

Metropolitan Nashville-Davidson County Multi-Hazard Mitigation Plan

April 2010
Final Revision



Metropolitan Nashville - Davidson County Multi-Hazard Mitigation Plan

TABLE OF CONTENTS

1.0 INTRODUCTION 1-1
Purpose and Need 1-1
Scope 1-2

2.0 COMMUNITY PROFILE 2-1
Geography – Location and Area 2-1
Climate 2-1
Physical Features and Land Use 2-3
Population 2-8
Economic Development 2-9

3.0 PLANNING PROCESS 3-1
Local Government / Community Participation 3-3
The Planning Process 3-3

4.0 RISK ASSESSMENT 4-1
4.1 Hazard Identification 4-3
Introduction 4-3
Disaster Declaration History 4-3
Dam and Levee Failure 4-7
Flooding 4-15
Flooding – Watershed Specific Data 4-21
Geological Hazards 4-43
Earthquake 4-43
Landslides 4-49
Sinkholes 4-53
Infestations 4-55
Manmade Hazards 4-57
Severe Weather 4-59
Drought 4-59
Wildfires 4-63
Extreme Temperatures 4-65
Thunderstorms/High Winds 4-69
Tornadoes 4-73
Winter Storms 4-75

4.2 Vulnerability Assessment....4-77
Drought....4-85
Dam & Levee Failures....4-86
Flood....4-87
Geological Hazards....4-89
Severe Weather....4-93
Natural Biological Hazards....4-95
4.3 Capability Assessment....4-97

5.0 MITIGATION STRATEGY....5-1
Goal Setting....5-3
Identification of Mitigation Measures....5-5
Mitigation Strategy....5-6
Action Plan....5-7
Complete Action Items....5-25
Other Action Items Considered....5-29

6.0 PLAN ADOPTION....6-1

7.0 PLAN IMPLEMENTATION AND MAINTENANCE....7-1
Implementation....7-1
Maintenance....7-3

APPENDIX A – PLANNING PROCESS....A-1
Community Planning Team....A-3
Public Input Advisory Committee....A-2
Promulgation Statement....A-6
Meeting Minutes....A-7

APPENDIX B – HISTORICAL HAZARD INFORMATION

APPENDIX C – REPETITIVE LOSS/ FLOOD DAMAGED AREAS

APPENDIX D - REFERENCES

LIST OF TABLES

Table 2-1 Normal Climate Statistics for Nashville-Davidson County, Tennessee...2-1
Table 2-2 Population Growth....2-8
Table 3-1 DMA and CRS Planning Cross Reference....3-2
Table 4-1 Federal Disaster Declarations for Davidson County....4-4
Table 4-2 Dams Affecting Davison County....4-9
Table 4-3 Major Sources of Flooding....4-16
Table 4-4 Critical Flood Depths and Velocities....4-18
Table 4-5 Structures within the Repetitive Loss Areas....4-20
Table 4-6 Browns Creek Damage Reach Information....4-22
Table 4-7 Cooper Creek Damage Reach Information....4-23
Table 4-8 Gibson Creek Damage Reach Information....4-25
Table 4-9 Mill Creek Tributary 1 Damage Reach Information....4-27
Table 4-10 Seven Mile Creek Damage Reach Information....4-28
Table 4-11 Sorgum Branch Damage Reach Information....4-29
Table 4-12 Whittemore Branch Damage Reach Information....4-30
Table 4-13 Pages Branch Damage Reach Information....4-32
Table 4-14 Richland Creek Damage Reach Information....4-34
Table 4-15 East Fork Hamilton Creek Damage Reach Information....4-36
Table 4-16 McCrory Creek Damage Reach Information....4-37
Table 4-17 Scotts Creek Damage Reach Information....4-38
Table 4-18 Whites Creek Damage Reach Information....4-41
Table 4-19 Comparison of Richter Magnitude and Modified Mercalli Intensity....4-46
Table 4-20 Precipitation Summary (inches) 1948-2003 Southeast Regional Climate Center....4-60
Table 4-21 Palmer Classifications....4-60
Table 4-22 Temperature Summary (^{O}F) 1971-2000 National Climatic Data Center....4-66
Table 4-23 Heat Index Values and Effects....4-67
Table 4-24 Enhanced Fujita Tornado Scale....4-74
Table 4-25 Snowfall Summary (inches) 1948-2003 Southeast Regional Climate Center....4-76
Table 4-26 Catastrophic Damages....4-77
Table 4-27 Cultural Resources....4-78
Table 4-28 Natural Resources....4-79
Table 4-29 Summary of Probable Hazard Risk and Vulnerability....4-84
Table 4-30 Analysis of Parcels Located within the 100-Year Floodplain....4-88
Table 4-31 Earthquake Hazard Damages....4-90
Table 4-32 Geological Hazard Damages....4-91
Table 4-33 Metropolitan Nashville-Davidson County Capability....4-98
Table 7-1 Plan Record of Changes....7-3
Table 4-35 CPT Members....A-3

LIST OF FIGURES

Figure 2-1 Metropolitan Nashville-Davidson County Location Map 2-2
Figure 2-2 Subarea Map 2-3
Figure 3-1 Similarity Between DMA and CRS Planning Steps 3-2
Figure 4-1 Federal Disaster Declaration Maps 4-4
Figure 4-2 Dam and Levees within Davidson Co. 4-8
Figure 4-3 J. Percy Priest Dam 4-9
Figure 4-4a Old Hickory Dam 4-10
Figure 4-4b Wolf Creek Dam 4-10
Figure 4-4c Center Hill Dam 4-11
Figure 4-5 Center Hill Dam Break Scenario 4-12
Figure 4-6 Metro Center Levee Rehabilitation 4-13
Figure 4-7a Schematic Map of New Madrid Seismic Zone 4-44
Figure 4-7b Schematic Map of East Tennessee Seismic Zone 4-45
Figure 4-8 Seismic Hazard Map of Tennessee 4-47
Figure 4-9 Historical Earthquake Events 4-47
Figure 4-10 Evidence of Landslides 4-51
Figure 4-11a Slope Failure Locations 4-52
Figure 4-11b Slopes greater than 25% 4-53
Figure 4-12 Sinkhole Collapse 4-54
Figure 4-13 Karst Topography of Tennessee 4-55
Figure 4-14 Human Cases Reported in 2003 4-56
Figure 4-15 2009 West Nile Activity within the United States 4-57
Figure 4-16 Palmer Drought Severity Index 4-61
Figure 4-17 U.S. Seasonal Drought Outlook 4-62
Figure 4-18 Tennessee Fire Districts 4-65
Figure 4-19 Observed Fire Danger Class 4-65
Figure 4-20 Normal Monthly Temperatures 4-66
Figure 4-21 Average Number of Thunderstorms Days Per Year 4-71
Figure 4-22 Tornado Damage 4-75
Figure 4-23 Footprint of April 16, 1998 Tornado 4-75
Figure 4-24 Annual Mean Snowfall 4-77
Figure 4-25 Tornado Siren Locations 4-94
Figure 5-1 Priority Stars 5-5
Figure A-1 Sample letter to additional agencies A-5
Figure A-2 Mayor's Promulgation Statement A-6
Figure A-3 Press release announcing notice of public hearing A-20
Figure A-4 Screen shot of OEM website A-21
Figure A-5 Mass email re: public meeting A-22
Figure A-6 Screen shot of MWS website A-23

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 Mayor's Office of Emergency Management)
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
MDPW	Metropolitan Department of Public Works
MWS	Metro Water Services
NIBS	National Institute of Building Sciences
NES	Nashville Electric Service
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	Mayor'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
USGA	United States Geological Survey
WCT	Wind Chill Temperature
WNV	West Nile Virus

(This page has been left blank intentionally.)

Metropolitan
Nashville-Davidson County
Multi-Hazard Mitigation Plan

Prepared by:
Metropolitan Nashville-Davidson County
Mayor's Office of Emergency Management
2060 15th Avenue South
Nashville, TN 37212

FINAL
April 2010

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 new and revitalized emphasis on hazard mitigation, including adding a new requirement for local mitigation plans, and the

required revision every 5 years. These new 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 process set forth in FEMA Region IV's Crosswalk Reference Document for Review and Submission of Local Mitigation Plans.

This plan addresses natural hazards only. Although Metro recognizes that FEMA is both encouraging and promoting communities to integrate human-caused hazards into the mitigation planning process, the scope of this effort does not address human-caused hazards for two reasons. First, DMA requires extensive public information and input, and this is in direct conflict with the security necessary in planning for Chemical, Biological, and Radiological hazards. The Planning Committee determined it was not in the Community's best interest to share specific information about the area's vulnerability to human-caused hazards. Second, organizationally, many of the planning activities for human-caused hazards are either underway or complete, and have been developed by a different set of organizations. The Mayor's Office of Emergency Management (OEM) may provide further information on a need-to-know basis.

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. Positioned within 600 miles and less than one day's drive from 50 percent of the United States population and less than 6 hours 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.

CLIMATE

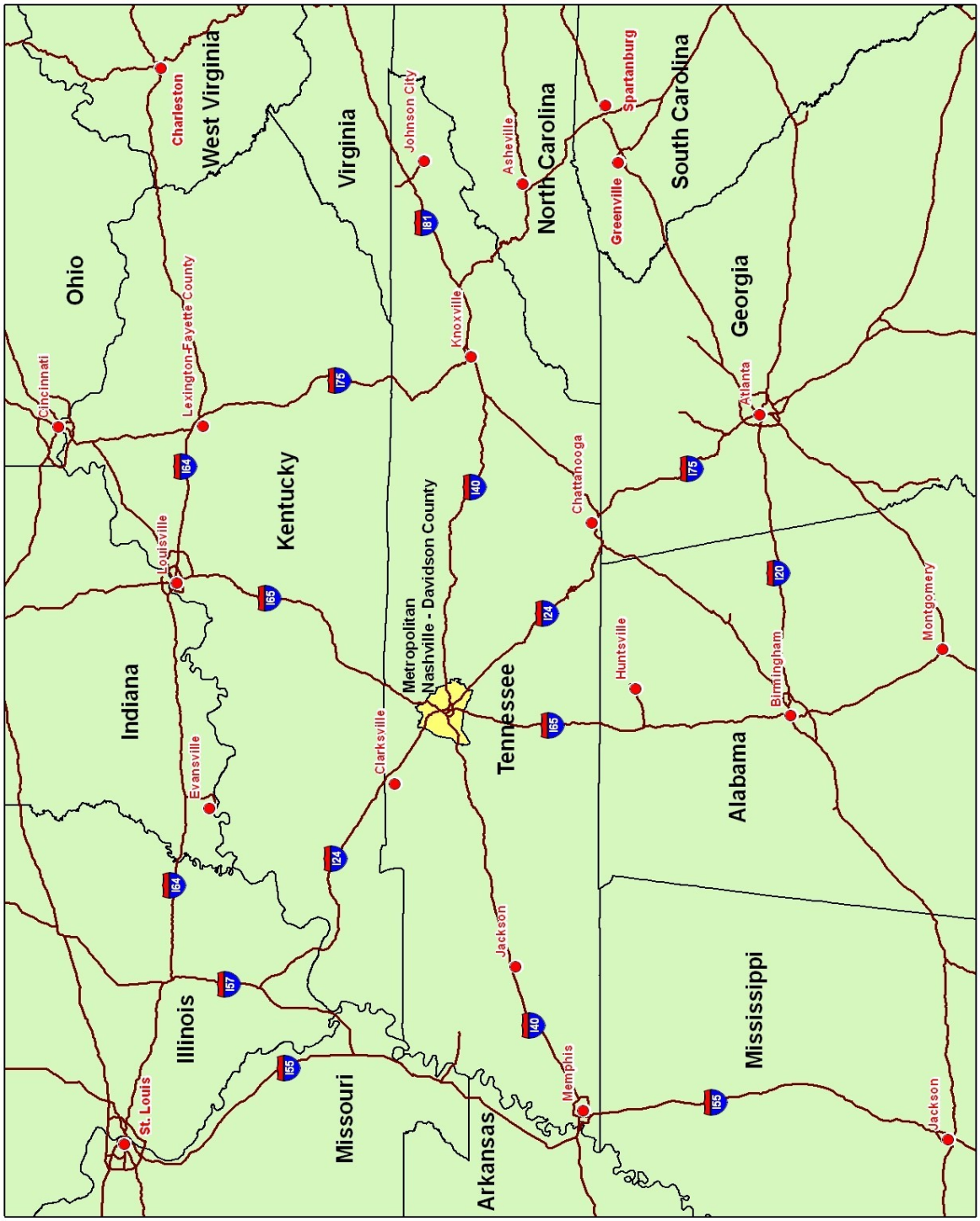
Nashville has a mild climate that is common throughout the southeastern part of the United States with four distinct seasons and light snowfall in the winter. Mean annual temperatures range from 37 to 79 degrees Fahrenheit with an average July high temperature of 89 degrees and an average winter January high of 46 degrees. The average annual precipitation is 48.1 inches and the average humidity at noon is 57 percent. Table 2-1 presents normal climate statistics for the community.

Table 2-1. Normal Climate Statistics for Nashville-Davidson County, Tennessee

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Days with Precipitation	11	10	12	11	11	10	10	8	8	7	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
Noon Humidity (%)	64	59	54	51	56	56	57	56	57	53	59	64
Sunshine (%)	41	47	52	59	60	65	63	63	62	62	50	42
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)	3.9	3.4	1.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5

(Source: National Weather Service)

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



PHYSICAL FEATURES AND LAND USE

Nashville-Davidson County is situated in a natural basin surrounded by wooded hills with the Cumberland River and numerous tributaries flowing through. Topography varies from flatter lands in the south to elevations in the northern areas that range from 550 feet above sea level to 1,100 feet at the highest point. In addition to the Cumberland River, major topographical features include Percy Priest Lake and Old Hickory Lake. The community features lush vegetation and over 6,600 acres of parks, making it the leader in per capita parks for the entire country. The downtown urban core is a combination of skyscrapers and renovated historic buildings.

In 1988, Nashville was divided into 14 subareas or major communities for planning purposes (Figure 2-2). For each subarea, the physical features and land use are summarized on the following pages.

