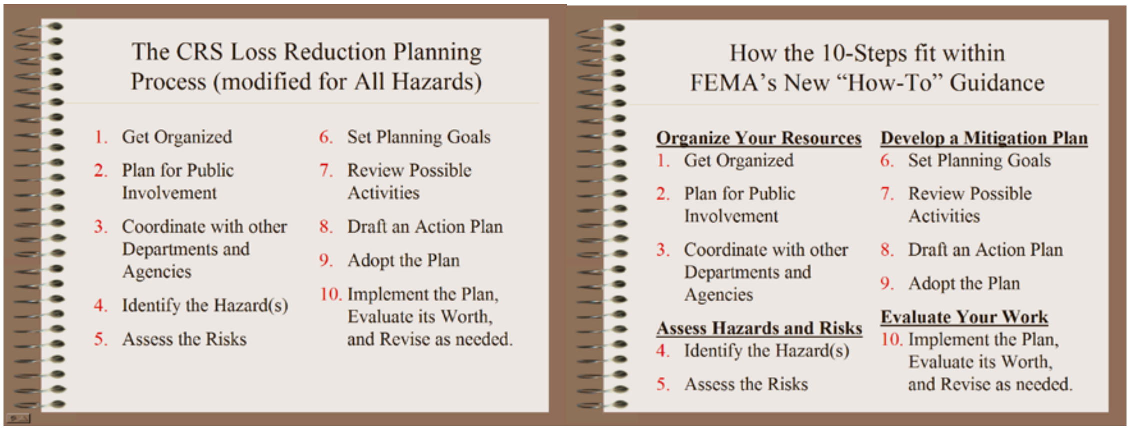

Figure 3-1: Similarity Between DMA and CRS Planning Steps

The following table also serves as a means of cross-referencing the two sets of planning requirements.

Disaster Mitigation Act Planning Regulations (44 *CFR* 201.6)	CRS Planning Steps
Planning process	
201.6(c)(1)	1. Organize
201.6(b)(1)	2. Involve the public
201.6(b)(2) & (3)	3. Coordinate
Risk assessment	
201.6(c)(2)(i)	4. Assess the Hazard
201.6(c)(2)(ii) & (iii)	5. Assess the Problem
Mitigation strategy	
201.6(c)(3)(i)	6. Set Planning Goals
201.6(c)(3)(ii)	7. Review Possible Activities
201.6(c)(3)(iii)	8. Draft an Action Plan
Plan maintenance	
201.6(c)(5)	9. Adopt the Plan
201.6(c)(4)	10. Implement, Evaluate, Revise

Table 3-1: DMA and CRS Planning Cross Reference

LOCAL GOVERNMENT / COMMUNITY PARTICIPATION

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

- Participate in the process;
- Detail areas within the Planning Area where the risk differs from that facing the entire area;
- Identify specific projects to be eligible for funding; and
- Have the Governing Board formally adopt the plan.

For Nashville and Davidson County, “participation” means the local government representatives will:

- Attend the Community Planning Team meetings;
- Provide available data that is requested by the Planning Team;
- Review and provide/coordinate comments on the Draft plans;
- Advertise, coordinate and participate in the Public Input process; and
- Coordinate the formal adoption of the plan by the Metro Council.

THE PLANNING PROCESS

Step 1: Organize

With the commitment to lead the planning process by the Nashville Office of Emergency Management (OEM), the next steps involved an established framework and organization for the revision of the Multi-Hazard Mitigation Plan. This Plan was previously developed by a planning team led by OEM and comprised of key Metro stakeholder representatives. This team is called the Community Planning Team, or CPT. The CPT met several times over a four month period. Representatives from several Metro departments attended these meetings including the Metro Water Services, Metro Public Works, Metro Planning Department; Metro Codes, Metro Fire and Metro Police Department. Also in regular attendance were representatives from Nashville Electric Service (NES) and the National Weather Service. The entire list of CPT members and meeting minutes are included in Appendix A. The CPT will stay in existence for the purpose of implementing and updating this plan. The CPT meeting dates and topics for this revision were as follows:

1. August 29th, 2014 – Kick off meeting
2. October 23rd, 2014 – HIRA & Plan review updates
3. November 3rd, 2014 – HIRA & Plan review updates
4. November 18th, 2014 – HIRA & Plan review updates
5. December 18th, 2014 –Planning Committee Plan review
6. January 6th, 2015 – Public Meeting to present and discuss plan
7. January 8th, 2015 – Final Planning Committee meeting

Step 2: Involve the Public

In addition to the CPT, public input notices were sent to local media outlets, posted on the internet and in social media sites, and sent out by mass emails. As noted in step 3, coordination with other outside agencies was critical and implemented. During the planning process the public was afforded the opportunity to comment on the plan via an online survey. Fifty responses were received, and these responses were considered by the planning committee during the planning process as noted in committee minutes. The results of the on-line survey were not inputted into this plan due to possible personal identifiable information. More public involvement information is located in Appendix A of this plan.

Step 3: Coordinate with other Departments and Agencies

Early in the planning process, the CPT determined that data collection, mitigation and action strategy development, and plan approval would be greatly enhanced by inviting other state and federal agencies to participate in the planning process. Based on their involvement in hazard mitigation planning, representatives from the following key agencies were contacted for input into the planning process:

- U.S. Army Corps of Engineers, Nashville District;
- United States Geological Survey; and
- National Flood Insurance Program (NFIP) State Coordinator;

Other Federal/State representatives participated directly as members of the CPT and included: the National Weather Service, Tennessee Emergency Management Agency and the Tennessee Geological Survey. In addition, technical data, reports, and studies were obtained from these agencies either through web-based resources or directly from the agencies.

Neighboring communities were also contacted for review and comment. These communities include:

- Belle Meade;
- Berry Hill;
- Forest Hills;
- Goodlettsville;
- Oak Hill

Relationship to Other Community Planning Efforts and Hazard Mitigation Activities

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

- Metro’s Office of Emergency Management: Metropolitan Nashville-Davidson County Multi- Hazard Mitigation Plan, September 2012
- Metro’s Office of Emergency Management: Comprehensive Emergency Management Plan (CEMP), 2012
- Metro‘s Office of Emergency Management, Metro Nashville Wolf Creek Dam Failure Emergency Operations Plan 2008 (3 different water level scenario plans)
- TEMA: Hazus – MH: Flood Event Report
- Metro Water Services: Stormwater Management Studies, various watersheds
- Metro Water Services: Stormwater Program and Organizational Study
- Metro Water Services: Community Rating System Action Plan
- Metro Water Services: Major Capital Improvement Program Planning and Prioritization
- Metro Water Services: Floodplain Management Plan for Repetitive Loss Areas
- Metro Water Services: Stormwater Business Plan, FY2009 – FY2013
- Metro Water Services: Drought Management Plan
- Metro Planning: NashvilleNext 2040 General Plan Update *(under development)*
- Metro Planning: 14 Community Plans
- Metro Planning: Mobility 2040 (*under development)*
- Metro Planning: Major and Collector Street Plan
- Metro Planning: Various other plans
- NES: Emergency Load Curtailment Plan, (updated annually)
- NES: Emergency Response Plan (updated annually); and
- NES: Vegetation Management Plan
- Forest Hills Hazard Mitigation Plan 2011

Additional references are included in Appendix D.

Step 4: Assess the Hazard

In 2005, the CPT conducted a Hazard Identification study to determine which hazards threaten the planning area. Research focused on previous occurrences, those that might occur in the future, and the likelihood of their occurrence or recurrence. In 2012, the CPT conducted another Hazard Identification Risk Assessment (HIRA) and included both natural and manmade hazards. This HIRA was revisited and revised again in 2014. The hazards identified for Metro Nashville Davidson County include:

- Dam and Levee Failures;
- Flooding
- Wildfires
- Hazardous Materials incidents
- Geological Hazards, which include
  - Earthquakes, and
  - Landslides and Sinkholes;
- Communicable Diseases;
- Manmade Hazards (technological/terrorism); and
- Severe Weather, which includes:

– Droughts
– Extreme Temperatures;
– Thunderstorms;
– Tornadoes; and
– Winter Storms.

More detailed information regarding the HIRA is located in section 4 of this plan.

Step 5: Assess the Problem

Once the hazard identification step was complete, the CPT conducted both vulnerability and capability assessments to describe the impact that each identified hazard would have upon Metropolitan Nashville-Davidson County and to determine the current ability of Metropolitan Nashville and Davidson County to mitigate the hazards through existing policies, regulations, programs, and procedures. The analyses identified areas where improvements could or should be made.

Step 6: Set Planning Goals

Planning goals were established to incorporate improvement areas identified in Step 5 into the Mitigation Plan. The CPT set goals, formulated as public policy statements, that:

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

Additionally, goals from other community programs and priorities were identified and discussed. This Multi-Objective Management (MOM) assisted the CPT in striving for efficiency by combining projects/needs from various community programs and plans that are similar in nature or location. Combining projects/needs through MOM effectively results in access to multiple sources of funding to solve problems that can be "packaged" and broadens the supporting constituency base by striving towards outcomes desired by multiple stakeholder groups.

Step 7: Review Possible Mitigation Activities

The CPT reviewed activities and goals presented in Metro's 2005 mitigation plan, and all mitigation plans since; this also included the review of any new activities and/or goals presented to the committee. The CPT continued to focus on the following categories of mitigation measures:

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

Step 8: Action Plan

The CPT continues to adhere to the prioritized mitigation measures presented in 2005 that identifies the following for each measure:

- Source (developed by the CPT or originating from an existing plan);
- Mitigation category (prevention, property protection, etc.);
- Responsible office;
- Priority (high, medium, or low);
- Cost estimate;
- Benefit to the community;
- Potential funding sources; and
- Schedule for completion.

Step 9: Adopt the Plan

As was the case in 2010, the Metropolitan Mayor adopts the Multi-Hazard Mitigation Plan by letter of promulgation. All satellite cities are given the opportunity to adopt this plan as their city plan through letters of resolution at their respective public meetings.

In 2010, the City of Forest Hills decided to create their own individual Hazard Mitigation Plan instead of adopting this county wide plan; however, in 2015, in order to keep things consistent, they have decided to join in and adopt this county wide Multi-Hazard Mitigation Plan. This decision was made since Metro Nashville already provides emergency services to the City of Forest Hills, the coordination between Metro agencies and Forest Hills agencies would already be there, and the adoption would contribute to the effective provisions of emergency services.

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

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

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

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Multi-Hazard Mitigation Plan

4.0 Risk Assessment

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

The risk assessment process provides information that allows a community to better understand its potential risk and associated vulnerability to natural and manmade hazards. This information provides the framework for a community to develop and prioritize mitigation strategies and to implement plans to help reduce both the risk and vulnerability from future hazard events. The risk assessment for Metropolitan Nashville-Davidson County followed methodology from FEMA and the Emergency Management Accreditation Program (EMAP). This assessment process was conducted by the CPT and select subject matter experts.

Risk from natural and manmade hazards is measured by a combination of impact, vulnerability and likelihood scores (Impact + Vulnerability x Likelihood = Risk). The impact and vulnerability scores were given the below parameters resulting from a hazard event:

- Geographic Extent
- Duration of the Event
- Environment
- Health Effects
- Displacement and Suffering
- Economy
- Infrastructure
- Transportation
- Critical Services
- Confidence in Government
- Cascading Effects

For each hazard identified, a score was given for each of the parameters, and then all the scores were added together to get a total Impact and Vulnerability Assessment Score.

Weighted scores were conducted where extra counts were given for the following lead agencies and associated hazards: NWS for all weather related hazards, Public Health for Communicable Diseases, TGS for Landslides/sinkholes, Police for Manmade & Fire for Hazmat and Wildfire.

Table 4-1 defines each of the above parameters.

HIRA Impact & Vulnerability Parameters						
Parameter	***Definition***	***1***	***2***	***3***	***4***	***5***
Geographic Extent	Size of the affected area. Includes areas not damaged but strongly affected by the incidents. For example, areas backed up by a transportation accident.	Single site. One or two blocks.	Single site. Multiple blocks.	Community (downtown, Berry Hill)	City-wide	Regional. (Winter Storms.)
Duration	How long does the acute crisis part of the disaster last?	Less than 24 hours	1-3 days	4-7 days	7-30 days	30+ days
Environment	How damaging is the disaster for the natural environment?	No damage/ temporary minor damage	Degradation of ecosystem that will repair itself	Degradation of ecosystem that requires intervention	Functional loss of ecosystem, but restoration is possible	Permanent loss of ecosystem
Health Effects (Deaths and Injuries)	How dangerous is the disaster for the natural environment?	No deaths or injuries	1-10 deaths and/or 1-100 injuries	11-50 deaths and/or 101-500 injuries	51-500 deaths and/or 501-1500 injuries	Over 501 deaths and/or 1501 injuries
Displacement and Suffering	How likely is the hazard to negatively impact the exposed population in terms of displacement, personal property loss and increased indebtedness?	No displaced people	Vulnerable populations begin to have problems with food, water, access to shelter.	Vulnerable populations having serious difficulties. General population starting to have problems.	251-1000 people displaced. 5-30% of population facing acute shortages.	1000+ displaced people. More than 30% of population facing acute shortages of basic supplies and access to services.
Economy	How does the hazard affect the local economy?	No measurable impacts	No impacts to overall economy but isolated businesses experience hardship.	Entire sectors experience loss of revenue and capital.	Core sectors of economy are affected and unable to generate revenue. Capital losses between 1-10%	Physical losses equal to 10% to assess value. Loss of ability to generate revenue.
Built Environment (Property, Facilities, Infrastructure)	How does the hazard affect buildings and physical infrastructure? (Includes utilities)	No effects.	1-10 structures uninhabitable (red tagged). Up to 25% loss of one utility.	11-250 structures red tagged. Multiple utilities affected up to 25%.	251-1000 structures red tagged. Multiple utilities affected 25-50%.	1000+ structures red tagged. At least two major utilities degraded at least 50%.
Transportation	How does the hazard affect the ability of residents and workers to access the resources they need?	No effects on mobility	All critical services accessible, but delays reaching work or non essential services	One critical service inaccessible. Degradation of at least one mode. Major corridors open, but minor streets degraded or impassible.	Many critical services inaccessible. One major mode inoperable. One major corridor inoperable.	Most critical services inaccessible. Multiple modes inoperable. Most high volume corridors impassible.
Critical Services (Continuity of Operations and Responders)	How likely is the hazard to reduce the ability of government and business to provide critical services? (Medical, Public Safety, Social, Financial, etc)	No impairment on critical services	Temporary degradation of 1 critical service	Temporary degradation of multiple critical services. Long term degradation of 1 critical service	Temporary degradation of most critical services. Long term degradation of multiple services.	Unable to deliver most critical services.
Confidence in Government	Would public's confidence in government be shaken?	No	(Not used)	Somewhat	(Not used)	Yes
Cascading Effects	How severe and complex will the secondary effects be?	Hazard extremely unlikely to cause secondary hazards. If they occur, would have minor effect.	Secondary hazards may occur, but are likely to be minor compared to primary hazard	Secondary hazards occur that extend the impact of the disaster and hamper response, but are not disasters in their own right.	Secondary effects generated that significantly increase the magnitude of the disaster. Secondary impacts would likely be considered disasters if they occurred by themselves.	Secondary effects generated and rival or exceed primary hazard. Secondary impacts would definitely be disasters in their own right.

Table 4-1: HIRA Impact & Vulnerability Parameters

Following are the combined scores from all the participants for each of the hazards identified with each of the parameters.

OVERALL Impact & Vulnerability Assessment Scores November 2014	Geographical Extent	Duration	Environment	Health Effects	Displacement	Economy	Built Environment	Transportation	Critical Services	Confidence in Govt	Cascading Effects	
Hazard	1	2	3	4	5	6	7	8	9	10	11	Total
Dam & Levee Failure	4	4	3	3	3	3	4	3	3	4	3	37
Flooding	4	4	3	3	3	3	4	3	3	3	3	36
Earthquake	5	4	3	4	4	4	4	4	4	3	4	41
Landslide/Sinkhole	2	2	2	2	2	2	2	2	1	1	1	19
Communicable Diseases	4	3	2	2	2	2	1	2	2	3	2	23
Drought	5	5	3	2	1	2	1	1	2	2	2	26
Wildfire	3	3	3	2	2	2	3	2	1	2	2	25
Extreme Temperature - Cold	5	3	2	2	2	2	1	2	2	2	2	25
Extreme Temperature - Heat	5	3	2	2	2	2	1	2	2	2	2	26
Thunderstorm	3	2	2	2	2	1	2	2	2	2	2	20
Tornado	3	2	3	2	3	3	3	3	2	2	3	28
Winter Storm	5	3	2	2	2	2	2	3	3	2	2	29
Manmade - Technological/Terrorism	3	3	2	3	3	3	2	2	2	3	3	29
Hazardous Materials Incident	2	2	3	2	2	2	2	2	2	2	2	24

Table 4-2: Impact & Vulnerability Assessment Scores

Next in this process was to calculate the Hazard Likelihood score. This score is based on its past frequency and the best estimate of when that particular hazard might reoccur. Table 4-3 outlines this ranking.

Hazard Likelihood Parameters		
Measure of likelihood	**Return period in years**	**Rank**
Frequent or very likely	Every 1-3 years	6
Moderate or likely	Every 3-10 years	5
Occasional, slight chance	Every 10-30 years	4
Unlikely, improbable	Every 30-100 years	3
Highly unlikely, rare event	Every 100-200 years	2
Very rare event	Every 200-300 years	1

Table 4-3: HIRA Hazard Likelihood Parameters

Hazard Likelihood Methodology Explanations:

Frequent or very likely
"Frequent or very likely to occur, events usually have a high number of recorded incidents or anecdotal evidence. (For example, an area that is subject to flooding every year or so) "

Moderate or likely
"Moderate or likely to occur, hazards also have a historical record but occur with a frequency of 3-10 years. (For example, an area that faces an infectious disease outbreak every few years)"

Occasional, slight chance
"Occasional or slight chance means events are those that occur infrequently. There may be little recorded historical evidence and a return interval of 10-30 years. (For example, a rail accident where dangerous chemicals are released) "

Unlikely, improbable
"Unlikely or improbable refers to hazards that are not expected to occur more frequently than once every 30-100 years. There may be no historical incidents in the community. (For example, a plane crash with total loss of life)"

Highly unlikely, rare
"Highly unlikely or rare events are extremely unlikely and have a return period of 100-200 years. (For example, a one hundred year flood) "

Very rare event
"Very rare events may happen every 200+ years. (For example, a large earthquake) "

Impact and Vulnerability Assessment x Hazard Likelihood = Risk

Table 4-4 shows the completed chart with the previous Impact and Vulnerability Assessment scores multiplied by the combined Hazard Likelihood scores to come up with the Risk Factor scores for each hazard.

OVERALL Total Risk Scores for Davidson County November 2014			
Hazard	**Impact & Vulnerability**	**x Likelihood**	**= Risk Factor**
Flooding	35.50	4.50	**160**
Winter Storm	28.92	5.17	**149**
Tornado	28.25	5.00	**141**
Extreme Temperature - Heat	25.50	5.17	**132**
Extreme Temperature - Cold	25.08	5.17	**130**
Thunderstorm	20.42	6.00	**123**
Drought	26.42	4.50	**119**
Hazardous Materials Incident	23.82	4.64	**110**
Earthquake	41.00	2.50	**103**
Manmade - Technological/Terrorism	29.09	2.91	**85**
Dam & Levee Failure	36.75	2.25	**83**
Landslide/Sinkhole	19.00	4.33	**82**
Wildfire	24.73	3.27	**81**
Communicable Diseases	23.36	2.27	**53**

Table 4-4: HIRA Total Risk Scores

Based on this most recent assessment (2014), the top 5 hazards for Davidson County are:

1. Flooding
2. Winter Storm
3. Tornado
4. Extreme Temperatures (Heat/Cold)
5. Thunderstorm

This risk assessment covers DMA Planning Step 4: Assess the Hazard and DMA Planning and Step 5: Assess the Problem. It also includes a third component, Existing Mitigation Capabilities, where the risk and vulnerability are analyzed in light of existing mitigation measures, for example, the adoption and enforcement of building codes, warning systems, and floodplain development regulations.

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Multi-Hazard Mitigation Plan

4.1 Hazard Identification

INTRODUCTION

The Metropolitan Nashville-Davidson Community Planning Team (CPT) conducted a Hazard Identification study to determine what hazards threaten the planning area. This section of the plan documents the previous occurrence of hazards, those that might occur in the future, and the likelihood of their occurrence or recurrence.

The hazards identified and investigated in the Metropolitan Nashville-Davidson County area include:

- Dam and Levee Failure;
- Flooding;
- Geological Hazards, which includes:
  - Earthquakes; and
  - Landslides and Sinkholes;
- Communicable Diseases;
- Wildfires;
- Hazardous Materials incidents;
- Manmade Hazards (technological/terrorism); and
- Severe Weather, which includes:
  - Droughts;
  - Extreme Temperatures;
  - Thunderstorms;
  - Tornadoes; and
  - Winter Storms

Disaster Declaration History

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

Within Nashville and Davidson County there have been nine federal disaster declarations since 1994 related to flooding, severe storms/tornadoes, and ice storms. All eight disasters are included in Table 4-5.

Date	Cause	FEMA Disaster Number	Total Federal/State Expenditures for Davidson County[1]	Total Local Expenditures for Davidson County[2]	NES Expenditures for Davidson County[3]
06-April-11	Severe storms, flooding, tornadoes, and straight-line winds	1978-DR*	N/A	N/A	$1,123,965
04-May-10	Severe Storms, Flooding, Straight-Line Winds, Tornadoes	1909-DR*	$ 52, 673, 689	$ 13,168,422	$ 6,098,027
06-April-06	Severe Storms, Tornadoes	1634-DR*	$ 42,457	$ 10,614	$ 1,359,604
08-May-03	Flooding, Severe Storm, Tornado	1464-DR*	N/A	N/A	$ 1,351,720
12-Jun-00	Flooding, Severe Storm, Tornado	1331-DR*	$ 1,271,947	$ 317,987	$ 1,435,929
12-May-99	Severe Storm, Tornado, Flooding	1275-DR*	$ 3,095,850	$ 773,963	$ 1,959,361
20-Apr-98	Flooding, Severe Storm, Tornado	1215-DR*	$ 20,454,316	$ 5,113,579	$ 7,751,925
07-Mar-97	Tornadoes, Hail, Floods	1167-DR*	$ 44,388	$ 11,097	Information not available
28-Feb-94	Ice Storm	1010-DR	$ 373,530	$ 93,383	$ 7,540,181

Table 4-5: Federal Disaster Declarations for Davidson County

[1]Source: Tennessee Emergency Management Agency (TEMA)
[2]Local expenditures calculated to be 25 percent of Federal expenditures.
[3]NES is the Nashville Electric Service.
*SBA Declaration associated with FEMA Declaration, not included in amounts listed.

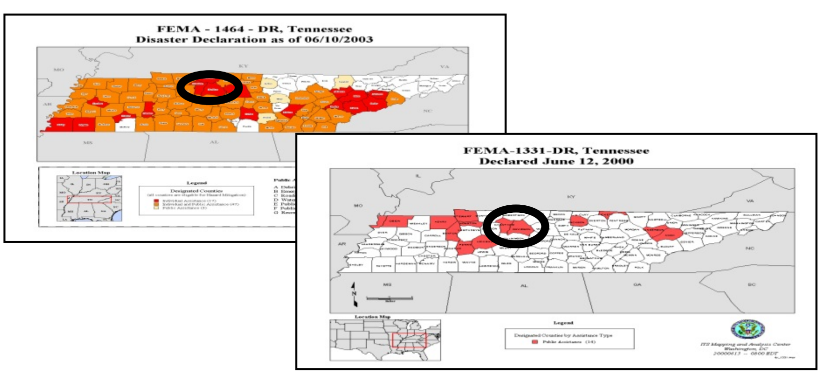

Figure 4-1: Federal Disaster Declaration Maps

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

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

USDA Secretarial disaster designations must be requested of the Secretary of Agriculture by a governor or the governor's authorized representative, or by an Indian Tribal Council leader. Davidson County is currently not a primary county with a USDA designation.

The Small Business Administration (SBA) provides disaster assistance to families and businesses through its Disaster Assistance Program. The mission of this program is to offer financial assistance to those who are trying to rebuild their homes and businesses in the aftermath of a disaster. By offering low-interest loans, the SBA is committed to long-term recovery efforts. SBA is also committed to mitigation, and has additional loan programs to help reduce future losses. Table 4-6 outlines SBA Declarations for Davidson County.

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

Declaration Date	Cause	SBA Declaration Number	FEMA Disaster Number	Total SBA Loan Amount
12-Nov-14	Freezing Temps (Sec-AG)	TN-00086 / 14187	-	-
12-Aug-12	Drought & Excessive Heat (Sec-AG)	TN-00072/13304	-	-
18-Jan-12	Drought & Excessive Heat (Sec-AG)	TN-00062/12995	-	-
29-Dec-11	Drought & Excessive Heat (Sec-AG)	TN-00060/12980	-	-
15-Feb-11	Drought & Excessive Heat (Sec-AG)	TN-00047/12470	-	-
06-Dec-10	Drought & Excessive Heat (Sec-AG)	TN-00046/12413	-	-
29-Aug-10	Drought & Excessive Heat (Sec-AG)	TN-00044/12344	-	-
07-July – 10	Excessive Rainfall, Flooding, and Flash Flooding (Sec-AG)	TN-00041/12230	-	$ 22,500
04-May-10	Severe Storms, Flooding, Straight-Line Winds, Tornadoes	TN-00039/12159 Presidential IA	1909-DR	$ 187,552,300
04-May-10	Severe Storms, Flooding, Straight-Line Winds, Tornadoes	TN-00038/12161 Presidential PA	1909-DR	$ 2,097,700
05-April-06	Severe Storms, Tornadoes	TN-00008/10440 Presidential IA	1634-DR	$ 16,786,600
15-April-04	Five Alarm Fire in Old Hickory	3571	-	$ 424,500
08-May-03	Storms, Tornadoes, Flooding	3498	1464-DR	$ 354,400
22-Oct-01	Expanded EIDL Program	9TTN	-	$ 944,000
12-Jun-00	Severe Storms & Tornadoes	3263	1331-DR	$ 5,300
12-May-99	Storms, Tornadoes, Flooding	3183	1275-DR	$ 65,600
20-Apr-98	Storms, Tornadoes, Flooding	3078	1215-DR	$ 4,732,400
07-Mar-97	Heavy Rain & Tornadoes	2937	1167-DR	$ 229,300
03-Feb-97	Tornadoes	2929	-	$ 10,000

Table 4-6: SBA Declarations for Davidson County

DAM AND LEVEE FAILURE

Dams are man-made structures built for the purpose of navigation, power production, agriculture, water quality, water supply, recreation, and flood protection. A levee is a natural or artificial barrier that diverts or restrains the flow of a stream or other body of water for the purpose of protecting an area from inundation.

Dams and levees are usually designed to withstand a flood with a computed risk of occurrence. For example, a dam or levee may be designed to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If a larger flood occurs, then that structure will be overtopped. Overtopping is the primary cause of earthen dam failure. Failed dams or levees can create floods that are catastrophic to life and property because of the tremendous energy of the released water and the amount of development located within the area protected by the dam or levee.

Dams and levees typically are constructed of earth, rock, concrete, or mine tailings. Two factors that influence the potential severity of a full or partial dam failure are:

- The amount of water impounded; and
- The density, type, and value of development and infrastructure located downstream.

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

- Deliberate intention (terrorism);
- Prolonged periods of rainfall and flooding;
- Earthquake (liquefaction / landslides);
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper design;
- Improper maintenance;
- Negligent operation; and/or
- Failure of upstream dams on the same waterway.

There are eleven dams located in Nashville-Davidson County (Figure 4-2). Eight of the dams are regulated by the Tennessee Department of Environment and Conservation (TDEC) and are primarily used for agricultural purposes (Table 4-2). The dams at J. Percy Priest Lake and Old Hickory Lake are managed by the U.S. Army Corps of Engineers. Old Hickory Dam is authorized and operated primarily for commercial navigation and hydroelectric power generation, with recreation and water supply as two important incidental benefits. J. Percy Priest Dam is authorized and operated primarily for flood control, recreation, hydroelectric power generation, and water supply. The Marrowbone Lake Dam is managed by the Tennessee Wildlife Resources Agency and is used for recreational purposes.

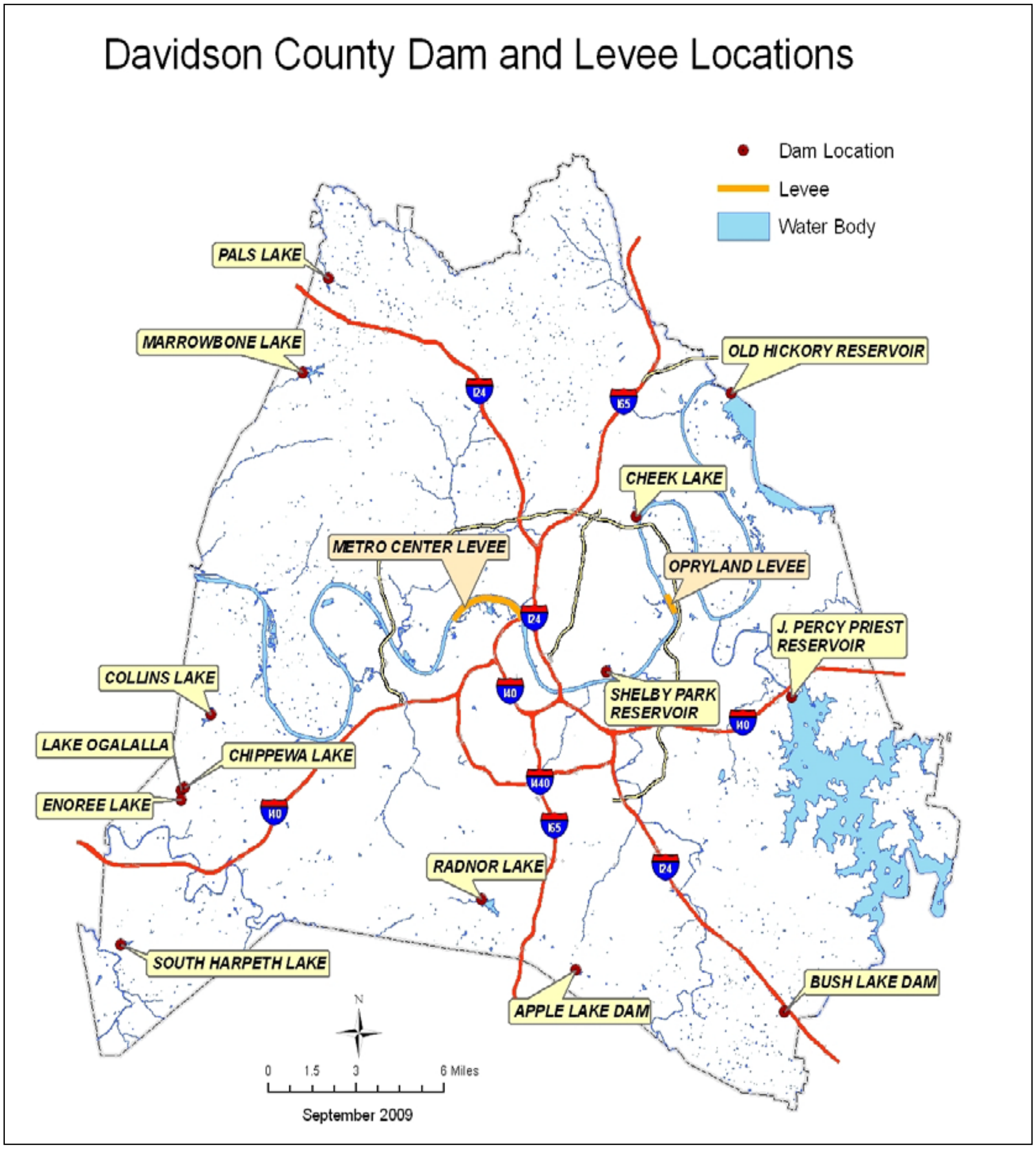

Figure 4-2: Dams and Levees within Davidson County

Each dam is categorized by its hazard potential. Hazard potential is determined by the downstream damage that could result if a dam failed. Table 4-7 lists the hazard classification for each dam.

- High hazard – dams would probably cause loss of life in the event of failure.
- Significant hazard – dams would cause property damage or temporary loss of roads or utilities with a remote chance of loss of life.
- Low hazard – dams would have little or no effect to life and property downstream in the event of failure.

Dam Name	Owner / Regulator	Hazard Classification
J. Percy Priest Lake	USACE	High
Old Hickory Lake	USACE	High
Chippewa Lake	Private	Significant
Enoree Lake	Private	Significant
Lake Ogallala	Private	Significant
Pal's Lake	Private	Significant
Marrowbone Lake	TWRA	High
Apple Lake	Private	High
Bush Lake	Private	Low
Cheek Lake	Private	Low
Dupont Retention Basin	Private	Low
Radnor Lake	TDEC	High
South Harpeth	Private	Low
Dams located outside of Davidson County		
Center Hill	USACE	High
Dale Hollow	USACE	High
Wolf Creek	USACE	High
Great Falls	TVA	High

Table 4-7: Dams affecting Davidson County

Figure 4-3: J. Percy Priest

J. Percy Priest Dam and Reservoir

J. Percy Priest Dam (Figure 4-3) is located at river mile 6.8 of the Stones River. The reservoir covers portions of Davidson, Rutherford, and Wilson counties and consists of 14,200 surface acres of water at summer pool elevation (490 feet above mean sea level). The water is surrounded by 18,854 acres of public lands; 10,000 acres are devoted to wildlife

management. Total storage capacity at maximum pool (elevation 504.5) is 652,000 acre-feet.

Rising 130 feet above the streambed, the combination earth and concrete-gravity dam is 2,716 feet long including a hydroelectric power generating plant. Average annual energy output is 70 million kilowatt hours. The dam has contributed significantly to reducing the frequency and severity of flooding in the Cumberland Valley. In addition to the far-reaching effects of flood control, the project contributes to the available electric power supply of this area. Construction began June 2, 1963 and the dam was completed in 1968.

Old Hickory Dam and Reservoir

The Old Hickory Lock and Dam (Figure 4-4a) is located on the Cumberland River at Mile 216.2 in Sumner and Davidson Counties. The reservoir extends 97.3 miles upstream to Cordell Hull Lock and Dam near Carthage, Tennessee.

Old Hickory Lock and Dam was authorized for construction by the Rivers and Harbors Act of 1946 as a unit of a comprehensive development plan for the Cumberland River Basin. The project was designed by the U.S. Army Corps of Engineers and built by private contractors under the Corps' supervision. Construction started in January 1952, and dam closure was completed in June of 1954. The project was completed for full beneficial use in December of 1957 with the placement of the final hydroelectric power unit in operation.

Figure 4-4a: Old Hickory Dam

The reservoir contains 22,500 surface acres at an elevation of 445 feet above sea level. Water level fluctuations are minimal with minimum pool elevation at 442 feet. Public facilities include nine marinas, three Corps-operated campgrounds, and 41 boat access sites.

Wolf Creek Dam and
Lake Cumberland Reservoir

Figure 4-4b: Wolf Creek Dam

The Wolf Creek Dam (Figure 4-4b) impounds Lake Cumberland at river mile 460.9 on the Cumberland River ten miles southwest of Jamestown, Kentucky. The reservoir is located in Wayne, Russell, Pulaski, Clinton, McCreary, Laurel and Whitley counties in Kentucky. Lake Cumberland is the largest man made reservoir east of the Mississippi River. The reservoir is 101 miles long and has 1,255 miles of shoreline. During flood conditions Wolf Creek Dam has the capability of storing 6,089,000 acre-feet of

water. The reservoir contains 50,250 acres of surface area at a normal summer pool elevation of 723 feet, and 63,530 acres of surface area at a flood control storage elevation of 760 feet.

Through the Corps of Engineers dam safety inspection program, seepage concerns associated with a karst foundation were identified at the project. In 2005, a Major Rehabilitation Report was completed and approved at US Army Corps of Engineers headquarters which called for a long-term rehabilitation of the project to include a grout curtain and concrete diaphragm wall to run the entire length of the earthen embankment and upstream of the right most concrete monoliths. The first phase of the construction project began in March 2006 and was estimated to be completed in October 2012 at an estimate cost of $594 million dollars. To decrease the risk of failure of the dam, and to those living in the downstream communities, an interim pool restriction at the project was put into place in January 2007 that targets a pool elevation of 680 feet for operation of the reservoir. This pool restriction was lifted in 2013 and is now back to normal levels as the project was completed in 2013.

<u>Center Hill Dam</u>

Center Hill Dam (Figure 4-4c) is located at river mile 26.6 of the Caney Fork River above its confluence with the Cumberland River at river mile 309.2. The reservoir is located in Dekalb, Putnam, and White Counties in Tennessee. The dam impounds a reservoir that is 64 miles long and has 415 miles of shoreline. During flood conditions Center Hill Dam has the capability of storing 2,092,000 acre-feet of water. The reservoir contains 18,220 acres of surface area at a normal summer pool elevation of 648 feet and 23,060 acres of surface area at a flood control storage elevation of 685 feet.

Figure 4-4c: Center Hill Dam

Through the Corps of Engineers dam safety inspection program, concerns associated with a karst limestone foundation were identified at the dam. In 2006, a Major Rehabilitation Report was completed and approved at US Army Corps of Engineers headquarters which called for a long-term rehabilitation of the project to include modern concrete cutoff walls through the embankment and into the foundations and grouting beneath the entire dam and along both sides of the dam. The construction project began in 2008, and was expected to be completed in 2014 at a cost of $249 million.

To decrease the risk of failure of the dam and to those living in the downstream communities an interim pool restriction at the project was put into place in 2007 that targets a pool elevation range of 618 ft to 630 ft for operation of the reservoir.

Dam Failure Flooding

Dam failure flooding can occur as the result of partial or complete collapse of an impoundment. Dam failures are often the result of prolonged rainfall and flooding or, during very dry conditions, erosion. The primary danger associated with a dam failure is the swift flooding of those properties immediately downstream of the dam.

In Tennessee, there are more than 1,200 dams and significant dam failures occur on an average of less than once every 40 years. There are large dams within the state, including those operated by the Tennessee Valley Authority and the U. S. Army Corps of Engineers. These dams serve to produce electrical power for the state, control flooding, water supply & quality, navigation, and to provide recreational opportunities to the state's citizens and its visitors. Dam failures are an infrequent occurrence. There has never been a major dam failure in Tennessee. All of the failures that have occurred have involved the small agricultural dams that are prevalent throughout the state.

In Tennessee, the Safe Dams Division of the Tennessee Department of Environment and Conservation regulates non-federal dams. This agency is responsible for enforcement of state and federal dam safety regulations (Safe Dams Act).

Center Hill and Wolf Creek Dam Break Analyses and Risk Communication

Following the approval of Major Rehabilitation Reports for both Wolf Creek and Center Hill, the Nashville District of the United States Army Corps of Engineers (USACE) conducted detailed analyses of the impacts of potential dam failure at both reservoirs (scenario shown in Figure 4-5).

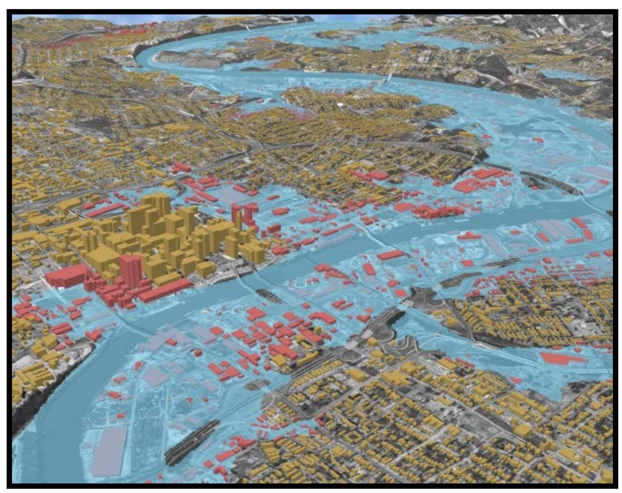

Figure 4-5: Center Hill Dam Break Scenario

These analyses included dam failure routines within the unsteady-flow hydraulic model HEC-RAS, and mapping of the resulting flooding downstream of each dam. Detailed maps for several potential failure scenarios at each dam were created.

Hardcopy maps, digital map-books, and Geographic Information System (GIS) layers were distributed to emergency management agencies within affected counties downstream of each dam to aid in preparation of flood evacuation and emergency management plans. In addition, multiple public meetings were held within affected communities to share information on the potential risks at each dam, the proposed construction projects, and to allow members of the public to view the dam failure flood mapping.

LEVEES

Metro Center Levee

Metro Center is a 1,000-acre commercial and industrial development located along the Cumberland River near downtown Nashville, Tennessee. The complex was developed in the early 1970's and encompasses a wide range of businesses. It contains approximately ninety property holdings and over 420 companies employing approximately 8,000 people. A 3-mile long levee, also built in the early 1970's, protects the Metro Center area from flooding.

Figure 4-6: Metro Center Levee Rehabilitation

When the levee was built, it was considered sufficient to protect the development from major floods. However, revised flood projections and deterioration of the levee over time have increased the risk of flooding. Stream bank erosion was threatening to undermine the levee's foundation and reducing its reliability. Trees and their root systems had also potentially compromised the integrity of the structure.

In 1999, the U.S. Army Corps of Engineers determined that the levee would have to be raised to meet new flood-control standards. The levee was raised and reconstructed by adding fill dirt and approximately 600 feet of floodwall in two sections (Figure 4-6). The project also improved the reliability of the interior drainage system for Metro Center. Subsequent inspection of the project in 2007 revealed additional deficiencies such as an encroachment at one facility, excessive vegetation, and a low area in the levee that would prevent it from providing the protection up to the 500 year flood. The 2010 Flood highlighted the need to construct a levee closure in front of the I-65 bridge opening. The opening was constructed to the 100 year flood elevation and required sand bagging to protect Metro Center properties during the actual flood. The recently constructed levee provides 500 year protection for the entire development. The completed project will bring the levee to post Katrina levee standards for certification. Metro Nashville and the US Army Corps of Engineers, Nashville District has agreed to continue with the project to address all deficiencies. Completion of this work will allow the levee to be placed into the Federal Rehabilitation and Inspection Program under Public Law 84-99. This will allow for federal funds to be used to fix any damage to the levee as the result of a natural disaster. Fixing the deficiencies will also allow the levee to be certified under the Federal Emergency Management Agency National Flood Insurance Program.

The Metro Parks Department worked with the Corps of Engineers on improvements to the levee trail, which became part of a large greenway system. A paved greenway path was added atop the levee, providing a recreational amenity for employees in Metro Center. Trailheads with parking were added for others who wish to use the site.

The Metro Center Levee performed as designed during the May 2010 and protected the 1,000 acre Metro Center commercial and industrial development from flood damage. However, there were a few vulnerabilities in the levee system that were identified and some damages that occurred during the flood that were addressed by the COE in the summer of 2011. Figure 4-7 shows locations where improvements were made to the levee system to increase its reliability for future flood events. The work included:

- Removal of woody vegetation from the levee
- Repair of railroad closure structure (See Figure 4-8)
- Installation of an inland levee under I-65 (See Figures 4-9 & 4-10).
- Repair of topsoil slide
- Levee center line shift
- Repaving of the damaged greenway trail.

Figure 4-7: Metro Center Levee Post-May 2010 Construction Areas

Figure 4-8: Repaired Railroad Closure

Figure 4-9: Sandbags placed by volunteers in May 2010 under I-65

Figure 4-10: I-65 Inland Levee Installed Under I-65

<u>Metro Center Stormwater Pump Station</u>

During the May 2010 flood, the pump station effectively protected the buildings within Metro Center from flooding. However, the existing pumps could not meet the demand to keep the roadways free from flooding. Supplemental portable pumps were required to evacuate the stormwater from the protected area. Following the May 2010, Metro conducted a study on the stormwater pumping station and decided to increase the protection level to a 500-year event. The study recommended increasing the capacity of the existing station and building a new, parallel station to increase the overall capacity and reliability of the system. Construction began in August 2012 and was completed February 2014 with a cost of $4.1 million. The project included upgrading the existing 72-MGD low-lift pump station and constructing a parallel 72-MGD pump station and lake intake, as well as backup power generation and increasing the total capacity to 144 MGD.

Figure 4-11: Metro Center Pump Station **Figure 4-12: Discharge from new station**

The new pump station includes:

- Belowground concrete pump station structure
- Electrical/pump building adjacent to new pump structure
- Emergency generator with integral diesel fuel tank
- Concrete splash pad with dissipater blocks at the force main discharge
- Site work, including new asphalt drive and parking area, demolition, new retaining wall, riprap, fencing, and grading
- Main switch gear, circuit breakers, and motor control center in new electrical/pump building
- Demolition and replacement of existing greenway and levee wall
- Two 25,000-GPM submersible mixed-flow pumps and two 36-inch discharge pipes over existing levee

The work at the existing pump station included:

- Removal of majority of the existing equipment, including diesel-driven pumps, emergency generator, diesel fuel tank, instrumentation, and controls
- Installation of two new 25,000-GPM submersible mixed-flow pumps with electric motors
- Structural and architectural modifications to existing pump station
- Upgrade of heating and ventilating system
- Upgrade of electrical and instrumentation system
- Modification of lake sluice gate actuator for 480-volt service

- Upgrade of instrumentation and controls to monitor river and lake water levels and operate equipment
- Modification of recharge pump piping and removal of valves beneath floor slab

<u>Opryland Levee</u>

The Opryland levee on the Cumberland River is located approximately 2.1 miles downstream of Briley Parkway. It was originally constructed in 1972 and it currently meets the FEMA requirements of having a minimum of three feet of vertical distance above the 100-year flood. During the May 2010 flood, this levee failed due to overtopping. The historic two-day May 2010 rain event caused the Cumberland River to reach just below the 500-year flood level. Floodwaters soon inundated the Gaylord Opryland Resort and Convention Center, the Grand Ole Opry House, and the Opry Mills Mall. After the May 2010 flood, Gaylord Entertainment made the decision to add additional flood protection for the hotel and Opry House. The new and improved levee will provide protection to the 500-year flood level.

Figure 4-13: Opryland Complex May 2010 Flood

While aesthetics and blending in with the existing landscape architecture was a major factor, public safety was the top priority. Design tasks included raising sections of the existing mile-long levee, installation of new concrete levee structures, and closures for 12 pedestrian and traffic openings. The combination of solid walls with removable barrier openings met the public accessibility and aesthetic issues. Because the complex was a "high visibility and tourist travel" attraction, the design had to accommodate the normal schedule of events which put emphasis on fast installation should a flood warning be issued. Simplicity was also a key consideration as the goal was to make as many of the closure beams of a common dimension

as economically possible to minimize training and on-site storage issues. The final design met all these requirements and setup/take down time can be accomplished in half the time as was originally forecasted.

Figure 4-14: Opryland Flood Wall Typical Road Closure

The original stormwater pumping station at the Opryland complex was replaced with a larger facility, having three auto-controlled electric 10,000 GPM pumps in a detention or storage pond at the southwest corner of the protected area. The storm drainage within the old park area was revised to direct all storm water to the detention pond. In addition, a two-acre section of the parking lot adjacent to the Opry Mills Shopping Center was lowered to provide additional storage in the event of an extreme rain during a river flood period.

Figure 4-15: Opryland Levee Pump Station

Past Occurrences

There have been 55 known dam failures that caused the release of water in the State of Tennessee. An additional 12 dams have had partial failures, which could have resulted in the release of floodwaters if remedial action had not been taken. Dam failures that have occurred in Davidson County are presented in Appendix B.

Likelihood of Future Occurrences

The Tennessee Safe Dams Program, operated by the TDEC, was created to protect the public from dam failures. TDEC inspects dams for safety and requires that dams meet stability and spillway standards in order to obtain and maintain an operating permit. Dams are inspected every 1, 2, or 3 years depending on the hazard potential category of the dam. Although the possibility of a dam failure is present, the probability of dam failure is low and not predictable.

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FLOODING

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

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

Riverine floods result from precipitation over large areas. This type of flood occurs in river systems whose tributaries may drain large geographic areas and include many independent river basins. The duration of riverine floods may vary from a few hours to many days. Factors that directly affect the amount of flood runoff include precipitation, intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, snow depth, and water-resistance of the surface areas due to urbanization.

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

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

Major Sources of Flooding

The Cumberland River is the largest stream in Davidson County and serves as the eventual receiving stream for all surface runoff in the County. Local, state, and federal agencies have defined watersheds in the county in a number of ways in prior reports. There are 26 watersheds in Davidson County as defined by the National Pollutant Discharge Elimination System (NPDES) permit (see Figure 4-16). Twenty-five watersheds represent tributaries to the Cumberland River and the 26th watershed represents the local inflow directly into the Cumberland River.

As part of the National Flood Insurance Program (NFIP), floodplains and floodways on many local streams have been established and are regulated by the local floodplain management ordinance (see Figure 4-17). The current effective Flood Insurance Study (FIS) for Metro Nashville was published by FEMA in 2001. This countywide FIS was revised in 2013 with the preliminary FIS, Flood Insurance Rate Maps (FIRMs), and associated database published in November. For this 2013 revision, a total of 7.2 stream miles were studied using detailed methods. Floodplain boundaries of 52.68 miles of streams that had been previously studied by

detailed methods were re-delineated based on more detailed and up-to-date topographic mapping. Additionally, 187.38 miles of detailed study streams were studied by USACE Nashville District in 2012 and incorporated in the FIS report (see Table 4-8).

Figure 4-16: Watersheds of Davidson County

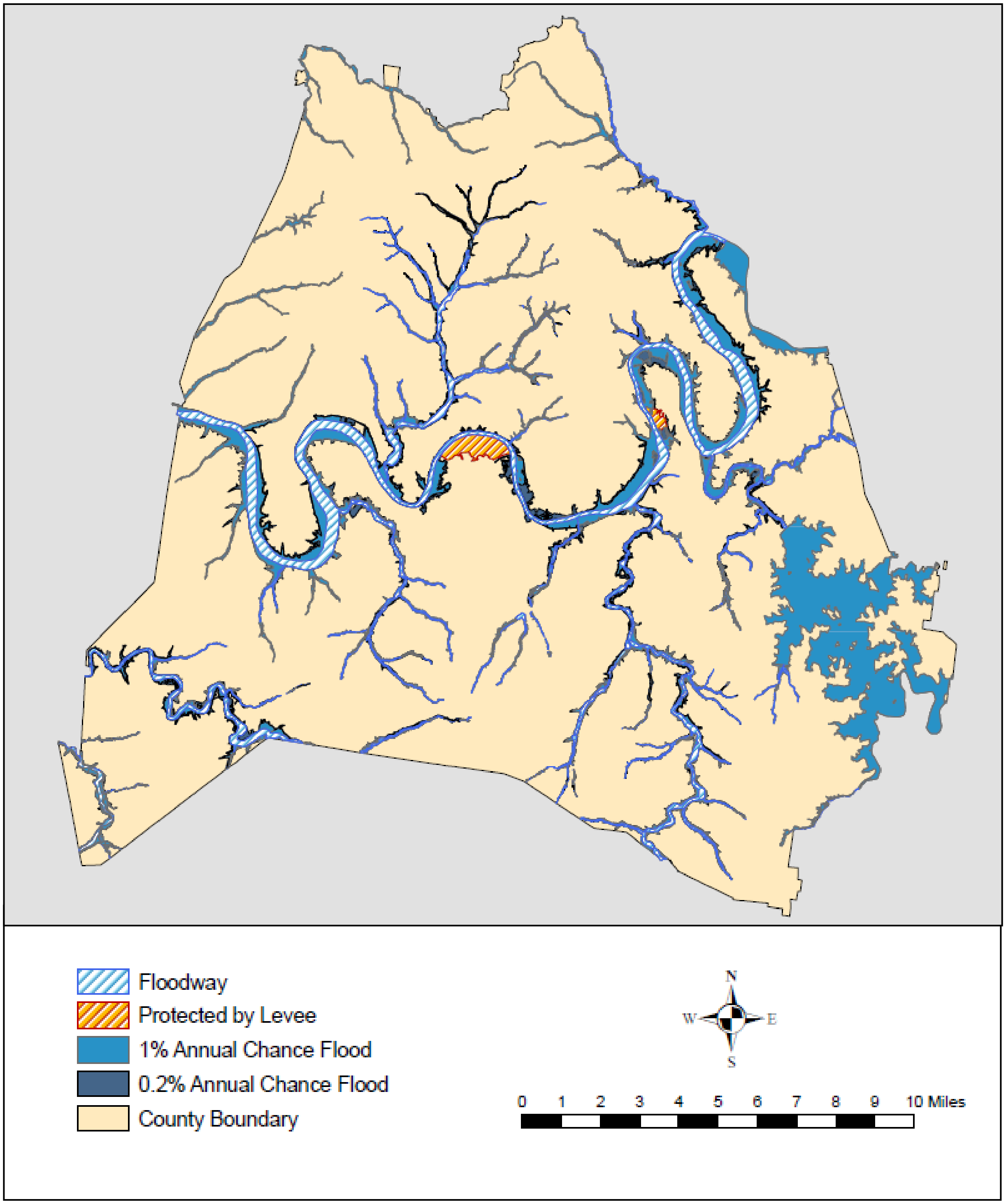


Figure 4-17: Flood Hazard Areas of Davidson County

Table 4-8: Major Sources of Flooding

Watershed	Contributing Drainage Area Within Davidson County (Sq.Mi.)	Flooding Source	Reach Length (miles)	
			Studied by Detailed Methods	Studied by Approximate Methods
Back Creek	2.6			
Browns Creek	16.6	Browns Creek	4.36	
		East Fork Browns Creek	2.27	
		Middle Fork Browns Creek	3.04	
		West Fork Browns Creek	3.57	
Bull Run	4	Bull Run Creek		5.07
Cooper Creek	4.9	Cooper Creek		2.08
		Cooper Creek - Tributary 2		0.5
Cub Creek	2.5	Cub Creek		3.79
Cumberland River	90.9	Cumberland River	53.29	
Davidson Branch	3.8	Davidson Branch		1.78
		Ewin Branch		1.4
Dry Creek	8.8	Dry Creek	3.46	
Gibson Creek	4.3	Gibson Creek	1.79	
		Gibson Creek Tributary	1.07	
Gizzard Branch	1.7			
Harpeth River	56.7	Buffalo Creek	3.05	
		East Fork Creek	1.51	
		Little East Fork Creek	0.83	
		Flat Creek	3.74	0.78
		Harpeth River	15.21	
		Little Harpeth River	2.21	
		South Harpeth River	11.01	
		Highway 100 Tributary	1.92	
		Otter Creek	4.86	
		Poplar Creek	2.58	
		Trace Creek	1.02	
		Windemere Branch	1.16	
Indian Creek	5.8	Indian Creek	3.25	3.26
Island Creek	1			
Loves Branch	2.3			
Mansker Creek	20.4	Bakers Fork		5.57
		Goodlettsville Outlet Ditch	0.59	0.55
		Lumsley Fork	0.88	0.49
		Mansker Creek	9.68	0.95
Marrowbone Creek	19.4	Little Marrowbone Creek		6.63
		Little Marrowbone Creek - Tributary 9		1.36
		Marrowbone Creek		3.48
Mill Creek	71.8	Collins Creek	1.41	
		Franklin Branch	2.74	
		Franklin Branch - Tributary 1	1.65	
		Franklin Branch - Tributary 2	0.75	

Watershed	Contributing Drainage Area Within Davidson County (Sq.Mi.)	Flooding Source	Reach Length (miles)	
			Studied by Detailed Methods	Studied by Approximate Methods
		Franklin Branch - Tributary 3	0.48	
		Holt Creek	2.46	
		Mill Creek	21.78	
		Mill Creek - Tributary A	2.15	
		Mill Creek - Tributary B	0.93	
		Mill Creek - Tributary 1	0.81	
		Sevenmile Creek	7.03	
		Sevenmile Creek - Tributary 1	1.75	
		Sevenmile Creek - Tributary 2	1.25	
		Sims Branch	2.08	
		Sorghum Branch	3.65	
		Sorghum Branch Overflow	0.19	
		Turkey Creek	1.80	
		Whittemore Branch	3.52	
		Unnamed Tributary to Whittemore Branch	0.11	
		Whittemore Branch Tributary	1.31	
Overall Creek	7.8	Overall Creek	2.33	3.88
		Tributary 1 to Overall Creek	0.81	0.99
Pages Branch	3.2	Pages Branch	2.46	
		Pages Branch - Tributary A	1.03	1.07
		Pages Branch - Tributary B	0.27	0.76
Pond Creek	2.5			
Richland Creek	28.5	Belle Meade Branch	2.05	
		Jocelyn Hollow	1.55	
		Jocelyn Hollow Creek	1.58	
		Richland Creek	11.69	
		Tributary to Richland Creek	1.54	
		Sugartree Creek	3.45	
		Vaughns Gap Branch	1.96	
		Vaughns Gap Branch Overflow	0.44	
Sandy Creek	0.7			
Stones River	77.2	Dry Fork Creek	3.66	
		East Fork Hamilton Creek	1.69	
		Elm Hill Tributary	1.35	
		Tributary 1 to East Fork Hamilton Creek	1.43	
		Tributary 2 to East Fork Hamilton Creek	1.39	
		Hurricane Creek	2.28	4.87
		West Branch Hurricane Creek	0.73	0.68
		J. Percy Priest Reservoir	11.83	
		McCrory Creek	5.68	
		Pulley Tributary	1.36	
		Scotts Creek	1.30	
		Scotts Hollow	0.89	
		Stoners Creek	5.54	

Watershed	Contributing Drainage Area Within Davidson County (Sq.Mi.)	Flooding Source	Reach Length (miles)	
			Studied by Detailed Methods	Studied by Approximate Methods
		Stoners Creek - Tributary 7		0.06
		Stones River	6.86	
Sulpher Creek	6	Sulpher Branch		2.87
		Sulpher Creek		4.6
Sycamore Creek	21.7	Long Creek		5.02
		Long Creek - Tributary 2		1.14
		South Fork Sycamore Creek		8.99
		South Fork Sycamore Creek - Tributary 1		2.03
Whites Creek	62.8	Bear Hollow Branch	0.75	
		Carney Creek	0.66	
		Claylick Creek	0.26	
		Claylick Overflow	0.47	
		Crocker Springs Branch	1.96	
		Crocker Springs Branch Tributary	0.48	
		Cummings Branch	2.83	
		Drakes Branch	1.69	
		Earthman Fork	4.97	
		Earthman Fork - Tributary 2	0.68	
		Earthman Fork - Tributary 3	0.63	
		Earthman Fork - Tributary 4	0.47	
		Eaton Creek	3.39	
		Ewing Creek	4.24	
		Ewing Creek - Tributary 1	0.97	
		Ewing Creek - Tributary 2	0.52	0.32
		Little Creek	3.93	
		Little Creek - Tributary 1	1.81	
		Little Creek - Tributary 2	1.06	
		North Fork Ewing Creek	3.57	
		North Fork Ewing Creek - Tributary 2	1.29	
		North Fork Ewing Creek - Tributary 3	0.43	
		North Fork Ewing Creek - Tributary 4	0.40	
		North Fork Ewing Creek - Tributary 5	0.32	
		North Fork Ewing Creek - Tributary 6	0.29	
		North Fork Ewing Creek - Tributary 7	0.92	
		North Fork Ewing Creek - Tributary 8	0.29	
		Shaws Branch	2.67	
		Trantham Creek	2.74	
		Vhoins Branch	1.23	
		Whites Creek	12.83	
		Whites Creek Tributary	1.15	

Table 4-8: Major Sources of Flooding (continued)

All streams within Metro Nashville, identified in Table 4-8, are subject to flooding and backwater flooding is significant. The primary effect of flooding on these streams appears to be inundation with water, although higher water velocities become significant to persons and structures under more extreme flooding situations. The calculated floodplain velocities range from 1.0 to 5.0 feet per second (fps), which is considered to be dangerous magnitude. Table 4-9 outlines the critical depths and velocities that will harm residents and structures during a flood event.

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

Table 4-9: Critical Flood Depths and Velocities

Identified Problem Areas

The streams throughout Davidson County, as previously identified, experience flooding during extreme rainfall events. The Metropolitan Government of Nashville and Davidson County and the Nashville District of the United States Army Corps of Engineers have documented potential flood damages countywide in numerous studies.

A number of documents have been reviewed for this plan, which were prepared by or for the Metropolitan Department of Public Works (MDPW) and the U.S. Army Corps of Engineers (USACE), Nashville District. MDPW documents consist of basin plans for the following streams: Browns Creek, including West and Middle Forks; Cooper Creek; East Fork Hamilton Creek; Gibson Creek; McCrory Creek; Sorghum Branch, Sevenmile Creek, and Tributary 1 of Mill Creek; Pages Branch; Richland Creek; Scotts Creek; Sugartree Creek; Whites Creek; and Whittemore Branch. Each basin plan provides a detailed description of the watershed drainage area and associated hydrologic and hydraulic parameters, existing and predicted future flooding problems within the watershed, and alternative solutions for reducing flooding problems. USACE documents consist of a variety of reconnaissance reports, feasibility reports, and detailed project reports for select streams within Davidson County. These streams include:

- Cumberland River;
- Mill Creek;
- Richland Creek;
- Whites Creek;
- Dry Creek;
- Gibson Creek;
- Browns Creek; and
- McCrory Creek.

Additionally, Nashville Mayor Karl Dean commissioned a study, called the Unified Flood Preparedness Plan (UFPP) following the May 2010 flood event, to identify and evaluate flood damage reduction measures on the Cumberland River and its five major tributaries – Harpeth River, Whites Creek, Browns Creek, Mill Creek and Richland Creek. The plan summarizes the damage which occurred along these streams and identifies the locations that would benefit from flood damage reduction projects and the types of solutions that would be most beneficial for each location. The UFPP integrates the knowledge and experience of past and present flood mitigation efforts with the lessons learned from the May 2010 flood.

Flood Prone Buildings

As of December 2014, FEMA documents 6,528 active flood insurance policies within Nashville-Davidson County and has paid 3,122 flood insurance claims. It is important to note that these statistics do not reflect the widespread flooding which occurred in Davidson County in 1973, 1975, and 1979 since Metro Nashville did not enter the National Flood Insurance Program until 1982. Countywide damage estimates for the 1979 flood alone were in excess of $40 million. Table 4-10 presents a summary of flood insurance information for all jurisdictions.

Jurisdiction	Total Number of Flood Insurance Policies	Total Number of Paid Losses	Total Value of Paid Losses
Belle Meade	42	6	$77,531
Berry Hill	10	1	$22,729
Goodlettsville	129	58	$1,240,344
Oak Hill	51	19	$367,672
Nashville-Davidson County	6296	3038	$145,116,656
TOTAL	**6528**	**3122**	**$146,824,932**

Table 4-10: Flood Insurance Summary

Nationwide, properties which flood repetitively comprise approximately one percent of currently insured properties, but account for 25 to 30 percent of flood claims. Repetitive loss properties constitute a significant expense of the National Flood Insurance Program (NFIP), costing about $200 million annually. The NFIP defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period since 1978. Within Nashville-Davidson County, the Federal Emergency Management Agency (FEMA) has identified 105 un-mitigated repetitive loss structures.

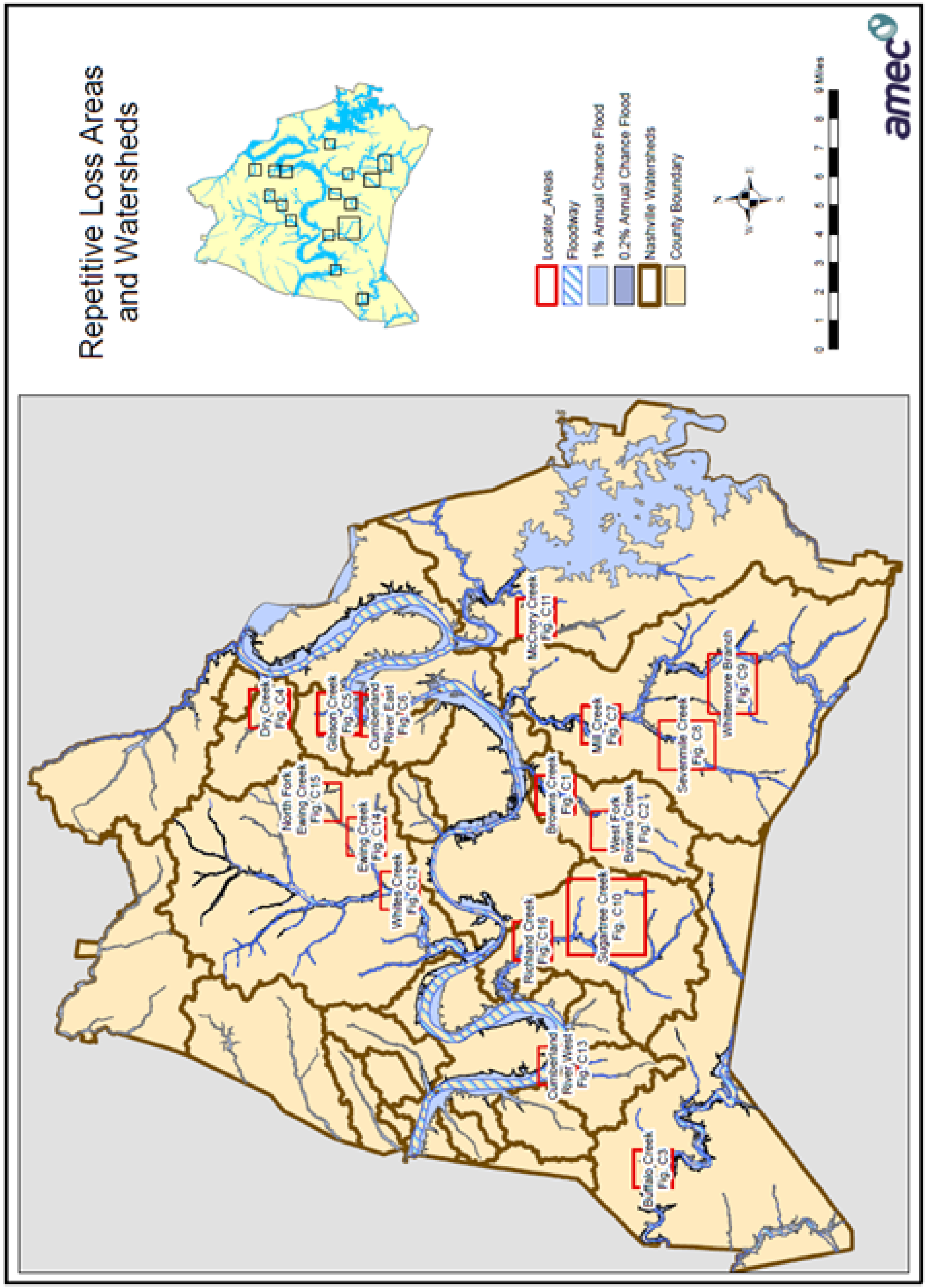
Repetitive Loss Areas have also been identified by Metro Nashville on 16 streams (see Table 4-11) to focus flood damage reduction efforts. Repetitive Loss Areas encompass a repetitive loss property, or a concentrated number of repetitive loss properties, and neighboring properties which are subject to a similar flood risk. Figure 4-18 presents the location of the identified Repetitive Loss Areas. Individual Repetitive Loss Area Maps are provided in Appendix C. These Repetitive Loss Areas were updated to reflect the current repetitive loss structures, additional flood-prone neighboring structures identified following the May 2010

flood event, and all mitigation efforts (acquisition and elevation) that have occurred. Detailed descriptions of the Repetitive Loss Areas are provided in the following subsection *Flooding – Watershed Specific Data*.

Table 4-11: Structures within the Repetitive Loss Areas

Repetitive Loss Area	Repetitive Loss Structures		Additional Non-Mitigated Structures	Mitigated Structures	Total Number of Parcels
	Residential	Non-Residential			
Browns Creek	0	3	28	1	32
West Fork Browns Creek	9	0	160	26	195
Cumberland River East	0	0	37	31	68
Cumberland River West	0	0	16	1	17
Dry Creek	0	1	40	1	42
Gibson Creek	3	0	53	21	77
Buffalo Creek	1	0	8	3	13
Mill Creek	0	0	104	17	121
Sevenmile Creek	12	0	123	24	158
Whitemore Branch	1	0	127	15	143
Richland Creek	0	0	32	61	93
Sugartree Creek	6	0	25	4	35
McCrory Creek	6	0	102	0	108
Ewing Creek	3	0	6	9	18
North Fork Ewing Creek	3	0	2	5	10
Whites Creek	3	0	141	42	186
SUBTOTAL	**47**	**4**	**1004**	**261**	**1316**
Outside of Identified Repetitive Loss Areas					
Browns Creek Watershed	0	3	2	7	12
Cooper Creek Watershed	0	0	0	3	3
Cumberland River Watershed	4	3	0	14	21
Davidson Branch Watershed	1	0	0	0	1
Dry Creek Watershed	4	0	1	3	8
Gibson Creek Watershed	0	0	7	1	8
Harpeth River Watershed	3	0	0	0	3
Mansker Creek Watershed	2	0	0	0	2
Mill Creek Watershed	6	3	9	10	28
Overall Creek Watershed	0	0	1	0	1
Pages Branch Watershed	0	0	0	7	7
Richland Creek Watershed	4	2	12	4	22
Stones River Watershed	8	0	5	6	19
Sycamore Creek Watershed	1	0	0	0	1
Whites Creek Watershed	10	0	1	14	25
SUBTOTAL	**43**	**11**	**38**	**69**	**162**
TOTAL	**90**	**15**	**1042**	**330**	**1477**

Figure 4-18: Repetitive Loss Areas



FLOODING – WATERSHED SPECIFIC DATA

Browns Creek Watershed

The Browns Creek Watershed has a drainage area of 16.64 square miles and is located in south-central Davidson County. Browns Creek flows from south to north and discharges into the Cumberland River. West Fork and Middle Fork Browns Creek are major sub-basins located within the Browns Creek Watershed. West Fork combines with Middle Fork just upstream in the Interstate 440/Interstate 65 culvert.

The principal causes of flooding problems within this watershed are construction in the designated floodway and natural floodplain, and a lack of adequate stormwater controls in the developed areas upstream. Additional contributing factors include backwater flooding upstream from bridges.

Repetitive Loss Areas

Two repetitive loss areas have been identified within the Browns Creek watershed. One on the mainstem of Browns Creek (Figure C.1) and one on West/Middle Fork Browns Creek (Figure C.2). Within these repetitive loss areas, there are three properties reporting repetitive losses due to flooding on Browns Creek and nine properties on West Fork and Middle Fork Browns Creek. In addition, the associated repetitive loss areas encompass 29 properties (1 mitigated, 28 un-mitigated) on Browns Creek and 186 properties (26 mitigated, 160 un-mitigated) on West/Middle Fork Browns Creek. The Browns Creek Storm Water Basin Plan, completed in 1990, further identifies the flood-prone areas and alternative solutions to reduce flooding problems. Flood magnitudes in the repetitive loss areas are not expected to increase significantly because the Browns Creek Watershed is nearly totally developed.

Cooper Creek Watershed

The Cooper Creek Watershed has a drainage area of 3.76 square miles and is located in north-central Davidson County. Cooper Creek flows from an elevation of approximately 495 feet in a southeasterly direction and to an elevation of 391 feet where it empties into the Cumberland River at river mile 197.3. Three flood-prone structures have been mitigated within this watershed.

Dry Creek Watershed

The Dry Creek Watershed has a drainage area of 9.2 square miles and is located in northeast Davidson County. Dry Creek flows from west to east and discharges into the Cumberland River at river mile 214.4.

A detailed analysis was performed for approximately 2.65 river miles of Dry Creek. An alternative analysis on Dry Creek by the USACE resulted in the elevation of several homes. The purpose of the project was to reduce flood damages within the Gateway Subdivision, located between Interstate 65 and the Seaboard Systems Railroad. The project also included a detention structure and flood proofing. The detention structure reduced flooding for all houses in the subdivision, with the exception of 19 structures whose first floor elevations remained below the 100-year flood elevation. The remaining 19 homes were raised between March 1989 and June 1990.

Repetitive Loss Areas

The current repetitive loss area is located downstream of the former project area along both the right and left banks of Dry Creek mainstem between the Seaboard Systems Railroad and north Gallatin Pike (Appendix C, Figure C.4). Flood damages within this area are attributable to rapid residential development without adequate stormwater controls in the upstream watershed areas combined with development along streams whose floodplain areas were not previously defined and regulated.

Currently, there is one property reporting repetitive losses due to flooding within the identified repetitive loss area. In addition, the associated repetitive loss areas encompass 41 (1 mitigated, 40 un-mitigated) properties.

Gibson Creek Watershed

The Gibson Creek Watershed has a drainage area of 4.4 square miles and is located in northeast Davidson County. Gibson Creek flows from west to east and discharges into the Cumberland River at river mile 200.9. The repetitive loss area is located along Emmitt Avenue between the East Meade Avenue intersection and Walnut Street intersection, and along Denson Ave between Emmitt Avenue and Gibson Creek.

The principal causes of flooding problems within the repetitive loss area are construction in the designated floodways and natural floodplains, and lack of adequate stormwater controls in the developed areas. Additional contributing factors include backwater flooding from the Cumberland River and backwater flooding upstream from bridges and relatively narrow floodplains in the tributaries that cause rapid concentration of runoff with very little peak attenuation.

Repetitive Loss Areas

Currently, there are two properties reporting repetitive losses due to flooding on Gibson Creek. In addition, 76 properties (21 mitigated, 55 un-mitigated) are located within the associated repetitive loss areas (Appendix C, Figure C.5). The Gibson Creek Storm Water Basin Plan, completed in 1996, identifies the repetitive loss area and alternative solutions to reduce existing flooding problems.

Harpeth River Watershed - Buffalo Creek

The Buffalo Creek Basin has a drainage area of 5.59 square miles and is located in southwestern Davidson County. Buffalo Creek flows from east to west and discharges into the Harpeth River.

A detailed analysis was performed on Buffalo Creek as a part of the Flood Insurance Study for Metro Nashville in 1993. No additional basin plans or alternative analysis have been performed. Primarily a rural portion of the county, flood damages within this watershed are generally attributable to rapid residential development without adequate stormwater controls in the upstream watershed areas combined with development along streams whose floodplain areas were not previously defined and regulated.

Repetitive Loss Areas

The repetitive loss area is located at the confluence with the Harpeth River (Appendix C, Figure C.3). Currently, there are two properties reporting repetitive losses due to flooding on Buffalo Creek. In addition, the associated repetitive loss areas encompass 11 properties (3 mitigated, 8 un-mitigated).

Mill Creek Watershed

The Mill Creek Watershed has a drainage area of 72.3 square miles and is located in southeastern Davidson County. Mill Creek flows in a northerly direction and discharges into the Cumberland River.

Mill Creek flows through several miles of highly developed properties and, therefore, provides valuable green space to thousands of local residents. The stream's vegetated riparian zones provide a natural corridor for urban wildlife, shade the stream, and furnish opportunities for scenic and recreational experiences in an urban setting.

The Mill Creek Watershed is experiencing intense pressure from adjacent and surrounding development. Surface runoff, point source pollution, riparian zone destruction, bank erosion, and floodplain encroachment are causing significant water quality deterioration and loss of natural floodplain functions and values. Future flooding conditions and stream ecological degradation will worsen as land development continues to stress Davidson County watersheds.

Repetitive Loss Areas

The repetitive loss area is identified as the right bank of Mill Creek mainstem extending approximately from Thompson Lane downstream to Murfreesboro Pike (Appendix C, Figure C.7). The repetitive loss areas encompass 121 properties (17 mitigated, 104 un-mitigated). Six repetitive loss properties have been removed from this area.

Mill Creek Watershed - Sevenmile Creek

Sevenmile Creek is located in southeastern Davidson County. It is the largest tributary to Mill Creek, having a drainage area of 17.7 square miles, with the confluence located immediately downstream of an Interstate 24 crossing. The stream flows through several miles of highly developed urban properties and provides valuable green space to thousands of local residents. Vegetated riparian zones provide a natural corridor for urban wildlife and birds, shades the stream, and furnishes opportunities for scenic and recreational experiences in an urban setting.

The principal causes of flooding problems in the repetitive loss areas are construction in the designated floodway and natural floodplain and a lack of adequate stormwater controls in the developed areas. Additional contributing factors include backwater flooding upstream from bridges, and relatively narrow floodplains in the tributaries that cause rapid concentration of runoff with very little peak attenuation. Without the use of stormwater controls, flood magnitudes in several of the flood prone areas are expected to increase significantly at predicted ultimate development conditions. There are several undeveloped areas in the watershed that have the potential to cause localized flooding once they are developed, if no stormwater controls are required.

Repetitive Loss Areas

The repetitive loss area is located between Nolensville Pike and Briarwood Drive (see Appendix C, Figure C.8). Currently, there are 12 properties reporting repetitive losses due to flooding on Sevenmile Creek. In addition, the associated repetitive loss areas encompass 146 properties (24 mitigated, 122 un-mitigated). The Sevenmile Creek Storm Water Basin Plan, completed in 2001, identifies these flood-prone areas and alternative solutions to reduce existing flooding problems.

Mill Creek Watershed – Sorghum Branch

The Mill Creek Sorghum Branch Watershed is located in southeast Davidson County and drains an area of 2.72 square miles. Stream flow within the watershed is generally in a northerly direction and empties into Mill Creek at Stream Mile 8.45 of Mill Creek. Maximum elevation at the upstream watershed divide reaches about 850 feet and drops to elevation 465 feet at the main stream confluence with Mill Creek. The Sorghum Branch watershed was divided into 14 sub-basins and is a relatively long and narrow watershed. Sorghum Branch is typified by narrow valleys with steep side slopes that transition into a rolling terrain on top of the ridges.

Mill Creek Watershed - Whittemore Branch

The Whittemore Branch Watershed has a drainage area of 3.7 square miles and is located in southeastern Davidson County. The mainstem flows in a northeasterly direction until its confluence with Mill Creek. The repetitive loss area extends from the upstream face of the bridge at Interstate 24 to the downstream face of the bridge at Bell Road.

The principal cause of flooding problems in the repetitive loss area is construction in the designated floodways and natural floodplains, in addition to the lack of adequate stormwater controls in the developed areas. Additional contributing factors include backwater flooding upstream from bridges, steep terrain, and relatively narrow floodplains in the tributaries that cause rapid concentration of runoff with little peak attenuation. Without the use of stormwater controls, flood magnitudes in the majority of the flood prone areas are expected to increase under predicted ultimate development conditions.

Repetitive Loss Areas

Currently, there is one property reporting repetitive losses due to flooding on Whittemore Branch. In addition, the associated repetitive loss areas encompass 142 properties (15 mitigated, 127 un-mitigated. See Appendix C, Figure C.9. The Whittemore Branch Storm Water Basin Plan, completed in 1996, identifies these flood-prone areas and alternative solutions to reduce existing flooding problems.

Homes are flooded at the existing conditions 10-year level and none at the 2-year level. However, analyses indicate flood damages begin at a recurrence interval of approximately 1 year. This occurs because the damage assessment analysis model assigns damage beginning when flood waters reach eight feet below the first finished floor.