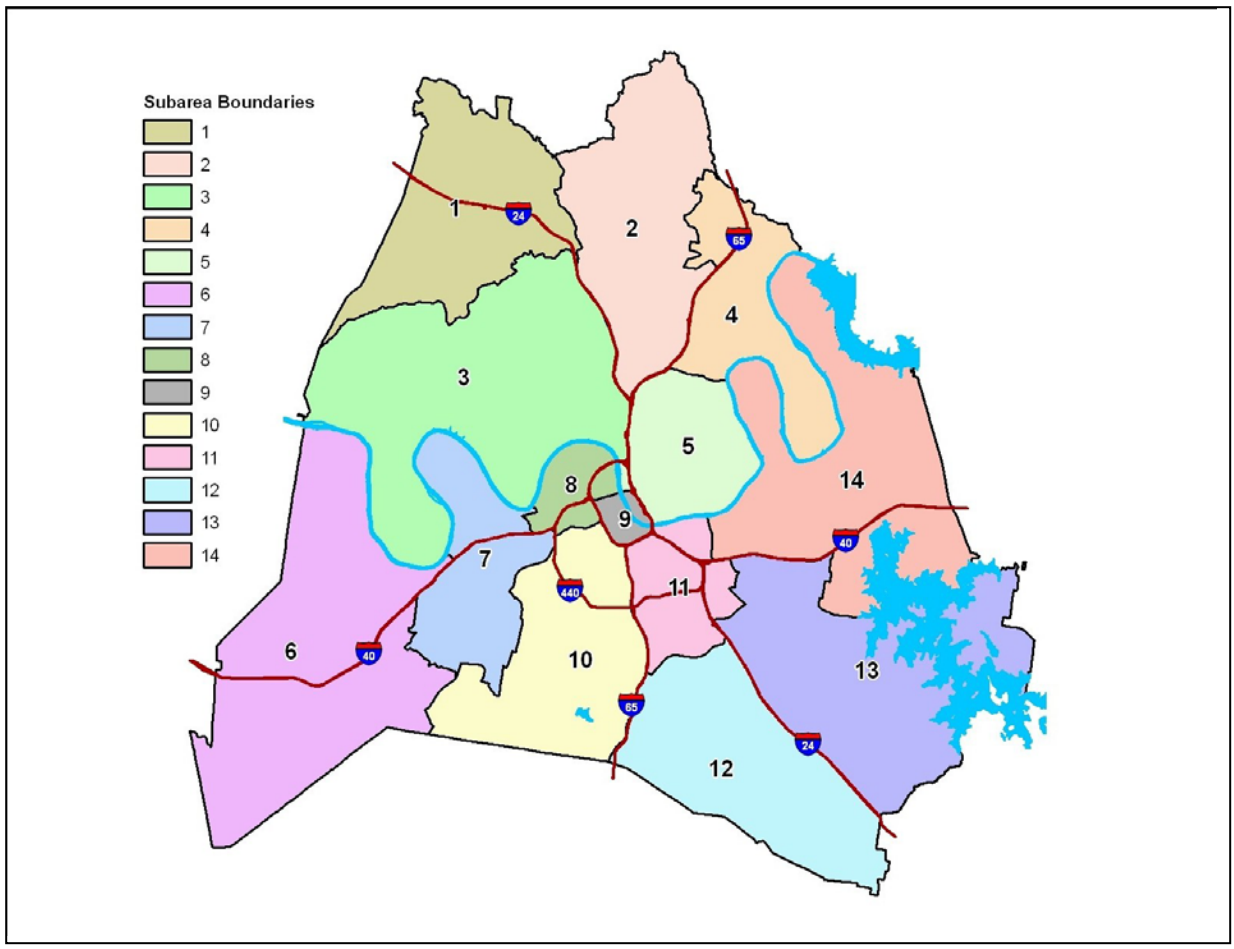


Figure 2-2. Subarea Location Map

Subarea 1 – Joelton

Joelton is located in the most northwestern part of Davidson County. It is bound to the west by the Cheatham County line; to the north by the Robertson County line; to the east by Ivy Point Road and Crocker Springs Road; and to the south by Little Marrowbone Drive and Old Hickory Boulevard. The Joelton Community is almost evenly divided into two distinct topographic areas. In a crescent that curves from the southwestern section to the northeastern section of the area, steep slopes (greater than 20 percent) and narrow ridges and valleys are the predominant features. In the northwestern and central area, level to rolling land is the predominant feature with occasional steep-sided ravines with streams at the bottom. Significant water bodies in this area include Marrowbone Lake, Little Marrowbone Creek, Whites Creek, and Eatons Creek.

Joelton's historically rural development pattern is evident in its land use. Fifty-six percent of the subarea's land use is residential, 40 percent is vacant, and only 0.02 percent is for commercial purposes.

Subarea 2 – Parkwood-Union Hill

This subarea is located in the most northeastern part of the county. It is bounded by the Robertson and Sumner County lines to the north, the Goodlettsville city limits and I-65 to the east, I-65 and I-24 to the south, and I-24, Lickton Pike, Crocker Springs Road, Union Hill Road, and Ivey Point Road to the west. Most of the subarea's terrain consists of heavily forested steep slopes and narrow ridges and valleys. Generally, land south of Old Hickory Boulevard is more level. Major streams in this area include Whites Creek, Ewing Creek, Mansker Creek, Little Creek, and Baker Branch Creek.

The area is predominantly rural and suburban residential with scattered commercial development along Dickerson Pike. There are mixed commercial concentrations at I-24/Old Hickory Boulevard and Briley Parkway/Brick Church Pike. Two emerging light industrial areas include Brick Church Pike/Brick Church Lane and Springfield Hwy/Lickton Pike. There are minimal to moderate growth expectations for both population and employment. New commercial concentration is planned at Briley Parkway/Dickerson Pike. Sixty-two percent of the subarea's land use is residential, 33 percent is vacant, 3 percent is for civic and public benefit and only 2 percent is for commercial purposes.

Subarea 3 – Bordeaux-Whites Creek Community

The Bordeaux-Whites Creek Community is located in northwestern Davidson County, stretching from the Cumberland River to Old Hickory Boulevard and I-24 to the Cheatham County line. The area is characterized by older suburban development and rural land. The north and west portions of the community are generally steeply sloped (slopes of 20 percent or greater) with a significant amount of Dellrose Soil scattered throughout. Dellrose soils are particularly noted for slippage when located on steep slopes. The areas of steep topography account for 50 percent of the land in the community. The southeast portion of the area is

gently rolling or relatively level. Portions of Whites Creek, Ewing Creek, and Eatons Creek pass through this area.

Land use is predominately residential or vacant land. Only a small portion is for commercial use. Industrial uses are found near Briley Parkway and along the southern portions of I-24.

Subarea 4 – Madison

This subarea is located in the northeastern section of the county. It is bounded in the north by the Sumner County line; in the west by the City of Goodlettsville; and in the east and south by Briley Parkway and the Cumberland River. The subarea's terrain is predominately level, with most areas having slopes less than 12 percent. Steeper sloping areas (slopes greater than 12 percent) can be found in the northern part of the subarea both in Goodlettsville and in the area north of Vietnam Veterans Boulevard, and in the southern part of the subarea at the I-65/Briley Parkway interchange.

Most of the subarea does not contain soils that are restrictive to urban development. Soils that are restrictive to development are found in the Cumberland River floodplain, the Dry Creek floodplain, and at the base of steep slopes near the I-65/Long Hollow Pike interchange. Major streams (other than the Cumberland River) include Mansker Creek, Dry Creek, Gibson Creek, and Love Branch.

Fifty-eight percent of active land use is residential, and 21 percent are used for non-residential uses and 21 percent is vacant or used for agricultural purposes.

Subarea 5 – East Nashville

This subarea is located in the central portion of the county. It is bounded by Briley Parkway to the north; the Cumberland River to the east and south; and I-65 to the west. Most of the subarea's terrain is 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 subarea. Other than the Cumberland River, the most significant waterways are East Fork Ewing Creek and Cooper Creek.

This is a predominantly developed subarea. Approximately 60 percent of the subarea is residential and 30 percent is devoted to nonresidential uses including commercial, industrial, and community facilities and services. The remaining 10 percent is undeveloped, most of which is in the northwest section. Commercial activities are focused in a linear pattern along Gallatin Pike and along Dickerson Pike.

Subarea 6 – Bellevue

Located in the southwestern corner of Davidson County, Bellevue is a primarily rural and suburban residential community. It is bound to the west by the Cheatham County line; to the south by the Williamson County line; to the north and northeast by the Cumberland River; and to the east by I-40, Percy Werner Park, and CSX railroad. Its distance from downtown

Nashville, coupled with the concentration of farmland and hilly terrain, gives the area an overall rural feel. Major commercial concentrations are at Highway 70 South and Old Hickory Boulevard and Highway 70 South and I-40, where the Bellevue Center Mall is located. Residential and commercial areas dominate the southern portion of the subarea, while the northern portion is generally rural.

In addition to the Cumberland River, water bodies in this area include the Harpeth River and Indian Creek. Colluvial soils are abundant in this area, located mostly in the southern portion along side the steeper slopes.

Subarea 7 – West Nashville

Subarea 7 is a predominately developed area and is located to the west and southwest of downtown Nashville. It is bound by the Cumberland River to the north, CSX railroad and the City of Belle Meade to the east, Percy Warner Park to the south, and I-40 to the west. Terrain in this subarea ranges from flat to moderately sloping, with some very steep slopes (20 percent and greater) found in the southwestern portion of the subarea. Approximately 71 percent of the land in this area has slopes with less than a 10 percent grade, 18 percent with slopes at 10-20 percent grade, and the remaining 11 percent with slopes at a grade of 20 percent and greater. In addition to the Cumberland River, which forms the northern boundary of the subarea, several major streams wind through this area including Richland Creek, Jocelyn Hollow Branch, and Vaughn's Gap Branch. The particularly unstable Dellrose soils are located within this subarea.

Fifty-five percent of the area's land use is residential, 6 percent is vacant, and 39 percent is for commercial, industrial, or community purposes.

Subarea 8 – North Nashville

This subarea is located to the north and northwest of downtown Nashville. The area is bound by the Cumberland River to the north, east, and west. The southern border is a combination of the CSX railroad, I-40, Charlotte Ave, and Jefferson Street.

Subarea 9 – Downtown Nashville

Located in the heart of Davidson County is subarea 9, Downtown Nashville. Bounding the area to the east is I-65/I-24; to the south and west is I-40; and to the north is Jefferson Street. This subarea is split by the Cumberland River, with approximately 25 percent of the area on the east bank. 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.

The subarea is dominated by three commanding physical features: Capitol Hill to the north; Rutledge Hill to the south; and the Cumberland River. Capitol Hill rises to an elevation of 555 feet and is given shape by sideslopes over 25 percent. Rutledge Hill reaches 536 feet. A distance of 1.4 miles separates the crests of the two hills.

This subarea is dominated by Nashville's Central Business District (CBD) and its supported uses. The CBD is characterized by an urban core of intensive office structures, which are a combination of skyscrapers and renovated historic buildings, with parking, printing, office supplies, and apartments on the outskirts. Bicentennial Mall and Riverside Park are the only significant areas of greenspace.

Subarea 10 – Greenhills-Midtown

Located in the southern portion of the county, this area is bound by I-40 to the north, I-65 to the east, the Williamson County line to the south, and Percy Werner Park, Belle Meade city limits, Charlotte Pike, and CSX railroad to the west. This area is mostly flat to rolling terrain except for an east-west band of hills across the southern portion, some of which are steep. The area is highly urbanized to the north, but becomes suburban and, finally, almost rural in the hilly area in the south. Major water bodies include Radnor Lake, Richland Creek, Browns Creek, Otter Creek and Sugartree Creek.

Approximately 64 percent of the land area is used for residential land uses, 28 percent of the area are non-residential, and 8 percent of the land area is vacant or farmland. Several major hospitals and universities are located in this subarea including Baptist, Columbia Centennial, Columbia Southern Hills, St.Thomas and Vanderbilt University Hospitals; and Vanderbilt, Belmont, and David Lipscomb Universities.

Subareas 11 and 12 – South Nashville

Subarea 11 is located in the south-central area of the county and is bounded by the Cumberland River to the north; I-24 to the east; the CSX railroad to the south; and I-65 to the west. The topography in the area is generally flat with the highest elevations occurring around Fort Negley. Major bodies of water include the Cumberland River, Mill Creek, and Brown's Creek. Predominant land uses are residential and industrial.

Subarea 12 is bounded by I-24 to the east; the Rutherford County line to the southeast; the Williamson County line to the south; Franklin Pike and I-65 to the west; and the CSX railroad and a small segment of Sevenmile Creek to the north. Although most of the land is gently rolling or relatively level, steep slopes are scattered throughout the subarea. Significant water bodies in this subarea 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 subarea 12, but are generally found within the floodplains of Mill Creek and Sevenmile Creek.

The predominant active use of land is residential use, which accounts for 64 percent of the subarea, while 25 percent of the subarea is vacant. Commercial and industrial uses occupy only 3.2 percent of the total subarea.

Subarea 13 – Antioch – Priest Lake

Subarea 13 located in southeast Davidson County and encompasses Nashville International Airport and J. Percy Priest Lake. The subarea is bounded to the southwest and west by

Interstate 24 and Briley Parkway; to the north by Interstate 40; to the east by J. Percy Priest Lake; and to the southeast by the Davidson County line. The subarea includes older suburban subdivisions, new development, large employers and rural lands.

Subarea 14 – Donelson – Hermitage

This subarea is located on the eastern side of Davidson County and is bounded by the Cumberland River to the west and north; Sumner and Wilson Counties to the northeast and east; Percy Priest Lake, Couchville Pike, Nashville International Airport, and I-40 to the south; and Spence Lane and the CSX railroad to the west. Most of the subarea has gently rolling terrain with steeply sloping land limited mostly to corridors along waterways. Major water bodies in this subarea include the Cumberland River, J. Percy Priest Lake, Stone's River, Stoner's Creek, and Mill Creek.

Almost half of the land currently developed is residential. Commercial concentrations are in the Donelson and Hermitage areas. There is a major mixed entertainment/commercial concentration in Pennington Bend that includes the Opryland Hotel, the Grand Ole Opry House, and Opry Mills Shopping Mall. An estimated one-fourth of the subarea's land is currently vacant, a significant portion of which is affected by flooding.

POPULATION

Since its settlement in 1779, Nashville has grown to become Tennessee's largest city. Together, Nashville and Davidson County contain a population of 626,144, according to the US Census Bureau.

Table 2-2. Population Growth

Population Growth 1970 to 2010			
Year	**Total Population**	**Population Change**	**Percent Change**
1970	448,003	---	---
1980	477,811	29808	6.7
1990	510,784	32973	6.9
2000	569,889	59092	11.6
2008	626,144	56268	9.9

(Source: Metro Planning Department and US Census Bureau)

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 thirteen counties including Principal County Davidson, Cannon, Cheatham, Dickson, Hickman, Macon, Robertson, Rutherford, Smith, Sumner, Trousdale, Williamson and Wilson. The MSA population is over one point five million persons.

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 and guarantee a strong local economy.

Major companies with headquarters or plants in metropolitan Nashville include auto manufacturers Saturn and Nissan; computer manufacturer Dell; national health care providers HCA; restaurants Cracker Barrel and Shoney's; Gaylord Entertainment, owner of Opryland USA and The Nashville Network (TNN). Other key enterprises include Aladdin, a leader in the manufacturing of vacuum bottles and lunch kits; Thomas Nelson, Inc., the world's largest bible publisher; Baptist Sunday School Board and United Methodist Publishing, two of the largest religious publishing houses in the world; and Bridgestone Firestone, Inc, tire manufacturer.

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 $44,486 in 2007.

(This page has been left blank intentionally.)

Multi-Hazard Mitigation Plan
3.0 Planning Process

The Mayor's 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 2009 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, where necessary.

Metro OEM led the process for this planning effort utilizing the DMA planning requirements and FEMA's associated guidance. This 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.

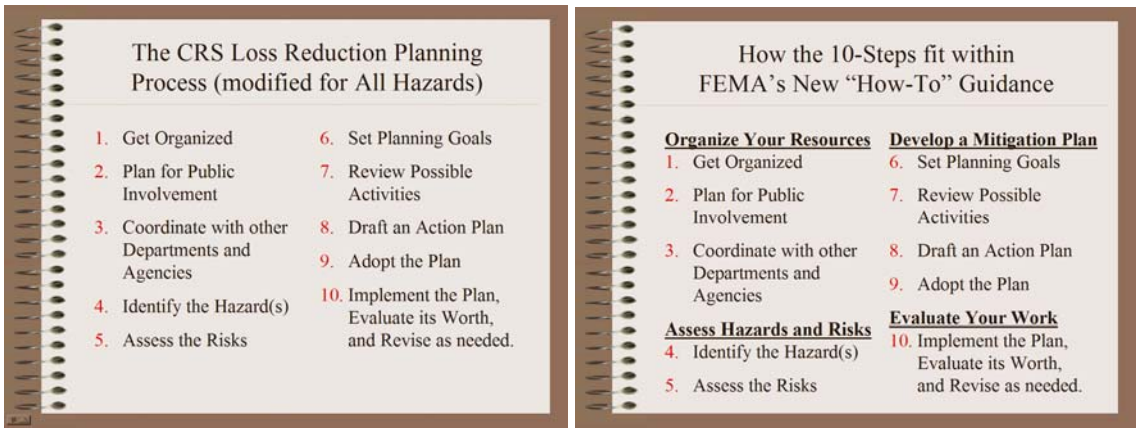


Figure 3-1. Similarity Between DMA and CRS Planning Steps

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

Table 3-1. DMA and CRS Planning Cross Reference

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

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 participate by the Mayor's Office of Emergency Management (OEM), 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 four times over a two month period. Representatives from several Metro departments attended each meeting including the Metro Water Services, Metro Planning Department; Metro Codes and Metro Police Department. Also in regular attendance were representatives from Nashville Electric Service (NES) and the National Weather Service. The list of CPT members is included in Appendix A. Attendees and meeting minutes for each of the CPT meetings are also included in Appendix A. The CPT will stay in existence for the purpose of implementing and updating this Plan. The four CPT meeting dates and topics were as follows:

1. July 23 – Kick off meeting
2. August 20 – Plan Review Hazard Identification, Risk Assessment, Goal Setting, Review of Possible Mitigation Activities, Revision Assignments
3. September 14 – Review of Final Plan
4. September 15 – Public Meeting to Present and Discuss Final Plan
5. September 21 – Discussion of public comments and review of Final Plan

Step 2: Involve the Public

In addition to the CPT, public input notices were routinely sent to local media outlets, posted on the internet, sent out by mass emails and visibly posted at the local courthouse. 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.

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 offered inclusion as members of the CPT:

- Tennessee Emergency Management Agency;
- FEMA Region IV;
- U.S. Army Corps of Engineers, Nashville District;
- Natural Resource Conservation Service, State Conservationist;
- National Flood Insurance Program (NFIP) State Coordinator; and
- Tennessee Natural Resource Conservation Service.

A copy of the invitation is included in Appendix A. Representatives from the National Weather Service participated as members of the CPT. 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 and provided with a copy of the Draft plan for review and comment. These communities include:

- Belle Meade;
- Berry Hill;
- Forest Hills;
- Goodlettsville;
- Lakewood;
- Oak Hill; and
- Ridgetop.

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:

- Mayor's Office of Emergency Management, Comprehensive Emergency Management Plan (CEMP), March 2008;
- Mayor's Office of Emergency Management, Local Hazard Mitigation Plan, April 2005;
- MWS, Stormwater Management Studies, various watersheds, 1988 – 2001;
- MWS, Stormwater Program and Organizational Study, January 2002;
- MWS, Community Rating System Action Plan, July 2003;
- MWS, Major Capital Improvement Program Planning and Prioritization, July 2003;
- MWS, Floodplain Management Plan for Repetitive Loss Areas, October 2002;
- MWS, Stormwater Business Plan, FY2009 – FY2013, February 1, 2008
- Metro Planning: Concept 2010 – A General Plan for Nashville and Davidson County, February 1992;
- Metro Planning: Subarea Plans, multiple plans, 1995-2009;
- NES, Emergency Load Curtailment Plan, Summer 2009 (updated semi-annually);
- NES, Emergency Response Plan (updated annually); and
- NES, Vegetation Management Plan – Cycle 3, July 2009.

Additional references are included in Appendix D.

Step 4: Assess the Hazard

The CPT previously conducted a Hazard Identification study to determine which hazards threaten the planning area. Research focused on previous occurrences of natural hazards, those that might occur in the future, and the likelihood of their occurrence or recurrence. The hazards identified and investigated in the Metro area include:

- Dam and Levee Failures;
- Flooding
- Geological Hazards, which include
  - Earthquakes, and
  - Landslides and Sinkholes;
- Infestations;
- Manmade Hazards; and
- Severe Weather, which includes:
  - Droughts / Wildfires;
  - Extreme Temperatures;
  - Thunderstorms / High Winds;
  - Tornadoes; and
  - Winter Storms.

Step 5: Assess the Problem

Once the hazard identification step was complete, the CPT previously 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 selected activities and goals presented in Metro's 2005 mitigation plan. 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 2005, the Metropolitan Mayor adopts the Multi-Hazard Mitigation Plan by letter of promulgation.

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.

(This page has been left blank intentionally.)

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.

Risk from natural hazards is a combination of hazard and exposure. The risk assessment process measures the potential loss to a community, including loss of life, personal injury, property damage, and economic injury resulting from a hazard event.

The risk assessment process provides information that allows a community to better understand its potential risk and associated vulnerability to natural 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 the methodology described in FEMA publication 386-2 *"Understanding Your Risks – Identifying Hazards and Estimating Losses"* (FEMA, 2002) and was based on a four-step process:

(1) Identify Hazards;
(2) Profile Hazard Events;
(3) Inventory Assets; and
(4) Estimate Losses.

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.

(This page has been left blank intentionally.)

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 natural hazards, those that might occur in the future, and the likelihood of their occurrence or recurrence.

The natural 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;
- Infestations;
- Manmade Hazards; and
- Severe Weather, which includes:
  - Drought / Wildfires;
  - Extreme Temperatures;
  - Thunderstorms / High Winds;
  - 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 seven federal presidential disaster declarations since 1994 related to flooding, severe storms/tornadoes, and ice storms. All seven disasters are included in Table 4-1.

Table 4-1. Federal Disaster Declarations for Davidson County

Date	Cause	FEMA Disaster Number	Total Federal Expenditures for Davidson County	Total Local Expenditures for Davidson County[4]	NES[1] Expenditures for Davidson County
06-April-06	Severe Storms, Tornadoes	1634-DR	Information not available	$42,457	$22,443
08-May-03	Flooding, Severe Storm, Tornado	1464-DR[2]	Information not available	Information not available	$ 1,351,720
12-Jun-00	Flooding, Severe Storm, Tornado	1331-DR[3]	$ 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

[1]NES is the Nashville Electric Service.
[2,3]See Figure 4-1 for extent of disaster declarations.
[4]Local expenditures calculated to be 25 percent of Federal expenditures.

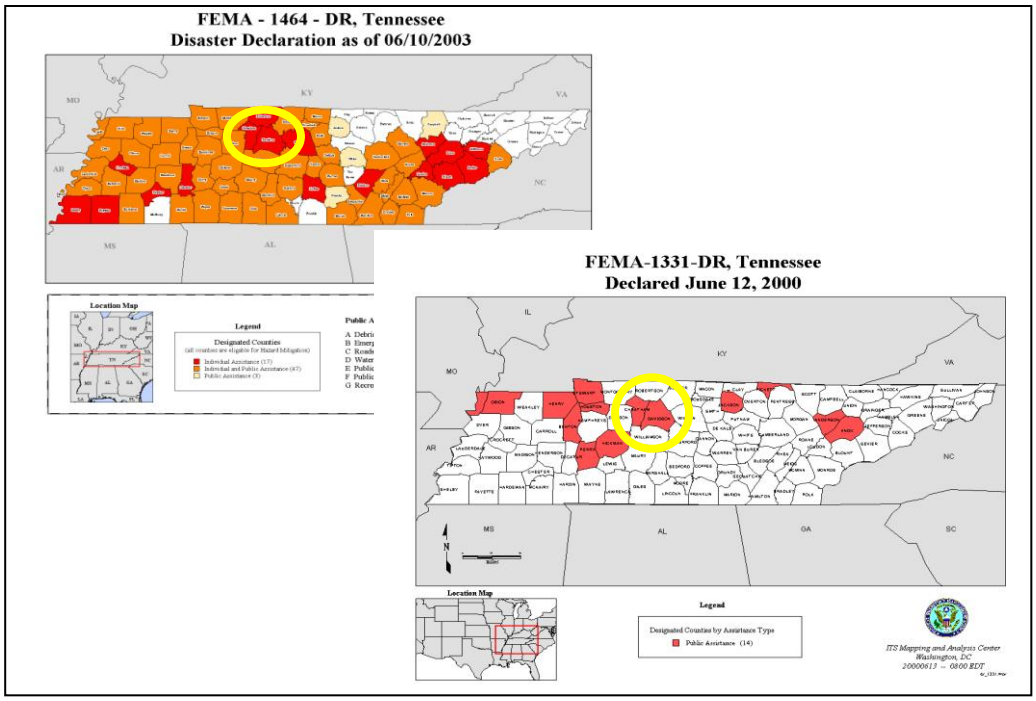


Figure 4-1. Federal Disaster Declaration Maps

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.

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.

SBA will make a physical disaster declaration or economic injury disaster declaration. Currently, Davidson County is eligible for one SBA Declaration:

- #R204 – Military Reservist Economic Injury Disaster Loan Program. Small businesses employing military reservists may apply for economic injury disaster loans if those employees are called up to active duty during a period of military conflict existing on or after March 24, 1999 and those employees are essential to the success of the small business daily operations.

Coinciding with Federal Disaster FEMA-1167-DR, the Small Business Administration provided approximately $20,000 to Davidson County under SBA Declaration #2929.

(This page has been left blank intentionally.)

DAM AND LEVEE FAILURE

Dams are man-made structures built for the purpose of power production, agriculture, 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 by floodwaters.

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 on J. Percy Priest Lake and Old Hickory Lake are managed by the U.S. Army Corps of Engineers and are used for flood control, hydroelectric power generation, and recreational purposes. The Marrowbone Lake Dam is managed by the Tennessee Wildlife Resources Agency and is used for recreational purposes.

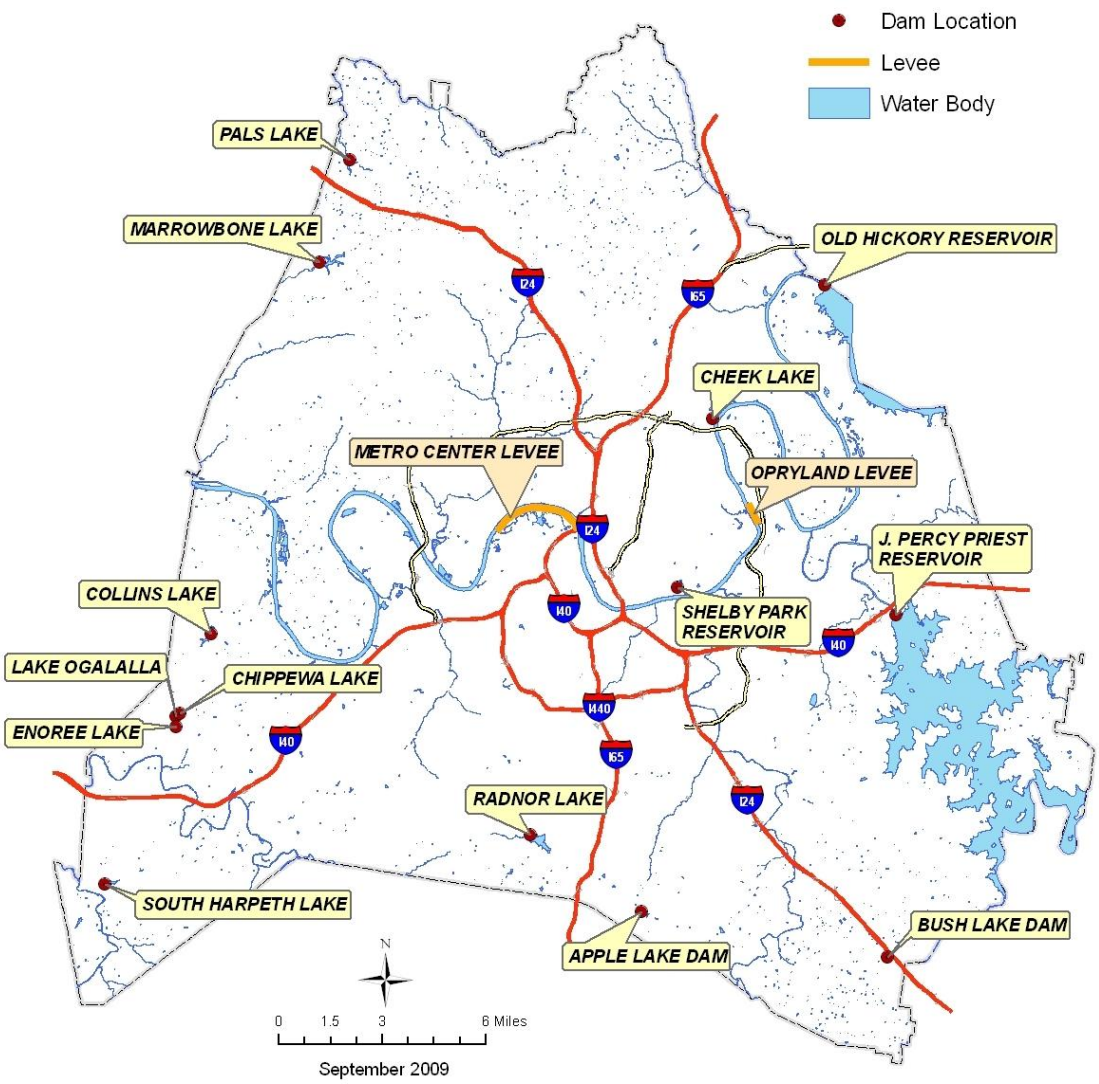


Figure 4-2. Dams and Levees within Davidson County

Each dam is categorized by its hazard potential. Hazard potential is determined by the downstream damage that could result if a dam failed.