Pages Branch Watershed

The Pages Branch Watershed is located in north-central Davidson County. Pages Branch originates at an elevation of approximately 680 feet and flows in a southwesterly direction to an elevation of approximately 374 feet at its mouth. The watershed drains an area of 3.23 square miles and empties into the Cumberland River at river mile 188.5. The watershed is divided into 4 sub-basins: Upper, Dickerson, Middle, and Lower. Two major tributaries empty into Pages Branch Mainstem. The watershed is characterized by flat to gently rolling plains with scattered, steep-sided hills reaching elevations up to 810 feet. Floodplain areas throughout the watershed are typically narrow and steep except in the lower reaches of the mainstem where they are flat. Seven flood-prone structures have been mitigated within this watershed.

Richland Creek Watershed

The Richland Creek Watershed is located in southwestern Davidson County. Richland Creek originates at an elevation of approximately 1,100 feet and flows in a north to northwesterly direction to an elevation of approximately 375 feet at its mouth. The watershed drains an area of 28.45 square miles and empties into the Cumberland River at river mile 175.6. The watershed is divided into 6 major sub-basins: Belle Meade, Vaughns Gap, Jocelyn Hollow, Sugartree, Middle, and Lower. There are five major tributaries that empty into Richland Creek Mainstem: Unnamed Tributary, Sugartree Creek, Jocelyn Hollow Branch, Vaughns Gap Branch, and Belle Meade Branch.

The watershed is characterized by rugged topography in the southern portion and flat to gently sloping plains with local hills reaching between 300-800 feet in the central and northern portions. Richland Creek and its tributaries flow through predominately urban settings.

Repetitive Loss Areas

Following the May 2010 flood event, a repetitive loss area was identified on the mainstem of Richland Creek north of the Interstate-40 overpass. The repetitive loss areas encompass 93 properties (61 mitigated, 32 un-mitigated). There are no repetitive loss properties remaining within this identified flood-prone area. See Appendix C, Figure C.16.

Richland Creek Watershed - Sugartree Creek

Sugartree Creek, a major tributary of Richland Creek, is located in southwestern Davidson County. The Sugartree Creek basin has a drainage area of 4.91 square miles and Sugartree Creek flows northwest and combines with Richland Creek downstream of West End Avenue. Sugartree Creek flows through predominantly urban settings. The repetitive loss area is located on both sides of Sugartree Creek along Dartmouth Avenue extending from the cul-de-sac of Wimbledon Road downstream to Woodmont Lane, with additional areas located downstream to Revere Private Road.

Repetitive Loss Areas

The principal causes of flooding in the repetitive loss area are construction in the designated floodways and natural floodplains and lack of adequate stormwater controls in the developed areas. Additional contributing factors include backwater flooding upstream from bridges and steep terrain and relatively narrow floodplains that cause rapid concentration of runoff with very little peak attenuation. Flood magnitudes in the repetitive loss areas are not expected to increase significantly at predicted ultimate development conditions compared to the level of existing urban development.

Currently, there are six properties reporting repetitive losses due to flooding on Sugartree Creek. In addition, the associated repetitive loss areas encompass 29 properties (4

mitigated, 25 un-mitigated) See Appendix C, Figure C.10. The Richland Creek Storm Water Basin Plan, completed in 1990, identifies these flood-prone areas and alternative solutions to alleviate existing flooding problems.

Stones River Watershed – East Fork Hamilton Creek

The Stones River Watershed is located in southeast Davidson County. East Fork Hamilton Creek originates at an elevation of approximately 735 feet and flows in a northerly direction to an elevation of approximately 485 feet at Percy Priest Lake. The watershed drains an area of 3.45 square miles and empties into Percy Priest Lake near Smith Springs Road. The watershed is divided into 4 main basins: Upper, Lower, Rural Hill, and Bluewater. There are two main unnamed tributaries to East Fork Hamilton Creek Mainstem. The watershed is characterized by flat to gently rolling plains and scattered, gently sloping hills reaching elevations up to 735 feet. Floodplain areas throughout the watershed are typically wide and flat, except in the upper reaches of the tributaries, where they are steep.

Stones River Watershed - McCrory Creek

The McCrory Creek Watershed has a drainage area of 9.31 square miles and is located in southeastern Davidson County. McCrory Creek flows north and discharges into the Stones River. The repetitive loss area is located on McCrory Creek Mainstem immediately downstream from Interstate 40 and extending from Elm Hill Pike to Stewart's Ferry Pike. These reaches encompass older and more established neighborhoods with a long history of flooding problems.

Flood damages within this watershed are generally due to rapid residential development without adequate stormwater controls in the upstream watershed areas combined with development along streams whose floodplain areas were not previously defined and regulated. Additional contributing factors include coincident peak flows from two-sub-basins within the watershed having approximately equal times-of-concentration located immediately upstream from the flood-prone areas, and steep terrain and narrow floodplains which cause a rapid concentration of runoff with very little peak attenuations. Table 4-22 provides specific damage information for each reach.

Repetitive Loss Areas

Currently, there are six properties reporting repetitive losses due to flooding on McCrory Creek. In addition, the associated repetitive loss area encompasses 102 un-mitigated properties (see Appendix C, Figure C.11). The McCrory Creek Storm Water Basin Plan, completed in 1988, identifies this flood-prone area and alternative solutions to reduce existing flooding problems.

Stones River Watershed - Scotts Creek

The Scotts Creek watershed has a drainage area of 3.39 square miles and is located in northeast Davidson County. Scotts Creek flows from north to south and empties into Stoner Creek at river mile 4.1. The watershed is divided into 19 sub-basins. Scotts Creek originates at an elevation of 600 feet and flows south to an elevation of 435 feet at its mouth. The watershed is characterized by flat to gently rolling plains with scattered, steep-sided hills reaching elevations of up to 600 feet. Floodplain areas throughout the watershed are typically narrow and steep, except in the lower reaches of the mainstream where they are flat and sometimes wide. There are two tributaries that flow into Scotts Creek at Stream Mile 0.9 (Tributary No. 2) and Stream Mile 0.21 (Tributary No. 3).

Whites Creek Watershed

The Whites Creek Watershed has a drainage area of 63.8 square miles and is located in north-central Davidson County. Whites Creek flows south and discharges into the Cumberland River.

The repetitive loss area is located on the right bank of Whites Creek mainstem extending from Knight Road downstream to Clarksville Pike. Flood damages within this repetitive loss area are due to construction in the natural floodplain. Flood damages have been aggravated by upstream and local urbanization, and backwater from several bridges.

Repetitive Loss Areas

Currently, there are 3 properties reporting repetitive losses due to flooding on Whites Creek. In addition, the associated repetitive loss areas encompass 183 properties (42 mitigated, 141 un-mitigated. See Appendix C, Figure C.12. The Whites Creek Storm Water Basin Plan, completed in 1988, identifies these flood-prone areas and alternative solutions to reduce existing flooding problems.

Two repetitive loss areas have also been identified along Ewing Creek within the Whites Creek watershed. One on the mainstem of Ewing Creek (Figure C.14) and one on North Fork Ewing Creek (Figure C.15). Within these repetitive loss areas, there are three properties reporting repetitive losses due to flooding on Ewing Creek and three properties on North Fork Ewing Creek. In addition, the associated repetitive loss areas encompass 15 properties (9 mitigated, 6 un-mitigated) on Ewing Creek and 183 properties (42 mitigated, 141 un-mitigated) on North Fork Ewing Creek.

Cumberland River

The Cumberland River is a major tributary of the Ohio River. It originates at the confluence of Poor and Clover Forks near the City of Harlan, Kentucky. The 694-mile river flows generally southwest to Nashville where it turns and flows northwest into western Kentucky and its confluence with the Ohio River. The Cumberland River

Watershed has a drainage area of 17,914 square miles, with approximately 12,841 square miles located upstream of Metro Nashville.

Repetitive Loss Areas

Two Repetitive Loss Areas are on the Cumberland River. The Cumberland River East area is located in the Pennington Bend area near the confluence of the Cumberland River and Gibson Creek. The repetitive loss areas encompass 68 properties (31 mitigated, 37 un-mitigated). There are no repetitive loss properties remaining within this identified flood-prone area. See Appendix C, Figure C.6.

The second Repetitive Loss Area, Cumberland River West, is located downstream of river mile 175, in the Cockrill Bend area. Several upstream control reservoirs provide the majority of flood damage abatement. However, in the repetitive loss area, flood problems are caused by the confluence of Overall Creek with the Cumberland River and inadequate stormwater controls on Overall Creek. The repetitive loss areas encompass 17 properties (1 mitigated, 16 un-mitigated). There are no repetitive loss properties remaining within this identified flood-prone area. See Appendix C, Figure C.13.

Past Occurrences

There have been 107 recorded flood events within Davidson County since July 1780. These events are reported in the Chronology of Disasters in TN (A.P. Coggins) and by the National Climatic Data Center, National Weather Service, and Metro Water Services. These events are presented in a tabular format within Appendix B.

Likelihood of Future Occurrences

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

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

Based on data from NCDC, from 1996 to 2014, there were 90 records of flood or flash flood events over an 18 year period. The average number of flood and flash flood events calculates to 5 events per year. The probability was assigned a rank of **frequent or very likely** to occur: events usually have a high number of recorded incidents or anecdotal evidence.

GEOLOGICAL HAZARDS

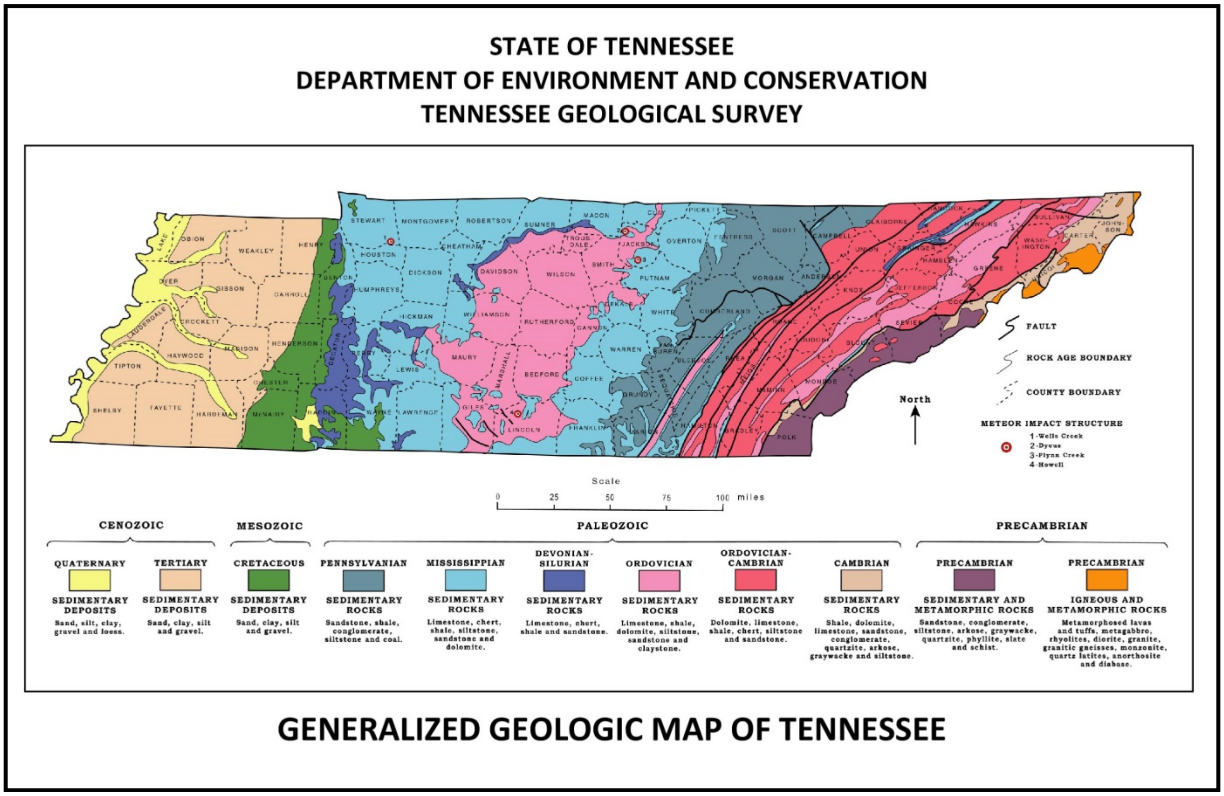


Figure 4-19: Generalized Geologic Map of TN

EARTHQUAKE

An earthquake is a shaking or trembling of the earth's surface caused by the lifting, shifting, breaking, or slipping of a fault line. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake.

Nashville is within proximity of two seismic zone the New Madrid Seismic Zone and the Southern Appalachian Seismic Zone, a portion of which is known as the East Tennessee Seismic Zone.

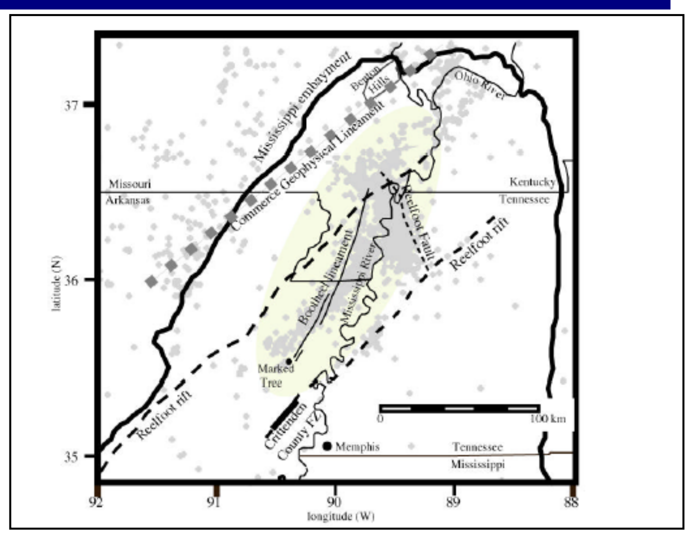


Figure 4-20a: Schematic Map of New Madrid Seismic Zone

The New Madrid Seismic Zone extends from west-central Mississippi northward past Cape Girardeau, Missouri. The center of this seismic zone is in New Madrid, Missouri, which is approximately 210 miles west of Nashville. It is the major source of seismic activity east of the Rocky Mountains. Although activity in the New Madrid Seismic Zone is less frequent than along the West Coast, when tremblers do occur, the destruction covers more than 20 times the area of an equivalent West Coast earthquake because of underlying geology. The largest earthquake in continental United States, according to the U.S. Geological Survey (USGS), occurred on the New Madrid fault in 1811.

Figure 4-20, is a schematic map of the New Madrid Seismic Zone showing major tectonic features, state boundaries, and major rivers. Instrumentally recorded seismicity delineates faults that probably ruptured in 1811-1812. Currently, aseismic structures (dashed lines) may also represent potential earthquake sources such as the Reelfoot rift boundaries, the Commerce geophysical lineament, the Crittendon County fault zone, and the Bootheel lineament.

The Southern Appalachian Seismic Zone (SASZ) extends from Alabama to Virginia with the most recent activity extending from northwestern Georgia through east Tennessee (the portion known as the East Tennessee Seismic Zone or ETSZ) (Figure 4.20b). The ETSZ is the most active seismic region in the eastern United States. Given the rate of seismicity in the ETSZ, it is somewhat surprising that the largest known earthquake in the ETSZ was the 1973 Alcoa, Tennessee earthquake, which had a magnitude of only 4.6 on the Richter magnitude scale.

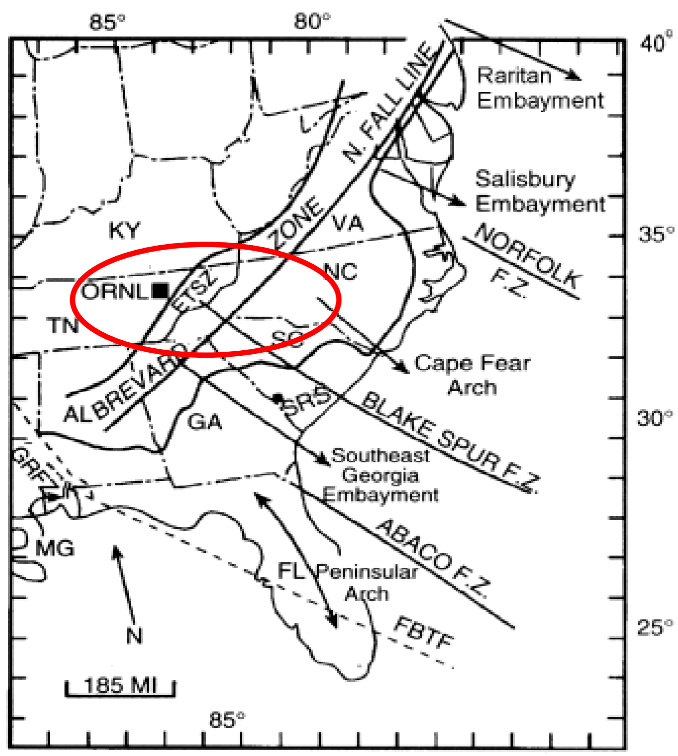


Figure 4-20b: Schematic Map of East Tennessee Seismic Zone

Several methods, compared in Table 4-12, have been developed to quantify the strength of an earthquake. The most recognized methods for measuring earthquake strength are:

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

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

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

Table 4-12: Comparison of Richter Magnitude and Modified Mercalli Intensity Scales

Ground Motion Amplification

Ground motion is the movement of the earth's surface due to earthquakes or explosions. It is produced by waves generated by a sudden slip on a fault or sudden pressure at the explosive source and travels through the earth and along its surface. Ground motion is amplified when surface waves of unconsolidated materials bounce off of or are refracted by adjacent solid bedrock.

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

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

When all the possible earthquakes and magnitudes have been considered, a ground motion value is determined such that the annual rate of its being exceeded has a certain value. Therefore, as presented on Figure 4-21, for the given probability of exceedance, ten percent, the locations shaken more frequently will have larger ground motions.

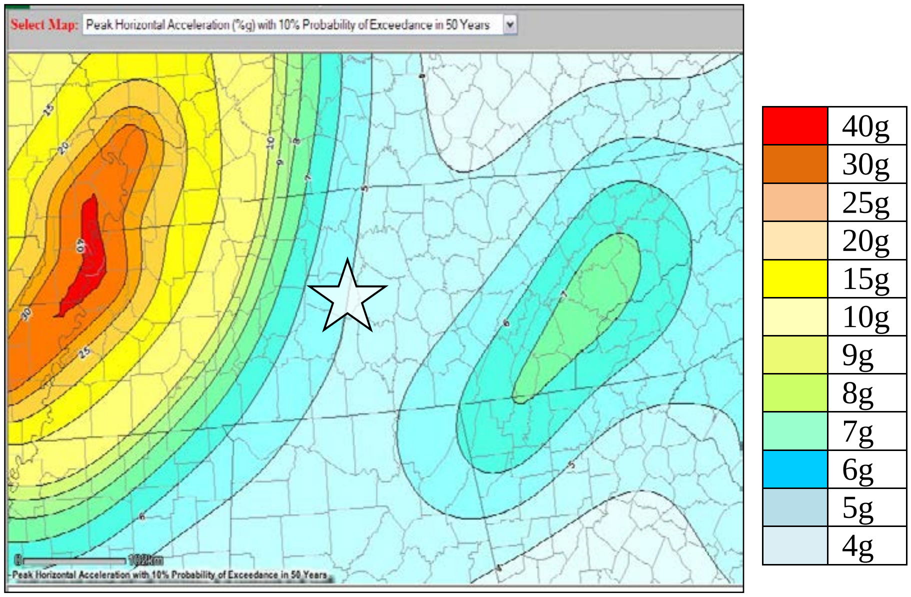


Figure 4-21: Peak Horizontal Acceleration with 10% Probability of Exceedance in 50 years. ***Source: USGS National Seismic Hazard Maps - 2008***

Past Occurrences

Earthquake events affecting the Nashville-Davidson County area are presented in Appendix B. The figure below presents the size and location of earthquake activity from 2000 to September 2009 within the New Madrid Seismic Zone.

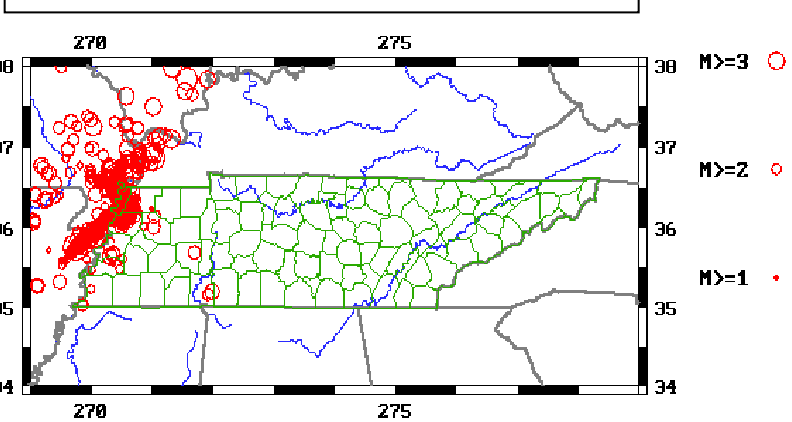


Figure 4-22: 2000-2009 Seismic Activity New Madrid Seismic Zone

Likelihood of Future Occurrences

According to the Tennessee Emergency Management Agency, instead of a prediction of when an earthquake will strike, an estimate of the likelihood of an earthquake recurring within a given time frame should be given:

- The U.S. Geological Survey (USGS) postulates the recurrence interval for a 5.0 magnitude event to be 10-12 years, and for a 6.0 magnitude event to be 70-90 years.
- The USGS and the Center for Earthquake Research and Information estimate that for a 50-year time period, the probability of a magnitude 7.5-8.0 event is 7-10 percent, and for a magnitude 6.0 or larger event is 25-40 percent.
- The highest recurrence rate of large earthquakes in Tennessee occurs in the northwestern quadrant of the state.
- New zones of relatively small seismicity have been identified near the Georgia-Tennessee border at Chattanooga, and roughly along Interstate 75 between Chattanooga and Knoxville. This area has not been studied enough to ascertain the expectancy of seismic event histories or likelihoods.

The New Madrid Seismic Zone is an active seismic zone, averaging more than 180 events per year that measure 1.0 or more on the Richter scale. This is equivalent to approximately 15 events per month. Events measuring 2.5-3.0 on the Richter scale includes tremors large enough to be felt and are noted annually. Every 18 months, the New Madrid Seismic Zone releases a shock of 4.0 or more, capable of local minor damage. Magnitudes of 5.0 or greater occur approximately once per decade, can cause significant damage, and are felt in several states. A damaging earthquake in the New Madrid Seismic Zone (6.0 or greater) occurs about every 80 years (the last one occurred in 1895).

A major earthquake in the New Madrid Seismic Zone (7.5 or greater) happens every 200-300 years (the last one occurred in 1812). It is predicted that there is a 25 percent chance of a disastrous major earthquake by 2040. A New Madrid Seismic Zone rupture of this size would be felt throughout half the United States and damage would be expected in 20 states or more. Events measuring 6.0-7.6 have more significant probabilities in the near future. A 6.0 shock has a 90 percent chance of occurring by the year 2040.

Only one or two earthquakes with magnitudes equal to or greater than 3.0 are expected in the SASZ per year. The extrapolated, expected recurrence time for earthquakes with magnitudes of 6.0 or greater in the SASZ is 186 years (Bollinger et al., 1989).

Studies were conducted by the Mid-America Earthquake Center under a $12 Million contract for the Dept. of Homeland Security and FEMA from 2006 to 2009 for projected damage figures for a 7.7 New Madrid Earthquake Event. This data was used to conduct a scenario for the National Level Exercise 2011 for all Federal Agencies, including the Dept. of Defense and all 22 affected state jurisdictions. Detailed information for Davidson County is discussed in section 4.2.

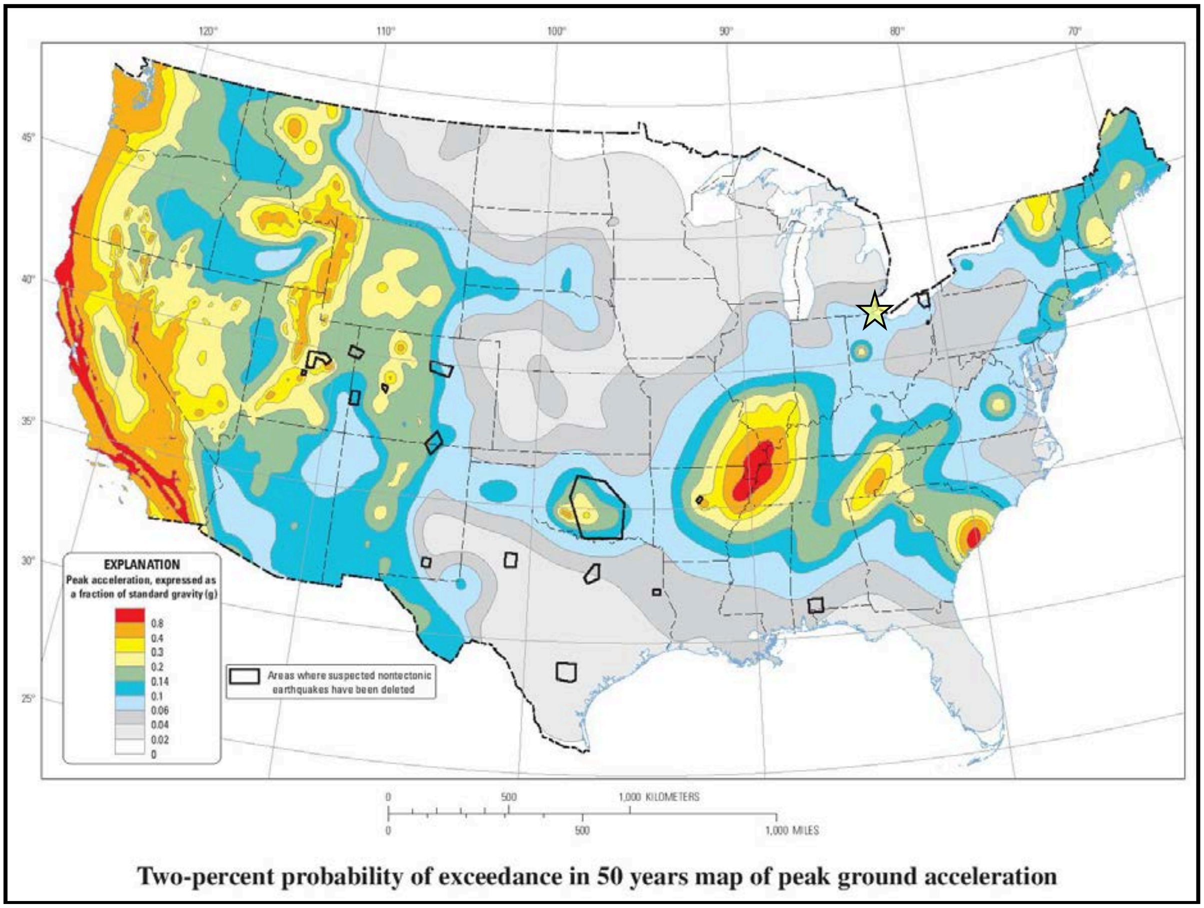


Figure 4-23: Seismic Hazard Map of US (as of November 2014)
(source: earthquake.usgs.gov)

LANDSLIDES

Figure 4-24: Evidence of Landslides

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

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

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

Steep slopes, present throughout the Metro area, specifically in south-central Davidson and north-central Williamson Counties, have the potential to be unstable. Landslides have occurred in this area due to construction-altered colluvium soils on steep slopes adjacent to the Highland Rim escarpment. Colluvium soils are derived from the weathering and erosion of the siliceous Fort Payne Formation, and are composed chiefly of silt- to clay-sized fragments of silica with some fragments ranging up to boulder size.

Developments on steeper slopes in recent years have increased the number of landslides and the potential for landsliding in areas around Nashville, especially in the Bellevue area of southwestern Davidson County. Most recent landslide incidents have occurred on Dellrose soils at the base of the Fort Payne-Chattanooga slopes.

Figure 4-24 presents evidence of a landslide that occurred at an apartment complex along Edmondson Pike. The slides average about 200 feet in width, 150 feet in length, and have steep surfaces on the undisturbed ground at the upper edge of the landslide ranging from about 3 feet to 24 feet. These slides are significant because they occurred in residential subdivisions with resulting financial loss to many property owners. Damage ranged from minor cracks in retaining walls and foundations to major structural failure of residences. Roadways and driveways were crumpled, dislocated, or cracked.

Figure 4-25 shows pictures taken from Metro Planning's pictometry flights just days after the May 2010 flood.

Figure 4-25: Evidence of Landslides after May 2010 Flood

Past Occurrences

Several landslides occurred in Nashville in the early 1970s. In particular, many landslides occurred in 1975, partially because of heavy rainfall. Approximately 40 slides were visited after the rains of March 11-13, 1975. One special problem was created in the case of a Tennessee Valley Authority transmission line tower located adjacent to one of the slides. The upper scarp of a slide that occurred March 11, 1975 (one occurred in the same location in 1974) was only 30 feet downhill from the lower legs of the tower. Within the following month, transverse cracks and scarps were forming all around the tower, causing the tower legs to buckle, the base was moved outward and downward, where the tower was tilting uphill. The tower has since been removed from the site.

During the construction of U.S. Highway 70 across Nine Mile Hill, fill failure over colluvium caused continuing problems. In 1973, there was subsequent collapse of deeply weathered Fort Payne and Chattanooga material onto the roadway at the same time.

Old alluvium in a cut on Interstate Highway 40 just northeast of the U.S. Highway 70 South interchange failed, requiring construction of a reinforced retaining wall. Failure of the same material at a service station at this intersection required similar construction.

Most recently, many landslides occurred as a result of the May 2010 flooding as shown in Figure 4-26a and in Appendix B.

Slopes greater than 25% are presented in Figure 4-26b.

Likelihood of Future Occurrences

Although the physical cause of many landslides cannot be removed, geologic investigations, good engineering practices, and effective enforcement of land use management regulations can reduce landslide hazards. Metro subdivision regulations designate lots with steeps slopes as critical lots, which require review of planned buildings on the lots. Lots are designated critical during the preliminary plat review process based on soil conditions, degree of slope or other lot features, and to address concerns relating to the feasibility of construction. However, outside of subdivision development, the critical lot concept is not utilized.

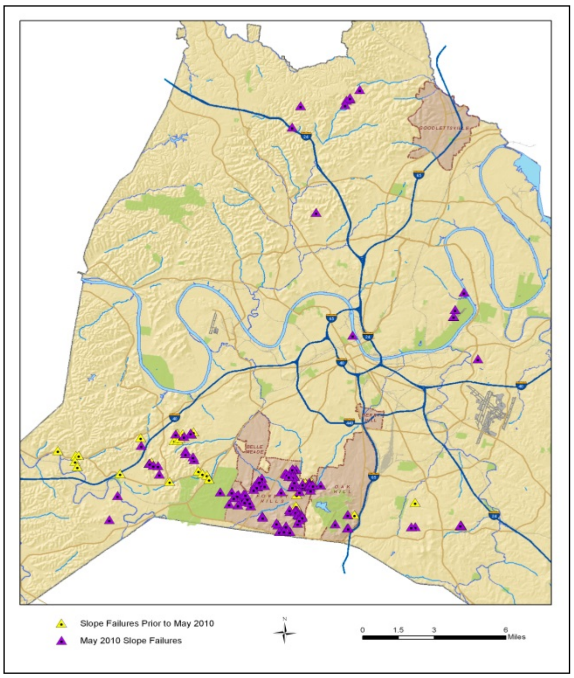


Figure 4-26a: Slope Failure Locations

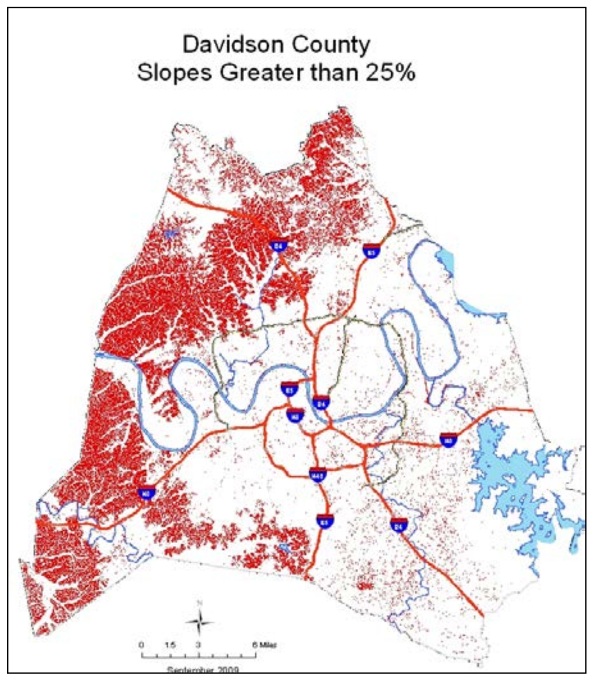


Figure 4-26b: Slopes greater than 25%

SINKHOLES

Karst is a distinctive topography in which the landscape is shaped by the dissolving action of water on carbonate bedrock (usually limestone, dolomite, or marble). Davidson County is characterized by gently folded and flat-lying carbonate rocks, indurated limestone, and dolomite that have not been strongly deformed. Dissolution in this region may produce solution, collapse, and cover-collapse sinkholes.

Solution sinkholes form as the limestone dissolves, creating sunken areas in the land surface. Collapse sinkholes form when caves collapse and suddenly drop a portion of the land surface above. Damage to buildings commonly results from collapse of soil and/or rock material into an open void space near or beneath man-made structures. As shown in figure 4-27, these three photos from different parts of the county proves that sinkholes happen all over the county; downtown, west and southeast.

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

Figure 4-27: Local Sink Holes

Within Metropolitan Nashville-Davidson County, areas susceptible to sinkhole formations have been noted adjacent to J. Percy Priest Lake (see Figure 4-28).

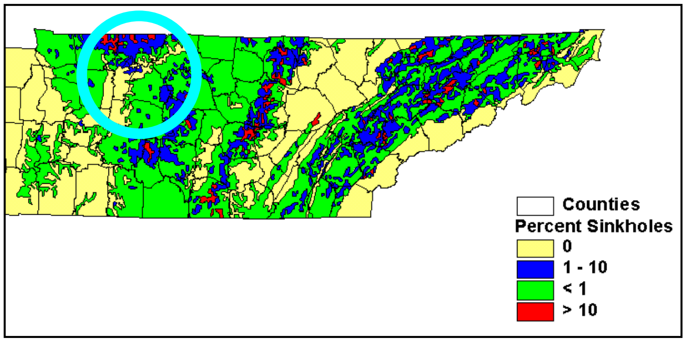
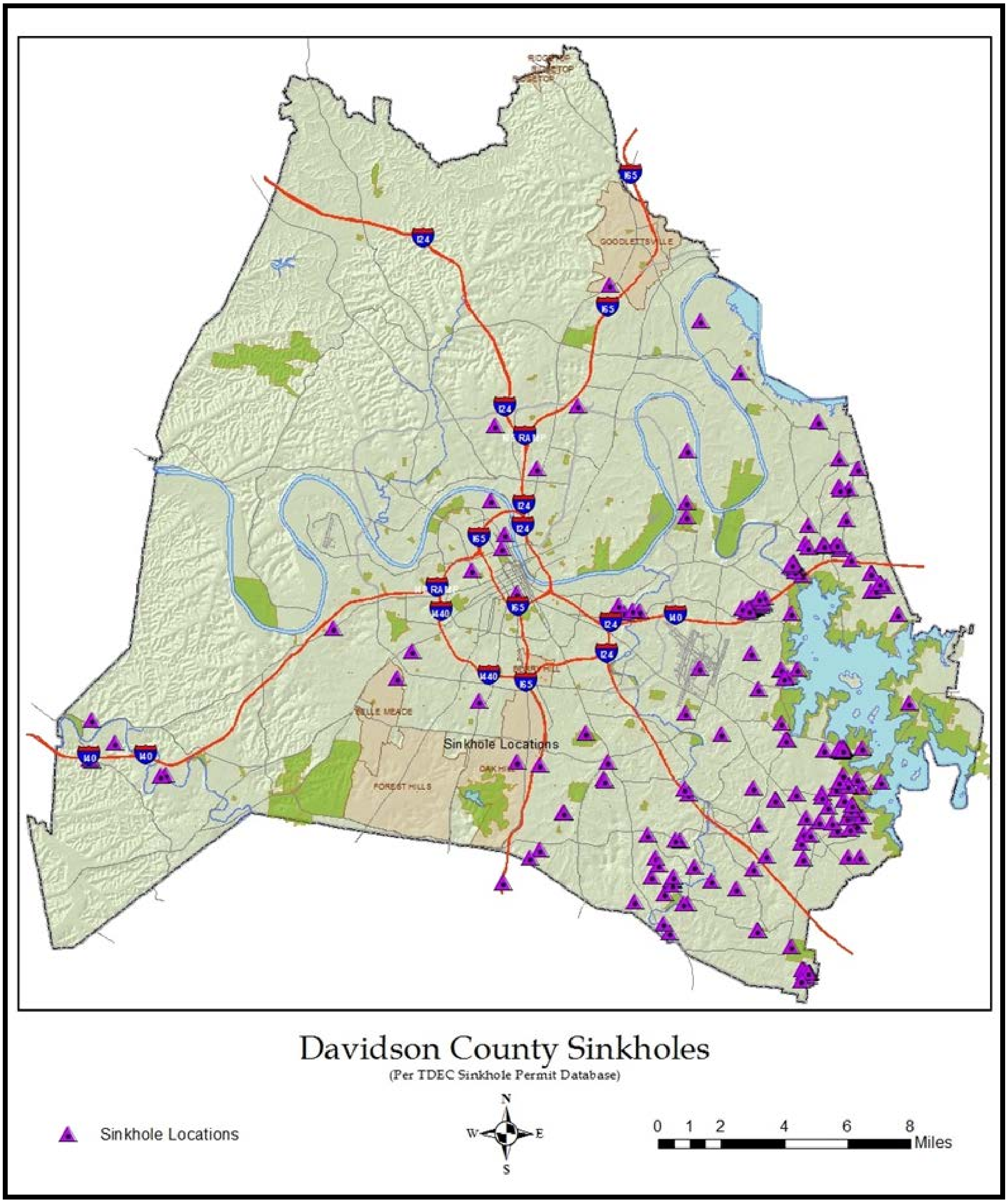


Figure 4-28: Karst Hazard Map of Tennessee

(Source: TDEC Ground Water 305b Water Quality Report, November2002)

Figure 4-29: Map of Davidson County Sinkholes per TDEC Sinkhole Permit Database 2014
(Provided by Metro GIS Planning)



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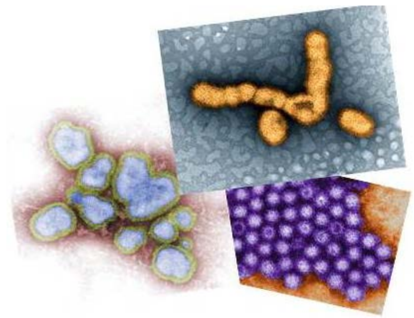
COMMUNICABLE DISEASES

Communicable diseases, sometimes called infectious diseases, are illnesses caused by organisms such as bacteria, viruses, fungi and parasites. Communicable diseases may be spread directly from one infected person to another, from an animal to a human or from some inanimate object (doorknobs, table tops, etc.) to an individual.



Past Occurrences

Examples of communicable disease outbreaks seen historically in TN are West Nile Virus (mosquito-borne), bed bugs and pertussis (whooping cough). The most recent declared communicable disease emergency in TN was the H1N1 (swine flu) pandemic in 2010, which was a worldwide event.

Likelihood of Future Occurrences

Because there are so many different types of communicable diseases, prevention and mitigation are dependent on the specific outbreak. Depending on the disease, prevention and mitigation could range from washing hands to covering cough to isolation and quarantine. It is the responsibility of the Director of Health to recognize various characteristics of the communicable disease and create/implement prevention and mitigation measures.

Davidson County communicable disease surveillance and control activities are coordinated by the Metro Public Health Department in conjunction with the Tennessee Department of Health.

MAN-MADE HAZARDS

For the purpose of this plan, "man-made hazards" are technological hazards and terrorism. These are distinguished from natural hazards in that they originate from human activity. The term "technological hazards" refers to the origins of incidents that can arise from human activities such as the manufacture, transportation, storage, and use of hazardous materials.

The term "terrorism" refers to intentional, criminal and malicious acts. Terrorism is officially defined in the Code of Federal Regulations as "...the unlawful use of force or violence against persons or property to intimidate or coerce a Government, the civilian population, or any segment thereof, in furtherance of political or social objectives." For the purposes of mitigation planning, "terrorism" refers to the use of Weapons of Mass Destruction (WMD) including biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases; and "cyber terrorism."

Mitigation planning refers to specific actions that can be taken to reduce loss of life and property from manmade hazards by modifying the built environment to reduce the risk and potential consequences of these hazards.

Preparedness includes plans and preparations made to save lives and property and to facilitate response operations. Response includes actions taken to provide emergency assistance, save lives, minimize property damage, and speed recovery immediately following an incident or disaster. Recovery includes actions taken to return to a normal or improved operating condition following an incident or disaster.

This Plan is intended to serve many purposes, including:

- **Increasing public awareness** to help residents of Davidson County better understand the natural and manmade hazards that threaten public health, safety, and welfare; economic vitality; and the operational capability of important institutions;
- **Enhancing decision making capacity** by providing information that managers and leaders of local government, business and industry, community associations, and other key institutions and organizations need to take action to address vulnerabilities to future disasters;
- **Developing a detailed community profile** that can be utilized to as reference when considering the potential impacts that a hazard can have on a range of community assets;
- **Providing inter-jurisdictional coordination of mitigation-related programming** to ensure that proposals for mitigation initiatives are reviewed and coordinated among the participating jurisdictions within the county; and
- **Promoting compliance with state and federal programming** to ensure that Davidson County and its communities can take full advantage of state and federal grant programs that encourage or mandate efficient hazard mitigation planning.

SEVERE WEATHER

DROUGHT

A drought is a period of drier-than-normal conditions that results in water-related problems. Precipitation (rain or snow) falls in uneven patterns across the country. The amount of precipitation at a particular location varies from year to year but, over a period of years, the average amount is fairly constant. The average monthly precipitation for Nashville is presented in the Table 4-13.

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Nashville International Airport	3.75	3.94	4.11	4.00	5.50	4.14	3.64	3.17	3.41	3.04	4.31	4.24	47.25
Old Hickory Dam	3.50	4.06	4.23	4.08	5.17	3.98	3.87	2.94	3.48	3.16	3.95	4.73	47.15

Table 4-13: Precipitation Normals (inches)

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

A common indicator of drought is the Palmer Drought Severity Index (PDSI). The PDSI is a soil moisture algorithm calibrated for relatively homogeneous regions. It is used by many U.S. government agencies and states to trigger drought relief programs. It was also the first comprehensive drought index developed in the United States. The classifications of the PDSI are presented in Table 4-14.

Palmer Classifications	
4.0 or more	Extremely wet
3.0 to 3.99	Very wet
2.0 to 2.99	Moderately wet
1.0 to 1.99	Slightly wet
0.5 to 0.99	Incipient wet spell
0.49 to -0.49	Near normal
-0.5 to -0.99	Incipient dry spell
-1.0 to -1.99	Mild drought
-2.0 to -2.99	Moderate drought
-3.0 to -3.99	Severe drought
-4.0 or less	Extreme drought

Table 4-14: Palmer Classifications

However, there is a newer index, Standardized Precipitation Index (SPI) that is based on the probability of precipitation for any time scale. The SPI can be computed for different time scales, and can provide early warning of drought and help assess drought severity, and is less complex than the Palmer Index.

The Western Regional Climate Center calculates the Standardized Precipitation Index (SPI) for a variety of time scales ranging from 1 month to 72 months. Figure 4-30 depicts the 48 month SPI as of September 2014, and shows the central portion of Tennessee was near normal for that time period. During periods of drought, historically the Governor or Mayor has called for a ban of open burning in an effort to reduce the risk of wildfire.

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

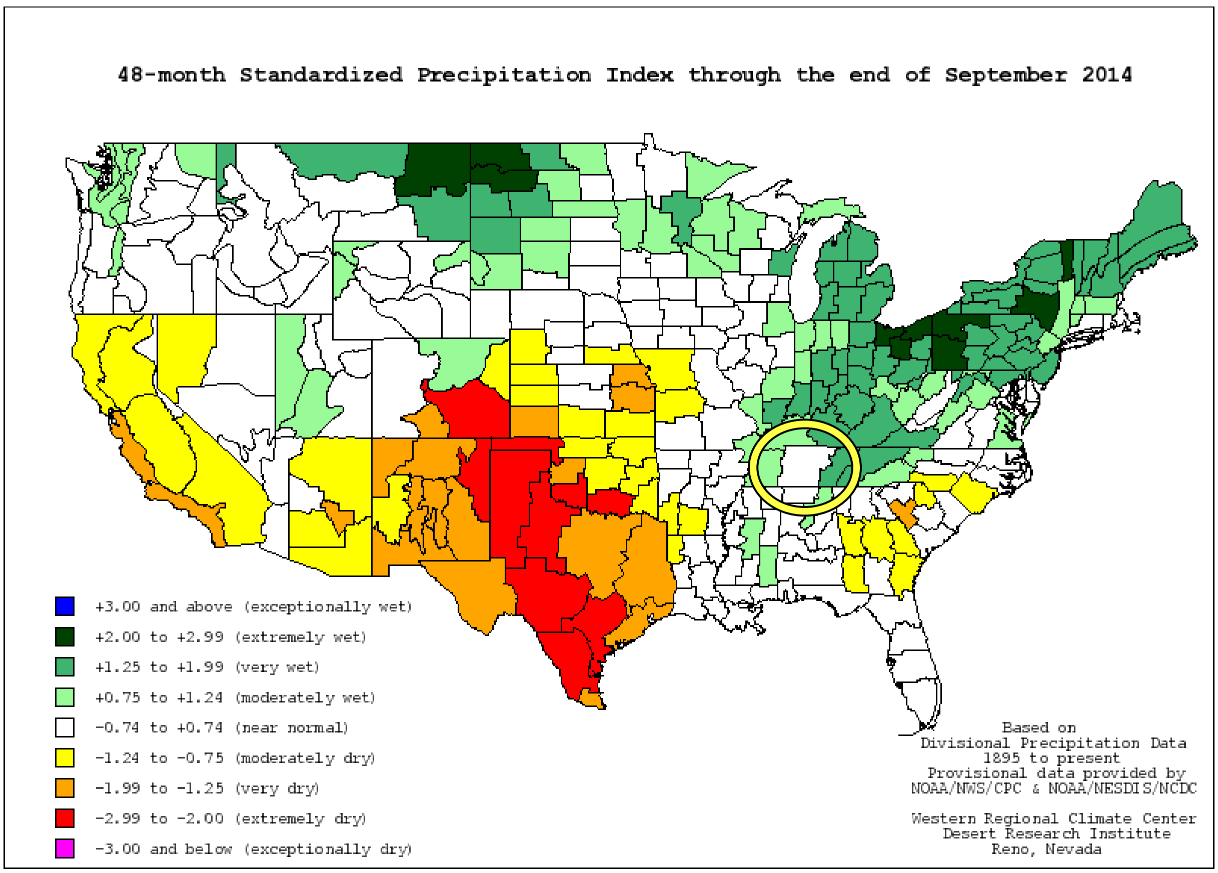


Figure 4-30: Standardized Precipitation Index (SPI)

Past Occurrences

There have been over 16 recorded droughts encompassing the Nashville-Davidson County area since 1797. Drought events are presented in Appendix B.

Likelihood of Future Occurrences

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

The example shown in figure 4-31 indicates the seasonal outlook for the United States as of October 2014. The Nashville-Davidson County area is not expected to experience drought based on this outlook.

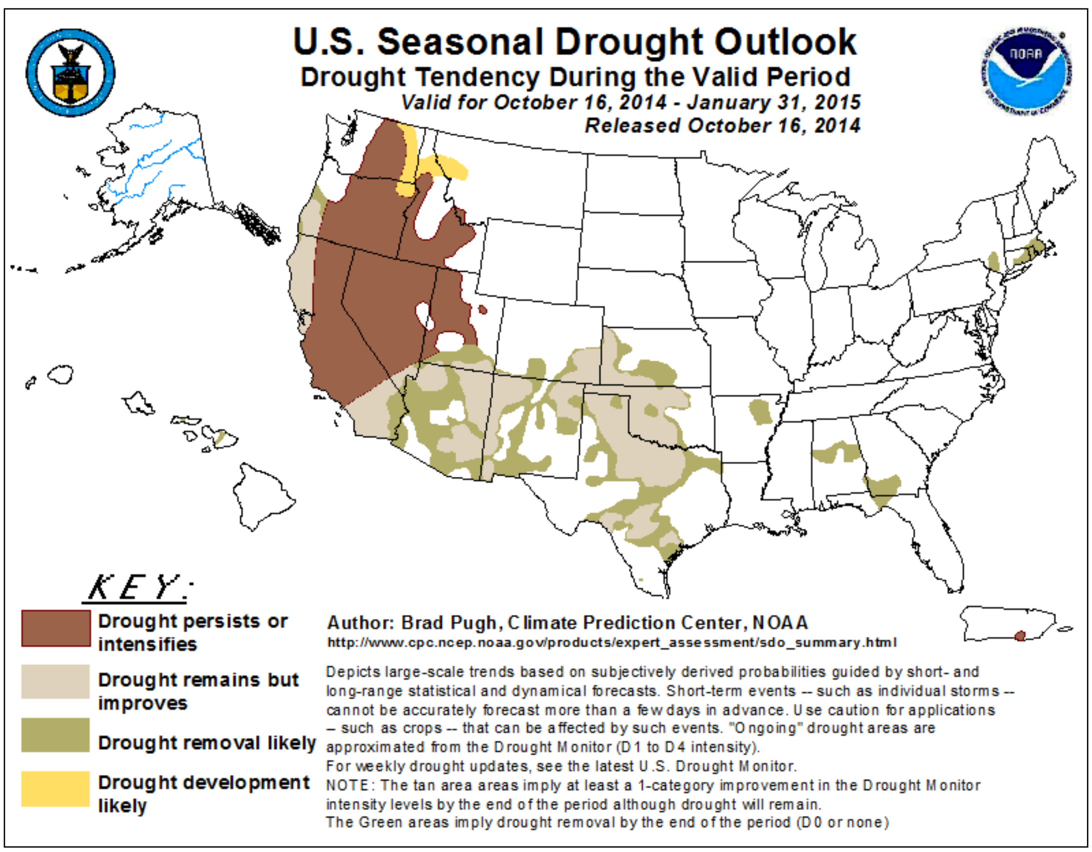


Figure 4-31: U.S. Seasonal Drought Outlook Oct. 2014

WILDFIRES

Heavily wooded or forested areas cover only a small portion of Davidson County's total land area, however, wildfires are not only in forested areas, many occur in grassland areas such as yards and pastures, primarily due to escaped debris burns. According to the TN Division of Forestry, debris burning and arson are the two main causes of wildfires. Debris burning is not allowed within Davidson County without a permit.

Nonetheless, when the conditions are right, all these areas become vulnerable to devastating wildfires. Also, in the last few decades, the risks associated with Davidson County's wildfire hazard have increased dramatically due to the increase in urban development in and around forested areas.

Generally, there are three major factors that sustain wildfires and allow for predictions of a given area's potential to burn. These factors include:

- Fuel;
- Topography; and
- Weather.

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

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

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

The National Weather Service Fire Weather Program emerged in response to a need for weather support to large and dangerous wildfires. This service is provided to federal and state land management agencies for the prevention, suppression, and management of forest and rangeland fires. The National Weather Service Forecast Office in Nashville provides year-round fire weather forecasts for most of Middle Tennessee. Routine fire weather forecasts are issued daily for Tennessee Division of Forestry Districts (Figure 4-32). Nashville/Davidson County is located within the Highland Rim District.

Figure 4-32: Tennessee Forestry Districts

Past Occurrences

Information about past events is presented in Appendix B.

HIGHLAND RIM DISTRICT WILDFIRE STATISTICS							
YEAR	TOTAL NUMBER FIRES	CAUSES - #		CAUSES - %		TOTAL ACRES BURNED	AVG FIRE SIZE
		DEBRIS	INCENDIARY	DEBRIS	INCENDIARY		
1997	326	162	94	50%	29%	1893	5.8
1998	394	192	110	49%	28%	2354	6.0
1999	1026	421	323	41%	31%	8354	8.1
2000	668	292	228	44%	34%	3689	5.5
2001	552	273	147	49%	27%	3689	6.7
2002	302	148	86	49%	28%	1627	5.4
2003	290	142	93	49%	32%	892	3.1
2004	380	195	115	51%	30%	2061	5.4
2005	519	261	145	50%	28%	2128	4.1
2006	700	383	156	55%	22%	4441	6.3
2007	825	362	190	44%	23%	6092	7.4
2008	275	132	59	48%	21%	1633	5.9
2009	299	163	65	55%	22%	2221	7.4
2010	375	194	91	52%	24%	2878	7.7
2011	289	122	68	42%	24%	2523	8.7
2012	249	98	58	39%	23%	1528	6.1
2013	159	75	52	47%	33%	774	4.9
AVERAGES	**449**	**213**	**122**	**48%**	**27%**	**2869**	**6.1**

Table 4-15: Highland Rim Wildfire Stats

Likelihood of Future Occurrences

The current US Forest Service forecasts a **low** fire danger potential for Nashville, presented in Figure 4-33.

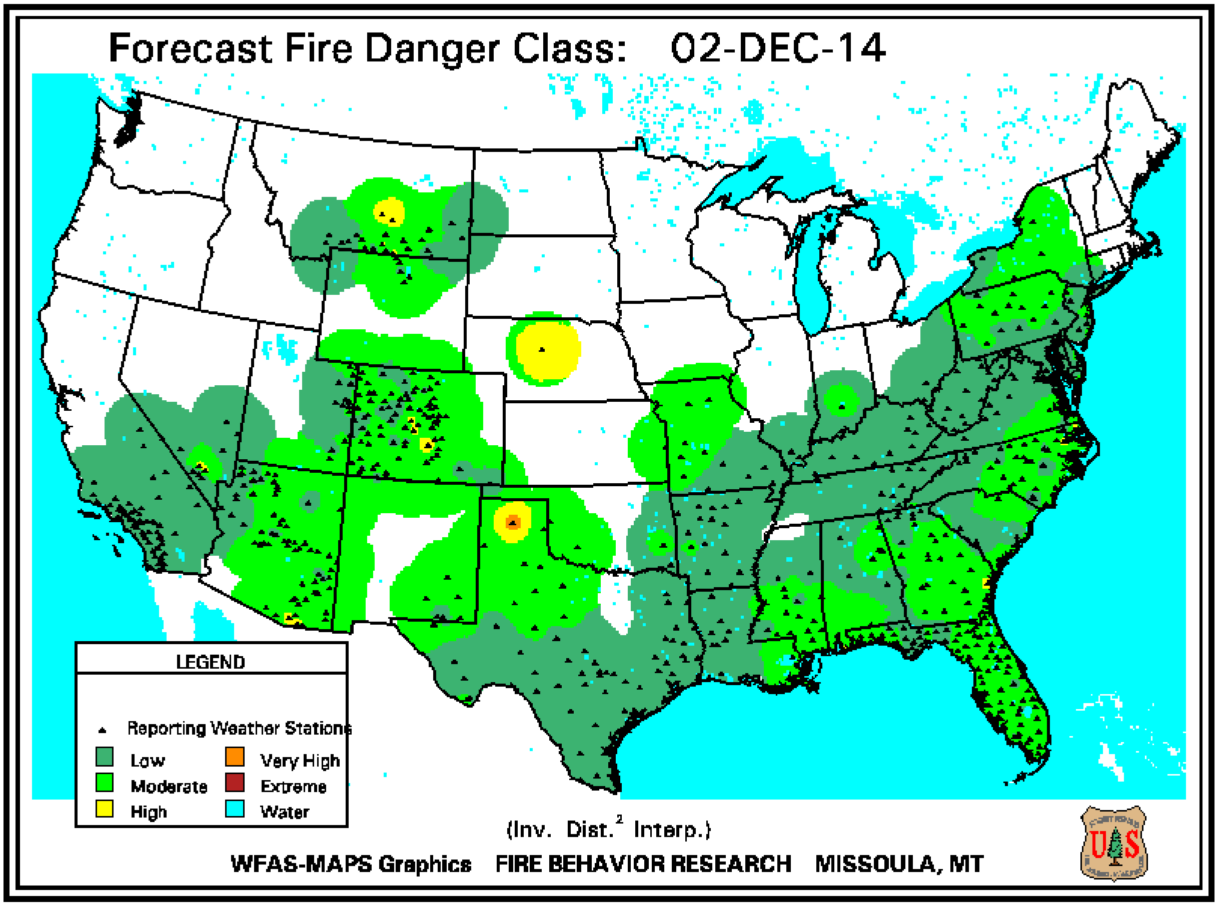


Figure 4-33: Forecast Fire Danger Class

EXTREME TEMPERATURES

Extreme temperature events, both hot and cold, can have severe impacts on natural ecosystems, agriculture and other economic sectors, and human health and mortality. The normal monthly temperatures for Nashville are presented in Table 4-16 and Figure 4-34.

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Nashville International Airport	37.7	41.7	50.0	59.0	67.5	75.7	79.4	78.7	71.5	60.3	49.8	40.4	59.3

Table 4-16: Temperature Normals (°F)

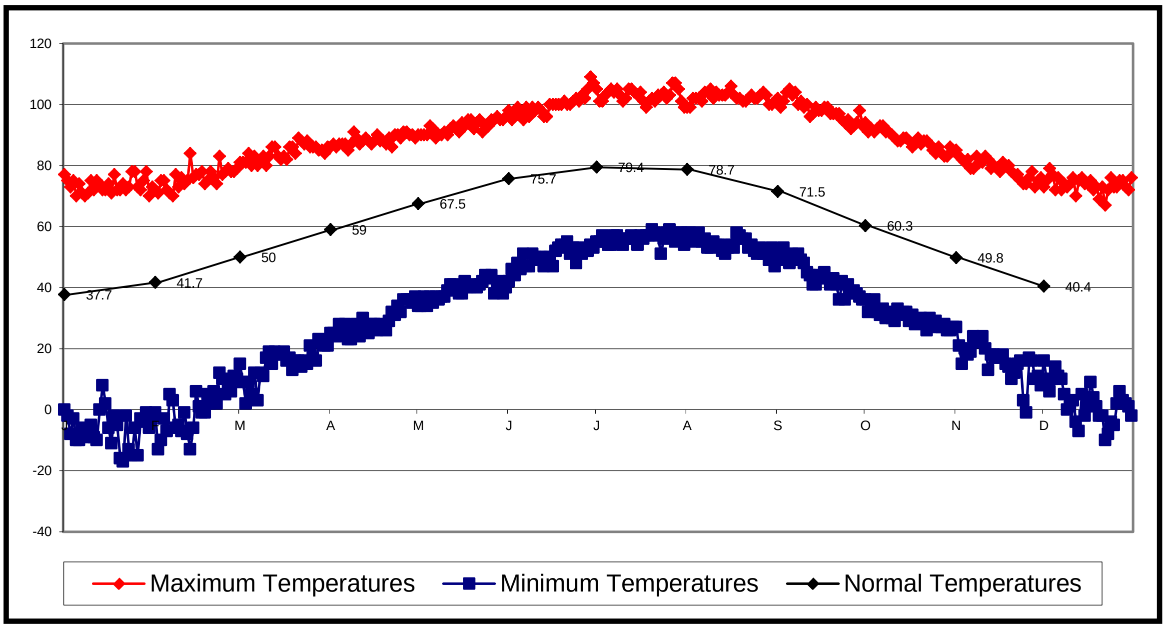


Figure 4-34: Normal Monthly Temperatures

(Source: http://www.nws.noaa.gov/climate/xmacis.php?wfo=ohx)

High Temperatures

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

In an effort to alert the public to the hazards of prolonged heat and humidity episodes, the National Weather Service devised the "heat index". The heat index is an accurate measure of

how hot it feels to an individual when the effects of humidity are added to high temperature. Table 4-17 presents heat index values and their potential physical effects.

The National Weather Service will issue a *Heat Advisory* for Nashville-Davidson County when daytime heat indices are at or above 105°F and nighttime heat indices are at or above 75°F. An *Excessive Heat Warning* is issued when the heat index equals or exceeds 115°F for three hours or longer with a minimum heat index of at least 80°F during a 24-hour period. An excessive heat advisory is also issued when heat advisory conditions persist for at least 3 days. In either of these scenarios, the heat becomes dangerous for a large portion of the population.

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

Table 4-17: Heat Index Values and Effects

Cold Temperatures

The National Weather Service will issue a Wind Chill Advisory for Nashville-Davidson County when wind-chill temperatures are expected to reach –5°F to –15°F, and a Wind Chill Warning would be issued if it is expected to reach colder than -15°F.

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

Specifically, the new WCT index:

- Calculates wind speed at an average height of five feet (typical height of an adult human face) based on readings from the national standard height of 33 feet (10m);
- Is based on a human face model;
- Incorporates modern heat transfer theory (heat loss from the body to its surroundings, during cold and breezy/windy days);
- Lowers the calm wind threshold to 3 mph;
- Uses a consistent standard for skin tissue resistance; and
- Assumes no impact from the sun (i.e., clear night sky).

Past Occurrences

There have been over a hundred recorded extreme temperature events in Davidson County since 1816. These events are presented in Appendix B.

Likelihood of Future Occurrences

On average, extreme temperature events have occurred once every 0.5 years, suggesting a similar recurrence period.

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THUNDERSTORMS

Thunderstorms are defined as localized storms, always accompanied by lightning, and often having strong wind gusts, heavy rain and sometimes hail or tornadoes. Thunderstorms can produce a strong out-rush of wind known as a downburst, or straight-line winds which may exceed 120 mph. These storms can overturn mobile homes, tear roofs off of houses and topple trees.

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

- Hail measuring 1 inch or greater;
- Winds gusting in excess of 50 knots (57.5 mph); or
- A tornado.

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

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

Lightning

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

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

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

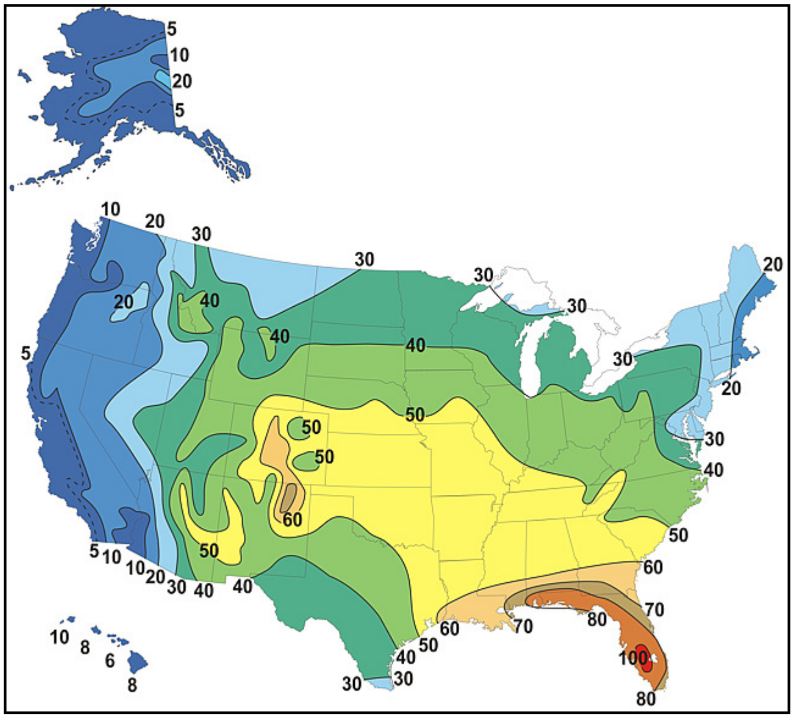

Figure 4-35: Average Number of Thunderstorm Days Per Year (source: NOAA)

Past Occurrences

There have been over 300 recorded thunderstorm/high wind events in Davidson County since 1872. These events are presented in Appendix B. *If damage reported from wind & hail events is under ~$100k, they are not significant enough to list in Appendix B, as of 2012)*

Likelihood of Future Occurrences

Thunderstorms are very likely to occur in Nashville-Davidson County approximately 50 to 60 days each year (Figure 4-35). Even though thunderstorms occur regularly, severe thunderstorms are fairly uncommon. However, as the population grows and development increases the likelihood of a severe thunderstorm impacting Davidson County also increases. During the time span of 1990-2009 there were slightly more than 1 severe hail event and about 8 severe wind events per year. Since 2010 that has increased to about 2 severe hail events and 12 severe wind events per year.

TORNADOES

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

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

Tornados are classified using the tornado scale developed by Dr. Theodore Fujita. The Fujita Tornado Scale assigns a category to tornados based on their wind speeds and relates this to the general type of damage that is expected. Ratings range from F0 (light damage), to F5 (total destruction). The Fujita scale and revised Enhanced Fujita Scale is presented in Table 4-18. Approximately ninety percent of tornados nationwide recorded between 1956 and 2001 were F2, F1, and F0 tornados. Most of these (68 percent of all tornados) were F1 and F0 tornados.

FUJITA SCALE			DERIVED EF SCALE		**OPERATIONAL EF SCALE**	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	**EF Number**	**3 Second Gust (mph)**
0	40-72	45-78	0	65-85	**0**	**65-85**
1	73-112	79-117	1	86-109	**1**	**86-110**
2	113-157	118-161	2	110-137	**2**	**111-135**
3	158-207	162-209	3	138-167	**3**	**136-165**
4	208-260	210-261	4	168-199	**4**	**166-200**
5	261-318	262-317	5	200-234	**5**	**Over 200**

Table 4-18: Fujita & Enhanced Fujita Tornado Scale

Past Occurrences

Figure 4-36: Tornado Damage

Several severe tornadoes have passed through Nashville, damaging property and taking lives in many of those instances. The tornado that occurred on April 16, 1998 caused the most damage ever in Davidson County because its path was through downtown Nashville (Figure 4-37). As a result, 35 buildings in downtown Nashville were "red tagged", meaning they were rendered structurally unsound. The tornado continued east and hit the residential section of East Nashville where at least 300 homes were damaged. Over a thousand trees were blown down at Andrew Jackson's home, The Hermitage. Some of the trees were well over 200 years old, and a few of the trees that were destroyed were planted by Andrew Jackson himself. Nashville Electric Service reported that 75,000 customers lost power. In April 2006 at 1308 hours, an F3 tornado struck 2.6 miles W of Goodlettsville and continued into Sumner County. This tornado killed 7 people and injured 128 and was on the ground for over 22 miles. Tornado reports are illustrated in Figure 4-38. Updated list of these events are presented in Appendix B.

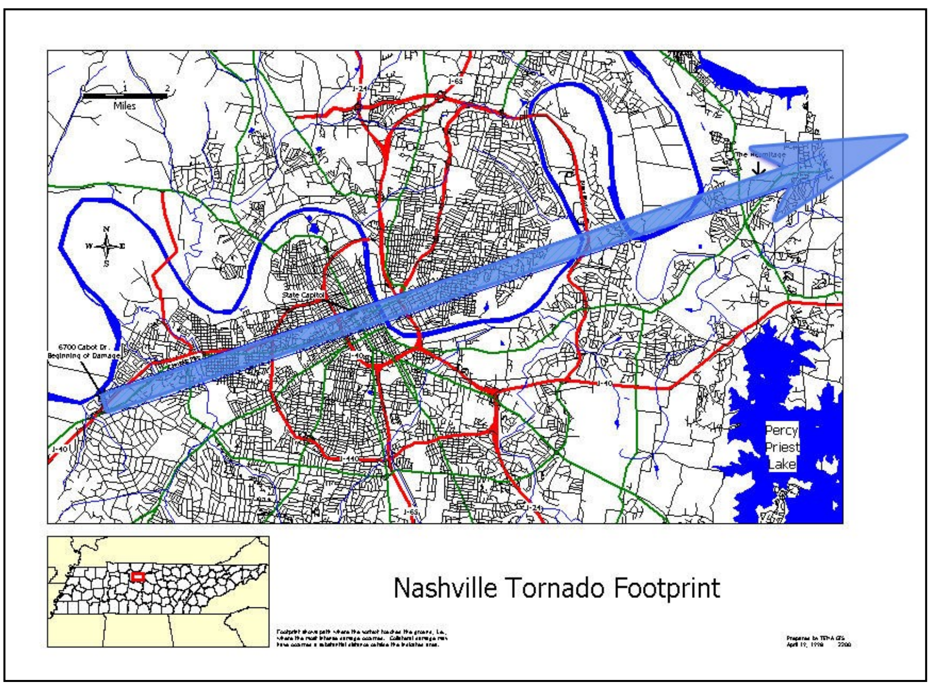

Figure 4-37: Footprint of April 16, 1998 Tornado

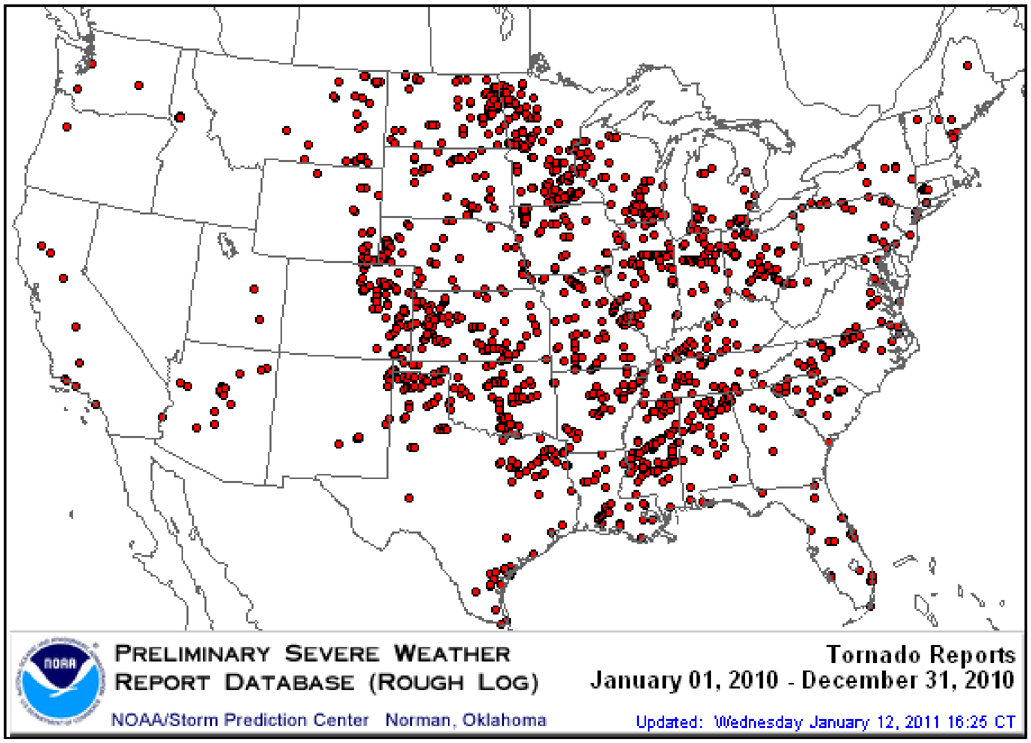

Figure 4-38: Tornado Reports 2010

Likelihood of Future Occurrences

Based on NOAA, Storm Prediction Center Statistics, Nashville is located in an area of High Risk for tornadoes. Thunderstorms that produce tornadoes are very rare with about 1 tornado touching down in Davidson County about every 3 years. However, as the population grows and development increases, the likelihood of a tornado touching down in Davidson County also increases. Since 1950, Davidson County has averaged about 1 event every 2 years, with an EF2 tornado touching down about every 6 years. When the statistics for the counties surrounding Davidson County are included, there are approximately 2.5 tornado events each year, and an EF2 event occurs every 1.5 years.

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WINTER STORMS

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

The types of winter precipitation that may occur in Davidson County include:

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

The average monthly snowfall for the Nashville-Davidson County area is presented below in Table 4-19.

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Nashville International Airport	2.3	2.2	0.7	---	---	---	---	---	---	---	0.1	0.6	5.5
Old Hickory Dam*	0.4	0.3	0.1	---	---	---	---	---	---	---	---	0.1	1.0

Table 4-19: Snowfall Summary (inches), 1981-2010 National Climatic Data Center

**Dataset for Old Hickory Dam was missing two big snow years (1984-1986), so the normals are noticeably lower than the Nashville Int'l Airport.*

Past Occurrences

There have been over 164 recorded winter storm events in Davidson County since 1779. These events are presented in Appendix B.

Likelihood of Future Occurrences

Nashville and Davidson County may anticipate 6 to 12 inches of snowfall annually, according to the National Weather Service.

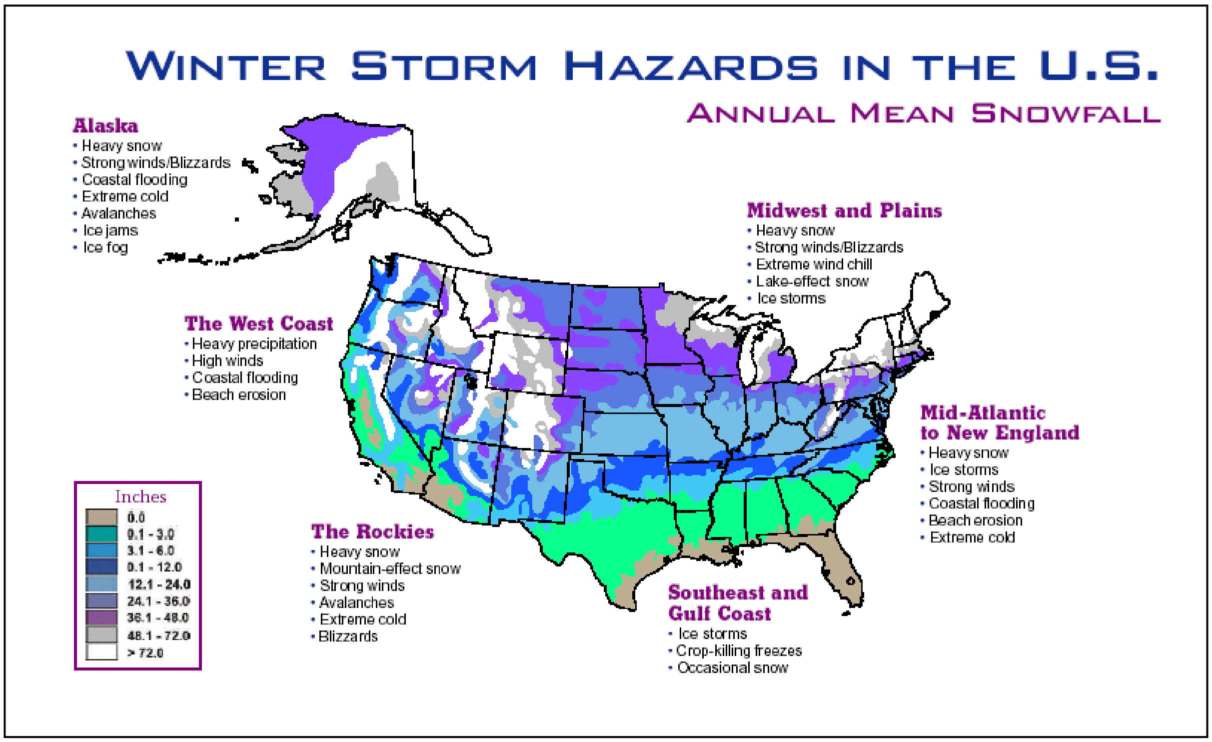

Figure 4-39: Annual Mean Snowfall
(Courtesy of NOAA)

Multi-Hazard Mitigation Plan

4.2 Vulnerability & Consequence Assessment

Once the hazard identification step was complete, the Community Planning Team (CPT) conducted a Vulnerability Assessment to describe the impact that each hazard identified in the preceding section would have upon Metropolitan Nashville-Davidson County, and subsequently completed consequence analysis for each hazard. The consequence analysis included the following items as described in the Emergency Management Accreditation Program:

1. Impact on the Public;
2. Impact on Responders;
3. Continuity of Operations & Continued Delivery of Services;
4. Infrastructure, Property and Facilities;
5. Environment;
6. Economic Conditions of the jurisdiction; and
7. Public Confidence in the jurisdictions governance.

As a starting point, the CPT used the parcel data available from the Metro Planning Department and Assessor of Property to define a baseline against which all other disaster impacts could be compared. The baseline is the catastrophic, worst-case scenario: the assessed value of the entire county as a whole.

Total Vulnerability of Metro Nashville-Davidson County to Catastrophic Disaster

Risk –Low; Vulnerability – Extremely High

The current total values of Metro Nashville-Davidson County, as maintained by the Assessor's office are presented in Table 4-20.

Table 4-20: Catastrophic Damages

Property Type	Total Number of Parcels	Number of Parcels with Improvement Value	Improvement Value
Bank/Finance	188	186	$156,279,151
Commercial	13,649	10,256	$11,574,952,009
Education	312	103	$427,645,149
Emergency/Medical	452	446	$1,355,968,106
Industrial	3,103	2,464	$2,254,801,439
Other (Government/Institutional)	1,885	1,175	$1,249,011,800
Residential - Mobile Home	520	515	$8,838,300
Residential - Mobile Home Park	44	44	$33,114,400
Residential	208,118	192,120	$27,494,789,881
Rural	10,814	7,272	$1,027,981,100
Telecommunications	94	34	$2,359,200
Recreation	213	73	$92,709,195
Bank/Finance	188	186	$156,279,151
Total	239,392	214,688	$45,678,449,730

Critical Facilities

Of significant concern with respect to a catastrophic event is the location of critical facilities within the Community. Critical facilities, as defined by the CPT, include both those facilities: (1) essential in providing services during the response and recovery operations, and (2) those that house discrete populations that may require greater assistance in the event of a hazard. There are over 837 critical facilities identified within Metropolitan Nashville-Davidson County.

Cultural Resources

Additional vulnerability to the catastrophic event includes the current sites on the Tennessee Register of Historic Sites and Structures (State Register) and the National Register of Historic Places. As of September 2009, there are 175 historic sites, structures or districts within the county. The following table (Table 4-21) shows those historic structures which are located within the 100 year floodplain.

Table 4-21: Historic Places located within the 100 year floodplain

Historic Place And Location	Period of Significance	Date listed on the National Register
Belle Meade Golf Links Subdivision Historic District Roughly bounded by Windsor Dr., Blackburn and Pembroke Aves., Westover Dr. and Harding Pl.	1900-1924, 1925-1949, 1950-1974	2004 Site - #04000675
Cameron School 1034 1st Ave S, Nashville	1925-1949, 1950-1974	2005 Site - #05000180
Devon Farm (Ensworth School Property) 7401 Highway 100	1750-1799	1974 Structure - #74001908
Lebanon Road Stone Arch Bridge Over Brown's Creek at Lebanon Rd.	1875-1899	1987 Structure - #87000379
Newsom's Mill West of Nashville at Big Harpeth River	1850-1874	1976 Structure - #76001771
Sandbar Village Aka Site Number 40 DV 36 Address Restricted	1000-500 AD, 1499-1000 AD	1994 Site - #9400074
Tanglewood Historic District 4907, 4909, and 4911 Tanglewood Dr.	1925-1949	1998 District - #98000819
Whites Creek Historic District Whites Creek Pike and Old Hickory Blvd.	1825-1849, 1850-1874, 1875-1899, 1900-1924, 1925-1949	1984 District - #84003530

Historic Place And Location	Period of Significance	Date listed on the National Register
Whitland Historic District Roughly bounded by Whitland Ave., Bowling Ave. S. Wilson Blvd., and tributary of Richland Creek.	NA	2007
Woodmont Terrace Apartments 920 Woodmont Blvd, Nashville	1925-1949, 1950-1974	2003 District - #03000280
US Naval Reserve Training Center 1515 Davidson St		July 6, 2011 #11000419
Omohundro Water Filtration Complex District Northeast of Omohundro Dr.	1888-	May 13, 1987 #87000380
American Baptist Theological Seminary Historic District 1800 Baptist World Center Dr.	1924-1963, 1954-1960	June 14, 2013 #13000399

Natural Resources

Additional vulnerability to the catastrophic event would include natural resources within Metropolitan Nashville-Davidson County. The species listed in Table 4-22 are identified as endangered, threatened, and rare by the Tennessee Department of Environment and Conservation.

Table 4-22: Natural Resources

Scientific Name	Common Name	Federal Status[1]	State Status[2]
PLANTS			
Apios priceana	Price's Potato-bean	S3	LT
Astragalus bibullatus	Pyne's Ground-plum	S1	LE
Dalea candida	White Prairie-clover	S2	--
Dalea foliosa	Leafy Prairie-clover	S2S3	LE
Dalea purpurea	Purple Prairie-clover	S1	--
Castanea dentata	American Chestnut	S2S3	--
Juglans cinerea	Butternut	S3	--
Mirabilis albida	Pale Umbrella-wort	S2	--
Phlox bifida ssp. stellaria	Glade Cleft Phlox	S3	--
Phemeranthus calcaricus	Limestone Fame-flower	S3	--
Anemone caroliniana	Carolina Anemone	S1S2	--
Ranunculus aquatilis var. diffusus	White Water-buttercup	S1	--
Crataegus harbisonii	Harbison's Hawthorn	S1	--
Zanthoxylum americanum	Northern Prickly-ash	S2	--
Vitis rupestris	Sand Grape	S1	--
Carex davisii	Davis' Sedge	S1	--
Carex hirtifolia	Pubescent Sedge	S1S2	--
Allium stellatum	Glade Onion	S1	--
Schoenolirion croceum	Yellow Sunnybell	S3	--

Scientific Name	Common Name	Federal Status[1]	State Status[2]
Ammoselinum popei	Pope's Sand-parsley	S2	--
Hydrocotyle americana	American Water-pennywort	S1	--
Perideridia americana	Eastern Yampah	S2	--
Polytaenia nuttallii	Prairie Parsley	S1	--
Amsonia tabernaemontana var. gattingeri	Limestone Blue Star	S3	--
Panax quinquefolius	American Ginseng	S3S4	--
Echinacea tennesseensis	Tennessee Coneflower	S2	DM
Helianthus eggertii	Eggert's Sunflower	S3	DM
Symphyotrichum praealtum	Willow Aster	S1	--
Onosmodium hispidissimum	Shaggy False Gromwell	S1	--
Boechera perstellata	Braun's Rockcress	S1	LE
Boechera shortii	Short's Rock-cress	S1S2	--
Erysimum capitatum	Western Wallflower	S1S2	--
Paysonia densipila	Duck River Bladderpod	S3	--
Physaria globosa	Short's Bladderpod	S2	C
Stellaria fontinalis	Water Stitchwort	S3	--
Evolvulus nuttallianus	Evolvulus	S3	--
Lonicera flava	Yellow Honeysuckle	S1	--
Elymus svensonii	Svenson's Wild-rye	S2	--
Heron rookery	Heron Rookery	SNR	--
Cimicifuga rubifolia	Appalachian Bugbane	S3	--
Lilium canadense	Canada Lily	S3	--
Lilium michiganense	Michigan Lily	S3	--
PLANT COMMUNITY			
Nashville Basin Limestone Glade	Nashville Basin Limestone Glade, Barrens, and Woodland	SNR	--
Dalea foliosa - Mecardonia acuminata - Mitreola petiolata Herbaceous Vegetation	Limestone Glade Streamside Meadow	S2?	--
Quercus stellata / Viburnum rufidulum / Schizachyrium scoparium - (Sorghastrum nutans, Helianthus eggertii) Woodland	Western Highland Rim Escarpment Post Oak Barrens	S2	--
INVERTEBRATES - Crustaceans			
Orconectes shoupi	Nashville Crayfish	S1S2	LE
INVERTEBRATES - Mollusks			
Lampsilis abrupta	Pink Mucket	S2	LE
Plethobasus cooperianus	Orangefoot Pimpleback	S1	LE
Epioblasma brevidens	Cumberlandian Combshell	S1	LE
Epioblasma florentina walkeri	Tan Riffleshell	S1	LE
Simpsonaias ambigua	Salamander Mussel	S1	--
Lithasia duttoniana	Helmet Rocksnail	S2	--
INVERTEBRATES - Flatworms			
Sphalloplana buchanani	A Cave Obligate Planarian	S1	--
INVERTEBRATES – Insects			

Scientific Name	Common Name	Federal Status[1]	State Status[2]
Pseudanophthalmus insularis	Baker Station Cave Beetle	S1	C
VERTEBRATES - Amphibians			
Ambystoma barbouri	Streamside Salamander	S2	--
Cryptobranchus alleganiensis	Hellbender	S3	No Status
VERTEBRATES - Birds			
Ixobrychus exilis	Least Bittern	S2B	--
Haliaeetus leucocephalus	Bald Eagle	S3	--
Falco peregrinus	Peregrine Falcon	S1B	No Status
Tyto alba	Barn Owl	S3	--
Thryomanes bewickii	Bewick's Wren	S1	--
Dendroica cerulea	Cerulean Warbler	S3B	--
Aimophila aestivalis	Bachman's Sparrow	S1B	--
VERTEBRATES - Fishes			
Etheostoma luteovinctum	Redband Darter	S4	--
Etheostoma microlepidum	Smallscale Darter	S2	--
Percina phoxocephala	Slenderhead Darter	S3	--
Acipenser fulvescens	Lake Sturgeon	S1	--
Carpiodes velifer	Highfin Carpsucker	S2S3	--
VERTEBRATES - Mammals			
Neotoma magister	Allegheny Woodrat	S3	--
Zapus hudsonius	Meadow Jumping Mouse	S4	No Status
VERTEBRATES - Reptiles			
Macrochelys temminckii	Alligator Snapping Turtle	S2S3	--
Ophisaurus attenuatus longicaudus	Eastern Slender Glass Lizard	S3	--

[1] Federal Status is defined as:

- **LE -** **Listed Endangered**, the taxon is threatened by extinction throughout all or a significant portion of its range.
- **LT -** **Listed Threatened**, the taxon is likely to become an endangered species in the foreseeable future.
- **C -** **Candidate Species**, These "Candidate" species are not currently proposed for listing, but development and publication of proposed rules for such candidate species is anticipated. The US Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species. The US Fish and Wildlife Service will determine the relative listing priority of these candidate species, and encourages other agencies, groups and individuals to give consideration to these taxa in environmental planning.
- **(PS) -** **Partial Status** (based on taxonomy) Taxon which is listed in part of its range, but for which Tennessee subspecies are not included in the Federal designation
- **(PS: status) - Partial Status (based on political boundaries)** Taxon which is listed in part of its range, but for which Tennessee populations are not included in the Federal designation e.g.

[2] State Status is defined as:

- **E -** **Endangered Species** means any species or subspecies of plant whose continued existence as a viable component of the state's flora is determined by the Commissioner to be in jeopardy, including but not limited to all species of plants determined to be "endangered species" pursuant to the Endangered Species Act.
- **T -** **Threatened Species** means any species or subspecies of plant which appears likely, within the foreseeable future, to become endangered throughout all or a significant portion of its range in Tennessee, including but not limited to all species of plants determined to be a "threatened species" pursuant to the Endangered Species Act.
- **S -** **Special Concern Species** means any species or subspecies of plant that is uncommon in Tennessee, or has unique or highly specific habitat requirements or scientific value and therefore requires careful monitoring of its status.
- **D -** **"Deemed in Need of Management"** Any species or subspecies of nongame wildlife which the executive director of the TWRA believes should be investigated in order to develop information relating to populations, distribution, habitat needs, limiting factors, and other biological and ecological data to determine management measures

necessary for their continued ability to sustain themselves successfully. This category is analogous to “Special Concern.”

P - **Possibly Extirpated** species or subspecies that have not been seen in Tennessee for the past 20 years. May no longer occur in Tennessee.

CE - **Commercially Exploited** due to large numbers being taken from the wild and propagation or cultivation insufficient to meet market demand. These plants are of long-term conservation concern, but the Division of Natural Heritage does not recommend they be included in the normal environmental review process.

DM - Delisted taxon, recovered, being monitored first five years

Historic and Natural Resources are important to identify before disasters for three reasons:

1. The community may decide that these sites are worthy of a greater degree of protection than currently exists, due to their unique and irreplaceable nature;
2. If these resources are affected by a disaster, cataloging them ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher; and
3. The rules for repair, reconstruction, restoration, rehabilitation and/or replacement of these resources usually differ from ordinary procedures.

Development Trends for Metro

The Metro Planning Department is in the middle of a three-year process to update the General Plan for Nashville and Davidson County called *NashvilleNext*, an integrated plan for Nashville's future to help ensure the city's prosperity and well-being for the next 25 years. It is anticipated to be adopted by the Metro Planning Commission in the spring of 2015.

The Planning Department updates 14 Community Plans every seven to ten years and develops plans for neighborhoods, corridors, and other smaller study areas within them. This process involves visioning, goal-setting, applying and tailoring community character policies that are used to guide the form and character of future development throughout the community, developing open space and multi-modal transportation plans, and establishing an implementation strategy. The NashvilleNext General Plan Update continues many of the policies outlined in the Community Plans and the vision for a 24/7 Downtown.

Demographics in Nashville have shifted so that those under the age of 35 and over the age of 65 are looking for similar housing opportunities. This usually means a home with less maintenance — smaller footprints and yards. Both age groups are also looking to not rely on a car as much as the past. Traffic counts and vehicle miles traveled, indicators of mobility, show a leveling off increased car usage despite increases in population. Development trends will continue to address these needs by focusing on creating a more efficient overall urban pattern with more housing opportunities and jobs within Downtown and activity centers throughout Davidson County. Redevelopment of arterial pikes to complement enhanced and high capacity transit service will be critical over the next 25 years. Much of the future population and job growth can be encouraged within the activity centers and corridors so that expansion of sewer service in some areas of Davidson County is discouraged and there is less impact upon slopes and within floodplains. The redevelopment should also include green practices that reduce energy use, lower the amount of impervious surfaces, preserves landscapes, promotes urban tree plantings, and minimizes storm water runoff. New development should contribute to a reduction in some of Nashville's most probable future hazards and their impacts, particularly flooding.

Vulnerability of Metro Nashville-Davidson County to more Probable Disasters

On a more realistic scale, community vulnerability can be quantified in those instances where there is a known, identified hazard area, such as a mapped floodplain. In these instances the numbers and types of buildings subject to the identified hazard can be counted and their values tabulated. Further, other information can be collected, such as the location of critical community facilities (e.g., a fire station), historic structures, and valued natural resources (e.g., an identified wetland or endangered species habitat) that are within the specific hazard area. Together, these values portray the impact, or *vulnerability*, of that area to that hazard.

However, it is important to note that these values could be refined one step further, with regard to the percent of probable impact. For example, when a flood occurs, the event seldom causes the total destruction of an area. In fact, we know from NFIP insurance claims that a flood with an average depth of 2-feet above the ground is likely to cause approximately 20 percent damage to structures in the aggregate (those with basements, no basements, and second stories). Thus, if the 100-year flood were estimated to be 2-feet deep, a more accurate description of flood vulnerability would be a 1 percent annual chance of incurring a loss of 20 percent of the values tabulated in the 100-year floodplain, not including the additional impacts of damage to infrastructure and economic disruption. This allows a community to measure the cost-effectiveness of alternative mitigation projects under consideration. The benefits of a mitigation project are the future losses avoided, or in this example, that portion of the value of the 1 percent annual chance of 20 percent damage that is protected by the project.

The CPT identified one hazard to Metro for which specific geographical hazard areas have been defined: flood. For this hazard area, the CPT has inventoried the following as a means of quantifying the vulnerability within the hazard area:

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

For the other hazards identified in the preceding section, information is available where the potential impacts can be developed or inferred, although this information is not tied to a specific area within the county. For these hazards, such as severe weather and drought, the entire county is at risk. In some cases, certain hazard characteristics suggest varying degrees of risk within different areas of Metro. For example:

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

- West Nile Virus is spread through mosquito bites. Thus, people and livestock frequenting areas with the greatest concentration of mosquitoes, and during the times of greatest concentration, are most likely to become infected. Areas with standing water are where mosquitoes breed, and therefore are an area of higher risk. Standing water can be found in, for example, swimming pools, ponds, birdbaths, ditches, and old spare tires – so the risk areas could be in many locations and in differing concentrations.

DROUGHT

Drought impacts may include physical, bio-physical, social and economic consequences. Physically, there may be a reduction in water quality and supply for drinking, domestic, and irrigation purposes with a subsequent impact of increased pumping costs. The ground water level may be depleted and the flow of perennial water sources reduced. Bio-physical impacts include damage to crop quantity and quality, damage to wildlife habitat and wildlife, an increase in invasive/noxious weeds, and the deterioration of water quality. Economically, there may be a loss in livestock production and increased prices for commodities.

Drought is divided into 5 categories:

D0 - Abnormally Dry

Typically growth of crops, plants, or pastures may be slowed and the fire risk may be elevated due to short-term dryness of a few weeks.

D1 - Moderate Drought

Crops, plants, or pastures may have some damage, the fire risk continues to be elevated, water levels in area rivers, creeks, and streams are below normal, and water shortages and restrictions may develop. Moderate drought may take several weeks to develop, and can last for a few months. These conditions typically develop every few years.

D2 - Severe Drought

Agricultural losses may occur, the fire risk is very high, and water shortages are common and restrictions may be imposed. Below normal precipitation and/or above normal temperatures over several weeks to a few months can cause severe drought to develop, which typically lasts for several months.

D3 - Extreme Drought

Significant agricultural losses, extreme fire danger, and widespread water shortages and restrictions are common. It may take several months for extreme drought conditions to develop, which can persist through several seasons. Extreme droughts occur about once every 10 to 25 years.

D4 - Exceptional Drought

Water shortages and restrictions are widespread and there are major agricultural losses. Exceptional droughts occur roughly once every 50 years or so, and can persist from one year to the next. The last Exceptional Drought to impact Davidson County was in September and October of 2007, with drought conditions lasting for about 2 years.

The main water supply is the Cumberland River. The two water treatment plants, Omohundro and K. R. Harrington, have a daily capacity output of 144 million gallons per day. On an average day, both plants pump 90 million gallons. If one plant is out of service, the other can supply the entire community’s water needs.

Consequence Analysis

Drought is often associated with periods of long and intense heat, and can cause injury and even death particularly with children, elderly citizens, special needs populations and animals. Injuries and potential deaths are most likely to impact areas that lack air conditioning and immediate medical care.

The largest impact of prolonged drought would be the financial impact to farmers with crops and livestock. A serious drought would damage or possibly destroy annual crops and limit the number of livestock that could be properly cared for. The decline in quantity and quality of crops could result in increased prices to the consumer and decreased revenue for farmers. The financial impact could be widespread over the area of the drought particularly if it lasts for a long time or occurs at vital times in crop development.

Droughts may cause severe impacts to infrastructure, property and facilities. Water supplies may run low and pipes may crack, making hydration from readily available, clean water difficult. The cost of new water resources can be high. As temperatures increase, so does the demand for energy. Increased energy demands can lead to power outages and higher prices, as more expensive fuels are substituted for power. Roadways and bridges may become impassable due to fractured surfaces or landslides. Transportation infrastructure will also be impacted in the waters as streams, rivers, and canals become impossible to navigate. As the number of individuals affected by the drought increases, shelters and hospitals may become overcrowded and unable to handle the influx.

Prolonged drought (over a number of years) could have long-term environmental impacts on the area, including species endangerment and necessary changes to the local agricultural makeup. Plants, marine life and wildlife could all be negatively affected by drought conditions.

The manner and efficiency in which a response to a disaster is conducted could result in the loss of confidence in the program and the government’s ability to protect the community. A strong and early show of the jurisdictions resources and capabilities can strengthen the public’s trust and confidence. Effective planning, response, and resource coordination through mutual aid agreements, memorandums of understanding, and standby contracts can make or break the ability to respond and positively impact the public’s perception of the response.

Table 4-23: Drought Impacts

CONSIDERATIONS	IMPACTS
Impact on the Public	Most damage is expected to be agricultural in nature; however, water supply disruptions may adversely affect people and animals with adverse health impacts.
Impact on Responders	With properly equipped and trained emergency responders, impact should be minimal. Emergency personnel and others involved in an incident should observe life safety and health standards/practices. Scene safety should be number one priority. The most likely hazards for responders would be dehydration and other exposure related illnesses. Firefighting impacts could be affected with low water pressure.
Continuity of Operations & Continued Delivery of Services	Minimal impact to Continuity of Operations and delivery of services. However, COOP's have addressed cascading events, and there could be added pressure to address more needs of its citizens and facilities. Impacts on infrastructure systems (energy/water) could cause negative effects on COOP implementation.
Infrastructure, Property & Facilities	Impact on pipes, causing hydrating to become a problem. Increased energy demands can cause power outages and high costs. Possible impact on TVA's power generation, nuclear and coal fired plants. Water navigation can become a problem with low levels. Hospitals may become overcrowded.
Environment	Plants, marine life and wildlife could all be negatively affected by drought conditions since they all rely on water to sustain life.
Economic Conditions of the Jurisdiction	Local economy and finances dependent on abundant water supply adversely affected for duration of drought.
Public Confidence in the Jurisdictions Governance	The ability to respond and recover to the situation may be questioned and challenged if planning, response and recovery are not timely and effective.

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DAM & LEVEE FAILURES

Based on Table 4-7 (which is also presented in Section 4.1), the average hazard classification is Significant; however, the larger the dam's the higher the hazard classification, which would weigh more with the vulnerability.

Metro Nashville and Davidson County along with numerous other jurisdictions have completed Wolf Creek Dam Emergency Operation Plans in 2007. This was due to the USACE starting a multi-year repair project due to maintenance problems and increased risk of a dam breach.

Dam Name	Owner / Regulator	Hazard Classification
J. Percy Priest Lake	USACE	High
Old Hickory Lake	USACE	High
Chippewa Lake	Private	Significant
Enoree Lake	Private	Significant
Lake Ogallala	Private	Significant
Pal's Lake	Private	Significant
Marrowbone Lake	TWRA	High
Apple Lake	Private	High
Bush Lake	Private	Low
Cheek Lake	Private	Low
Dupont Retention Basin	Private	Low
Radnor Lake	TDEC	High
South Harpeth	Private	Low
Dams located outside of Davidson County		
Center Hill	USACE	High
Dale Hollow	USACE	High
Wolf Creek	USACE	High
Great Falls	TVA	High

Table 4-7: Dams affecting Davidson County

Consequence Analysis

Flooding or infrastructure damage causing loss of life is the primary concern with any dam or levee compromise/full breech. Homes, bridges and roadways can be demolished in minutes.

Major impacts to the community include the sudden release of water possibly causing a flood surge, contaminants in floodwaters can cause risk to the public, and crop damage and long term soil deterioration, which often account for upwards of 75% of the economic impact.

Infrastructure that could be impacted includes electricity delivery, and water based cargo traffic. Electric distribution facilities in affected areas could be damaged with delayed repairs due to the flood waters. However, due to redundancies built in, NES should be able to maintain service to those not directly impacted by the flood waters. Cargo that is delivered via the inland waterways includes coal, which helps maintaining efficient energy supply. Hazardous waste, lumber and a number of durable foods that are too heavy for efficient roadway transport are also delivered via waterways.

Table 4-24: Dam & Levee Impacts

CONSIDERATIONS	IMPACTS
Impact on the Public	Localized impact expected to be severe for inundation area and moderate to light for other adversely affected areas.
Impact on Responders	Localized impact expected to limit damage to persons in the inundation area at the time of the incident.
Continuity of Operations & Continued Delivery of Services	Damage to facilities/personnel in the area of the incident may require temporary relocation of some operations. Localized disruption of roads and/or utilities may postpone delivery of some services.
Infrastructure, Property & Facilities	Localized impact to facilities and infrastructure in the inundation area of the incident. Some severe damage possible.
Environment	Localized impact expected to be severe for inundation area and moderate to light for other adversely affected areas, including marine life.
Economic Conditions of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time, depending on damage and length of event.
Public Confidence in the Jurisdictions Governance	Localized impact expected to primarily adversely affect dam owner, however localized impact is expected to adversely affect confidence in local, state, and federal government, regardless of the levee owner. Public education is important.

FLOOD

Flooding impacts may include urban, residential, and commercial consequences. Buildings can experience significant damage, sometimes beyond repair. Household furnishings and business inventories can be lost if there is not adequate time to remove items to safe locations. Subsequent impacts include revenue loss to employees and businesses, as well as, local governments through tax loss.

In addition to being at risk because of floodwater, residents face the threat of explosions and fires caused by leaking gas lines along with the possibility of being electrocuted. Even wild animals, such as venomous snakes, forced out of their homes and brought into contact with humans by floodwaters, can be a threat. Additional public health concerns include mold, West Nile Virus, and encephalitis.

Severe flooding can cause extensive damage to public utilities and disruptions to the delivery of services. Loss of power and communications can be expected. Drinking water and wastewater treatment facilities may be temporarily out of operation. Storm and sanitary sewers may also be impacted due to locations in floodprone areas for design purposes, such as gravity flow to minimize pumping charges.

Impacts of flooding on transportation are particularly significant. Flooded streets and roads block transportation and make it difficult for emergency vehicles to respond to calls for service. Floodwaters can washout sections of roadway and bridges. This disruption may extend to a regional, even national scale, particularly with regard to access to highways, railroads, and navigable waterways. Most importantly, the majority of fatalities that occur in floods are the result of people trying to dry on roads covered by floodwaters.

Existing Development

To analyze vulnerability to flood events and how this varies by jurisdiction, the critical facilities and number/types of structures located within the 1-percent annual chance floodplain were calculated using the preliminary Flood Insurance Study and associated digital Flood Insurance Rate Maps (FIRMs), dated November 22, 2013 and the latest parcel information from Metropolitan Nashville-Davidson County. Figure 4-40 and Tables 4-25 and 4-26 present this data.

Figure 4-40: 1-Percent Annual Chance Floodplain

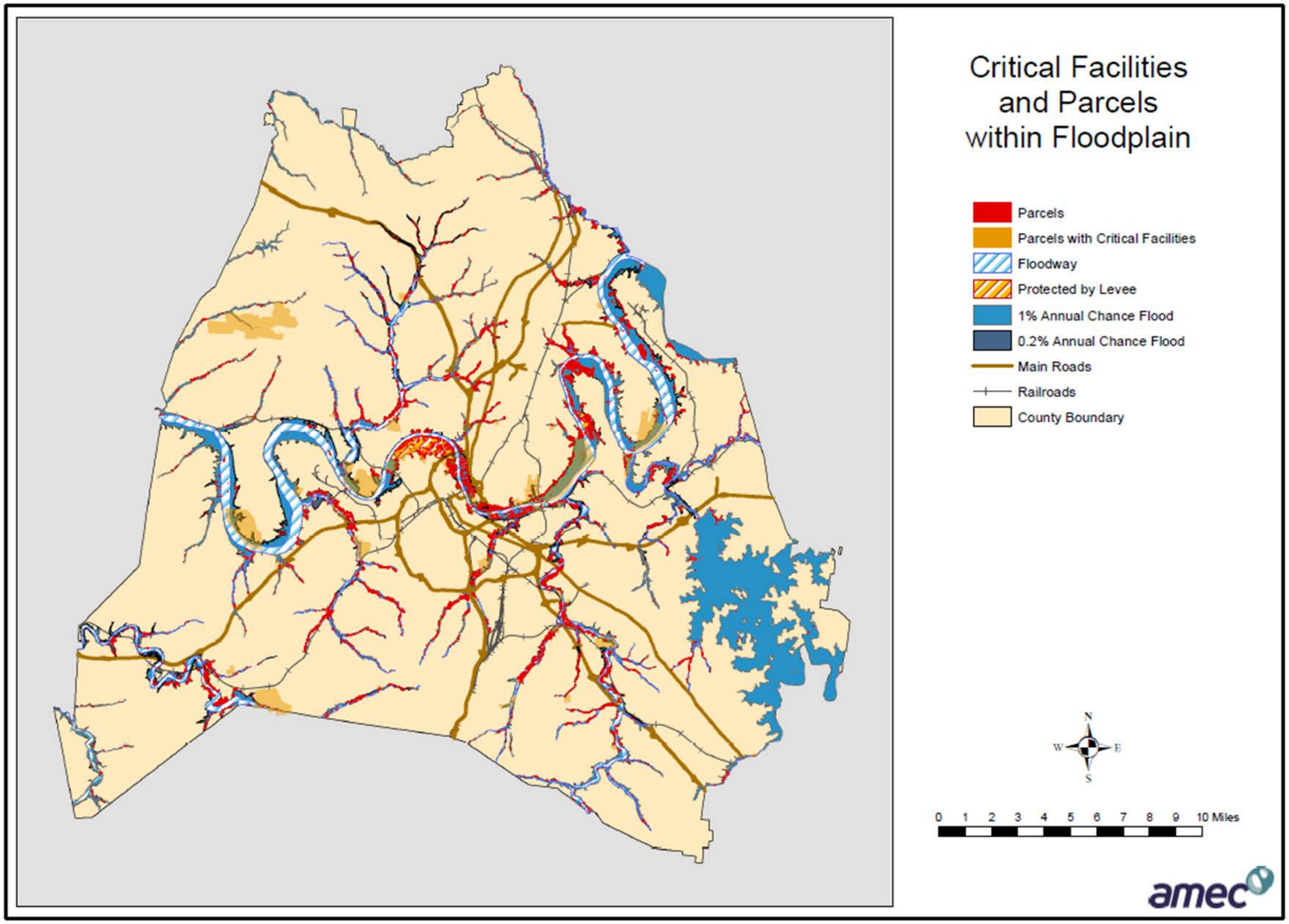


Table 4-25: Critical Facilities within the 1% Annual Chance (100-year) Floodplain

Jurisdiction	Critical Facility Bldg. Footprints within 1% Annual Chance Floodplain
Belle Meade	0
Berry Hill	0
Goodlettsville	1
Oak Hill	0
Nashville-Davidson County	32
TOTAL	**33**

Source: Metro Planning Parcel Data

Critical facilities, as defined by the Office of Emergency Management and the Metropolitan Police Department, are located within the floodplain. These facilities include:

- Antioch Middle School
- Bordeaux Hospital
- Brick Church Middle School
- Browns Creek Pumping Station
- Central Treatment Plant (2)
- Correction Center
- Dry Creek Treatment Plan (8)
- Hurricane Creek Treatment
- Maintenance Facility
- Metro Transit Authority (2)
- Sewerage Pumping Stations (6)
- Tier II Facilities (10)
- Treatment Plant
- Water Filtration Plant (2)
- Water Pumping Station
- Whites Creek High School
- Other (3)

Improvement values for structures located within the 1-percent annual chance floodplain were then calculated using data from the Assessor of Property for Davidson County. There are approximately 11,715 parcels that intersect the floodplain with an improvement value greater than $0.00. These properties represent approximately 4.9 percent of the properties of Metropolitan Nashville and Davidson County (Table 4-24).

Table 4-26: Analysis of Parcels Located Within the 100-year Floodplain

Property Type	Total Number of Parcels	Number of Parcels with Improvement Value	Improvement Value
Bank / Finance	7	7	$5,291,100
Commercial	990	620	$1,389,288,462
Education *	42	14	$44,272,150
Emergency / Medical	35	31	$201,465,200
Industrial	480	339	$485,351,100
Other (Government/Institutional) **	101	14	$16,067,300
Recreational	52	23	$24,171,440
Religious	75	71	$89,027,400
Residential - Mobile Home Park	9	9	$16,733,700
Residential - Mobile Home	9	9	$156,300
Residential	10834	9146	$1,698,525,798
Rural	2153	1420	$227,434,700
Telecommunications	8	2	$76,900
Uncoded Parcels	197	10	$3,583,400
Satellite Cities	8	0	$0
Total	**15,000**	**11,715**	**$4,201,444,950**

* Metro Schools would be tax exempt and may not have an appraised value for improvement.

**Many of these properties would be tax exempt and may not have an appraised value for the improvement.

Vulnerability was further analyzed using a HAZUS Flood Average Annualized Loss (AAL) study conducted by FEMA in 2009-2010. FEMA conducted the HAZUS study for the entire continental United States using the MR4 release of HAZUS-MH. The inputs for the AAL included 30 meter Digital Elevation Model (DEM) and the default census block data in HAZUS MR4, which utilized the 2000 Decennial Census data.

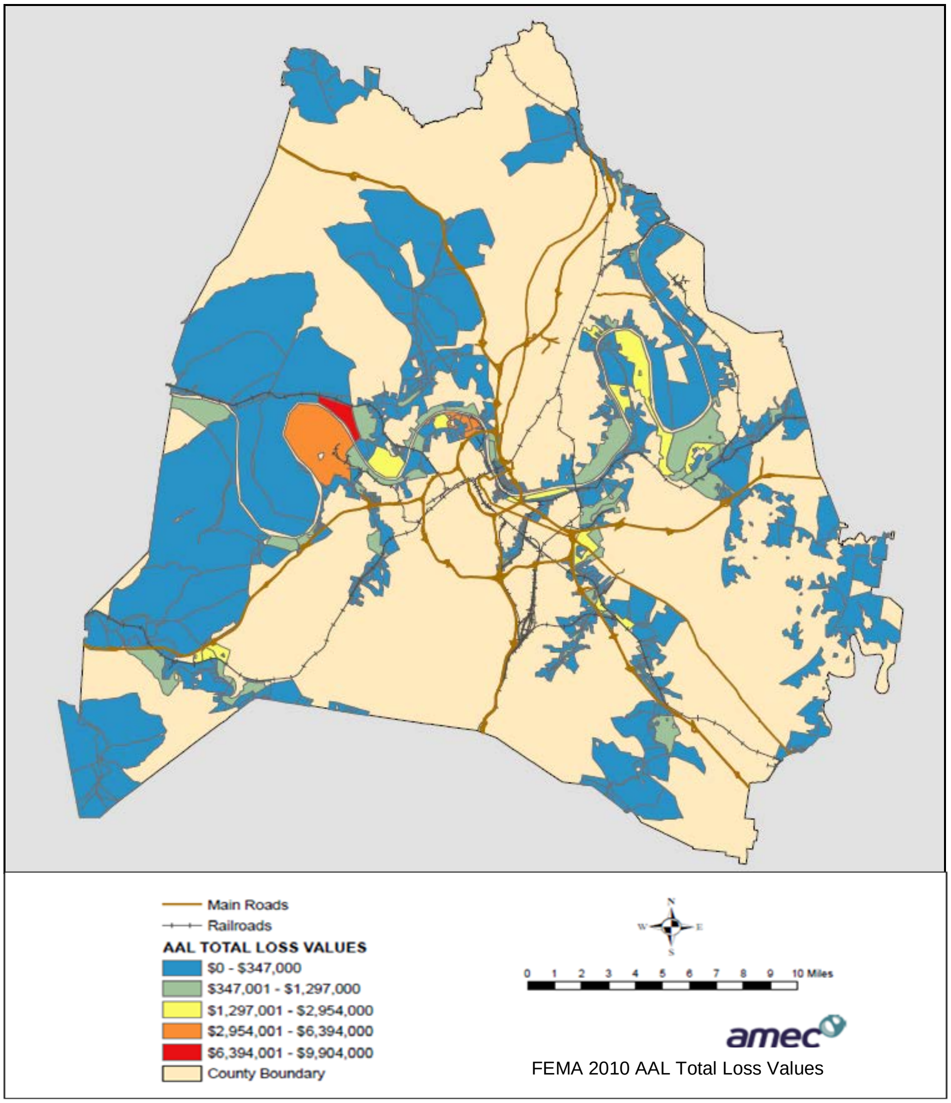
The analysis was performed at the county level using Level 1 methodology with national datasets. The purpose of the AAL study was to identify flood-prone areas and communicate relative flood risk in terms of people and property vulnerable to damage. The AAL study data provides potential dollar losses for four flood frequencies as follows: 10-percent (10-year), 2-percent (50-year), 1-percent (100-year), and 0.2 percent (500-year). The average annualized loss estimates are then calculated based on the aggregated dollar losses from the various flood frequencies (averaged and annualized). Figure 4-41 and Table 4.25 provide the detailed estimated AAL results for each jurisdiction in Davidson County.

Table 4-27: Average Annualized Losses by Jurisdiction

Jurisdiction	Building Damage ($)	Content Damage ($)	Business Disruption ($)	Total Loss ($)
Belle Meade	$754,000	$1,912,000	$105,000	$2,771,000
Berry Hill	$402,000	$1,435,000	$237,000	$2,074,000
Goodlettsville	$495,000	$383,000	$7,000	$885,000
Oak Hill	n/a	n/a	n/a	n/a
Nashville-Davidson County	$49,664,000	$70,674,000	$6,546,000	$126,884,000
Total County	$51,315,000	$74,404,000	$6,895,000	$132,614,000

Source: HAZUS-MR4

Figure 4-41: Average Annualized Loss (AAL) for Davidson County



Future Development

The risk of flooding to future development should be minimized by the floodplain management programs of the County and its jurisdictions, if properly enforced. For Nashville-Davidson County, the first floor elevations of residential property must be 4-feet above the base flood elevation. For non-residential properties, the standard is to either elevate or flood proof to 1-foot above the base flood elevation. Additionally, no new structures are allowed within the floodway.

Nashville-Davidson County also participates in the NFIP's Community Rating System (CRS) and takes steps above and beyond the minimum NFIP requirements to qualify for a 10-percent reduction in flood insurance premiums for structures within the SFHA and 5-percent reduction in flood insurance premiums for structures outside the SFHA. The floodplain management practices for CRS communities are reviewed on a periodic cycle, typically every five years.

Consequence Analysis

Historical data suggests floods are the most common hazard in the United States and have the potential of causing minimal to devastating damage to large areas, as well as injuries, fatalities, and severe emotional distress. Flooding or infrastructure damage causing loss of life is the primary concern with any flood situation. Homes, bridges and roadways can be demolished in minutes. In general, floods pose extreme hazards to individuals in vehicles, who may lose control, become trapped inside, and be washed away. Additionally, lack of visibility during a flood may cause drivers to become stranded or trapped when the road has been washed out.

Major impacts to the community include the sudden release of water possibly causing a flood surge, contaminants in floodwaters (and water sources) can cause risk to the public, along with mold that is developed after the water has receded.

Infrastructure that could be impacted includes water supply, electricity delivery, communication systems, waterway cargo. NES substations could be affected by floodwaters and may have to be taken off line, and repairs may be hampered due to floodwaters. Cargo that is delivered via the inland waterways includes coal, which helps maintaining efficient energy supply. Hazardous waste, lumber and a number of durable foods that are too heavy for efficient roadway transport are also delivered via waterways. During flood waters, debris is washed in and may impact the waterways.

Even with proper planning, training and exercising, first responders have a potential of being impacted during rescue operations. These potential dangers may include being swept away from flood waters, trapped in collapsed buildings, gas leaks/explosions etc.

Table 4-28: Flood Impacts

CONSIDERATIONS	IMPACTS
Impact on the Public	Localized impact expected to be severe for inundation area and moderate to light for other adversely affected areas.
Impact on Responders	Localized impact expected to limit response to persons in the inundation area at the time of the incident.
Continuity of Operations & Continued Delivery of Services	Damage to facilities/personnel in the area of the incident may require temporary relocation of some operations. Localized disruption of roads and/or utilities may postpone delivery of some services.
Infrastructure, Property & Facilities	Localized impact to facilities and infrastructure in the inundation area of the incident. Some severe damage possible, primary with water supply.
Environment	Localized impact expected to be severe for inundation area and moderate to light for other adversely affected areas, including marine life. Increase in wild animals, snakes, and mosquitos may be a major impact during event.
Economic Conditions of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time, depending on damage and length of event.
Public Confidence in the Jurisdictions Governance	Localized impact is expected to adversely affect confidence in local, state, and federal government. Public education is important. Response and recovery efforts to be the primary contributing factor in public confidence.

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GEOLOGICAL HAZARDS

Earthquakes

Based on historic and scientific information, the risk to Metro Nashville-Davidson County from earthquakes is low.

A site-specific evaluation of the vulnerability of Metro to earthquakes was performed by AMEC Environmental, Inc. using the HAZUS software program. HAZUS-MH**,** is a nationally applicable standardized methodology and software program that contains models for estimating potential losses from earthquakes, floods, and hurricane winds. HAZUS-MH was developed by the Federal Emergency Management Agency (FEMA) under contract with the National Institute of Building Sciences (NIBS). NIBS maintains committees of wind, flood, earthquake, and software experts to provide technical oversight and guidance to HAZUS-MH development. Loss estimates produced by HAZUS-MH are based on current scientific and engineering knowledge of the effects of hurricane winds, floods, and earthquakes. Estimating losses is essential to decision-making at all levels of government, providing a basis for developing mitigation plans and policies on emergency preparedness and response and recovery planning.

The study used 2000 Census Bureau data for the region with the following assumptions:

- New Madrid Fault
- 7.5 Magnitude at 10 KM depth;
- 525 square mile region with 144 census tracts;
- 237,000 households;
- Population of 569,891 people;
- 181,000 buildings within the region;
- Total building replacement cost of 44,665 million dollars; and
- Approximately 97 percent of the buildings (and 76 percent of the building value) are associated with residential housing.

Studies were conducted by the Mid-America Earthquake Center under a $12 Million contract for the Dept. of Homeland Security and FEMA from 2006 to 2009 for projected damage figures for a 7.7 New Madrid Earthquake Event. These data were used to conduct a scenario for the National Level Exercise 2011 for all Federal Agencies, including the Dept. of Defense and all 22 affected state jurisdictions. Detailed information for Davidson County is following.

Davidson County Earthquake Hazard Damages					
Damages	Total	Moderate	Extensive	Complete	
Single Family Homes	159,343	52 units	10 units	0	
Other residential	16,555	55 units	0	0	
Commercial	3,658	11 units	0	0	
Industrial	356	1 unit	0	0	
Functionality	Totals	Day 1	Day 3	Day 7	Day 30
Hospital Functionality	5,307 beds	96.40%	96.50%	99.30%	99.90%
Police Station Functionality	23 sites	94.10%			
School Functionality	205 sites	94.10%			
Fire Station Functionality	37 sites	94.10%			
*Homes without Elec. Service	237,405	0%			
Homes without Water Service	237,405	0%			
Waste Water Facility Functionality	64 sites	89.79% No Damage; 9.43% Slight Damage			
Potable Water Facility Functionality	5 sites	89.79% No Damage; 9.43% Slight Damage			
Potable Water Lines Functionality	3,244 mi	18 Leaks; 4 Breaks			
Bridge Damage	521 bridges	98.52% No Damage; 0.82% Slight Damage			
Bridge Functionality	521 bridges	99.21%			
Communications Functionality	1,205	99.50%			
(Functionality % = percent that is functional)					

Table 4-29: Earthquake Hazard Damages

*This study did not take into consideration a possible cascading of consequences surrounding the Electric Power Grid throughout the Region. TVA and DHS/FEMA have produced electric grid studies which indicate the possibility of a temporary collapse of the East U.S. electric power grid similar to what happened during the Northeast Power failure in 2005. A temporary shutdown of nuclear and coal-fired generator plants could create a 48 to 72 hour loss of electric service before restoration could be completed. Almost all critical infrastructure and emergency services would have to rely on back-up power systems (generators). The lack of a coordinated Fuel Contingency Planning System for all Federal, State and Local jurisdictions would also cause numerous response issues.

Common impacts from earthquakes include damages to infrastructure and buildings (e.g., crumbling of un-reinforced masonry (brick); collapse of architectural facades; breakage of underground utilities, gas-fed fires; landslides and rock falls; and road closures). Less common, but possible damages would include dam failures and subsequent flash floods. However, with the distance of Metro Nashville from any major fault lines, the impact from an earthquake at the New Madrid fault would be minimal.

Landslides

The locations of past landslides (Figure 4-15, Section 4.1) were utilized to determine the vulnerability of the Metro area to future landslides. A 50-foot radius from the point of the landslide was overlaid onto the Metro parcel data. The properties that intersected the radii were then queried for property improvements greater than $0.00. This gave an indication of an improvement to a piece of property that touched the identified sites. There are approximately 45 properties that intersect the landslide areas with an improvement value greater than $0.00. These properties represent approximately 0.02 percent of the properties of Metropolitan Nashville and Davidson County (See Table 4-27). There are no critical facilities, as defined by the Office of Emergency Management and the Metropolitan Police Department, located within the landslide geological hazard areas.

Delineation of the Dellrose soils has not been completed for Davidson County. This information cross-referenced with steep slopes would provide an even more accurate estimation of vulnerability to landslides.

Table 4-30: Geological Hazard Damages

Property Type	Total Number of Parcels	Number of Parcels with Improvement Value	Improvement Value
Bank / Finance	0	0	0
Commercial	3	0	0
Education	0	0	0
Emergency / Medical	0	0	0
Industrial	0	0	0
Other (Government / Institutional)	2	1	$5,772,800
Residential – Mobile Home	0	0	0
Residential – Mobile Home Park	0	0	0
Residential	43	43	$767,1900
Rural	1	1	$245,500
Telecommunications	0	0	0
No Associated Land Use Code	1	0	0
TOTAL	50	45	$13,690,200

Of the 206,834 parcels located within the Metro area, 50 are located within a 50-foot radius of identified landslide locations, that is, 0.04 percent of the total properties. Similarly of the total $29.1 billion in improvement values, $13 million are located within a 50-foot radius of the identified landslide locations. This results in 0.02 percent of the total property value being located adjacent to an identified landslide area.

Landslides have resulted in direct damages to structures and roadways, e.g., shifting structures off foundations, deformation of walls and doors, and blocking major thoroughfares. Potential direct impacts may include damages to rail lines and bridges, damming of rivers, and subsequent "dam" failure. Indirect impacts included the cost of debris clearance, personal injuries, and economic loses from rail and roadway closures.

Consequence Analysis

Impacts are greatly dependent on a number of conditions, but primarily is the location of the epicenter (or landslide/sinkhole), and the size of the event (earthquake/sinkhole). Adverse impact expected to be severe for close events and minor to minimal for those farther away.

Table 4-31: Geological Impacts

CONSIDERATIONS	IMPACTS
Impact on the Public	Close proximity may have moderate to light impact. Falling debris and building instability are the largest adverse impacts.
Impact on Responders	Potential to be seriously injured in close proximity. Structural instability and broken power/gas lines.
Continuity of Operations & Continued Delivery of Services	Damage to facilities/personnel in the area of the incident may require relocation of operations and lines of succession execution. Disruption of lines of communication and destruction of facilities may extensively postpone delivery of services.
Infrastructure, Property & Facilities	Damage to facilities and infrastructure in the area of the incident may be extensive for facilities, people, infrastructure and hazmat. A major event could have significant impact on all stages of electric power, cause nuclear/coal generation put off line, and damage substations/transmission and distribution facilities.
Environment	May cause extensive damage to environment in the area of the incident.
Economic Conditions of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time in the area of the incident.
Public Confidence in the Jurisdictions Governance	Ability to respond and recover may be questioned and challenged if planning, response and recovery are not timely and effective.

SEVERE WEATHER

(Extreme Temperatures, Thunderstorms, Tornadoes, and Winter Storms)

The severe weather evaluated as part of this risk assessment included: extreme temperatures, thunderstorms and lightning, tornadoes, and winter storms. In general, both the risk and vulnerability to Metro Nashville-Davidson County from severe weather is high.

Impacts to Metro Nashville-Davidson County as a result of severe weather could include damage to infrastructure, particularly damage to overhead power lines, road closures, and interruption in business and school activities. In the case of tornadoes, severe damages can occur to buildings. Utility outages can impact anything relying on electricity without a redundant power supply (e.g., a generator, solar power, or redistribution plan), and include secondary impacts such as interruption to water and sewage services, heat and refrigeration, fuel supplies, computers and cell phones. If interruption to business occurs for an extended period, economic impacts can be severe. Also of concern would be the impacts on populations with special needs such as the elderly and those requiring the use of electric medical equipment. Although typically short-lived, delays in emergency response services can also be of concern. Depending on the nature of a given storm, all areas within Metro are equally at risk; however, those areas relying on above ground utilities could suffer the greatest damage.

Extreme Temperatures

The health and safety of persons affected by extreme temperatures will vary, depending on the length and severity of the temperature condition. Both extreme heat and extreme cold can negatively impact individuals in the affected area. Tennessee is known to have temperatures well over 100 degrees in summer months, and as low as 20 degrees below zero in the winter. Historically, such extreme temperature events have been credited with numerous injuries and fatalities. Children, people with disabilities, and the elderly are especially susceptible to the effects of extreme temperatures, and those that are homeless, or have limited access to proper heating and cooling systems.

There are a number of health complications that can be associated with prolonged exposure to extreme heat. The stagnant atmospheric conditions and poor air quality that accompany extreme heat can put individuals at risk of developing a heat disorder, as the body becomes unable to circulate and/or sweats too much. Heat disorders can lead to serious health complications, such as heat cramps, heat exhaustion, and heat strokes. Individuals living in urbanized areas are at a greater risk than those in rural areas due in part to the overheated asphalt and concrete.

Similarly, extreme cold can impact individuals' health and safety. Wet areas may freeze, making driving dangerous. Continued exposure to extreme cold can result in serious health complications in those unable to generate body heat, such as hypothermia. Increased power demands for heating or cooling may result in brownout or blackout conditions, and carbon monoxide poisoning from the use of space heaters and fireplaces can make the situation worse.

Table 4-32: Extreme Temperature Impacts

CONSIDERATIONS	IMPACTS
Impact on the Public	Localized impact expected to be moderate for affected areas, primarily with adverse health effects.
Impact on Responders	Adverse impact expected to be moderate for unprotected personnel and light for trained, equipped, and protected personnel.
Continuity of Operations & Continued Delivery of Services	Unlikely to necessitate execution of the Continuity of Operations Plan. Localized disruption of roads and/or utilities caused by incident may postpone delivery of some services.
Infrastructure, Property & Facilities	Localized impact to facilities and infrastructure in the areas of the incident. Increased power demand anticipated. NES customer load curtailments could result if TVA generation is not adequate. Power lines and roads most adversely affected.
Environment	Marginal impact. Impacts could include possible drought conditions, increased risk of wildfires.
Economic Conditions of the Jurisdiction	Local economy not anticipated to be adversely affected.
Public Confidence in the Jurisdictions Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

Thunderstorms/Tornadoes

Populations affected by severe storms are dependent on numerous factors. These include the tornado's mass and strength at the time of impact, location of impact, and ability to respond to warnings. Tornadoes may strike quickly, with little to no warning, and can bring heavy rain and hail. Historical data suggests that tornadoes have the potential of causing minimal to devastating damage to an area, as well as hundreds of injuries, and even death. Most fatalities and injuries associated with tornadoes are caused by flying debris. Those in the affected area may also become trapped by a collapsing structure. Tornadoes may also damage power lines and cause gas leaks, making individuals susceptible to fires, electrocution, explosions, and exposure to harmful gases. It is also important to remember that tornadoes often accompany severe storms, and bring with them additional dangers of lightning and flash floods.

There are 93 pole-mounted sirens utilized by OEM to warn residents of tornado warnings for Davidson County. The sirens are designed to warn those people located outdoors and in public gathering places, such as parks or in the downtown business area. The warning sound from each siren is audible within a 1/2 to 1 1/2 mile radius, depending upon the terrain, humidity, foliage, and background noise, such as wind and rain.

Figure 4-42 presents the siren locations and their respective range. An upgraded siren system along with additional sirens was completed in 2013.

Table 4-33: Thunderstorm/Tornado Impacts

CONSIDERATIONS	IMPACTS
Impact on the Public	Localized impact expected to be severe for incident areas and moderate to light for other adversely affected areas.
Impact on Responders	Localized impact expected to be severe for personnel in the areas at the time of the incident.
Continuity of Operations & Continued Delivery of Services	Damage to facilities/personnel in the area of the incident may require temporary relocation of some operations. Localized and possible severe disruption of roads, facilities, and/or utilities caused by incident may postpone delivery of some services.
Infrastructure, Property & Facilities	Severe localized impact to facilities and infrastructure in the area of the incident possible. .
Environment	Localized impact expected to be severe for incident areas and moderate to light for other areas affected by the storm or HazMat spills.
Economic Conditions of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time.
Public Confidence in the Jurisdictions Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

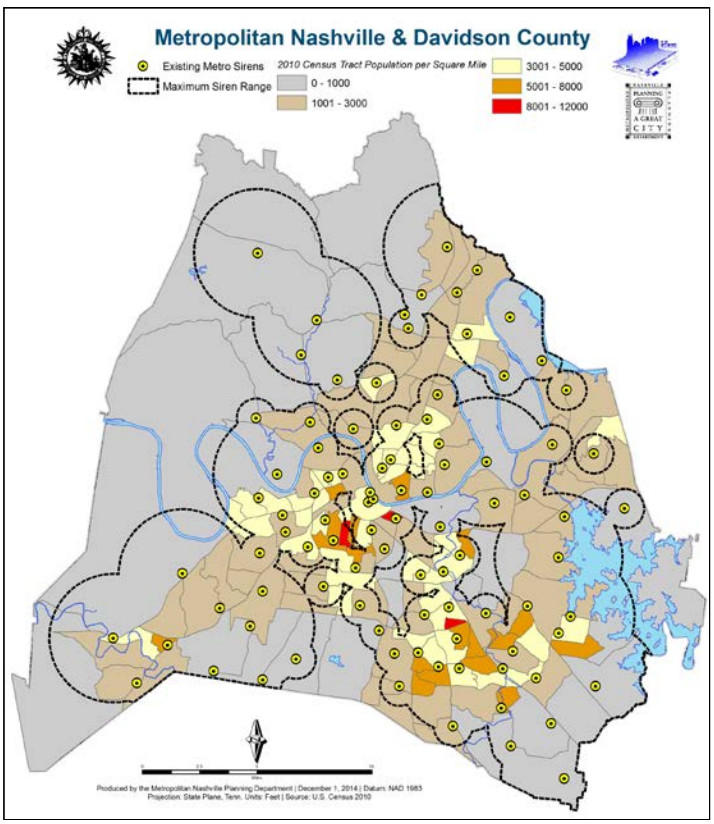

Figure 4-42: Tornado Siren Locations

Winter Storms

There are many factors during a winter storm that can dictate methods and strategy for mitigation and clearing of roadways. The temperature, wind speed, amount of precipitation, and traffic all play a vital role in establishing a successful cleanup practice. Metro Nashville Public Works uses several techniques to help mitigate the effects of winter storms on its twenty-eight primary and secondary routes.

First is the direct application of brine onto the roads from the back of their eighteen distribution trucks, approximately twenty-four hours before the snow event takes place. This treatment applies brine directly to the roadway and assists in the prevention of ice formation and bonding to the pavement surface. The next technique used is the actual spreading of salt once accumulation has begun. To perform this application Metro Public Works uses twenty-eight route trucks and seven standby units to accommodate all mitigating factors that occur during a winter storm. This process requires traffic assistance to help activate the salt and the melting process.

Recently, the department of Public Works added five trucks equipped with onboard wetting systems that apply brine or other liquid materials such as calcium chloride to dry rock salt as it exits the truck. The addition of this pre-wetting capability activates the salt & initiates the melting process. These units also contribute to the cleanup, with less material bouncing off of the roadways and going to our ground water supply via storm drains and inlets.

These resources will assist in mitigating the effects of a winter storm on local infrastructure and the motoring public. They will also provide the department a faster and more efficient method of clearing roadways, while providing a more environmentally friendly approach to snow and ice removal.

Table 4-34: Winter Storm Impacts

CONSIDERATIONS	IMPACTS
Impact on the Public	Localized impact expected to be severe for affected areas and moderate to light for other less affected areas.
Impact on Responders	Adverse impact expected to be severe for unprotected personnel and moderate to light for trained, equipped, and protected personnel.
Continuity of Operations & Continued Delivery of Services	Possible need to necessitate execution of the Continuity of Operations Plan, dependent on location of operations. Localized possibly severe disruption of roads and/or utilities caused by incident may postpone delivery of some services.
Infrastructure, Property & Facilities	Localized impact to facilities and infrastructure in the areas of the incident. Power lines and roads most adversely affected. If frigid temperatures, restoration efforts may be greatly hampered due to temperature and poor road conditions. Extreme temperature fluctuations may cause damage to older water mains, and could affect water distribution.
Environment	Environmental damage to trees, bushes, etc.
Economic Conditions of the Jurisdiction	Local economy and finances may be adversely affected, depending on damage.
Public Confidence in the Jurisdictions Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

COMMUNICABLE DISEASES

The impact of a communicable disease outbreak within the Metro area may include the loss of life, short-term or long-term debilitation for victims and/or loss or delay of business and service deliverability. Economic hardships are often a direct result of a communicable disease outbreak, as lost work time due to individual illnesses affects employees and employers; in addition, healthy citizens tend to stay home and self-isolate, which puts a strain on business profits.

In addition, a serious epidemic would likely cause a strain on current public health and medical resources. Depending on the disease outbreak, response efforts will include education for both medical personnel and citizens, continuing surveillance and data monitoring, public information and, if necessary, mass prophylaxis.

While communicable diseases vary in intensity and possible impact, the risk and vulnerability of a communicable disease epidemic in Metro Nashville-Davidson County is considered low, based on historical data. Because of ongoing mitigation efforts within the Metro Public Health Department for diseases such as West Nile Virus and pandemic flu, and because of constant surveillance among hospital data and infectious disease reporting, the probability that an epidemic would spread among Metro Nashville-Davidson County before response and planning measures were implemented is low.

Table 4-35: Communicable Diseases Impacts

CONSIDERATIONS	IMPACTS
Impact on the Public	Adverse impact expected to be severe for unprotected persons and moderate to light for protected persons.
Impact on Responders	Adverse impact expected to be severe for unprotected personnel and uncertain for trained and protected personnel, depending on the nature of the incident.
Continuity of Operations & Continued Delivery of Services	Impacted personnel may require lines of succession execution. Disruption of lines of communication and temporary destruction of facilities may extensively postpone delivery of services.
Infrastructure, Property & Facilities	Access to facilities and infrastructure in the area of the incident may be denied until decontamination completed.
Environment	Limited impact anticipated.
Economic Conditions of the Jurisdiction	Minor local economy affected, possibly for an extended period of time.
Public Confidence in the Jurisdictions Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

Hazardous Materials

HAZMAT incidents vary widely in their effects on exposure. Most of the common chemicals can quickly cause death or permanent injury in high concentrations with relatively little exposure time, but some toxins cause injury only with repeated exposures, or are carcinogenic. Emphysema or other chronic lung diseases can result from toxic gas inhalation. Caustics, acids, and some other compounds cause immediate burns. Clothing, vehicles, and personal effects can be contaminated by most hazardous materials, often regardless of their chemical state (gas or liquid). Even properly-contained limited impact HAZMAT incidents can swiftly harm those in the affected area before first responders arrive, and leave chemical residues that persist for months or years. A few injuries and deaths occurring at a large facility fire can lead to many casualties from smoke exposure or residential area contamination if the incident is inadequately contained. Winds, flooding, ground elevation, and accessible terrain might increase exposure. Fires and explosions may cause structural damage.

Obviously health and safety of people present at a HAZMAT incident will vary by more than the chemical type: proximity to other volatile or flammable substances, warning time and evacuation protocols, the duration and location of the accident (relative to population centers and to their food and water supplies), and the presence or absence of secondary incidents such as fires and explosions. Transportation-related HAZMAT events can lead to fatalities and injuries caused by the combination of the chemical effects with automobile and road damage, and possible pile-ups.

This hazard could have a significant impact on the public health, the environment, private property and the economy. The impact of this type of disaster will likely be localized to the immediate area surrounding the incident. The initial concern will be for people, then the environment. If contamination occurs, the spiller is responsible for the cleanup actions and will work closely with federal and state agencies and the local jurisdiction to ensure that cleanup is done safely and in accordance with federal and state laws.

Table 4-36: Hazardous Materials Impacts

CONSIDERATIONS	IMPACTS
Impact on the Public	Localized impact expected to be severe for plume area and moderate to light for other adversely affected areas.
Impact on Responders	Adverse impact expected to be severe for unprotected personnel and moderate to light for protected personnel.
Continuity of Operations & Continued Delivery of Services	Damage to facilities/personnel in the area of the incident may require temporary relocation of some operations. Localized disruption of roads and/or utilities may postpone delivery of some services.
Infrastructure, Property & Facilities	Localized impact to facilities and infrastructure in the plume area of the incident, possibly for extended period.
Environment	Localized impact expected to be severe for plume area. Remediation required.
Economic Conditions of the Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time, depending on damage, extent of cleanup, and length of investigation.
Public Confidence in the Jurisdictions Governance	Localized impact expected to primarily adversely affect HazMat source owner and local entities.

Wildfires

Wildfires can emanate from myriad sources, but more often than not they are technological or human caused events. Home wildfires, wildfires, and forest wildfires can impact large populations if intensified. The specific impacts they have can vary, but there are some similarities. Individuals may be exposed to smoke inhalation. In home wildfires, smoke may fill a room quickly, making it difficult for an individual to breathe and find a safe exit. The smoke from wildfires and forest wildfires can affect overall air quality in the area, proving especially dangerous for those with asthma or other lung related health concerns. Food may become exposed to heat, smoke, or soot, putting individuals at risk for food poisoning. In addition, each type of event may impact an individual's general safety, placing them at risk for burns and carbon monoxide poisoning.

Wildfires may cause entire communities to go without power, making it difficult for individuals to stay cool and compromising the food supply. Water can become contaminated, and unable to be used without risking sickness. Wildfires produce an extreme amount of heat, which can severely burn an individual's hands and feet even after the blaze is extinguished, and may also reignite the flames. The wildfire may also have caused chemicals to explode or leak, placing those exposed to the potential health risks of hazardous materials.

Wildfires may result in cascading events, such as future flooding, which may further impact citizens. Rapid response to wildfires is necessary to prevent them from developing into forest wildfires. Although forest wildfires typically occur in heavily forested areas, more people have begun to populate these areas.

Table 4-37: Wildfires Impacts

CONSIDERATIONS	IMPACTS
Impact on the Public	Localized impact expected to be severe for incident areas and moderate to light for other adversely affected areas.
Impact on Responders	Localized impact expected to limit damage to personnel in the incident areas at the time of the incident.
Continuity of Operations & Continued Delivery of Services	Damage to facilities/personnel in the area of the incident may require temporary relocation of some operations. Localized disruption of roads and/or utilities caused by incident may postpone delivery of some services.
Infrastructure, Property & Facilities	Localized impact to facilities and infrastructure in the area of the incident. Some severe damage possible.
Environment	Localized impact expected to be severe for incident areas and moderate to light for other areas affected by smoke or HazMat remediation.
Economic Conditions of the Jurisdiction	Local economy and finances may be adversely affected, depending on damage and length of investigations.
Public Confidence in the Jurisdictions Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

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Multi-Hazard Mitigation Plan
4.3 Capability Assessment

An additional method of evaluating the potential for hazards to adversely impact Metro is to conduct an inventory and analysis of the community's existing mitigation capabilities. Doing so provides an assessment of how well prepared Metro is presently, and highlights any areas where improvements might be worthwhile. The term "mitigation capabilities" is meant to be inclusive of all existing policies, regulations, procedures, and abilities that already contribute to the protection of the Metro area and the minimization of damages from future disasters.

The Community Planning Team's intent, through this plan, is to identify those policies, regulations, procedures, and abilities that contribute to lessening disaster damages. Second, it is the intent of the CPT to evaluate these mechanisms in terms of whether they could be improved in order to reduce future disaster damages. For example, a community that has adopted building codes has adopted procedures that take a significant step in preventing future damage. However, if that community does not have a Building Inspector, someone whose responsibility it is to inspect pre-construction plans, new construction, and enforce penalties for projects that do not meet the code, then the *usefulness and effectiveness* of the community's building codes has been substantially undermined. Such a circumstance, which is NOT the case in Metro, would lead the CPT towards recommending that the position of Building Inspector be funded and filled.

Table 4-28 presents the inventory of existing mitigation capabilities within Metropolitan Nashville-Davidson County. An evaluation of key capabilities follows.

Table 4-38: Metropolitan Nashville-Davidson County Mitigation Capability

Capability	Metropolitan Nashville-Davidson County
Comprehensive Plan	Adopted with a major update underway
Land Use Plan	County divided into 14 community plans and updated on a rotating schedule.
Subdivision Ordinance	Subdivision Regulation administered by the Planning Department
Zoning Ordinance	Metro Code – Title 17
NFIP/FPM Ordinance	Ordinance #78-840
Floodway Buffer Ordinance	50' outside Floodway
- Map Date	2001. Preliminary FIRM Dated November 2013
- Substantial Damage language?	Cumulative Substantial Damage
- Certified Floodplain Manager?	10 – Tom Palko, Roger Lindsey + 8 staff members
- # of Floodprone Buildings?	Approximately 11,740 bldg footprints within floodplain
- # of NFIP policies	Approximately 6,347 policies in force
- Maintain Elevation Certificates?	Yes
- # of Repetitive Losses?	165 Structures
CRS Rating, if applicable	8
Stormwater Program?	Yes
Building Code Version	2006 IRC; 2006 IBC
Full-time Building Official	Yes, Metro Codes Department
- Conduct "as-built" Inspections?	At time of framing an elevation certificate is required
BCEGS Rating	Commercial – 4; Residential – None
Local Emergency Operations Plan	Yes
Hazard Mitigation Plan	Yes
Warning System in Place?	Yes
- Storm Ready Certified?	Yes
- Weather Radio reception?	100 % with back-up transmitter
- Outdoor Warning Sirens?	Yes
- Emergency Notification (R-911)?	No
- Other? (e.g., cable over-ride)	Yes cable over-ride; EAS message; FCC requirement No – for satellite TV homeowners
GIS System?	Yes – Metro and NES
- Hazard Data?	Floodplains, parcels, soils
- Building footprints?	Yes
- Tied to Assessor data?	Yes
- Land-Use designations?	Yes, within parcel data – different than zoning code
Structural Protection Projects	Levees – MetroCenter
Property Owner Protection Projects	Buyouts and Elevations; Flood protection/ retrofit not typical
Critical Facilities Protected?	Water Treatment plants – yes; Sewage Treatment plants – no Program in place to upgrade to submersible pumps
Natural Resources Inventory?	TDEC has database – wetlands, endangered species, tree cover; hyperspectral also available
Cultural Resources Inventory?	Yes – Historic Administration; Information should be parcel based
Erosion Control procedures?	Yes – Regulations
Sediment Control procedures?	Yes – Regulations
Public Information Program/Outlet Environmental Education Program?	Billing Stuffers; Website – MWS has Public Information Officer; meet NPDES public information requirements.

Explanation of Capability Assessment Matrix

<u>Comp Plan:</u> Comprehensive Long-Term Community Growth Plan

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

<u>Subdivision Ordinance:</u> Regulates platting, recording, infrastructure improvement

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

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

<u>Sub. Damage:</u> Does your FPM Ordinance contain language on Substantial Damage/Improvements? (50% rule)

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

<u># of FP Bldgs:</u> How many buildings are in the Floodplain?

<u># of policies?</u> How many buildings are insured against flood through the NFIP?

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

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

<u>BCEGS:</u> Building Code Effectiveness Grading System Rating

<u>LEOP:</u> Do you have a Local Emergency Operations Plan – a disaster RESPONSE plan

<u>HM Plan:</u> Do you have a Hazard Mitigation Plan

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

<u>GIS:</u> Geographic Information System

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

<u>Property Protection Projects:</u> (buy-outs, elevation of structures, flood proofing, small "residential" levees or berms/floodwalls)

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

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

<u>Erosion Or Sediment Control:</u> Do you have any projects or regulations in place?

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

Evaluation of Existing Capabilities Identified Through the Matrix

Overall, the existing policies and procedures for implementation and accomplishing mitigation are both strong and comprehensive. This analysis has highlighted some issues with the current status of the Community Rating System (CRS) that are discussed below:

- Metro fully participates in the National Flood Insurance Program, however there are approximately 11,740 structures located within the 100-year floodplain, but only 6,347 active flood insurance policies in force. Metro should continue to promote the purchase of flood insurance to all who have the potential for future flood losses.

- Currently Metro has a CRS rating of Class 8 which provides a 10% discount for all flood insurance policy holders within Davidson County. Annually the policy holders receive a cumulative savings of approximately $524,300 in insurance premiums.

- Metro cannot improve its classification in the CRS beyond Class 7 without improving its scores in the Building Code Effectiveness Grading Schedule (BCEGS). Currently Metro does not have a suitable rating for residential plan review. The CPT recommends that Metro research the benefits of implementing the required residential plan review in order to improve the rating within the CRS.

Other Existing Mitigation Capabilities within Metro

Several significant mitigation programs are underway in Metropolitan Nashville-Davidson County that further strengthen the existing level of community protection against hazards and reduce future losses from disasters.

- Metro's cumulative Substantial Damage Ordinance is a notable effort to utilize the NFIP to minimize future damages to existing structures.

- Metro's floodplain ordinance requiring construction at the Base Flood Elevation (BFE) plus four feet is a notable effort to use the NFIP to minimize future damages to new and substantially improved structures.

- Community Emergency Response Team (CERT) training. Operated through the Nashville Office of Emergency Management, CERT Training allows citizens to manage utilities, put out small fires, search for and rescue victims safely, triage the victims, and organize themselves and spontaneous volunteers to be effective in aiding victims.

- American Red Cross provides shelter for disaster victims, cooling and heating shelters for victims during extreme temperatures, as well as public information brochures and presentations on multiple natural hazards.

- The Tennessee Valley Authority (TVA) and the Nashville Electric Service (NES) Emergency Load Curtailment Plan is a pre-stated contingency plan for use in the event of emergencies resulting from the shortage of power or other causes.

- NES Vegetation Management Plan. NES developed a Vegetation Management Plan in 2003 to trim trees throughout the entire service area with the goal of improving service reliability, through the use of proper tree trimming techniques. NES has completed two complete 3 year trim cycles trimming trees along an estimated 4,800 miles of power lines. In 2009, the plan was changed from a 3 year trim cycle to a 4 year trim cycle where an approximate 1,200 miles of power lines will are trimmed each year of the 4 year cycle. NES began year 2 of the 2nd 4 year trim cycle in July 2014.

- NES has constructed a back up operations center that will allow power system monitoring and power restoration efforts to continue if their main control center is not available either from physical damage or inaccessibility. The back up operations center is constantly in stand-by mode ready to be activated. Its computer and control systems are totally independent of the systems located at the NES main building allowing completely independent operations from the back up facility. The facility can accommodate 4 system operators, 4 service dispatchers and necessary support staff.

- Critical Lots. According to the Subdivision Regulations, lots are designated critical during the preliminary plat review process based on soil conditions and degree of slope or other lot features, to address concerns related to the feasibility of construction. Reviewers emphasize that a typical house design may not be suitable for a critical lot. A critical lot usually requires a design that is specifically for that lot. Generally, a lot will be designated critical when it is created on an up-slope greater than 15 percent or a down or cross-slope greater than 20 percent grade.

  Prior to submission of an application for a building permit on a lot designated as critical, a plan shall be submitted to the Planning Commission staff for approval. The plan shall provide a survey of existing conditions and details of the proposed development on the lot. No clearing or grading may take place prior to approval of the critical lot plan and issuance of a building permit.

- Flood Hazard Barricades. There are several areas in Metro that are barricaded during heavy rainfall or flooding events to prevent residents from driving through standing flood waters. These areas include:

  Mill Creek
    - Bluff Road – from Nolensville Pike to Davidson County Line;
    - Culbertson Road – from Nolensville Pike to Old Hickory Boulevard.;
    - Blue Hole Road – from Una-Antioch Pike to Tusculum Road; and
    - Una-Antioch Pike – from Reeves Road to Hickory Hollow Parkway.

    The U.S. Army Corps of Engineers, Nashville District, is currently performing a detailed hydrologic and hydraulic study of the Mill Creek watershed.

  Dry Fork Creek
    - Stewarts Ferry Pike – from South New Hope Road to Earhart Road.

Harpeth River

- Newsom Station Road at Highway 70 – flooding at bridge crossing;
- Old Harding Pike – from Harpeth River Bridge to Poplar Creek Road; and
- Coley-Davis Road – barricading only required occasionally.

McCrory Creek

- Elm Hill Pike - near Interstate 40 bridge. This is also adjacent to an identified repetitive loss area along McCrory Creek.

- Homeowner Direct Mailings. MWS distributes a notice to all properties located within the 100-year floodplain, which affects approximately 10,000 residents. The annual notice clearly explains that the recipient's property is subject to flooding and includes a phrase such as "your property is in or near the floodplain."

  The pamphlet presents a map of the specific residence and floodplain. The pamphlet also includes information on elevation certificates and narrative information concerning covering such topics as flood safety, flood insurance, property protection measures, floodplain development permit requirements, cumulative substantial improvement policy, drainage system maintenance, natural and beneficial functions of the floodplain, and illicit discharges.

- Metro has created an on-line program for the community called NERVE (Nashville Emergency Response Viewing Engine). This is an interactive mapping site designed to provide timely information relating to natural or man-made emergencies in Davidson County. As an emergency arises, the site will provide information about road closures, evacuation areas and/or routes, shelters and relief centers (i.e. food, water & clothing distribution centers, disaster information centers, disaster recovery centers and more). This site also includes a media tab that includes a Twitter feed from the OEM/EOC, press releases and links to other important information and agencies.

- After the Flood of May 2010, there was a combined effort from the US Geological Survey (USGS), National Weather Service (NWS), Metro Water Services and Nashville OEM to install river gauges at flood prone waterways in Davidson County. Data from these gauges is made available to local authorities for action as needed. The USGS supplied the gauges and is responsible for the maintenance. Along with these gauges, there are 3 fixed post cameras, and 2 mobile cameras to monitor flood levels. The current location of the river gauges are listed below in Table 4-29 and illustrated in Figure 4-43.

Browns Creek
Glendale Lane
State Fairgrounds

Cumberland River
Old Hickory Dam
Edenwold
Stones River – Hermitage
Pennington Bend
Omohundro
Nashville
Bordeaux
Cockrill Bend

Dry Creek
Edenwold

Harpeth River
Bellevue

Mansker Creek
Millersville

Mill Creek
Nolensville
Sevenmile Creek
Antioch
Woodbine

Richland Creek
Harding Place/Belle Meade
Charlotte Ave

Stones River
Donelson

Whites Creek
Whites Creek
Bordeaux

Table 4-39: River Gauges

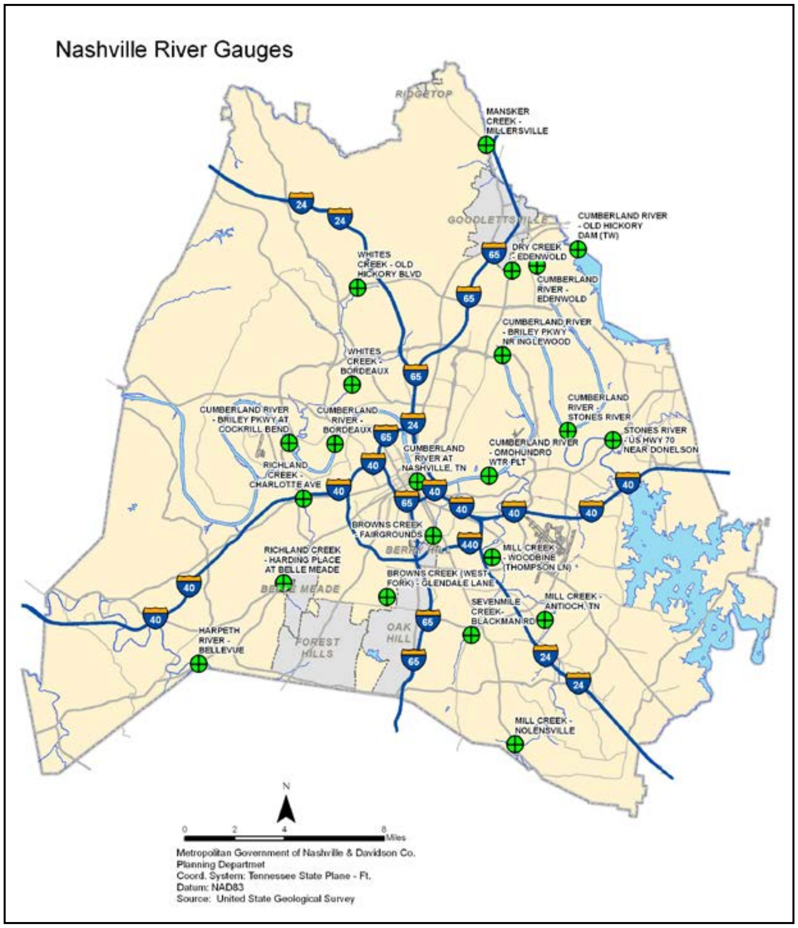

Figure 4-43: River Gauge Locations

- There is also a new program called 'SAFE' (Situational Awareness for Flooding Events) that Nashville utilizes. It is a partnership between Metro Water Services, Nashville OEM, Metro Planning, US Army Corps of Engineers, the USGS and the National Weather Service. The expertise and data from each of these agencies is collectively used to monitor and predict watershed conditions. This program allows Metro to monitor actual and forecasted river stages and acquire information that can be used to dispatch resources and respond more efficiently to flood related emergencies. This information will be used to alert emergency personnel to the threat or actual danger of flooding, and not as a warning system for the general public. There are currently 25 gauges installed. This information gets mapped to a program developed by Metro Planning and displays resulting inundation areas and impacts associated with current and predicted flooding.

The Nashville SAFE program is focused on the six major watersheds within Metro Nashville: Cumberland River, Harpeth River, Mill Creek, Richland Creek, Whites Creek, and Browns Creek.

- Metro Water Services Stormwater completed a Metro Stormwater Management Plan that generally provides a framework by which stormwater resources within Metro are protected.

- Metro Water participates in the TNWARN program, which is a type of mutual aid agreement among participating water and sewer utilities across the state. Program info is available at http://www.tnwarn.org/.Metro Nashville Public Health employs an Integrated Mosquito Management (IMM) approach in Davidson County. The components are surveillance for adult mosquitoes and West Nile Virus, inspections and management of breeding sites, public education, control of immature stages with larvicides, and control of adult populations, if and when necessary. For other pests, Metro Public Health uses similar approaches and would inspect and make informed decisions based on the results of such inspections. During emergencies, such as the May 2010 Flood, similar approaches were used, albeit on a wider scale. Good working relationships with State and Federal agencies would allow for scaling up if necessary. Metro Public Health has a written Mosquito Control/West Nile Virus plan in place.

- There are many factors during a winter storm that can dictate methods and strategy for mitigation and clearing of roadways. The temperature, wind speed, amount of precipitation, and traffic all play a vital role in establishing a successful cleanup practice. Metro Nashville Public Works uses several techniques to help mitigate the effects of winter storms on its twenty-eight primary and secondary routes.

  First is the direct application of brine onto the roads from the back of their eighteen distribution trucks, approximately twenty-four hours before the snow event takes place. This treatment applies brine directly to the roadway and assists in the prevention of ice formation and bonding to the pavement surface. The next technique used is the actual spreading of salt once accumulation has begun. To perform this application Metro Public Works uses twenty-eight route trucks and seven standby units to accommodate all mitigating factors that occur during a winter storm. This process requires traffic assistance to help activate the salt and the melting process.

  Recently, the department of Public Works added five trucks equipped with onboard wetting systems that apply brine or other liquid materials such as calcium chloride to dry rock salt as it exits the truck. The addition of this pre-wetting capability activates the salt & initiates the melting process. These units also contribute to the cleanup, with less material bouncing off of the roadways and going to our ground water supply via storm drains and inlets. These resources will assist in mitigating the effects of a winter storm on local infrastructure and the motoring public. They will also provide the department a faster and more efficient method of clearing roadways, while providing a more environmentally friendly approach to snow and ice removal.

Multi-Hazard Mitigation Plan

5.0 Mitigation Strategy

This Multi-Hazard Mitigation Plan was originally created in 2005. In 2009, 2012 and 2014, the CPT reviewed and agreed to continue to adopt the original goals and objectives as noted in this section

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

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

The first two components have painted a picture of Metro's vulnerability to natural hazards. The CPT learned that:

1. Stream system and neighborhood flooding continues to be a significant threat to the community;
2. Geological hazards including landslides and sinkholes are a moderate threat;
3. Earthquakes pose a potential threat; and
4. Most meteorological and natural biological hazards occur periodically: drought, extreme temperatures, infestations, severe thunderstorms/high wind, tornadoes, and severe winter storms.

The third component, Capability Assessment, described the current ability of Metro to counter the identified threats through existing policies, regulations, programs, and procedures. Here, the CPT learned that:

1. Flood insurance is available for all parts of Davidson County. Currently (2014) , 6347 policies are in effect, covering 54 percent of the 11,740 building footprints located within the floodplain;

2. Metro's Floodplain Management Plan for Repetitive Loss Areas, has been incorporated into this document.

3. The stormwater regulations were recently updated to clarify and strengthen existing policies. In December 2010, Substitute Ordinance No. BL2010-794 was passed by Metro Council and approved by the Mayor. This ordinance set up low impact

development practices, set standards for No Adverse Impact design, and included the provision that no new structure shall be constructed within the floodway.

4. MWS has prioritized Capital Improvement Projects as outlined in the multiple Stormwater Basin Plans;

5. MWS has prioritized watersheds throughout the County for preparing/updating Basin Plans;

6. The IRC Building Codes contain seismic and design wind elements;

7. Residential plan reviews are performed on complex designs;

8. Flood warning capabilities and stream gauging, has been enhanced since the May 2010 flood event;

9. OEM has 93 Outdoor Early Warning sirens throughout the community. This siren program was recently updated (2012) and upgraded with additional sirens added to the footprint;

10. Public information is made available to inform residents about the risks of hazards (earthquakes, floods, and tornadoes, predominantly) and appropriate risk reduction actions that they can undertake. Social media outlets are also utilized along with Metro Government websites; and

11. Metro does not support flood protection and retrofitting as standard solutions for residential flooding problems. Metro's voluntary home buyout program is focused on removing at risk structures from the floodway and floodplain and restoring the property to open space.

GOAL SETTING

The analysis of the three components of the Risk Assessment identified areas where mitigation improvements could be made, providing the framework for the CPT to formulate planning goals. Each CPT member was provided an alphabetized list of possible goal statements. In addition, each CPT member also received a list of goals from other community plans that have had public input and review and have already been formally adopted by Metro. This information was provided to CPT to ensure that the Mitigation Planning Goals would be in concert, not in conflict, with other existing community priorities. CPT members then each received three index cards and were asked to write what they felt would be appropriate goals for this plan using the information provided as a guide.