- 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.

Table 4-2. Dams affecting Davidson County

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

J. Percy Priest Dam and Reservoir

J. Percy Priest Dam (Figure 4-3) is located between miles six and seven 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

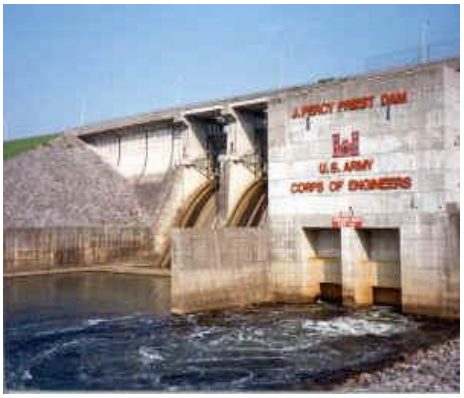


Figure 4-3. J. Percy Priest

management. Total storage capacity at maximum pool (elevation 504.5) is 652,200 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 4-4) 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 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 6,000,000 acre-ft of water. The reservoir contains 50,250 acres of surface area at a normal summer pool elevation of 723 ft., and 63,530 acres of surface area at a flood control storage elevation of 760 ft.

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 is estimated to be completed in October 2012 at an estimate cost of $584 million dollars. To insure the safety of the dam of 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 ft for operation of the reservoir.

Center Hill Dam

Center Hill Dam 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-ft of water. The reservoir contains 18,220 acres of surface area at a normal summer pool elevation of 648 ft., and 23,060 acres of surface area at a flood control storage elevation of 760 ft.

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 is expected to be completed in 2014 at a cost of $249 million.

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, fortunately, 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, 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, largely 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 Dam Break Analysis

One example of current efforts by the Nashville District of the United States Army Corps of Engineers (USACE) to prepare for and prevent dam failure is the Center Hill Dam Break Analysis (Figure 4-5). The analysis includes dam failure routines within the unsteady-flow hydraulic model UNET and an automated tool for calculating and displaying the results of a failure at Center Hill Dam, specifically the resulting flooding downstream in Metro Nashville. Center Hill Dam is located east of Davidson County covering parts of DeKalb, Putman, White, and Warren Counties in Tennessee.

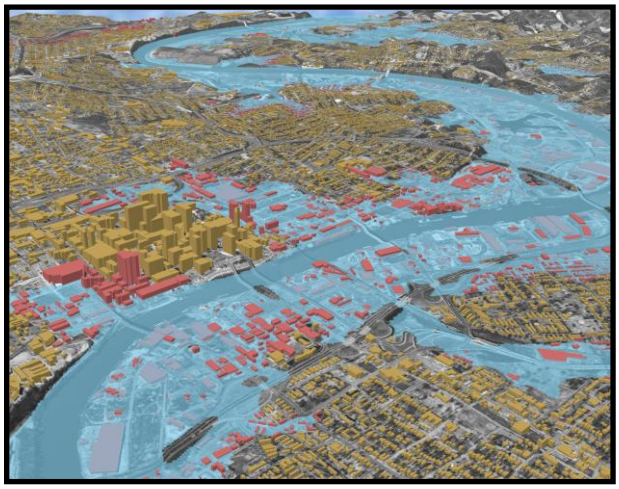


Figure 4-5. Center Hill Dam Break Scenario

The limits of this project are from Center Hill Dam on the Caney Fork River to river mile 132 on the Cumberland River near Clarksville, TN. The project included a visual basic application for data viewing and modifying, specific modifications to the UNET software application, establishing boundary conditions for various ranges of flow conditions, an integrated ground surface with planimetrics, and visuals of flooded surfaces per model results.

The UNET unsteady-flow hydraulic model extends throughout the study reach and can simulate numerous failure conditions (i.e. multiple dam breaches, dry or wet weather failures, and monolithic or piping failures).

This innovative tool provides the Corps of Engineers the capability to quickly assess downstream impacts of a dam failure. It can be used for flood evacuation management, emergency management planning, and as a 'what if' tool.

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 seventy

property holdings and over 200 companies employing over 8,000 people. A 3-mile long levee, also built in the early 1970's, protects the Metro Center area from flooding.

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 is undermining the levee's foundation and reducing its reliability. Trees and their root systems also compromised the integrity of the structure

Figure 4-6. Metro Center Levee Rehabilitation

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 by Fox News, excessive vegetation, and a low area in the levee that would prevent it from providing the protection up to the 500 year flood. Metro Nashville and the US Army Corps of Engineers, Nashville District have 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 Nashville Parks Department worked with the Corps of Engineers on improvements to the levee trail, which became part of a large greenway system. A greenway path was added atop the levee, providing a recreational amenity for employees in MetroCenter. Trailheads with parking were added for others who wish to use the site.

Opryland Levee

The Opryland levee on the Cumberland River located approximately 2.1 miles downstream of Briley Parkway meets the FEMA requirements of having a minimum of three feet of vertical distance above the 100-year flood to be considered a safe flood protection structure.

Past Occurrences

There have been 55 known dam failures that caused the release of water in the State of Tennessee. An additional 21 dams have had partial failures, which could have resulted in release of floodwaters if remedial action 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.

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 Table 4-3). 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. The most recent Flood Insurance Study (FIS) for Metro Nashville was published by FEMA in 2001. The FIS includes Flood Insurance Rate Maps (FIRM) that presents the adopted floodplains, floodways, and flood profiles for streams in Davidson County. In preparation of the FIRMs, a total of 66 streams with combined lengths of approximately 250.95 miles were studied. Of this total, approximately 216.8 miles of streams were studied by detailed methods (see Table 4-3).

Table 4-3. Major Sources of Flooding

WATERSHED	CONTRIBUTING DRAINAGE AREA Within Davidson County (sq.mi.)	STREAMS STUDIED BY DETAILED METHOD
Back Creek	2.6	
Browns Creek	16.6	• Browns Creek (4.27 mi.) • Middle Fork Browns Creek (1.14 mi.) • West Fork Browns Creek (2.62 mi.)
Bull Run	4.0	
Cooper Creek	4.9	
Cub Creek	2.5	
Cumberland River	90.9	• Cumberland River (48.93 mi within Davidson County)
Davidson Branch	3.8	
Dry Creek	8.8	• Dry Creek (2.65 mi.)
Gibson Creek	4.3	• Gibson Creek (1.83 mi.) • Gibson Creek Tributary (1.05 mi.)
Gizzard Branch	1.7	
Harpeth River	56.7	• Buffalo Creek (2.25 mi.) • Flat Creek (3.07 mi.) • Harpeth River (15.3 mi.) • Little Harpeth River (2.4 mi.) • South Harpeth River (5.5 mi.) • Trace Creek (0.92 mi.) • Windemere Branch (1.16 mi.)
Indian Creek	5.8	
Island Creek	1.0	
Loves Branch	2.3	
Mansker Creek	20.4	• Mansker Creek (7.61 mi.)
Marrowbone Creek	19.4	
Mill Creek	71.8	• Collins Creek (1.12 mi.) • Mill Creek (20.3 mi.) • Mill Creek - Tributary A (2.15 mi.) • Mill Creek - Tributary B (0.93 mi.) • Mill Creek - Tributary 1 (0.81 mi.) • Sevenmile Creek (4.72 mi.) • Sims Branch (1.82 mi.) • Sorghum Branch (2.63 mi.) • Whittemore Branch (3.02 mi.)
Overall Creek	7.8	• Overall Creek (2.22 mi.) • Overall Creek - Tributary 1 (0.81 mi.)

Table 4-3. Major Sources of Flooding (continued)

WATERSHED	CONTRIBUTING DRAINAGE AREA Within Davidson County (sq.mi.)	STREAMS STUDIED BY DETAILED METHOD
Pages Branch	3.2	• Pages Branch (2.41 mi.) • Pages Branch - Tributary A (1.02 mi.) • Pages Branch - Tributary B (0.78 mi.)
Pond Creek	2.5	
Richland Creek	28.5	• Jocelyn Hollow Branch (1.14 mi.) • Richland Creek (5.78 mi.) • Sugartree Creek (3.45 mi.) • Vaughns Gap Branch (1.90 mi.)
Sandy Creek	0.7	
Stones River	77.2	• East Fork Hamilton Creek (1.16 mi.) • East Fork Hamilton Creek - Tributary 1 (0.48 mi.) • Hurricane Creek (2.38 mi.) • West Branch Hurricane Creek (0.71 mi.) • McCrory Creek (3.51 mi.) • Scotts Creek (1.32 mi.) • Scotts Hollow (0.88 mi.) • Stoners Creek (5.60 mi.) • Stones River (6.50 mi.)
Sulpher Creek	6.0	
Sycamore Creek	21.7	
Whites Creek	62.8	• Drakes Branch (1.43 mi.) • Earthman Fork (0.48 mi.) • Eaton Creek (2.92 mi.) • Ewing Creek (4.12 mi.) • Little Creek (2.61 mi.) • North Fork Ewing Creek (2.92 mi.) • Vhoins Branch (1.10 mi.) • Whites Creek (12.6 mi.)

All streams within Metro Nashville, identified in Table 4-3, 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. Calculated floodplain velocities range from 1.0 to 5.0 feet per second (fps), which is considered to be dangerous magnitude. Table 4-4 outlines the critical depths and velocities that will harm residents and structures during a flood event.

Table 4-4. Critical Flood Depths and Velocities

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

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 was 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.

The multiple stream analyses resulted in the identification of flood prone areas or "damage reaches."

Flood Prone Buildings

The Federal Emergency Management Agency (FEMA) has identified 102 structures in Metro that have been paid two flood insurance claims of $1,000 or more within any 10-year period since 1978. These 102 "repetitive loss properties" have been flooded a total of 345 times, an average of 3.4 times each. These properties do not reflect the total number of buildings that have flooded in Davidson County but rather the number of insured properties that have flooded more than once since 1976.

As of June 30, 2008, FEMA documents 3,733 active flood insurance policies in Davidson County and has paid 1,079 flood insurance claims since Metro

Nashville entered the flood insurance program in 1982. 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.

Repetitive loss areas have also been identified by Metro Nashville on twelve creeks (see Table 4-5). A repetitive loss area is an area that encompasses a repetitive loss property, identified by FEMA, plus all other properties in the immediate vicinity identified as being subject to a similar flood risk.

Table 4-5. Structures within the Repetitive Loss Areas

Repetitive Loss Area	Repetitive Loss Structures		Total Number of Properties
	Residential	Non-Residential	
Browns Creek	0	7	20
West & Middle Forks of Browns Creek	5	1	190
Buffalo Creek	1	0	13
Cumberland River	1	3	20
Dry Creek	1	1	31
Gibson Creek	1	0	40
McCrory Creek	6	0	105
Mill Creek	6	0	120
Sevenmile Creek	13	1	160
Sugartree Creek	8	1	45
Whittemore Branch	4	1	135
Whites Creek	1	0	90
Located Outside Major Creek Flooding	8	0	
TOTAL	**55**	**15**	**969**

(Source: Metropolitan Water Services, September 2009)

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 in the identified damage reaches 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. Flood magnitudes in the repetitive loss areas are not expected to increase significantly because the Browns Creek Watershed is nearly totally developed.

Damage Reaches

Eleven damage reaches have been identified on Browns Creek (see Appendix C, Figure C.1a). Flooding problems in these areas are due primarily to development and construction in the natural floodplain, which is very broad and flat, and development and construction in the floodway. Additionally, backwater is caused by multiple undersized bridges and culverts and aggravation, due to numerous large industrial and commercial buildings lining the creek bank, can severely constrict flood waters during major storm events. Table 4-6 provides specific damage information for each reach.

Damage Reach 1 extends from Murfreesboro Pike upstream to a point approximately .25 miles below Nolensville Pike. Damage Reach 2 extends from where Damage Reach 1 ends to Nolensville Pike. Damage Reach 3 begins at a point approximately one mile upstream of Nolensville Pike and extends for approximately 0.5 miles toward Interstate 65.

Damage Reach 4 extends from the convergence of East Fork into Browns Creek upstream for approximately 0.5 miles on East Fork Browns Creek. Damage Reach 5 extends from Damage Reach 4 upstream to Woodmont Boulevard.

Damage Reach 6 covers the half-mile most downstream on Middle Fork Browns Creek. Damage Reach 7 is also on Middle Fork. It starts approximately 0.5 miles upstream of Woodmont Blvd. and extends upstream for approximately another 0.5 miles. Damage Reach 8 extends from Battery Lane downstream on Middle Fork approximately 0.5 miles. Damage Reach 9 extends from the ramp connecting the southwest corner of Interstate 65 and Interstate 440 upstream for almost 2 miles. Damage Reach 10 is upstream of Reach 9 and ends at a point approximately 1 mile downstream of Battery Lane. Damage Reach 11 extends approximately .75 miles both upstream and downstream of Battery Lane.