The CPT members were instructed that they could use, combine or revise the statements provided, or develop new ones. The goal statements were then attached to the meeting-room wall, grouped into similar topics, combined, rewritten, and agreed upon.

Some of the statements were determined to be better suited as objectives or actual mitigation projects, and were set aside for later use. Based upon the planning data review, and the process described above, the CPT developed the final goal statements listed below. None of the final goal statements are the same as those provided on the alphabetized list. The goals and objectives provide the direction for reducing future hazard-related losses in Metropolitan Nashville - Davidson County.

GOAL #1: **Reduce exposure to hazard related losses for existing and future development.**

Objective 1.1: *Strengthen the existing flood hazard mitigation program.*

Objective 1.2: *Protect critical facilities, utilities, and infrastructure.*

Objective 1.3: *Improve the coordination of severe weather mitigation actions.*

Objective1.4: *Develop a coordinated set of mitigation actions that address geological hazards (earthquakes, sinkholes, and landslides).*

GOAL #2: **Promote awareness of hazards and vulnerability among citizens, business, industry and government.**

Objective 2.1: *Develop a seasonal multi-hazard public education campaign to be implemented annually.*

GOAL #3: Maximize use of available funding.

Objective 3.1: Identify multiple objective opportunities that can be used to support mitigation activities.

Objective 3.2: Identify and analyze project cost share options.

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Objective 3.3: Submit mitigation project applications annually at a minimum.

IDENTIFICATION OF MITIGATION MEASURES

This Multi-Hazard Mitigation Plan was originally created in 2005. In 2009, 2012 & 2014, the CPT reviewed and agreed to continue to adopt the original mitigation measures and recommended actions as noted in this section, with slight edits and updates as noted.

Following the goal setting meeting, the CPT conducted a brainstorming session to generate a set of viable alternatives that would support the selected goals. Each CPT member was provided with the following list of categories of mitigation measures:

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

Potential mitigation measures within each of the six categories were presented to the CPT. (see Appendix A). A facilitated discussion examined and analyzed the alternatives. Then, with an understanding of the alternatives, the CPT generated a list of preferred mitigation actions to be recommended. Similar to the goal-setting activity, the CPT included all previously recommended mitigation actions from existing Metro mitigation plans in its review. This process reinforced Metro's use of the Multi-Hazard Mitigation Plan as an umbrella document for all exiting mitigation plans mentioned in Section 3. Thus, this plan puts forth existing recommendations that are still to be implemented in addition to the new recommendations that resulted from the CPT's detailed Risk Assessment process. This plan serves as an update to the existing mitigation plans by identifying the recommendations from previous plans that have already been implemented and by reprioritizing those that remain.

Once the old and new mitigation actions were identified, the CPT members were provided with decision-making criteria to prioritize the recommended actions. FEMA's recommended "STAPLE/E" criteria set (social, technical, administrative, political, legal, economic, and environmental criteria) was utilized in order to help decide why one recommended action might be more important, more effective, or more likely to be implemented than another.

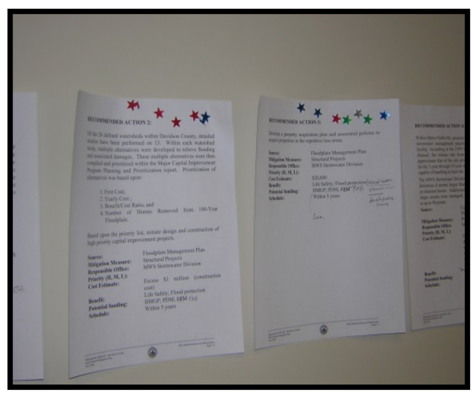

Figure 5.1 Priority "Stars"

With these tools, the CPT then undertook an exercise to prioritize the recommended mitigation measures. CPT members were provided with colored "stars": three red, three blue, and three green. Each color represented either high, medium, or low priority with regard to the importance, and each color was assigned a corresponding value (high = 5 points, medium = 3 points, and low = 1 point).

CPT members then voted for their preferred mitigation measures by placing their "stars" on specific mitigation measures. Team members were allowed to place as many as they wished of any or all colors on any one recommendation or to spread the stars among multiple mitigation actions. They were allowed to trade "stars", or otherwise negotiate with any other Team member, and they did not have to use all of their "stars" if they did not wish to do so. This process provided both consensus and priority for the CPT recommendations.

THE MITIGATION STRATEGY

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

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

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

2. EDUCATE the community on the hazard information that Metro has collected and analyzed through this planning process so that the community understands what disasters can happen, where disasters might occur, and what they can do to prepare themselves better. As part of public education, publicize the "success stories" that are achieved through the CPT's ongoing efforts.

3. IMPLEMENT the Action Plan, much of which is comprised of reiterating recommendations that have previously been made as a result of existing community plans.

4. MOM --- ardently monitor "Multi-Objective Management" opportunities, so that funding opportunities may be shared and "packaged" and broader constituent support may be garnered.

ACTION PLAN

The Action Plan presents the prioritized recommendations for Metro to pursue in order to lessen the vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. The recommendations are presented in order of priority to the community both in terms of need and effectiveness. The recommendations are also listed under the corresponding developed goal. Each recommendation includes a cost estimate and community benefit to meet the regulatory requirements of DMA. Action items that have already been completed or that were not recommended are included at the end of this section.

Below is a summary of all the action items and the responsible agencies. Detailed information for each action item is following in this section.

Table 5-1: Mitigation Action Plan Summary

Action #	NASHVILLE/DAVIDSON COUNTY HAZARD MITIGATION ACTION PLANS SUMMARY	Responsible Agency
1-1	Based upon the priority list, the action plan recommends that Metro initiate design and construction of high priority capital improvement projects.	MWS
1-2	The CPT recommends that ordinance language to provide added protection for critical facilities and prohibit hazardous materials and public health hazards from the floodplain is drafted, circulated for review and adopted.	MWS, Planning, Codes
1-3	The Nashville Office of Emergency Management (OEM) should review the costs and benefits of preparing a detailed flood response plan that identifies specific actions to take at different flood level predictions.	OEM
1-4	The studies underway in the approximate A Zones should be completed and adopted into Metro's floodplain regulations. The studies should then be submitted to FEMA with a request to revise the FIRM.	MWS
1-5	Develop a property acquisition plan and associated policies to acquire properties in the repetitive loss areas.	MWS
1-6	Fund, acquire, and install appropriate hardware and software.	OEM
1-7	The MWS Stormwater Division should review the costs and benefits of formalizing Metro's inspection and maintenance program to include detention facilities as well as streams and ditches.	MWS
1-8	It is recommended that the definition of a critical lot be expanded to include specific geological details and defined subjectively during plat review and that the critical lot concept be used in review of other developments.	MWS, Planning, Codes
1-9	MWS Drainage Maintenance staff should make site visits in response to complaints or inquiries from property owners. Staff should be trained in retrofitting techniques and be comfortable providing retrofitting guidance during site visits.	MWS
1-10	The severe weather hazards of drought and wildfire, extreme temperatures, thunderstorms and high winds, tornadoes; and winter storms are recommended to be included in a multi-hazard, seasonal Public Awareness Program. (see Goal #2)	
1-11	It is recommended that Metro personnel participate in training in the use of the RSDE program.	MWS
1-12	The CPT recommends assisting the City of Goodlettsville with the FEMA repetitive loss buyout program and associated flood mitigation initiatives.	MWS, OEM

1-13	The CPT recommends assisting local colleges and universities in obtaining outdoor early warning sirens through grant funding and connecting them to the city's existing early warning siren systems.	OEM
1-14	The satellite city of Oak Hill (located within Davidson County, TN) is aware of certain areas in their jurisdiction that have historically experienced flooding during significant rain events. In an effort to address these and any other such issues that may exist, Oak Hill has initiated a 3 Phase Drainage Study/Correction Plan (see below). It is recommended to include this project from The City of Oak Hill in this Multi-Hazard Mitigation Plan as it mirrors actions with Metro Water Services, and applies to the over goal.	City of Oak Hill
1-15	Based upon the priority list, the action plan recommends that Metro initiate design and construction of high priority capital improvement projects	MWS
1-16	The Clean Water Nashville Overflow Abatement Program (CWNOAP) Design Management Manual (Section 2.6.1) stipulates that all plan projects abide by the following flood elevation considerations.	MWS
1-17	NES has planned the construction of a joint Training and Operation Center in the northern part of the service territory to be located on Myatt Drive.	NES
1-18	In restoring MWS' water and sewer facilities from 2010 Flood impacts, site-specific flood risk mitigation was employed as possible/feasible in bringing facilities back on line. Further, it has been MWS's practice since the May 2010 flood to incorporate flood mitigation into capital projects planned for the facilities that were impacted by the flood. Since the flood, the designs were modified to elevate the facilities above the flood of record to minimize the potential impacts of future floods.	MWS
2-1	Develop and conduct a multi-hazard, seasonal Public Awareness Program that provides citizens and businesses with accurate information describing the risk and vulnerability to natural hazards, and is implemented on an annual basis.	OEM, MWS
2-2	Metro Water Services should request the state NFIP Coordinator to conduct Agent and Lender Workshops in support of the community's overall NFIP program efforts.	MWS
2-3	MWS currently sends an annual mailing to the approximate 10,000 properties located within the 100-year floodplain. It is recommended that MWS Stormwater Division continue the mailing and that the mailing be modified to include other natural hazards of concern that have been identified through the hazard mitigation planning process.	MWS
2-4	Discussions should be held with Metro website staff on the best way to post Elevation Certificate data on the website and procedures to maintain the data.	MWS
3-1	The Nashville Office of Emergency Management (OEM), with help from the MWS Stormwater Division's engineers, should review the costs and benefits of developing flood crest prediction programs for other streams with reporting gauges.	MWS, OEM
3-2	Metro officials should talk to their state legislators and Tennessee Department of Environment and Conservation staff about the feasibility of amending the State's dam safety laws.	MWS, OEM
3-3	Metro's Stormwater Division should pursue a Cooperating Technical Partner agreement with FEMA in order to get its mapping standards to better fit local conditions or make the community a higher priority for mapping support.	MWS
3-4	Develop a financial strategy to design and construct large capital improvement projects. The strategy shall incorporate a cost-sharing plan to leverage local, state, and federal funding for stormwater management activities and projects.	MWS
3-5	The CPT recommends applying annually for potentially available HMGP and FMA grants.	MWS, OEM

GOAL #1:	**Reduce exposure to hazard related losses for existing and future development.**
Objective 1.1:	*Strengthen the existing flood hazard mitigation program.*
Objective 1.2:	*Protect critical facilities, utilities, and infrastructure.*
Objective 1.3:	*Improve the coordination of severe weather mitigation actions.*
Objective 1.4:	*Develop a coordinated set of mitigation actions that address geological hazards (earthquakes, sinkholes, and landslides).*

RECOMMENDED ACTION 1-1:

Of the 26 defined watersheds within Davidson County, detailed basin studies have been performed on 13. Within each basin study, multiple alternatives were developed to relieve flooding and associated damages. These multiple alternatives were then compiled and prioritized within the Major Capital Improvement Program Planning and Prioritization report. Prioritization of alternatives was based upon:

1. First Cost;
2. Yearly Cost;
3. Benefit/Cost Ratio; and
4. Number of Homes Removed from 100-Year Floodplain.

Based upon the priority list, the action plan recommends that Metro initiate design and construction of high priority capital improvement projects.

Source:	Floodplain Management Plan
Mitigation Category:	Structural Projects
Responsible Office:	MWS
Priority (H, M, L):	High
Cost Estimate:	Excess $1 million (construction cost)
Community Benefit:	Life Safety; Flood protection
Potential funding:	HMGP; PDM; FMA
Schedule:	Within 5 years

2009 Update: *Since the creation of this plan in 2005, Metro has initiated a new Stormwater fee where as of July 1, 2009, Stormwater has a dedicated funding source. With this funding, the plan is to continue the home buyout program at $1M/year, plus construct $12M/year in drainage improvements. Stormwater has a master project list that is being constantly updated as new stormwater projects are identified. This list will be ranked and will be used as the plan for making capital improvements to the stormwater system.*

RECOMMENDED ACTION 1-2:

Communities often prohibit critical facilities or hazardous uses from the floodway or the entire floodplain. While a building may be considered protected from the 100-year flood, a higher flood or an error on the builder's or operator's part could result in a greater risk than

the community is willing to accept. If a critical facility must be located in a floodplain, then it should be designed to stringent protection standards and have flood evacuation plans. Metro does not currently have any special provisions for critical facilities.

The CPT recommends that ordinance language to provide added protection for critical facilities and prohibit hazardous materials and public health hazards from the floodplain is drafted, circulated for review and adopted.

Source:	Community Rating System Action Plan
Mitigation Category:	Prevention
Responsible Office:	MWS; Metro Planning; Metro Codes
Priority (H, M, L):	High
Cost Estimate:	Staff Time; Five to ten days of staff time to get the regulation adopted. Enforcing the new standard would be part of ongoing permit enforcement work.
Community Benefit:	Critical facility protection
Potential funding:	Existing Budget
Schedule:	Within 2 years

2009 Update: *A flood response plan was completed in 2009 for Mill creek. OEM will continue to work on more flood response plans in coordination with MWS and NWS.*

2012 Update: *In response to and per situations evidenced during the May 2010 flood event, Metro Water Services is systematically evaluating key infrastructure locations and making certain retrofits to address flooding impact potentials so as to eliminate or minimize operational disruptions during future "flood of record" flood events.*

2014 Update: *Metro Council passed an ordinance that prohibits the construction of new structures within the floodway.*

RECOMMENDED ACTION 1-3:

A community flood response plan must specify steps to be implemented when a flood warning is issued, such as when and which streets to close, when to order an evacuation, when and what equipment should be moved to high ground, etc.

The Nashville Office of Emergency Management (OEM) should review the costs and benefits of preparing a detailed flood response plan that identifies specific actions to take at different flood level predictions.

Source:	Community Rating System Action Plan
Mitigation Category:	Emergency Services
Responsible Office:	OEM
Priority (H, M, L):	High
Cost Estimate:	$25,000 or less

Community Benefit:	Effective, coordinated response, reducing losses, eliminating gaps and duplications in response activities
Potential funding:	FMA, HMGP, Existing Budget
Schedule:	Within 3 years

2009 Update: *A flood response plan was completed in 2009 for Mill creek. OEM will continue to work on more flood response plans in coordination with MWS and NWS.*

2014 Update: *Wolf Creek Dam failure plans were created in January 2008 for three different levels: Red Level: Lake Level 680 ft. (Minor to Moderate Flooding), Blue Level: Lake Level 715 ft. (Moderate Flooding), and Green Level: Lake Level 751 ft. (Major Flooding). These plans were utilized for the May 2010 flood, even though the flood wasn't from Wolf Creek Dam. Will evaluate the need for a community flood plan apart of these plans, or if they would do the same deeds.*

RECOMMENDED ACTION 1-4:

Metro Nashville's Special Flood Hazard Areas include 107.9 river miles of approximate A Zones, where FEMA did not provide base flood elevations. Most of these areas are slated for studies that will provide flood elevations and floodways.

The studies underway in the approximate A Zones should be completed and adopted into Metro's floodplain regulations. The studies should then be submitted to FEMA with a request to revise the FIRM.

Source:	Community Rating System Action Plan
Mitigation Category:	Prevention
Responsible Office:	MWS
Priority (H, M, L):	Medium
Cost Estimate:	Approximately $1,500 per river mile of each approximate A Zone
Community Benefit:	Life Safety; Regulating development to a defined flood elevation
Potential funding:	CTP; HGMP; PDM; USACE
Schedule:	Within 5 years

2009 Update: *MWS has a meeting scheduled in October 2009 with the State NFIP Coordinator and FEMA's contractor to perform a needs assessment on streams in Davidson County that are in need of a restudy. Converting the un-numbered "A" zones to detailed studies will be on the needs list.*

2014 Update: *The 2001 FIRM includes 95 miles of Zone A streams. A total of 42 miles of these streams have been replaced with detailed studies on the current preliminary FIRM dated November 22, 2013. The remaining 53 miles of Zone A streams are scheduled to be updated with detailed models under a currently funded contract.*

RECOMMENDED ACTION 1-5:

Develop a property acquisition plan and associated policies to acquire properties in the repetitive loss areas.

Source:	Floodplain Management Plan
Mitigation Category:	Property Protection
Responsible Office:	MWS
Priority (H, M, L):	Medium
Cost Estimate:	$20,000
Community Benefit:	Life Safety; Flood protection; Reduced losses; Development of greenway; stormwater management
Potential funding:	HMGP; PDM; FMA
Schedule:	Within 5 years

2009 Update: *MWS is in the final stages of developing an acquisition plan for floodplain properties.*

2014 Update: *Immediately following the May 2010 flood, MWS Stormwater finalized an acquisition plan that included 305 structures. The plan was implemented as a voluntary buyout program that resulted in the removal of 225 homes from the floodplain. MWS Stormwater continues to revise and update the acquisition plan.*

RECOMMENDED ACTION 1-6:

OEM monitors and updates a software program through TEMA (E-Plan) that companies provide contact information and the geographical location of the following facilities within the Metro area: Title III facilities, critical facilities, and service facilities such as Metro ECC, Metro Fire Stations, NES, MWS facilities, Metro Police precinct stations, hospitals, nursing homes, schools, and daycares.

WebEOC is a software program with required associated hardware, LCD Panels and projectors. WebEOC will provide emergency management checklists during EOC activation. It will also provide real time multi-media with plotted incident sites and damage / impact areas based on Computer Aided Dispatch (CAD) data and field reports.

Fund, acquire, and install appropriate hardware and software.

Source:	OEM Local Hazard Mitigation Plan
Mitigation Category:	Emergency Services
Responsible Office:	OEM
Priority (H, M, L):	Medium
Cost Estimate:	Approximately $25,000
Community Benefit:	Modeling would allow fit-gap analysis to determine optimum solutions; maximize efficiency in response and recovery activities; forecast and prioritize problem areas

Potential funding:	Public-Private partnerships
Schedule:	Within 2 years

2009 Update: *OEM has purchased and is actively utilizing WebEOC within the local Emergency Operations Center.*

2012 Update: *OEM is moving to utilize LEO, a free on-line FBI program, in place of WebEOC. WebEOC will continue to be updated and kept as a back-up to the LEO program. OEM does not utilize E-Stat anymore. P-1 is the newest computed aided dispatch and has common places noted for dispatch information. TEMA has an online E-Plan program that companies submit electronically. Companies can also scan a copy and send it directly to OEM.*

2014 Update: *OEM has changed from WebEOC to on-line LEO/LEEP, the free on-line secured FBI sponsored program.*

RECOMMENDED ACTION 1-7:

The MWS Stormwater Division's drainage maintenance section currently removes debris and obstructions in response to complaints and reports of problems. Although staff is increasing, there are not enough people to inspect the entire drainage system once a year. There is also no written set of procedures.

The MWS Stormwater Division should review the costs and benefits of formalizing Metro's inspection and maintenance program to include detention facilities as well as streams and ditches.

Source:	Community Rating System Action Plan
Mitigation Category:	Structural Projects
Responsible Office:	MWS
Priority (H, M, L):	Medium
Cost Estimate:	The entire drainage system would need to be mapped, streams and basins deserving of annual inspections and maintenance would need to be identified, and procedures would need to be written and approved. The total cost of removing small obstructions found by more frequent inspections before causing a problem would be less than removing large obstructions later. Five (5) days of staff time.
Community Benefit:	Life Safety; Property Protection; Pro-active approach to flood mitigation; FEMA eligibility
Potential funding:	Existing Budget
Schedule:	Within 5 years

2009 Update: *MWS's inspection program does include detention ponds and water quality devices. MWS has initiated an inspection program for these facilities and devices.*

2014 Update: *MWS Stormwater inspection program includes inspecting a representative sample of stormwater control measures annually (approximately 10% of total sites) to gauge private owner-maintenance of these measures. This reflects what is feasible with current staffing. MWS has initiated a proactive education effort to inform new owners of the maintenance required by control measures on their properties. Inspection reports generated by this outreach (submitted by property owners) has broadened MWS' ability to gain information about functionality of stormwater control measures without physically inspecting each site – while promoting overall better maintenance of facilities and devices.*

RECOMMENDED ACTION 1-8:

The CPT determined that geological hazards were adequately prevented in subdivision development through the designation of critical lots. Lots are designated critical during the preliminary plat review process based on soil conditions, degree of slope or other lot features, and to address concerns relating to the feasibility of construction. In order to determine the best method for addressing geological hazards, it is recommended that geological hazard ordinances from communities similar to Metro be identified, collected, and reviewed as part of the process of modifying the critical lot concept. However, outside of subdivision development, the critical lot concept is not utilized.

It is recommended that the definition of a critical lot be expanded to include specific geological details and defined subjectively during plat review and that the critical lot concept be used in review of other developments.

Source:	Community Planning Team
Mitigation Category:	Prevention
Responsible Office:	MWS; Metro Codes, Metro Planning
Priority (H, M, L):	Medium
Cost Estimate:	Staff Time
Community Benefit:	Life Safety
Potential funding:	Existing Budget
Schedule:	Within 3 years

2009 Update: *This will be re-addressed to create procedures for Metro Codes in regards to what gets flagged as critical lots with all parties, and to consolidate with what is flagged with Stormwater Division.*

RECOMMENDED ACTION 1-9:

MWS Drainage Maintenance staff should make site visits in response to complaints or inquiries from property owners. Staff should be trained in retrofitting techniques and be comfortable providing retrofitting guidance during site visits.

Source:	Community Rating System Action Plan
Mitigation Category:	Property Protection
Responsible Office:	MWS
Priority (H, M, L):	Medium
Cost Estimate:	$5,000 for 2-day on-site course for staff
Community Benefit:	Reduce losses, complaints, and staff time in responding to complaints
Potential funding:	Existing Budget; TEMA
Schedule:	Within 2 years

2009 Update: *MWS Stormwater staff responds to inquiries concerning flooding complaints. MWS refers the property owner to available FEMA publications on flood proofing and property protection methods.*

2014 Update: *MWS Stormwater continues to investigate stormwater related requests for service and meets with property owners on site upon request.*

RECOMMENDED ACTION 1-10:

The CPT determined that severe weather hazard mitigation actions and coordination would be best addressed under the goal of public awareness (Goal #2).

The severe weather hazards of drought and wildfire, extreme temperatures, thunderstorms and high winds, tornadoes; and winter storms are recommended to be included in a multi-hazard, seasonal Public Awareness Program.

RECOMMENDED ACTION 1-11:

Communities that participate in the National Flood Insurance Program (NFIP) often have difficulty determining whether structures meet the NFIP definition of being substantially damaged. This is particularly true after a major flood or other disaster in which large numbers of buildings have suffered damage and there is a pressing need to provide damage determinations so that reconstruction can begin. Structures in Special Flood Hazard Areas that are substantially damaged must be brought into compliance with the minimum requirements of local ordinances and the NFIP. To assist communities in making such determinations, FEMA developed the Residential Substantial Damage Estimator (RSDE) software, which provides guidance in estimating building value and damage costs for both single family and manufactured homes. Based on the regulatory requirements of the NFIP, it is intended to be used in conjunction with industry-accepted residential cost estimating guides.

It is recommended that Metro personnel participate in training in the use of the RSDE program.

Source:	CPT
Mitigation Category:	Prevention
Responsible Office:	MWS
Priority (H, M, L):	Low
Cost Estimate:	$5,000 for 2-day on-site course for staff
Community Benefit:	Improved enforcement of substantial damage regulations; mitigated structures; increased eligibility for ICC (increased cost of compliance)
Potential funding:	Existing Budget; TEMA
Schedule:	Within 2 years

2009 Update: *Nothing new to report at this time.*

2014 Update: *MWS Stormwater staff has been trained and they continue to use the program to assess damage to structures following flooding events.*

RECOMMENDED ACTION 1-12: (NEW ITEM 2009)

The City of Goodlettsville continues to have problems with flooding and properties continuing to be damaged by floods. The City of Goodlettsville has requested assistance from Metro Government with flood mitigation efforts.

The CPT recommends assisting the City of Goodlettsville with the FEMA repetitive loss buyout program and associated flood mitigation initiatives.

Source:	CPT
Mitigation Category:	Property Protection, Prevention
Responsible Office:	MWS and OEM
Priority (H, M, L):	High
Cost Estimate:	Staff Time
Community Benefit:	Life safety, Potential funding sources for action items of this Mitigation Plan
Potential funding:	Mitigation Funds
Schedule:	Within 2 years

2014 Update: *The city of Goodlettsville and Metro Nashville Davidson County requested the Army Corp of Engineers to perform a new flood study for Dry Creek. That study is in draft report, with results to soon be released. The city of Goodlettsville has implemented improved procedures to monitor Dry Creek with special attention to the weir structure at Interstate 65. Measures are in place to provide warning to residents when flooding is a threat which includes close monitoring of possible flooding areas, and door to door evacuations if needed. Goodlettsville continues to pursue mitigation projects through FEMA grants.*

RECOMMENDED ACTION 1-13: (NEW ITEM 2009)

Colleges and Universities in the area continue to address the need for supplying quick, accurate emergency information to the student body.

The CPT recommends assisting local colleges and universities in obtaining outdoor early warning sirens through grant funding and connecting them to the city's existing early warning siren systems.

Source:	CPT
Mitigation Category:	Property Protection
Responsible Office:	OEM
Priority (H, M, L):	Medium
Cost Estimate:	Staff time, equipment, service expenses
Community Benefit:	Life Safety, Potential funding sources for action items of this Mitigation Plan
Potential funding:	Mitigation Funds
Schedule:	Within 5 years

2014 Update: *OEM has initiated a "Higher Education Preparedness Group" for all major colleges and universities. The purpose of this group is for information sharing, and networking, including sharing concerns. OEM is currently leading this program.*

RECOMMENDED ACTION 1-14: (NEW ITEM 2012)

The satellite city of Oak Hill (located within Davidson County, TN) is aware of certain areas in their jurisdiction that have historically experienced flooding during significant rain events. In an effort to address these and any other such issues that may exist, Oak Hill has initiated a 3 Phase Drainage Study/Correction Plan (see below). Phase 1 was completed in 2011, Phase 2 anticipated to be completed in 2014, and Phase 3 will depend on the results of Phase 2 and funding availability.

1. Planning (started)
    a. Identify drainage basins
    b. Inventory stormwater infrastructure
    c. Prioritize basin drainage work considering need
2. Model stormwater drainage to determine what work is needed to address issues (not started)
3. Construction of flooding resolution projects (not started)

It is recommended to include this project from The City of Oak Hill in this Multi-Hazard Mitigation Plan as it mirrors actions with Metro Water Services, and applies to the over goal.

Source:	City of Oak Hill
Mitigation Category:	Property Protection, Life Safety, Structural Projects
Responsible Office:	City of Oak Hill

Priority (H, M, L):	Medium
Cost Estimate:	Phase 1 ~ 100k, Phase 2 ~150k, Phase 3 unknown at this time
Community Benefit:	Life Safety, Potential funding sources for action items of this Mitigation Plan
Potential funding:	Existing Oak Hill Budget; Grant Funding
Schedule:	Phase 1 – Completed in 2011 Phase 2 **–** Anticipated completion in 2014 Phase 3 **–** Anticipated start date dependent on funding sources

2014 Update: *Phase 1 was completed in 2011 and the drainage study is in the Oak Hill office. Phase II has not been initiated due to lack of funding. Phase III cannot be completed, or even budgeted until Phase II is completed.*

RECOMMENDED ACTION 1-15: (NEW ITEM 2014)

In 2012, Metro Water Services contracted with a consultant to assist in identifying critical assets and to determine projects to mitigate / minimize risk. The report was completed in early 2013 and projects were added to the 5 year Capital Improvement Budget. In addition to the replacement projects, MWS has an ongoing leak detection program to identify leaks before they cause an emergency and impact service.

Based upon the priority list, the action plan recommends that Metro initiate design and construction of high priority capital improvement projects.

Source:	Distribution Optimization Report (DSO)
Mitigation Category:	Structural Projects/Infrastructure Evaluation
Responsible Office:	MWS
Priority (H, M, L):	High
Cost Estimate:	$164M (redundancy projects and improved water quality projects)
Community Benefit:	Continuity of service
Potential funding:	Capital Funding
Schedule:	Long-term plan (5+ years)

RECOMMENDED ACTION 1-16: (NEW ITEM 2014)

The Clean Water Nashville Overflow Abatement Program (CWNOAP) Design Management Manual (Section 2.6.1) stipulates that all plan projects abide by the following flood elevation considerations.

2.6.1 Flood Elevations
The floor elevation for new electrical/control buildings shall be above the 500-year flood elevation or flood of record, whichever is greater.

All new site electrical equipment such as switchgear, electrical panels, VFDs, and non-submersible motor operators shall be installed 2 feet above the 500-year flood elevation or flood of record, whichever is greater. Existing site additions or modifications shall consider this level of protection in design.

Source:	Clean Water Nashville Overflow Abatement Program (CWNOAP) Design Management Manual
Mitigation Category:	Structural Projects/Infrastructure Evaluation
Responsible Office:	MWS
Priority (H, M, L):	Medium
Cost Estimate:	NA (planned projects will simply be designed to meet criteria)
Community Benefit:	Flood protection, continuity of service
Potential funding:	Capital Funding
Schedule:	20+ years

RECOMMENDED ACTION 1-17: (NEW ITEM 2014)

All three of the NES Operating Centers (Central, West and Donelson) are physically located south of the Cumberland River. These Centers house all the fleet facilities and material warehouses used by NES to maintain the transmission and distribution system. Should an event such as a dam breach or earthquake occur and it became necessary to close the bridges over the Cumberland River until inspections could be performed to verify their structural integrity, NES emergency response efforts would be hampered since the river runs through the middle of the NES service territory. Depending on what advance notice was available for a dam breech, much of NES' equipment and material could be on the south side of the river with no easy way to get it on the north side. In the event of an earthquake, there would be no advance notice. Therefore, there would be no opportunity to stage equipment and material north of the river. Because of this situation and load growth in the northern part of the service territory, NES has planned the construction of a joint Training and Operation Center in the northern part of the service territory to be located on Myatt Drive.

Source:	NES Wolf Creek/Center Hill Dam EOP
Mitigation Category:	Property Protection;
Responsible Office:	NES
Priority (H, M, L):	Medium
Cost Estimate:	Approximately $14,000,000 (total cost of the site work, infrastructure improvements and construction of both training facilities and operations center)
Community Benefit:	Continuity of service
Potential funding:	NES
Schedule:	End of 2015

RECOMMENDED ACTION 1-18: (NEW ITEM 2014)

In restoring MWS' water and sewer facilities from 2010 Flood impacts, site-specific flood risk mitigation was employed as possible/feasible in bringing facilities back on line. Further, it has been MWS's practice since the May 2010 flood to incorporate flood mitigation into capital projects planned for the facilities that were impacted by the flood. Two examples of this are the Hot House and Generator Building at the K.R. Harrington WTP and the Effluent Pump Station at the Central WWTP Biosolids Facility. Both of these facilities were damaged in the May 2010 flood. MWS planned to upgrade these facilities prior to the flood. Since the flood, the designs were modified to elevate the facilities above the flood of record to minimize the potential impacts of future floods.

Source:	Metro Water Services Post May 2010 Flood Report
Mitigation Category:	Structural Projects
Responsible Office:	MWS
Priority (H, M, L):	H/M
Cost Estimate:	To be determined for each project and varies with building size, structure type and equipment.
Community Benefit:	Life Safety; Property Protection; Pro-active approach to flood mitigation; FEMA eligibility
Potential funding:	Capital Budget/FEMA
Schedule:	Within 5 years

2014 Update: *MWS continues to pursue these projects as approvals and funds are available*

GOAL #2:	**Promote awareness of hazards and vulnerability among citizens, business, industry and government.**
Objective 2.1:	*Develop a seasonal multi-hazard public education campaign to be implemented annually.*

RECOMMENDED ACTION 2-1:

Develop and conduct a multi-hazard, seasonal Public Awareness Program that provides citizens and businesses with accurate information describing the risk and vulnerability to natural hazards, and is implemented on an annual basis.

Metro is subject to several natural hazards, each of which pose a different degree of risk and associated vulnerability. Some hazards have a combination of attributes, including a high likelihood of occurrence, specific locations that are likely to be affected, and proven approaches that can reduce the impact; therefore the CPT has recommended specific actions be taken in regards to these hazards. For other hazards, where either the likelihood of occurrence is very low, or the area of likely impact cannot be specified, or there is very little that can be done to reduce the impacts of the hazard, the CPT has determined that the best approach would simply be public awareness. An educational program for the community should include information describing historical events and losses, the likelihood of future occurrences, the range of possible impacts, appropriate actions citizens can take to save lives and minimize property damage, and resources for additional information. Any information provided through this effort should be accurate, specific, timely, and consistent with current and accepted local emergency management procedures as promoted by the Tennessee Emergency Management Agency (TEMA), the Nashville Office of Emergency Management (OEM), the CRS Public Outreach (Activity 330), and the American Red Cross.

In order to implement a Public Awareness Program, the following actions are recommended:

- Establish a Public Information Committee with the responsibility for developing a Public Awareness Program highlighting the following topics:
    - Wind mitigation techniques such as safe rooms, securing of roofs and foundations, and strengthening garage doors;
    - Information on geological hazards including landslide and sinkhole risk areas;
    - Information on flood hazards and flood insurance; and
    - Winter storm tips including driving and emergency preparedness kits.

- Use a variety of information outlets including local news media, distribution of brochures and leaflets, water bill inserts, websites, and public service announcements. Current brochures and flyers should be put on display in Metro office buildings, libraries, and other public places. In addition, information should be linked to billing e-payments.

- Develop public-private partnerships and incentives to support public education activities, including displaying hazard models at schools, OEM, NWS, Home Depot, Lowes, Homebuilder shows, Realtor organizations, and other events and locations.

- Investigate opportunities to cooperate with the Greater Nashville Association of Realtors in preparing the public information program strategy. Possibilities include developing a real estate agents' brochure or a process whereby real estate agents disclose hazard information to potential property purchasers, for example through the MLS listing services.

- Continue all public information activities currently taking place. Review effectiveness and revise accordingly.

Source:	CPT and Community Rating System Action Plan
Mitigation Category:	Public Information
Responsible Office:	MWS; OEM; Chamber of Commerce; Realtor Board
Priority (H, M, L):	High
Cost Estimate:	$5,000-20,000, depending upon printing and mailing costs, level of volunteer participation, and scope and frequency of events.
Community Benefit:	Life-Safety, Relatively Low Cost, Multi-Hazard program is efficient, relies upon work already accomplished by CPT and others.
Potential funding:	5% state set aside from HMGP funding and PDM funds
Schedule	Part of a seasonal multi-hazard public awareness campaign

2009 Update: *OEM continues to reach out to the public with all hazard information including the current publication "Ready Nashville".*

2012 Update: *Besides the normal face to face outreach, OEM utilizes social media for its outreach efforts before, during and after emergencies. OEM utilizes Metro's website, OEM's Facebook and Twitter accounts.*

Metro has also created a new on-line program for the community called NERVE (Nashville Emergency Response Viewing Engine). This is an interactive mapping site designed to provide timely information relating to natural or man-made emergencies in Davidson County. As an emergency arises, this site will provide information about road closures, evacuation areas and/or routes, shelters and relief centers (i.e. food, water & clothing distribution centers, disaster information centers, disaster recovery centers and more). This site also includes a media tab that includes a Twitter feed from the OEM/EOC, press releases and links to other important information and agencies.

RECOMMENDED ACTION 2-2:

Metro Water Services should request the state NFIP Coordinator to conduct Agent and Lender Workshops in support of the community's overall NFIP program efforts.

The workshops provide updated program information, responsibilities and requirements for two critical components of the NFIP delivery: insurance agents and lending institutions. Both of these workshops are available through the Technical Assistance provided by the state NFIP Coordinator.

CPT discussions during the development of this plan highlighted two common issues. First, citizens are receiving unclear, mixed, inconsistent or inaccurate information regarding the NFIP and their individual policies. One method of addressing this issue is to ensure that independent insurance agents, the most common source of flood insurance policies and policy information to policy holders, are offered on-going training opportunities to maintain their proficiency regarding the NFIP program and program changes.

Second, since low-interest rates have been available for the past two years, the CPT anticipated, but could not verify, that there would be an increase in the number of flood insurance policies in force as people either refinanced their homes or took out other home-equity loans, which would trigger the mandatory flood insurance purchase requirement on federally backed mortgages. One method of addressing this issue is to ensure that lending institutions, the most common source of federally backed mortgages, are offered on-going training opportunities to maintain their proficiency regarding the NFIP program and their responsibilities within that program.

Source:	CPT
Mitigation Measure:	Prevention
Responsible Office:	Metro Water Services
Priority:	High
Cost Estimate:	Staff time for workshop coordination and delivery
Community Benefit:	Increased policy base and more accurate information regarding policy coverage's by the policy holder.
Potential Funding:	None required. This is a service of the state NFIP Coordinator.
Schedule:	2010

2014 Update*: Flood Insurance Reform Legislation in 2012 and 2014 implemented some significant changes to the National Flood Insurance Program. Flood insurance subsidies for Pre-FIRM structures will be phased out which will significantly increase the cost of flood insurance for some structures. MWS Stormwater will continue to work with the State NFIP Coordinator and FEMA to provide local training to Agents and Lenders.*

RECOMMENDED ACTION 2-3:

MWS currently sends an annual mailing to the approximate 10,000 properties located within the 100-year floodplain.

It is recommended that MWS Stormwater Division continue the mailing and that the mailing be modified to include other natural hazards of concern that have been identified through the hazard mitigation planning process.

Source:	Community Rating System Action Plan
Mitigation Category:	Public Information
Responsible Office:	MWS
Priority (H, M, L):	Medium
Cost Estimate:	Staff time is required to produce and review approximately 10,000 individual digital pamphlets. The pamphlets must be printed, folded, sealed, and posted in accordance with US Postal Service requirements. Assume one week of staff time in addition to approximately $5,000 in printing and postage costs.
Community Benefit:	The annual mailing is distributed to all properties of the SFHA and those additional areas known to have flooding problems. The notice clearly explains that the recipient's property is subject to flooding. The mailing recommends flood insurance coverage and protection measures undertaken by building-owners.
Potential funding:	Existing Budget
Schedule:	Annually

2009 Update: *MWS continues to send these notices to properties in the 100 year floodplain on an annual basis to approximately 10,000 parcels.*

2014 Update: *MWS Stormwater continues to send these notices to properties in the 100-year floodplain on an annual basis. No new sections discussing other hazards have been added to the notice.*

RECOMMENDED ACTION 2-4:

According to insurance agents, one of the greatest impediments to selling flood insurance is the difficulty of obtaining accurate flood insurance rating zone and building elevation data. By providing this data on the community website, the information is readily accessible to any inquirer (e.g., no payment of money is needed). The elevation certificates may be in the form of a searchable database, scanned elevation certificates, or any other format that makes the data available. Additionally, the relatively low setup cost would be more than paid for by the reduced staff time needed to retrieve elevation certificate data and answer questions from inquirers. By referring people to the website, staff would be free to handle technical issues and permit reviews.

Discussions should be held with Metro website staff on the best way to post Elevation Certificate data on the website and procedures to maintain the data.

Source:	CPT and Community Rating System Action Plan
Mitigation Category:	Public Information
Responsible Office:	MWS
Priority (H, M, L):	Low
Cost Estimate:	Staff Time
Community Benefit:	Public Information
Potential funding:	Existing Budget
Schedule:	Within 2 years

2009 Update: *At this time, Elevation Certificates are not available through the web site.*

2014 Update: *Elevation Certificates continue to be collected and maintained in files at MWS Stormwater. These certificates are available upon request but have not been made available through the Metro web site.*

GOAL #3: Maximize use of available funding.	
Objective 3.1:	*Identify multiple objective opportunities that can be used to support mitigation activities.*
Objective 3.2:	*Identify and analyze project cost share options.*
Objective 3.3:	*Submit mitigation project applications annually at a minimum.*

RECOMMENDED ACTION 3-1:

A flood threat recognition system tells emergency management officials that a flood is imminent. Examples of systems include river stage predictions from the National Weather Service and using local gauges to predict flood crests and times. Flood crest prediction programs are currently in place on the Cumberland and Harpeth Rivers.

The Nashville Office of Emergency Management (OEM), with help from the MWS Stormwater Division's engineers, should review the costs and benefits of developing flood crest prediction programs for other streams with reporting gauges.

There are more rain and river gauges on smaller streams and additional work would be needed to translate readings into a crest prediction for these areas. These gauges include Mill Creek at Antioch, Browns Creek at the State Fairgrounds, and Whites Creek at Bordeaux.

Source:	Community Rating System Action Plan
Mitigation Category:	Emergency Services
Responsible Office:	MWS in conjunction with OEM
Priority (H, M, L):	Medium
Cost Estimate:	One half (½) day of staff time for documentation of the Cumberland and Harpeth River gauges; $10,000 to develop crest prediction programs for other streams. Additionally there is an existing cost of $165,000 for current monitoring efforts. This cost is shared equally by Metro and the USGS.
Community Benefit:	Public Safety
Potential funding:	NWS; USGS; HMGP, FMA
Schedule:	Within 5 years

2009 Update: *Mill Creek at Bluff and Nolensville Road is complete. Further surveying needs to be completed in the Antioch area and along other creeks.*

2012 Update: *After the Flood of May 2010, there was a combined effort from the US Geological Survey (USGS), National Weather Service (NWS), Metro Water and Nashville OEM to install river gauges at flood prone waterways in Davidson County. Data from these gauges is made available to local authorities for action as needed. The USGS supplied the gauges and is responsible for the maintenance. Along with these gauges, there are 2 fixed post cameras, and 2 mobile cameras to monitor flood levels. (This update also goes with Recommended Action #8)*

2014 Update: *Currently within Davidson County there are 25 river stage gauges, 10 rain gauges, 3 fixed cameras, and 2 mobile cameras. This equipment is being funded and maintained through agreements between Metro and our federal partners.*

RECOMMENDED ACTION 3-2:

Dams can create a false sense of security for floodplain residents. Unlike levees, they do not need flood conditions to fail. They can be breached with little or no warning and send a wall of water downstream. The combination of high velocity, great depth, and short notice has proven particularly deadly and destructive. One way to minimize this hazard is to enforce construction and maintenance standards. This is usually done through a state dam safety program.

Tennessee state law exempts "farm ponds" from state regulations. The Tennessee Department of Environment and Conservation reports that of the 1,100 dams in the state, over 500 qualify as farm ponds, which are any privately owned dams that are not open to the public.

There are 16 such farm pond dams in Davidson County, eight of which are considered "high hazard" dams. "High hazard" means that their failures would likely kill or injure someone. Since 1973, thirty-seven dams in Tennessee have failed. Thirty-three were unregulated.

Metro officials should talk to their state legislators and Tennessee Department of Environment and Conservation staff about the feasibility of amending the State's dam safety laws.

Source:	Community Rating System Action Plan
Mitigation Category:	Emergency Services
Responsible Office:	MWS and OEM
Priority (H, M, L):	Low
Cost Estimate:	Staff Time; because changing a state law involves political contacts and discussions, a cost for technical staff time or consultant expenses cannot be estimated. It would take one to two days to prepare a background paper on the issues.
Community Benefit:	Public Safety
Potential funding:	Existing Budget
Schedule:	Within 5 years

2009 Update: *Tennessee's safe dam program does not include farm ponds.*

2014 Update: *No action has occurred and no actions are currently planned on this issue.*

RECOMMENDED ACTION 3-3:

Cooperating Technical Partners (CTPs) are communities, regional agencies, or states that have the interest and capability to be active partners in FEMA's flood mapping program. CTPs enter into an agreement that formalizes their contribution and commitment to flood mapping. The objective of the program is to maximize limited funding by combining resources and help maintain consistent national standards.

Metro's Stormwater Division should pursue a Cooperating Technical Partner agreement with FEMA in order to get its mapping standards to better fit local conditions or make the community a higher priority for mapping support.

Source:	Community Rating System Action Plan
Mitigation Category:	Prevention
Responsible Office:	MWS
Priority (H, M, L):	Low
Cost Estimate:	Staff Time
Community Benefit:	Formalization of community contribution and commitment to flood mapping. CTP program maximizes limited funding by combining resources and helps to maintain consistent national standards.
Potential funding:	Existing Budget
Schedule:	Within 5 years

2014 Update: *MWS Stormwater has investigated becoming a Cooperating Technical Partner and has decided not to pursue it any further at this time. This should be re-evaluated in 5 years.*

RECOMMENDED ACTION 3-4:

Develop a financial strategy to design and construct large capital improvement projects.

The strategy shall incorporate a cost-sharing plan to leverage local, state, and federal funding for stormwater management activities and projects.

Source:	Floodplain Management Plan
Mitigation Category:	Structural Projects
Responsible Office:	MWS
Priority (H, M, L):	Low
Cost Estimate:	$40,000
Community Benefit:	Life Safety
Potential funding:	Existing Budget; TEMA
Schedule:	2005

2009 Update: *Beginning July 1, 2009, Metro implemented a Stormwater User fee where all properties in Davidson County that have more than 400 square feet of impervious surface pay*

a monthly user fee. (The seven incorporated satellite cities within the county are not in the program.) The funds collected through this fee pay the operation expenses of the Stormwater Division and support a $12M/year capital construction program.

2014 Update: *The City of Lakewood has been abolished. The property owners in the boundaries of the former city limits are now part of Metro and are required to pay the monthly Stormwater User Fee. The remaining satellite cities are not in the program. These funds continue to be collected and are used to support all MWS Stormwater activities.*

RECOMMENDED ACTION 3-5:

FEMA offers two programs, the Hazard Mitigation Grant Program (HMGP) and the Flood Mitigation Assistance (FMA) Program, to assist local communities with reducing future losses of lives and properties due to disasters. The HMGP provides grants to local communities to implement long-term hazard mitigation measures such as the elevation, acquisition, or relocation of flood-prone structures after a major disaster declaration. The FMA program provides grants to communities for projects that reduce the risk of flood damage to structures that have flood insurance coverage. FEMA's mitigation grant programs are administered by the TEMA, which prioritizes and selects project applications developed and submitted by local jurisdictions.

The CPT recommends applying annually for potentially available HMGP and FMA grants.

Source:	CPT
Mitigation Category:	Property Protection; Structural Projects
Responsible Office:	MWS and OEM
Priority (H, M, L):	Low
Cost Estimate:	Staff Time to complete grant application
Community Benefit:	Potential funding sources for action items of this Mitigation Plan
Potential funding:	Existing Budget
Schedule:	Annually

2009 Update: *MWS has a close working relationship with TEMA and MWS has applied for and been awarded funding from both HMGP and FMA on an annual basis. Since 2002, MWS has acquired and removed 52 homes from the 100 year floodplain.*

2012 Update: *Post May 2010 Flood, the MWS applied for $46.7 million in HMGP funds to acquire 244 properties. Since May 2010, MWS has purchased 197 homes, and 120 homes have been demolished.*

2014 Update: *Since May 2010, MWS Stormwater has purchased 225 homes all of which have been demolished with the area being converted to open space. MWS Stormwater is currently working through TEMA/FEMA on a project to purchase 33 homes in the Gibson Creek watershed.*

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COMPLETED ACTION ITEMS

Recommended mitigation action items from several existing community plans have already been implemented by Metro. This demonstrates not only the current capability of Metro to counter identified hazards through existing policies, regulations, programs, and procedures, but also the ongoing commitment of Metro to protect the community and mitigate the damaging effects of hazards. Completed action items since 2005 are presented below.

COMPLETED ACTION 1:

Develop a plan and schedule to modify and enhance the existing floodplain management regulations with the intent of minimizing future flooding within the floodplain.

Source: Floodplain Management Plan
Responsible Office: MWS
Status: A Stormwater Regulation Review Committee was formed to advise Metro Water Services on revisions and enhancements to stormwater management regulations and associated processes.

COMPLETED ACTION 2:

Develop formalized policies (level-of-service and extent-of-service) for maintenance of the stormwater drainage system.

Source: Floodplain Management Plan and Community Rating System Action Plan
Responsible Office: MWS
Status: Draft policies addressing level-of-service and extent-of-service have been prepared in order to define the areas where maintenance work will be performed by MWS Stormwater Division staff.

COMPLETED ACTION 3:

Develop a GIS database of all stormwater detention structures and BMP facilities within Metro Nashville and Davidson County. Upon completion of database, develop a routine maintenance schedule to ensure proper detention and water quality functions of stormwater facilities.

Source: Floodplain Management Plan
Responsible Office: MWS
Status: The GIS database was completed in 2003 based upon the available data through 2002. A maintenance schedule using the GIS database was initiated in June of 2004. The MWS Stormwater Division Maintenance Staff estimate that they inspect 100 stormwater structures each month. The inspection program is performed in conjunction with system maintenance for documentation purposes.

COMPLETED ACTION 4:

Double the number of stormwater infrastructure maintenance crews (four to eight) that handle maintenance problems and dedicate appropriate equipment to perform maintenance.

> **Source:** Floodplain Management Plan
> **Responsible Office:** MWS
> **Status:** The MWS Stormwater Division currently employs eight maintenance crews. The crews are assigned to large ditch maintenance, stormwater inlet construction, stormwater inlet cleanout, and masonry.

COMPLETED ACTION 5:

Metro should begin a practice to place deed restrictions on all flood-prone lands purchased with public funds.

> **Source:** Community Rating System Action Plan
> **Responsible Office:** MWS
> **Status:** Deed restrictions have been revised and/or placed on all flood prone lands purchased with public funds as a part of the CRS annual review and update.

COMPLETED ACTION 6:

Develop GIS database of insurable structures within the designated floodplain, particularly including the repetitive loss areas. The database shall contain detailed structure elevation and floodplain data.

> **Source:** Floodplain Management Plan
> **Responsible Office:** MWS
> **Status:** Developed for the repetitive loss homeowner mailouts, a database of parcels and structures located in the floodplain has been linked to existing elevation certificate information. This information is provided to all homeowners located in the floodplain on an annual basis. Approximately 10,000 homeowners currently receive a residence-specific mailout.

COMPLETED ACTION 7:

Initiate a multi-year comprehensive watershed study for Mill Creek, the largest watershed in Davidson County, Mill Creek. Repetitive loss areas are identified on Mill Creek mainstem and two tributaries, Sevenmile Creek and Whittemore Branch. The watershed study will identify flooding problems and develop capital improvement projects to remedy flooding problems.

Source: Floodplain Management Plan
Responsible Office: MWS
Status: The US Army Corps of Engineers, Nashville District, in conjunction with a contractor, will complete floodplain inundation mapping and floodway analysis for the following streams in the Mill Creek Watershed: Mill Creek, Sevenmile Creek, Sorghum Branch, Whittemore Branch, Sims Branch, Tributary A, Tributary B, Collins Creek, Turkey Creek, Indian Creek, and Holt Creek. The watershed study will be the first study to utilize new HEC software, HEC-HMS version 3.0. The 107 square mile watershed is subdivided into 129 subwatersheds that are further broken down into 200-meter grids (10 acres). Each grid is defined with unique parameters, such as impervious surface area, loss rates, and land use that have been derived from existing Metro GIS data. Newly developed GIS tools will use watershed management practices for stormwater and planning purposes.

COMPLETED ACTION 8: (2009)

Due to the historically perceived threat of nuclear attack, fallout shelters have been designated throughout Davidson County.

The CPT recommends completing an inventory of these existing shelters and utilizing them as "tornado safe" places and shelters. The inventory should be published for community access.

Source: CPT
Responsible Office: OEM
Status: ***2009 Update:*** *Due to legality concerns, this recommended action will not be implemented.*

COMPLETED ACTION 9: (2012)

Metro's emergency management program, in conjunction with Public Works, has installed several flood-warning gauges in some county streams and creeks. The coverage of these gauges is for only three of the county's 14 repetitive flooding creeks and streams.

An additional 11 gauges are recommended for total coverage of the community.

Source: OEM Local Hazard Mitigation Plan
Responsible Office: OEM
Status: ***2009 Update:*** *This action item is being amended to include the recommendation of a flood gauge on Mansker Creek in Goodlettsville (automatic notification gauge). MWS has re-installed hardware for the alarm system at the Dry Creek flood control structure and the alarm will alert MWS and OEM; this was conducted using 100% local funding. Manually staff gauges were installed in 2009 at Mill Creek and in the process of being installed at Seven Mile Creek.* ***2012 Update:*** *After the Flood of May 2010, there was a combined effort from the US Geological Survey (USGS), National Weather Service (NWS), Metro Water and Nashville OEM to*

install river gauges at flood prone waterways in Davidson County. Data from these gauges is made available to local authorities for action as needed. The USGS supplied the gauges and is responsible for the maintenance. Along with these gauges, there are 2 fixed post cameras, and 2 mobile cameras to monitor flood levels. (This update also goes with Recommended Action #20.)

There is a new program called 'SAFE' (Situational Awareness for Flooding Events) that Nashville utilizes. It is a partnership between Metro Water, Nashville OEM, Metro Planning, US Army Corps of Engineers, the USGS and the National Weather Service. The expertise and data from each of these agencies is collectively used to monitor and predict watershed conditions. This program allows Metro to monitor actual and forecasted river stages and acquire information that can be used to dispatch resources and respond more efficiently to flood related emergencies. This information will be used to alert emergency personnel to the threat or actual danger of flooding, and not as a warning system for the general public. There are currently 28 gauges installed. This information gets mapped to a mapping program developed by Metro Planning and displays resulting inundation areas and impacts associated with current and predicted flooding.

The Nashville SAFE program is focused on the six major watersheds within Metro Nashville: Cumberland River, Harpeth River, Mill Creek, Richland Creek, Whites Creek, and Browns Creek.

COMPLETED ACTION 10: (2014)

Channels and detention basins can lose their carrying capacities due to debris accumulation, sedimentation, and the growth of vegetation. This loss may be prevented through the enforcement of regulations that prohibit dumping in streams and other portions of the drainage system. Regulations should:

- Prohibit dumping ANY material in a channel or basin that could cause an obstruction to flows. Ordinances prohibiting pollutants or causing nuisances are not sufficient by themselves;
- Identify of an officer or office responsible for enforcement and monitoring compliance; and
- Include provisions for penalties and abatement of violations.

The Metro Department of Law should draft stream-dumping regulations.

Source: Community Rating System Action Plan
Responsible Office: MWS; Metro Legal
Status: ***2009 Update:*** *Nothing new to report at this time.* ***2012 Update:*** *Metro currently addresses the issues identified in Action 7 as outlined below:*

1. *Metro Codes regulates general refuse dumping within Metro to include such incidents in or near drainage conveyances. This includes mandating the removal of such material by the responsible party.*
2. *Metro Stormwater works closely with Metro Public Works to educate the public on proper locations (not in ditches, etc.) to stage landscaping debris for pick-up. Public Works also facilitates right-of-way refuse removal assistance in certain situations.*
3. *Metro Stormwater in certain circumstances will facilitate the removal of accumulated material within the drainage system that represents a localized flooding risk.*
4. *Metro Stormwater in certain circumstances will facilitate the removal of dumped material within the drainage system that represents a localized flooding risk – if the responsible party cannot be identified/required to remove material.*
5. *Metro Stormwater enforces certain floodplain provisions in the Metro Stormwater Management Manual that require "cut and fill" material be balanced within designated floodplain areas.*
6. *Metro Stormwater mandates the performance of certain post development Best Management Practice maintenance activities (per the Metro Stormwater Management manual) by responsible parties. Stormwater works with the parcel owner/manager to facilitate that required maintenance is performed in a timely fashion. Stormwater has the authority to enforce that such maintenance actions are performed.*
7. *Metro Stormwater provides targeted public education in circumstances of isolated dumping incidents to conveyances or streams in neighborhoods.*

COMPLETED ACTION 11: (2014)

Current NFIP riverine regulatory standards require that new residential buildings in the Special Flood Hazard Area (SFHA) have their lowest floor at or above the base flood elevation. Non-residential buildings may be flood proofed to the base flood elevation. Many regulatory standards adopted by communities provide increased protection to new development and redevelopment. Examples of the regulatory standards include:

- **Foundation protection:** Flood and erosion requirements can protect buildings on fill against differential settling as well as scour and erosion.
- **Cumulative substantial improvements:** The NFIP allows improvements valued at up to 50% of the building's pre-improvement value to be permitted without meeting the flood protection requirements. Over the years, a community may issue a succession of permits for different repairs or improvements to the same structures. This can greatly increase the building's overall flood damage potential.
- **Compensatory storage:** Buildings built on fill and elevated above the base flood elevation meet the NFIP rules. However, when fill or buildings are placed in the floodplain, the flood storage areas are lost and flood heights will go up because there is less room for the floodwaters. This is particularly important in smaller watersheds which respond sooner to changes in the topography.
- **Protecting shorelines:** Regulations that require new floodplain developments to avoid or minimize disruption to shorelines, stream channels, and their banks.

- **Low density zoning:** The fewer structures built in the floodplain, the better. Regulatory standards may zone areas to keep them substantially open. This includes undeveloped land within low density zoning districts, as well as for areas developed in accordance with the density requirements.

Existing permit procedures should be reviewed or revised, as needed, to ensure that the provisions of the ordinances are fully implemented. In addition, permit records should be reviewed to verify that Metro can document enforcement of the ordinances.

Source: Community Rating System Action Plan
Responsible Office: MWS; Metro Codes
Status: ***2009 Update:*** *The provisions of the Stormwater Regulations are being fully implemented and enforced.* ***2014 Update:*** *MWS Stormwater continues to implement and enforce the Stormwater Regulations.*

OTHER ACTION ITEMS CONSIDERED

Not all of the mitigation actions presented to and/or discussed by the CPT became recommended action items. Action items may not have been considered to be cost-effective or support the community's goals. Additionally, action items may have lacked political support, constituent support, and funding. Action items not recommended or included in the priority list are presented below for each identified hazard.

GEOLOGICAL HAZARDS

As previously noted, steep slopes, present throughout the Metro area, specifically in south-central Davidson and north-central Williamson Counties, have the potential to be unstable. Landslides have also occurred in this area due to construction-altered colluvium soils on steep slopes adjacent to the Highland Rim escarpment. The CPT discussed the following potential mitigation measures to address these geological hazards:

- Require a stronger, institutionalized methodology of identifying "at risk" soils;
- Require geotechnical studies and engineered solutions for "at risk" soils or "critical sites";
- Identify site specific road-cut issues for county, state, and private roadways; and
- Create standard road-cut designs for specific slopes and/or given soils.

Assessment: The CPT determined geological hazards within the metropolitan area are adequately addressed through notification of the known hazards to grading permit applicants during the plans review process. The CPT did not feel the historical losses from geological hazards were significant enough to warrant additional regulation and expense on the community.

SEVERE WEATHER HAZARDS

Severe weather hazards within the Metro area include drought, extreme temperatures, thunderstorms and high winds, tornadoes, and winter storms. Severe winter storms and tornadoes have been among the causes of significant losses to the community resulting in presidential disaster declarations. The CPT discussed the following potential mitigation measures to address severe weather hazards:

- Improvements to the severe weather warning system.

Assessment: The CPT determined the recently updated warning system of 71 outdoor warning siren locations within the community -- although adequate -- can still be expanded. Additional public education efforts would be better suited to inform the community of the warning system and appropriate emergency response actions. See Recommended Action Item #15.

2012 Update: As of this revision, Metro has 73 sirens. Metro Nashville has issued an RFP in July 2012 for adding approximately 20 new sirens, and upgrading the current outdoor early warning

siren system. This would give almost 100% coverage for the jurisdiction. Expected completion date is 2013, at a capital funding cost of approximately two million dollars.

- Construct tornado saferooms and/or seek vendor donation of one model saferoom.

Assessment: The CPT preferred the use of existing fallout shelters, previously constructed due to the historically perceived threat of nuclear attack, to the new construction of tornado saferooms. See Recommended Action Item #19.

2009 Update: Due to legality concerns, this recommended action will not be implemented.

Assessment: The CPT determined the existing urban forester, currently working within the Metro Codes Department, sufficiently enforces the landscape ordinances at the present time.

- Continue development of tree-trimming program to lessen the risk of power outages by falling limbs.
- Update vegetation ordinances (i.e., urban forester, landscape ordinances, supplement NES program)

Assessment: The CPT the tree-trimming program operated by the Nashville Electric Service adequately served the community.

- NES continues development of tree-trimming program to lessen the risk of power outages by falling limbs.

FLOODING HAZARD

Within Metro Nashville, projects that are required to implement stormwater management practices must provide a detention facility. According to the 1999 *Metro Stormwater Management Manual*, the release rate from any detention facility should approximate that of the site prior to the proposed development for the 2-year through 10-year storms, with emergency overflow capable of handling at least the 100-year discharge. The CPT discussed the following potential mitigation measures to address stormwater management practices:

- The MWS Stormwater Division should review its standards to determine if storm events larger than the 10-year event should be managed in retention basins.

Assessment: The CPT did not consider this action item a priority for the Multi-Hazard Mitigation Plan. The action item did not receive any "stars" during the prioritization of preferred measures. The CPT found this action item established an undue regulation on the community, that the probability of storm events larger than the 10-year were not balanced by the life of the structure itself. Upon further discussion, the CPT determined the flooding hazard was sufficiently addressed in the other developed action items.

2014 Update: According to the 2013 Metro Stormwater Management Manual, the design of detention facilities is required to control peak flow at the outlet of a site such that post-developed flows are equal to or less than pre-developed flows for the 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year design storms.

Multi-Hazard Mitigation Plan

6.0 Plan Adoption

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

The Metropolitan Mayor adopts the Multi-Hazard Mitigation Plan by signing a promulgation statement, making it policy for the Metropolitan Government of Nashville and Davidson County. Within this section, there is a copy of this promulgation statement along with resolutions of all the Satellite Cities in Davidson County, which have all officially adopted this plan as their official Multi-Hazard Mitigation Plan. This action will complete Step 9 of the Plan Development Process: Formal Plan Adoption.

PROMULGATION STATMENT

METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY

KARL F. DEAN
MAYOR

OFFICE OF THE MAYOR
METROPOLITAN COURTHOUSE
NASHVILLE, TENNESSEE 37201
PHONE: (615) 862-6000
FAX: (615) 862-6040

DATE: **April 30, 2015**

TO: **Metro Departments and the Citizens of The Metropolitan Government of Nashville and Davidson County**

The Metropolitan Government of Nashville and Davidson County continues to work toward ensuring the safety and well-being of citizens and property against hazards that have the potential for causing damage and/or loss of life. It is imperative that local government agencies, as well as the citizens at large make plans to effectively mitigate against the results brought about by the occurrence of such events. Accordingly, it is prudent to take appropriate steps to lessen the potential effects of such events or to eventually prevent their occurrence altogether. Reviewed and approved at the local, state and federal levels of government, the 2015 Metro Nashville-Davidson County Multi-Hazard Mitigation Plan is one of many mechanisms through which these goals can be accomplished.

By virtue of the powers and authority vested in me by the Metropolitan Charter and the Constitution of the State of Tennessee, and in accordance with the provisions of the Tennessee Code Annotated and the federal Civil Defense Act of 1950, as amended, as Mayor of The Metropolitan Government of Nashville and Davidson County, I hereby promulgate and issue, effective this date, the Metro Nashville-Davidson County Multi-Hazard Mitigation Plan. Further, I declare this plan to be the official multi-hazard mitigation plan for The Metropolitan Government of Nashville and Davidson County and its municipalities. It shall serve as the central policy and guidance document for such mitigation actions, upon all agencies and political subdivisions within.

This plan is effective upon receipt and for execution when so directed. The Nashville-Davidson County Office of Emergency Management (OEM) is responsible for maintaining and updating this plan, as required, in coordination with the appropriate departments, agencies and the community at large.

Signed,

Karl F. Dean

Karl F. Dean, Mayor
Metropolitan Government of Nashville and Davidson County

Figure 6-1: Mayor's 2015 Promulgation Statement

Satellite City Plan Resolutions

RESOLUTION 2015-02

A RESOLUTION ADOPTING THE 2015 METROPOLITAN NASHVILLE DAVIDSON COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the City of Belle Meade recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted hazard mitigation plan is required as a condition of future federal and state grant funding for mitigation projects; and

WHEREAS, Metropolitan Nashville Davidson County has prepared the Multi-Hazard Mitigation Plan and has incorporated comments of the other local units of government within the County to prepare the Multi-Hazard Mitigation Plan; and

WHEREAS, the Metropolitan Nashville Davidson County Office of Emergency Management will submit on behalf of the participating municipalities, including the City of Belle Meade, the adopted Multi-Hazard Mitigation Plan to the Federal Emergency Management Agency officials for final review and approval.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS OF THE CITY OF BELLE MEADE, TENNESSEE, AS FOLLOWS:

SECTION 1. That the City of Belle Meade hereby adopts the 2015 Metropolitan Nashville Davidson County Multi-Hazard Mitigation Plan as an official plan of the City of Belle Meade.

SECTION 2. This Resolution shall be effective immediately upon its passage and adoption, the public welfare and the welfare of the City requiring it.

Date of Adoption:

May 20, 2015

Mayor James V. Hunt

Linda Berner

City Recorder Linda Berner

Figure 6-2: City of Belle Meade Plan Resolution 2015

RESOLUTION NO. 108-2015

A RESOLUTION ADOPTING THE METROPOLITAN NASHVILLE-DAVIDSON COUNTY MULTI-HAZARD MITIGATION PLAN

WHEREAS, the City of Berry Hill recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted hazard mitigation plan is required as a condition of future federal and state grant funding for mitigation projects; and

WHEREAS, the City of Berry Hill participated in the process by which the Metropolitan Government of Nashville and Davidson County (Metro) prepared a multi-hazard mitigation plan pursuant to the requirements of the Disaster Mitigation Act of 2000, for the metropolitan area, comprising 533 square miles and encompassing the City of Berry Hill; and

WHEREAS, in addition to a public meeting conducted by Metro and participated in by a City of Berry Hill representative, whereby public comment on the proposed plan was solicited, a public hearing was held by the Berry Hill Board of Commissioners on adoption of the multi-hazard mitigation plan, following public notice being placed in a newspaper of general circulation and on the City's website; and

WHEREAS, the Board of Commissioners of the City of Berry Hill finds that the interest of the city and its citizens will be served by the adoption of the multi-hazard mitigation plan prepared by Metro, as Metro agencies provide emergency services in

Figure 6-3.1: City of Berry Hill Plan Resolution 2015

the City of Berry Hill and coordination between Metro agencies and Berry Hill agencies will contribute to the effective provision of emergency services;

NOW, THEREFORE, BE IT RESOLVED, as follows:

1. That the City of Berry Hill hereby adopts the Metropolitan Nashville-Davidson County Multi-Hazard Mitigation Plan, dated January 2015.

2. That this Resolution shall be effective immediately upon its passage and adoption, the public welfare requiring it.

APPROVED AND ADOPTED this 8th day of June, 2015.

Beth Sartain

BETH SARTAIN, MAYOR

ATTEST:

Michelle Horrick

CITY RECORDER

Dan R Alexander, City Attorney

2

Figure 6-3.2: City of Berry Hill Plan Resolution 2015

RESOLUTION NO. 15-633

A RESOLUTION TO ADOPT THE METROPOLITAN NASHVILLE-DAVIDSON COUNTY MULTI-HAZARD MITIGATION PLAN FOR THE CITY OF GOODLETTSVILLE

WHEREAS, the City of Goodlettsville partially lies in Davidson County, and

WHEREAS, an adopted hazard mitigation plan is required as a condition of future grant funding from the State of Tennessee and/or the Federal government for hazard mitigation projects, and

WHEREAS, Metropolitan Nashville-Davidson County has developed a multi-hazard mitigation plan including the county and the City of Goodlettsville,

NOW, THEREFORE, BE IT RESOLVED THAT the Board of Commissioners of the City of Goodlettsville recognizes and adopts the Metropolitan Nashville-Davidson County Hazard Mitigation Plan as the hazard mitigation plan of the City of Goodlettsville, and

BE IT FURTHER RESOLVED THAT the Board of Commissioners of the City of Goodlettsville acknowledges with understanding that the Metropolitan Nashville-Davidson County Office of Emergency Management will submit on behalf of the participating municipalities, including the City of Goodlettsville, the adopted hazard mitigation plan to the Federal Emergency Management Agency for final review and approval.

____
MAYOR

____
CITY RECORDER

Approved as to Form and Legality

____
CITY ATTORNEY

May 28, 2015
DATE

Figure 6-4: City of Goodlettsville Plan Resolution 2015

RESOLUTION 15-1

ADOPTION OF THE METROPOLITAN NASHVILLE DAVIDSON COUNTY HAZARD MITIGATION PLAN

WHEREAS, the City of Oak Hill recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted hazard mitigation plan is required as condition of future federal and state grant funding the mitigation projects; and

WHEREAS, Metropolitan Nashville – Davidson County Emergency Management Agency drafted a Hazard Mitigation Plan and incorporated comments of the City of Oak Hill and other local units of government within the County to prepare the Metropolitan Nashville – Davidson County Hazard Mitigation Plan; and

WHEREAS, the Metropolitan Nashville – Davidson County council has submitted, on behalf of itself and the participating municipalities the Metropolitan Nashville – Davidson County Hazard Mitigation Plan to the Federal Emergency Management Agency ("FEMA"), which granted approval.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARDS OF COMMISSIONERS OF THE CITY OF OAK HILL, TENNESSEE, AS FOLLOWS:

Section 1, That the City of Oak Hill hereby adopts the FEMA approved Metropolitan Nashville-Davidson County Hazard Mitigation Plan as an official plan of the City of Oak Hill.

Section 2, This Resolution shall be effective immediately upon its passage and adoption, the public welfare and the welfare of the City requiring it.

Passed: JUNE 18, 2015

Ron Coles, Mayor

ATTEST:

City Manager & Recorder

APPROVED AS TO FORM:

City Attorney

Figure 6-5: City of Oak Hill Plan Resolution 2015

RESOLUTION NO. 2015-03

A RESOLUTION ADOPTING THE
METROPOLITAN NASHVILLE-DAVIDSON COUNTY
MULTI-HAZARD MITIGATION PLAN

WHEREAS, the City of Forest Hills recognizes the threat that natural hazards pose to people and property;

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted hazard mitigation plan is required as a condition of future federal and state grant funding for mitigation projects; and

WHEREAS, the Metropolitan Government of Nashville and Davidson County (Metro) prepared a multi-hazard mitigation plan pursuant to the requirements of the Disaster Mitigation Act of 2000, for the metropolitan area, comprising 533 square miles and encompassing the City of Forest Hills, and invited comment from the City of Forest Hills in preparing said plan; and

WHEREAS, the Board of Commissioners of the City of Forest Hills finds that the interest of the city and its citizens will be served by the adoption of the multi-hazard mitigation plan prepared by Metro, as Metro agencies provide emergency services in the City of Forest Hills and coordination between Metro agencies and Forest Hills agencies will contribute to the effective provision of emergency services;

NOW, THEREFORE, BE IT RESOLVED, as follows:

1. That the City of Forest Hills hereby adopts the Metropolitan Nashville-Davidson County Multi-Hazard Mitigation Plan, revised January 2015.
2. That this Resolution shall be effective immediately upon its passage and adoption, the public welfare requiring it.

APPROVED AND ADOPTED THIS 21st **day of** May**, 2015**

John Lovell, Mayor

ATTEST

Amanda K. Deaton-Moyer, City Recorder

Figure 6-6: City of Forest Hills Plan Resolution 2015

Multi-Hazard Mitigation Plan
7.0 Plan Implementation and Maintenance

IMPLEMENTATION

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

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

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

Another important implementation mechanism that is highly effective but low-cost, is to take steps to incorporate both the recommendations and the underlying principles of this Hazard Mitigation Plan into other community plans and mechanisms, such as Comprehensive Planning, Capital Improvement budgeting, Economic Development goals and incentives, or regional plans such as those put forth by the State Department of Transportation. Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. The best chance for the plan's success is if CPT staff and elected officials maintain a vigilance to incorporate the plan into operations. This integration is accomplished by a constant, prevailing, and energetic effort to network among programs and to identify and highlight the multi-objective, "win-win" benefits for each affected program, as well as the communities and constituents. This effort is achieved through the routine actions of monitoring agendas, attending meetings, sending memos, and promoting safe, sustainable communities.

In concert with these efforts, it is important to maintain constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions. This will include creating and maintaining a bank of ideas on how any required local match or participation requirement can be met. Then, when funding does become available, the CPT will be in a position to capitalize upon the opportunity. Funding opportunities that can be monitored include special pre- and post-disaster funds, special district budgeted funds, state or federal ear-marked funds, and grant programs, including those that can serve or support multi-objective applications.

With the adoption of this plan, the CPT should be converted to a permanent advisory body referred to as the Mitigation Coordinating Committee. This Committee, led by OEM, should agree to commit to:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of the high priority, low/no-cost Recommended Actions;
- Keep the concept of mitigation in the forefront of community decision-making by identifying recommendations of this plan when other community goals, plans and activities overlap, influence, or directly affect community vulnerability to disasters;
- Maintain vigilant monitoring of multi-objective cost-share opportunities to assist the community in implementing the Recommended Actions of this plan for which no current funding or support exists;
- Monitor implementation of this Plan;
- Report on progress and recommended changes to the Metro Council; and
- Inform and solicit input from the public.

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

MAINTENANCE

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

Previously, informal ad hoc reviews have been held to cover a multitude of planning areas (including this plan); however, moving forward, formal annual reviews (including any additional reviews needed) will be held and documented within this plan.

This monitoring and updating will take place through an annual review by OEM and the standing CPT, and a 5-year written update to be submitted to the state and FEMA Region IV, unless disaster or other circumstances (e.g., changing regulations) lead to a different time frame. CRS requires an annual re-certification report.

When the Committee reconvenes for the review they will coordinate with all of the stakeholders that participated in the planning process, or that have joined the Committee since the inception of the planning process, to update and revise the plan. Public notice will be given and public participation will be invited, at a minimum, through available web postings and press releases to the local media outlets, when a large written revision is anticipated.

The evaluation of the progress can be achieved by monitoring changes in the degree of vulnerability identified in the plan. Changes in vulnerability status can be identified by noting:

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

The plan will be updated via written changes and submissions, as the Committee deems appropriate and necessary, and as approved by the Metro Council.

The Committee will have Action Review meetings annually to ensure the action items contained in this plan are maintained and updated.

Nature of Change	Date of Change	Page (s) affected	Changes made by
Plan Creation	April 2005	All	OEM/KP
Plan Revision	September 2009	All	OEM/HJJ
Plan Adoptions	October 2010	6-3 to 6-10	OEM/HJJ
Plan Revision	September 2012	All	OEM/HJM
Plan Revision	January 2015	All	OEM/HJM
Plan Adoptions	June 2015	Sections 3, 6, 7	OEM/HJM

Table 7-1: Plan Record of Changes

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Multi-Hazard Mitigation Plan
Appendix A – Planning Process

The Nashville Office of Emergency Management (OEM) facilitated the revision of this 2015 Multi-Hazard Mitigation Plan.

Specific tasks included:

- Establishing a planning organization for Nashville and Davidson County and all of the participants;
- Meeting all of the DMA requirements as established by federal regulations, following FEMA's planning guidance;
- Facilitating the entire planning process;
- Coordinating the DMA planning process with the Community Rating System planning process; and
- Developing and facilitating the Public Input process.
- Identifying the data requirements that the participating counties, communities, and other FEMA "eligible applicants" could provide, and conduct the research and documentation necessary to augment that data;
- Producing the Draft and Final Plan documents.

Community Planning Team (CPT)

The DMA planning regulations and guidance ardently stress that each local government seeking the required FEMA approval of its mitigation plan must participate in the process. The Community Planning Team (CPT) is composed of Metro staff and stakeholders. The following members participated on the Community Planning Team:

Table A-1: CPT Members

Attendee	Agency / Title	Phone	E-mail
Heidi Mariscal	OEM/ Planning, Training, Exercise Coordinator	615-862-8530	Heidi.Mariscal@nashville.gov
Tom Palko	MWS/ Assistant Director	615-862-4510	Tom.Palko@nashville.gov
Stan Robinson	MWS/ Home Buyout/Grant Coordinator	615-862-4516	Stan.Robinson@nashville.gov
Roger Lindsey	MWS/ Program Manager	615-862-4505	Roger.Lindsey@nashville.gov
Michael Hunt	MWS/ System Services Manager	615-880-2420	Michael.Hunt@nashville.gov
Anna Kuoppamaki	MWS/Planner I-GIS Analyst	615-862-4505	Anna.kuoppamaki@nashville.gov
Jim Snyder	MWS/ Special Projects Manager	615-862-4505	Jim.snyder@nashville.gov
Brad Heilwagen	AMEC-MWS/ Water Engineering Branch Manager	615-862-4505	brad.heilwagen@amec.com
Cindy Popplewell	AMEC-MWS/ Senior Project Manager	615-862-4505	Cindy.popplewell@amec.com
Michael Briggs	Metro Planning/ Transportation Planner	615-862-7150	Michael.Briggs@nashville.gov
Jennifer Higgs	Metro Planning/ GIS Director	615-880-3416	Jennifer.higgs@nashville.gov
Kathryn Withers	Metro Planning/ Manager of Community Plans & Design Studio	615-862-7150	Kathryn.withers@nashville.gov
Wade Hill	Metro Codes/ Acting Director	615-862-6520	wade.hill@nashville.gov
Ross Musgrave	Nashville Fire/ Captain	615-862-5421	Ross.Musgrave@nashville.gov
Mike Franklin	Nashville Fire/ Deputy Director	615-862-5421	Mike.franklin@nashville.gov
Al Thomas	Nashville Fire/ Deputy Director	615-862-5421	Al.thomas@nashville.gov
Mark Becknal	Goodlettsville Fire/ Deputy Chief	615-851-3478	mbecknal@cityofgoodlettsville.org
Floyd Hyde	Metro Police/ Lieutenant	615-880-3015	floyd.hyde@nashville.gov
William Robinson	Metro Public Works/ Technical Specialist	615-862-8750	William.robinson@nashville.gov
Tim Young	Metro Public Works/ Technical Specialist I	615-862-8750	Tim.young@nashville.gov

Jack Baxter	NES/Operations Manager – System Operations	615-747-3683	jbaxter@nespower.com
James LaRosa	National Weather Service/ Service Hydrologist	615-754-8506	james.larosa@noaa.gov
Brenna Robinson	TEMA/Planner	615-741-0001	brobinson@tnema.org
Brent Morse	TEMA/ District Coordinator	615-741-7342	bmorse@tnema.org
Ron Zurawski	TGS/ State Geologist	615-532-1502	Ronald.zurawski@tn.gov
Mike Bradley	USGS/ Asst. District Chief SE Region	615-837-4703	mbradley@usgs.gov
Amanda Deaton	Forest Hills/ City Mgr	615-372-8677	Amanda.deaton@cityofforesthills.com
Beth Reardon	Belle Meade/ City Mgr	615-297-6041	breardon@cityofbellemeade.org
Beth Sartain	Berry Hill/ Mayor	615-292-5531	bsartain@berryhilltn.net
Cathy Altenbern	Belle Meade/ Vice Mayor	615-297-6041	caltenbern@citybellemeade.org
DeWayne Baskette	Oak Hill/ City Mgr	615-371-8291	Dewayne.baskette@oakhilltn.us
Gary Goodwin	Goodlettsville/ Police Chief	615-851-2220	ggoodwin@cityofgoodlettsville.gov
Harry Bell	Goodlettsville/ Commissioner	615-865-1996	hbell@cityofgoodlettsville.org
James Hunt Sr	Belle Meade/ Mayor	615-297-6041	jhunt@citybellemeade.org
Jane Birdwell	Goodlettsville/ Vice Mayor	615-851-2200	Jane.m.birdwell@gmail.com
Jeff Duncan	Goodlettsville/ Commissioner	615-851-2200	jduncan@cityofgoodlettsville.org
Joe Baker	Berry Hill/ City Mgr	615-292-5531	jbaker@berryhilltn.net
John Coombs	Goodlettsville/ Mayor	615-851-2200	Johncoombs2@bellsouth.net
Lanson Hyde III	Forest Hills/ Commissioner	615-372-8677	lhyde@surgicaldevelopmentpartners.com
Phillip Gibson	Goodlettsville/ Fire Chief	615-851-2246	pgibson@cityofgoodlettsville.org
Robert Bennett	Berry Hill/ Police Chief	615-297-3242	rbennett@berryhilltn.net
Ron Coles	Oak Hill/ Mayor	615-371-8291	Ron.coles@oakhilltn.us
Tim Eads	Belle Meade/ Chief of Police	615-297-0241	teads@cityofbellemeade.org
Tim Ellis	Goodlettsville/ City Mgr	615-851-2200	tellis@cityofgoodlettsville.org
Tommy Campsey	Oak Hill/ Safety Coord.	615-371-8291	safetycoordinator@oakhilltn.us
Zach Young	Goodlettsville/ Commissioner	615-851-2200	zyoung@cityofgoodlettsville.org

Additional Agencies and Organizations

Additional agencies and organizations interested in Metro Nashville and/or natural hazards were contacted to see if they were doing anything that might affect the community's program and to see how they could support the community's efforts. The following key agencies were contacted:

- U.S. Army Corps of Engineers, Nashville District;
- National Flood Insurance Program (NFIP) State Coordinator;

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

Neighboring communities were also contacted and provided an opportunity to take part in the community planning team meetings, and were added to the email group to ensure constant communication with the planning. These communities included:

- Belle Meade;
- Berry Hill;
- Forest Hills;
- Goodlettsville;
- Oak Hill

From: Mariscal, Heidi (OEM)
To: Amanda Deaton (Forest Hills, City Mgr); "Beth Reardon (Belle Meade City Manager)"; "Beth Sartain (Berry Hill, Mayor)"; "Cathy Altenbern (Belle Meade, Vice Mayor)"; "DeWayne Baskette (Oak Hill City Mgr)"; "Gary Goodwin (Goodlettsville Police Chief)"; "Harry Bell (Goodlettsville Commissioner)"; "James Hunt Sr (Mayor Belle Meade)"; "Jane Birdwell (Goodlettsville, Vice Mayor)"; "Jay Luthy (Goodlettsville PD Supervisor of Comm)"; "Jeff Duncan (Goodlettsville, Commissioner)"; "Joe Baker (Berry Hill City Mgr)"; "John Coombs, Goodlettsville Mayor"; "Lanson Hyde III (Forest Hills)"; "Phillip Gibson (Goodlettsville Fire Chief)"; "Robert Bennett (Berry Hill Police Chief)"; "Ron Coles (Oak Hill, Mayor)"; "Tim Eads (Belle Meade Chief of Police)"; Tim Ellis (Goodlettsville City Mgr); "Tommy Campsey (Oak Hill Safey Coord)"; "Zach Young (Goodlettsville Commissioner)"
Cc: Shannon, Charles (NFD-ADM)
Subject: Multi-Hazard Mitigation Plan
Date: Tuesday, September 23, 2014 11:37:00 AM
Importance: High

Good Morning!