Table 4-6. Browns Creek Damage Reach Information

Browns Creek		Damage Reach 1	Damage Reach 2	Damage Reach 3	Damage Reach 4	Damage Reach 5	Damage Reach 6	Damage Reach 7	Damage Reach 8	Damage Reach 9	Damage Reach 10	Damage Reach 11
Buildings in floodplain		81	31	19	15	19	32	10	7	114	26	18
Buildings that have first floor living spaces that are inundated at the ***existing*** conditions 100-year flood level		77	31	19	14	0	7	2	5	39	5	11
Buildings that have first floor living spaces that are inundated at the ***future*** conditions 100-year flood level		78	31	19	14	0	7	2	5	39	5	11
Homes located in the designated floodway		9	16 trailers 3 business buildings	0	0	0	3	3	0	20	7	7
Homes flooded at existing ***2-year*** flood level		3	2	9	11	0	2	0	4	4	2	1
Homes flooded at existing ***10-year*** flood level		22	10	18	13	0	6	2	5	16	4	4
Flood damages begin at a recurrence interval of (years)		< 2	< 2	< 2	< 2	0	< 2	3	<2	< 2	< 2	< 2
Types of buildings		Res, Ind and Comm	Res and Comm	Ind and Comm	Ind and Comm	Res	Res	Res	Res	Res	Res	Res
Average structural value (1990 dollars)		15K for Res	5K for the trailers	15K to 5 Mil	100K to 300K	n/a	57K	129K	51K	62K	63K	67K
Expected annual damages for ***existing*** conditions		333K	41K	743K	342K	$0.00	33K	19K	53K	104K	31K	32K
Expected annual damages for ***future*** conditions		424K	49K	868K	344K	$0.00	34K	21K	56K	110K	33K	35K

n/a – not applicable
* - information not available
K – 1,000 dollars

Repetitive Loss Areas

Currently, there are seven properties reporting repetitive losses due to flooding on Browns Creek and six properties on West Fork and Middle Fork Browns Creek. In addition, the associated repetitive loss areas encompass 20 properties on Browns Creek and 190 properties on West Fork and Middle Fork Browns Creek (see Appendix C, Figures C.1b and C.1c). The Browns Creek Storm Water Basin Plan, completed in 1990, identifies the flood-prone areas and alternative solutions to reduce flooding problems.

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.

Damage Reaches

Three damage reaches have been identified on Cooper Creek (Appendix C, Figure C.2). Flooding problems in these areas are primarily due to development and construction in the natural floodplain. Table 4-7 provides specific damage information for each reach. Damage Reach 1 extends from a point 728 feet below Ravenwood Drive (river mile 1.543) to a point 306 feet below McGavock Pike (river mile 1.917). Damage Reach 2 extends from a point just above McGavock Pike (river mile 1.988) to a point 1746 feet below Kennedy Avenue (river mile 2.204). Damage Reach 3 extends from a point at the upstream culvert at Kennedy Avenue (river mile 2.541) to a point 545 feet above Ardee Avenue (river mile 2.757)

Table 4-7. Cooper Creek Damage Reach Information

Cooper Creek		Damage Reach 1	Damage Reach 2	Damage Reach 3
Buildings in floodplain		29	10	13
Buildings that have first floor living spaces that are inundated at the ***existing*** conditions 100-year flood level		20	6	8
Buildings that have first floor living spaces that are inundated at the ***future*** conditions 100-year flood level		20	6	8
Homes located in the designated floodway		19	11	25
Homes flooded at existing ***2-year*** flood level		*	*	*
Homes flooded at existing ***10-year*** flood level		*	*	*
Flood damages begin at a recurrence interval of (years)		<10	*	*
Types of buildings		Res	Res	Res
Average structural value (1994 dollars)		46K	46K	46K
Expected annual damages for ***existing*** conditions		51K	8K	40K
Expected annual damages for ***future*** conditions		51K	8 K	40K

n/a – not applicable
* - information not available
K – 1,000 dollars

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.3). 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 are two properties reporting repetitive losses due to flooding on Dry Creek. In addition, the associated repetitive loss areas encompass 31 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.

Damage Reaches

Four damage reaches have been identified on Gibson Creek (Appendix C, Figure C.4a). Flooding problems in these areas are primarily due to development and construction in the natural floodplain. Table 4-8 provides specific damage information for each reach. Damage

Reach 1 on Gibson Creek mainstem extends from about 475 feet downstream of Gallatin Road at Stream Mile 0.85 and continues upstream past Gallatin Road approximately 1,125 feet to Stream Mile 1.13. Damage Reach 2 begins approximately 500 feet upstream of the confluence of Tributary No. 4 with Gibson Creak at Stream Mile 0.10 and extends up along Tributary No. 4 approximately 1,500 feet to Stream Mile 0.3. Damage Reach 3 begins at the upstream face of Idlewild Drive at Stream Mile 0.45 on Tributary No. 3 and extends 50 feet downstream of Harris Road to Stream Mile 0.73. Damage Reach 4 begins at the end of Damage Reach 3 on Tributary 3 and extends to a point approximately 150 feet upstream of Maple Street at Stream Mile 1.01.

Repetitive Loss Areas

Currently, there is one property reporting repetitive losses due to flooding on Gibson Creek. In addition, 40 properties are located within the associated repetitive loss areas (Appendix C, Figure C.4b). The Gibson Creek Storm Water Basin Plan, completed in 1996, identifies the repetitive loss area and alternative solutions to reduce existing flooding problems.

Table 4-8. Gibson Creek Damage Reach Information

Gibson Creek		Damage Reach 1	Damage Reach 2	Damage Reach 3	Damage Reach 4
Buildings in floodplain		10	7	37	41
Buildings that have first floor living spaces that are inundated at the ***existing*** conditions 100-year flood level		8	4	10	19
Buildings that have first floor living spaces that are inundated at the ***future*** conditions 100-year flood level		9	5	10	19
Homes located in the designated floodway		0	0	0	5
Homes flooded at existing ***2-year*** flood level		4	0	1	9
Homes flooded at existing ***10-year*** flood level		8	1	6	15
Flood damages begin at a recurrence interval of (years)		<2	<10	2	<2
Types of buildings		Res and Comm	Res	Res	Res
Average structural value (1994 dollars)		171K	*	42K	34K
Expected annual damages for ***existing*** conditions		173K	*	19K	60K
Expected annual damages for ***future*** conditions		n/a	*	19K	60K

n/a – not applicable
* - information not available
K – 1,000 dollars

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.5). Currently, there is one property reporting repetitive losses due to flooding on Buffalo Creek. In addition, the associated repetitive loss areas encompass 13 properties.

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.

Damage Reaches

One damage reach has been identified on Tributary 1 of Mill Creek, and it extends from Rader Ridge Road upstream about 2060 feet from Stream Mile 1.31 to Stream Mile 1.70 on Tributary A (see Appendix C, Figure C.6a). Flooding problems in this area is due primarily to development in the natural floodplain. Delineation of the floodplain within the area is also a concern. Table 4-9 provides specific damage information for the damage reach.

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.6b). Currently, there are six properties reporting repetitive losses due to flooding on Mill Creek. In addition, the associated repetitive loss areas encompass 120 properties.

Table 4-9. Mill Creek Tributary 1 Damage Reach Information

Mill Creek - Trib 1		Damage Reach
Buildings in floodplain		20
Buildings that have first floor living spaces that are inundated at the ***existing*** conditions 100-year flood level		11
Buildings that have first floor living spaces that are inundated at the ***future*** conditions 100-year flood level		16
Homes located in the designated floodway		0
Homes flooded at existing ***2-year*** flood level		0
Homes flooded at existing ***10-year*** flood level		0
Flood damages begin at a recurrence interval of (years)		<25
Types of buildings		Res
Average structural value (1993 dollars)		100K
Expected annual damages for ***existing*** conditions		12K
Expected annual damages for ***future*** conditions		17K

n/a – not applicable
* - information not available
K – 1,000 dollars

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.

Damage Reaches

Three damage reaches have been identified on Sevenmile Creek (Appendix C, Figure C.7a). Damage Reach 1 is comprised of the residential area located between the railroad crossing over Sevenmile Creek at river mile 0.33 and Welch Road located at river mile 1.52. Damage

Reach 2 starts at Welch Road (river mile 1.53) and continues upstream through a residential area above Blackman Road and ends near Edmondson Pike and Brewer Drive at river mile 3.27. Damage Reach 3 starts near Edmondson Pike and Huntingdon Parkway at river mile 4.45 continuing to a private driveway at river mile 4.73. Table 4-10 provides specific damage information for the damage reach.

Repetitive Loss Areas

The repetitive loss area is located between Nolensville Pike and Briarwood Drive (see Appendix C, Figure C.7b). Currently, there are fourteen properties reporting repetitive losses due to flooding on Sevenmile Creek. In addition, the associated repetitive loss areas encompass 160 properties. The Sevenmile Creek Storm Water Basin Plan, completed in 2001, identifies these flood-prone areas and alternative solutions to reduce existing flooding problems.

Table 4-10. Seven Mile Creek Damage Reach Information

Sevenmile Creek		Damage Reach 1	Damage Reach 2	Damage Reach 3
Buildings in floodplain		160	171	6
Buildings that have first floor living spaces that are inundated at the ***existing*** conditions 100-year flood level		0	0	0
Buildings that have first floor living spaces that are inundated at the ***future*** conditions 100-year flood level		139	158	1
Homes located in the designated floodway		149	213	33
Homes flooded at **future *2-year*** flood level		1	4	0
Homes flooded at **future *10-year*** flood level		20	42	0
Flood damages begin at a recurrence interval of (years)		< 2	< 2	>100
Types of buildings		Res	Res	Res
Average structural value (1999 dollars)		69.5K	123.5K	123K
Expected annual damages for ***existing*** conditions		0	0	0
Expected annual damages for ***future*** conditions		233K	394K	1K

n/a – not applicable
* - information not available
K – 1,000 dollars

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.

Damage Reaches

Two damage reaches have been identified on Sorghum Branch (Appendix C, Figure C.8). Damage Reach 1 extends from Haywood Lane upstream about 950 feet from Stream Mile 2.12 to Stream Mile 2.30 on Sorghum Branch. Damage Reach 2 extends from a private drive to St. Basil's Church on Tusculum Road, upstream about 740 feet from Stream Mile 3.26 to Stream Mile 3.40. Flooding problems in these areas are primarily due to development and construction in the natural floodplain. Table 4-11 provides specific damage information for each reach.

Table 4-11. Sorghum Branch Damage Reach Information

Sorghum Branch		Damage Reach 1	Damage Reach 2
Buildings in floodplain		23	8
Buildings that have first floor living spaces that are inundated at the ***existing*** conditions 100-year flood level		5	3
Buildings that have first floor living spaces that are inundated at the ***future*** conditions 100-year flood level		5	3
Homes located in the designated floodway		1	0
Homes flooded at existing ***2-year*** flood level		0	0
Homes flooded at existing ***10-year*** flood level		3	2
Flood damages begin at a recurrence interval of (years)		<10	<10
Types of buildings		Res	Res
Average structural value (1995 dollars)		69K	78K
Expected annual damages for ***existing*** conditions		36K	19K
Expected annual damages for ***future*** conditions		36K	19K

n/a – not applicable
* - information not available
K – 1,000 dollars

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.

Damage Reaches

Four damage reaches have been identified on Whittemore Branch and its tributaries (Appendix C, Figure C.9a). Damage Reach 1, on the Main Branch, extends from the upstream face of the bridge at Interstate 24 at river mile 0.445 to the downstream face of the bridge at Tusculum Road at river mile 0.987. Damage Reach 2, on the Main Branch, extends from a point 3,250 feet above the upstream face of the bridge at Tusculum Road at river mile 1.610 to the downstream face of the bridge at Bell Road at river mile 1.853. Damage Reach 3, on the Main Branch, extends from a point 125 feet below Cedarmont Drive at river mile 2.360 to a point 1710 feet above Cedarmont Drive (river mile 2.718). Damage Reach 4, on the West Branch of Whittemore Branch, extends from a point 200 feet above Tusculum Court at river mile 0.820 to the downstream face of the bridge at Ocala Circle at river mile 1.170. Flooding problems in these areas are due primarily to development and construction in the natural floodplain. Table 4-12 provides specific damage information for each reach.

Repetitive Loss Areas

Currently, there are five properties reporting repetitive losses due to flooding on Whittemore Branch. In addition, the associated repetitive loss areas encompass 135 properties (see Appendix C, Figure C.9b). The Whittemore Branch Storm Water Basin Plan, completed in 1996, identifies these flood-prone areas and alternative solutions to reduce existing flooding problems.

Table 4-12. Whittemore Branch Damage Reach Information

Whittemore Branch		Damage Reach 1	Damage Reach 2	Damage Reach 3	Damage Reach 4
Buildings in floodplain		58	48	40	34
Buildings that have first floor living spaces that are inundated at the ***existing*** conditions 100-year flood level		26	9	8	4
Buildings that have first floor living spaces that are inundated at the ***future*** conditions 100-year flood level		37	13	11	4
Homes located in the designated floodway		8	3	1	0
Homes flooded at existing ***2-year*** flood level		0	0	1	0
Homes flooded at existing ***10-year*** flood level		3	0	8	2
Flood damages begin at a recurrence interval of (years)		10	<100	<10	10
Types of buildings		Res	Res	Res	Res
Average structural value (1994 dollars)		70K	70K	70K	70K
Expected annual damages for ***existing*** conditions		69K	22K	59K	14K
Expected annual damages for ***future*** conditions		168K	53K	108K	19K

n/a – not applicable
* - information not available
K – 1,000 dollars

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 approcimately 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.

Damage Reaches

Five damage reaches have been identified on Pages Branch and its tributaries (Appendix C, Figure C.10). Flooding problems in these areas are primarily due to development and construction in the natural floodplain. Damage Reach 1 is located on the mainstem of Pages Branch and extends from a point 27 feet above Old Trinity Lane at river mile 1.03 to a point 497 feet above Old Trinity Lane at river mile 1.12. Damage Reach 2 is located on the mainstem of Pages Branch and extends from a point 12 feet above Dickerson Pike at river mile 1.46 to a point 223 feet above Donald Street at river mile 1.87. Damage Reach 3 is located on the Upper Unnamed Tributary of Pages Branch and extends from a point 210 feet below Donald Street at river mile 0.09 to a point 590 feet below Dellway Avenue at river mile 0.33. Damage Reach 4 is located on the Upper Unnamed Tributary of Pages Branch and extends from a point 216 feet below Dellway Avenue at river mile 0.41 to a point 593 feet above Brunswick Drive at river mile 0.78. Damage Reach 5 is located on the Upper Unnamed Tributary of Pages Branch and extends from a point 391 feet below Jones Avenue at river mile 0.88 to a point 499 feet above Jones Avenue at river mile 1.02. Table 4-13 provides specific damage information for each reach

.