Metro Nashville-Davidson County is in the initial planning phase for the 5 year revision cycle of the Metro-Nashville Davidson County Multi-Hazard Mitigation Plan, and will be holding the very first meeting on Monday, September 29th @ 10:30am, at the Nashville Emergency Operations Center, 2060 15th Ave South.

The purpose of hazard mitigation is to reduce potential losses from future disasters. The intent of mitigation planning, therefore, is to maintain a process that leads to hazard mitigation actions. Mitigation plans identify the natural hazards that impact communities, identify actions to reduce losses from those hazards, and establish a coordinated process to implement the plan. (44 CFR §201.1(b)) Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards (44 CFR 201.2). Hazard mitigation activities may be implemented prior to, during, or after an event. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs.

With this being said, it has been noted by FEMA that communities of any size, resources or capability that demonstrate a genuine interest in and commitment to hazard mitigation through their planning process will be better positioned to receive FEMA technical and financial assistance to implement their actions or projects.

Previously, you may or may not have adopted the last plan revision as your own for your community, so we want to extend an invitation to you (or your designee) to participate in the planning process of this very important plan, by providing input and being engaged in the outcome of the plan's content. During this process, you can determine if your community will adopt this plan, or create your own. Nonetheless, your input is invaluable to the protection of all the citizens of Davidson County.

The current Multi-Hazard Mitigation Plan can be found on our website at: http://www.nashville.gov/Mayors-Office-of-Emergency-Management/Planning.aspx. This includes the entire Multi-Hazard Mitigation plan, and all the appendices associated with it. (Section 6 in the plan is on Plan Adoptions, and would have your resolution if you adopted the plan in 2010, right after the flood.)

Please let me know if you will be participating in the planning process, and who will be your primary point of contact for this project.

Thank you, and if you have any questions or would like to discuss this further, please do not hesitate to let me know. Hope to see you here!

Heidi J. Mariscal, MEP
Office of Emergency Management
2060 15th Ave South
Nashville, TN 37212
(615)880-2950 Office Direct
(615)862-8530 Main Office
(615)566-8614 Cellular
(615)880-2990 Media Line
(615)862-8534 Fax
www.oem.nashville.gov

Figure A-1: Initial email to stakeholders

The following communities have officially adopted this plan in 2010 as their Multi-Hazard Mitigation plan, and will be asked to officially adopt or opt out again this revision:

- Belle Meade;
- Berry Hill;
- Goodlettsville;
- Oak Hill; and
- Forest Hills. (opted out of adopting this plan in 2010, but will have an opportunity to adopt with this revision)

Public Input

The Community Planning Team reached out to the community early in the planning process, to allow public input into the Hazard Mitigation Plan. The main avenue for the public to provide input into the plan was through an on-line survey just for capturing information. The public was also given the opportunity to email the OEM Planner. The information obtained from this open public input was discussed and considered at Community Planning Team meetings during the planning process. Majority of the comments received were already being addressed by the committee, and no further action was needed. Some of the comments made on the on-line survey did not require action, and were simply statements or other comments not related to mitigation activities. During the community public input meeting, only one family of three showed up and asked for advice on a good place to live with little crime; no other community members presented at this meeting.

The avenues utilized to reach the public include:

- Survey (on-line)
- Social Media (Facebook/Twitter/LinkedIn)
- Nashville.gov website
- Metro Human Resources mass email
- Metro Planning mass email
- Community Public Input Meeting scheduled/conducted

The on-line survey for public input included the option to pick any of the identified hazards, and to pick a priority level for those hazards. They were also given a text box to suggest mitigation actions for the hazard they picked. Finally, they were given the option to include their personal information, and any other comments on the plan and/or the process. The results of the survey are not included within this plan due to any possible personal identifiable information. Screen shots of the original on-line survey follow.

Summary results of this on-line survey are as follows:

Hazard	# of responses
Flooding	19
Tornadic Activity	8
Hazardous Materials Incident	5
Manmade – Technological/Terrorism	5
Winter Weather	4
Communicable Diseases	3
Extreme Temperature – Heat	2
Other	2
Drought	1
Earthquake	1
Extreme Temperature – Cold	1
Thunderstorms	1
Dam/Levee Failure	0
Landslide/Sinkhole	0
Wildfire	0

Table A-2: Summary results of on-line survey

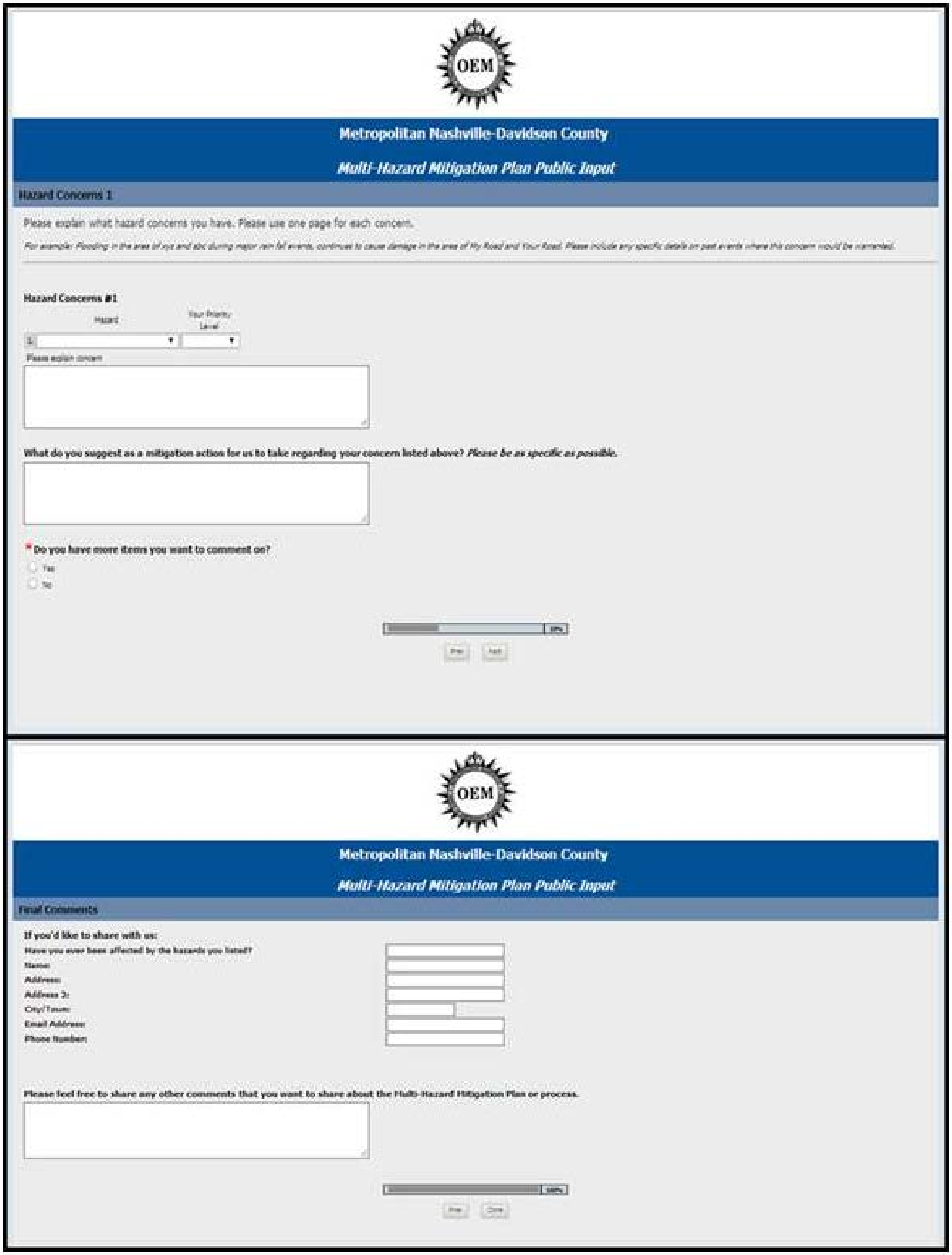

Figure A-2: Screen shot of Public Input Survey

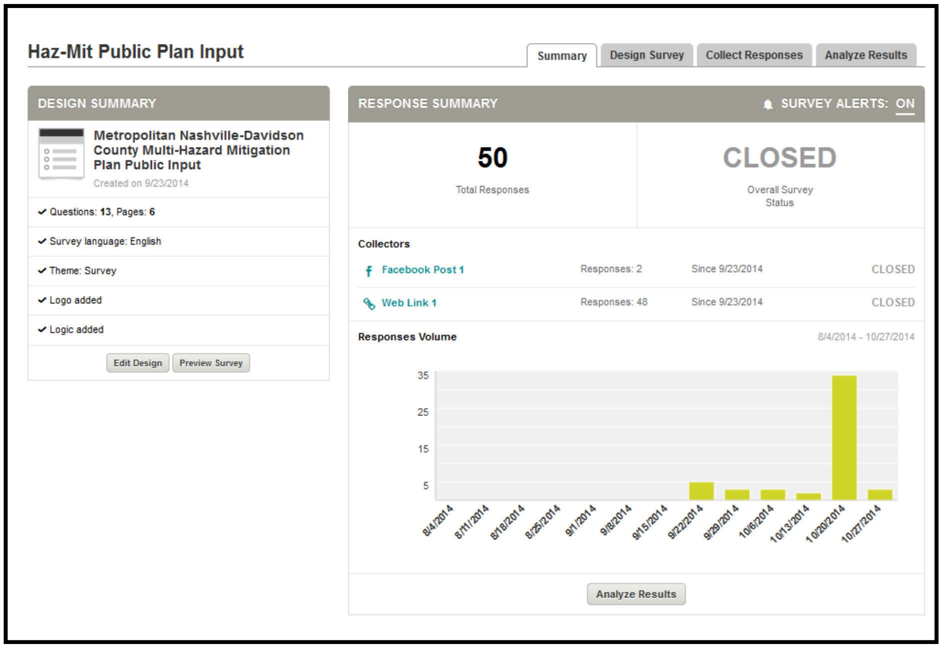

Figure A-3: Public Input Survey summary page

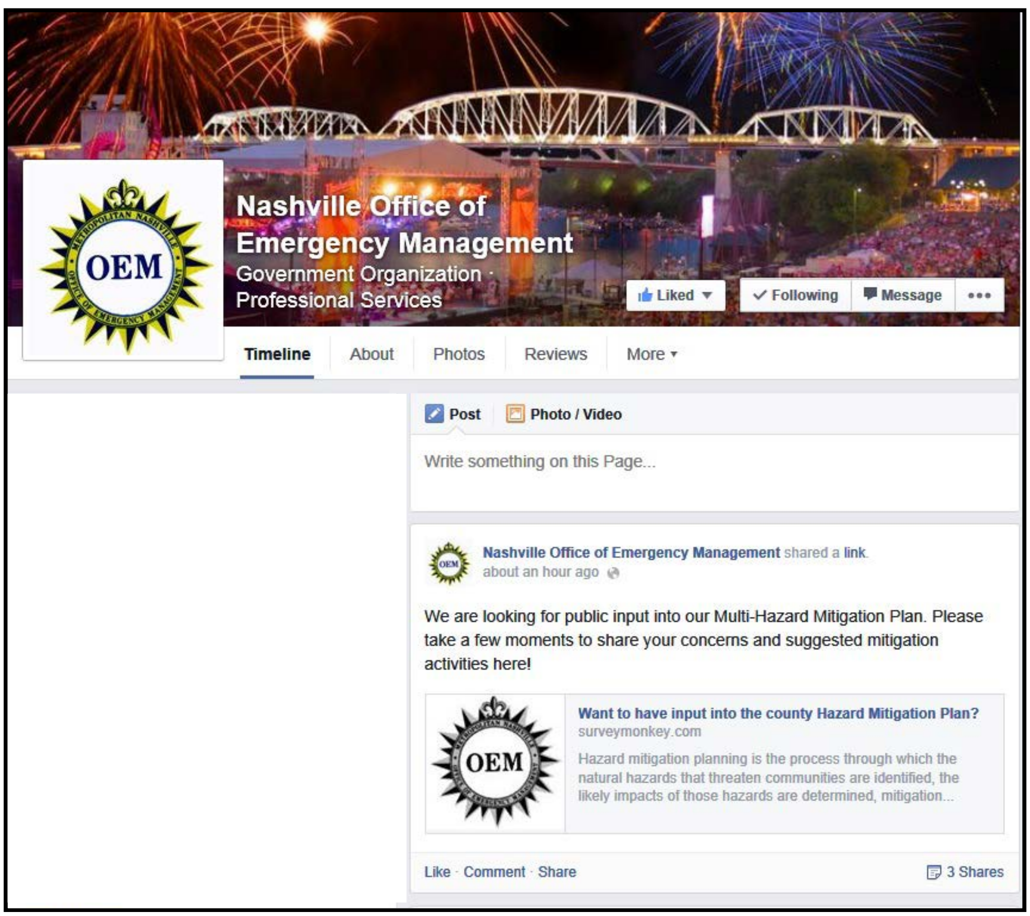

Figure A-4: Facebook posting for public input (9/24/14)

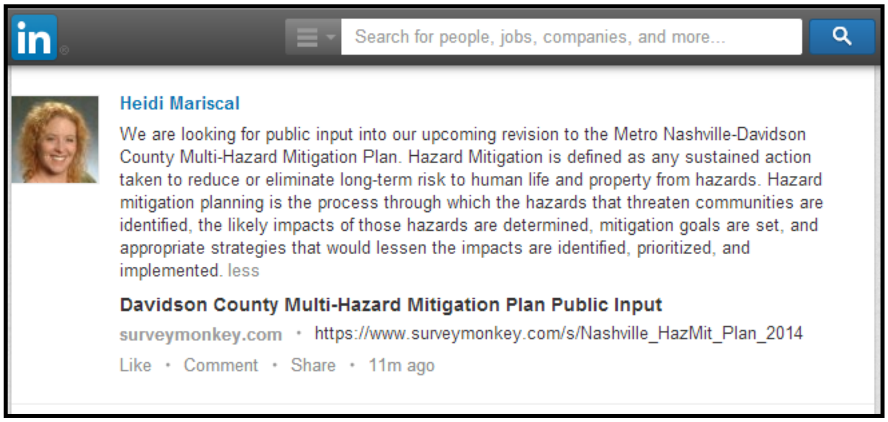

Figure A-5: LinkedIn public post (9/24/14)

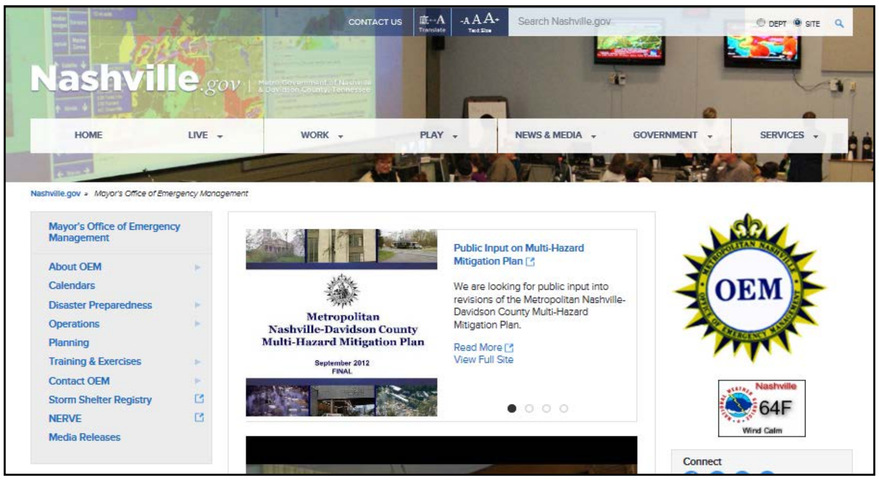

Figure A-6: Public Input posted as featured story on main OEM webpage, linked to the public input survey. (9/24/14)

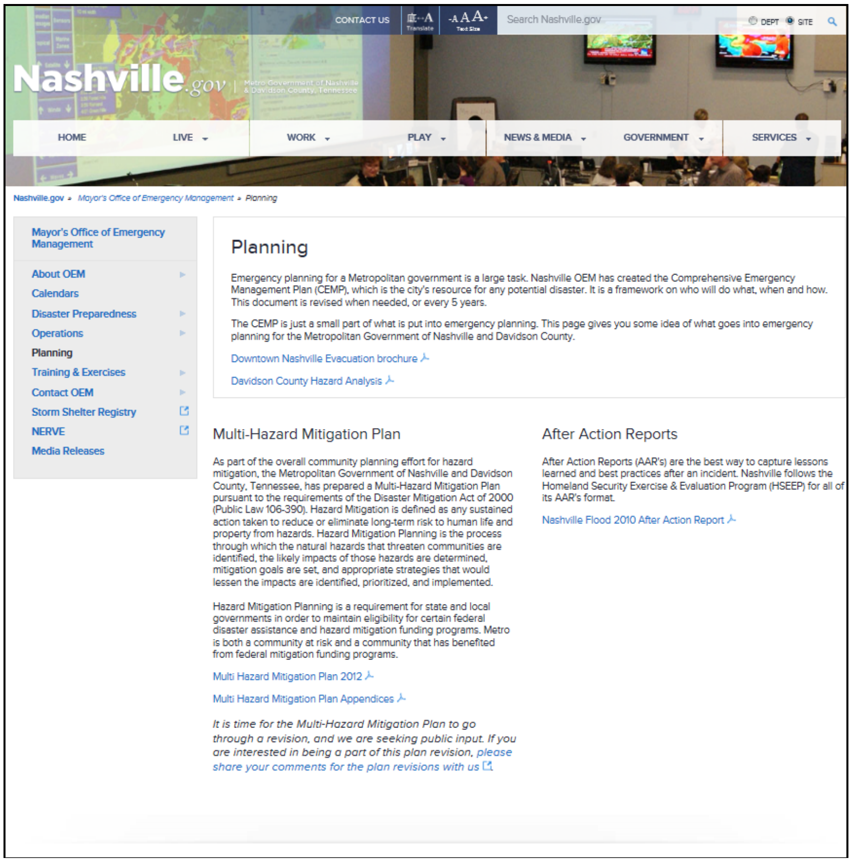

Figure A-7: Public Input on OEM website, planning section (9/24/14)

MEETING MINUTES

The CPT met several times during the planning process. Meeting dates were scheduled for the following:

- September 29th , 2014 – Kick off meeting
- October 23rd, 2014 – Plan review
- November 3rd, 2014 – Plan review updates
- November 18th, 2014 – HIRA & Plan review updates
- December 18th, 2014 – Draft Plan review
- January 6th, 2015 – Public Input Meeting
- January 8th, 2015 – Final Plan review
- January 9th, 2015 – Submit to TEMA

Metro Nashville & Davidson County
Multi-Hazard Mitigation Planning Team Meeting
September 29, 2014, 10A -11:45A

In attendance:

Heidi Mariscal, OEM
Angi Roscoe, OEM
Jim Snyder, MWS
Anna Kuoppamaki, MWS
Mike Franklin, NFD
James LaRosa, NWS
Tim Eads, Belle Meade PD
Joe Baker, City of Berry Hill
Mike Ryman, OEM/PW
Michael Hunt, MWS
Tom Palko, MWS
Michael Briggs, Planning
Tim Young, PW
Brad Heilwagen, AMEC
Beth Reardon, City of Belle Meade
Mark Becknal, Goodlettsville FD

Absent:

Eddie Andrews, NES
Jennifer Higgs, Planning
Bob Leeman, Planning
Floyd Hyde, MNPD
Leander Dupie, MNPD
Jack Baxter, NES
Ron Holt, NFD/FMO
Stan Robinson, MWS
Dhana Jones, MNPD
Wade Hill, Codes

Heidi called the meeting to order at 10:05am.

It is time to update the Hazard Mitigation Plan. Last full revision was completed in 2012.

Review Planning Guide:

Heidi Mariscal, OEM, stated the mitigation activity needs to be prioritized. She also advised there needs to be public input on the plan before it can be submitted to TEMA. A Survey Monkey questionnaire has been added to the OEM website that will allow citizens to contribute to the plan. There will be a public meeting held prior to the final approval of the plan.

HIRA Updates:

The public version of the HIRA is on the OEM website. Heidi raised the question if the HIRA needed to be reviewed and revised along with the rest of the Multi-Hazard Mitigation Plan. Mike Ryman, OEM/PW stated the priorities have changed but not the hazards. James LaRosa, NWS, stated the weather is constantly changing. Heidi passed the current version of the HIRA around for everyone to review and decide what changes, if any, need to be made as soon priorities and hazards have increased over time.

Heidi polled the committee to see if the HIRA needs to be reviewed and revised. The committee agreed, under majority vote, to revisit and revise the HIRA.

Tasks:

1. Section 1 — Heidi Mariscal/OEM
2. Section 2 — Heidi Mariscal/OEM
   Michael Briggs/Planning
   James LaRosa/NWS
   Jim Tarpy/MWS
   NES
   Piedmont Nashville Gas
3. Section 3 — Heidi Mariscal/OEM
4. Section 4.1
   a. Heidi Mariscal/OEM (pg. 4.01.01–4.01.04, 4.01.05-4.01.12, 4.01.43-4.01.48)
   b. James LaRosa/NWS (pg.4.01.57-4.01.78)
   c. Tom Palko/MWS (pg.4.01.13-4.01.42, 4.01.49-4.01.52, 4.01.53-4.01.54)
   d. Metro Public Health (pg.4.01.55-4.01.56)
   e. Metro Police Dept. (pg.4.01.57-4.01.58)
   f. Mike Franklin/NFD (pg.4.01.63-4.01.66)
5. Section 4.2
   a. MWS and TDEC (pg. 4.02.03-4.02.05)
   b. Michael Briggs/Planning (pg.4.02.09-4.02.20) **Heidi requested Jennifer Higgs review Table 4.33*
   c. ALL (pg.4.02.09-4.02.20)
6. Section 4.3
   a. Michael Briggs/Planning Table 4.39
   b. ALL **Heidi requested that everyone review this section for any revisions that need to be made. She also requested that the capabilities be updated to include any new teams be added, (i.e. swift-water response team, dive teams, etc.).*
7. Section 5 — ALL * *everyone needs to review the recommended actions and provide updates. If there is a new action item you would like to add, please let Heidi know and we will put it on the next* team meeting agenda.
8. Section 6 — Heidi Mariscal/OEM
9. Section 7 — Heidi Mariscal/OEM
10. Appendix A — Heidi Mariscal/OEM
11. Appendix B — ALL
12. Appendix C — ALL
13. Appendix D — ALL
14. Misc maps within the entire plan — Jennifer Higgs/Planning

Milestone Timetable:

Initial Team Kick off Meeting	9/29/14 @ 10am, EOC
Team Meeting	~~10/20/14 @ 9am, EOC,~~ 10/23/14 @ 9am, EOC
Public Input Meeting	TBD
Target Completion Date	November 2014

Meeting adjourned @ 11:45a.m.

Metro Nashville & Davidson County
Multi-Hazard Mitigation Planning Team Meeting
October 23, 2014, 9A -9:45A

In attendance:

Heidi Mariscal, OEM
Angi Roscoe, OEM
Jim Snyder, MWS
Anna Kuoppamaki, MWS
Paul Harbin, MNPD
James LaRosa, NWS
Brent Morse, TEMA
Tommy Campsey, City of Oak Hill
Rocky Robinson, PW
Michael Hunt, MWS
Tom Palko, MWS
Roger Lindsey, MWS
Jack Baxter, NES
Cindy Popplewell, AMEC
Joe Baker, City of Berry Hill

Absent:

Eddie Andrews, NES
Jennifer Higgs, Planning
Bob Leeman, Planning
Stan Robinson, MWS
Dhana Jones, MNPD
Wade Hill, Codes
Tim Young, PW
Tim Eads, Belle Meade PD
Mark Becknal, Goodlettsville FD
Jack Baxter, NES
Ron Holt, NFD/FMO
Michael Briggs, Planning
Floyd Hyde, MNPD
Leander Dupie, MNPD
Mike Franklin, NFD
Brad Heilwagen, AMEC
Beth Reardon, City of Belle Meade

Heidi called the meeting to order at 9:07am.

We have more time than originally thought to submit the updated Multi-Hazard Mitigation Plan to TEMA. Heidi would like to have to plan submitted by the end of the year.

File Transfer Protocol Sharing Site (FTPS):

Due to the size of files used with this revision, we have created a dedicated FTPS to use for any revisions to the plan. This site is like any other Windows Explorer window in that you can "drag" information in and out. Heidi gave participants their usernames and passwords for the site (metro employees use their regular metro log-in). There are 2 main folders on the site: 2014 Hazard Mitigation Planning, and 2014 THIRA.

Heidi asks that if you have any changes that need to be made to the current plan, that you copy the plan to your computer, make the needed changes, using the tracking feature, and submit/upload your copy of the plan to the "Revisions for Heidi" folder, with your name/agency in the file name. This will ensure that all changes have been received and made to the plan. Please let Heidi know if you need your log in information, or if you have any problems. Directions have been emailed out to everyone.

Heidi will put a copy of the most recently revised plan to the "2014 Master Revised Plan" for folks to review if they need to. This will be kept up to date as often as possible. Please DO NOT change the plan within the FTPS, but make sure you copy it to your computer, then upload it to the submit changes file.

Received Revisions:

Heidi advised she has received some revisions from Planning, National Weather Service and Metro Water Services. She has questions regarding the Planning submissions. The revisions from James are regarding graphics. He stated that the graphics are currently changing week to week. He will send the most updated version to Heidi.

Public Input:

Heidi has requested public input on the plan via the internet (websites/social media). (copy of current public input received handed out) Any concerns and/or suggestions will be addressed in the plan revisions. Here is the link to the Survey Monkey results. https://www.surveymonkey.com/results/SM-K3GQ5CJL/

She stated she has received quite a bit of input from a Mr. Vaughn. She was advised by MWS that Mr. Vaughn's concerns are being handled on the executive level of Metro Water Services.

Community Rating System:

It has been decided to combine the Community Rating System plan, with the Hazard Mitigation Plan, since the Hazard Mitigation Plan already has most of the other plan already in it, and it just fits perfectly. It was decided to combine the Community Rating System public meeting and the Hazard Mitigation Plan Public Input meeting into one public meeting. There will need to be an internal meeting regarding CRS prior to the Public Input Meeting. The public will have access to the Hazard Mitigation Plan at this meeting, not online. It was suggested by Brent Morse, TEMA, that the public also have access to the plan at their local libraries, as that is what most counties do before their plan is submitted.

Review Regulation Checklist:

The checklist remains the same. Heidi passed around a copy of the checklist for everyone to review if they didn't get one at the last meeting.

HIRA Updates:

The HIRA needs to be filled in as before. It is also on the FTPS site. Heidi passed around a copy of the 2012 Final HIRA for review. She stated that revisions need to be submitted within the next week. There will be a meeting to discuss the changes on November 3rd at 2:30pm.

Consequence Analysis:

The Consequence Analysis needs to be written/revised. A lot of the needed information is already in the plan. Heidi will be adding this to the FTPS site for revisions to be submitted. She passed a copy around to the group for review. The November 3rd meeting will include any and all revisions that are submitted.

<u>Tasks:</u>

1. Section 1 — Heidi Mariscal/OEM
2. Section 2 — Heidi Mariscal/OEM
   Michael Briggs/Planning
   James LaRosa/NWS
   Jim Tarpy/MWS
   NES
   Piedmont Nashville Gas
3. Section 3 — Heidi Mariscal/OEM
4. Section 4.1
   a. Heidi Mariscal/OEM (pg. 4.01.01–4.01.04, 4.01.05-4.01.12, 4.01.43-4.01.48)
   b. James LaRosa/NWS (pg.4.01.57-4.01.78)
   c. Tom Palko/MWS (pg.4.01.13-4.01.42, 4.01.49-4.01.52, 4.01.53-4.01.54)
   d. Metro Public Health (pg.4.01.55-4.01.56)
   e. Metro Police Dept. (pg.4.01.57-4.01.58)
   f. Mike Franklin/NFD (pg.4.01.63-4.01.66)
5. Section 4.2
   a. MWS and TDEC (pg. 4.02.03-4.02.05)
   b. Michael Briggs/Planning (pg.4.02.09-4.02.20) **Heidi requested Jennifer Higgs review Table 4.33*
   c. ALL (pg.4.02.09-4.02.20)
6. Section 4.3
   a. Michael Briggs/Planning Table 4.39
   b. ALL **Heidi requested that everyone review this section for any revisions that need to be made. She also requested that the capabilities be updated to include any new teams be added, (i.e. swift-water response team, dive teams, etc.).*
7. Section 5 — ALL ** everyone needs to review the recommended actions and provide updates. If there is a new action item you would like to add, please let Heidi know and we will put it on the next* team meeting agenda.
8. Section 6 — Heidi Mariscal/OEM
9. Section 7 — Heidi Mariscal/OEM
10. Appendix A — Heidi Mariscal/OEM
11. Appendix B — ALL
12. Appendix C — ALL
13. Appendix D — ALL
14. Misc. maps within the entire plan — Jennifer Higgs/Planning
15. HIRA — ALL

Milestone Meetings:

- *HIRA & Consequence Analysis Revision Meeting*: November 3rd, 2:30pm-4:30pm, Southeast Regional Community Center
- *Committee Planning Meeting*: November 18th, 9am-11am Midtown Police Precinct
- *Public Input Meeting*: December 16th, 4:30pm-6:00pm, Midtown Police Precinct
- *Final Committee Planning Meeting*: December 18th, 9am-10am, Midtown Police Precinct
- December 19th, target plan completion date

Meeting adjourned @ 9:45am.

Metro Nashville & Davidson County
Multi-Hazard Mitigation Planning Team Meeting
November 3rd, 2014
2:30 p.m. - 4 p.m.

In attendance:

Heidi Mariscal, OEM
Angi Roscoe, OEM
Roger Lindsey, MWS
Anna Kuoppamaki, MWS
Jack Baxter, NES
Mark Becknal, Goodlettsville FD
Rocky Robinson, PW
Michael Hunt, MWS
Tom Palko, MWS
Cindy Popplewell, AMEC
Vincent Higgins, Belle Meade PD
Ron Zurawski, TN Geological Survey

Absent:

Jim Snyder, MWS
Jennifer Higgs, Planning
Bob Leeman, Planning
Stan Robinson, MWS
Dhana Jones, MNPD
Wade Hill, Codes
Tim Young, PW
Tim Eads, Belle Meade PD
Brent Morse, TEMA
Tommy Campsey, City of Oak Hill
Eddie Andrews, NES
Ron Holt, NFD/FMO
Michael Briggs, Planning
Floyd Hyde, MNPD
Leander Dupie, MNPD
Mike Franklin, NFD
Brad Heilwagen, AMEC
Beth Reardon, City of Belle Meade
Joe Baker, City of Berry Hill
James LaRosa, NWS

Heidi called the meeting to order at 2:45 p.m.

THIRA Update and Consensus

- Still missing updates from MNPD, NFD, Planning and Codes
- Discussed current THIRA rankings thus far
    - No one disagrees with the hazard changes so far.
- Sinkholes: TGS is not really tracking them, but after something happens somewhere, they get lots of calls regarding sinkholes. Knoxville office is tracking for East TN only. Basically, it's better for Nashville to track for themselves. Will continue to have Metro GIS/Planning and MWS continue tracking the best they can with the calls as they come in.
- Consensus that since we are missing several departments, we will vote on THIRA via email next week.

Consequence Analysis

- Cindy gave us a copy of a different locals analysis as a guide. Heidi advised she likes their layout better than ours. She passed around a copy for everyone to look at.
- Heidi needs help with this analysis. She's not an expert in everything noted, so she needs everyone's input to create this information. A lot of the information is already in the Hazard Mitigation Plan, but more details are needed.
- There are 7 different areas that need to have something written up on for each 14 identified hazards:
    - Impact on the public.
    - Impact on responders
    - Continuity of Operations & continued delivery of services
    - Infrastructure, Property, Facilities
    - Environment
    - Economic Conditions of jurisdiction
    - Public Confidence in the jurisdictions governance.
- Combine extreme temperatures for one single hazard and add specifics for each.
- Hazard Update Point of Contact:
    - Flooding: Tom Palko
    - Infrastructure, Property & Facilities in Tornadoes: Rocky Robinson
    - Earthquake, Landslides and Sinkholes: Ron Zurawski
- Heidi requested NES look at the hazards and let her know what information they can provide.
- It was decided to have each agency type up its own section on each hazard.
- Michael Hunt advised it would be easier to use TEMA's version and augment to fit Metro, but use the analysis of what Cindy provided as the layout.
- Need to concentrate on this as it may take a while to complete.

Mitigation Projects & Priorities (Section 5)

- Page 1, section 5: Metro's vulnerability- everyone agrees they are the same
- Page 1, section 5: MWS advised the numbers have increased. (Delete #2)
- Page 2, section 5, Change #8 to include USGS: Michael Hunt will type up the changes for #8.
- Page 2, section 5, OEM to update #9

- Page 2, section 5, #11: FEMA doesn't allow it for residential. Flood-proofing a home does not take the place of Flood Insurance. Tom will send Heidi some information.

- **Goal Setting:**
    - 3 primary goals and objectives will stay the same.
    - Look at rewording Goal #1 (Heidi will look at)
    - Page 3, section 5, Goal 1: Metro Council passed an ordinance that no new buildings can be built in the flood-way. Tom Palko advised he will send Heidi a copy of the new ordinances.

- **Mitigation Measures:**
    - Page 5-6, section 5, will stay the same.

- **Action Plan:**
    - Heidi Mariscal/OEM
        - will summarize in the beginning for ease of reading
        - Update
            - Goal #1: #3, 6, 26
            - Goal #2: #15: change to "on-going", and update responsible offices
        - Public Awareness: NES and OEM work together on sending out a flyer for Public Education. Heidi wants to include the satellite cities in this project.
        - Heidi will update the Public Education stuff on Public Awareness.

    - Tom Palko/MWS
        - Update
            - Goal #1: # 1, 2, 4, 5, 9, 11, 12
            - Goal #2: #16, 17, 18
            - Goal #3: #24
        - Update on completed to close out:
            - #7, 14, 25
            - Goal #3: #20, 21, 22, 23 (Heidi will move both #21 & 22 to "Other Items Considered")
        - Tom will write up something on the MWS rebuilding the Metro Center Pumping Station to add as a "Project" but it's already completed.

- Wade Hill/Codes and Planning
  - Update #10

- Tommy Campsey /Oak Hill
  - Update #27

- Michael Hunt/MWS
  - Wants to add to Goal #1 regarding issues they have been working on since 2010.

- Rocky Robinson/PW
  - Heidi requested Rocky come up with something on brine, snow routes, etc. to add as a project under Goal #1.

- Jack Baxter/NES
  - NES is building a new Station/Training center in the Myatt Drive area. They are going to write something up to add to the plan.

- Combined:
  - MWS & PW:
    - Murfreesboro Road: MWS, PW and TDOT are working on trying this project (ADD as a project)

- Action Plan #13 will remain the same.
- It was voted that once the updates are inserted, the priorities will be renumbered for less confusion.

<u>Other Updates & Changes</u>

- Heidi (Tom) will update the Mitigation Plan as soon as possible.
- Newest geological maps on the TDEC website, Heidi will add
- Please look at the Public Input information and address as much as possible and send revisions to Heidi.

CRS Integration

- Cindy will make changes in 4.1 and 4.5 and send to Heidi.

Deadlines & Meetings

- Might have to add a meeting BEFORE the public meeting.
- Next meeting is November 18th at Midtown PD Station. Need a full draft provided by that meeting. If not, there will need to be another meeting.
- Heidi needs to know at least 30 days BEFORE the public meeting b/c the public has to have 30 days' notice before the meeting.
- Public Input meeting: December 16th. Recommends everyone attend.
- Final Planning Meeting: December 18th. Everyone needs to attend.

Meeting adjourned @ 4:00pm.

Metro Nashville & Davidson County
Multi-Hazard Mitigation Planning Team Meeting
November 18TH, 2014 9a-11a

In attendance:

Heidi Mariscal, OEM	Rocky Robinson, PW
Angi Roscoe, OEM	Michael Hunt, MWS
Roger Lindsey, MWS	Tom Palko, MWS
Anna Kuoppamaki, MWS	Cindy Popplewell, AMEC
Jack Baxter, NES	James LaRosa, NWS
Michael Briggs, Planning	Ron Zurawski, TN Geological Survey
Joe Baker, City of Berry Hill	

Absent:

Jim Snyder, MWS	Eddie Andrews, NES
Jennifer Higgs, Planning	Ron Holt, NFD/FMO
Bob Leeman, Planning	Stan Robinson, MWS
Floyd Hyde, MNPD	Dhana Jones, MNPD
Leander Dupie, MNPD	Mike Franklin, NFD
Wade Hill, Codes	Brad Heilwagen, AMEC
Tim Young, PW	Tim Eads, Belle Meade PD
Beth Reardon, City of Belle Meade	Mark Becknal, Goodlettsville FD
Brent Morse, TEMA	Tommy Campsey, City of Oak Hill

Heidi called the meeting to order at 9:10 a.m.

HIRA Update and Consensus

- Still don't have the consequence analysis but DO have the HIRA complete. Going to review the HIRA and vote on the changes.
  - Vote to accept the HIRA with the current updates: 100% approval

Plan Updates

- Main updates still needing:
    - Health – Communicable Diseases
    - Fire – Wildfires and HazMat
- Needed Verification
  - Section 2
    - Planning (Michael Briggs)
      - Physical Land Use: double-check info
      - Verify information that was highlighted in the changes submitted by Planning.
      - Long-term Care information

                - RE: new companies, Heidi sent email to Chris Cotton for verification
                - Need to look at the median household income. Last updated in 2007.
            - Michael Hunt advised Piedmont Gas has done some projects regarding updating their lines. Heidi will contact the Piedmont Gas representative to update.
            - Planning section: there are some things that Heidi still needs to change.
            - OEM (Heidi)
                - Contact Piedmont for updates
                - Make contact for updated companies list in Metrocenter area.
                - Various planning section updates
        - Section 4.0
            - New SBA declarations need to be added. Heidi is contacting SBA for updates
            - TN Geological Survey (Ron Zurawski)
                - Updated information from the Corp of Engineers
            - Metro Water Services (Cindy Popplewell)
                - Currently rewriting the entire Flooding section, including Water-Shed information. Advised the maps are also being updated.
            - OEM (Heidi Mariscal)
                - Man-made hazards
                - Contact Health Department for Communicable Diseases
                - Contact Nashville Fire Department regarding Forest Fires
                - Contact SBA re: declarations
        - Section 4.2
            - Heidi will contact the Assessor's Office for this section, including historic data.
            - Everyone review "Vulnerability of Metro-Nashville for more Probable Disasters" and let Heidi know of any changes.
            - Metro Water Services
                - Check for changes in the drought section regarding the pumping stations. (Michael Hunt)
                - Other needed changes to other water related information in this section. (Cindy Popplewell)
            - Heidi passed around TEMA's HAZUS report on flood.
            - Part of this section will be used in Consequence Analysis
        - Section 4.3
            - Approximately page 4, wants Tom Palko to review flood insurance section.
        - Section 5
            - Update Goal 1-13 for the recommended action & contact Oak Hill (Heidi)
            - MWS needs to review Flooding Hazard under the Other Options section.

<u>Consequence Analysis</u>

- Heidi stated she will be going through and writing the Consequence Analysis.

Deadlines & Meetings

- **Next Committee Planning Meeting:** December 18th, 9 a.m.-11 a.m., at Midtown Police Precinct
- **Public Input Meeting:** January 6th, 4:30 p.m.-6 p.m., at Midtown Police Precinct
- **Final Committee Planning Meeting:** January 8th, 9 a.m.-10 a.m., Midtown Police Precinct
- **Target plan completion date:** January 9th to TEMA

Meeting adjourned @ 10:10 a.m.

Metro Nashville & Davidson County
Multi-Hazard Mitigation Planning Team Meeting
December 18TH, 2014, 9a-10a

In attendance:

Heidi Mariscal, OEM	Rocky Robinson, PW
Angi Roscoe, OEM	Michael Hunt, MWS
Roger Lindsey, MWS	Tom Palko, MWS
Anna Kuoppamaki, MWS	Cindy Popplewell, AMEC
Michael Briggs, Planning	Joe Baker, City of Berry Hill
Tim Eads, Belle Meade PD	

Absent:

Wade Hill, Codes	Jim Snyder, MWS
Eddie Andrews, NES	Jack Baxter, NES
Jennifer Higgs, Planning	Ron Holt, NFD/FMO
Bob Leeman, Planning	Stan Robinson, MWS
Floyd Hyde, MNPD	Dhana Jones, MNPD
Leander Dupie, MNPD	Mike Franklin, NFD
James LaRosa, NWS	Brad Heilwagen, AMEC
Tim Young, PW	Ron Zurawski, TN Geological Survey
Beth Reardon, City of Belle Meade	Mark Becknal, Goodlettsville FD
Brent Morse, TEMA	Tommy Campsey, City of Oak Hill

Heidi called the meeting to order at 9:03 a.m.

I. Introduction
    a. Everything that has been submitted has been updated in the plan.

II. Updates/Changes
    a. Still missing verification on critical facilities in the flood plain.
    b. Assessor's Office still verifying historical data (Section 4-2, p 1-2)
    c. Consequence Analysis
        i. Heidi passed out copies to the committee members for review and discussion. She will have a copy in the FTPS site for further review.
        ii. Severe Weather section: Heidi added the Extreme Temperatures section as this is a higher risk. She divided this section into 3 subsections:
            1. Extreme Temperatures
            2. Thunderstorms/Tornadoes
            3. Winter Storms
                a. Add "may be severe" to the Continuity of Operations & Continued Delivery of Services section.

b. Add "Extreme temperature fluctuations may cause damage to older water mains and could affect water distribution." to Infrastructure, Property & Facilities.

iii. NFD requested to review Hazardous Materials and Wildfires sections.

iv. Heidi will have to make some formatting changes but the information will remain the same.

III. Deadlines/ Meetings

a. **Public Meeting: January 6th, 2015**, 4:30pm-6pm, Midtown Police Precinct

i. Request as many of you be present to address any concerns of the public. Heidi will have a couple copies of the draft plan for public review, but no official presentation will be completed, unless a large crowd shows up.

b. **Final committee meeting: January 8th**, 2015, 9am-10am, Midtown Police Precinct

i. Please be present to give final approval of the plan for submission.

c. **Target plan submittal date: January 9th**, 2015

Meeting adjourned @ 10:00 a.m.

Metro Nashville & Davidson County
Multi-Hazard Mitigation Plan Public Meeting
January 6th, 2015 4:30pm-6pm

In attendance:

Heidi Mariscal, OEM
Michael Hunt, MWS
Roger Lindsey, MWS
Anna Kuoppamaki, MWS
Michael Briggs, Planning
Vincent Higgins, Belle Meade PD
Jack Baxter, NES
Rocky Robinson, PW
Ron Zurawski, TN Geological Survey
Tom Palko, MWS
Cindy Popplewell, AMEC
Joe Baker, City of Berry Hill
Jim Snyder, MWS

Absent:

Wade Hill, Codes
Jennifer Higgs, Planning
Bob Leeman, Planning
Floyd Hyde, MNPD
Leander Dupie, MNPD
James LaRosa, NWS
Tim Young, PW
Mark Becknal, Goodlettsville FD
Tommy Campsey, City of Oak Hill
Eddie Andrews, NES
Ron Holt, NFD/FMO
Stan Robinson, MWS
Dhana Jones, MNPD
Mike Franklin, NFD
Brad Heilwagen, AMEC
Beth Reardon, City of Belle Meade
Brent Morse, TEMA

Heidi called the meeting to order at 4:30 p.m.

Besides 1 family who showed up and asked a question regarding a good location to live regarding crime rates, no other public members attended this meeting.

Meeting adjourned @ 6:00 p.m.

Metro Nashville & Davidson County
Multi-Hazard Mitigation Planning Committee Final Meeting
(via conference call)
January 8th, 2015 9am - 9:15am

In attendance:

Heidi Mariscal, OEM
Michael Hunt, MWS
Anna Kuoppamaki, MWS
Michael Briggs, Planning
Jack Baxter, NES
Floyd Hyde, MNPD
Rocky Robinson, PW
Tom Palko, MWS
Cindy Popplewell, AMEC
Joe Baker, City of Berry Hill
Angela Roscoe, OEM
Tim Eads, Belle Meade PD

Absent:

Wade Hill, Codes
Jennifer Higgs, Planning
Bob Leeman, Planning
Dhana Jones, MNPD
Leander Dupie, MNPD
James LaRosa, NWS
Tim Young, PW
Mark Becknal, Goodlettsville FD
Tommy Campsey, City of Oak Hill
Roger Lindsey, MWS
Eddie Andrews, NES
Ron Holt, NFD/FMO
Stan Robinson, MWS
Jim Snyder, MWS
Mike Franklin, NFD
Brad Heilwagen, AMEC
Beth Reardon, City of Belle Meade
Brent Morse, TEMA
Ron Zurawski, TN Geological Survey

Heidi called the meeting to order at 9:06 a.m.

Everyone has had a chance to review and comment on the Final plan posted on-line; no changes recommended at this time, all have agreed to the final plan being submitted as is.

Annual committee review to be scheduled for October, and annually after. At this committee review meeting the committee will review after actions of incidents, updates for the mitigation actions and any other details of the plan that may need to be reviewed/changed. Written revisions to the plan (and re-submittal) will only take place if significant enough to the plan, otherwise revisions will be noted for next revision cycle.

Heidi will leave plan on website, and once FEMA approves the plan, the committee will be made aware to share with their respective agencies and any others requesting.

Meeting adjourned @ 9:15 a.m.

PUBLIC MEETING ADVERTISEMENTS

Public Notice

Nashville.gov sent this bulletin at 12/05/2014 02:10 PM CST

View Online

Nashville Fire Department
Office Of Emergency Management
2060 15TH AVENUE SOUTH NASHVILLE, TN 37212

FOR IMMEDIATE RELEASE
December 5, 2014

CONTACT: Heidi Mariscal
(615) 880-2990
Heidi.Mariscal@nashville.gov

Public Notice

Metro Holds Multi-Hazard Plan Public Meeting

NASHVILLE, Tenn. – Metropolitan Nashville-Davidson County government is holding a public input meeting for the revision of the Metropolitan Nashville-Davidson County Multi-Hazard Mitigation Plan. The meeting will be held Tuesday January 6th, 2015 from 4:30 p.m. - 5:30 p.m. at the Midtown Hills Police Precinct, located at 1443 12th Avenue South, Nashville, TN.

Hazard mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards. Local and state governments are required to have hazard mitigation plans to remain eligible for certain federal disaster assistance and other funding programs.

A draft copy of Metro's revised Multi-Hazard Mitigation Plan will be available for review at the meeting.

Who:	OEM and Numerous Metro Agencies
What:	Multi-Hazard Mitigation Plan Public Input Mtg
Where:	Midtown Hills Police Precinct 1443 12th Avenue South Nashville, TN
When:	January 6th, 2015 4:30 p.m. - 5:30 p.m.

###

This message was electronically and officially sent from the Office of Emergency Management within the Metropolitan Government of Nashville and Davidson County, Tennessee. (615) 862-8530

Powered by GOVDELIVERY

Figure A-8: Public Meeting Notice sent out (12/5/14)

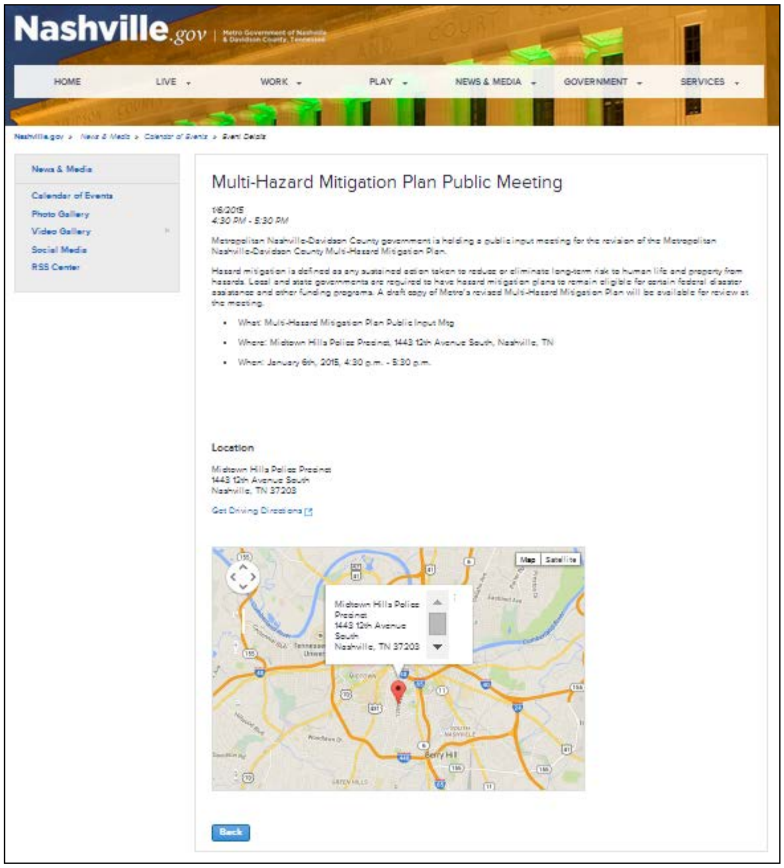

Figure A-9: Public Meeting Calendar Event on Nashville.gov

Figure A-10: Public Meeting Post on OEM Facebook Page

Multi-Hazard Mitigation Plan
Appendix B – Historical Hazard Information

This appendix contains the past occurrences of the following natural hazards identified and investigated in the Metropolitan Nashville-Davidson County area:

- Dam and Levee Failures;
- Flooding;
- Geological Hazards, which includes:
  - Earthquakes, and
  - Landslides and Sinkholes;
- Communicable Diseases;
- Manmade Hazards; and
- Severe Weather, which includes:
  - Droughts / Wildfires;
  - Extreme Temperatures;
  - Thunderstorms / High Winds;
  - Tornadoes; and
  - Winter Storms.

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No.	Location	Historical Event	Source of Information
1	Nashville Eighth Avenue Reservoir Break	11/5/1912	Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1988

Dam Failure-1

FLOODING-1

No.	Location	Historical Event	Time	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
1	Davidson County	July 1780		Flood					Cumberland and Stones Rivers	Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1991
2	Davidson County	25-Dec-1808		Flood					Cumberland River, Newsoms Mill, Davidson County	
3	Nashville	1841		Flood					Cumberland River at Nashville	
4	Nashville	21-Jan-27		Flood	2				The Cumberland River at Nashville crested at a record 56.2' -- 16.2' above flood stage -- in the "Great Flood of 1927." The river swelled to 3 miles wide at one point. Two persons were killed and 10,400 were left homeless. Ryman Auditorium became a shelter. One young man, whose Old Hickory girlfriend lived ½-mile across the river, had to drive 110 miles around the flooded area to get to her. Water reached as far inland as 3rd Avenue. Two steamboats floated onto 1st Avenue. Sixty square blocks were under water. Grocery shopping in some cases was done Venetian style -- by rowboat.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
5	Mill and Sevenmile Creeks	21-Mar-55		Flood					This storm event lasted 24 hours, beginning at 6pm on March 20th, producing approximately 6.5 inches of rain in the upper reach and approximately 4.9 inches in the lower reach. Mill Creek reached a maximum stage of 19.73 feet. The estimated average frequency was 40 years for Mill Creek and 30 years for Sevenmile Creek. An area of approximately 1,300 acres in the base was inundated by the flood event.	Floodplain Management Report; Metro Water Services; October 2002
6	Mill and Sevenmile Creeks	17-Jun-60		Flood					The storm event lasted approximately 6 hours, beginning at 9pm on June 16th. Over 6.7 inches of rain fell on the basin. Mill Creek reached a maximum stage of 19.15 feet. The flood was severe in the upper reaches of Mill Creek while the lower reaches of Mill Creek and Sevenmile Creek experienced only moderate rise.	
7	Nashville	23-Feb-62		Flood					Cumberland River at Nashville	Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1988
	Mill and Sevenmile Creeks	23-Feb-62		Flood					Following a 60-hour period of precipitation, beginning in the afternoon of February 25th, an average of 6 inches of rain fell over the Mill Creek basin. The creek crested on the morning of the 27th at a stage of 18.38 feet.	Floodplain Management Report; Metro Water Services; October 2002
8	Cumberland River	1-May-75		Flood			6.6 million		At Nashville, 6.4 inches of rainfall were recorded in a 3-day period (66 hour). Flood stages above Cumberland River Mile 175 were the highest experienced since large flood control reservoirs were constructed on the Cumberland River and three of its tributaries. The flood caused major damages and many counties in Tennessee and Kentucky were declared disaster areas by Presidential proclamation. The Cumberland River crested at a stage of 47.6 feet, 7.6 feet above the officially designated flood stage. This was the flood of record for the Cumberland River in Metro Nashville under regulated conditions, with an estimated average frequency of 80 years. The river remained above flood stage for over six days and damages in the Metro Nashville amounted to approximately 6.6 million dollars.	
9	Mill and Sevenmile Creeks	4-May-79		Flood					This is the flood of record on Mill Creek. Mill Creek crested at a stage of 23.78 feet at the USGS gage near Antioch. Estimates of the peak discharge on May 4th indicate that 30,100 cfs passed the gage. This is approximately twice the magnitude of the March 1955 event.	
10	Richland and Sugartree Creeks	Sep-79		Flood					Richland and Sugartree Creeks are subject to flooding during the winter or early spring. The flood of record occurred in September 1979; 11.44 inches was recorded.	
11	Nashville	5-May-93	7:15 PM	Flash Flood	0	0	5	0	An animal shelter was flooded. Several roads were flooded as well.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
12	Nashville		1:00 PM	Flash Flood	0	0	5	0	Several roads were closed due to flash flooding.	
13	Nashville	14-May-95	9:00 AM	Flash Flood	0	0	5	0	The New Song Christian Fellowship Church had about two feet of water in their parking lot after a nearby creek flooded.	
14	Nashville	18-May-95	11:26 AM	Flash Flood	0	0	5	0	A few roads had water over them and were closed.	
15	Nashville	8-Aug-95	2:00 PM	Flash Flood	0	0	0	0	Flooding of a few roads reported by local law enforcement.	
16	Nashville	23-Jun-96	7:10 PM	Flash Flood	0	0	0	0	Local law enforcement reported many streets flooded around Nashville.	
17	Nashville	21-Jul-96	9:09 PM	Flash Flood	0	0	0	0	Street flooding, underpasses flooded, 6 feet of water on I-24 at I-24 and I-40 split.	

No.	Location	Historical Event	Time	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
18	Nashville	27-Sep-96	3:55 PM	Flash Flood	0	0	0	0	Police department reported street flooding in northwest Davidson County and the Nashville area.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
19	Nashville	27-Sep-96	6:18 AM	Flash Flood	0	0	0	0	METRO EOC reported numerous flooding problems around the city. There were several road closures, and a few cars were stranded.	
20	Nashville	16-Dec-96	10:45 PM	Flash Flood	0	0	0	0	Sheriff's Office reported two roads closed due to high water in Nashville. They were Harding and Davidson roads.	
21	Nashville	2-Mar-97	5:00 PM	Flood	0	0	0	0	High water over roads in the southern part of the city.	
22	Nashville	5-Mar-97	6:38 AM	Flash Flood	0	0	0	0	Roads were flooded in the downtown area near the Bicentennial Mall. Culverts were full.	
23	Nashville	5-Mar-97	8:16 AM	Urban/sml Stream Fld	0	0	0	0	Street flooding occurred at 10th Circle North in the downtown area.	
24	Nashville	5-Mar-97	8:34 AM	Urban/sml Stream Fld	0	0	0	0	Street flooding at Davidson Road and Harding Road.	
25	Nashville	5-Mar-97	8:45 AM	Urban/sml Stream Fld	0	0	0	0	Street flooding at Tulip Grove Road and Chandler Road.	
26	Nashville	5-Mar-97	8:53 AM	Flash Flood	0	0	0	0	Flooding at junction of Interstate 24 and Interstate 40. Also flooding on I-40 at Charlotte Pike exit.	
27	Nashville	13-Jun-97	11:30 PM	Flash Flood	0	0	0	0	Several roads had high water.	
28	Whites Creek	30-Jun-97	3:50 PM	Flash Flood	0	0	0	0	A creek was out of its banks.	
29	Northeast Davidson County	30-Jun-97	4:00 PM	Flash Flood	0	0	0	0	Many streets were Flooded in northeast Davidson county.	
30	Nashville	28-Jul-97	4:40 PM	Flash Flood	0	0	0	0	Street Flooding citywide. Murfreesboro Road underpass was under water. Riverside Drive also had a lot of standing water.	
31	Nashville	30-Nov-97	3:30 PM	Flash Flood	0	0	50	0	High water over Highways 41 and 31A in the southeast part of town. A number of motorists were stranded in their vehicles and had to be rescued. Doppler radar rainfall estimates were as high as 4 inches per hour during this event.	
32	Hermitage	16-Apr-98	5:25 AM	Flash Flood	0	0	0	0	NWS employee reported Dobson Chappel Road down to one lane due to high water. Culverts were overflowing.	
33	Hermitage	16-Apr-98	6:25 AM	Flash Flood	0	0	0	0	One half foot of water at Lebanon Road and Matterhorn Road.	
34	Joelton	26-May-98	8:04 AM	Flash Flood	0	0	0	0	Car swept off the side of the road on I-24 due to high water.	
35	Southern Davidson County	4-Jun-98	9:00 AM	Flash Flood	0	0	0	0	Water covered the roads in the southern half of Davidson County. Water threatened the Harding Mall and other structures in south and west Nashville.	
	Mill and Sevenmile Creeks	4-Jun-98							Mill Creek near Nolensville flooded June 4th and 5th reaching the year's highest marks on June 4th at 16.23 ft and a peak discharge greater than 10,000 cfs.	Floodplain Management Report; Metro Water Services; October 2002
36	Nashville	5-Jun-98	1:35 AM	Flash Flood	0	0	0	0	Spotter reported flash flooding in the western part of the city. Flash flooding in Brentwood caused damage to 30 homes.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
37	Goodlettsville	10-Jun-98	10:30 AM	Flash Flood	0	0	0	0	Street Flooding was reported by the local EMA.	
38	Nashville	28-Jun-99	4:41 PM	Flash Flood	0	0	0	0	EMA office reported flooding at several major intersections such as Union and Larksburg, Myatt Drive and Gallatin Pike, and Dickerson Pike & Alhambre.	
39	Nashville	24-May-00	11:05 PM	Flash Flood	0	0	0	0	Three feet of water on Nolensville Road. The road closed after cars were swept away at 2305 CST. Flooding occurred at Sevenmile Creek near the Harding Mall at 0120 CST. Also, water was getting into homes on Whiteman Road in the southern part of the county.	
40	Nashville	16-Feb-01	5:00 PM	Flood	0	0	0	0	EMA reported that several roads were flooded and closed in Davidson county such as Newsom Station and Merrymount, Bluff Road and Nolensville Road.	
41	Belle Meade	16-Feb-01	9:50 AM	Flood	0	0	0	0	Highway 100 flooded at Warner Park.	
42	Nashville	12-Aug-01	1:15 PM	Flash Flood	0	0	0	0	House flooding at the intersection of Hillsboro Road and the eastern part of Overhill Drive. Standing water of about 1/2 to one foot in these homes.	

No.	Location	Historical Event	Time	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
43	Nashville	12-Aug-01	1:15 PM	Flash Flood	0	0	0	0	Two roads were covered with water and were impassable.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
44	Nashville	12-Aug-01	1:45 PM	Flash Flood	0	0	0	0	Flooding reported along Brown's Creek near Lipscomb University.	
45	Nashville	12-Aug-01	1:55 PM	Flash Flood	0	0	0	0	Street Flooding off Harding Place.	
46	Nashville	29-Nov-01	2:55 PM	Flash Flood	0	0	0	0	OEM reported Whites Creek was over its banks and was affecting several backyards of residences. Also, Sevenmile Creek overflowed its banks and spilled into many backyards.	
47	Nashville	24-Jan-02	6:20 AM	Flash Flood	0	0	0	0	EMA reported several intersections were flooded in Nashville. Seventeen counties in Tennessee requested federal assistance due to the flooding. The counties are: Anderson, Bedford, Cannon, Coffee, Cumberland, Fentress, Giles, Hardin, Jackson, Lawrence, Lewis, Lincoln, McNairy, Maury, Putnam, Warren and Wayne. Doppler radar estimated as much as 6 to 8 inches of rain fell over the southern part of Middle Tennessee during this flood event.	
48	Nashville	24-Jan-02		Flood	6	11	$2 million		Three-day flooding event across Middle Tennessee ended, with flooding reported in 39 of the mid state's 42 counties. Two persons were killed in Cookeville on the 23rd during a rescue attempt. In Bedford County, a couple and their son were killed when their car was swept into Carr Creek during the evening of the 24th. A woman was killed at the Cedars of Lebanon State Park in Wilson County when she was swept away in a flooded creek. Overall, 6 people were killed, with another 11 injuries. A total of 97 homes were damaged, along with 37 businesses, and at least 34 bridges. Some 40 roads were damaged in Lawrence County alone. There were also numerous school and road closings, and 180 people were evacuated from their homes, and 46 of them placed in shelters. Rainfall totals during the three days were topped off by Wartrace, which measured 9.25". Flooding also occured along many rivers, the Duck River at Columbia crested more than 13 feet above flood stage. Damage was estimated at $2 million.	
49	Nashville	17-Mar-02	6:00 PM	Flash Flood	0	0	0	0	Spotter reported Hadley Drive in Old Hickory was flooded. Also, Central Pike had 1 to 2 feet of water near the Davidson County and Wilson County line. By 7:55 PM, there was 3-4 feet of water near the fairgrounds. Two cars were stranded on Nolensville Road.	
50	Nashville	13-May-02	4:25 AM	Flash Flood	0	0	0	0	EMA reported flooding at 703 Murfreesboro Rd., in front of the Alladin plant. A few cars stalled out.	
51	Nashville	6-Jun-02	3:00 AM	Flash Flood	0	0	0	0	Several roads closed in Nashville due to high water.	
52	Davidson County	12-Jul-02	2:20 PM	Flash Flood	0	0	0	0	EMA and SKYWARN spotters reported flooding on Brown's Creek, Leelan Lane, Granny White Pike, Woodvale Drive, Green Hills and Forest Hills area. By 240 PM CST, Otter Creek Road was closed due to high water. By 308 PM CST, Brown's Creek was out of its banks at the fairgrounds.	
53	Nashville	5-May-03		Flash Flood/Tornado					Two waves of severe weather droped a total of 12 twisters across Middle Tennessee during the late evening and early morning, then from late morning through early afternoon. Two persons were injured in Lincoln County. Baseball-size hail was reported in Lutts (Wayne County). In addition, widespread flash flooding occured as a result of excessive rainfall. Nashville measured 4.63" of rain, which established a new one-day record for May. This was also the 5th largest tornado outbreak in mid state history.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
54	Nashville	5-May-03	3:15 AM	Flash Flood	0	0	0	0	Spotter reported flooding at Edmonson Pike and Blackman St. There was 6 feet of water over roads and some homes were flooded. The White House granted Governor Phil Bredesen's request for Presidential Disaster Declaration for 20 counties in West and Middle Tennessee for damage as a result of tornadoes, flooding and severe thunderstorms which began on Sunday , May 4, 2003.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
55	Davidson County	7-May-03	12:00 AM	Flash Flood	0	0	0	0	EMA reported Mill Creek, Sevenmile Creek and Richland Creek out of their banks. The White House granted Governor Phil Bredesen's request for Presidential Disaster Declaration for 20 counties in West and Middle Tennessee for damage as a result of tornadoes, flooding and severe thunderstorms which began on Sunday, May 4, 2003.	

No.	Location	Historical Event	Time	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
56	Inglewood	31-Jul-03	11:28 PM	Flash Flood	0	0	10	0	Several homes were flooded with 3 feet of water in them along Gallatin Pike. The flash flood event ended on August 1, 0100 CST.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
57	Inglewood	1-Aug-03	12:00 AM	Flash Flood	0	0	10	0	Several homes were flooded with 3 feet of water in them along Gallatin Pike. The flash flood event started on July 31, 2328 CST and ended on August 1, 0100 CST.	
58	Nashville	30-Aug-03	5:40 PM	Flash Flood	0	0	0	0	Spotter reported street flooding near Vanderbilt Hospital.	
59	Nashville	30-Aug-03	6:30 PM	Flash Flood	0	0	1	0	Davidson County OEM reported heavy rains in East Nashville caused 4 to 5 inches of water to get into a home on Joseph Avenue.	
60	Davidson County	5-Feb-04	10:00 AM	Flood	0	0	88	0	Mill Creek was 6 feet over its banks at the intersection of Thompson Lane and Glen Rose at 1019 AM CST in Davidson County. Stewarts Ferry Pike was flooded and impassable around 11 PM CST.	
61	Nashville	30-May-04	10:50 PM	Flash Flood	0	0	1	0	Numerous flooding at Harding Place and Bellmeade Rd.	
62	Nashville	5-Aug-04	5:30 AM	Flash Flood	0	0	1	0	Flooding was occurring on some streets in Nashville according to station WKRN-TV 2. Portions of I-440 was flooded in the western part of the city.	
63	Nashville	2-Sep-04	6:30 PM	Flash Flood	0	0	1	0	NWS employee reported street flooding near the intersection of Old Hicklory Boulevard and Merritt Street in the Old Hickory area of Davidson County.	
64	Nashville	18-Oct-04	10:54 PM	Flash Flood	0	0	1	0	Major flooding on U.S. Highway 70 South and Old Harding Rd.	
65	Nashville	19-Oct-04	1:11 AM	Flash Flood	0	0	1	0	Harding and Hillwood Road flooded	
66	Nashville	19-Oct-04	1:12 AM	Flash Flood	0	0	5	0	Vehicles trapped in flooded road at Edmonson Pike and Blackman Rd.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
67	Nashville	19-Oct-04	1:36 AM	Flash Flood	0	0	5	0	Mill Creek was out of its banks and into nearby homes.	
68	Nashville	30-Nov-04	12:55 PM	Flash Flood	0	0	1	0	Davidson County OEM reported the intersection of Bell Road and Smith Springs Road was impassable due to high water in the Antioch section of Nashville. Also...the intersection of Nolensville Road and Culbertson Road had high water.	
69	Nashville	7-Dec-04	5:00 AM	Flash Flood	0	0	1	0	Davidson County OEM reported Mill Creek was out of its banks. Low spots on Nolensville Road were flooded in South Nashville. Other roads were flooded as well in the county.	
70	Nashville	27-Jun-05	4:55 PM	Flash Flood	0	0	1	0	Street flooding reported at Eight Avenue and Lafayette Streets.	
71	Goodlettsville	22-Jan-06	9:30 PM	Flash Flood	0	0	1	0	Low water bridge at Hix Road was covered with water.	
72	Hermitage	31-May-06	4:50 PM	Flash Flood	0	0	1	0	I-40 westbound lanes in Hermitage was flooded over.	
73	Davidson County	4-Aug-06	3:05 PM	Flash Flood	0	0	1	0	Roads were flooded in the Mill Creek area in Davidson County. Nolensville Road flooded as well from southern Davidson County into Williamson County.	
74	Nashville	2-Apr-09	15:07 PM	Flash Flood	0	0	5	0	Flash flooding reported near Centennial Park with water over wheel wells of cars. Newspaper also reported that manhole covers popped off because of the force of water and police closed a few streets because of flooding in the surrounding areas.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
75	Donelson	2-Apr-09	16:00 PM	Flash Flood	0	0	5	0	Street flash flooding was reported in Donelson.	
76	Goodlettsville	9-May-09	4:00 AM	Flash Flood	0	0	100	0	Several people were rescued from their homes.	
77	Walnut Grove	1-May-10	1045 AM	Flash Flood	1	0	25000	0	Dozens of cars and trucks were trapped by flash flooding along Mill Creek near the Bell Rd. exit on I-24. A portable classroom trailer from a school half a mile away floated to the Interstate and was destroyed as it was sucked into a culvert. A 21 year old man was killed attempting to cross water in the Bell Rd. area	NWS-Nashville Office
78	Davidson County	1-May-10	1045 AM	Flood	10	0	1500000	1	At U.S. Highway 431 near the Robertson/Davidson County Line at Sycamore Creek, water was overflowing its banks, resulting in flooding of low lying areas. At least one home and farm was reported to be covered with flood waters. At the time of this report, U.S. Highway 431 was still	
79	Joelton	14-May-10	1230 PM	Flash Flood	0	0	10	1	Elaines Salon in Joelton reported about a foot of water standing in their parking lot.	

FLOODING-4

No.	Location	Historical Event	Time	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
80	Goodlettsville	14-May-10	1254 PM	Flash Flood	0	0	25	1	Goodletsville Police reported that the I-65 Ramp at Long Hollow Pike was flooded and blocked off.	NWS-Nashville Office
81	Antioch	14-May-10	254 PM	Flash Flood	0	0	25	1	Sheriff's Office reported that Interstate 24 at Exit 57 was flooded with 8 inches of water on the road.	
82	Glencliff	24-Feb-11	1250 PM	Flash Flood	0	0	1	0	Spotter reported Murfreesboro Road flooded between Kermit Drive and Thompson Lane. Water was deep enough to cause some larger trucks problems while driving through this area.	
83	Richland	28-Feb-11	825 AM	Flash Flood	0	0	1	1	Road was flooded and impassible at the intersection of Charlotte Pike and American Road.	
84	Providence	27-Apr-11	404 PM	Flash Flood	0	0	1	0	Flooding was occurring at the intersection of Citrus and Tampa Drives.	
85	Davidson County	11-Jan-12	600 AM	Flash Flood	0	0	1	1	Numerous reports of minor flooding of secondary roads were reported across the county.	
86	Woodbine	4-Apr-12	315 PM	Flood	0	0	0	0	Street flooding was reported on East Thompson Lane at Murfreesboro Road with the roadway becoming impassable.	
87	Donelson	14-Jul-12	1100 AM	Flash Flood	0	0	1	1	Water over roadway near the intersection of McCampbell Avenue and Stewarts Ferry Pike.	
88	Hermitage	14-Jul-12	1126 AM	Flash Flood	0	0	1	1	Water was over the roadway near the intersection of Tulip Grove Road and Central Pike.	
89	Linton	5-Sep-12	542 PM	Flash Flood	0	0	1	1	Some roads in this area were flooded due to a few creeks overflowing their banks and causing overflow onto county roadways. 2.4 inches of rainfall was measured near McCrory Lane in Bellevue.	
90	Antioch	27-Apr-13	1130 AM	Flash Flood	0	0	10	0	Considerable flooding affected the Antioch area of southeast Davidson County on Saturday afternoon April 27 after radar estimates indicated 2 to 3 inches of rain had fallen since midnight. Locations along Mill Creek saw the most substantial flooding, such as Culbertson Road which was impassable due to high water, the Lighthouse Christian Ball Park along Blue Hole Road at I-24, and the old Family Fun Center on Bell Road at I-24.	
91	Forest Grove	27-Apr-13	1000 PM	Flash Flood	0	0	100	0	Moderate rainfall of 1 to 2 inches during the morning of April 27 was followed by heavy thunderstorms that produced an additional 2 to 4 inches of rainfall during the evening and into the early morning hours on April 28. The result was widespread flash flooding of roadways and a few homes across Davidson County, with numerous water rescues from people trapped in vehicles. Several homes flooded along Dry Creek in Goodlettsville on Jannett Avenue at Monticello Avenue. Roadways that were flooded included Bear Hollow Road, Porter Road, Riverside Drive, and Eatons Creek Road near Old Hickory Boulevard.	
92	Newsome	28-Apr-13	200 AM	Flood	0	0	0	0	The parking lot of the Harpeth Valley Golf Center on Old Hickory Pike in Bellevue was covered by one and a half feet of flood waters from the Harpeth River.	
93	Goodlettsville	17-Jun-13	330 PM	Flood	0	0	0	0	Trained spotters reported water from Dry Creek covered Dickerson Pike, Old Dickerson Pike, and Dry Creek Road in Goodlettsville.	
94	Bakers	3-Jul-13	1022 PM	Flash Flood	0	0	1	0	The Davidson County Emergency Manager reported flash flooding of Mansker Creek over Tinnin Road. Also, a trained spotter reported minor flooding of a home on Old Springfield Pike just west of Millersville in Davidson County. The flooding was due to Bakers Fork overflowing its banks.	
95	Linton	5-Jul-13	120 PM	Flash Flood	0	0	5	0	The 1100 block of Murfreesboro Road was reported impassable due to high water. A Local Broadcast Media outlet reported 12 to 16 inches of water over the intersection of Charlotte Ave and American Road. A report of water flowing across Regent Drive near the Hogan Road intersection in Crieve Hall and a report of water rising into yards of homes near the intersection of West Meade and Brownlee Roads was received via Twitter.	
96	Nashville	10-Jul-13	555 PM	Flash Flood	0	0	0	0	The intersection of McGavock Pike and Elm Hill Pike was reported to have 7 to 8 inches of water standing over the roadway. Also, water was flowing over roadways near The Pharmacy in East Nashville located at the intersection of McFerrin Ave and West Eastland Ave.	
97	Scottsboro - North Nashville	8-Aug-13	405 AM	Flash Flood	0	0	50,000	0	More than 100 homes and businesses were damaged and a couple homes destroyed by significant flash flooding across metro Nashville. There were dozens of water rescues across the city, including along Interstate 24 and Briley Parkway where several motorists had to be rescued. All told, Nashville OEM responded to over 200 calls for help from residents.	
98	Woodbine	6-Jun-14	730 PM	Flash Flood	0	0	10	0	Murfreesboro Road was closed at Thompson Lane due to water covering the road. Three vehicles were stranded and stalled in the flood waters.	