Table 4-13. Pages Branch Damage Reach Information

Pages Branch		Damage Reach 1	Damage Reach 2	Damage Reach 3	Damage Reach 4	Damage Reach 5
Buildings in floodplain		23	14	11	15	15
Buildings that have first floor living spaces that are inundated at the ***existing*** conditions 100-year flood level		6	4	7	9	7
Buildings that have first floor living spaces that are inundated at the ***future*** conditions 100-year flood level		7	5	7	9	9
Homes located in the designated floodway		2	3	4	6	3
Homes flooded at existing ***2-year*** flood level		0	1	2	4	6
Homes flooded at existing ***10-year*** flood level		0	2	2	8	6
Flood damages begin at a recurrence interval of (years)		12	< 2	< 2	< 2	< 2
Types of buildings		Res	Res	Res	Res	Res
Average structural value (1990 dollars)		15K	25K	26K	24K	27K
Expected annual damages for ***existing*** conditions		1K	7K	11K	21K	27K
Expected annual damages for ***future*** conditions		1K	7K	13K	29K	32K

n/a – not applicable
* - information not available
K – 1,000 dollars

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.

Damage Reaches

Nine damage reaches have been identified on Richland Creek and its tributaries (Appendix C, Figure C.11). Flooding problems in these areas are due to development and construction in the natural floodplain, aggravation due to upstream and local urbanization, and backwater created from multiple undersized bridges/culverts. Table 4-14 provides specific damage information for each reach.

Damage Reaches 1 and 2 are located on Richland Creek Mainstem. Damage Reach 1 extends from 495 feet downstream from Briley Parkway to 3,240 feet upstream from Charlotte Pike. Damage Reach 2 is located between the upstream side of Bosley Springs Road and 120 feet upstream from Harding Place.

Damage Reaches 3 and 4 are located on Unnamed Tributary to Richland Creek. Damage Reach 3 extends from 325 feet upstream of Montgomery Bell Academy to 185 feet downstream of Bowling Avenue.

Damage Reaches 5 and 6 are located on Sugartree Creek. Damage Reach 5 extends from 1140 feet downstream of Valley Forge Drive to a point 625 feet upstream of Estes Road. Damage Reach 6 is located between the upstream end of Damage Reach 5 and 280 feet downstream from Hillsboro Pike.

Damage Reach 7 is located on Jocelyn Hollow Branch and extends from 116 feet upstream of the Seaboard Systems Railroad to a point 501 feet upstream of Sedberry Road. Damage Reach 8 is located on Vaughns Gap Branch and extends from the upstream side of the Memphis-Bristol Highway to a point 1025 feet downstream from Park Lane. Damage Reach 9 is located on Belle Meade Branch and extends from 622 feet downstream from Forsythe Place to 70 feet upstream from Warner Place.

Table 4-14. Richland Creek Damage Reach Information

Richland Creek		Damage Reach 1	Damage Reach 2	Damage Reach 3	Damage Reach 4	Damage Reach 5	Damage Reach 6	Damage Reach 7	Damage Reach 8 Vaughn's Gap Branch	Damage Reach 9
Buildings in floodplain		332	55	45	12	82	61	17	46	9
Buildings that have first floor living spaces that are inundated at the ***existing*** conditions 100-year flood level		201	31	29	7	61	42	7	23	6
Buildings that have first floor living spaces that are inundated at the ***future*** conditions 100-year flood level		232	34	32	9	61	42	7	23	6
Homes located in the designated floodway		81	4	10	2	25	12	2	12	2
Homes flooded at existing ***2-year*** flood level		28	5	19	2	7	20	1	3	2
Homes flooded at existing ***10-year*** flood level		81	13	24	6	32	35	4	10	3
Flood damages begin at a recurrence interval of (years)		< 2	<1	<1	< 2	<1	< 1	< 1	< 1	< 1
Types of buildings		Res	Res and Comm	Res	Res	Res	Res	Res	Res	Res
Average structural value (1989 dollars)		40K	70K	40K	60k	68K	68K	70K	60K	100K
Expected annual damages for ***existing*** conditions		404K	114K	452K	36K	242K	485K	32K	53K	38K
Expected annual damages for ***future*** conditions		531K	149K	559K	147K	265K	502K	36K	60K	41K

n/a – not applicable
* - information not available
K – 1,000 dollars

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 nine properties reporting repetitive losses due to flooding on Sugartree Creek. In addition, the associated repetitive loss areas encompass 45 properties (see Appendix C, Figure C.12). 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.

Damage Reaches

Six damage reaches have been identified on East Fork Hamilton Creek (see Appendix C, Figure C.13). Flooding problems in these areas are primarily due to development in the natural floodplain. Damage Reach 1 extends from a point at the upstream face of the bridge at Smith Springs Road at river mile 2.83 to a point 1,470 feet below Mossdale Drive at river mile 3.33. From here to a point 50 feet below Mossdale Drive at river mile 3.60 is defined as Damage Reach 2. Damage Reach 3 extends from the bridge at Mossdale Drive at river mile

3.62 to a point 680 feet below Bell Road at river mile 4.21. Damage Reach 4 is on the Upper Unnamed Tributary to East Fork Hamilton Creek and extends from a point at the downstream face of the bridge at Mossdale Drive at river mile 0.14 to a point 45 feet below Anderson Road at river mile 0.47. Damage Reach 5 is on the Upper Unnamed Tributary to East Fork Hamilton Creek and extends from the bridge at Anderson Road at river mile 0.49 to a point 847 feet below Hamilton Church Road at river mile 0.99. Damage Reach 6 is on the Lower Unnamed Tributary to East Fork Hamilton Creek and extends from a point 780 feet above Butler Road at river mile 0.34 to a point 2035 feet above Butler Road at river mile 0.58. Table 4-15 provides specific damage information for each reach.

Table 4-15. East Fork Hamilton Creek Damage Reach Information

East Fork Hamilton Creek		Damage Reach 1	Damage Reach 2	Damage Reach 3	Damage Reach 4	Damage Reach 5	Damage Reach 6
Buildings in floodplain		32	46	61	57	79	44
Buildings that have first floor living spaces that are inundated at the ***existing*** conditions 100-year flood level		17	12	11	2	11	8
Buildings that have first floor living spaces that are inundated at the ***future*** conditions 100-year flood level		18	12	13	7	25	8
Homes located in the designated floodway		0	1	1	1	0	0
Homes flooded at existing ***2-year*** flood level		0	1	2	0	0	4
Homes flooded at existing ***10-year*** flood level		0	5	2	0	0	4
Flood damages begin at a recurrence interval of (years)		50	< 2	<2	15	15	< 2
Types of buildings		Res	Res	Res	Res	Res	Res
Average structural value (1990 dollars)		60K	60K	60K	60K	60K	60K
Expected annual damages for ***existing*** conditions		4K	24K	15K	3K	5K	26K
Expected annual damages for ***future*** conditions		4K	31K	18K	5K	19K	29K

n/a – not applicable
* - information not available
K – 1,000 dollars

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 4-16 provides specific damage information for each reach.

Damage Reaches

Four damage reaches have been identified on McCrory Creek. Flooding problems can be attributed to steep terrain, urbanization (both rapid, recent urbanization and long term growth) and lack of detention facilities. Damage reaches 1 and 2 are located in the Elm Hill Basin. Damage reach 1 extends downstream from the confluence of runoff from Elm Hill sub-basins 1 and 2 to Elm Hill Pike. Damage reach 2 extends along the right bank from the upper end of Elm Hill sub-basin 5 to Interstate 40. Damage Reaches 3 and 4 are located along the main stem of McCrory Creek. Damage reach 3 extends from Elm Hill Pike just north of Interstate 40 to the confluanec of Elm Hill Tributary and McCrory Creek mainstem at the outlet to Middle Basin sub-basin 3. Damage reach 4 extends from the downstream end of damage reach 3 to Stewarts Ferry Pike. (Appendix C, Figure C.14a).

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 105 properties (see Appendix C, Figure C.14b). The McCrory Creek Storm Water Basin Plan, completed in 1988, identifies this flood-prone area and alternative solutions to reduce existing flooding problems.

Table 4-16. McCrory Creek Damage Reach Information

McCrory Creek		Damage Reaches 1 and 2	Damage Reaches 3 and 4
Buildings in floodplain		5	48
Buildings that have first floor living spaces that are inundated at the ***existing*** conditions 100-year flood level		5	48
Buildings that have first floor living spaces that are inundated at the ***future*** conditions 100-year flood level		15	77
Homes located in the designated floodway		*	*
Homes flooded at existing ***2-year*** flood level		0	2
Homes flooded at existing ***10-year*** flood level		0	12
Flood damages begin at a recurrence interval of (years)		11	<2
Types of buildings		Res	Res
Average structural value (1988 dollars)		75 K	50 K
Expected annual damages for ***existing*** conditions		2 K	37 K
Expected annual damages for ***future*** conditions		20 K	85 K

n/a – not applicable
* - information not available
K – 1,000 dollars

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).

Damage Reaches

Three damage reaches have been identified on Scotts Creek and its tributaries (Appendix C, Figure C.15). Flooding problems in these areas are attributable to development in the natural floodplain. Damage Reach 1 begins 1000 feet south of Lebanon Road at Stream Mile 0.75 and continues upstream along Scotts Creek mainstem 900 feet to Stream Mile 0.92. Damage Reach 2 begins 300 feet north of Lebanon Road at Stream Mile 0.17 and continues upstream 1,700 feet along Tributary No. 2 to Stream Mile 0.49. Damage Reach 3 begins on Tributary No. 3 at Stream Mile 0.26 and extends upstream along Tributary No. 3 to Stream Mile 0.58. Table 4-17 provides specific damage information for each reach.

Table 4-17. Scotts Creek Damage Reach Information

Scott's Creek		Damage Reach 1	Damage Reach 2	Damage Reach 3
Buildings in floodplain		16	17	18
Buildings that have first floor living spaces that are inundated at the ***existing*** conditions 100-year flood level		2	13	9
Buildings that have first floor living spaces that are inundated at the ***future*** conditions 100-year flood level		10	14	14
Homes located in the designated floodway		*	*	*
Homes flooded at existing ***2-year*** flood level		0	3	<2
Homes flooded at existing ***10-year*** flood level		0	9	9
Flood damages begin at a recurrence interval of (years)		100	2	1
Types of buildings		Res	Res	Res
Average structural value (1997 dollars)		41K	60K	51K
Expected annual damages for ***existing*** conditions		1K	64K	33K
Expected annual damages for ***future*** conditions		9K	100K	67K

n/a – not applicable
* - information not available
K – 1,000 dollars

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.

Damage Reaches

Sixteen damage reaches have been identified on Whites Creek and its tributaries (Appendix C, Figure C.16a). Flooding problems in these areas can be attributed to development and construction in the natural floodplain, aggravation caused by upstream and local urbanization, and backwater from multiple undersized bridges and culverts. However, flooding problems in these areas have also been eased by headwater detention and floodplain storage behind Interstate embankments. Table 4-18 provides specific damage information for each reach.

Damage Reaches 1, 2, and 3 are located on Whites Creek Mainstem. Damage Reach 1 extends from the upstream side of the bridge at Hydes Ferry Pike at river mile 3.34 to the confluence of Whites Creek Mainstem and Ewing Creek Mainstem at river mile 6.1. Damage Reach 2 is located between the confluence of Whites Creek Mainstem and Ewing Creek Mainstem at river mile 6.1 and the downstream side of the bridge at Knight Road at river mile 9.09. Damage Reach 3 extends from the upstream side of the bridge at Knight Road at river mile 9.09 to the confluence of Whites Creek Mainstem and Crocker Springs Branch at river mile 12.29.

Damage Reaches 4, 5, 6, and 7 are located on Ewing Creek Mainstem. Damage Reach 4 is located between the upstream side of the bridge at Whites Creek Pike at river mile 0.79 and the downstream side of the bridge at Gwynnwood Drive at river mile 2.06. Damage Reach 5 extends from the upstream side of the bridge at Gwynnwood Drive at river mile 2.07 to the downstream side of Interstate 24 at river mile 2.47. Damage Reach 6 is located between the upstream side of Interstate 24 at river mile 2.55 and the downstream side of Interstate 65 at river mile 3.35. Damage Reach 7 extends from the upstream side of Interstate 65 at river mile 3.4 to the downstream side of Dickerson Pike at river mile 4.01.

Damage Reaches 8 and 9 are located on North Fork Ewing Creek. Damage Reach 8 extends from the upstream side of Interstate 24 at river mile 0.26 to the downstream side of the bridge at Brick Chruch Pike at river mile 1.34. Damage Reach 9 is located between the upstream side of the bridge at Brick Church Pike at river mile 1.34 and the downstream side of Dickerson Pike at river mile 2.90.

Damage Reach 10 is located on Eaton Creek and encompasses the entire 3.19 miles studied. Damage Reach 11 is located on Little Creek and extends from its confluence with Whites Creek Mainstem to approximately 0.5 miles upstream of Old Hickory Boulevard at river mile

2.96. Damage Reach 12 is located on Drake Branch and extends from its confluence with Whites Creek Mainstem to river mile 1.0. Damage Reach 13 is located on Earthman Fork and extends from downstream of the bridge at Whites Creek Pike at river mile 0.21 to approximately 1.80 miles upstream of the bridge at Old Hickory Boulevard at river mile 2.2.

Damage Reach 14 is located on Dry Fork and extends from its confluence with Whites Creek Mainstem to downstream of Waller Road at river mile 1.71. Damage Reach 15 is located on an unnamed tributary of Whites Creek Mainstem just south of the Whites Creek Mainstem and Ewing Creek Mainstem confluence. This damage reach extends from the downstream side of Crouch Drive at river mile 0.10 to approximately 0.26 miles upstream of the bridge at Rowan Drive. Finally, Damage Reach 16 is located on an unnamed tributary to Ewing Creek Mainstem between Interstates 24 and 65. This damage reach extends from its confluence with Ewing Creek Mainstem to approximately 0.13 miles upstream of the bridge at Spears Road.

Repetitive Loss Areas

Currently, one property is reporting repetitive losses due to flooding on Whites Creek. In addition, the associated repetitive loss areas encompass ninety properties (see Appendix C, Figure C.16b). The Whites Creek Storm Water Basin Plan, completed in 1988, identifies these flood-prone areas and alternative solutions to reduce existing flooding problems.