FLOODING-5

EARTHQUAKES-1

No.	Date	Richter Magnitude	Associated Fault	Comment	Source of Information
1	16-Dec-1811 (2) 23-Jan-1812 7-Feb-1812	XII, 8	New Madrid	The three great earthquakes that occurred in the Upper Mississippi region near New Madrid in 1811 - 1812 rank among the most significant events in U.S. history. Maximum intensity for each of the large shocks is estimated at XII. Topographic changes were noted over an area of 75,000 to 130,000 square kilometers; the total area shaken was at least 5 million square kilometers. Damage was very small for such great earthquakes because of sparse population. Chimneys were knocked down in many places in Tennessee, Kentucky, and Missouri. The most seriously affected area was characterized by raised and sunken lands, fissures, sinks, sand blows, and large landslides. The most typical sunken land is Reelfoot Lake in Tennessee. This lake is from 12 to 16 kilometers in length and from 3 to 5 kilometers in width. The depth ranges from 1.5 to perhaps 6 meters, although greater depths have been reported.	
2	January 4, 1843	VII	New Madrid	On January 4, 1843, a severe earthquake (intensity VIII) affected Memphis and other places in western Tennessee. The shock was reported to have lasted 2 minutes, though this is probably exaggerated. Walls were cracked, chimneys fell, and windows were broken. The total felt affected was about 1 million square kilometers. The shock was strongly felt in Knoxville and caused considerable alarm but did no damage. It was also sharply felt in Nashville.	
3	March 28, 1913	VII	Southern Appalachian	A strong shock centered at Knoxville on March 28, 1913 was felt over an area of 7,000 square kilometers in eastern Tennessee. Two shocks were felt in many places. Movable objects were overthrown, and bricks fell from chimneys (VII). A number of false alarms were set off at fire stations. Buildings throughout the city shook violently. The Knox County Courthouse, a massive brick structure, trembled noticeably. People outdoors experienced a distinct rise and fall in the ground; there were some cases of nausea.	
4	May 7, 1927	VII	New Madrid	Another earthquake in the Mississippi Valley region caused damage in Tennessee and Arkansas on May 7, 1927. It was strongest at Jonesboro, Arkansas, where some chimneys fell (VII). However, the felt area indicated that the epicenter was farther to the east, in Tennessee. Damage there was limited to the shattering of window panes and breaking of dishes in the Memphis area. Many people were awakened by the early morning (2:28 AM) rapid rocking motion; in addition, surface and subterranean sounds were heard. The shock was also felt in parts of Alabama, Illinois, Kentucky, Mississippi, and Missouri, an area of about 337,000 square kilometers.	Earthquake Information Bulletin, Volume 9, Number 2, March - April 1977.
5	November 16, 1941	V-VI	New Madrid	A sizable area in western Tennessee was affected by a fairly strong earthquake centered near Covington on November 16, 1941. Cracks appeared in the courthouse at Covington, where the tremor was noticed by everyone (V-VI). At Henning, it was felt by many, and an explosive noise preceded the trembling. The shock was also felt at Dyersburg, Frayser, Memphis, Millington, Pleasant Hill, and Ripley.	
6	July 16, 1952	VI	New Madrid	Dyersburg was the center of another disturbance on July 16, 1952. The press reported numerous cracks in a concrete-block structure. The earthquake was felt by nearly all, and many persons were frightened (VI). It was also felt at Finley and Jenkinsville. A weak aftershock was felt by a few people.	
7	January 25, 1955	VI	New Madrid	An earthquake centered near the Arkansas - Tennessee border (near Finley) awakened many residents on January 25, 1955. The 1:24 AM shock broke windows and damaged plaster walls at Finley, where it was felt by all (VI). The total felt area, including points in Illinois and Kentucky, covered about 75,000 square kilometers.	
8	March 29, 1955	VI	New Madrid	An early morning shock (3:52 AM) on March 29, 1955, was felt by everyone in Finley (VI). Plaster was cracked in one home. A roaring noise and violent shaking were reported. The tremor was felt by many as far away as Caruthersville, Missouri.	
9	January 28, 1956	VI	New Madrid	Minor damage occurred at Covington from a January 28, 1956, earthquake. Chimneys and walls were cracked (VI). Many were awakened at Covington, and the press reported some residents left their homes at Henning. The shock was also felt in Arkansas and Missouri.	
10	September 7, 1956		New Madrid	Two tremors about 13 minutes apart were felt over a broad area of eastern Tennessee and adjoining parts of Kentucky, North Carolina, and Virginia on September 7, 1956. At Knoxville, both shocks were felt by nearly all, many of whom were alarmed (VI). Windowpanes shattered, dishes broke, objects were shaken from shelves, pictures fell, and some plaster was knocked from walls. The total felt area covered approximately 21,500 square kilometers.	
11	October 30, 1973	V, 3.4	Southern Appalachian	An earthquake sequence consisting of one foreshock, a magnitude 4.6 main shock, and more than 30 aftershocks occurred south of Knoxville during the latter part of 1973. The foreshock, magnitude 3.4, on October 30, was felt over an area of 2,100 square kilometers, with a maximum intensity of V. The main shock cause minor damage (VI) in several towns in eastern Tennessee, Georgia, Kentucky, and North Carolina. Minor cracks in walls at the University of Tennessee Hospital at Knoxville were reported. Minor damage to walls, windows, and chimneys occurred in the Maryville - Alcoa area. The shock disrupted relay contacts at the Alcoa switching station, causing a temporary loss of power. The total felt area, including parts of South Carolina, Virginia, and West Virginia, as well as the region mentioned above, covered about 65,000 square kilometers. A network of eight portable seismographs was installed in the main epicentral area. This network was operational from December 2 through December 12 and recorded 30 small magnitude aftershocks. Additional aftershocks were reported felt on December 13, 14, and 21.	Earthquake Information Bulletin, Volume 9, Number 2, March - April 1977.
12	1975-2009		New Madrid	Since 1974, There have been 79 earthquakes over 3.0, with the largest earthquake of 5.0 in 1976.	http://folkworm.ceri.memphis.edu/catalogs/scratch/cat_s_5517

No.	Historical Event	Width (ft)	Length (ft)	Relief (ft)	Scarp (ft)	Material	Probable Cause	Damage	Comment	Source of Information
		138	125	38	7	colluvium		minor		
		205	155	58	24	colluvium		minor		
		240	53	28	14	colluvium		minor		
		262	111	34	3	colluvium		moderate		
		88	75	48	10	colluvium; bedrock		minor	joint set parallel to axis of movement	
		220	95	42	3	colluvium; roadfill		moderate		
1	Winter 1975	162	105	47	9	colluvium	oversteepening of slope, excessive rain	minor		Landslides in the Nashville, Tennessee Area - Winter 1975 Environmental Geology Series No. 3 State of Tennessee; Department of Conservation; Division of Geology; Robert Miller and John Wiethe; 1975.
		132	170	54	4	colluvium				
		220	115	40	7	colluvium		moderate		
		155	100	44	3	colluvium		minor		
		154	167	45	6	colluvium		major		
		138	110	26	3	residuum (Hermitage)				
			240	50	0	colluvium		major	translational movement	
		110	110	28	3	colluvium				
						Deeply weathered limestone	Heavy rains	Closed U.S. 70		
						Colluvium	Construction, heavy rains	Ruined lawn		
						Colluvium	Construction, heavy rains	Ruined lawn		
						Colluvium	Construction, heavy rains	Ruined lawns	Same location as 2a and 2b from Winter 1975 study	
						Colluvium and weathered bedrock	Undercutting of hillside for fill material			
2	Bellevue 1979					Fill, colluvium, residuum	Construction loading, slope steepening	Failure of road during construction, later blockage		
						Colluvium	Slope steepening, heavy rains	Foundation, retaining wall, driveway	Same location as 3 from Winter 1975 study	
						Fill composed of colluvium	Steepness of fill, heavy rains	Roadway cracked		
						Colluvium	Notching of hill, heavy rains	Retaining wall, driveway	Same location as 1 from Winter 1975 study	

LANDSLIDES-1

No.	Historical Event	Width (ft)	Length (ft)	Relief (ft)	Scarp (ft)	Material	Location	Damage	Comment	Source of Information
3	May Flood 2010						225 Ash Grove		Back of house on slope falling away from road.	Metro Planning-GIS
							5421 Ashlawn Dr		Back of house on slope falling away from road.	
							5425 Ashlawn Dr		Back of house on slope falling away from road.	
							5413 Ashlawn Dr		Back of house on slope falling away from road. Per Codes: Issues have existed for several years.	
							5405 Ashlawn Dr		Back of house on slope falling away from road.	
							223 Ash Grove		Back of house on slope falling away from road.	
							5409 Ashlawn Dr		Back of house on slope falling away from road. Per Codes: Issues have existed for several years.	
							305 Forrest Valley Dr		Steep slope rising behind house	
							1016 Shadow Lane			
							2619 Highview Dr.		Reported by Mr. Gordon; probably not on his property	
							1014 Shadow Lane, 37206.		All down low	
							2271 Luster Rd.			
							5830 Lickton Pike			
							2474 Clay Lick Rd.			
							2331 Luster Rd.			
							2608 Crocker Springs Rd.			
							Across from 2301 Luster Rd.			
							3743 Knight Dr.			
							3748 Moss Rose		Not a landslide; bank behind house collapsed from flood water erosion	
							320 Woodberry Dr		Sinkhole	
							5849 Fredricksburg Dr			
							1316 Beddington Park			
							5609 Skymont Dr			
							1404 Beddington			
							5 St. James			
							1209 Cliftee Drive			
							4378 Chickering Lane			
							5320 Stanford Dr			
							1239 Saxon Drive 37215			
							1239 Saxon Dr			
							1237 Cliftee Dr			
							1916 Cromwell			
							5337 S. Stanford			
							1528 Dresden Circle			
							1712 Tyne Blvd			
							4354 Chickering Ln			
							5335 Stuart Glen			
							1311 Saxon Dr			
							5424 Forest Acres Dr			
							2133 Chickering Lane			
							412 Oakleigh Hill			
							1765 Tyne Blvd			
							1220 Taggartwood Rd			

No.	Historical Event	Width (ft)	Length (ft)	Relief (ft)	Scarp (ft)	Material	Location	Damage	Comment	Source of Information
3 cont'	May Flood 2010						1766 Tyne Blvd			Metro Planning-GIS
							1829 Tyne Blvd			
							5 Agincourt Way			
							1205 Cliftee Dr			
							1119 Chickering Park			
							5165 Granny White Pike			
							1540 Old Hickory Blvd			
							1147 Crater Hill Dr			
							4713 Stuart Glen			
							5527 Stanford Dr			
							1244 Cliftee Dr			
							5815 Still Hollow Rd			
							1700 Tyne Blvd			
							5200 Stanford Dr			
							1436 Old Hickory Blvd.			
							1241 Cliftee Dr.			
							1247 Saxon Dr. 37215			
							1247 Saxon Dr			
							1952 Edenbridge Way 37215			
							1084 Lynnwood Blvd			
							2201 Chickering Ln			
							1109 Chateau Ln			
							6005 Andover Dr			
							2112 Piccadilly Pl			
							1159 Crater Hill Dr			
							1630 Chickering Rd			
							5420 Stanford			
							1617 Tynewood			
							1251 Saxon Dr			
							1324 Beddington Park			
							1107 Park Ridge Dr			
							844 Forest Hills Dr			
							1912 Cromwell Dr			
							1502 Chickering			
							5541 South Stanford			
							1600 Chickering Rd			
							1137 Balbade Dr			
							One Club Dr			
							4717 Stuart Glen			
							1243 Saxon Dr			
							1117 Park Ridge Dr			
							1229 Cliftee Dr.			
							1221 Cliftee Dr.			
							1235 Saxon Dr			
							4333 Chickering Ln			
							1301 Saxon Dr			
							1766 Tyne Blvd			
							4375 Chickering Ln			
							1210 Cliftee Dr			
							1155 Crater Hill Dr			
							2201 Chickering Ln			
							5426 Stanford			
							5996 Andover Drive 37215			
							2227 Chickering Ln 37215			

No.	Historical Event	Width (ft)	Length (ft)	Relief (ft)	Scarp (ft)	Material	Location	Damage	Comment	Source of Information
3 cont'	May Flood 2010						1249 Saxon Drive 37215			Metro Planning-GIS
							5849 Beauregard Drive			
							1255 Saxon Dr			
							906 Travelers Ct 37220			
							844 Lakemont Dr			
							5509 Hillview Dr			
							1417 Calloway Court 37221			
							108 River Court (also ref. to include 106 River Court) 37211			
							1084 First Ave. North			
							209 Still Spring Hollow Ct 37221			
							521 Holt Valley Rd			
							525 Holt Valley Rd			
							517 Holt Valley Rd			
							5360 Village Way			
							5280 Village Trace			
							6500 Cornwall Dr			
							6569 Rolling Fork Dr			
							6700 Rodney Ct			
							6615 Ormond Dr			
							6505 Cornwall Dr			
							6558 Rolling Fork Dr			
							155 Carnavon Parkway			
4	4/25/2013						301 McGavock Pike	Sinkhole	side of road, but within roadway	Metro Public Works
5	2/20/2014						444 Hicks	Sinkhole	middle of two lane road. Anticipated to be due to drain pipe collapse	Metro Public Works
6	5/13/2014						5th Ave South/Korean Vets Blvd	Sinkhole	middle of two lane road.	

COMMUNICABLE DISEASES-1

	Location	Year	Type of Infestation/Disease	Comment	Source of Information
1	Statewide	1832-33	Cholera Epidemic		Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1994
2	Statewide	1916	Polio Epidemic		
3	Statewide	fall 1918	Influenza	Statewide pandemic	
4	Statewide	1923	Measles	High incidence across state	
5	Statewide		Influenza	Heavy outbreak	
6	Statewide	1930-31	Meningitis	State-wide very high incidence	
7	Statewide	1943	Measles		
8	Statewide	1936	Meningitis		
9	Statewide	Sum-Fall 1936	Polio Epidemic		
10	Statewide	1939	Typhus Fever	Rat-flea borne epidemic in Nashville	
11	Statewide	1941	Whooping Cough	High incidence across state	
12	Statewide	Sum-Fall 1941	Polio Epidemic	Primarily in Davidson, Franklin, Hamilton, and Sumner counties along main highway routes	
13	Statewide	1941-43	Measles		
14	Statewide	1943	Whooping Cough		
15	Statewide	1943	Meningitis		
16	Statewide	1945-56	Polio Epidemic		
17	Statewide	1945	Diptheria Epidemic		
18	Statewide	1957	Influenza		
19	Statewide	1960-61	Hepatitis Epidemic		
20	Knox and Davidson counties (greatest number of cases in state history)	1962-63	Type E Botulism		
21	Worldwide	2009	H1N1 Influenza	health.state.tn.us/Ceds/WebAim/interactive.htm	TN Dept of Health

No.	Location	Historical Event	Type	Comment	Source of Information
1	Davidson County	1950 - 2003	Drought	No drought event(s) were reported in Davidson County, Tennessee between 01/01/1950 and 09/30/2003.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
2	Statewide	1797	Drought		
3	Statewide	1819	Drought		
4	Statewide	1830	Drought		
5	Statewide	1853-54	Drought		
6	Statewide	1877-78	Drought		
7	Statewide	1887	Drought		
8	Statewide	1894-96	Drought		
9	Statewide	1913-14	Drought		
10	Statewide	1925-26	Drought		
11	Statewide	1930-1931	Drought		
12	Statewide	1940-42	Drought		
13	Statewide		Drought		
14	Statewide	1966-1967	Drought		
15	Statewide	1969-1971	Drought		
16	Statewide	1980-1981	Drought		
17	Statewide	1985-1988	Drought		
18	Statewide	2007-2009	Drought	At the height of the drought in October of 2007, just about all of the state was classified as at least D3 - Extreme Drought, with about 71% classified as D4 - Exceptional Drought. Davidson County was in an Exceptional Drought in September and October of 2007.	
19	Statewide	2012	Drought	Drought conditions developed in April 2012, but intensified in late June and early July with D2 - Severe Drought affecting the county. D1 - Moderate Drought continued to affect the area until early August, when conditions improved to D0 - Abnormally Dry. Davidson County remained in this category until the early fall.	Nashville NWS

DROUGHT-1

No.	Location	Year	Historical Event	Source of Information
1	East Nashville	1922	Urban Fire	Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1988
2	Statewide	1925	Forest Fires	
3	Statewide	1935	Forest Fires	
4	Statewide	1987	Forest Fires	
5	Statewide	1987	"Since 1960, the worst year for Tennessee wildfires was 1987 when 5,478 fires burned 112,000 acres."	The Oak Ridger newspaper http://www.oakridger.com/stories/092199/com_0921990036.html
6	Statewide	1995	1 fire, 0.5 acres 2 prescribed fires, 120 acres	U.S. Fish and Wildlife Service http://fire.fws.gov/fm/stats/stats.htm
7	Statewide	1996	3 fires, 4.3 acres 3 prescribed fires, 130.1 acres	
8	Statewide	1997	3 fires, 2.5 acres 1 prescribed fire, 7.5 acres	
9	Statewide	1998	4 fires, 55.1 acres 1 prescribed fire, 49.8 acres	
10	Statewide	1999	4 fires, 55.1 acres 0 prescribed fires, 0 acres	
11	Statewide	1999	September - "Forestry officials have said the state could be headed for its worst wildfire season in more than a decade. So far this year, more than 2,100 fires have burned 25,000 acres. The state has 13 million acres of forests."	The Oak Ridger newspaper http://www.oakridger.com/stories/092199/com_0921990036.html
12	Statewide	2000	5 fires, 49 acres 0 prescribed fires, 0 acres	U.S. Fish and Wildlife Service http://fire.fws.gov/fm/stats/stats.htm
13	Statewide		1 fire, 6 acres Prescribed fires not listed for Tennessee	
14	Statewide	2001	November -"Since the end of October, 520 fires -- most set intentionally -- have burned 29,000 acres across the state. The largest fire in the state was a 4,000-acre blaze between Nashville and Knoxville. Womack said crews were having a hard time because of the rugged terrain and remote area. No homes were in immediate danger." One fire, six acres. Prescribed fires not listed for Tennessee.	USA Today paper - November 16, 2001http://www.usatoday.com/weather/news/2001/2001-11-16-southern-wildfires.htm
15	Statewide	2001	November - "The 37,000 acres were burned by about 800 fires, Bible said. He said officials suspect as many as 80 percent of those were arson. So far this year 2,600 fires have burned about 63,000 acres of Tennessee, Bible said. One state firefighter was killed, two others injured and at least four homes destroyed."	The Oak Ridger newspaper http://www.oakridger.com/stories/112701/stt_1127010029.html
16	Statewide	2003	1089 fires, 7110 acres burned	Tennessee Department of Agriculture http://www.state.tn.us/agriculture/forestry/fires/statistics.html
17	Statewide	2004	1565 fires, 14,513 acres burned	TN Dept of Agricutlture, Division of Forestry, http://burnsafetn.org/pdfs/summary.pdf
18	Statewide	2005	2,073 fires, 24,744 acres burned	
19	Statewide	2006	2,198 fires, 30,800 acres burned	
20	Statewide	2007	3,000 fires, 44,126 acres burned	

WILDFIRES-1

No.	Location	Year	Historical Event	Source of Information
21	Statewide	2008	1,290 fires, 18,068 acres burned	TN Dept of Agricutlture, Division of Forestry, http://burnsafetn.org/pdfs/summary.pdf
22			Federal funds have been made available by the Federal Emergency Management Agency (FEMA) to help Tennessee fight uncontrolled wildfires that pose a threat to populated areas in the counties of Anderson and Sevier. The states request for federal fire suppression aid was approved when it was reported that the Knoxville Fire Complex, consisting of 136 fires, was endangering 200 homes in Sevier County and another 100 in Anderson County. At the time of the request, the fires had consumed 8,800 acres of land and were forcing the evacuation of residents in the city of Pigeon Forge	Regulatory Intelligence Data - November 3, 2000 http://www.highbeam.com/library/doc0.asp?docid=1P1:37954085&refid=ink_key
23	Statewide	2009	1,218 fires, 15,558 acres burned	Tennessee Department of Agriculture http://www.state.tn.us/agriculture/forestry/fires/statistics.html
24	Statewide	2010	1,671 fires, 20,322 acres burned	
25	Statewide	2011	1,039 fires, 13,326 acres burned	Tennessee Department of Agriculture http://www.state.tn.us/agriculture/forestry/fires/statistics.html
26	Statewide	2012	1,062 fires, 19,325 acres burned	http://www.burnsafetn.org/pdfs/annual.pdf
27	Statewide	2014	1,192 fires, 15,541 acres burned	

WILDFIRES-2

EXTREME COLD TEMPERATURES-1

No.	Location	Historical Event	Time	Record Highs / Lows ^{o}F	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
1	Statewide	Summer 1816			Cold					Unusually low temperatures Statewide	Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances)
2	Statewide	1876-77			Cold						
3	Nashville	09-Jan-1886		7 / -8	Cold					One of the coldest days in Nashville's history -- high temperature topped out at 7 degrees, with a low of -8, which made a daily mean value of -1. All three were records.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
4	Statewide	January 1893			Cold					Severe cold statewide	Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1991
5	Nashville	28-Dec-1894		3 Low	Cold	0	0	0	0	A cold snap brought record low temperatures to the mid state. Nashville's high struggled to just 10 degrees after a low temperature of 3.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
6	Nashville	10-Feb-1899		10 / -7	Cold	0	0	0	0	Temperature at Nashville dropped to -7 degrees during the second coldest February on record. It was the lowest reading ever observed on this date. The high temperature topped out at a mere 10 degrees, a record "cool high."	
7	Nashville	13-Feb-1899		-13	Cold	0	0	0	0	Nashville's -13 set a record low for February	
8	Nashville	15-Dec-01		-2 Low	Cold	0	0	0	0	A strong cold front ushered in a blast of arctic air. Nashville's temperature sank to -2 degrees following the previous day's high of 42.	
9	Nashville	2-Jan-04		59 / 13	Cold					A powerful cold front dunked Nashville's temperature 46 degrees, from a daytime high of 59 degrees, to a low of 13 the following morning.	
10	Statewide	3-Feb-05			Cold						Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1990
11	Nashville	11-Oct-06		29	Cold	0	0	0	0	An early freeze occured at Nashville, as the morning temperature bottoms out at 29 degrees.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
12	Nashville	9-Dec-17		0	Cold	0	0	0	0	It was a cold day in Middle Tennessee. Nashville, 0.	
13	Nashville	10-Dec-17		15 / 1	Cold	0	0	0	0	A record cold air mass penetrated Middle Tennessee. Nashville's low temperature was 1 degree, with a high reaching just 15.	
14	Nashville	12-Jan-18		2 High	Cold					High temperature at Nashville reached just 2 degrees -- the lowest daily maximum temperature on record.	
15	Nashville	19-Dec-24		67 / 17	Cold	0	0	0	0	The temperature at Nashville dropped from a high of 67 degrees to 17 degrees by midnight.	
16	Nashville	29-Oct-25		26 Low	Cold	0	0	0	0	Temperature at Nashville dropped to 26, setting a record low for the month.	
17	Nashville	31-Dec-27		58 \ 2	Cold	0	0	0	0	A cold front dropped the temperature at Nashville a remarkable 56 degrees -- from a high of 58 to 2 degrees the following day.	
18	Nashville	21-Jan-35		69 / 12	Cold					Nashville reported an early morning high temperature of 69 degrees before a strong cold front passed through, dropping the temperature to 36 degrees by 7:00 a.m., 24 degrees by noon, and 14 degrees by 7:00 p.m. The temperature dropped another 2 degrees during the evening, for a low of 12, and a daily range of 57 degrees. Three inches of snow fell by evening.	
19	Nashville	18-Feb-36		-1 Low	Cold	0	0	0	0	Low temperature at Nashville fell to -1 -- the latest sub-zero temperature on record.	
20	Nashville	6-Dec-37		17 \ 11	Cold	0	0	0	0	A chilly day brought record cold to the mid state. Nashville's low temperature is 11, with the high reaching just 17 degrees.	

No.	Location	Historical Event	Time	Record Highs / Lows	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
21	Nashville	25-Jan-40		1 Low	Cold					Following a cold spell lasting several days, the Cumberland River froze, as the low temperature at Nashville dropped to 1 degree.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
22	Nashville	15-Nov-40		29 / 17	Cold	0	0	0	0	A cold outbreak produces the lowest high, low, and mean temperatures ever observed on this date at Nashville. The high was 29, with a low of 17, producing a mean temperature of 23 degrees.	
23	Nashville	31-Aug-46		47 Low	Cold	0	0	0	0	Temperature at Nashville dropped to 47, setting a record low for the month.	
24	Nashville	8-May-47		36 Low	Cold	0	0	0	0	It was an almost winter-like day in Middle Tennessee, as Nashville's low dropped to 36 degrees	
25	Nashville	23-Jul-47		51 Low	Cold	0	0	0	0	Temperature at Nashville dropped to 51, setting a record low for the month.	
26	Nashville	29-Jan-48		28 High	Cold	0	0	0	0	The high temperature at Nashville reached just 28 degrees. This is the 7th consecutive day in which temperatures have remained below freezing, setting a record. During this stretch, the temperature never rose above 31 degrees, nor fell below -2 degrees.	
27	Nashville	19-Oct-48		29 Low	Cold	0	0	0	0	A Cold snap brought the 3rd consecutive day of sub-freezing temperatures to Nashville, with a morning low of 29 degrees. Clarksville got down to 26 degrees for the 2nd day in a row.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
28	Nashville	30-Sep-49		36 Low	Cold	0	0	0	0	Temperature at Nashville dropped to 36, setting a record low for the month.	
29	Nashville	13-Apr-50		42 / 27	Cold	0	0	0	0	A cold outbreak produced the lowest high, low, and mean temperatures ever observed on this date at Nashville. The high was 42, with a low of 27, producing a mean temperature of 35 degrees.	
30	Nashville	25-Nov-50		-1 Low	Cold	0	0	0	0	Temperature at Clarksville plummets to -2 degrees, setting a record low for the month. Nashville's -1 also established a monthly record.	
31	Nashville	28-Jan-51	1:00 PM		Cold	0	0	0	0	A strong cold front moved through Nashville shortly after 1:00 p.m., causing temperatures to fall during the afternoon and evening, and ushered in one of the most remarkable weather events in Nashville's history.	
32	Nashville	2-Feb-51		-13	Cold	0	0	0	0	Temperature at Nashville dropped to -13, tying the record low for the month.	
33	Nashville	30-Oct-52		26 Low	Cold	0	0	0	0	Temperature at Nashville dropped to 26, tying the record low for the month.	
34	Nashville	1-Oct-53		94 High	Cold	0	0	0	0	Temperature at Clarksville reached 97 degrees, setting a record high for the month, as did Nashville, with a reading of 94 degrees.	
35	Nashville	16-Nov-55		73 / 30	Cold	0	0	0	0	A strong cold front produced a 44-degree temperature drop at Crossville, from a daytime high of 69 degrees to 25. A 43-degree drop occured at Nashville, as the temperature fell to 30 degrees by midnight, following a daytime high of 73.	
36	Nashville	28-Oct-57		28 Low	Cold	0	0	0	0	A cold wave brought record low temperatures to the mid state. Nashville observed a reading of 28 degrees. Crossville dropped to 20.	
37	Nashville	21-Jan-59		74 / 15	Cold					A cold front dropped the temperature at Nashville a remarkable 59 degrees -- from a high of 74, to 15 degrees the next morning	
38	Nashville	11-Nov-60		20 Low	Cold	0	0	0	0	An unusually strong cold outbreak produced a low of 19 degrees at Crossville, 20 at Nashville	

EXTREME COLD TEMPERATURES-2

No.	Location	Historical Event	Time	Record Highs / Lows	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
39	Nashville	1-May-63		34 Low	Cold	0	0	0	0	Temperature at Nashville dropped to 34, setting a record low for the month	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
40	Nashville	2-May-63		34 Low	Cold	0	0	0	0	Temperature at Nashville dropped to 34 for the 2nd consecutive day	
41	Nashville	24-Dec-63		32 / 5	Cold	0	0	0	0	The high temperature at Nashville reached just 32 degrees. This was the 7th consecutive day in which temperatures remained below freezing, tying a record. During this stretch, the temperature never rose above 32 degrees, nor fell below 5 degrees	
42	Nashville	6-Jun-66		42 Low	Cold	0	0	0	0	Temperatures at Nashville and Clarksville drop to 42 degrees, setting record lows for the month.	
43	Nashville	24-Feb-67		10 Low	Cold	0	0	0	0	Record lows for this date are set at both Nashville (10 degrees) and Crossville (2 degrees).	
44	Nashville	4-May-76		34 Low	Cold	0	0	0	0	Temperature at Nashville dropped to 34, tying the record low for the month	
45	Nashville	1-Jan-78		31 / 7	Cold					The high temperature at Nashville reached just 28 degrees. This was the 7th consecutive day in which temperatures fell below freezing, tying a record. During this stretch, the temperature never rose above 31 degrees, nor fell below 7 degrees	
46	Nashville	3-Mar-80		2 Low	Cold	0	0	0	0	Temperature for Nashville dropped to 2, setting a record low for the month	
47	Nashville	24-Oct-81		28 Low	Cold	0	0	0	0	Nashville broke its daily record with 28 degrees.	
48	Nashville	7-Apr-82		23 Low	Cold	0	0	0	0	Temperature at Nashville dropped to 23, setting a record low for the month.	
49	Nashville	22-Sep-83		36 Low	Cold	0	0	0	0	Temperature at Nashville dropped to 36, tying the record low for the month. Crossville's low of 33 tied the record low for the month.	
50	Nashville	24-Sep-83		36 Low	Cold	0	0	0	0	Temperature at Nashville dropped to 36 for the 2nd time in three days.	
51	Nashville	2-Oct-84		32 Low	Cold	0	0	0	0	Temperature at Nashville dropped to 32 -- the earliest freeze ever.	
52	Nashville	20-Jan-85		7 / -16	Cold					Nashville set an all-time record low mean temperature of -5. Following a daytime high of 7 degrees, the temperature fell to -16 by midnight. Temperature at Crossville fell to -21 by midnight, which established an all-time record low.	
53	Nashville	21-Jan-85		-17 Low	Cold					Temperature at Nashville dropped to -17, setting an all-time record low.	
54	Nashville	29-Aug-86		49 Low	Cold	0	0	0	0	A low temperature of 44 degrees broke Clarksville's record for August. In addition, Crossville's 44 degrees and Nashville's 49 set new daily record lows	
55	Nashville	22-Oct-87		26 Low	Cold	0	0	0	0	Temperature at Nashville drops to 26, which tied the record low for the month.	
56	Nashville	27-Oct-88		29 / 72	Cold/Hot	0	0	0	0	Nashville's temperature rocketed 43 degrees from a morning low of 29 to an afternoon high of 72.	
57	Nashville	21-Dec-89		-2 Low	Cold	0	0	0	0	The beginning of perhaps the worst December cold wave ever saw Nashville's temperature drop to -2.	
58	Nashville	22-Dec-89		-10 Low	Cold	0	0	0	0	Nashville broke its monthly record with a reading of -10.	
59	Nashville	15-Jan-94	6:00 AM		Cold	1	0	0	0	A homeless man died due to exposure to the cold.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

EXTREME COLD TEMPERATURES-3

No.	Location	Historical Event	Time	Record Highs / Lows ^{o}F	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
60	Nashville	18-Jan-94		10 Low	Cold					A record cold air mass pushed into the mid state. The high temperature reached just 10 degrees at Nashville. The plateau is especially hard-hit, as Crossville checked in with a low of -8.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
61	Nashville	13-Oct-00		38 / 81	Cold/Hot	0	0	0	0	Despite a start of 38 degrees, the afternoon temperature at Nashville soared to 81.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
62	Nashville	26-Sep-01		38 Low	Cold	0	0	0	0	Nashville's low of 38 degrees is the Coldest ever observed on this date.	
63	Nashville	11-Jun-03		75 High	Cold	0	0	0	0	The mean temperature at Nashville of 75 degrees was one degree above normal, which ended a remarkable streak of 22 consecutive cooler-than-normal days.	
64	Nashville	8-Apr-07		23 Low	Cold	0	0	0	0	The low of 23 tied the record low for the month of April.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
65	Nashville	2013								Deaths related to cold weather: Age DOD Immediate COD Contributing factors Circumstances 50 1/3/2013 Complications of cardiomegaly Hypothermia, chronic ethanolism Found outside in cold weather 54 2/16/2013 Environmental hypothermia Chronic ethanolism, ASCVD, COPD Found outside in tent in cold weather 53 2/21/2013 Environmental hypothermia Found indoors in cold environment 53 10/21/2013 Environmental hypothermia Acute and chronic ethanolism Drank alcohol and laid outside in cold temperature	Davidson County Medical Examiners Office
66	Nashville	2014								Deaths related to cold weather: Age DOD Immediate COD Contributing factors Circumstances78 2/3/2014 Hypothermia Atherosclerotic cardiovascular disease Found outside in inclement weather	Davidson County Medical Examiners Office

EXTREME COLD TEMPERATURES-4

EXTREME HOT TEMPERATURES-1

No.	Location	Historical Event	Time	Record Highs / Lows	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
1	Nashville	11-Jul-01		107	Hot	0	0	0	0	An unusually hot day occurred across the mid state, as Nashville hit 102 degrees. Some of the country stations measured as high as 107.	
2	Nashville	18-Aug-05		102 High	Hot	0	0	0	0	Record heat wave pushed toward late summer, as Nashville hit 102 degrees. Morning low was a miserable 79.	
3	Nashville	21-Mar-07		89 High	Hot	0	0	0	0	Temperature at Nashville reached 89, setting a record high for the month.	
4	Nashville	28-May-11		96 High	Hot	0	0	0	0	Temperature at Nashville reached 96, setting a record high for the month.	
5	Nashville	6-Jul-30		99 / 76	Hot	0	0	0	0	It was a sultry day in one of the most oppressive heat waves in Middle Tennessee history. The high at Nashville reached 99 degrees, following a morning low of 76.	
6	Nashville	28-Jul-30		112 High	Hot	0	0	0	0	Madison recorded a temperature of 112 degrees, tying the all-time record high for Middle Tennessee. The temperature at McMinnville reached 106, setting an all-time record high there. In addition, the mean temperature of 95 degrees measured at Nashville is also an all-time record.	
7	Nashville	7-Aug-30		104 High	Hot	0	0	0	0	One of the most notorious heat waves was underway in Middle Tennessee. Nashville's 104 degrees was the second of 4 consecutive days with highs greater than 100.	
8	Nashville	9-Aug-30		105 High	Hot	0	0	0	0	The mercury soared to 110 degrees at Dickson, setting an all-time mark there. Nashville's thermometer peaked at 105, setting a record high for the month.	
9	Nashville	2-Nov-35		85 High	Hot	0	0	0	0	Temperature at Nashville reached 85, setting a record high for the month.	
10	Nashville	31-May-37		96 High	Hot	0	0	0	0	Temperature at Nashville reached 96, tying the record high for the month.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
11	Nashville	7-Oct-41		93 High	Hot	0	0	0	0	Temperature at Nashville climbed to 93 degrees for the second straight day.	
12	Nashville	21-Nov-42		77 / 63	Hot	0	0	0	0	A spring-like day was enjoyed at Nashville, with a high of 77 degrees, and a low of 63.	
13	Nashville	26-Aug-43		103 High	Hot	0	0	0	0	Mercury soared to 103 at Nashville -- the third in a remarkable four-day run with highs of 100+.	
14	Nashville	6-Aug-47		101 High	Hot	0	0	0	0	Temperature at Nashville reached 101 degrees, the third straight day with readings above 100.	
15	Nashville	14-Oct-47		89 High	warm	0	0	0	0	Unseasonably warm weather continues across Middle Tennessee. Nashville's high topped out at 89 degrees.	
16	Nashville	15-Jun-52		100 High	Hot	0	0	0	0	The temperature at Nashville climbed to 100 degrees -- the earliest date ever for a 100 degree reading	
17	Nashville	30-Jun-52		106 High	Hot	0	0	0	0	Temperature at Nashville reached 106, setting a record high for the month. It also marked the 8th consecutive day of 100+ readings, a record.	
18	Nashville	3-Jul-52		97.3 High	Hot	0	0	0	0	The temperature at Nashville hit 94 degrees, the 31st consecutive day with 90+ degree readings, a record. The average high temperature during this remarkable stretch was 97.3 degrees.	
19	Nashville	26-Jul-52		63 / 103	Hot	0	0	0	0	One of the most notorious heat waves assaulted Nashville with its first of four consecutive daily record high temperatures. Today, the mercury rose to 103 degrees. The air mass was unusually dry, though, with a temperature range of 40 degrees, following a pleasant morning low of 63.	

EXTREME HOT TEMPERATURES-2

No.	Location	Historical Event	Time	Record Highs / Lows	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
20	Nashville	27-Jul-52		107 High	Hot	0	0	0	0	Temperature at Nashville reached 107, setting an all-time record high. Other record highs include Clarksville (110).	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
21	Nashville	28-Jul-52		107 High	Hot	0	0	0	0	Temperature at Nashville reached 107 for the 2nd consecutive day. All-time record highs were set at Centerville, Columbia, and Palmetto (109), Shelbyville (107), Springfield (106), Tullahoma (106), and Monteagle (101).	
22	Statewide	June and July of 1952			Hot						http://www.srh.noaa.gov/ohx/climate/calendar.htm
23	Nashville	14-Jul-54		85 Low	Hot	0	0	0	0	Low temperature of 85 was Nashville's highest minimum temperature on record. In addition, the mean temperature of 95 degrees tied a record high.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
24	Nashville	5-Aug-54		97 High	Hot	0	0	0	0	The temperature at Nashville reached 97 degrees, the 27th consecutive day with 90+ degree readings. This was the 3rd longest such period in Nashville's history. In addition, the high temperature reached at least 90 degrees on 58 out of the last 59 days.	
25	Nashville	15-Aug-54		102 High	Hot	0	0	0	0	Temperature at Nashville hit 102 degrees. It's the highest temperature ever observed on this date, and marked day 2 of a 3-day run with highs above 100.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
26	Nashville	2-Sep-54		55 / 95	Hot/Cold	0	0	0	0	At Nashville, a 40-degree difference between high (95) and low (55) was observed.	
27	Nashville	3-Sep-54		60 / 101	Hot	0	0	0	0	Arid weather continues, as Nashville hit 101 degrees, following a morning low of 60. At Crossville, the high temperature hit 93, despite a morning low of 50 degrees.	
28	Nashville	5-Sep-54		105 High	Hot	0	0	0	0	Mount Pleasant (1 N) set it's all-time record high with a reading of 105 degrees. At 106 degrees, Clarksville measured it's highest temperature ever in September, as did Nashville, with a 105-degree reading, and Crossville, with 99 degrees.	
29	Nashville	19-Sep-54		97 High	Hot	0	0	0	0	One of the Hottest summers on record continued its strangle-hold on the mid state. Nashville's high hit 97 degrees, Crossville got to 93.	
30	Nashville	17-Apr-55		90 High	Hot	0	0	0	0	Temperature at Nashville reached 90 -- the earliest date ever for 90 degrees to be observed.	
31	Nashville	13-Feb-62		84 High	Hot	0	0	0	0	Temperature at Nashville reached 84, setting a record high for the month.	
32	Nashville	24-Jan-72		78 High	Hot					Nashville's 78 degrees set a record high for January.	
33	Nashville	1-Jul-80			Hot	0	0	0	0	Severe heat wave-West and Middle TN	
34	Nashville	9-Oct-80		91 High	Hot	0	0	0	0	A unusually warm spell saw temperatures climb to 91 at Nashville, 83 at Crossville -- the highest temperatures ever observed on this date at either location.	Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1988
35	Nashville	10-Oct-80		90 High	Hot	0	0	0	0	The temperature at Nashville reached 90 degrees -- the latest date ever for a 90 degree reading.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
36	Nashville	1-Dec-82		62 / 70	Hot	0	0	0	0	A mild air mass brought record warmth to Middle Tennessee. Nashville recorded a high of 70, with a low of 62.	
37	Nashville	3-Dec-82		79 High	Hot	0	0	0	0	Temperature at Nashville reached 79, setting a record high for the month.	

EXTREME HOT TEMPERATURES-3

No.	Location	Historical Event	Time	Record Highs / Lows	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
38	Nashville	27-Dec-82		75 High	Hot	0	0	0	0	Middle Tennessee experienced record warmth, as Nashville's high reached 75 degrees.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN, http://www.srh.noaa.gov/ohx/climate/calendar.htm
39	Nashville	20-Aug-83		101 High	Hot	0	0	0	0	Nashville's high of 101 was the first of four straight 100+ readings	
40	Nashville	11-Sep-83		100 High	Hot	0	0	0	0	The temperature at Nashville reached 100 degrees -- the latest date ever for a 100 degree reading.	
41	Nashville	22-Jun-88		100 High	Hot	0	0	0	0	Summer began with a record heat wave. Nashville's high of 100 degrees is the second in a six-day string of 100+ readings	
42	Nashville	2-Aug-88		99 High	Hot	0	0	0	0	Oppressive heat wave stretched into August. Thermometer at Nashville climbed to 99 degrees	
43	Nashville	26-Apr-89		91 High	Hot	0	0	0	0	Temperature at Nashville reached 91, setting a record high for the month.	
44	Nashville	28-Apr-89		91 High	Hot	0	0	0	0	Temperature at Nashville reached 91 for the 2nd consecutive day	
45	Nashville	30-Jul-99		101 High	Hot	0	0	0	0	The thermometer hit 101 degrees at Nashville. It was the hottest temperature observed in the city in nearly nine years.	
46	Nashville	3-Jan-00		61 / 72	Hot					A very pleasant, almost spring-like day settled over the mid state. At Nashville, the high temp. reached 72 degrees, with a low of 61.	
47	Nashville	10-Nov-02		81 High	Hot	0	0	0	0	Then, followed record high temperatures at Nashville (81)	
48	Nashville	3-Nov-03		82 High	Hot	0	0	0	0	An unseasonably warm spell brought record warmth to the mid state. Nashville's 82 degrees broke the daily record, and Crossville's 79 degrees tied the record high for November.	
49	Nashville	16-Aug-07		106 High	Hot	0	0	0	0	In the midst of one of the worst droughts in Middle Tennessee's history, the temperature at Nashville climbs to 106 degrees, setting a record high for the month. It is only the fifth time in Nashville's history that this mark has been hit. It is the fifth consecutive day with 100+ degree readings --	
50	Nashville	26-Aug-07		94 High	Hot	0	0	0	0	Temperature hits 94 degrees at Nashville, the 32nd consecutive day with 90+ degree readings, a record. The average high temperature during this remarkable stretch is 98.2 degrees.	
51	Nashville	4-Aug-10		101 High	Hot	0	25	100	0	Afternoon heat index readings ranged from 110 to 115 degrees over much of Middle Tennessee on August 4th. Around the Nashville Metropolitan area, a couple dozen people were hospitalized suffering from heat exhaustion along with several others being hospitalized suffering from burnt feet. There were no known fatalities. There were also numerous reports of damage from the heat, including exploding tires on automobiles.	National Weather Service Forecast Office; Nashville, TN;
52	Nashville	6/28/2012 - 7/7/2012		109 High	Hot	2	0	0	0	An all time record high of 109 degrees was set in Nashville on June 29th. This was the hottest day of a 10 day stretch from June 28th through July 7th in which the average daily high temperature was 104 degrees. Age DOD Immediate COD Contributing factors Circumstances 57 7/1/2012 Environmental hyperthermia Decedent living in storage unit 64 7/2/2012 Hypertensive cariovascular disease Hyperthermia Environmental exposure - Found outside of residence 5 months 8/7/2012 Hyperthermia Exposed to high temperature inside minivan	National Weather Service Forecast Office; Nashville, TN;

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
1	Nashville	8-Jun-1872		rain		2.56	0	0	0	0	Nashville records 2.56" of rainfall.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
2	Nashville	22-Feb-1874		rain		5.36	0	0	0	0	Nashville records a record 2.58" of rain, for a 2-day total of 5.36".	
3	Nashville	24-Aug-1876		rain		2.65	0	0	0	0	Nashville gets a rare August downpour of 2.65".	
4	Nashville	17-Sept-1877		rain		2.93	0	0	0	0	Nashville measures 2.93" of rainfall.	
5	Nashville	13-Feb-1880		rain		5.2	0	0	0	0	Nashville records greatest one-day rainfall for February, with 5.20". This caps off a three-day total of 7.65", another Nashville record.	
6	Nashville	15-Sept-1881		rain		4.21	0	0	0	0	Nashville measures 4.21" of rainfall.	
7	Nashville	22-Apr-1883		rain		5.03	0	0	0	0	Nashville records greatest one-day rainfall for April, with 5.03".	
8	Nashville	5-Jul-1883		wind			0	0	0	0	Wind gust of 61 mph is recorded at Nashville.	
9	Nashville	10-Jul-1886		wind			0	0	0	0	Wind gust of 75 mph is recorded at Nashville.	
10	Nashville	18-Sept-1887		rain		4.66	0	0	0	0	Nashville measures 3.12" of rainfall, for a 2-day total of 4.66".	
11	Nashville	Dec-87		rain and flood			0	0	0	0	West and middle Tennessee	Chronology of Disasters in TN (Including Natural and Man Diseasters, Epidemics and Civil Disturbances) © Allen P. Coggins, 1988
12	Nashville	10-Sept-1895		rain		4.93	0	0	0	0	Nashville measures 4.93" of rainfall.	
13	Middle TN	Summer 1896		rain							Very rainy summer	Chronology of Disasters in TN (Including Natural and Man Diseasters, Epidemics and Civil Disturbances) © Allen P. Coggins, 1988
14	Nashville	9-Aug-1898		rain		5.2	0	0	0	0	Nashville records greatest one-day rainfall for August, with 5.20".	National Weather Service Forecast Office; Nashville, TN;
15	Nashville	23-Mar-01		wind			0	0	0	0	Wind gust of 58 mph is recorded at Nashville.	National Weather Service Forecast Office, Nashville, TN
16	Nashville	28-Sep-06		rain		2.6	0	0	0	0	Nashville culminates its second-wettest September ever with 2.60" of rainfall	National Weather Service Forecast Office, Nashville, TN
17	Nashville	17-Nov-06		rain		3.17	0	0	0	0	Nashville measures 3.17" of rainfall.	National Weather Service Forecast Office, Nashville, TN
18	Nashville	23-Feb-09		rain		3.69	0	0	0	0	Nashville measures 3.69" of rain.	National Weather Service Forecast Office, Nashville, TN
19	Nashville	21-Sep-09		wind			0	0	0	0	Wind gust of 60 mph is recorded at Nashville.	National Weather Service Forecast Office, Nashville, TN
20	Nashville	24-Jun-10		wind			0	0	0	0	Wind gust of 60 mph is recorded at Nashville.	National Weather Service Forecast Office, Nashville, TN
21	Nashville	6-Oct-10		rain		2.41	0	0	0	0	Nashville is hit with 2.41" of rain.	National Weather Service Forecast Office, Nashville, TN
22	Nashville	4-Apr-11		wind			0	0	0	0	Wind gust of 62 mph is recorded at Nashville.	National Weather Service Forecast Office, Nashville, TN
23	Nashville	25-Jun-11		rain		3.79	0	0	0	0	Nashville sees a remarkable 3.79" of rainfall.	National Weather Service Forecast Office, Nashville, TN
24	Nashville	12-Nov-11		wind			0	0	0	0	Following a high temperature of 73 degrees, a strong cold front brings 48 mile per hour winds to Nashville, followed by a 52 degree drop by midnight.	National Weather Service Forecast Office, Nashville, TN
25	Nashville	26-Dec-11		rain		4.06	0	0	0	0	Nashville measures 4.06" of rainfall.	National Weather Service Forecast Office, Nashville, TN

THUNDERSTORMS-1

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
26	Nashville	17-Dec-15		rain		2.72	0	0	0	0	Nashville records 2.72" of rainfall.	National Weather Service Forecast Office, Nashville, TN
27	Nashville	1-Aug-16		rain		2.58	0	0	0	0	Nashville measures 2.58" of rain.	National Weather Service Forecast Office, Nashville, TN
28	Nashville	27-Jan-18		rain		2.88	0	0	0	0	Nashville measures 2.88" of rain.	National Weather Service Forecast Office, Nashville, TN
29	Nashville	26-Oct-20		rain		2.08	0	0	0	0	Nashville gets soaked with 2.08" of rain.	National Weather Service Forecast Office, Nashville, TN
30	Nashville	19-Jul-21		rain		4.02	0	0	0	0	Nashville records greatest one-day rainfall for July, with 4.02".	National Weather Service Forecast Office, Nashville, TN
31	TN and other states	24-Dec-21		severe storm								Chronology of Disasters in TN (Including Natural and Man Diseasters, Epidemics and Civil Disturbances) © Allen P.
32	Nashville	11-Mar-23		wind			0	0	0	0	Wind gust of 72 mph is recorded at Nashville.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
33	Nashville	27-Jun-23		wind			0	0	0	0	Wind gust of 62 mph is recorded at Nashville.	
34	Nashville	20-Dec-26		rain		2.03	0	0	0	0	Nashville gets 2.03" of rain. This marks the beginning of a 2-day stretch that will see 5.52" fall on the city.	
35	Nashville	16-Sep-27		rain			0	0	0	0	Very summer-like weather is felt across the mid state. The afternoon temperature hits 98 degrees at Nashville.	
36	Nashville	29-Jun-28		rain		4.22	0	0	0	0	Allardt records its greatest one-day rainfall ever, with 6.75". Nashville records greatest one-day rainfall for June, measuring 4.22".	
37	Nashville	17-Oct-28		rain		3.18	0	0	0	0	Nashville records its greatest one-day rainfall for October, with 3.18".	
38	Nashville	21-Oct-29		rain		2.14	0	0	0	0	Nashville is drenched with 2.14" of rain.	
39	Nashville	14-Aug-30		rain		3.98	0	0	0	0	Nashville gets 3.98" of rainfall.	
40	Nashville	16-Oct-32		rain		2.98	0	0	0	0	A wet day for Nashvillians, as 2.98" of rain is measured.	
41	Bolivar to Nashville	January 5-9, 1946		severe storm								Chronology of Disasters in TN (Including Natural and Man Diseasters, Epidemics and Civil Disturbances) © Allen P. Coggins, 1988
42	Nashville	31-Oct-51		rain		2.3	0	0	0	0	Nashville measures 2.30" of rain.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
43	Nashville	14-Dec-51		rain		2.91	0	0	0	0	Nashville gets soaked with 2.91" of rainfall.	
44	Nashville	13-Jun-53		wind			0	0	0	0	Wind gust of 61 mph is recorded at Nashville.	
45	Nashville	22-Mar-55		rain			0	0	0	0	Nashville measures precipitation for the 11th consecutive day, setting a record.	
46	Davidson County	3-Apr-57	6:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
47	Nashville	17-May-57		hail			0	0	0	0	Golfball size hail is reported in Davidson County.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
48	Davidson County	17-May-57	11:10 AM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources /
49	Davidson County	18-Nov-57	2:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
50	Davidson County	5-Apr-58	6:30 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
52	Davidson County	27-Apr-58	2:34 PM	tstm wind	75 kts.		0	0	0	0	None Reported	
53	Davidson County	1-Jun-58	6:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
54	Davidson County	1-Jun-58	6:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
55	Davidson County	1-May-59	1:45 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
56	Davidson County	13-May-59	4:30 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
57	Nashville	8-Oct-59		rain		2.93	0	0	0	0	Nashville measures 2.93" of rain for a 3-day total of 4.75".	
58	Davidson County	16-Jun-60	8:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
59	Davidson County	29-Jun-60	1:33 AM	tstm wind	65 kts.		0	0	0	0	None Reported	
60	Davidson County	8-May-61	7:33 PM	tstm wind	50 kts.		0	0	0	0	None Reported	
61	Davidson County	21-Jul-61	1:47 PM	tstm wind	80 kts.		0	0	0	0	None Reported	
62	Nashville	26-Feb-62		rain		2.86	0	0	0	0	Nashville records 2.86" of rain in the middle of a 3-day stretch during which 5.31" are measured.	
63	Davidson County	27-Feb-62	8:04 PM	tstm wind	58 kts.		0	0	0	0	None Reported	
64	Davidson County	7-Aug-62	7:20 AM	tstm wind	50 kts.		0	0	0	0	None Reported	
65	Davidson County	8-Jul-63	4:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
66	Nashville	28-Aug-63		rain		4.1	0	0	0	0	Nashville measures 4.10" of rainfall.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
67	Davidson County	4-Mar-64	4:10 PM	tstm wind	50 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources /
68	Davidson County	27-May-64	3:00 PM	tstm wind	57 kts.		0	0	0	0	None Reported	
69	Davidson County	27-May-64	10:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
70	Davidson County	15-Jun-64	7:45 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
71	Davidson County	15-Apr-65	5:57 PM	tstm wind	51 kts.		0	0	0	0	None Reported	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
72	Davidson County	5-Jul-66	4:00 PM	tstm wind	56 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
73	Davidson County	5-Jul-66	4:30 PM	tstm wind	59 kts.		0	0	0	0	None Reported	
74	Davidson County	7-Jul-66	2:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
75	Davidson County	7-Jul-66	2:05 PM	tstm wind	60 kts.		0	0	0	0	None Reported	
76	Davidson County	10-Jul-66	11:15 PM	tstm wind	50 kts.		0	0	0	0	None Reported	
77	Davidson County	15-Jul-66	12:00 AM	tstm wind	50 kts.		0	0	0	0	None Reported	
78	Davidson County	6-Mar-67	4:05 AM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
79	Davidson County	22-Nov-67	1:30 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
80	Davidson County	1-Jul-68	10:45 PM	tstm wind	70 kts.		0	0	0	0	None Reported	
81	Nashville	29-Dec-69		rain		2.18	0	0	0	0	Nashville measures 2.18" of rainfall during the 2nd day of a 3-day wet spell that produces 4.86". Crossville's 3.46" contributes to a 3-day total of 7.60".	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
82	Davidson County	19-Apr-70	8:20 PM	tstm wind	70 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
83	Davidson County	3-Jul-70	8:05 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
84	Davidson County	3-Aug-70	6:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
85	Davidson County	27-Jun-71	4:20 PM	tstm wind	50 kts.		0	0	0	0	None Reported	
86	Nashville	7-Apr-72		wind			0	0	0	0	Wind gust of 63 mph is recorded at Nashville.	
87	Davidson County	7-Apr-72	5:17 PM	tstm wind	63 kts.		0	0	0	0	None Reported	
88	Davidson County	28-Jun-72	4:20 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
89	Davidson County	27-Jul-72	6:50 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events
90	Davidson County	12-Aug-72	12:00 PM	Tstm Wind	0 kts.		0	0	0	0	None Reported	
91	Davidson County	12-Aug-72	12:15 PM	Tstm Wind	65 kts.		0	0	0	0	None Reported	
92	Nashville	18-Oct-72		rain		2.33	0	0	0	0	Crossville measures 2.42" of rain. Nashville is not far behind with 2.33".	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
93	Davidson County	1-Apr-74	7:15 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center
94	Davidson County	1-Apr-74	7:20 PM	tstm wind	82 kts.		0	0	0	0	None Reported	NCDC / Climate Resources /
95	Nashville	12-Mar-75		rain			0	0	0	0	Nashville records greatest one-day rainfall for March, with 4.66".	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
96	Davidson County	13-Jan-76	3:04 PM	tstm wind	57 kts.	4.66	0	0	0	0	None Reported	National Climatic Data Center
97	Davidson County	17-Jul-77	5:54 PM	tstm wind	0 kts.		0	0	0	0	None Reported	NCDC / Climate Resources / Climate Data / Events / Storm
98	Nashville	17-Mar-78		rain			0	0	0	0	Nashville measures precipitation for the 11th consecutive day, tying a record.	National Weather Service Forecast Office; Nashville, TN;
99	Nashville	28-May-78		rain		3.47	0	0	0	0	Downpour at Nashville sets rainfall intensity records for 30 minutes (1.86"), 1 hour (2.82"), & 2 hours (3.47").	Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/clim
100	Davidson County	19-Aug-78	6:26 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
101	Nashville	8-Dec-78		rain		4.46	0	0	0	0	Nashville records greatest one-day rainfall for December, with 4.46".	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
102	Davidson County	28-Jul-79	12:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
103	Nashville	13-Sep-79		rain		6.6	0	0	0	0	Nashville records its greatest one-day rainfall ever, with 6.60", as the remnants of Hurricane Frederic push inland. Rainfall intensity records for 3 hours (4.12"), 6 hours (5.17"), & 12 hours (6.37") are also set.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN
104	Nashville	19-Apr-81		rain		1.6	0	0	0	0	Downpour at Nashville sets rainfall intensity records for 5 minutes (0.95"), 10 minutes (1.35"), & 15 minutes (1.60").	http://www.srh.noaa.gov/ohx/climate/calendar.htm
105	Davidson County	10-Jun-81	3:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center
106	Davidson County	10-Jun-81	3:23 PM	tstm wind	51 kts.		0	0	0	0	None Reported	NCDC / Climate Resources /
107	Davidson County	25-Jun-81	2:42 PM	tstm wind	50 kts.		0	0	0	0	None Reported	Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
108	Nashville	May-Sept 1981		lightning			0	0	0	0	Weather related deaths: numerous lightening fatalities across the state	Chronology of Disasters in TN (Including Natural and Man Diseasters, Epidemics and Civil Disturbances) © Allen P. Coggins, 1988
109	Davidson County	3-Jun-83	10:20 PM	tstm wind	56 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources /
110	Davidson County	11-Aug-83	5:19 PM	tstm wind	50 kts.		0	0	0	0	None Reported	
111	Davidson County	23-Aug-83	6:00 PM	tstm wind	52 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm
112	Davidson County	15-Mar-84	11:50 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
113	Davidson County	28-Apr-84	6:00 AM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
114	Davidson County	7-May-84	2:00 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
115	Davidson County	7-May-84	2:00 PM	tstm wind	54 kts.		0	0	0	0	None Reported	
116	Davidson County	4-Jul-84	2:55 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
117	Davidson County	3-Sep-84	9:30 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
118	Davidson County	27-Nov-84	10:30 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
119	Davidson County	31-May-85	6:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
120	Nashville	4-Jun-85		hail			0	0	0	0	Softball-sized hail is reported in Davidson County. This is the largest known hail ever to fall in Tennessee's history.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
121	Davidson County	30-Aug-85	6:30 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
122	Nashville	26-Nov-85		wind			0	0	0	0	Wind gust of 60 mph is recorded at Nashville.	National Weather Service Forecast Office; Nashville, TN;
123	Davidson County	26-Nov-85	10:55 PM	tstm wind	52 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
124	Davidson County	27-Nov-85	5:15 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
125	Davidson County	26-Jul-86	2:45 PM	tstm wind	87 kts.		0	0	0	0	None Reported	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
126	Nashville	May-Sept. 1986		lightning			0	0	0	0	Numerous lightning fatalities across the state	Chronology of Disasters in TN (Including Natural and Man Diseasters, Epidemics and Civil Disturbances) © Allen P. Coggins, 1988
127	Davidson County	1-Oct-86	5:20 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-
128	Davidson County	18-Mar-87	3:58 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
129	Davidson County	24-Jun-87	3:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
130	Davidson County	13-Jul-87	1:30 PM	tstm wind	0 kts.		0	1	0	0	None Reported	
131	Davidson County	23-Jul-87	2:15 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources /
132	Davidson County	9-May-88	8:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
133	Davidson County	26-Jun-88	3:15 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events
134	Davidson County	20-May-89	3:00 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
135	Nashville	29-Aug-90		wind			0	0	0	0	Wind gust of 70 mph is recorded at Nashville	
136	Davidson County	29-Aug-90	4:12 PM	tstm wind	61 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
137	Davidson County	11-Sep-90	6:30 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
138	Davidson County	4-Oct-90	2:00 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
139	Nashville	9-Nov-90		rain		2.58	0	0	0	0	Nashville measures 2.58" of rainfall.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
140	Davidson County	22-Mar-91	6:20 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
141	Davidson County	22-Mar-91	7:10 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
142	Davidson County	27-Mar-91	4:15 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
143	Davidson County	27-Mar-91	4:30 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
144	Nashville	9-Apr-91		wind			0	0	0	0	Wind gust of 67 mph is recorded at Nashville.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm

THUNDERSTORMS-7

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
145	Davidson County	9-Apr-91	12:00 PM	tstm wind	58 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
146	Davidson County	9-Apr-91	12:16 PM	tstm wind	0 kts.		0	4	0	0	None Reported	
147	Davidson County	21-Jun-91	5:00 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
148	Davidson County	2-Jul-91	4:10 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
149	Davidson County	8-Jul-91	9:00 PM	tstm wind	0 kts.		0	1	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-
150	Davidson County	10-Jul-91	3:45 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
151	Nashville	2-Dec-91		rain		3.07	0	0	0	0	Nashville measures 3.07" of rainfall, for a 3-day total of 5.96".	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
152	Davidson County	12-May-92	7:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
153	Davidson County	3-Jul-92	2:50 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
154	Davidson County	16-Jul-92	8:15 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
155	Davidson County	27-Aug-92	5:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
156	Davidson County	27-Aug-92	6:15 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
157	Southeast Davidson County	21-Feb-93	1:30 PM	tstm wind	N/A		0	0	1	0	A few trees were blown down.	
158	Davidson County	4-Mar-93	10:30 PM	tstm wind	51 kts.		0	0	0	0	None Reported	
159	Donelson	31-Mar-93	3:20 PM	tstm wind	N/A		0	0	1	0	A few trees were knocked down.	
160	Nashville	6-May-93	6:00 PM	tstm wind	N/A		0	0	1	0	A few trees were knocked down.	
161	West Nashville	25-Aug-93	2:38 PM	tstm wind	N/A		0	0	1	0	Some trees were blown down.	
162	Lakewood	3-Sep-93	2:45 PM	tstm wind	N/A		0	0	1	0	Some trees and power lines were blown down.	
163	Southeast Corner of Tennessee	28-Jan-94	12:00 AM	High Winds	0 kts.		0	0	500	0	High winds blew through the southeast corner of the state. Some roofs, shingles and awning were blown	
164	Antioch	10-Apr-94	12:30 PM	Lightning	N/A		1	18	0	0	One person was killed and 18 others were injured when lightning struck during an Ultimate Frisbee Match. M29O	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
165	Nashville	27-Apr-94	9:00 AM	tstm wind	N/A		0	0	5	0	A few trees and power lines were blown down.	National Climatic Data Center
166	Goodlettsville	29-Apr-94	1:45 PM	tstm wind	N/A		0	0	1	0	A few trees were blown down	
167	Donelson	5-Jun-94	5:00 PM	tstm wind	N/A		0	0	50	0	Several trees were knocked down. One fell on the roof of an apartment building. Twenty-five people were evacuated from the building.	
168	Nashville	9-Jun-94	5:45 PM	tstm wind	N/A		0	0	1	0	A few trees were knocked down in the north part of the city.	
169	Southern Davidson County	25-Jun-94	3:30 PM	tstm wind	N/A		0	0	1	0	A few power lines were blown down.	
170	Western Davidson County	26-Jun-94	3:45 PM	tstm wind	N/A		0	0	1 M	0	The roof was blown off of a harbor marina producing around $1 million in damage. Several trees were blown	
171	Nashville	23-Sep-94		rain		2.86	0	0	0	0	Nashville measures 2.86" of rainfall.	
172	Nashville	27-Nov-94	8:30 PM	tstm wind	N/A		0	0	50	0	Several large tree limbs fell on top of some power lines knocking out power to about 500 homes.	
173	State of Tennessee	11-Apr-95	6:30 AM	High Winds	0 kts.		0	4	1.0M	0	A large part of the state experienced high winds after a line of thunderstorms moved through. The winds were not associated with the thunderstorms. Winds speeds exceeded 70 mph at times. Two persons were injured in Clarksville (Montgomery County) when a tree was blown on top of the truck they were in. Another person was injured in Decherd (Franklin County) when the car they were driving was blown off the road. A fourth person was also injured in Decherd when they were struck by a portable sign. A church that was under construction in Clarksville was destroyed. A greenhouse collapsed in St. James (Greene County). A church steeple was broken off in McEwen (Humphreys County). A boat dock and a 17-foot fishing boat were damaged in Wilson County. One person was trapped in an elevator that had lost power on the campus of East Tennessee State University in Johnson City. There were widespread reports of damage to mobile homes and outbuildings. Numerous homes and businesses suffered roof or awning damage. Trees, power lines and power poles by the hundreds were blown down.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
174	Goodlettsville	9-May-95	7:01 AM	Lightning	N/A		0	0	2	0	A mobile home was destroyed by a fire started by lightning. A 3-year-old girl and a 26-year-old woman were injured in the fire.	
175	Nashville	18-May-95	11:27 AM	tstm wind	N/A		0	0	2	0	Part of a roof was torn off. Many trees and telephone poles were blown down.	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
176	Southeastern Davidson County	18-May-95	6:25 PM	tstm wind	N/A		0	0	2	0	A few trees were knocked down.	
177	Davidson County	6-Jun-95	4:30 PM	tstm wind	N/A		0	0	7	0	Five trees and some power lines were blown down.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather
178	Nashville	7-Jun-95	7:00 PM	tstm wind	N/A		0	0	2	0	Some trees were blown down.	
179	Nashville	4-Jul-95		wind			0	0	0	0	Wind gust of 58 mph is recorded at Nashville.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
180	Joelton	4-Jul-95	5:30 PM	Lightning	N/A		0	1	0	0	A man was injured by a lightning strike while sitting on his front porch.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
181	Nashville	22-Jul-95	2:40 PM	tstm wind	N/A		0	0	2	0	Several power lines were blown down.	
182	Hermitage	22-Jul-95	2:55 PM	tstm wind	N/A		0	0	2	0	A couple of trees were blown down.	
183	Nashville	8-Aug-95	12:40 PM	tstm wind	N/A		0	0	0	0	Tennessee Highway Patrol reported a couple of trees down.	
184	Nashville	18-Aug-95	2:00 PM	tstm wind	N/A		0	0	1	0	Large tree blown down five miles west of Nashville. Telephone pole blown down near Whites Creek Pike.	
185	Nashville	18-Jan-96	1:35 PM	tstm wind	0 kts.		0	0	1	0	Four trees blown down near intersection of Old Hickory Blvd. and Clarksville Highway. Report was by Davidson County Emergency Management Agency.	
186	Davidson County	27-May-96	2:15 PM	tstm wind	50 kts.		0	0	0	0	Emergency Management Agency reported numerous trees and power lines down around the county.	
187	Joelton	3-Jun-96	6:25 PM	tstm wind	50 kts.		0	0	0	0	Power lines and trees were blown down.	
188	Nashville	3-Jun-96	6:25 PM	tstm wind	0 kts.		0	0	1	0	Power lines and trees were blown down in the south part of Nashville.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
189	Hermitage	3-Jun-96	7:05 PM	tstm wind	50 kts.		0	0	0	0	TEMA reported trees down and hail covering the ground in spots at Hermitage. Hail size is unknown.	
190	Nashville	3-Jun-96	7:05 PM	tstm wind	50 kts.		0	0	0	0	Davidson County Emergency Management Agency reported power lines down across the western parts of downtown Nashville.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-
191	Nashville	14-Jul-96	5:15 PM	tstm wind	50 kts.		0	0	0	0	Trees and wires down along Kirkwood St., Clayton Ave., and Bellmont Blvd.	
192	Nashville	21-Jul-96	6:05 PM	tstm wind	50 kts.		0	0	0	0	SKYWARN spotter reported minor damage to Polk Building in downtown Nashville.	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
193	Nashville	21-Jul-96	6:05 PM	`	0 kts.		0	0	200	0	Strong thunderstorm winds knocked down a transmission tower for WKDF-AM radio station in downtown Nashville. It landed on a Nissan truck which was to be a promotional item for the radio station and on another car in the parking lot. Nashville Electric Service reported more than 200 power lines down; about 13,000 people were without power. Ther hardest hit areas without power were West and North Nashville, Antioch and Goodlettsville. One apartment lost a roof in West Nashville at Sequoia Village. Also, a tree fell on top of a car in a church parking lot.	
194	Hermitage	21-Jul-96	6:12 PM	tstm wind	50 kts.		0	0	0	0	Numerous trees and power lines down.	
195	Madison	21-Jul-96	6:12 PM	tstm wind	50 kts.		0	0	0	0	Numerous trees and power lines blown down.	
196	Nashville	21-Jul-96	6:12 PM	tstm wind	50 kts.		0	0	0	0	Numerous trees and power lines were down in the west and northwest part of the city.	
197	Nashville	29-Jul-96	11:50 AM	tstm wind	50 kts.		0	0	0	0	Trees and power lines were down 7 to 8 miles west of downtown Nashville.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
198	Antioch	27-Sep-96	6:10 AM	tstm wind	50 kts.		0	0	0	0	Power company reported tree limbs down on power lines.	
199	Hermitage	18-Oct-96	12:10 AM	tstm wind	50 kts.		0	0	0	0	National Weather Service employee reported large tree limbs were blown down.	
200	Nashville	7-Nov-96	1:40 PM	tstm wind	50 kts.		0	0	1	0	Numerous trees and power lines were down.	
201	Nashville	3-Jan-97	11:20 PM	tstm wind	50 kts.		0	0	0	0	Local law enforcement reported power lines were down and signs were blown down.	
202	Madison	4-Jan-97	9:20 PM	tstm wind	50 kts.		0	2	500	0	Severe property damage in Madison near Gallatin Rd. and Myatt Dr. Parts of roofs were ripped off several buildings including the Olive Garden restaurant. About 200 people scurried under tables when the Olive Garden lost part of its roof. The facade of a Blockbuster Music store was also destroyed. Other businesses that sustained heavy damage were Audio Video Environments, Bow Boot Store, Picture Frame Warehouse, Rio Bravo Restaurant, and Doctor's ValuVision. Several homes in Madison had roof damage. A power pole was knocked down on Jannette Ave. Several trees were blown down in the Madison area. An outdoor satellite dish was blown over. A total of 12 businesses and 6 homes received some damage. There were 2 minor injuries. Both individuals were treated and released.	
203	Cane Ridge	21-Feb-97	7:30 AM	tstm wind	50 kts.		0	0	0	0	A tree was blown down on Burkitt Rd. in the southeast part of Davidson county.	
204	Antioch	5-Mar-97	6:14 AM	tstm wind	50 kts.		0	0	0	0	Large tree limbs were blown down.	
205	Nashville	5-Mar-97	6:28 AM	tstm wind	50 kts.		0	0	0	0	Large tree limb was down at downtown Nashville.	
206	Forest Hills	21-Apr-97	6:00 AM	Lightning	N/A		0	0	100	0	A lightning strike started a fire and severely damaged a Forest Hill home.	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
207	Nashville	19-May-97	7:24 PM	tstm wind	50 kts.		0	0	0	0	Metro Nashville EOC reported one tree was down on McCrory Lane in west Nashville.	
208	Bellevue	26-May-97	10:20 AM	`	50 kts.		0	0	0	0	A few trees were blown down.	
209	Joelton	13-Jun-97	1:43 PM	tstm wind	50 kts.		0	0	10	0	Numerous trees down. A tree fell on top of a house.	
210	Joelton	13-Jun-97	6:45 PM	tstm wind	50 kts.		0	0	0	0	Several trees were blown down. At one point 30,000 customers were without power in Davidson county.	
211	Goodlettsville	4-Jul-97	4:10 AM	tstm wind	0 kts.		0	0	1	0	Trees down over the road	
212	Nashville	14-Jul-97	9:30 PM	tstm wind	50 kts.		0	0	0	0	Local law enforcement reported several trees and power lines were down.	
213	Nashville	28-Jul-97	4:25 PM	tstm wind	0 kts.		0	0	10	0	Power poles were down along River Road in west Nashville.	
214	Goodlettsville	19-Aug-97	5:00 PM	tstm wind	50 kts.		0	0	0	0	Thunderstorm winds blew down 12 to 16 trees in the vicinity of highway 41.	
215	Nashville	30-Nov-97		rain		4.2	0	0	0	0	Nashville records greatest one-day rainfall for November, with 4.20". High water covers Highways 41 and 31A in the southeast part of town. A number of motorists are stranded in their vehicles and have to be rescued.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
216	Nashville	30-Nov-97	2:58 PM	tstm wind	50 kts.		0	0	10	0	NWS employee reported a billboard sign was blown down. The location was about 2 miles west of the	National Climatic Data Center NCDC / Climate Resources /
217	Inglewood	8-Mar-98	5:10 PM	tstm wind	50 kts.		0	0	0	0	Large tree limbs were blown down.	Climate Data / Events / Storm
218	Nashville	8-Apr-98		wind			0	0	0	0	Wind gust of 59 mph is recorded at Nashville.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN
219	Inglewood	8-Apr-98	2:00 AM	tstm wind	0 kts.		0	0	5	0	Tree fell on a car. A few bricks were out of a chimney.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
220	Donelson	8-Apr-98	2:15 AM	tstm wind	50 kts.		0	0	0	0	Local law enforcement reported trees and powerlines down.	
221	Donelson	8-Apr-98	11:48 AM	tstm wind	60 kts.		0	0	0	0	Local law enforcement reported 2 trees blown down.	
222	Nashville	18-Apr-98	1:55 AM	tstm wind	50 kts.		0	0	0	0	EMA official reported a tree down on Whites Creek Pike.	
223	Antioch	21-May-98	6:10 PM	tstm wind	0 kts.		0	0	10	0	A few roofs were blown off homes from strong thunderstorm winds.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events
224	Nashville	25-May-98	7:40 PM	tstm wind	0 kts.		0	0	5K	0	Roof and some bricks blown off business in west Nashville, 50th St. and Charlotte Pike.	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
225	Nashville	4-Jun-98	9:00 AM	Lightning	N/A		0	0	250	0	Lightning struck the 108-year-old St. Patrick Catholic Church on Second Ave. So. The fire had done serious structural damage to the roof and steeple.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
226	Inglewood	4-Jun-98	6:20 AM	tstm wind	50 kts.		0	0	0	0	8 inch diameter wide branch snapped off a tree.	
227	Nashville	10-Jun-98	4:10 PM	tstm wind	50 kts.		0	0	0	0	EMA reported scattered areas of trees and power lines were blown down in the western part of the city.	
228	Goodlettsville	10-Jun-98	8:30 AM	tstm wind	50 kts.		0	0	0	0	Trees were blown down.	
229	Nashville	10-Jun-98	9:46 AM	tstm wind	50 kts.		0	0	0	0	EMA reported trees and power lines down.	
230	Nashville	10-Jun-98	10:02 AM	tstm wind	0 kts.		0	0	5	0	Tree fell on a house.	
231	Hermitage	14-Jun-98	9:25 PM	tstm wind	50 kts.		0	2	10	0	A tree fell on a car which injured 2 people.	
242	Nashville Metro Airport	20-Jun-98	6:00 PM	tstm wind	85 kts.		0	0	0	0	98 mph wind gust was recorded in a thunderstorm at the control tower at Metro Airport. Rotating wall cloud was also observed by tower personnel.	
243	Davidson County	3-Jul-98	1:40 PM	tstm wind	50 kts.		0	0	0	0	A few trees, large limbs, and power lines were blown down across the county.	
244	Hermitage	10-Nov-98	11:45 AM	tstm wind	50 kts.		0	0	0	0	Powerlines were down.	
245	Nashville Metro Airport	17-Jan-99	8:16 PM	tstm wind	60 kts.		0	0	0	0	70 mph thunderstorm wind gust recorded at the airport.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-
246	Nashville Metro Airport	2-Mar-99	5:00 PM	tstm wind	0 kts.		0	0	50	0	Straight line thunderstorm winds hit east Nashville. Trees were blown down, and 30 homes were damaged.	
247	Davidson County	5-Apr-99	11:10 PM	tstm wind	50 kts.		0	0	0	0	EMA reported power lines were down.	
248	Nashville	19-Apr-99		Hail			0	0	0	0	Baseball-size hail is reported northwest of Nashville at Whites Creek Pike.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN
249	Bellevue	5-May-99	8:34 PM	tstm wind	52 kts.		0	0	0	0	Spotter reported 60 mph wind gust.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm
250	Nashville	5-May-99	8:34 PM	tstm wind	0 kts.		0	0	5	0	EMA reported roof blown off a house on 10th and Monroe.	
251	Bellevue	5-May-99	8:35 PM	tstm wind	61 kts.		0	0	0	0	Spotter reported 70 mph wind gust.	
252	Nashville	5-May-99	8:40 PM	tstm wind	70 kts.		0	0	0	0	Spotter reported 80 mph wind gust in the Fessler's Lane and Murfreesboro Road area of Nashville.	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
253	Nashville Metro Airport	5-May-99	8:45 PM	tstm wind	86 kts.		0	0	2.7M	0	FAA wind equipment clocked a 99 mph wind gust in the strong thunderstorm downdrafts. 70 planes were damaged, and 2 hangars were destroyed. Many trees and power lines were down around the county. Debris and jet fuel was scattered across the runway. The airport was closed for several hours. The hardest hit areas in Davidson county were Pennington Bend, Elysian Fields, Antioch, Old Hickory, east Nashville and Radnor lake. Part of a roof was lifted off Stratford H.S. Metro schools were cancelled on May 6 so crews could restore power and clean up debris around the county.	
254	Western Davidson County	5-May-99	8:45 PM	tstm wind	50 kts.		0	0	0	0	Widespread trees were blown down across the western part of the county.	
255	Joelton	5-May-99	8:57 PM	tstm wind	50 kts.		0	0	0	0	Tree fell on top of a car.	
256	Goodlettsville	5-May-99	9:05 PM	tstm wind	50 kts.		0	0	0	0	Large trees were uprooted.	
257	Brentwood	10-Jun-99	3:18 PM	tstm wind	50 kts.		0	0	0	0	EMA reported trees blown down.	
258	Nashville	24-Jul-99	2:13 PM	tstm wind	50 kts.		0	0	0	0	Police department reported power lines down in south Nashville.	
259	Nashville	1-Aug-99	2:25 PM	tstm wind	50 kts.		0	0	0	0	Several power lines and trees were down. A tree was blocking Overhill Road and Hillsboro Rd. 4000 homes were without power.	
260	Nashville	12-Aug-99	3:55 PM	tstm wind	0 kts.		0	0	100	0	Newspaper article stated Antioch Middle School, Una Elementary School, and Donelson's Two Rivers Middle School sustained water damage after winds lifted the roofs, allowing rain to seep in. Also, 5 private planes were damaged, 3 of them heavily, on the ramp of Mercury Air, a charter operation at Nashville International Airport. Strong winds collapsed a section of a warehouse in east Nashville.	
261	Bellevue	26-May-00	11:18 AM	tstm wind	61 kts.		0	0	0	0	Spotter reported 70 mph wind gust.	
262	Nashville	26-May-00	11:38 AM	tstm wind	65 kts.		0	0	10	0	Spotter reported trees and power lines down as well as damage to a structure at I-65 and Harding.	
263	Donelson	27-May-00	3:00 PM	tstm wind	51 kts.		0	0	0	0	Spotter reported 60 mph wind gusts and trees down.	
264	Nashville	27-May-00	3:00 PM	tstm wind	61 kts.		0	0	0	0	70 mph wind gusts moved through the Nashville area with many trees and power lines down.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
265	Nashville	29-Jul-00	12:00 PM	tstm wind	50 kts.		0	0	1	0	Spotter measured 58 mph wind gust. Also, a tree fell on a MTA bus in south Nashville.	