Table 4-18. Whites Creek Damage Reach Information

Whites Creek		Damage Reach 1 and 2	Damage Reach 3	Damage Reach 4, 5, 6, and 7	Damage Reach 8 and 9	Damage Reach 10	Damage Reach 11	Damage Reach 12	Damage Reach 13	Damage Reach 14	Damage Reach 15	Damage Reach 16
Buildings in floodplain		364	17	232	69	31	15	41	20	7	45	33
Buildings that have first floor living spaces that are inundated at the ***existing*** conditions 100-year flood level		181	6	63	12	8	6	6	6	0	4	1
Buildings that have first floor living spaces that are inundated at the ***future*** conditions 100-year flood level		237	8	81	13	9	7	11	8	1	4	2
Homes located in the designated floodway		44	6	44	*	*	*	*	1	0	0	*
Homes flooded at existing ***2-year*** flood level		0	2	4	0	0	2	0	4	0	0	0
Homes flooded at existing ***10-year*** flood level		13	5	22	3	3	5	4		0	0	0
Flood damages begin at a recurrence interval of (years)		<10	< 1	< 1	<10	4	<2	<10	< 1	100	25	<100
Types of buildings		Res	Res	Res	Res	Res	Res	Res	Res	Res	Res	Res
Average structural value (1988 dollars)		48K	51K	58K	58K	58K	45K	45K	45K	45K	58K	58K
Expected annual damages for ***existing*** conditions		100K	102K	386K	16K	8K	24K	7K	74K	0	2K	719 K
Expected annual damages for ***future*** conditions		236K	117K	539K	22K	16K	69K	13K	91K	0	3K	1,106 K

n/a – not applicable
* - information not available
K – 1,000 dollars

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

A repetitive loss area is identified downstream of river mile 175, in the Cockrill Bend area (Appendix C, Figure C.17). 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.

Currently, there are four properties reporting repetitive losses due to flooding on the Cumberland River. The associated repetitive loss areas encompass 20 properties.

Past Occurrences

There have been 60 recorded flood events in Davidson County by the National Climatic Data Center since 1950. These events are presented in 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.

GEOLOGICAL HAZARDS

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 zones: the New Madrid Seismic Zone and the Southern Appalachian Seismic Zone, a portion of which is known as the East Tennessee 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 4-7a, below, 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.

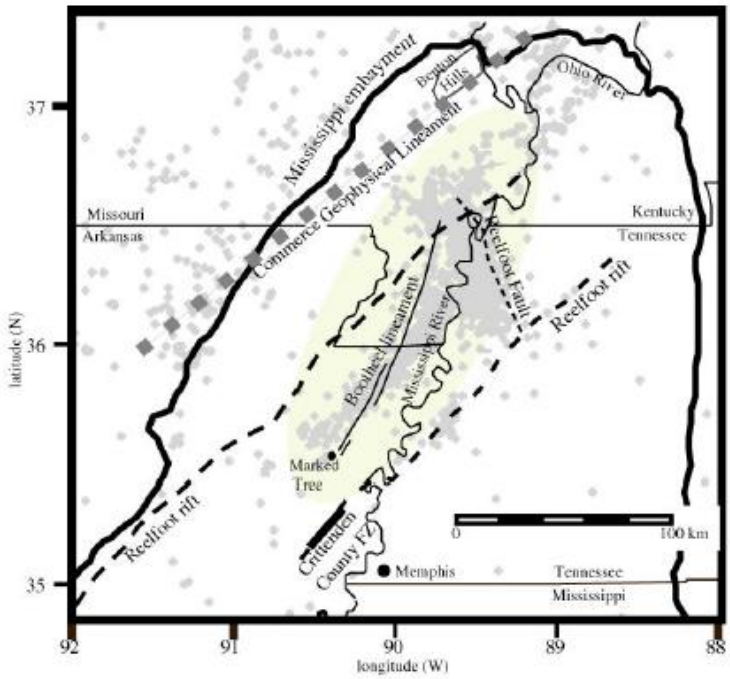


Figure 4-7a. Schematic Map of New Madrid Seismic Zone

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 4.7b). 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.

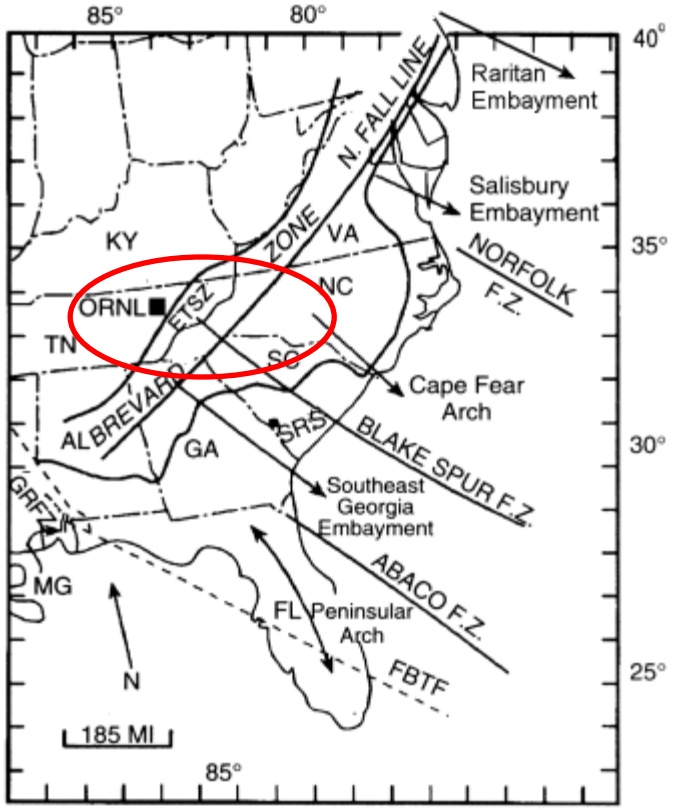


Figure 4-7b. Schematic Map of East Tennessee Seismic Zone

Several methods, compared in Table 4-19, 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.

Table 4-19. Comparison of Richter Magnitude and Modified Mercalli Intensity Scales

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

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 seismic hazard in the Metro area is shown in Figure 4-8, which uses contour values to indicate the earthquake ground motions that have a common probability of being exceeded in 50 years.

In developing Figure 4-8, 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 4-8, for the given probability of exceedance, two percent, the locations shaken more frequently will have larger ground motions.

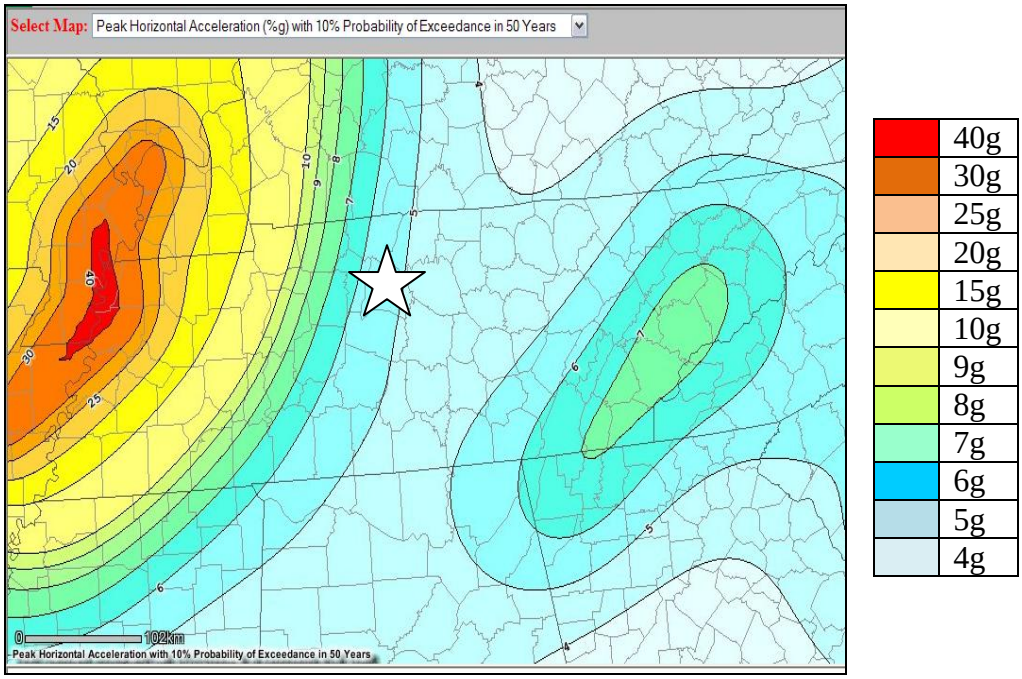
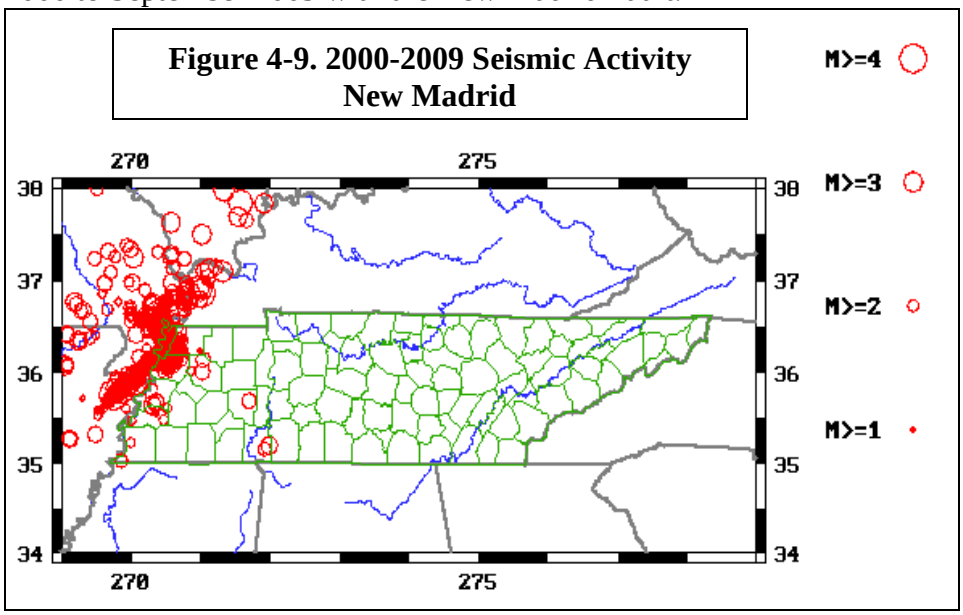


Figure 4-8. Peak Horizontal Acceleration with 10% Probability of Exceedance in 50 years. Source: USGS National Seismic Hazard Maps - 2008

Past Occurrences

Major earthquake events affecting the Nashville-Davidson County area are presented in Appendix B. The figure below presents the size and location of earthquake activity since 2000 to September 2009 with the New Madrid Fault.



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:

- In all of western Tennessee, an event of magnitude greater than 5.0 can be expected once every year, a magnitude of 6.0 or greater should occur ever 50 years, and a magnitude 7.0 or greater should occur every 600 years.
- 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 Fault is an active fault, 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 Fault 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 area (6.0 or greater) occurs about every 80 years (the last one occurred in 1895).

A major earthquake in the New Madrid area (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 Fault 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).

(This page left blank intentionally.)

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 4-10 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 4-10. Evidence of Landslides

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.

Landslide events are presented in Figure 4-11a and Appendix B.

Slopes greater than 25% are presented in Figure 4-11b.

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.