THUNDERSTORMS-14

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
266	Bellevue	4-Aug-00	4:45 AM	tstm wind	50 kts.		0	0	0	0	Tree was down at intersection of Sawyer Brown Road and Hicks Road.	
267	Davidson County	9-Nov-00	11:50 AM	tstm wind	55 kts.		0	0	0	0	EMA reported numerous trees and power lines down countywide.	
268	Nashville	25-Feb-01	12:15 AM	tstm wind	50 kts.		0	0	0	0	EMA reported a few trees and power lines down.	
269	Nashville	15-Apr-01	5:30 AM	tstm wind	60 kts.		0	0	0	0	EMA reported a large tree fell on a house located at 4429 Franklin Rd. About 60% of the house was destroyed.	
270	Nashville	15-Apr-01	6:10 AM	tstm wind	65 kts.		0	0	0	0	EMA reported numerous trees down and 7 homes damaged mainly in west Nashville and the Antioch area. A tree fell on a mobile home, trees also fell on cars and damaged an apartment building.	
271	Nashville	28-Apr-01	1:00 PM	tstm wind	60 kts.		0	0	0	0	Spotter reported numerous trees were down, and some	
272	Nashville	7-May-01	5:20 PM	tstm wind	55 kts.		0	0	0	0	Trained spotter reported trees blown down on Old Hickory Golf Course. Also, trees and power lines were down in south Nashville.	
273	Nashville	11-May-01	12:30 PM	tstm wind	50 kts.		0	0	0	0	EMA reported power lines down in South Nashville.	
274	Nashville	20-May-01	6:54 PM	tstm wind	50 kts.		0	0	0	0	Davidson County Office of Emergency Management reported trees and a power pole down in South Nashville.	
275	Cheatham, Davidson, Dickson, Hickman, Humphreys, Macon, Montgomery, Rutherford, Sumner, Williamson, Wilson	4-Jun-01	7:12 PM	High Wind	52 kts.		0	0	0	0	Trees and power lines were down around the county. A decaying area of thunderstorms from Northern Alabama was entering the southern part of Middle Tennessee Monday evening. As a result a strong gust front developed ahead of this area of dissipating thunderstorms. Winds were estimated to be 40 mph with brief occasional gusts to 60 mph along this gust front. No thunderstorms were associated with these winds. Trees and power lines were blown down across several counties in Middle Tennessee. This gust front weakened as it entered southern Kentucky.	
276	Nashville	6-Jun-01	2:15 PM	tstm wind	50 kts.		0	0	0	0	Davidson County Office of Emergency Management reported trees and power lines down in west Nashville. Urban street flooding was also reported.	
277	Nashville	15-Jun-01	1:25 PM	tstm wind	55 kts.		0	0	0	0	Trees and power lines were down around Nashville. A tree was down on Belle Meade Road. Wires were down near Adelphia stadium.	
278	Nashville	26-Jun-01	4:00 PM	tstm wind	50 kts.		0	0	0	0	EMA reported tree down in downtown Nashville.	
279	Antioch	27-Jun-01	3:30 PM	tstm wind	50 kts.		0	0	0	0	Several trees down in Antioch and Woodbine.	
280	Nashville	30-Jun-01	5:00 PM	tstm wind	50 kts.		0	0	0	0	Office of Emergency Management reported trees and power lines down across the southern and western part of the county.	
281	Joelton	4-Jul-01	1:00 PM	tstm wind	50 kts.		0	0	0	0	Spotter reported trees snapped off.	
282	Nashville	5-Jul-01	3:38 PM	tstm wind	50 kts.		0	0	0	0	EMA reported a tree was blown down across a power line near 25th Avenue So.	
283	Nashville	5-Jul-01	9:16 AM	tstm wind	52 kts.		0	0	0	0	Spotter reported 60 mph wind gust in downtown	
284	Goodlettsville	28-Jul-01	3:39 PM	tstm wind	50 kts.		0	0	0	0	Metro EOC reported power lines down.	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
285	Nashville	3-Aug-01	6:00 PM	tstm wind	50 kts.		0	0	0	0	Davidson County OEM reported a power line down at Peabody and Hermitage Ave.	
286	Nashville	24-Oct-01	6:40 PM	tstm wind	57 kts.		0	0	0	0	Numerous trees and power lines were down in Old Hickory.	
287	Nashville	24-Oct-01	7:01 PM	tstm wind	61 kts.		0	0	0	0	Amateur radio report of numerous trees and power poles down in the Nashville metro area.	
288	Nashville	29-Nov-01		rain		3.46	0	0	0	0	Nashville measures 3.46" of rainfall.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
289	Nashville	18-Mar-02		rain		4.12	0	0	0	0	Widespread heavy rainfall begins during the afternoon of the 17th and lasts into the early morning of the 18th. A total of 5 persons are killed across Middle Tennessee, three in Robertson County, one in Lewisburg, another in Nashville. All 5 deaths are vehicle-related. Manchester receives the most rainfall -- 6.44" in 24 hours, with Dickson reporting 5.45", Warner Park (Nashville), 4.12", and Morrison (Warren County), 3.67".	
290	Madison	28-Apr-02	4:30 AM	tstm wind	50 kts.		0	0	0	0	Spotter reported trees were blown down.	
291	Davidson County	30-Apr-02	11:15 PM	tstm wind	55 kts.		0	0	0	0	EMA reported 4 trees down and 5 power lines down around the county.	
292	Davidson County	13-May-02	3:30 AM	tstm wind	50 kts.		0	0	0	0	Numerous trees and power lines down around the county including Hermitage, Joelton, East Nashville and Old Hickory. Some trees fell on cars and homes.	
293	Northwest Davidson County	13-May-02	9:22 AM	tstm wind	50 kts.		0	0	0	0	EMA reported trees and power lines down.	
294	Hermitage	13-May-02	9:30 AM	tstm wind	50 kts.		0	0	0	0	NWS employee reported trees down.	
295	Bellevue	24-Jun-02	4:50 PM	tstm wind	50 kts.		0	0	0	0	EMA reported trees and power lines were down.	
296	Hermitage	25-Jun-02	5:27 AM	tstm wind	50 kts.		0	0	0	0	EMA reported a tree down on Shutes Lane and Saundersville Rd.	
297	Nashville	25-Jun-02	6:25 AM	tstm wind	50 kts.		0	0	0	0	EMA reported trees were down in the western sections of the city.	
298	Nashville	30-Jun-02	7:30 PM	tstm wind	50 kts.		0	0	0	0	Police reported several trees were down in East Nashville.	
301	Davidson County	10-Jul-02	2:08 PM	tstm wind	55 kts.		0	0	0	0	Davidson county OEM reported numerous trees and scattered power outages. Areas affected were Joelton...Whites Creek and Donelson.	
302	Nashville	12-Jul-02	2:30 PM	tstm wind	50 kts.		0	0	0	0	OEM reported a power line was down on Woodale Ln.	
303	Nashville	22-Jul-02	11:50 AM	tstm wind	50 kts.		0	0	0	0	Law enforcement reported numerous trees and power lines down in the West End area.	
304	Davidson County	30-Jul-02	11:31 AM	tstm wind	50 kts.		0	0	0	0	OEM reported 6 trees were blown down along with numerous power lines.	

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305	Nashville	16-Aug-02	12:35 PM	tstm wind	65 kts.		0	0	0	0	EMA reported an air conditioner unit was blown off a two-story building onto a car on 4th Ave. and Lafayette. Also, many large trees were blown down. There was some damage at Greer Stadium. The strong winds damaged the Nashville Sound's guitar-shaped scoreboard. There was also damage to the stadium's temporary bleachers.	
306	Madison	22-Aug-02	2:45 PM	tstm wind	50 kts.		0	0	0	0	SKYWARN spotter reported trees were blown down.	
307	Madison	22-Aug-02	2:45 PM	tstm wind	60 kts.		0	0	0	0	NWS employee reported numerous trees were down near Anderson Road, between Myatt Drive and Gallatin Road.	
308	Nashville	1-May-03	2:20 PM	tstm wind	55 kts.		0	0	0	0	Numerous power lines and trees down in western portion of county.	
309	Nashville	1-May-03	2:45 PM	tstm wind	55 kts.		0	0	0	0	Numerous 3 to 8 inch diameter trees down.	
310	Nashville	5-May-03	1:38 AM	tstm wind	70 kts.		0	0	0	0	Spotter reported structural damage to homes near Madison. The White House granted Governor Phil Bredesen's request for Presential Disaster Declaration for 20 counties in West and Middle Tennessee for damage as a result of tornadoes, flooding and severe	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
311	Nashville	5-May-03	12:44 AM	tstm wind	50 kts.		0	0	0	0	Spotter reported power lines down near Skyline Medical Center. The White House granted Governor Phil Bredesen's request for Presential Disaster Declaration for 20 counties in West and Middle Tennessee for damage as a result of tornadoes, flooding and severe thunderstorms which began on Sunday , May 4, 2003.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
312	Nashville	7-May-03	1:10 AM	tstm wind	65 kts.		0	0	0	0	EMA reported numerous trees were blown down and 3 buildings were damaged at the Rivergate Mall. A McDonald Restaurant had damage to its signs, a Lenscrafter store had roof damage, and the El Chico Mexican Restaurant had its awnings torn away and minor roof damage. The White House granted Governor Phil Bredesen's request for Presential Disaster Declaration for 20 counties in West and Middle Tennessee for damage as a result of tornadoes, flooding and severe thunderstorms which began on Sunday , May 4, 2003.	
313	Nashville	11-May-03	2:12 AM	tstm wind	50 kts.		0	0	0	0	Spotter reported a wind gust around 60 mph.	
314	Nashville	11-May-03	2:12 AM	tstm wind	68 kts.		0	0	0	0	Spotter reported a measured gust of 78 mph.	
315	Nashville	10-Jun-03	2:05 PM	tstm wind	55 kts.		0	0	10	0	Tree fell on a house located at 113 Belvedere Drive in Nashville.	
316	Antioch	10-Jun-03	2:08 PM	tstm wind	50 kts.		0	0	0	0	Large tree limbs were down about one mile west of Hickory Hollow Mall.	
317	Antioch	10-Jun-03	2:10 PM	tstm wind	60 kts.		0	0	0	0	Ham radio operator reported a 16 inch diameter tree blew down on a house. 2 other trees were uprooted.	
318	Forest Hills	11-Jun-03	2:00 PM	tstm wind	60 kts.		0	0	0	0	EMA reported numerous trees were down.	
319	Donelson	11-Jun-03	2:15 PM	tstm wind	55 kts.		0	0	0	0	Ham radio operator reported trees down and one power line down.	

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320	Nashville	16-Jun-03	3:15 PM	tstm wind	50 kts.		0	0	0	0	Two trees were blown down near the Rivergate Mall.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events
321	Nashville	10-Jul-03	1:40 PM	tstm wind	55 kts.		0	0	0	0	Trees and power lines were down in downtown Nashville.	
322	Bellevue	12-Jul-03	4:11 PM	tstm wind	50 kts.		0	0	0	0	Public reported a tree down at the intersection of U.S. Highway 70 and U.S. Highway 70S.	
323	Whites Creek Area	13-Jul-03	4:00 PM	tstm wind	55 kts.		0	0	0	0	EMA reported trees down.	
324	Davidson County	21-Jul-03	1:00 PM	tstm wind	65 kts.		0	0	493	0	EMA office reported trees and power lines were down around the county. The historic building "The Cannery" in downtown Nashville lost part of its roof, and the fourth floor was damaged. The four-story 120-year-old building was located at Eighth Avenue South. The historic building had to be torn down. The huge building started as the home of Liberty Mills in 1883. Wheat was ground into flour in the old building. The building and the land it was on was worth $493,200.	
325	Donelson	21-Jul-03	1:05 PM	tstm wind	60 kts.		0	0	15	0	Tree was blown down on a vehicle.	
326	Nashville	28-Jul-03	7:15 PM	tstm wind	55 kts.		0	0	0	0	TDOT reported a few trees were down on Maplehurst Ave., Walton Lane, and Old Hickory Blvd.	
327	Nashville	4-Aug-03	9:08 PM	tstm wind	55 kts.		0	0	0	0	Davidson County Office of Emergency Management reported a measured wind gust of 63 mph (55 knots) with numerous trees and power lines down around the county. Several trees fell on houses and cars. There were at least 200 calls about the downed trees and power lines.	
328	Nashville Metro Airport	4-Aug-03	9:15 PM	tstm wind	51 kts.		0	0	0	0	59 mph wind gust measured by BNA ASOS at the airport.	
329	Nashville	4-Aug-03	9:20 PM	tstm wind	65 kts.		0	4	50K	0	Law enforcement and newspaper articles reported 20 to	
330	Nashville Metro Airport	4-Aug-03	9:20 PM	tstm wind	60 kts.		0	0	0	0	Law enforcement reported 2 planes flipped over at BNA airport.	
331	Nashville	4-Aug-03	9:25 PM	tstm wind	55 kts.		0	0	0	0	Spotter reported trees down at the corner of 46th Ave. and Charlotte.	
332	Nashville	22-Aug-03	6:50 PM	tstm wind	50 kts.		0	0	0	0	Spotter reported a tree was blown down on a house.	
333	Nashville	22-Aug-03	6:50 PM	tstm wind	50 kts.		0	0	0	0	NWS employee reported an interstate road sign was twisted near Percy Priest Dam.	
334	Nashville	22-Aug-03	6:50 PM	tstm wind	52 kts.		0	0	0	0	Spotter estimated wind gusts to be 60 mph.	

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335	Nashville	22-Aug-03	7:00 PM	tstm wind	55 kts.		0	0	0	0	Davidson County OEM reported 78 downed trees, 146 downed power lines and 35,000 people with out power in the Nashville Metro area.	
336	Antioch	27-Aug-03	1:50 PM	tstm wind	50 kts.		0	0	0	0	Large tree limbs were blown down.	
337	Nashville	30-Aug-03	5:30 PM	Lightning	N/A		0	0	10	0	News article about lightning striking the William R. Snodgrass Tennessee Tower. The lightning set off the sprinkler system in the 31-story building. The water leaked through elevator shafts onto almost every floor of the building. The first four floors were the hardest hit. The elevator shafts filled up with more than 20 feet of water. The building was built in 1970 as the headquarters of the National Life and Accident Insurance Company.	
338	Nashville	18-Nov-03	1:25 PM	tstm wind	52 kts.		0	0	0	0	Ham radio spotter reported a 60 mph wind gust in the Green Hills section of Davidson County.	
339	Nashville	13-Jul-04	8:19PM	tstm wind	60 kts.		0	0	0	0	Winds were estimated to be 60 to 70 mph in the Green Hills area.	
340	Nashville	13-Jul-04	8:28 PM	tstm wind	60 kts.		0	0	0	0	Davidson County OEM reported hundreds of trees and power lines were down around the county.	
341	Nashville	13-Jul-04	8:39 PM	tstm wind	60 kts.		0	0	0	0	Trees down at the intersection of Nolensville Road and Old Hickory Blvd.	
342	Nashville	13-Jan-05	9:03 AM	tstm wind	65 kts.		0	0	20K	0	Strong thunderstorm winds took part of a roof of an apartment building located on Picadilly Row at the Signature Pointe Apartments in Antioch.	National Weather Service Forecast Office; Nashville, TN;
343	Donelson	19-May-05	3:40 PM	tstm wind	60 kts.		0	0	0	0	NWS Trained Spotter estimated wind gusts to be 65 to 70 mph.	
344	Joelton	6-Nov-05	4:10 AM	tstm wind	60 kts.		0	0	10K	0	Shallow rooted trees were uprooted, and a few trees were snapped. One home had roof damage. The hardest hit area was along Strawberry Hill Rd.	National Weather Service Forecast Office; Nashville, TN;
345	Nashville	9-Mar-06	4:37 PM	tstm wind	60 kts.		0	0	0	0	Trees and power lines were down. Roof was off one building near Bellevue. Winds toppled over a tractor-trailer truck on I-65 just south of Nashville. Winds were estimated to be about 70 mph.	National Weather Service Forecast Office; Nashville, TN;
346	Nashville	18-Oct-07	10:35 PM	tstm wind	63 kts.		0	0	0	0	Davidson County OEM official reported 73 mph wind gust with hand held anemometer at I-65 and Harding Road.A Tornado Watch was in effect for much of Middle Tennessee Thursday afternoon and evening. Squall line type thunderstorms developed and produced some wind damage, mainly downed trees and power lines. One tornado occurred in extreme northwest part of Stewart County.	
347	Nashville	18-Oct-07	10:40 PM	tstm wind	60 kts.		0	0	2k	0	Several large trees were blown down at the Crieve Hall area of Nashville near the Ellington Agricultural Center.A Tornado Watch was in effect for much of Middle Tennessee Thursday afternoon and evening. Squall line type thunderstorms developed and produced some wind damage, mainly downed trees and power lines. One tornado occurred in extreme northwest part of Stewart County.	

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348	Nashville	2-Apr-09	4:00 PM	tstm wind	60 kts.		0	0	100k	0	A newspaper reported that a spokeswomen with the Davidson County Office of Emergency Management said that the roof was blown off an Internal Revenue Service Building and the building had significant water damage.	
349	Nashville	26-Jun-10	6:30 PM	tstm wind	55 kts.		0	0	150k	0	A survey team consisting of personnel from the NWS and the Metro Nashville Office of Emergency Management surveyed damage in the Grieve Hall area of Southern Davidson County. A microburst, with maximum winds around 90 mph occurred. It resulted in around 100 trees being snapped or uprooted, several buildings with partial uplifting and shingle damage, and four wooden power poles being snapped. Initial damage was noted at the corner of Harding Place and Trousdale Drive. A couple of windows were blown out of a local businesses, several signs were destroyed, and a gas pump was blown over onto a car. The damage area then extended around one mile to the east and south, generally an area bordered by Elysian Fields Road to the north and Trousdale Road to the west.	National Weather Service Forecast Office; Nashville, TN;
350	Nashville	24-Feb-11	9:51 PM	tstm wind	75 kts.		0	0	250k	0	In the Cleveland Street area north of downtown Nashville, at least 100 large hardwood trees were uprooted and a few were snapped. Fallen trees damaged some roofs and vehicles. Some loss of shingles noted on house roofs. A small amount of aluminum siding peeled off a couple of exterior walls. A wood fence was also blown down.	National Weather Service Forecast Office; Nashville, TN;
351	Nashville	4-Apr-11	4:00 PM	tstm wind	60 kts.		0	0	80k	0	Near the intersection of Central Pike and Tulip Grove Road two metal high voltage power poles were bent over. Some trees were also snapped and uprooted.	National Weather Service Forecast Office; Nashville, TN;
352	Nashville	24-May-11	4:00 PM	tstm wind	55 kts.		0	0	60k	0	In the eastern part of Nashville, 40 plus trees were downed along with numerous power poles.	National Weather Service Forecast Office; Nashville, TN;
as of 2012, wind and hail events will not be significant enough to report if under $100k…per NWS												
358	(BNA)NASHVILLE METRO	1/23/2012	135	tstm wind	50		0	0	10000	0		National Weather Service Forecast Office; Nashville, TN; http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=47%2CTENNESSEE
359	BERRY HILL	3/2/2012	1603	tstm wind	71		0	0	0	0		
360	BERRY HILL	5/6/2012	1530	tstm wind	55		0	0	5000	0		
361	NASHVILLE	5/31/2012	1910	tstm wind	55		0	0	25000	0		
362	GLENCLIFF	5/31/2012	1915	tstm wind	55		0	0	5000	0		
363	WOODBINE	5/31/2012	1915	tstm wind	55		0	0	10000	0		
364	PASQUO	7/2/2012	1230	tstm wind	55		0	0	10000	0		
365	JOELTON	7/2/2012	1330	tstm wind	55		0	0	25000	0		
366	NASHVILLE	7/6/2012	1455	tstm wind	55		0	0	25000	0		
367	INGLEWOOD	7/8/2012	1520	tstm wind	55		0	0	5000	0		
368	INGLEWOOD	7/8/2012	1616	tstm wind	55		0	0	3000	0		
369	(BNA)NASHVILL	7/8/2012	1616	tstm wind	55		0	0	3000	0		
370	NASHVILLE	7/8/2012	1620	tstm wind	55		0	0	5000	0		
371	OAK HILL	7/8/2012	1620	tstm wind	55		0	0	20000	0		

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372	HERMITAGE	7/8/2012	2130	tstm wind	55		0	0	25000	0		National Weather Service Forecast Office; Nashville, TN; http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=47%2CTENNESSEE
373	FOREST HILLS	7/18/2012	1720	tstm wind	55		0	0	2000	0		
374	BELLE MEADE	7/18/2012	1720	tstm wind	55		0	0	1000	0		
375	GOODLETTSVILLE	7/19/2012	2020	tstm wind	52		0	0	0	0		
376	JOELTON	7/19/2012	2040	tstm wind	55		0	0	10000	0		
377	THE HERMITAGE	7/19/2012	2055	tstm wind	55		0	0	25000	0		
378	TULIP GROVE	7/19/2012	2115	tstm wind	55		0	0	5000	0		
379	BELLE MEADE	7/19/2012	2115	tstm wind	55		0	0	250	0		
380	BRENTWOOD	7/19/2012	2129	tstm wind	55		0	0	25000	0		
381	BELLE MEADE	7/19/2012	2130	tstm wind	55		0	0	10000	0		
382	NASHVILLE	7/19/2012	2130	tstm wind	55		0	0	10000	0		
383	BORDEAUX	8/1/2012	1632	tstm wind	52		0	0	5000	0		
384	NASHVILLE	8/1/2012	1647	tstm wind	48		0	0	1000	0		
385	TUSCULUM	8/1/2012	1650	tstm wind	52		0	0	5000	0		
386	TUSCULUM	8/1/2012	1655	tstm wind	52		0	0	10000	0		
387	NASHVILLE	8/13/2012	948	tstm wind	52		0	0	2000	0		
388	DONELSON	8/13/2012	955	tstm wind	48		0	0	1000	0		
389	TULIP GROVE	8/13/2012	1000	tstm wind	48		0	0	1000	0		
390	RICHLAND	8/16/2012	2120	tstm wind	52		0	0	2000	0		
391	NASHVILLE	8/16/2012	2120	tstm wind	52		0	0	5000	0		
392	AMQUI	8/16/2012	2127	tstm wind	52		0	2	15000	0		
393	FOUR CORNERS	8/16/2012	2140	tstm wind	52		0	0	30000	0		
394	DONELSON	8/16/2012	2140	tstm wind	52		0	0	2000	0		
395	BRENTWOOD	8/16/2012	2157	tstm wind	48		0	0	1000	0		
396	ERCY PRIEST RE	8/25/2012	1401	tstm wind	30		0	0	5000	0		
397	NASHVILLE	9/5/2012	1715	tstm wind	55		0	0	15000	0		
398	PASQUO	11/3/2012	1633	tstm wind	55		0	0	5000	0		
399	RICHLAND	1/30/2013	305	tstm wind	52		0	0	3000	0		
400	BORDEAUX	1/30/2013	307	tstm wind	52		1	0	5000	0		

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401	BELLE MEADE	1/30/2013	308	tstm wind	52		0	0	15000	0		National Weather Service Forecast Office; Nashville, TN; http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=47%2CTENNESSEE
402	NASHVILLE	1/30/2013	310	tstm wind	61		0	0	10000	0		
403	GOODLETTSVILLE	1/30/2013	315	tstm wind	60		0	0	10000	0		
404	SHVILLE CORNEL	1/30/2013	316	tstm wind	61		0	0	25000	0		
405	STONE RIVER	1/30/2013	321	tstm wind	61		0	0	10000	0		
406	TULIP GROVE	1/30/2013	323	tstm wind	61		0	0	5000	0		
407	BELLE MEADE	4/18/2013	2338	tstm wind	48		0	0	2000	0		
408	FOREST GROVE	4/24/2013	650	tstm wind	43		0	0	2000	0		
409	LICKTON	4/24/2013	655	tstm wind	43		0	0	5000	0		
410	NASHVILLE	5/21/2013	1120	tstm wind	50		0	0	50000	0		
411	WEST MEADE	5/21/2013	2103	tstm wind	50		0	0	1000	0		
412	VAUGHNS GAP	5/21/2013	2105	tstm wind	50		0	0	1000	0		
413	BELLEVUE	6/1/2013	1500	tstm wind	48		0	0	2000	0		
414	MADISON	6/1/2013	1515	tstm wind	48		0	0	2000	0		
415	GOODLETTSVILLE	6/1/2013	1515	tstm wind	48		0	0	1000	0		
416	NASHVILLE	6/1/2013	1520	tstm wind	48		0	0	1000	0		
417	NASHVILLE	6/10/2013	1323	tstm wind	52		0	0	1000	0		
418	WRENCOE	6/10/2013	1344	tstm wind	52		0	0	3000	0		
419	ANTIOCH	6/10/2013	1345	tstm wind	52		0	0	2000	0		
420	ANTIOCH	6/10/2013	1346	tstm wind	52		0	0	3000	0		
421	PARAGON MILL	6/20/2013	1337	tstm wind	48		0	0	1000	0		
422	MADISON	7/10/2013	1710	tstm wind	50		0	0	1000	0		
423	BELLE MEADE	7/10/2013	1757	tstm wind	50		0	0	10000	0		
424	STONE RIVER	7/18/2013	1347	tstm wind	43		0	0	1000	0		
425	SMITH SPGS	7/18/2013	1357	tstm wind	43		0	0	1000	0		
426	WRENCOE	7/18/2013	1401	tstm wind	48		0	0	2000	0		
427	PROVIDENCE	7/18/2013	1410	tstm wind	48		0	0	2000	0		
428	NASHVILLE	8/23/2013	1418	tstm wind	48		0	0	3000	0		

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
429	BELLE MEADE	10/31/2013	2100	tstm wind	52		1	0	3000	0	9 yo riding his bike made contact with a downed power line due to high winds at 585 Charles E. Davis Blvd.	National Weather Service Forecast Office; Nashville, TN; http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=47%2CTENNESSEE
430	ANTIOCH	10/31/2013	2147	tstm wind	52		0	0	10000	0		
431	WRENCOE	10/31/2013	2150	tstm wind	52		0	0	5000	0		
432	LITTLE CREEK	11/17/2013	1905	tstm wind	50		0	0	2000	0		
433	JOELTON	12/21/2013	2103	tstm wind	52		0	0	1000	0		
434	WHITES CREEK	12/21/2013	2110	tstm wind	56		0	0	5000	0		
435	BORDEAUX	12/21/2013	2117	tstm wind	54		0	0	0	0		
436	NASHVILLE	12/21/2013	2120	tstm wind	52		0	0	10000	0		
437	NASHVILLE	12/21/2013	2123	tstm wind	52		0	0	15000	0		
438	WRENCOE	12/21/2013	2144	tstm wind	52		0	0	2000	0		
439	PASQUO	2/20/2014	1944	tstm wind	52		0	0	1000	0		
440	RICHLAND	2/20/2014	1948	tstm wind	52		0	0	1000	0		
441	UNION HILL	2/20/2014	1955	tstm wind	52		0	0	1000	0		
442	BELLEVUE	4/4/2014	429	tstm wind	52		0	0	5000	0		
443	ERCY PRIEST RE	6/7/2014	1750	tstm wind	52		0	0	10000	0		
444	RAYON CITY	6/20/2014	1525	tstm wind	52		0	0	5000	0		
445	THE HERMITAGE	6/20/2014	1532	tstm wind	48		0	0	2000	0		
446	UNION HILL	7/27/2014	2015	tstm wind	50		0	0	1000	0		
447	INGLEWOOD	7/27/2014	2040	tstm wind	50		0	0	50000	0		
448	TULIP GROVE	7/27/2014	2050	tstm wind	50		0	0	10000	0		
449	STONE RIVER	7/27/2014	2050	tstm wind	50		0	0	1000	0		
450	WRENCOE	7/27/2014	2115	tstm wind	50		0	0	0	0		

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Death (#)	Injury (#)	Path Length (miles)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
1	Nashville	12-Feb-1880	12:00 AM	Tornado	F2	0	0				A late evening F2 tornado rips a 4-mile path across the Hillsboro area of Davidson County.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
2	Nashville	Nov - 1811		Tornado								Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1996
3	Davidson County	6-May-1868	4:00 PM	Tornado		5	15	10			Brentwood area	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle
4	Davidson County	18-Apr-1877	10:00 PM	Tornado		10	50	40			12 miles southeast of Nashville	
5	Davidson County	12-Feb-1880	10:00 PM	Tornado	F2			4			Hillsboro Pike	
6	TN and other states	9-Feb-1884		Tornado								Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1994
7	Davidson County	25-Mar-1884	7:30 PM	Tornado							6 miles north of Nashville	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
8	Davidson County	23-Mar-1893	8:15 PM	Tornado	F2	0	17	2			North edge of Nashville, south of the Cumberland River	
9	Davidson County	20-Nov-00	6:00 PM	Tornado	F3	9	40	25			5 miles south of Franklin to LaVergne, including Clovercroft, Nolensville, and Thompson Station	
	Nashville	20-Nov-00		Tornado	F3 & F4	9	40	8		$40,000	F4 tornado cuts a devastating swath 300 yards wide and 8 miles long along the northwest edge of Columbia. Hardin, Wayne, and Lewis Counties may have had related tornado activity before the storm reached Columbia. Most deaths are in the Macedonia community, 2 miles west of Columbia, where the homes and cabins are "turned into kindling wood." The funnel was moving northeastward, heading for the center of Columbia, but turns suddenly to the north. Damage is estimated at $40,000. The tornado kills 27, and injures 75. It is the 4th deadliest tornado to ever strike Middle Tennessee. An F3 tornado kills 9 and injures 40 along a 25-mile path across Williamson, Davidson, and Rutherford Counties.	
10	Statewide	30-Apr-09		Tornado								Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1993
11	Madison	12-Jan-16		Tornado	F2		7	5			Seven are injured in Madison after an F2 tornado rips a five mile path during the middle of the afternoon.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN
	Davidson County	12-Jan-16	2:55 PM	Tornado	F2	0	7	5			Madison area	
12	Middle TN	27-May-17		Tornado							Lake, Dyer, Henry, Gibson, Carrol, Stewart, McNairy, Wilson, Hickman, Weakley, Benton, Houston, Henderso, Perry, and Davidson counties	Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1992
	Davidson County	27-May-17	7:00 PM	Tornado	F2	2	30	35			North of Brentwood, Una, Bakertown, Dodoburg, and Lebanon	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
13	Nashville	12-May-23		Tornado	F2	0	6	10	0	0	An F2 tornado touches down 10 miles north of Nashville, and cuts a 10 mile path northeastward into Sumner County. There are 6 injuries	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
	Davidson County	12-May-23	2:15 PM	Tornado	F2	0	6	10			It started, apparently, in the north-central part of Davidson County about 8 miles north of Nashville, being first observed near and to the east of some hills that rise 200 to 300 feet higher than the	
14	TN and other states	Nov. 25-26, 1926		Tornado								Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1991
15	Davidson County	29-Jun-28		Tornado								
	Nashville	29-Jun-28		Tornado	F2	1	38		0	0	A severe weather outbreak produces 5 tornadoes across Middle Tennessee, beginning on the afternoon of the 28th, and continuing into the next morning. All tornadoes are classified as F2. One person is killed in Davidson County. Another 38 injuries are reported overall.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
	Davidson County	29-Jun-28	1:00 AM	Tornado	F2	1	0	8			4 miles north of Nashville to the Cumberland River	

TORNADOES-1

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Death (#)	Injury (#)	Path Length (miles)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
16	Davidson County	21-Mar-32	6:00 PM	Tornado	F2	3	8	50			Skipped from southwest Leiper's Fork to 3 miles west of Brentwood across Wilson County to near Trousdale County border	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle http://www.srh.noaa.gov/ohx/climate/calendar.htm
17	Davidson County	25-Apr-32	1:30 PM	Tornado	F2	0	3	10			4 miles north of Nashville east-northeast for 10 miles	
18	Middle TN	14-Mar-33		Tornado							Davidson, Wilson, Smith, Campbell, Claiborne, Hancock and Sullivan Counties	Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1989
	Davidson County	14-Mar-33	7:30 PM	Tornado	F3	15	45	45			4 miles west of downtown Nashville for 45 miles east to Bellwood and Lebanon	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
	Nashville	14-Mar-33		Tornado	F3	15	45		0	0	F3 tornado touches down 4 miles west of downtown Nashville, killing 15, injuring 45, and continues for 45 miles, moving through Wilson and Smith Counties.	
19	Davidson County	17-Jun-34	5:00 PM	Tornado	F2	0	0	5			3 miles north of Joelton northwest for 5 miles	
20	Davidson County	28-Mar-35		Tornado								Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1988
21	TN and other states	Feb. 5-6, 1942		Tornado								
22	Nashville	11-Apr-44	6:30 AM	Tornado	F2	1	14	4			One person is killed, and 14 more injured, as an F2 tornado strikes near Lebanon at 6:30 a.m., cutting a 4 mile path before lifting.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
23	TN and other states	Dec. 31-Jan. 1, 1948-49		Tornado								Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1988
24	Davidson County	13-Feb-52	7:45 PM	Tornado	F1	0	0	1	25K	0	Between Newsom Station and Linton	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
	statewide	13-Feb-52		Tornado							Giles, Grundy, Benton, Davidson, Lincoln, Moore, and Franklin Counties	Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1988
	Davidson County	30-Jun-52	6:05 PM	Tornado	F1	0	0		3K	0	Cloverland Acres, near Oak Hill	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
25	Davidson County	22-Jan-57	4:30 PM	Tornado	F2	0	4	15	2.5M	0	Belle Meade to Donelson	
26	Davidson County	22-Jan-57		Tornado							Davidson, Wilson, Rutherford, Warren and Coffee counties	Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1988
	Davidson County	25-Dec-64	10:00 PM	Tornado	F1	0	0	6	2.5M	0	Near Oak Hill to near Antioch	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
27	Davidson County	25-Dec-64		Tornado								Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1988
	Davidson County	14-May-68	4:15 PM	Tornado	F1	0	0		0K	0	Near Oak Hill	National Weather Service Forecast Office; Nashville, TN;
28	Davidson County	25-May-68	6:40 PM	Tornado	F1	0	0		0K	0	Near Forest Grove	
29	TN and other states	21-Feb-71		Tornado								Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1988

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Death (#)	Injury (#)	Path Length (miles)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
30	Davidson County	24-May-71	8:55 PM	Tornado	F0	0	3		250K	0	Near Madison	National Weather Service Forecast Office; Nashville, TN; Tornado Database
31	Davidson County	7-Apr-72	4:45 PM	Tornado	F2	0	15	28	250K	0	Skipped ESE for 28 miles from 2 mile north of Ashland City to Donelson	
33	Davidson County	1-Apr-74	7:10 PM	Tornado	F2	1	12	12	3K	0	From Belle Meade to Nashville airport	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
34	Davidson County	1-Apr-74		Tornado								Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1988
	Davidson County	3-Apr-74	4:18 PM	Tornado	F2	0	0	12	2.5M	0	From the southeast edge of Nashville, traveled northeast for 12 miles	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
35	Davidson County	18-May-95	11:30 AM	Tornado	F2	0	26	5			Near Goodlettsville, including the Rivergate Mall	
36	This Nashville tornado on April 16, 1998 took a very similar path to another F3 tornado that occurred on March 14, 1933, which killed 11 people in Nashville. The tornado touched down at 330 PM one mile west of Charlotte Pike and I-440. A tree fell on an ROTC student at Centennial Park. He was attending an ROTC picnic. He died later on May 4 from his injuries. The tornado went through downtown Nashville at 340 PM and on toward East Nashville, Donelson and Hermitage. The tornado blew out many windows on office buildings. The Nations Bank Office Towers were one of the hardest hit buildings in Nashville. Tennessee Performance Arts Center (TPAC) and the Tennessee Towers sustained damage. TPAC had over 100 windows blown out. NOAA Weather Radio broadcasts from the Tennessee Towers and was off the air for about 24 hours. 30 private airplanes were damaged at Cornelia Fort Airport. Estimated damage to the airplanes was 3 million dollars. 35 buildings in downtown Nashville were "red tagged", meaning these buildings were structurally unsound. Many signs in Davidson county were blown down or severely damaged. The tornado blew down 3 out of 10 construction cranes on the construction site of the Tennessee Oiler's Football Stadium near the Cumberland River. The tornado continued east and hit the residential section of East Nashville. At least 300 homes were damaged in East Nashville. Many homes lost a good part of their roofs, trees were uprooted, telephone poles were knocked down. St. Ann's Episcopal Church, which is well over 100 years old, received major damage. Uprooted trees, damaged roofs to many homes was the story across Donelson and Hermitage. Numerous windows were blown out from the Gaylord Building in Donelson. About half the trees, that is over a thousand trees, were blown down at Andrew Jackson's home, The Hermitage. The Hermitage is a 600 acre estate of the former President. Some of those trees were well over 200 years old, and a few of those trees that were destroyed were planted by Andrew Jackson himself. Mayor Phil Bredesen closed downtown Nashville of Friday, April 17. Many workers had an unscheduled holiday. The downtown area was reopened Monday, April 20. This gave time for cleanup crews to remove broken glass and repair downed power lines. Nashville Electric Service said 75,000 customers were without power.											
37	Nashville Metro Airport	16-Apr-98	3:20 PM	Tornado	F2	0	0	28	50K	0	Trees were blown down. There was some damage to homes from fallen trees. This tornado was not as strong as the first. It started between downtown and Nashville International Airport and continued into Wilson county.	
38	Nashville	16-Apr-98	4:15 PM	Tornado	F2	0	0	1	500K	0	EMA official reported a tornado touchdowns at 12th and Charlotte and 6th and Union. Damage was mainly blown out windows and downed trees and power lines.	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Death (#)	Injury (#)	Path Length (miles)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
39	Nashville	16-Apr-98		Tornado	F2	4	105		0	0	Lawrence County experiences the first F5 tornado in Tennessee's history. Nashville is hit by 3 tornadoes, including an F3, which strikes downtown for the first time in more than 65 years. A total of 10 tornadoes are confirmed across Middle Tennessee. Surprisingly, there are only 4 fatalities across the mid state, with 105 injuries. Baseball-size hail is reported northwest of Ashland City (Cheatham County), damaging 35 to 50 homes. This is the 7th largest tornado outbreak in mid state history.	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
40	Oglesby	30-Jun-98	2:09 AM	Tornado	F1	0	0	1.2	20K	0	The tornado hit south Nashville, in the Oglesby section of town. The tornado began on Hill Road and ended near the intersection of Edmonson Pk and Old Hickory Boulevard. The tornado damaged 2 roofs and snapped trees at the Brentwood Downs Apartments. A lady at the apartment complex saw the tornado.	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
41	Neelys Bend	5-May-99	8:45 PM	Tornado	F1	0	0	0.1	5K	0	A weak tornado caused some roof damage to a few homes at a subdivision in Neely's Bend area of Davidson county.	
42	Nashville	5-May-99		Tornado	F4	3			$4.7 million	0	Severe weather outbreak produces widespread wind damage (at least $4.7 million) across Middle Tennessee. Linden is hit by an F4 tornado, killing 3. FAA wind equipment at Nashville International Airport clocks a 99 mph wind gust. Seventy planes are damaged, and 2 hangars are destroyed. Debris and jet fuel are scattered	
	Lickton	5-May-99	8:58 PM	Tornado	F1	0	0	0.1	1K	0	A weak tornado caused some roof damage to a home on Shaw Rd. in Lickton	
43	Madison	12-Aug-99	4:00 PM	Funnel Cloud	N/A	0	0		0	0	EMA office relayed a public report of a funnel cloud at Gallatin Road and Old Hickory Blvd.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
44	Nashville	13-Feb-00	6:04 PM	Tornado	F1	0	1	4.3	500K	0	About 50 homes and 20 businesses received damage from this tornado. A 25 foot hackberry tree fell on a house. An oak tree crashed into the side of a building. A school trailer was destroyed at St. Vincent De Paul School. There was 15 rooftop damage at an apartment complex on Delta Street. The hardest hit area of downtown Nashville was the Eight Avenue North and Bordeaux . The tornado started around Scovel Street and 28th Avenue North. Extensive damage occurred from this location and to the eastnortheast for just over a mile in length. Numerous trees were uprooted or snapped. Powerlines were down. A number of homes suffered roof damage. The tornado crossed I-265 , moving eastnortheast reaching Arthur Avenue, 10th Ave. and 9th Ave. North, crossed the Cumberland River and then reaching Dickerson Pike and Ellington Parkway, finally dissipating around Petway Avenue and Gallatin Road. One woman was injured when an interstate sign blew into her car and caused her to wreck.	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
45	Nashville Metro Airport	24-May-00	10:58 PM	Tornado	F1	0	0	0.8	20K	0	Trees blown down on Belmont and Caldwell Ave.	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Death (#)	Injury (#)	Path Length (miles)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
46	Nashville Metro Airport	24-May-00	11:00 PM	Tornado	F1	0	0		20K	0	Trees blown down on Woodmont Blvd. and Granny White Pike and onto I-440.	
	Nashville Metro Airport	26-May-00	11:45 AM	Tornado	F1	0	0	1.3	20K	0	Numerous trees and power lines down. The tornado started around Overton and Hill Road. It ended at Marchant Drive, near the Ellington Agricultural Center.	
47	Nashville	5-May-03	12:45 AM	Tornado	F1	0	0	0.2	250K	0	Considerable roof damage to homes in Bellshire Terrace Court and Bellshire Terrace Drive. Cars were overturned. This is in the Bellshire area of northern Davidson county. The White House granted Governor Phil Bredesen's request for Presential Disaster Declaration for 20 counties in West and Middle Tennessee for damage as a result of tornadoes, flooding and severe thunderstorms which began on Sunday , May 4, 2003.	
48	Nashville	11-May-03	2:12 AM	Tornado	F1	0	0	4.5	500K	0	There was damage to the roofs of homes and businesses. Several businesses had their signs damaged as well. The Davidson County tornado started about 5.3 miles northeast of downtown Nashville near Riverwood Drive. The tornado crossed the Cumberland River and affected the Opryland area and dissipated around Bonnameade Road or about 8.9 miles east northeast of downtown Nashville.	
49	Nashville	11-May-03		Tornado	F3 & F1	0	0		0	0	An pre-dawn severe weather outbreak produces six tornadoes across the Nashville metropolitan area. Two of the tornadoes (Franklin and Walterhill) are rated as F3, and produce considerable damage. The other four twisters are rated F1. Amazingly, there are no injuries. This is the 9th largest tornado outbreak in Middle Tennessee's history.	National Weather Service Forecast Office; Nashville, TN;
50	Nashville	15-Nov-05		Tornado	EF0	0	0	0.2	1K	0	Utility poles were broken at 3205 and 3225 Whites Creek Pike. This was from the storm complex that came from Dickson County. This report was given to the NWS by Nashville Electric Service.	
51	Goodlettsville	7-Apr-06		Tornado	EF3	0	7	5	10M	0	The tornado destroyed many residential homes in Goodlettsville. Significant damage was done to the Metro Baptist Church with part of the roof blown off and front of church blown away. This tornado destroyed 25 homes, 13 homes or businesses with major damage and 31 with moderate damage/.	
52	Scottsboro	6-Feb-08		Tornado	EF0	0	0		0	0	Trees were blown down.The Super Severe Weather Outbreak on Feb. 5, 2008 produced supercelluar thunderstorms, well in advance of a multicell line of thunderstorms. The whole episode lasted about 6 hours. This occurred ironically while many states, including Tennessee, were participating in the Super Tuesday Primary Election. Fortunately, polls had already closed in the mid state when these tornadoes struck.	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Death (#)	Injury (#)	Path Length (miles)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
53	Nashville	2-Apr-09		Tornado	EF1	0	1	2	500k	0	An EF1 Tornado with maximum estimated wind speed around 90 to 100 mph touched down in the Nashville Metro Area. The tornado touched down south of Briley Parkway and Murfreesboro Pike, where it caused minor damage to houses and downed several trees. As the tornado crossed Murfreesboro Pike and it damaged several businesses, some significantly. The tornado continued north and caused minor damage to houses and downed trees, some very large, then crossed Interstate 40 west of Briley Parkway and lifted near Elm Hill Pike.	
54	Nashville	2-May-10		Tornado	EF1	0	0	3.64	500k	0	The initial touchdown was near the intersection of South Dickerson Pike and Old Dickerson Pike in northeast Davidson county. Trees were snapped, trailers suffered roof and underpinning damage, and an old building had its roof removed.||Damage, which continued to the northeast for over 3.5 miles, consisted of minor roof uplifting along with hundreds of snapped trees. The tornado crossed Rivergate Parkway at the Rivergate Mall. It blew over power poles and business signs. Several large projectiles impacted the Mallâ€™ facade, leaving craters as high as 30 feet off the ground. The last evidence of damage was to business signs just east of Rivergate Mall on Gallatin Pike.||Maximum wind speeds in the tornado were estimated to be around 105 mph.	
55	Nashville	26-Jul-10		Tornado	EF1	0	0	0.5	200k	0	National Weather Service and Metro Nashville Office of Emergency Management Officials surveyed damage in Northern Davidson County. Most of the surveyed damage, including Trail Hollow Lane just west of Interstate 24, and communities along Brick Church Pike from Northbrook Drive south to Briley Parkway, was from microburst winds. A semi-trailer was blown over, dozens of trees were snapped and uprooted, and several roofs suffered minor damage. Maximum winds in these areas were around|80 mph.||Further north, areas along Westchester Drive experienced much more significant damage. Approximately 12 brick homes suffered heavy roof damage, including one which had a large section of the roof removed. Two buildings were impaled by two by fours, and a couple of dozen windows were blown out. The damage pattern in this area was characterized by convergence and obvious rotation consistent with a tornado. Damage that occurred was also consistent with the highest end of the EF-1 range, 105 to 110 mph.	National Weather Service Forecast Office; Nashville, TN;
56	Nashville	24-Feb-11		Tornado	EF2	0	0	4.86	500k	0	Damaged occurred in the Smith Springs Area of southeast Davidson County. Damage began near the intersection of Butler and Smith Springs Road where two churches experienced significant roof damage. Damage continued to the northeast across the Priest Lake Forecast Community where approximately ten homes suffered significant roof damage. A couple of homes had complete roof loss including a two story home which lost most of its second floor. Damage continued northeast across Percy Priest Lake and eventually into Wilson County. The last evidence of damage was near the intersection of Gladieville Circle and Stewarts Ferry Pike.	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Death (#)	Injury (#)	Path Length (miles)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
56	Nashville	24-Feb-11		Tornado	EF2	0	0	2.59	500k	0	Damaged occurred in the Smith Springs Area of southeast Davidson County. Damage began near the intersection of Butler and Smith Springs Road where two churches experienced significant roof damage. Damage continued to the northeast across the Priest Lake Forecast Community where approximately ten homes suffered significant roof damage. A couple of homes had complete roof loss including a two story home which lost most of its second floor. Damage continued northeast across Percy Priest Lake and eventually into Wilson County. The last evidence of damage was near the intersection of Gladieville Circle and Stewarts Ferry Pike.	
58	Nashville	4-Apr-11		Tornado	EF1	0	1	2.67	250k	0	The EEF1 tornado began along the Davidson and Williamson County line, along Kidd Road. The damage path extended east across Battle Road, Waldron Road, along Blair Road, and ending near Interstate 24 and Sam Ridley Parkway. The damage path ranged from 50 to 100 yards wide. Damage was very consistent along the path, which was just over 4 miles long. ||The debris pattern showed clear convergent patterns, and eyewitness accounts support the determination that a tornado caused the damage. Numerous power poles were snapped. Hundreds of trees were snapped or uprooted. Some of these had large root systems. Some small storage buildings were destroyed. Numerous homes had roof|and siding damage. Several fences were blown down. Debris was scattered hundreds of yards. A tractor trailer was blown over on Interstate 24. Several cargo trailers were overturned on Interstate 24 also.	
59	Joelton	30-Jan-13	300 AM	Tornado	EF0	0	0	5.55	10	15	An EF0 tornado began in Joelton along Harper Road between I-24 and Highway 41 where 3 large oak trees were uprooted and fell in a convergent pattern. The damage path continued east northeast with mostly tree damage. Along Bidwell Road, damage to a roof and barn was observed along with 10 to 15 downed trees. The path of damage crossed Wilkinson Road, Ridgewood Road, and Ivy Point Road where numerous trees were snapped and uprooted before the tornado lifted.	
60	Ivy Point	30-Jan-13	310 AM	Tornado	EFO	0	0	2.33	70	20	An EF0 tornado touched down west of Freeman Hollow Road at Freeman Hollow Court where numerous trees were snapped and uprooted. Additional trees were blown down with a few homes receiving minor roof damage to the east along Baker Road, Old Springfield Pike, and Highway 11. An old barn was also destroyed east of Highway 11. The tornado then crossed into Sumner County.	
61	Inglewood	30-Jan-13	312 AM	Tornado	EF0	0	1	3.2	150	10	An EF0 tornado touched down just northeast of the I-65 and Trinity Lane interchange and moved eastward along a narrow intermittent path through East Nashville before ending around McGavock Pike in Inglewood just to the west of the Cumberland River. Several mobile homes were heavily damaged by falling trees along Dickerson Pike, with one woman receiving a minor injury in the Ranchwood Mobile Home Park. Numerous homes had minor roof and exterior damage along Donald Street, Gordon Terrace, Woodyhill Drive, and Jones Avenue, and several large trees were blown down. Some roof damage was noted to health department buildings on RS Gass drive south of Hart Lane. Dozens of more homes suffered minor roof and exterior damage from the Gillock Street and Gallatin Pike area eastward to near McGavock Pike, with numerous trees and fences blown down.	

WINTER STORMS-1

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
1	Nashville	Dec-Jan 1779-80		severe winter							Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1996
2	Nashville	1787-88		severe winter							
3	Statewide	Feb 1823		severe winter							
4	Middle Tennessee	Dec-Jan 1831-32		severe winter							
5	Statewide	Mid April 1849		severe cold/snow							
6	Middle Tennessee	22-Jan-1873		blizzard	0.0	0	0	0	0		
7	Nashville	08-Jan-1886		snow	3.7	0	0	0	0	A winter storm ushers in one of the worst cold outbreakes in mid state history. A strong cold front 3.7" of snow to Nashville, and drops the temperature from a high of 35 degrees to -8 the following morning. For the next 3 days, the temperature does not rise above 8 degrees, and the low temperature drops to 0 or below for five consecutive mornings, falling to -9 degrees on the morning of January 11.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
8	Nashville	2-Feb-1886		snow	6.5	0	0	0	0	Nashville receives 6½" of snow.	
9	Nashville	3-Feb-1886		snow	9.8	0	0	0	0	Nashville records greatest one-day snowfall for February, measuring 9.8".	
10	Nashville	21-Jan-1888		snow	6.1	0	0	0	0	Nashville receives 6.1" of snow.	
11	Nashville	17-Mar-1892		snow	17.0	0	0	0	0	Nashville records its greatest one-day snowfall ever, measuring 17". The snow starts after midnight, and continues until noon. No street cars are running. Morning trains are delayed. And the "arteries of trade" are clogged. Suburban workers have to walk to town. Mailmen don't leave the post office on their rounds until 10:00 a.m. A freight train from Chattanooga slides off the track at the Winton community, near Murfreesboro, and a passenger train from Memphis due at 7:00 a.m. doesn't arrives until 2:00 p.m. Riddleton, a few miles northwest of Carthage, receives 18.7" in what is believed to be the greatest single-day snowfall in Middle Tennessee's history.	
12	Nashville	11-Feb-1895		snow	6.0	0	0	0	0	Nashville receives 6" of snow.	
13	Nashville	14-Feb-02		snow	8.0	0	0	0	0	Nashville receives 8.0" of snow.	
14	Nashville	29-Jan-05		snow	8.5	0	0	0	0	Nashville records greatest one-day snowfall for January, measuring 8.5"	
15	Nashville	8-Feb-10		snow	8.8	0	0	0	0	Nashville receives 8.8" of snow.	
16	Nashville	25-Apr-10		snow/ice	1.5	0	0	0	0	Temperature at Nashville drops to 32 -- the latest freeze ever. Snowfall measuring 1½" also represents the greatest one-day snowfall for April, and is the latest date for measurable snowfall.	
17	Nashville	18-Dec-16		snow	6.0	0	0	0	0	Nashville records greatest one-day snowfall for December, measuring 6".	
18	Nashville	4-Mar-17		snow	7.5	0	0	0	0	Nashville receives 7½" of snow.	
19	Nashville	11-Jan-18		snow	6.5	0	0	0	0	Nashville receives 6½" of snow.	
20	statewide	Winter 1917-18		winter storm							Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1990
21	Nashville	30-Oct-25		snow	1.0	0	0	0	0	Nashville records earliest measurable snowfall, with 1".	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
22	Nashville	20-Feb-29		snow	7.0	0	0	0	0	Nashville receives 7" of snow.	
23	Nashville	21-Feb-29		snow	8.0	0	0	0	0	Nashville receives 8" of snow, for a two-day total of 15". The entire event occurs during a 13-hour period.	
24	Nashville	22-Nov-29		snow	5.0	0	0	0	0	Five inches of snow fall at Nashville, the most ever measured on this date.	
25	Nashville	19-Jan-36		snow	6.2	0	0	0	0	Nashville receives 6.2" of snow.	

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
26	Nashville	16-Jan-48		snow	7.0	0	0	0	0	Nashville receives 7" of snow.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
27	Nashville	24-Nov-50		snow	7.2	0	0	0	0	Nashville records greatest one-day snowfall for November, measuring 7.2".	
28	Nashville	29-Jan-51		snow/ice	1.6	0	0	0	0	The worst ice storm in Nashville's history begins, causing a complete stalemate of transportation in Nashville for two days. Frozen precipitation starts during the evening, with 1.6" of snow and ice accumulating by midnight.	
29	Nashville	31-Jan-51		snow	5.0	0	0	0	0	Five inches of snow and ice fall, much of it during the evening, producing a water equivalent of 3.83". This is the greatest one-day precipitation event for January in Nashville's history.	
30	Nashville	1-Feb-51		snow	5.2	0	0	0	0	Precipitation continues at Nashville through the morning, most of it as snow, and finally ends around noon. An additional 5.2" are measured, leaving the city buried under 8" of ice and snow.	
31	Nashville	2-Apr-51		snow	1.0	0	0	0	0	A rare late-season winter weather event produces an inch of snow at Nashville. The high of 43 is the lowest high temperature ever recorded on this date.	
32	Davidson County	7-Jun-55	11:30 AM	hail	1.0	0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events
33	Davidson County	14-Aug-56	4:10 PM	hail	0.8	0	0	0	0	None Reported	
34	Davidson County	27-Aug-56	7:30 PM	hail	0.8	0	0	0	0	None Reported	
35	TN and other states	23-31-Jan-1957		ice storm							Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1989
36	Davidson County	17-May-57	11:10 AM	hail	1.8	0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
37	Nashville	5-Jan-60		snow	7.3	0	0	0	0	A winter storm brings heavy snowfall to much of Middle TN.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN
38	Nashville	8-Feb-60		snow	7.4	0	0	0	0	Nashville receives 7.4" of snow.	
39	statewide	2-Mar-60		ice storm							Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1988
40	Nashville	26-Feb-62		snow	9.7	0	0	0	0	Nashville gets 9.7" of snow	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
41	Davidson County	30-Apr-62	3:45 PM	hail	0.8	0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
42	Nashville	11-Dec-62		snow/cold	2.8	0	0	0	0	It's the beginning of a record cold outbreak in Middle Tennessee. Nashville's temperature drops to 3 degrees after a snowfall of 2.8".	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
43	Davidson County	10-Jan-63	9:00 PM	hail	0.8	0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events /
44	Davidson County	10-Jan-63	11:35 PM	hail	0.8	0	0	0	0	None Reported	
45	Nashville	23-Jan-63		snow	6.2	0	0	0	0	The strongest cold front in mid state history brings heavy snow and an unprecedented drop in temperature. Nashville receives 6.2" of snow. In addition, the high temperature reaches 48 degrees, but plummets to -13 degrees by midnight, for a range of 61 degrees. This is the greatest daily range of temperatures in Nashville's history.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm

WINTER STORMS-3

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
46	Davidson County	7-Jul-63	10:30 AM	hail	0.8	0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-
47	Davidson County	20-Mar-64	5:08 PM	hail	0.8	0	0	0	0	None Reported	
48	Davidson County	24-Dec-64	4:30 PM	hail	1.0	0	0	0	0	None Reported	
49	Davidson County	11-Apr-65	6:56 PM	hail	0.8	0	0	0	0	None Reported	
50	Nashville	22-Jan-66		snow	7.5	0	0	0	0	Nashville receives 7.5" of snow.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
51	Davidson County	12-Apr-66	6:15 PM	hail	1.0	0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events /
52	Davidson County	12-Apr-66	7:05 PM	hail	3.0	0	0	0	0	None Reported	
53	Nashville	2-Nov-66		snow	7.2	0	0	0	0	A rare, early-season snowstorm strikes the mid state, as Nashville ties its record for greatest one-day snowfall for November, measuring 7.2".	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
54	Davidson County	23-Apr-67	1:10 PM	hail	0.8	0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events /
55	Davidson County	19-May-67	4:30 PM	hail	0.8	0	0	0	0	None Reported	
56	Nashville	20-Mar-68		snow	8.2	0	0	0	0	Nashville measures 8.2" of snow in a rare late-season winter weather event.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
57	Davidson County	23-Apr-68	12:15 PM	hail	1.8	0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events /
58	Davidson County	21-Apr-69	9:35 PM	hail	0.8	0	0	0	0	None Reported	
59	Nashville	25-Dec-69		snow	2.7	0	0	0	0	Nashville records greatest Christmas Day snowfall ever, measuring 2.7".	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
60	Davidson County	4-Mar-70	6:15 PM	hail	0.8	0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
61	Nashville	6-Apr-71		snow	1.1	0	0	0	0	A rare late-season winter weather event produces 1.1" of snow at Nashville. The high temperature of 42 is the lowest high temperature ever recorded on this date	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
62	Davidson County	27-Apr-71	7:35 PM	hail	1.0	0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events
63	Davidson County	27-Jun-71	4:15 PM	hail	0.8	0	0	0	0	None Reported	
64	Davidson County	7-Apr-72	5:17 PM	hail	0.8	0	0	0	0	None Reported	
65	Davidson County	10-May-73	12:45 PM	hail	1.0	0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
66	Davidson County	19-May-73	12:30 PM	hail	1.0	0	0	0	0	None Reported	
67	Davidson County	3-Apr-74	4:09 PM	hail	0.8	0	0	0	0	None Reported	
68	Davidson County	15-May-76	1:47 PM	hail	0.8	0	0	0	0	None Reported	
69	Davidson County	15-May-76	2:00 PM	hail	0.8	0	0	0	0	None Reported	
70	Davidson County	17-Jul-77	5:54 PM	hail	1.8	0	0	0	0	None Reported	
71	Davidson County	6-May-84	12:15 PM	hail	1.8	0	0	0	0	None Reported	
72	Davidson County	6-May-84	1:10 PM	hail	1.8	0	0	0	0	None Reported	
73	Nashville	1-Feb-85		snow	6.7	0	0	0	0	Nashville receives 6.7" of snow	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
74	Davidson County	4-Jun-85	4:10 PM	hail	4.5	0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events
75	Davidson County	4-Jun-85	4:25 PM	hail	1.8	0	0	0	0	None Reported	
76	Davidson County	6-Jun-85	7:25 PM	hail	1.8	0	0	0	0	None Reported	
77	Nashville	7-Jan-88		snow	8.1	0	0	0	0	A snowstorm brings widespread accumulation to the midstate.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
78	Davidson County	2-Aug-88	2:15 PM	hail	0.8	0	0	0	0	None Reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events
79	Davidson County	6-May-89	4:40 AM	hail	0.8	0	0	0	0	None Reported	
80	Davidson County	20-May-89	2:11 AM	hail	0.8	0	0	0	0	None Reported	
81	Nashville	7-Dec-89		snow		0	0	0	0	A winter storm leaves 40,000 homes around Nashville without electricity for several hours.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
82	Hermitage	15-Apr-93	1:30 PM	hail	1.3	0	0	0K	0	Ping-Pong ball-size hail was reported	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
83	South Nashville	25-Aug-93	2:15 PM	hail	0.9	0	0	0	0	Some trees were blown down.	
84	Northeast Tennessee	4-Jan-94	1200	snow	N/A	0	0	1K	0	A winter storm dumped four to six inches of snow on Northeast Tennessee. Numerous roads were closed by the snow.	
85	Northeast Tennessee	14-Jan-94	1800	snow	N/A	0	0	0K	0	Up to two inches of snow fell on parts of Northeast Tennessee.	
86	Nashville	9-Feb-94		snow/ice	1.0	0	0	0	0	A major winter weather event strikes the mid state. Temperature at Nashville at midnight is 70 degrees, but a strong cold front sweeps through, with temperatures falling throughout the day. By noon, snow begins as the temperature falls to 32 degrees, and changes to freezing rain by evening. At midnight, the temperature is 23 degrees. By the following morning, the ground is covered by an inch of snow and ice.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
87	Tennessee	9-Feb-94	2000	ice storm	N/A	0	0	500K	0	A major ice storm hit much of Tennessee. Numerous trees were knocked down. Many of these trees took down power lines as well. About 770,000 people in the state lost power for some period of time. One person was killed in Memphis when a tree fell upon his car while he was driving.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
88	Nashville	27-Apr-94	9:00 AM	hail	0.8	0	0	0K	0	None Reported	
89	Goodlettsville	29-Apr-94	1:40 PM	hail	1.8	0	0	1K	0	A few trees were blown down	
90	Middle and East Tennessee	17-Jan-95	400	heavy snow	N/A	0	0	0	0	A mix of sleet and freezing rain fell on parts of Middle and East Tennessee. Numerous roads were closed because of the icy conditions. Numerous auto accidents occurred with one death reported from an accident near Knoxville. Numerous trees and	
91	Middle and East Tennessee	17-Jan-95	1700	ice	N/A	0	0	500K	0		
92	Percy Priest Lake	20-Mar-95	6:10 PM	hail	0.8	0	0	0K	0	None Reported	
93	Middle Tennessee	6-Jan-96	5:00 PM	winter storm	N/A	0	0	10K	0	The snow started Saturday evening and did not let up until Monday morning. As a result, church services were cancelled Sunday, schools were closed for several days across middle Tennessee. There were several fender benders as a result of the snow storm across middle Tennessee. Snow totals for this storm were 4 to 5 inches across Davidson county, 1-3 inches for the southern part of middle Tennessee, and as much as 8 inches for Gainsboro in Jackson county and 6-8 inches for Clay county. Jackson and Clay counties are located in the Cumberland Plateau.	
94	Middle Tennessee	6-Jan-96	5:50 AM	winter storm	N/A	0	0	0	0	Freezing rain started across middle Tennessee during the early morning hours. The freezing rain caused slippery roadways Saturday morning, especially on bridges and overpasses. The freezing rain changed to sleet in the afternoon and then to all snow around evening.	
95	Nashville	19-Mar-96		snow	8.7	0	0	0	0	Nashville receives 8.7" of snow.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
96	Joelton	20-Apr-96	2:00 AM	hail	1.8	0	0	0	0	Golf ball size hail covered the ground 1.5 inches to 2.0 inches deep from Joelton to Pleasant View.	
97	Millersville	20-Apr-96	2:20 AM	hail	1.3	0	0	0	0	Half dollar size hail near the Sumner County-Davidson County line.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events /
98	Nashville	29-Apr-96	2:25 PM	hail	0.8	0	0	0	0	Dime size hail reported at Long Hunter State Park.	

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
99		19-May-96	1:00 AM	heavy snow	N/A	0	0	5K	0	A heavy wet snow hit portions of middle Tennessee, especially the northern portions close to the Kentucky border. The weight of the snow brought large tree branches and power lines down across middle Tennessee. As a result, thousands were left without power. On Tuesday afternoon, March 19, the snow accumulated up to 12 inches in northern Sumner County with drifts up to 10 feet reported at the Tennessee Christian Medical Center at Portland. Also, many areas in the city of Portland lost power at 12:45 PM Tuesday. Around 11:00 AM Wednesday March 20, a Lear Jet slid off the runway at Portland Municipal airport. There were no injuries and only slight damage to the aircraft. Problems started with the snow at 4:30 AM on March 19, with 3 inches of snow across Williamson county. Reports of downed trees and power lines were being received across the county and also from Bellevue in southwest Davidson County. By 6:00 AM, the snow had accumulated to 3 to 4 inches across Williamson county and also at Bellevue. Specifically, there were 4 inches at Franklin in Williamson county and 3 inches at the Nashville airport. By 9:00 AM, Nashville received 4 inches of snow. The snow continued to accumulate. Snow reports by 1:00 PM were: 4-8 inches across Montgomery and Robertson counties, 5-6 feet drifts were common across Sumner county. The snow had settled to 3 inches at Nashville at 1:00 PM. There were 12,000 people without power in Fairview in Williamson county at 2:30 PM. On Wednesday March 20, 4:30 AM these were the following snow totals received by the National Weather Service: Lafayette in Macon county had 8 inches with 3 to 5 feet	
100	Goodlettsville	21-Jul-96	8:40 PM	hail	1.8	0	0	0	0	Dime to golf ball size hail reported.	
101	Nashville	28-Mar-97	7:55 PM	hail	0.9	0	0	0	0	Amateur radio operator relayed report of nickel size hail at Opryland Park.	
102	Goodlettsville	28-Mar-97	8:00 PM	hail	0.9	0	0	0	0	Emergency management official reported nickel size hail.	
103	Madison	28-Mar-97	8:04 PM	hail	1.8	0	0	0	0	SKYWARN Spotter reported golf ball size hail.	
104	Nashville	26-May-97	8:49 PM	hail	1.0	0	0	0	0	Quarter size hail reported at I-40/440 junction.	
105	Nashville Metro Airport	13-Jun-97	1:55 PM	hail	1.8	0	0	0	0	Golf ball size hail at the airport.	
106	Nashville	25-Oct-97	6:17 AM	hail	0.9	0	0	0	0	METRO EOC reported nickel size hail near I-65 in the southern part of the county.	
107	Antioch	30-Nov-97	2:35 PM	hail	1.0	0	0	0	0	Quarter size hail reported by local law enforcement.	
108	Nashville	3-Apr-98	3:18 PM	hail	0.8	0	0	0	0	Local EMA official reported dime size hail.	
109	Nashville	3-Apr-98	3:37 PM	hail	0.8	0	0	0	0	Metro police reported dime size hail in south Nashville.	
110	Nashville	16-Apr-98	2:15 PM	hail	1.8	0	0	0	0	Sheriff reported golf ball size hail in west Nashville on Charlotte Pike.	
111	Nashville	16-Apr-98	2:34 PM	hail	0.8	0	0	0	0	NWS employee reported dime size hail on Delta Queen Drive near Opryland.	
112	Madison	16-Apr-98	2:36 PM	hail	0.8	0	0	0	0	Sheriff reported dime size hail.	
113	Inglewood	16-Apr-98	2:43 PM	hail	1.0	0	0	0	0	NWS employee reported quarter size hail.	
114	Nashville	16-Apr-98	3:20 PM	hail	0.9	0	0	0	0	County sheriff reported nickel size hail in the Green Hills area.	
115	Madison	16-Apr-98	4:20 PM	hail	1.0	0	0	0	0	Ham radio operator reported quarter size hail.	
116	Hermitage	16-Apr-98	5:25 AM	hail	0.9	0	0	0	0	NWS employee reported nickel size hail.	
117	Hermitage	16-Apr-98	5:30 AM	hail	1.8	0	0	0	0	NWS employee reported golf ball size hail.	
118	Nashville	21-May-98	6:10 PM	hail	0.8	0	0	0	0	County EMA official reported dime size hail downtown.	
119	Nashville	25-May-98	7:39 PM	hail	0.8	0	0	0	0	Metro EOC reported dime size hail in the western part of the city.	
120	Goodlettsville	10-Jun-98	8:40 AM	hail	1.8	0	0	0	0	Golf ball size hail was reported.	

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
121	Middle and East Tennessee	23-Dec-98	7:30 AM	winter storm	N/A	0	11	1.5M	0	1/4 inch of ice on the ground at Clarksville. Newspaper accounts reported trecherous driving conditions across Franklin County. 1/2 to 3/4 inch of ice was observed at 105 PM on December 24 and there was one injury. In Fentress County, 40 percent of the county was without power and numerous trees were down. 1/2 to 3/4 inch of ice reported as of 1200 PM over Pickett County. Trees were down and power outages along with 11/2 inch of ice reported at 1200 PM over DeKalb County. The Cookville NOAA Weather Radio was knocked off the air, due to ice on power lines in Putnam County. In Overton County there was a car accident with 2 injuries near Alpine. 1/2 inch of ice at 1200 PM at Alpine and 1 inch of ice at Livingston in Overton County. 3 to 4 inches of sleet and ice with 2000 homes without power reported in Cannon County. There was a 1/2 inch of ice at 1110 AM CST in Murfreesboro with several fender benders. Also, 1/2 to 3/4 inch of ice on the ground by 1100 AM CST in Hartsville along with numerous car wrecks. Widespread trees and power lines were down in Warren County. Warren and Coffee Counties were the hardest hit counties in this winter storm. Caney Fork Electric estimated it cost 1.5 million dollars to restore downed utility poles and power lines. Most of the cost was for labor especially over the Christmas holiday. The damage was worst than the February Ice Storm of 1994 by three fold for Warren County. Cataclysmic tree and power line damage with one inch of ice in Coffee County. 80 percent of the residents were without power. Most of the damage was done when trees and power lines were coated with an inch of ice. The weight	
122	Bellevue	17-Jan-99	7:55 PM	hail	0.8	0	0	0	0	Dime size hail reported.	
123	Nashville	17-Jan-99	8:10 PM	hail	0.8	0	0	0	0	Dime size hail reported at South Nashville at the intersection of Old Hickory Boulevard and Franklin Road.	
124	Nashville	19-Apr-99	9:42 PM	hail	2.8	0	0	0	0	Spotter reported baseball size hail at Whites Creek Pike.	
125	Donelson	19-Apr-99	9:55 PM	hail	1.8	0	0	0	0	Spotter reported golf ball size hail near Opryland on Briley Parkway.	
126	Hermitage	19-Apr-99	10:05 PM	hail	0.8	0	0	0	0	Public reported dime size hail in north Hermitage.	
127	Madison	19-Apr-99	10:15 PM	hail	1.0	0	0	0	0	Spotter reported quarter size hail.	
128	Nashville	9-May-99	5:25 PM	hail	0.9	0	0	0	0	WTVF-TV Channel 5 reported nickel size hail.	
129	Nashville	9-May-99	5:30 PM	hail	0.8	0	0	0	0	Public reported dime size hail at Thompson Lane and Murfreesboro Road.	
130	Goodlettsville	13-May-99	2:30 PM	hail	0.8	0	0	0	0	SKYWARN Spotter reported dime size hail.	
131	Goodlettsville	13-May-99	2:35 PM	hail	0.9	0	0	0	0	EMA reported nickel size hail.	
132	Donelson	12-Aug-99	3:55 PM	hail	1.8	0	0	0	0	Golf ball size hail covering the ground.	
133	Goodlettsville	12-Aug-99	4:26 PM	hail	0.9	0	0	0	0	SKYWARN Spotter reported nickel size hail.	
134	Nashville	12-Aug-99	5:30 PM	hail	1.0	0	0	0	0	Quarter size hail reported near Briley Parkway and Ellington Pkwy.	
135	Middle Tennessee	22-Jan-00	2:30 PM	winter storm	N/A	0	0	0	0	These were some snow depths as of 230 PM Sat. Jan. 22, 2000 CITY SNOWFALL IN. NASHVILLE METRO 3-4 DICKSON 2-3 CLARKSVILLE 3-4 CROSSVILLE 2-3 COOKEVILLE 2-3 MONTEREY 3.0 SPRINGFIELD 3-4 LIVINGSTON 2-3 CENTERVILLE 4.0 More snow continued to fall Saturday evening resulting in many school closures by Monday morning.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
136	Bellevue	25-Mar-00	4:34 PM	hail	0.9	0	0	0	0	Nickel size hail reported at the intersection of Highways 100 and 96.	
137	Nashville	20-Apr-00	12:40 PM	hail	1.0	0	0	0	0	Ham radio report of quarter size hail.	
138	Nashville	20-Apr-00	12:48 PM	hail	0.8	0	0	0	0	Spotter reported dime size hail at Hermitage Landing on Percy Priest Lake.	

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
139	Nashville	15-Apr-01	5:30 AM	hail	0.8	0	0	0	0	EMA official reported dime size hail at his home.	
140	Nashville Metro Airport	15-Apr-01	6:23 AM	hail	0.8	0	0	0	0	Dime size hail reported at the airport.	
141	Southwest Davidson County	27-Jun-01	3:05 PM	hail	0.9	0	0	0	0	Public reported nickel size hail in southwest Davidson County. Dime size hail was reported at Hermitage.	
142	Goodlettsville	27-Jun-01	3:55 PM	hail	0.8	0	0	0	0	Spotter reported dime size hail.	
143	Nashville	5-Jul-01	3:35 PM	hail	0.8	0	0	0	0	Spotter reported dime size hail in the Whites Creek area of Nashville.	
144	Goodlettsville	5-Jul-01	8:59 AM	hail	0.8	0	0	0	0	Dime size hail reported.	
145	Nashville	23-Sep-01	8:00 PM	hail	0.8	0	0	0	0	Dime size hail reported.	
146	Goodlettsville	17-Apr-02	4:00 PM	hail	0.8	0	0	0	0	Public reported dime size hail.	
147	Nashville	28-Apr-02	1:00 PM	hail	1.8	0	0	0	0	Spotter reported golf ball size hail.	
148	Nashville	28-Apr-02	1:28 PM	hail	1.8	0	0	0	0	Spotter reported golf ball size hail.	
149	Nashville	28-Apr-02	1:35 PM	hail	1.8	0	0	0	0	Spotter reported hail from the size of peas to golf balls in the Antioch area.	
150	Goodlettsville	28-Apr-02	4:30 AM	hail	0.9	0	0	0	0	Spotter reported nickel size hail.	
151	Nashville Metro Airport	17-May-02	12:45 PM	hail	0.8	0	0	0	0	SKYWARN Spotter reported dime size hail.	
152	Middle Tennessee	16-Jan-03	11:00 AM	heavy snow	N/A	0	0	0	0	Heavy snow moved into Middle Tennessee faster and heavier than forecasters thought. There was as much as 8 inches of snow in Gallatin and 7 inches at the NWS Office at Old Hickory. Specific amounts as of 4 PM were: GALLATIN 8 INCHES (SPOTTER) GAINESBORO 5 INCHES (SPOTTER) CLARKSVILLE 4 INCHES (SPOTTER) CROSSVILLE 3-5 INCHES WITH A FEW 5-6 INCHES. (LAW ENFORCEMENT) ALLARDT 2.8 INCHES (CO-OP OBSERVER) DICKSON 5.0 INCHES (CO-OP OBSERVER) SPARTA 2.8 INCHES (CO-OP OBSERVER) NWS OLD HICKORY 7.0 INCHES. This amount at NWS OLD HICKORY ties the record snowfall for January 16. Downtown Nashville had 7 inches of snow by 1345 CST. 7 inches of snowfall was recorded in Nashville on January 16, 1948. The snow began to fall in the Metro Nashville area around 8 AM. The snow shut down the city with schools, businesses and government agencies shutting down early. Motorists were stranded in slow-moving or non-moving traffic. It took hours to get cross town. Tracker trailer trucks could not move on the interstates or jack-knifed, which resulted in grid lock. Since schools let out early, parents rushed to pick them up. Schools closed at 9 AM, right in the middle of the storm. Many school buses were stranded in the snow and some students didn't get home until 10 PM. At one point, 60 busues were stranded throughout the city. Also, some students were kept in schools with food, heat and water. Other students were sent home with teachers or school officials with 4 wheel drive vehicles. Parents were angry because students were either kept at school or because their children had to ride in 4 wheel drive vehicles with strangers. I-65 was backed up for 5 hours from Nashville to the Kentucky border. A newspaper story stated that many motorists had to relieve themselves in their vehicles because of the grid lock.	
153	Middle Tennessee	9-Feb-03	9:00 PM	heavy snow		0	0	0	0	3 to 5 inches of wet snow was common across the area.	
154	Goodlettsville	6-Apr-03	1:55 PM	hail	0.8	0	0	0	0	NWS employee reported penny size hail.	
155	Lakewood	6-Apr-03	12:30 PM	hail	0.8	0	0	0	0	NWS employee reported penny size hail.	
156	Belle Meade	25-Apr-03	2:58 PM	hail	0.8	0	0	0	0	Nashville Metro EOC reported penny size hail.	
157	Antioch	25-Apr-03	3:15 PM	hail	0.8	0	0	0	0	Spotter observed penny size hail.	
158	Nashville	5-May-03	11:33 AM	hail	1.0	0	0	0	0	Spotter reported quarter size hail at the intersection of Harding Place and Nolensville Roads. The White House granted Governor Phil Bredesen's request for Presidential Disaster Declaration for 20 counties in West and Middle Tennessee for damage as a result of tornadoes, flooding and severe thunderstorms which began on Sunday , May 4, 2003.	
159	Hermitage	13-Jul-03	1:10 PM	hail	0.9	0	0	0	0	Nickel size hail reported by Spotter at intersection of Lebanon Road and Andrew Jackson Parkway.	

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
160	Joelton	13-Jul-03	4:01 PM	hail	1.0	0	0	0	0	Spotter reported quarter size hail on I-24 near the Davidson County and Cheatham county line.	
161	Nashville Metro Airport	4-Aug-03	9:20 PM	hail	1.0	0	0	0	0	Quarter size hail was observed at BNA airport.	
162	Hermitage	4-Aug-03	9:30 PM	hail	1.0	0	0	0	0	Quarter size hail reported by Spotter located on I-40 and Stewarts Ferry Pike.	
163	Donelson	27-Aug-03	2:12 PM	hail	0.8	0	0	0	0	Penny size hail was reported near BNA airport.	
164	Middle Tennessee	4-Dec-03	6:00 AM	winter storm	N/A	0	0	0	0	The winter storm peaked around 11 AM CST. Some of the problems noted by TDOT were : Counties and Conditions Stewart- Icing on some roadways. Montgomery- Many roads icy. Ice on trees and power lines. About an inch of snow and sleet on ground. Dickson- 1/4 inch of ice on trees. Cheatham- Icy roads in many spots. Benton- Ice on trees and roads. Houston- Ice on trees and roads. Humphreys- Icing on trees and power lines. There were trees on some roads. Roberston- Numerous roads iced over. Trees and power lines were down. Ice was 1/4 to 1/2 inch thick by 6:30 AM CST. Davidson - Icing on trees and power lines caused scattered outages in the Belmont, Centennial Park and Nolensville Road area. Sumner- About 2 inches of slushy ice and snow on roads mainly north of Gallatin. Wilson- Ice on trees and power lines, mainly in the northern part of county. Macon- About a 1/4 inch of ice on all surfaces. Roads were slick and trecherous. About an inch of snow was on the ground. Clay- Roads were slick and icy. Ice on trees and power lines. Highway 52 east was in very bad shape. Pickett- 1/4 inch of ice on all surfaces. 2 inches of snow on the ground. Roads were in very bad shape. Smith- About 1/4 inch of ice on trees and power lines. Northern section had very icy roads. Trousdale- 1/4 inch of ice on surfaces. Roads in northern sections were in very bad shape. Jackson- About 1/4 inch of ice on power lines and trees. Secondary roads were icy. Overton - 3 inches of ice and snow on roads. Ice accumulations were about an inch on all surfaces. Putnam - Icing on trees. Fentress- Roads were icy. An inch of snow was on the ground. Dekalb- Some icing on trees and back roads.	
165	Nashville	22-Dec-04	9:00 PM	winter storm	0.5	0	0	0	0	Snow, sleet and freezing rain made an icy mix that brought down tree limbs and power lines. 22,000 NES customers were without power.	
166	Nashville	7-Mar-08	9:00 PM	winter storm	2.0	0	0	5	0	A mixture of sleet, snow and freezing rain hit the county. Snow accumulations were about 2 inches across the county by 10 AM CST Sat. March 8. Driving was treacherous due to the snow and ice.	National Weather Service Forecast Office; Nashville, TN;
167	Nashville	29-Jan-10	9:00 PM	winter storm	7.0	0	0	250k	0	Total snowfall accumulation, measured at seven inches, was reported in the southern part of town in Crieve Hall. Multiple roads across this area became snow covered, causing hazardous driving conditions and several car accidents. Newspaper reported that Tennessee Department of Transportation trucks worked 125 incidents by 4:30 PM, with no serious injuries. Nashville Metro Police reported that they responded to about 105 minor accidents and 26 injuries by 5 PM. Tennessee Department of Transportation crews responded to nearly 300 wrecks by 2 AM Saturday. Details on any damage amounts or extent of injuries associated with these accidents were unknown. Newspaper also reported that Tennessee Governor Phil Bredesen declared a state of emergency and state offices closed at 12 PM, along with many other business across the county closing during the afternoon hours. The Nashville International Airport experienced dozens of flight cancellations and flight delays stacked up throughout the day.	National Weather Service Forecast Office; Nashville, TN;

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
168	Nashville	12-Dec-10	9:00 PM	winter storm	3.0	0	0	0	0	Three inches of total snowfall accumulation occurred in Joelton. Law enforcement officials reported that other locations across the county received between two and two and a half inches of total snowfall accumulation. This total snowfall accumulation resulted in public and some private primary, secondary, and higher education school closures across the county, along with closures or postponement of other civic engagements across the county for the remainder of that day into the early morning hours on Monday, December 13th, as travel across roads throughout the county became hazardous due to the accumulating snowfall.	
169	Nashville	10-Jan-11	9:00 PM	winter storm	4.0	0	0	0	0	Four inches of total snowfall accumulation occurred at the Nashville International Airport.|Other locations across the county had total snowfall accumulations ranging on average from two to three inches. A newspaper reported that a private snow removal company reported road conditions as being terrible, with multiple cars spun out on the ice and abandoned on the side of county roadways. Details concerning any injuries or damage cost amounts to individual cars was unknown. This total snowfall accumulation resulted in public and some private primary, secondary, and higher education school closures across the county on Monday, January 10th, along with closures or postponement of other civic engagements across the county for the remainder of that day, as travel across roads throughout the county became hazardous due to the accumulating snowfall.	
170	Nashville	26-Jan-11	9:00 PM	winter storm	4.0	0	0	0	0	Total snowfall accumulations of between three and one half and four inches occurred on average across the county. This total snowfall accumulation resulted in public and some private primary, secondary, and higher education school closures across the county on Wednesday, January 26th, along with closures or postponement of other civic engagements across the county for the remainder of that day, as travel across roads throughout the county became hazardous due to the accumulating snowfall.	
171	Nashville	12-Jan-12	4:00 PM	snowfall	1.0	0	0	0	0	As a broad upper level trough with an associated embedded upper level low moved across Middle Tennessee during the afternoon hours on Thursday, January 12 to the early morning hours on Friday, January 13th, a significant snowfall event occurred across multiple counties in the mid state, resulting in hazardous driving conditions and the cancellations or postponements of civic engagements across these counties. One inch of total snowfall accumulation occurred just northeast of Brentwood in southern Davidson County. This total snowfall accumulation resulted in the closures or postponement of some civic engagements across southern Davidson County for the late afternoon through evening hours, as travel on roads across this area became hazardous due to the accumulating snowfall.	
172	Nashville	29-Dec-12		snow/ice		0	0	0	0	Light snow showers fell across much of Middle Tennessee on December 29 as a fast moving upper level disturbance moved across the region. Light snow accumulations were reported generally along and east of the I-65 corridor, with significant impacts on roadways including road closures and numerous vehicle accidents. Light snow with accumulations up to two tenths of an inch fell during the afternoon hours and froze onto some area roadways by evening. Numerous vehicle accidents were reported due to the icy roadways, including at the Old Hickory Boulevard exit on I-65 in Brentwood.	
172	Nashville	19-Feb-12	8:00 AM	snowfall	2.0	0	0	0	0	A strong surface low pressure system moving from the Gulf Coast states into the Carolinas spread widespread rainfall across Middle Tennessee from February 18 into the early morning hours on February 19. The rain changed over to a wet snow across during the morning and afternoon hours on February 19 before ending during the evening. The heaviest snow fell across the northern Cumberland Plateau, where accumulations reached up to 5 inches. Davidson County emergency management reported up to 2 inches of total snow accumulation in the higher elevations of the county such as Oak Hill.	
173	Nashville	2-Mar-12	5:00 PM	hail	2.0	0	0	25m	0	Large hail up to 2 inches in diamter fell across much of central and southern Davidson County. Numerous rooms and cars were damaged by the up to 2 inch diameter hail stones.	

WINTER STORMS-9

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
174	Nashville	14-Jan-13								As a plume of moisture from the Gulf of Mexico streamed into Middle Tennessee during the afternoon through evening hours on Monday, January 14th, with sub-freezing temperatures near the surface across the mid state, ice accumulations due to freezing rainfall occurred, resulting in numerous automobile accidents and also a significant impact to commerce and transportation across the counties affected. Automobile accident reported at bridge near mile marker one on Interstate 440 East due to ice accumulation from freezing rain. This location was also near West End Avenue.	
175	Nashville	15-Jan-13	7:00 PM	ice storm	0.5	0	0	5	0	As a plume of moisture from the Gulf of Mexico continued streaming northeastward into Middle Tennessee during the afternoon hours on Tuesday, January 15th through the early morning hours on Wednesday, January 16th, and with surface temperatures near freezing, freezing rain that fell resulted in significant ice accumulations of between eight hundreths to one quarter of an inch for locations generally around and west of Interstate 65 through the Tennessee River Valley Region of Middle Tennessee. This resulted in a significant impact to commerce and transportation across this portion of the mid state, including several automobile accidents. Around five miles south of Nashville, about 0.25 of an inch of ice accumulation due to freezing rain occurred on trees and roads signs around the Oak Hill Area of the county. Large tree limbs were downed as well. This resulted in a significant impact to commerce and transportation in and around this area from the evening hours on Tuesday, January 15th through the early morning hours on Wednesday, January 16th. Also reported was that the road over Percy Priest Dam located in eastern Davidson County was also frozen over.	
176	Nashville	25-Jan-13		winter storm	0.2	0	0	25	0	As a surface trough developed across Middle Tennessee during the morning hours on Friday, January 25th, it became a focusing mechanism for feezing rain development. This precipitation intially began as freezing rain, transitioning to rain from southern portions of the mid state to northern portions as the mid morning hours progressed. Freezing rain left ice accumulations generally around one to two tenths of an inch, resulting in numerous automobile accidents along with several trees and power poles being downed. Vehicle accidents scattered around the county, primarily in northern and western parts, including Joelton, Goodlettsville, and a multiple vehicle pile up on Bull Run Rd, Total injury and property damage amounts unknown.	
177	Nashville	31-Jan-13	9:00 PM	winter storm	0.5	0	0	0	0	As a low pressure system swept rapidly southeastward from the Ohio River Valley across the Tennessee Valley during the late evening hours on Thursday, January 31st, a band of snow showers quickly entered western and central portions of Middle Tennessee, as temperatures began falling into the 20s. This resulted in a significant impact to commerce and transportation across central portions of the mid state during the late evening hours. This event continued into the mid morning hours on Friday, February 1st. Total snowfall acumulation amounts of 0.25 to 0.50 inches across the Nashville Metropolitian area. This resulted in a significant impact to commerce and transportation across the Nashville Metropolitian area through the late evening hours.	
178	Nashville	2-Feb-13	4:00 AM	snow	1.0	0	0	0	0	Another round of snowfall moved into Middle Tennessee during the early morning hours of February 2 and spread across the area into the morning hours on February 3. Temperatures warmed above freezing and changed the snow over to rain across much of Middle Tennessee during the day on February 2, but the Cumberland Plateau area remained below freezing and no changeover occurred. Snowfall amounts up to 2 inches were reported in several area, with significant impacts to travel due to snow on roadways. NWS employees reported up to 1 inch of snow accumulation across Davidson County. This snow resulted in significant impacts to travel, with some roadways closed due to being snow covered and icy.	

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
179	Nashville	7-Dec-13	9:00 PM	winter storm	.1-.5	0	1	10	0	Moisture overrunning a stalled frontal boundary created widespread freezing rain across the northwestern half of Middle Tennessee from the late evening hours on December 7 into the morning of December 8. Since much of the ice accumulation that occurred on December 6 did not melt, these additional ice accumulations resulted in widespread tree damage and power outages across parts of northwest Middle Tennessee. Davidson County Emergency Management estimated around 0.10 inches of ice accumulation across most of the county, with 0.25 to 0.50 inches of ice accumulation at elevations above 900 feet. Ice formed on several bridges and overpasses across the county, resulting in several vehicle accidents. Ice on the 3rd Avenue Bridge over Interstate 65 just north of downtown Nashville contributed to a one vehicle accident with one fatality. Several trees and power lines were also knocked down in areas above 900 feet across the county.	
180	Nashville	9-Dec-13	9:00 PM	winter storm	1.1	0	0	0	0	The third winter weather event in as many days affected Middle Tennessee from late evening on December 9 into the morning of December 10. Much of the southeastern half of Middle Tennessee experienced rain and some freezing rain, while parts of the northwestern half received a mix of rain, freezing rain, sleet, and snow. A narrow band of up to 1 inch of snow fell along a line from Lobelville to Nashville to Lafayette, causing numerous travel problems. Snowfall of 0.5 to 1.1 inches fell across Davidson County. CoCoRaHS snow measurements included 1.1 inches 5.2 miles west-southwest of Nashville, and 1.0 inches of snow 5.3 miles west-southwest of Belle Meade. Twitter reports indicated 0.5 inches of snow fell between Brentwood and Antioch. Snowfall combined with low temperatures in the 20s on the morning of December 10 to cause severe traffic congestion and numerous accidents throughout the Nashville metro area, with several interstates closed due to icy conditions.	
181	Nashville	7-Feb-14	9:00 PM	winter storm	1.2	0	0	0	0	Light snow fell across much of northern Middle Tennessee from the late evening hours on February 7 into the morning hours on February 8. Up to 2 inches of snow was measured in northwest Middle Tennessee. CoCoRaHS and social media reports indicated up to one inch of snow fell in parts of Davidson County, especially the northern portions of the county and in higher elevations. CoCoRaHS station Joelton 1.6 N measured 1.0 inch of snow, and CoCoRaHS station Madison 1.2 WSW measured 0.5 inches of snow. 0.5 inches of snow was also reported in Whites Creek via Facebook.	
182	Nashville	2-Mar-14	7:00 PM	winter storm	0.3	0	0	0	0	As a low pressure system approached and moved across Middle Tennessee from Friday, March 1st through Saturday, March 2nd, significant accumulating snowfalls amounts occurred across several counties. These snowfall accumulations resulted in a significant impact to commerce and transportation across these counties. One half of an inch of total snowfall accumulation occurred in Belle Meade. Up to a quarter inch of ice accumulation was reported across Davidson County. Around 9000 customers were without power due to the ice.	

WINTER STORMS-11

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Multi-Hazard Mitigation Plan
Appendix C - Maps

This appendix contains maps of the repetitive loss areas identified and investigated in the Metropolitan Nashville-Davidson County area located on the following streams:

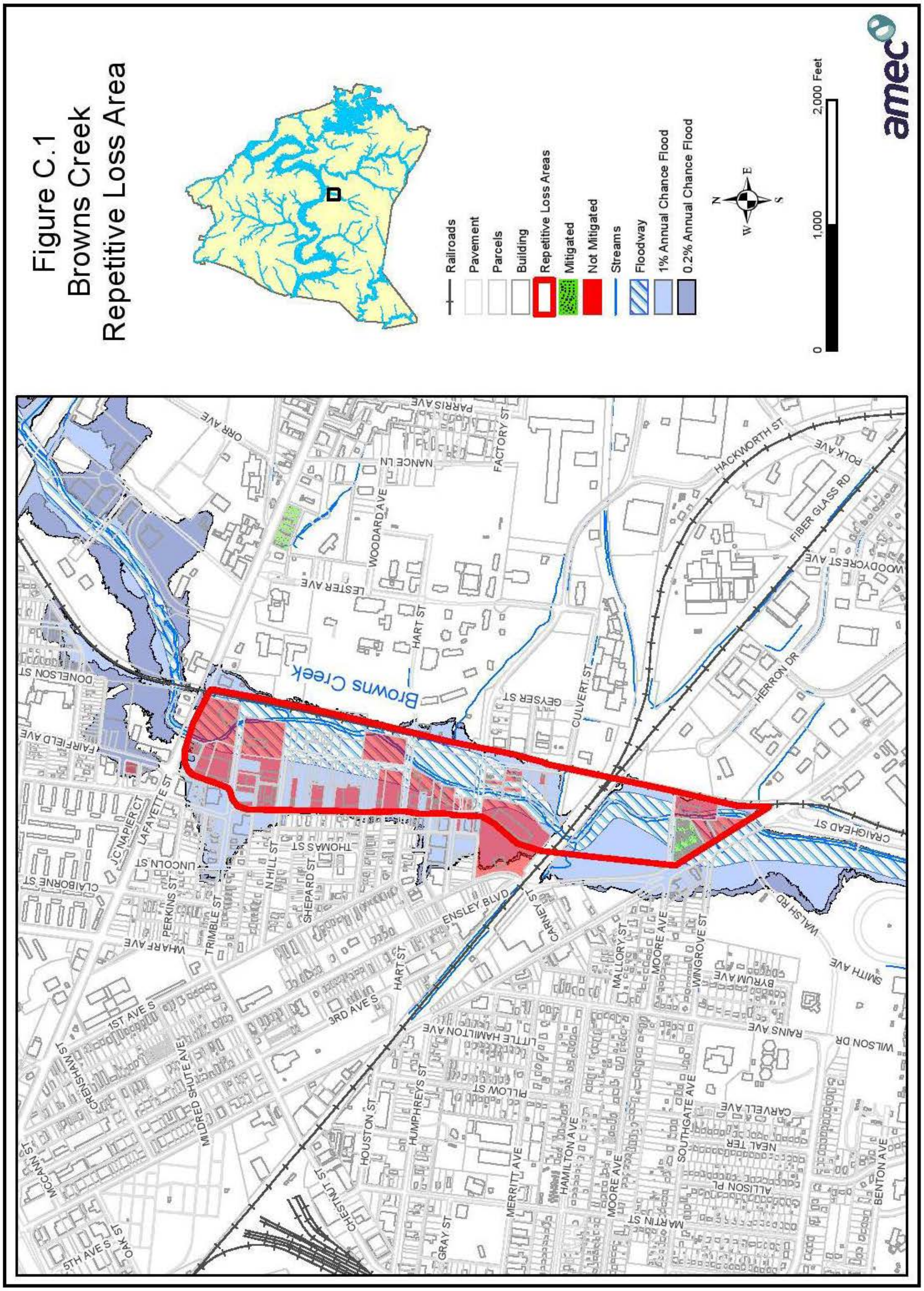

Figure C.1
Browns Creek
Repetitive Loss Area

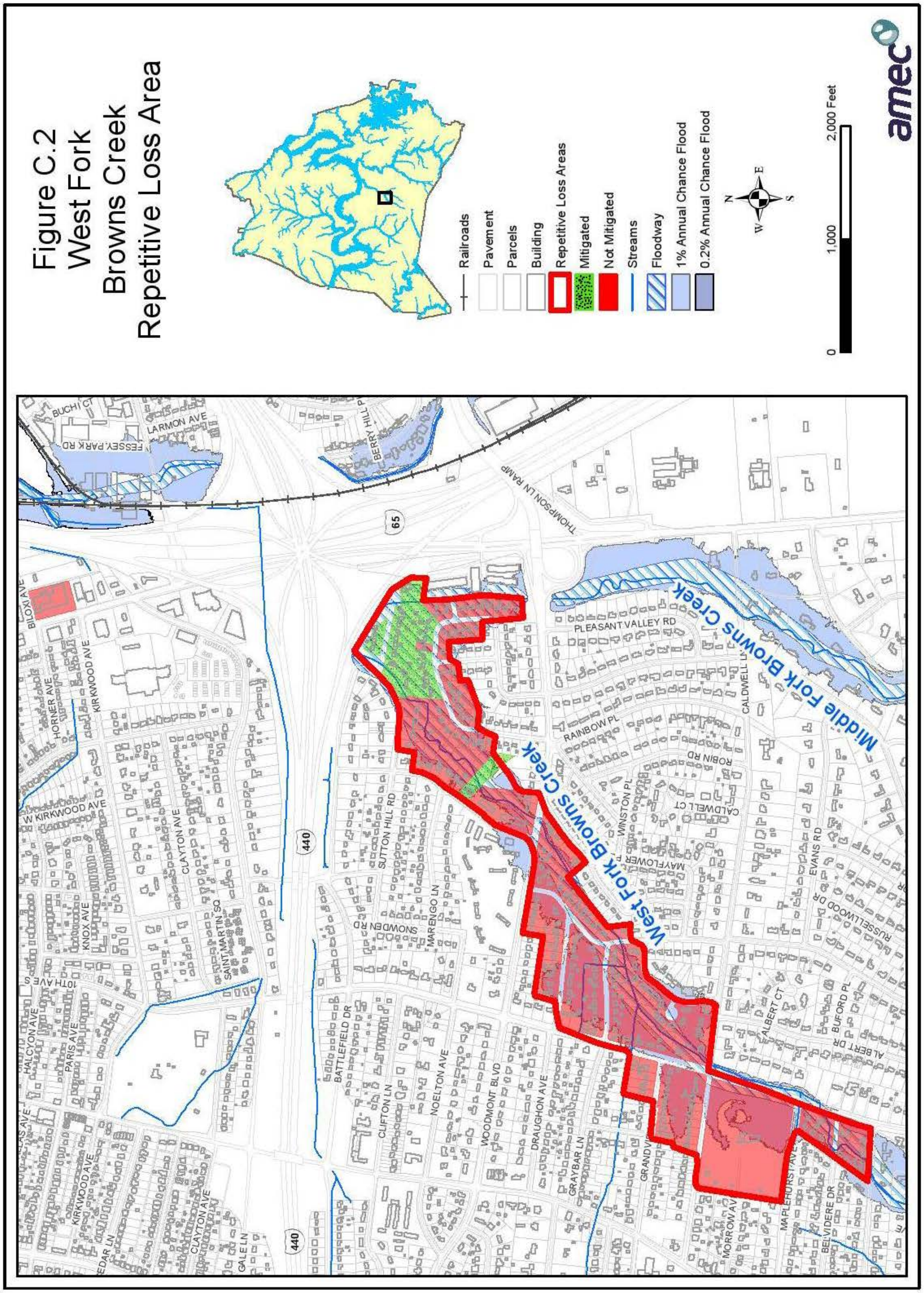

Figure C.2
West Fork
Browns Creek
Repetitive Loss Area

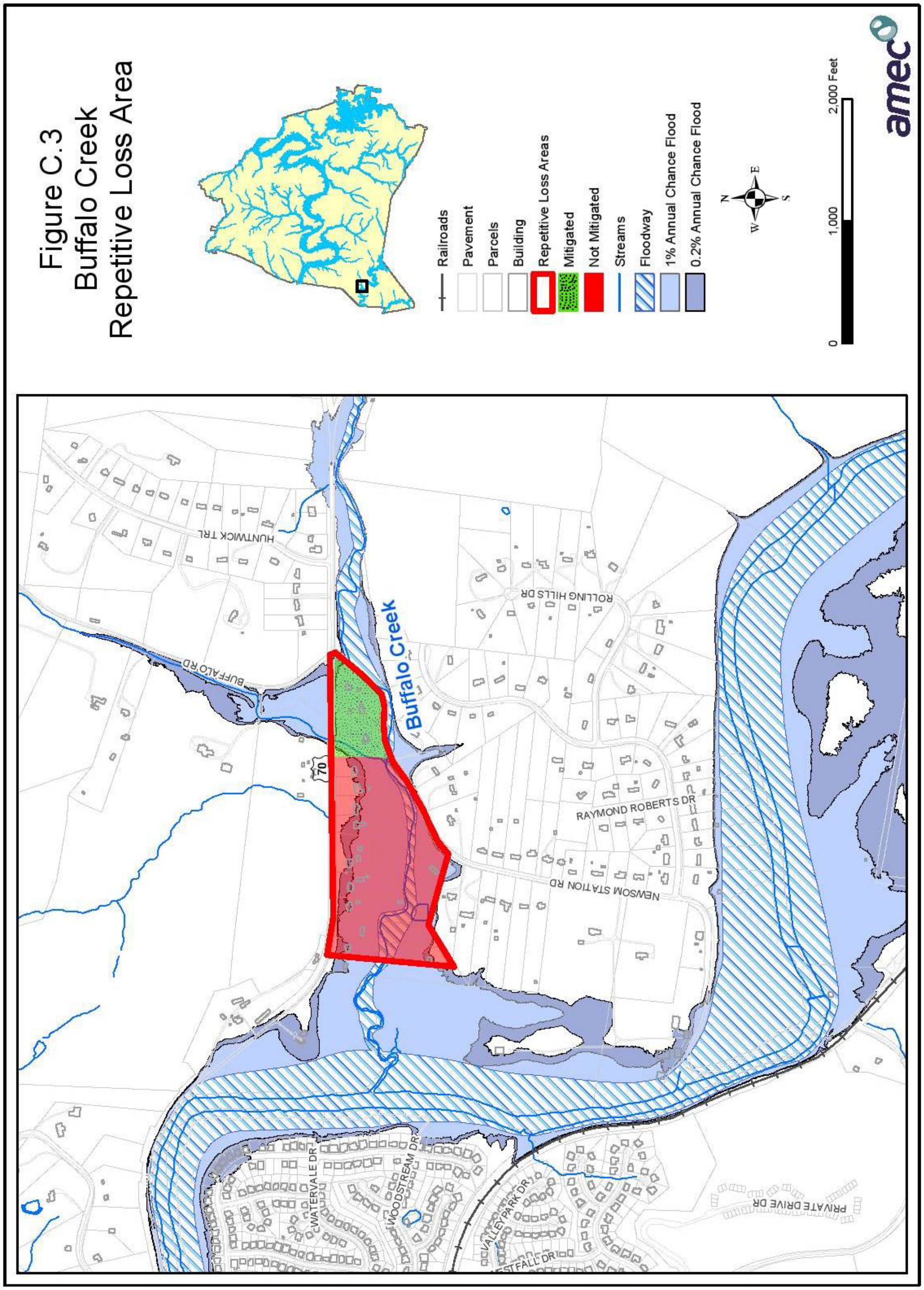
Figure C.3
Buffalo Creek
Repetitive Loss Area
Railroads
Pavement
Parcels
Building
Repetitive Loss Areas
Mitigated
Not Mitigated
Streams
Floodway
1% Annual Chance Flood
0.2% Annual Chance Flood
N
E
S
W
0
1,000
2,000 Feet
amec
HUNTWICK TRL
ROLLING HILLS DR
Buffalo Creek
BUFFALO RD
70
RAYMOND ROBERTS DR
NEWSOM STATION RD
WATERVALE DR
WOODSTREAM DR
VALLEYPARK DR
PRIVATE DRIVE DR

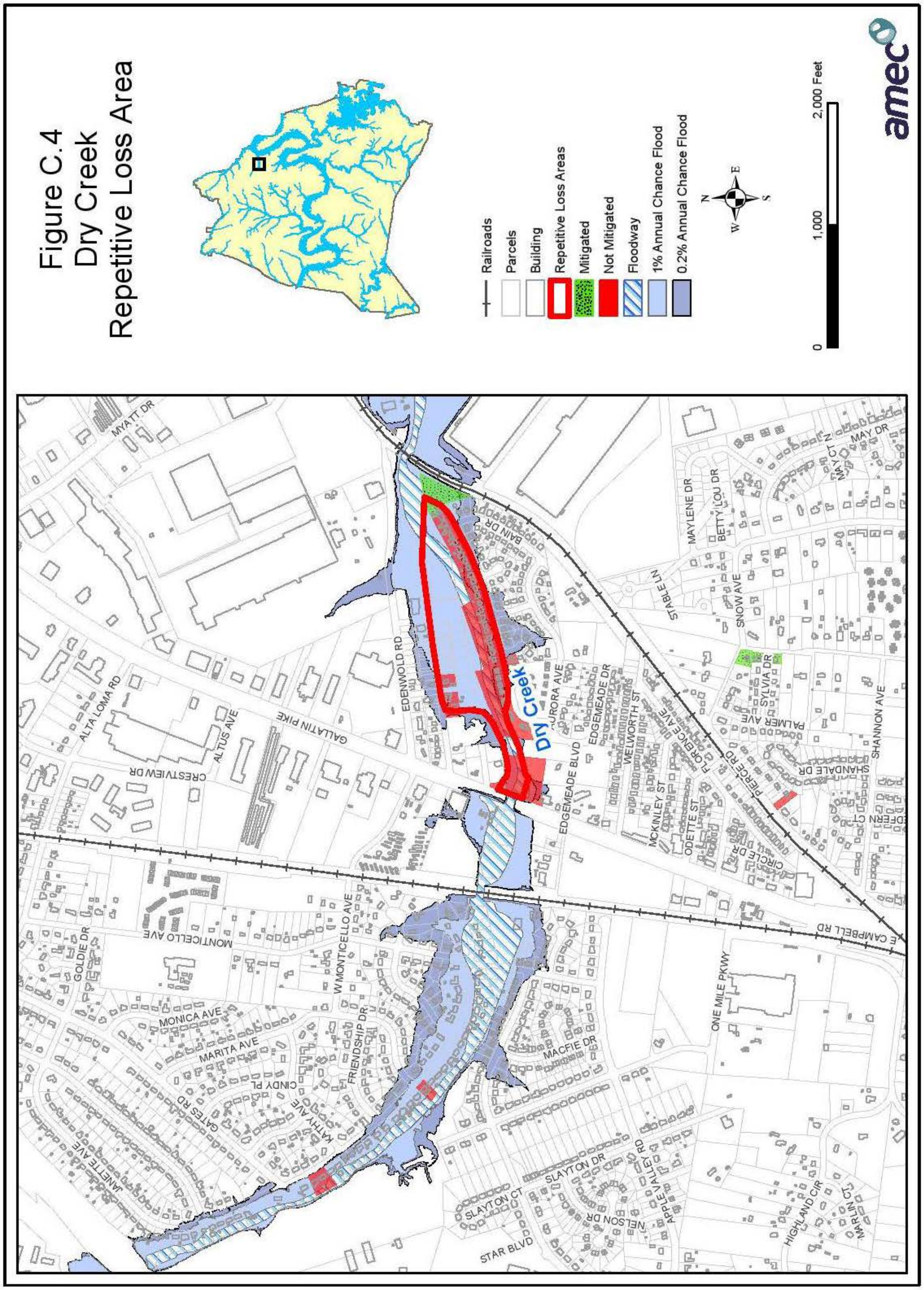
Figure C.4
Dry Creek
Repetitive Loss Area
Railroads
Parcels
Building
Repetitive Loss Areas
Mitigated
Not Mitigated
Floodway
1% Annual Chance Flood
0.2% Annual Chance Flood
N
E
S
W
0
1,000
2,000 Feet
amec
Dry Creek
GALLATIN PIKE
EDENWOLD RD
AURORA AVE
EDGEMEADE BLVD
EDGEMEADE DR
WELWORTH ST
MCKINLEY ST
ODETTE ST
FLORENCE AVE
PIERCE RD
STABLE LN
SNOW AVE
MAYLENE DR
BETTY LOU DR
SYLVIA DR
PALMER AVE
SHANNON AVE
SHADALE DR
CIRCLE DR
E CAMPBELL RD
ONE MILE PKWY
MACFIE DR
SLAYTON DR
SLAYTON CT
APPLE VALLEY RD
NELSON DR
HIGHLAND CIR
MARLIN CT
STAR BLVD
KATHY AVE
CINDY PL
GATES RD
JANETTE AVE
MARITA AVE
MONICA AVE
FRIENDSHIP DR
W MONTICELLO AVE
MONTICELLO AVE
GOLDIE DR
CRESTVIEW DR
ALTUS AVE
ALTA LOMA RD
MYATT DR
BAIN DR
MAY DR
MAY CT

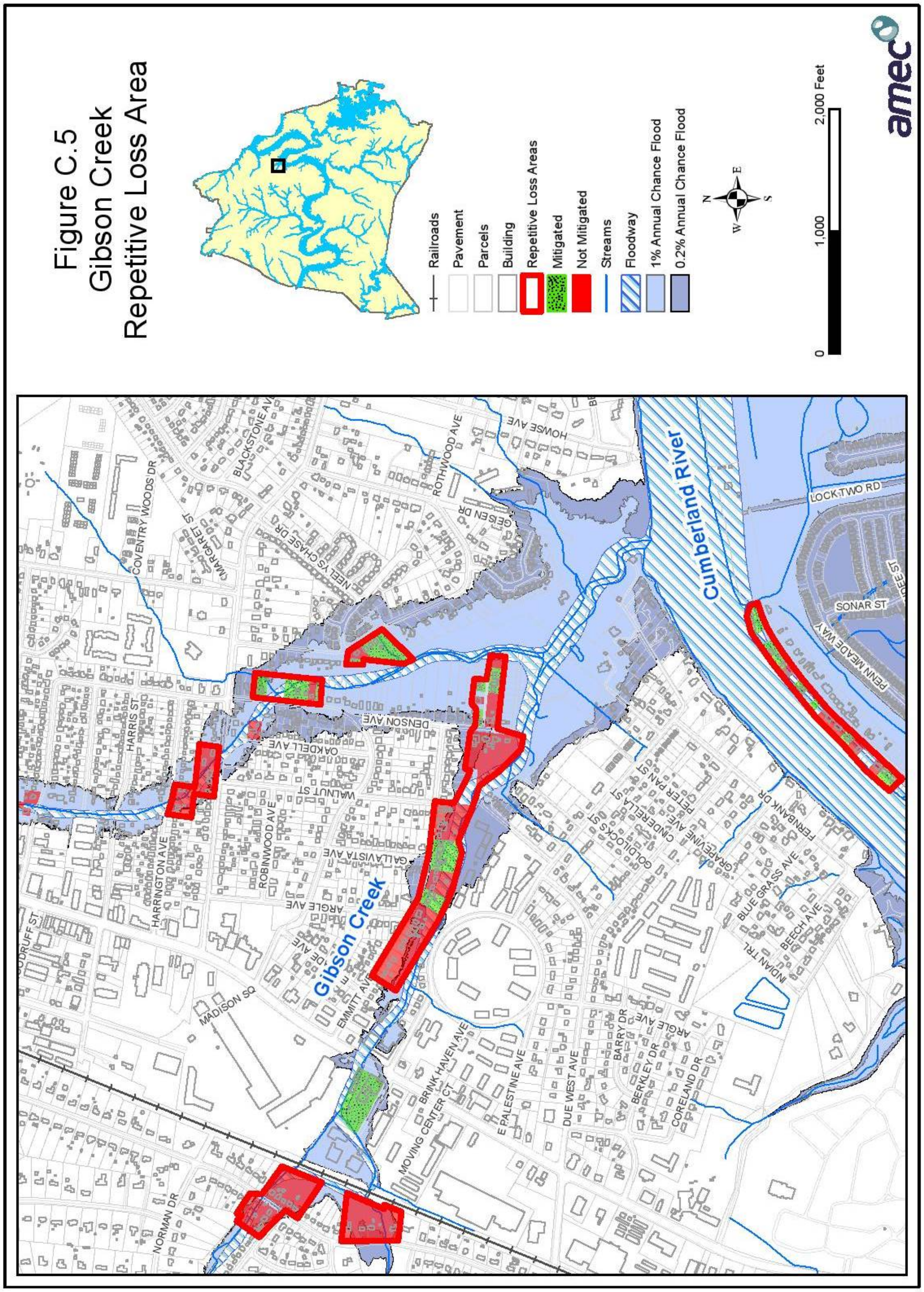

Figure C.5
Gibson Creek
Repetitive Loss Area

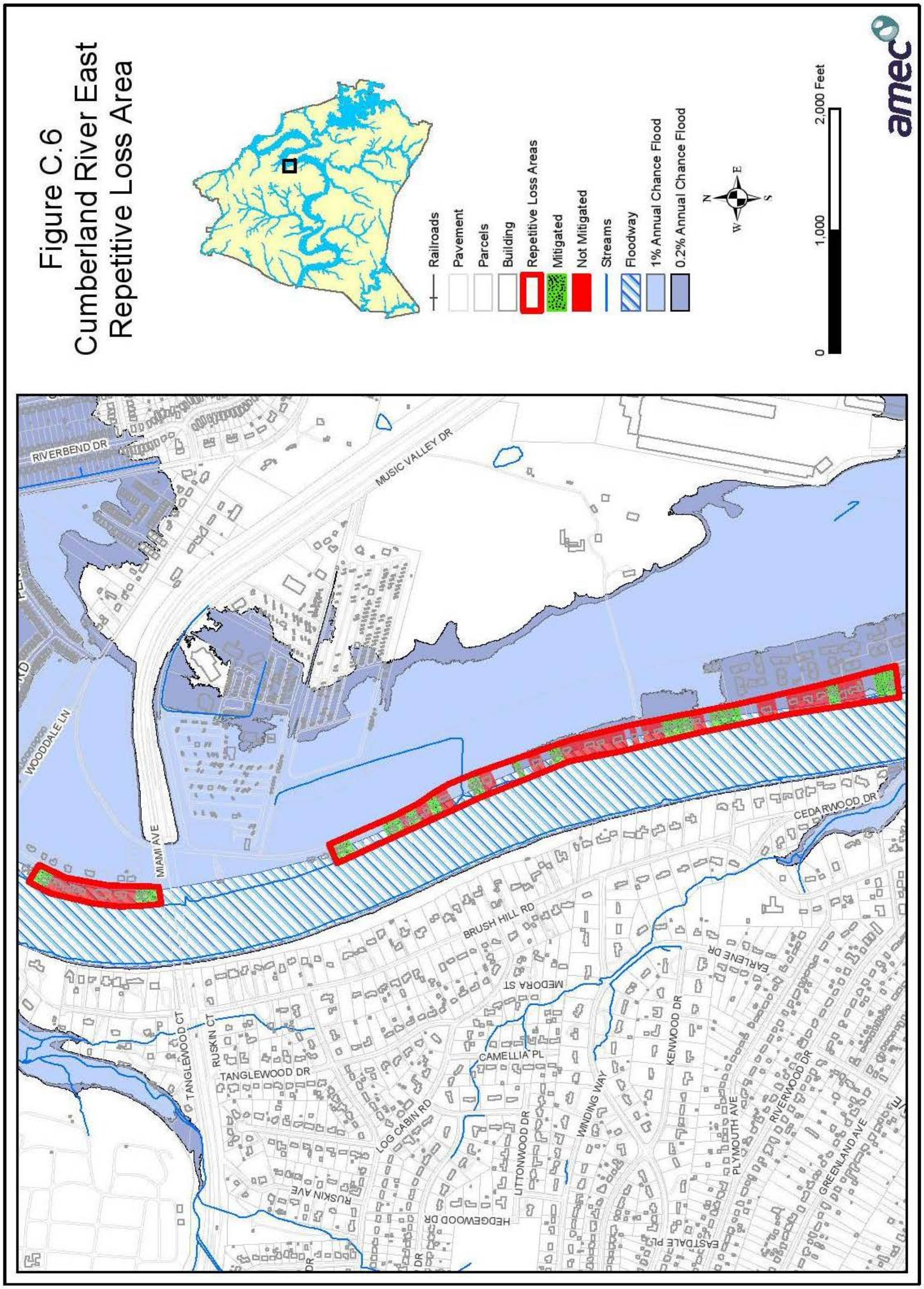

Figure C.6
Cumberland River East
Repetitive Loss Area

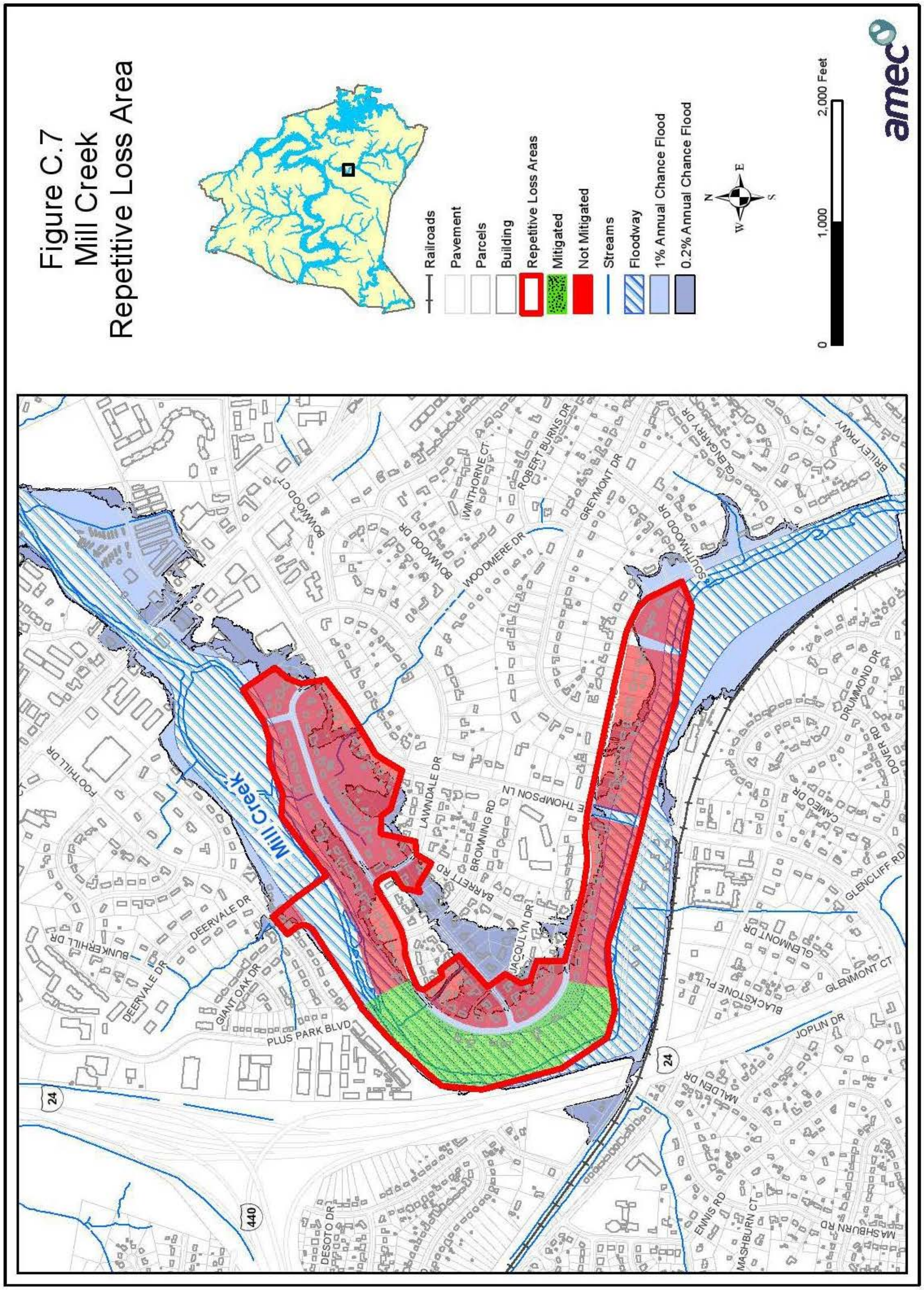
Figure C.7
Mill Creek
Repetitive Loss Area
Railroads
Pavement
Parcels
Building
Repetitive Loss Areas
Mitigated
Not Mitigated
Streams
Floodway
1% Annual Chance Flood
0.2% Annual Chance Flood
0
1,000
2,000 Feet
amec
Mill Creek
PLUS PARK BLVD
FOOTHILL DR
DEERVALE DR
BUNKERHILL DR
GIANT OAK DR
LAWNDALE DR
BROWNING RD
BARRETT RD
JACQUELYN DR
E THOMPSON LN
WOODMERE DR
BOWWOOD DR
BOWWOOD CT
WINTHORNE CT
ROBERT BURNS DR
GREYMONT DR
SOUTHWOOD DR
GLENGARRY DR
BRILEY PKWY
DRUMMOND DR
DOVER RD
CAMEO DR
GLENCLIFF RD
GLENMONT DR
GLENMONT CT
BLACKSTONE PL
JOPLIN DR
MALDEN DR
ENNIS RD
MASHBURN CT
MASHBURN RD
DESOTO DR
24
440

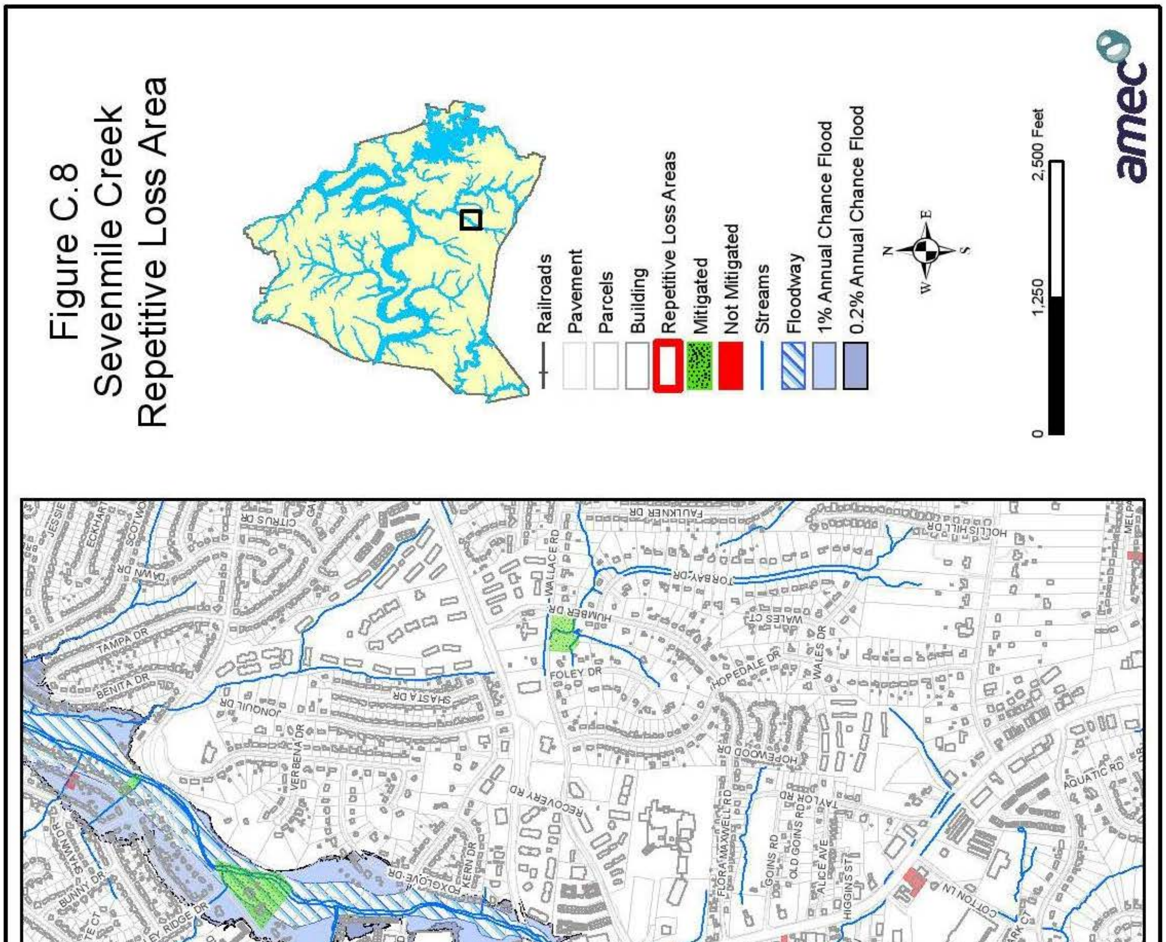

Figure C.8
Sevenmile Creek
Repetitive Loss Area

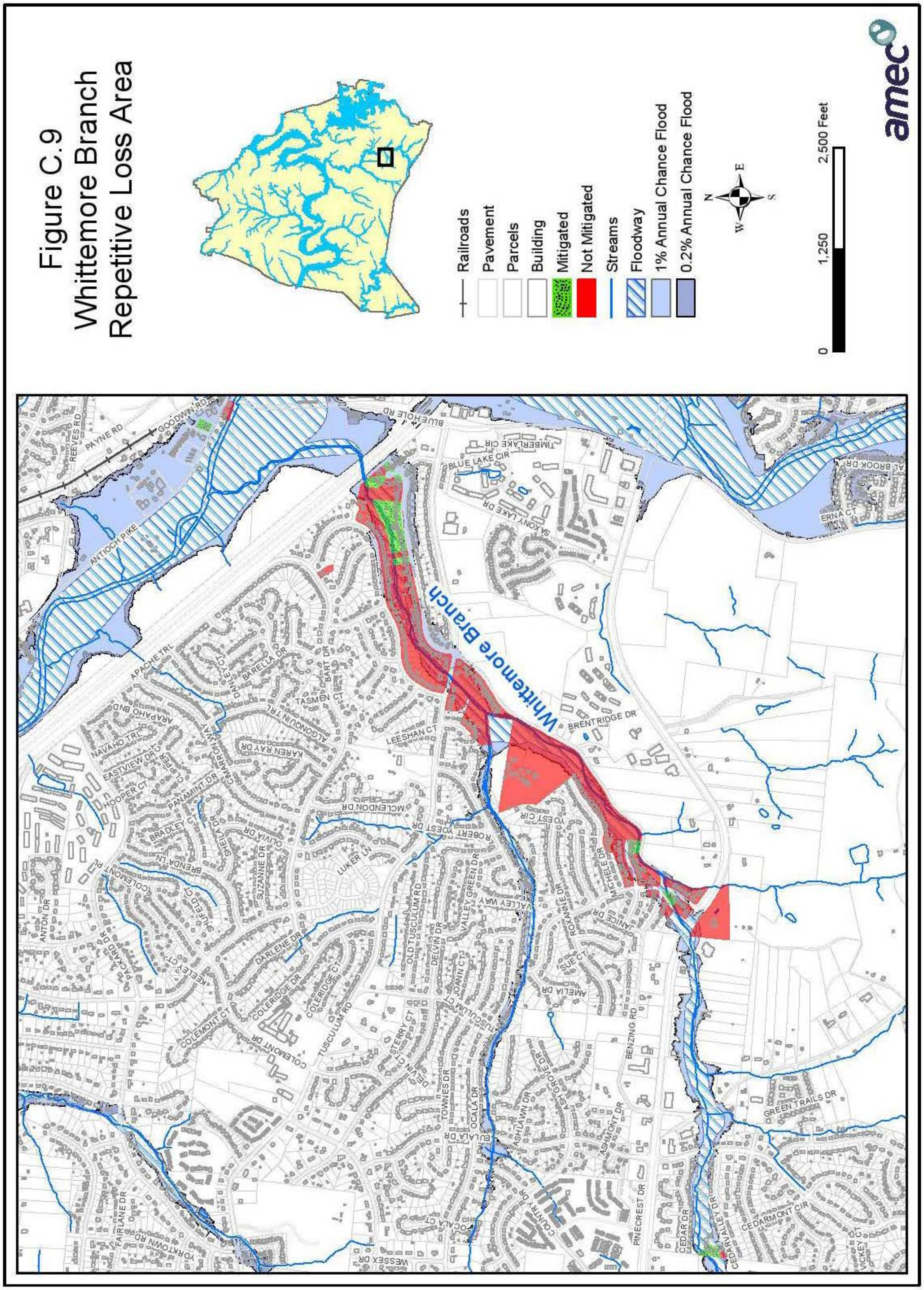

Figure C.9
Whittemore Branch
Repetitive Loss Area

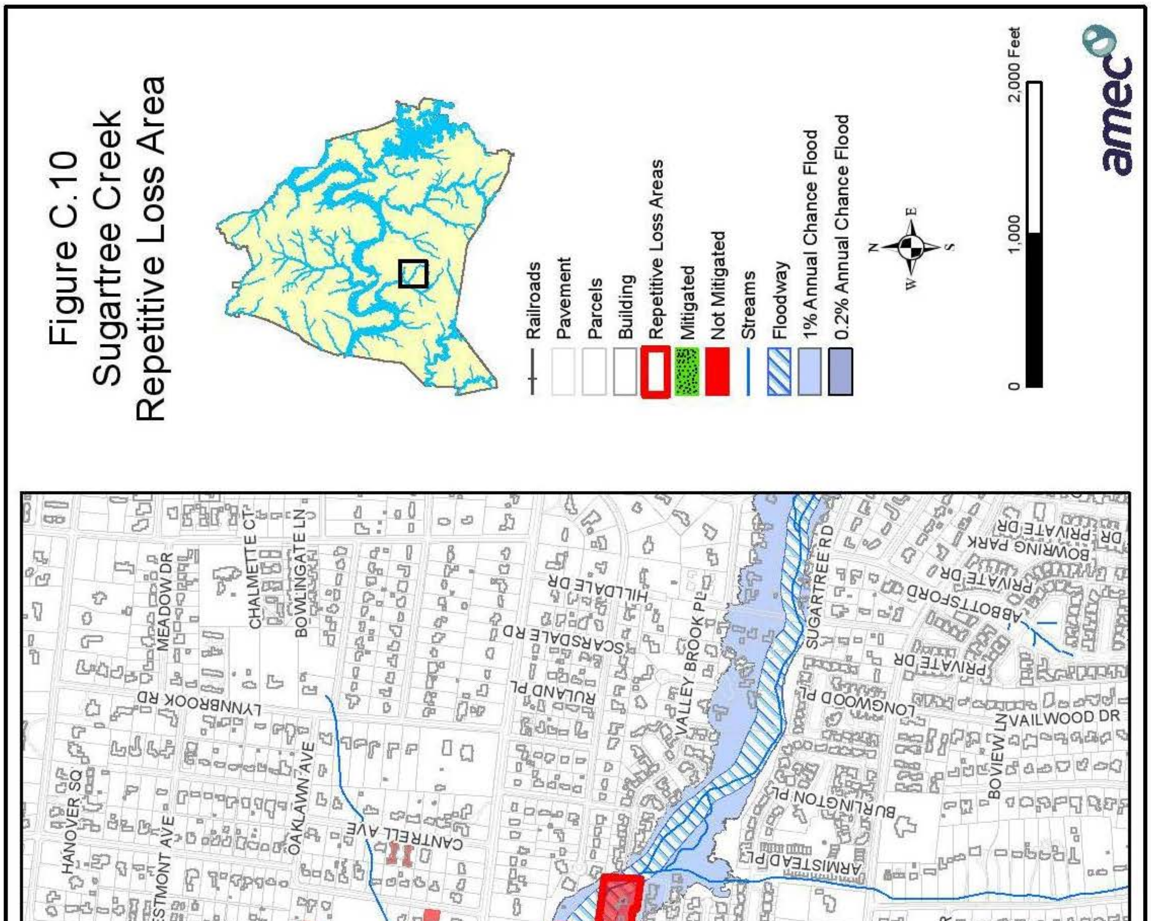
Figure C.10
Sugartree Creek
Repetitive Loss Area
Railroads
Pavement
Parcels
Building
Repetitive Loss Areas
Mitigated
Not Mitigated
Streams
Floodway
1% Annual Chance Flood
0.2% Annual Chance Flood
N
E
S
W
0
1,000
2,000 Feet
amec
Sugartree Creek
ENSWORTH PL
KENNER AVE
NICHOLS CT
MILLRACE LN
LYNNWOOD TER
LYNNWOOD LN
LILLYWOOD RD
WALNUT DR
PENDLETON AVE
ROYAL OAKS DR
GLENEDEN DR
ASHCROFT PL
AUBURN LN
WOODMONT CIR
CRESCENT RD
WESTMONT AVE
HANOVER SQ
OAKLAWN AVE
CANTRELL AVE
LYNNBROOK RD
MEADOW DR
CHALMETTE CT
BOWLINGATE LN
HILLDALE DR
SCARSDALE RD
RULAND PL
VALLEY BROOK PL
SUGARTREE RD
ELDER PL
ARUNDEL CT
WYNDHAM PL
VAIL CT
SNEED TER
ARMISTEAD PL
BURLINGTON PL
BOVIEW LN
VAILWOOD DR
LONGWOOD PL
PRIVATE DR
ABBOTTSFORD
BOWRING PARK

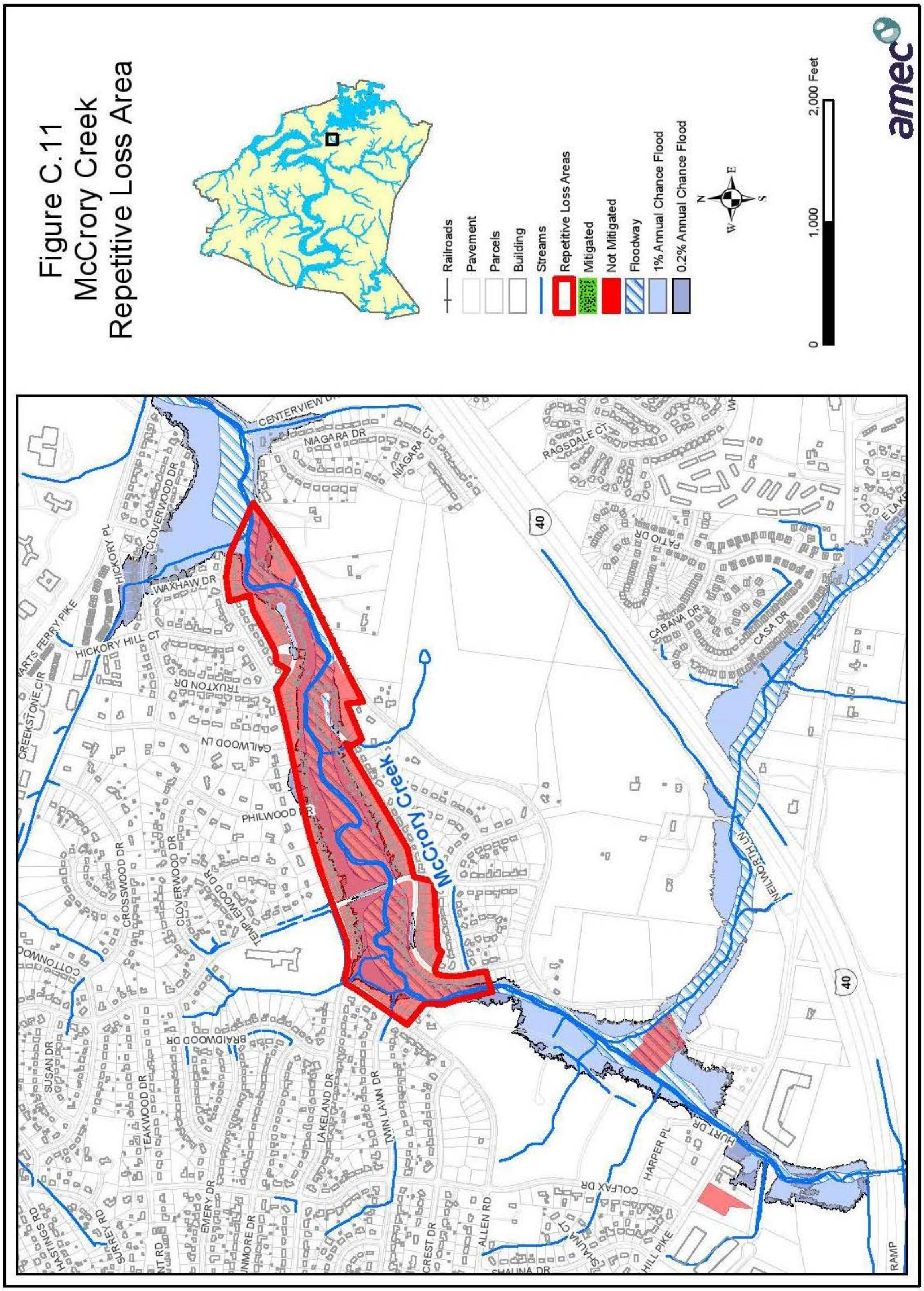
Figure C.11
McCrory Creek
Repetitive Loss Area
Railroads
Pavement
Parcels
Building
Streams
Repetitive Loss Areas
Mitigated
Not Mitigated
Floodway
1% Annual Chance Flood
0.2% Annual Chance Flood
N
E
S
W
0
1,000
2,000 Feet
amec
McCrory Creek
CENTERVIEW DR
NIAGARA DR
NIAGARA CT
RAGSDALE CT
PATIO DR
CABANA DR
CASA DR
CLOVERWOOD DR
HICKORY PL
WAXHAW DR
HICKORY HILL CT
TRUXTON DR
GAILWOOD LN
CREEKSTONE CIR
PHILWOOD DR
CROSSWOOD DR
TEMPLEWOOD DR
COTTONWOOD
BRAIDWOOD DR
SUSAN DR
TEAKWOOD DR
LAKELAND DR
TWIN LAWN DR
EMERY DR
HASTINGS RD
SURREY RD
ALLEN RD
COLFAX DR
HARPER PL
HURT DR
ELSWORTH LN
40
RAMP

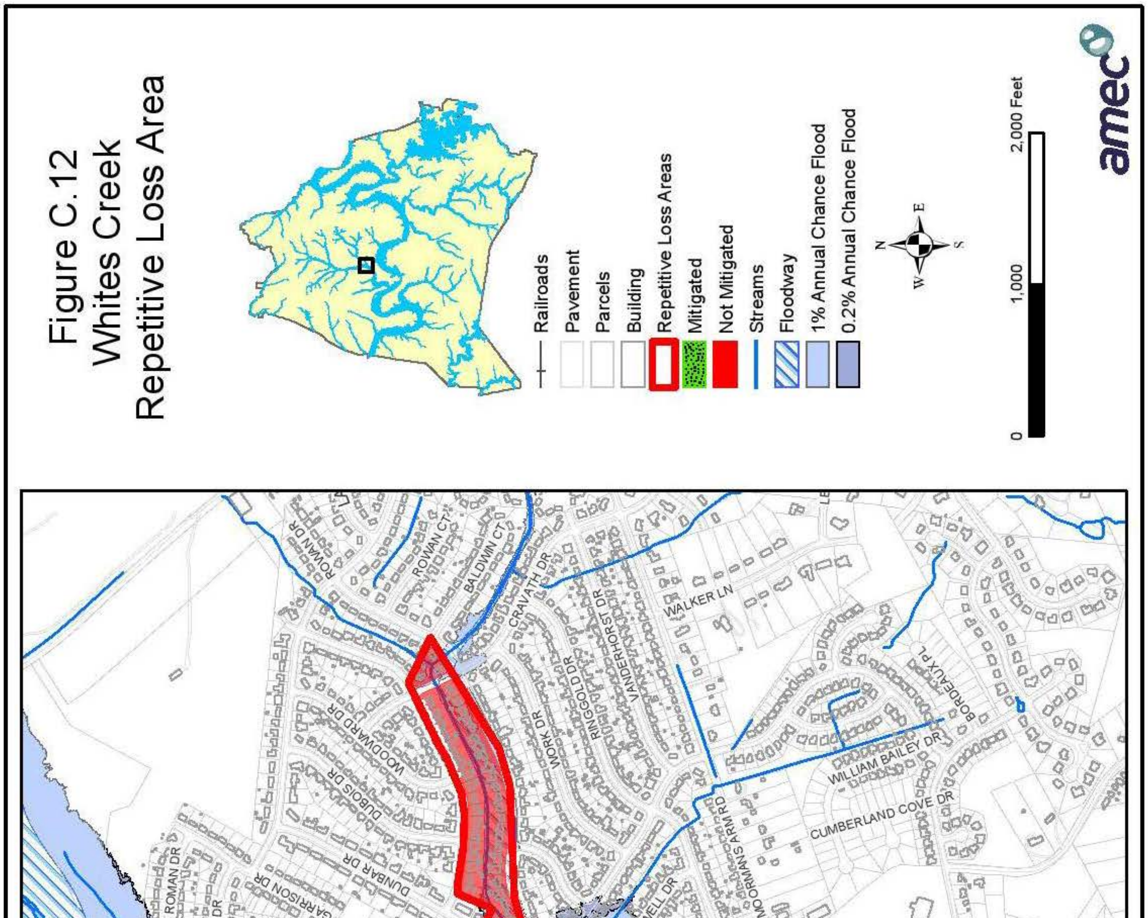
Figure C.12
Whites Creek
Repetitive Loss Area
Railroads
Pavement
Parcels
Building
Repetitive Loss Areas
Mitigated
Not Mitigated
Streams
Floodway
1% Annual Chance Flood
0.2% Annual Chance Flood
N
E
S
W
0
1,000
2,000 Feet
amec
Whites Creek
ROWAN DR
ROWAN CT
BALDWIN CT
CRAVATH DR
WALKER LN
WOODWARD DR
WORK DR
RINGGOLD DR
VANDERHORST DR
BORDEAUX PL
WILLIAM BAILEY DR
CUMBERLAND COVE DR
DUBOIS DR
DUNBAR DR
GARRISON DR
ROMAN DR
TROY DR
ATWELL DR
MOORMANS ARM RD
BOATNER DR
HILLMORE DR
MIKE SHIELDS CT
STOKERS LN
AMES DR
AMES CT
KINGS CIR
LYTLE DR
MEADOW HILL DR
BUENAVIEW BLVD
BOYD DR
BOBWHITE DR
FARMVIEW DR
BRAY DR
SWAN DR

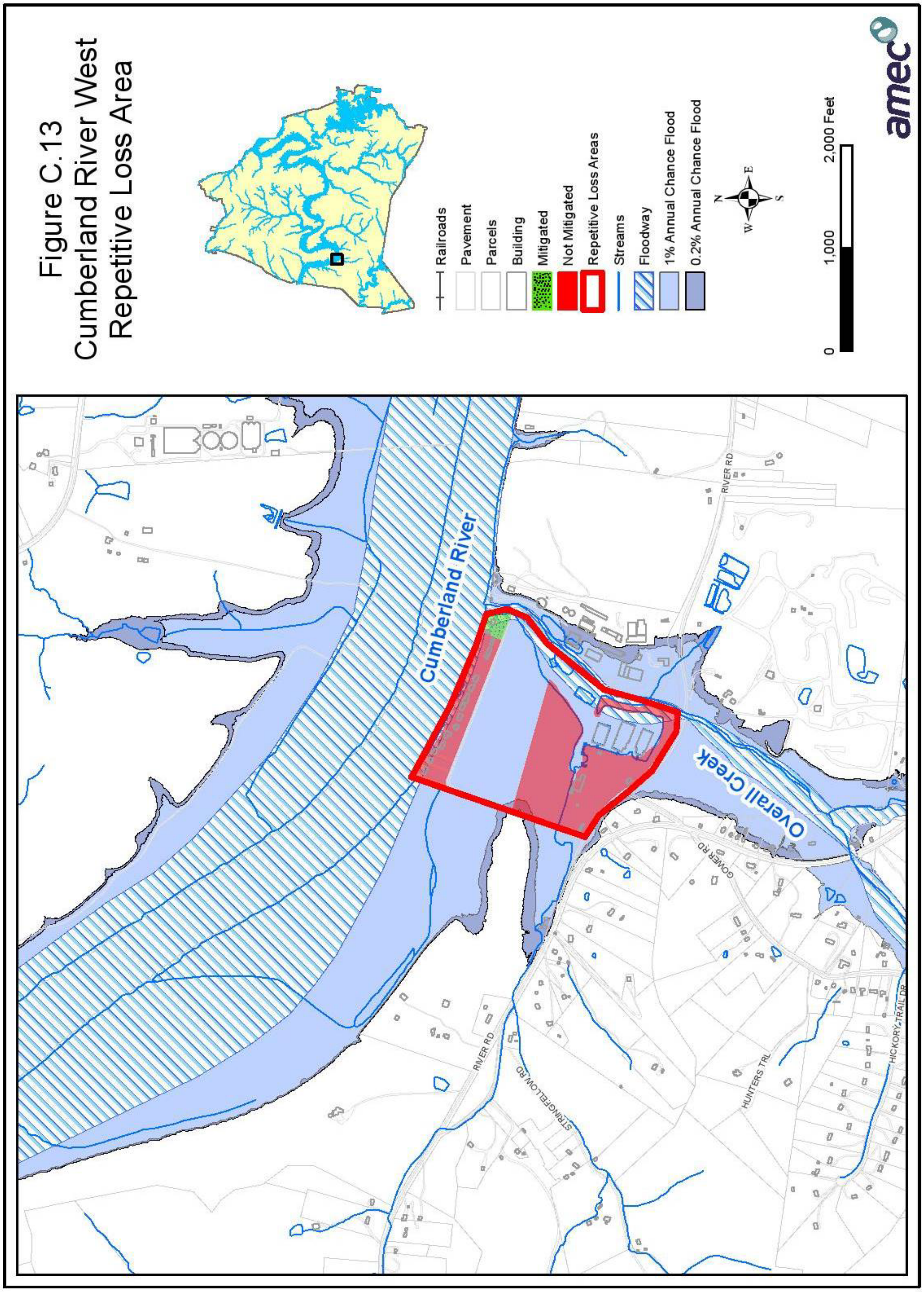

Figure C.13
Cumberland River West
Repetitive Loss Area

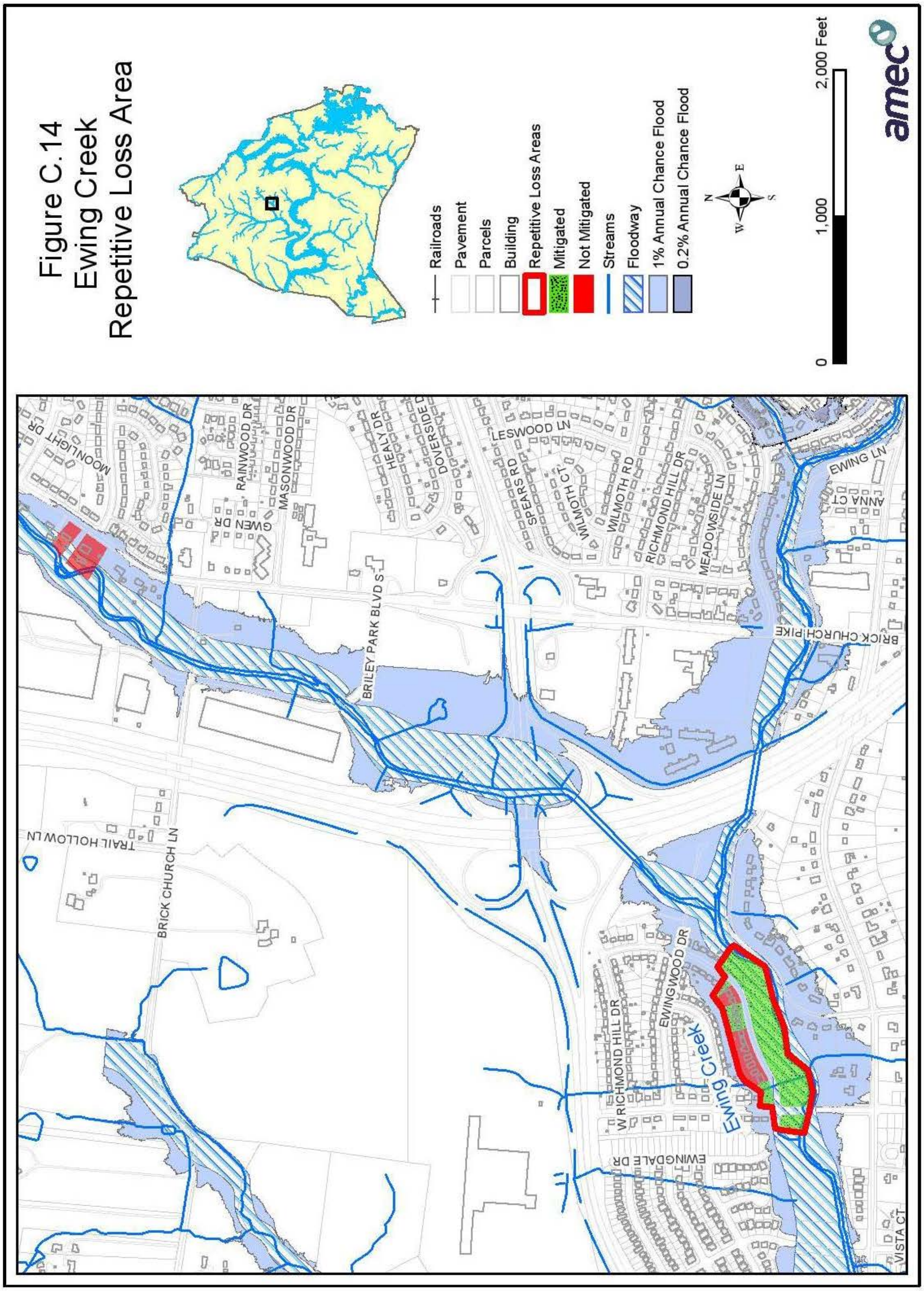

Figure C.14
Ewing Creek
Repetitive Loss Area
Railroads
Pavement
Parcels
Building
Repetitive Loss Areas
Mitigated
Not Mitigated
Streams
Floodway
1% Annual Chance Flood
0.2% Annual Chance Flood
N
E
S
W
0
1,000
2,000 Feet
amec
MOONLIGHT DR
RAINWOOD DR
MASONWOOD DR
GWEN DR
HEALY DR
DOVERSIDE DR
LESWOOD LN
SPEARS RD
WILMOTH CT
WILMOTH RD
RICHMOND HILL DR
MEADOWSIDE LN
EWING LN
ANNA CT
BRILEY PARK BLVD S
BRICK CHURCH PIKE
TRAIL HOLLOW LN
BRICK CHURCH LN
EWINGWOOD DR
W RICHMOND HILL DR
Ewing Creek
EWINGDALE DR
VISTA CT

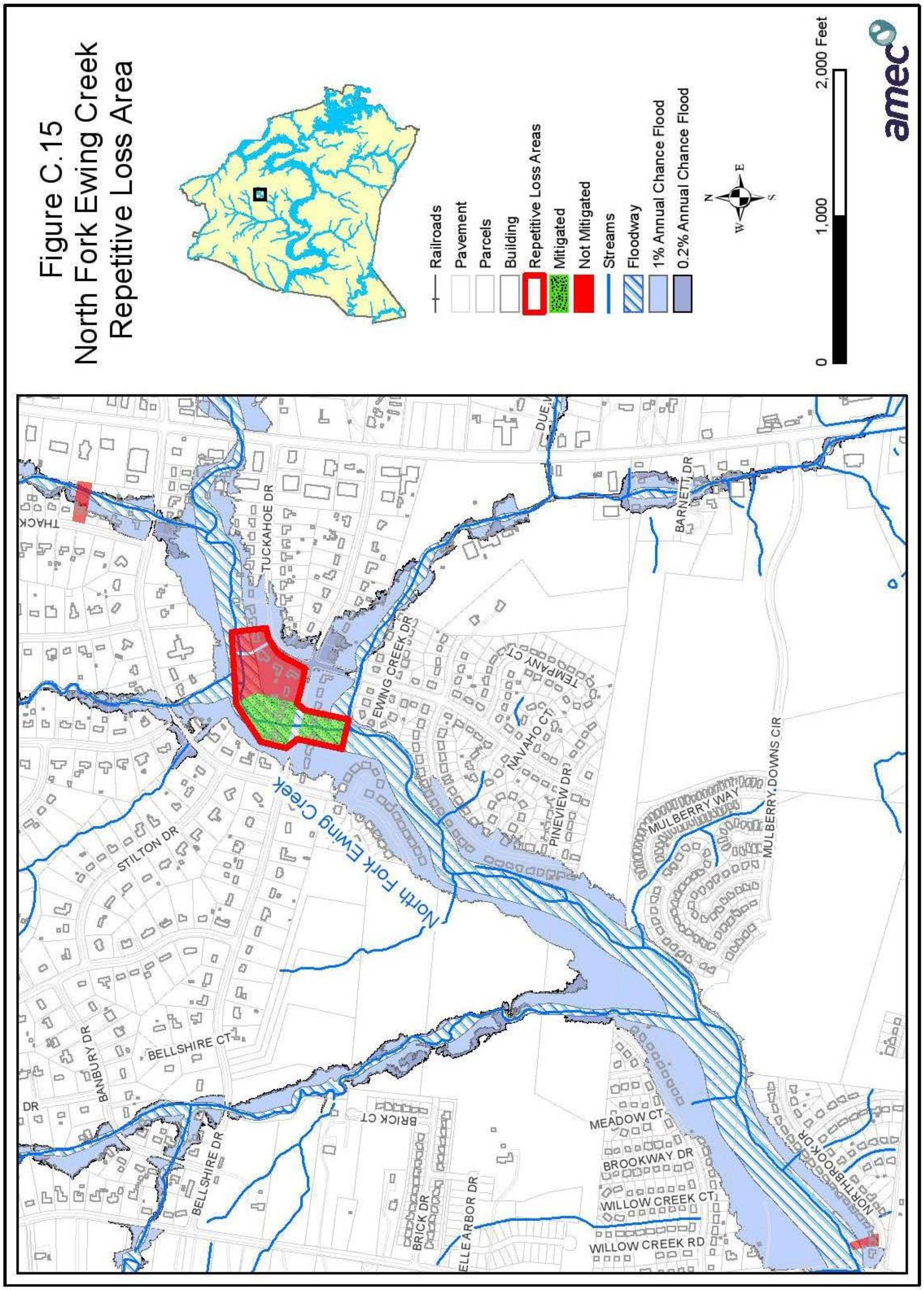
Figure C.15
North Fork Ewing Creek
Repetitive Loss Area
Railroads
Pavement
Parcels
Building
Repetitive Loss Areas
Mitigated
Not Mitigated
Streams
Floodway
1% Annual Chance Flood
0.2% Annual Chance Flood
N
W
E
S
0
1,000
2,000 Feet
amec
North Fork Ewing Creek
TUCKAHOE DR
EWING CREEK DR
TEMPANY CT
NAVAHO CT
PINEVIEW DR
MULBERRY WAY
MULBERRY DOWNS CIR
BARNETT DR
STILTON DR
BANBURY DR
BELLSHIRE CT
BELLSHIRE DR
BRICK CT
BRICK DR
ELLE ARBOR DR
MEADOW CT
BROOKWAY DR
WILLOW CREEK CT
WILLOW CREEK RD
NORTHBROOK DR
THACK
DUE

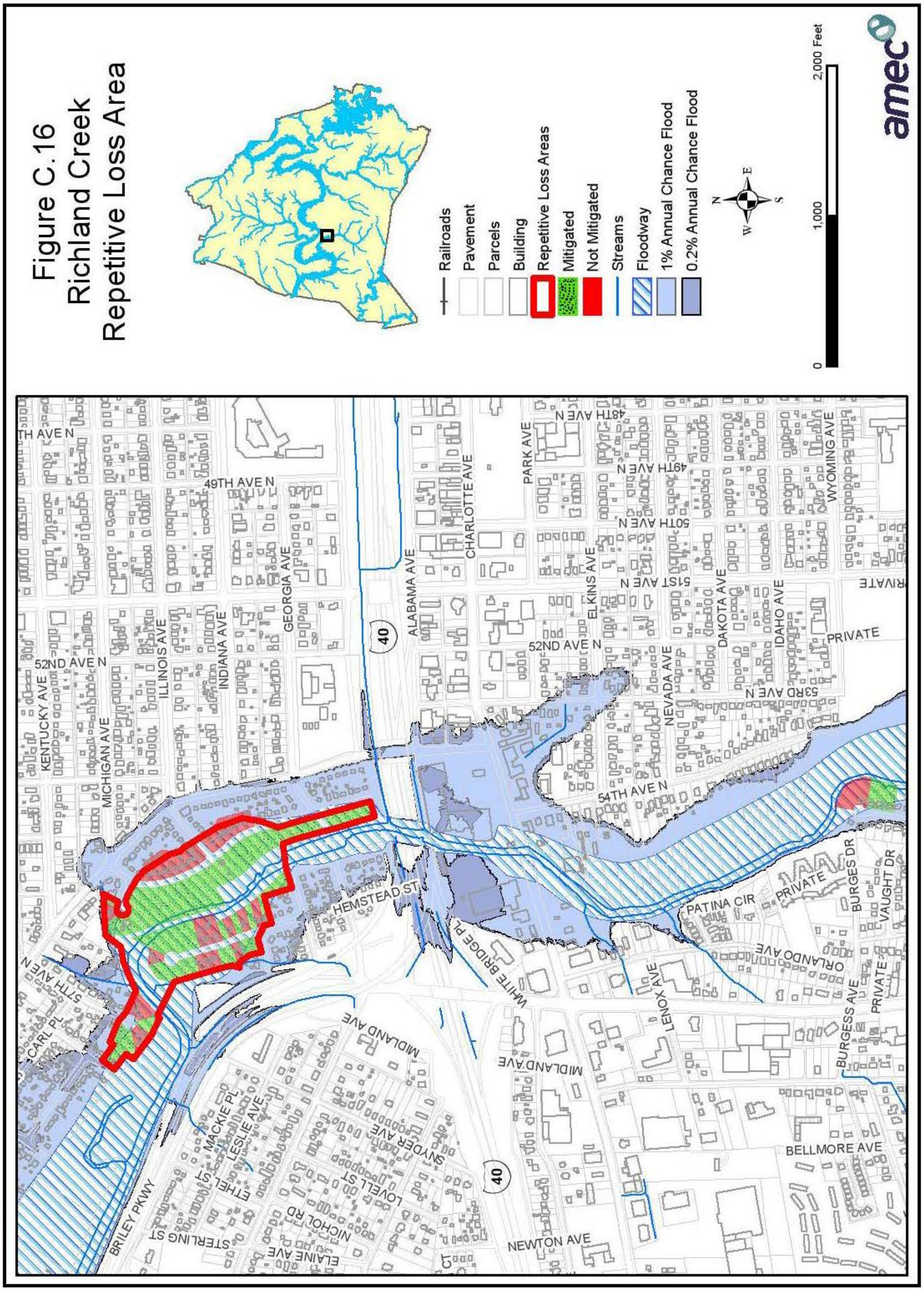

Figure C.16
Richland Creek
Repetitive Loss Area

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Title 44, Emergency Management and Assistance

44 CFR § 201.6 Local Mitigation Plans

The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. Local plans will also serve as the basis for the State to provide technical assistance and to prioritize project funding.

(a) ***Plan requirements.***
(1) A local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants. The Administrator may, at his discretion, require a local mitigation plan for the Repetitive Flood Claims Program. A local government must have a mitigation plan approved pursuant to this section in order to apply for and receive mitigation project grants under all other mitigation grant programs.
(2) Plans prepared for the FMA program, described at part 79 of this chapter, need only address these requirements as they relate to flood hazards in order to be eligible for FMA project grants. However, these plans must be clearly identified as being flood mitigation plans, and they will not meet the eligibility criteria for other mitigation grant programs, unless flooding is the only natural hazard the jurisdiction faces.
(3) Regional Administrator's may grant an exception to the plan requirement in extraordinary circumstances, such as in a small and impoverished community, when justification is provided. In these cases, a plan will be completed within 12 months of the award of the project grant. If a plan is not provided within this timeframe, the project grant will be terminated, and any costs incurred after notice of grant's termination will not be reimbursed by FEMA.
(4) Multi-jurisdictional plans (*e.g.* watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan. State-wide plans will not be accepted as multi-jurisdictional plans.

(b) ***Planning process.*** An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

(c) ***Plan content.*** The plan shall include the following:
(1) Documentation of the *planning process* used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

(2) A *risk assessment* that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards. The risk assessment shall include:
(i) A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
(ii) A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:
(A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;
(B) An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate;
(C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.
(iii) For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.
(3) *A mitigation strategy* that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools. This section shall include:
(i) A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
(ii) A section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.
(iii) An action plan describing how the actions identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.
(iv) For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.
(4) A *plan maintenance process* that includes:
(i) A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
(ii) A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

(iii) Discussion on how the community will continue public participation in the plan maintenance process.
(5) *Documentation* that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

(d) ***Plan review.***
(1) Plans must be submitted to the State Hazard Mitigation Officer (SHMO) for initial review and coordination. The State will then send the plan to the appropriate FEMA Regional Office for formal review and approval. Where the State point of contact for the FMA program is different from the SHMO, the SHMO will be responsible for coordinating the local plan reviews between the FMA point of contact and FEMA.
(2) The Regional review will be completed within 45 days after receipt from the State, whenever possible.
(3) A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding.
(4) Managing States that have been approved under the criteria established by FEMA pursuant to 42 U.S.C. 5170c(c) will be delegated approval authority for local mitigation plans, and the review will be based on the criteria in this part. Managing States will review the plans within 45 days of receipt of the plans, whenever possible, and provide a copy of the approved plans to the Regional Office.