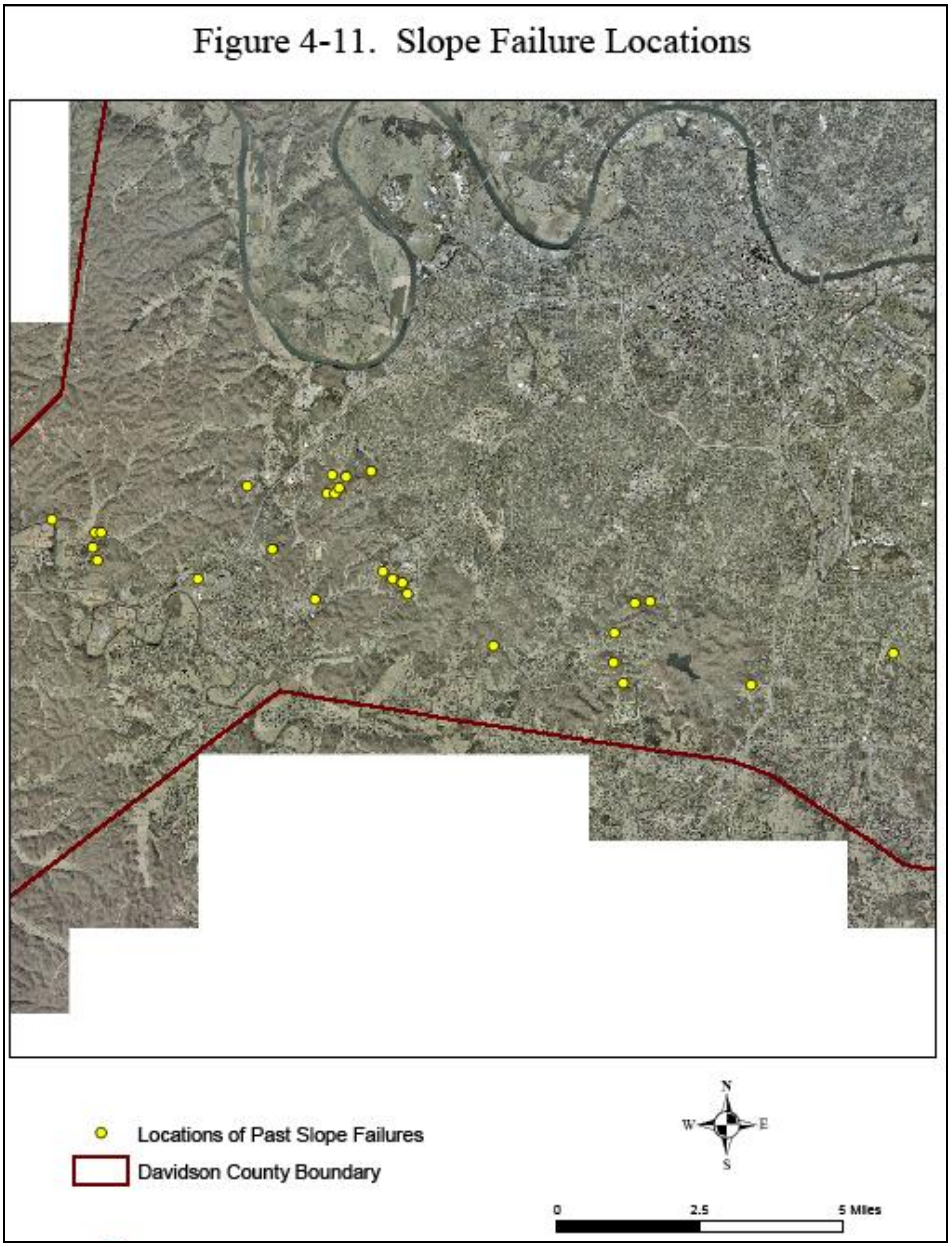


Figure 4-11a. Slope Failure Locations

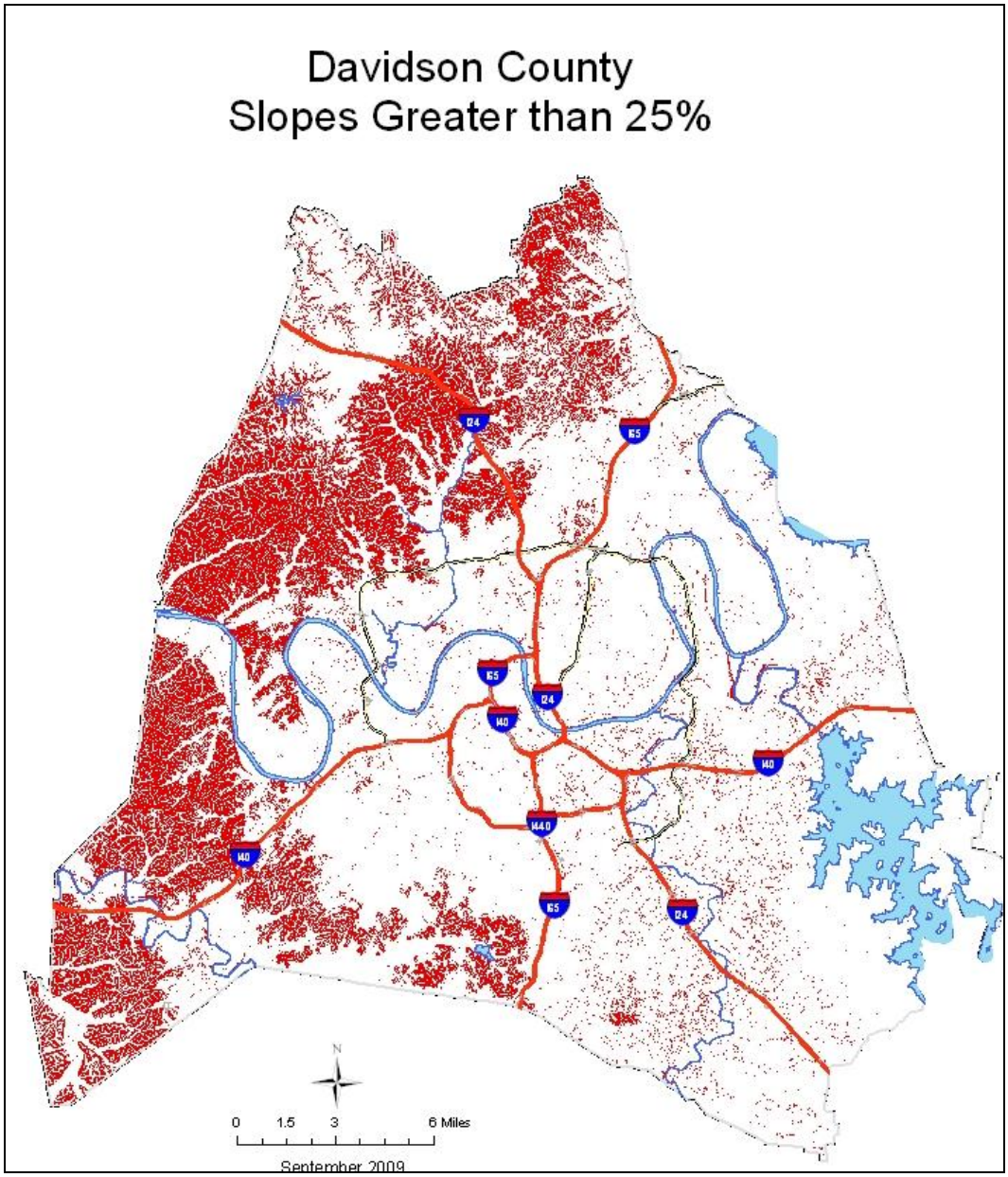


Figure 4-11b. Slopes greater than 25%

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 has 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 (see Figure 4-12).

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 4-12. Sinkhole Collapse

Within Metropolitan Nashville-Davidson County, areas susceptible to sinkhole formations have been noted adjacent to J. Percy Priest Lake (see Figure 4-13).

.

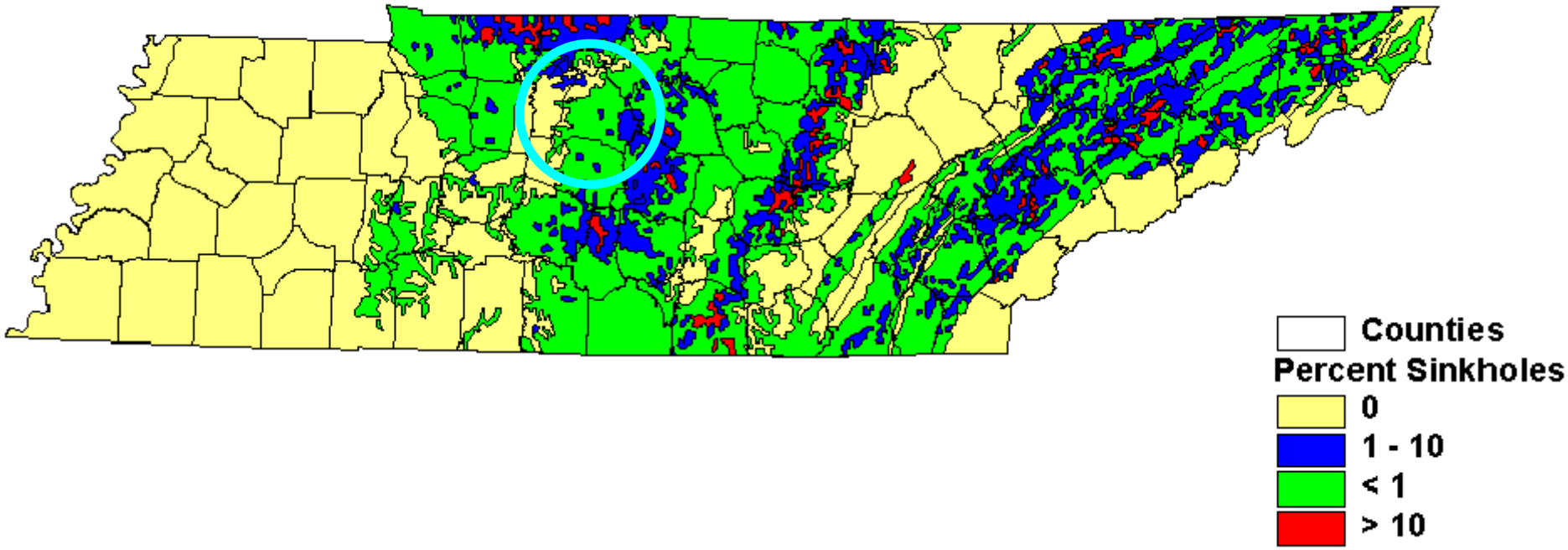


Figure 4.13 Karst Hazard Map of Tennessee
(Source: TDEC Ground Water 305b Water Quality Report, November2002)

INFESTATIONS

West Nile virus (WNV) is one of several mosquito-borne viruses in the United States that can infect people. The virus exists in nature primarily through a transmission cycle involving certain species of mosquitoes and birds. Mosquitoes become infected with WNV when they feed on infected birds.

WNV first struck the northern hemisphere in Queens, N.Y., in 1999 and killed four people. The disease spread from New York to the West Coast in three years. By 2003, all 50 states were warning of an outbreak.

Positive cases of West Nile Virus in Davidson County were first reported in 2002. Since that time, positive cases in humans, horses, and birds have been reported each year. Figure 4-14 presents human case data from 2008.

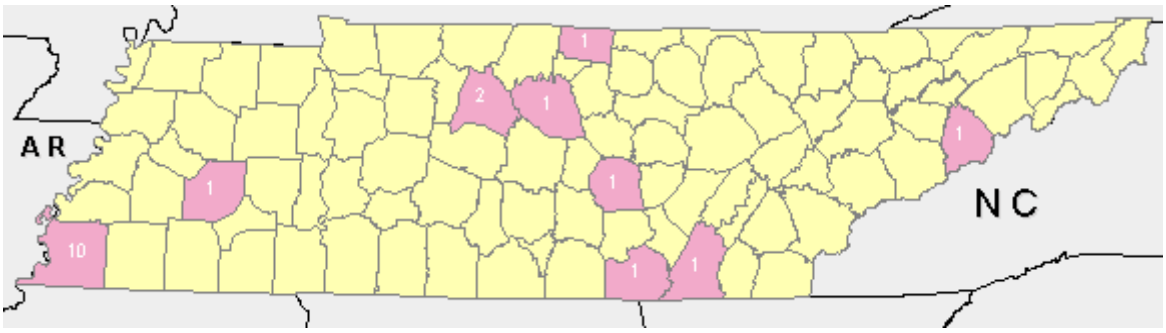


Figure 4-14. Human Cases Reported in 2008
(Courtesy of the Centers for Disease Control and Prevention, Cases for 2008)

Past Occurrences

Positive cases of West Nile Virus in Davidson County are presented in Appendix B.

Likelihood of Future Occurrences

The fifth annual West Nile Virus conference was held in Denver, Colorado in February 2004. Conclusions of the conference include:

- Widespread West Nile virus activity exists over most of the continental United States;
- At least 225 species of birds have been infected. Corvids are the most commonly reported positive bird;
- At least 49 species of mosquitoes have been infected. *Culex* mosquitoes are the most commonly reported positive mosquito;
- WNV-positive bird collections and WNV-positive mosquito collections precede the onset of human cases in most counties;

- Human cases have been reported in all states except Maine, Oregon, and Washington;
- Neuroinvasive disease and high mortality is the most common among people over 60 years of age; There is an impressive westward movement of most intense WNV transmission;
- No currently approved and effective vaccine and no currently approved and effective antivirals exists; and
- Mosquito control reduces the WNV risk of human infection.

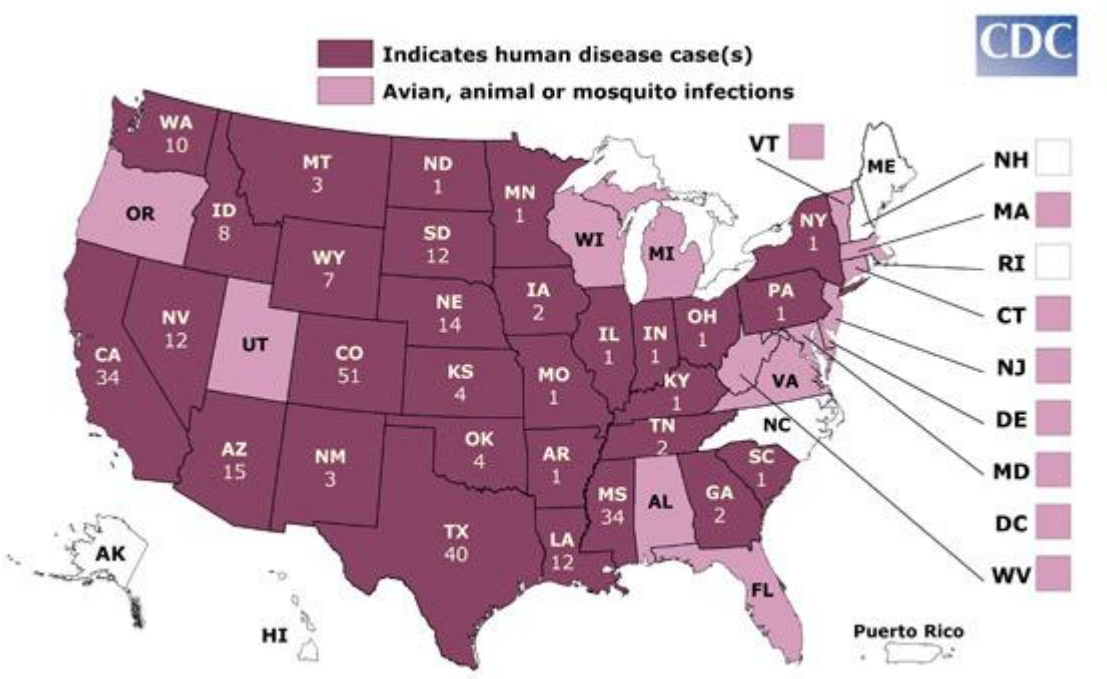


Figure 4-15. 2009 West Nile Activity in the United States
(Courtesy of the Centers for Disease Control and Prevention, As of September 15, 2009)

WNV is seemingly at its worst during a state's second year of exposure. If this continues to hold true, Nashville-Davidson County may be past the peak period, while still remaining susceptible.

MANMADE 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 "cyberterrorism."

Mitigation planning efforts for manmade hazards have been completed by the Office of Emergency Management (OEM) and are presented in the Comprehensive Emergency Management Plan, 2008.

(This page has been left blank intentionally.)

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 4-20.

Table 4-20. Precipitation Summary (inches)
1948-2003 Southeast Regional Climate Center

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Nashville International Airport	4.33	4.18	5.01	4.05	4.76	4.04	3.78	3.20	3.41	2.68	3.98	4.48	47.90
Old Hickory Dam	3.81	4.32	4.92	3.93	4.79	4.04	3.59	3.05	3.49	2.76	4.06	4.80	47.55

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 4-21.

Table 4-21. Palmer Classifications

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

The PDSI indicates that for the period of 1895 through 1995 the central portion of Tennessee was in a severe to extreme drought 5 to 10 percent of the time (Figure 4-16). During periods of drought, the Governor has called for a ban of open burning in an effort to reduce the risk of wildfire.

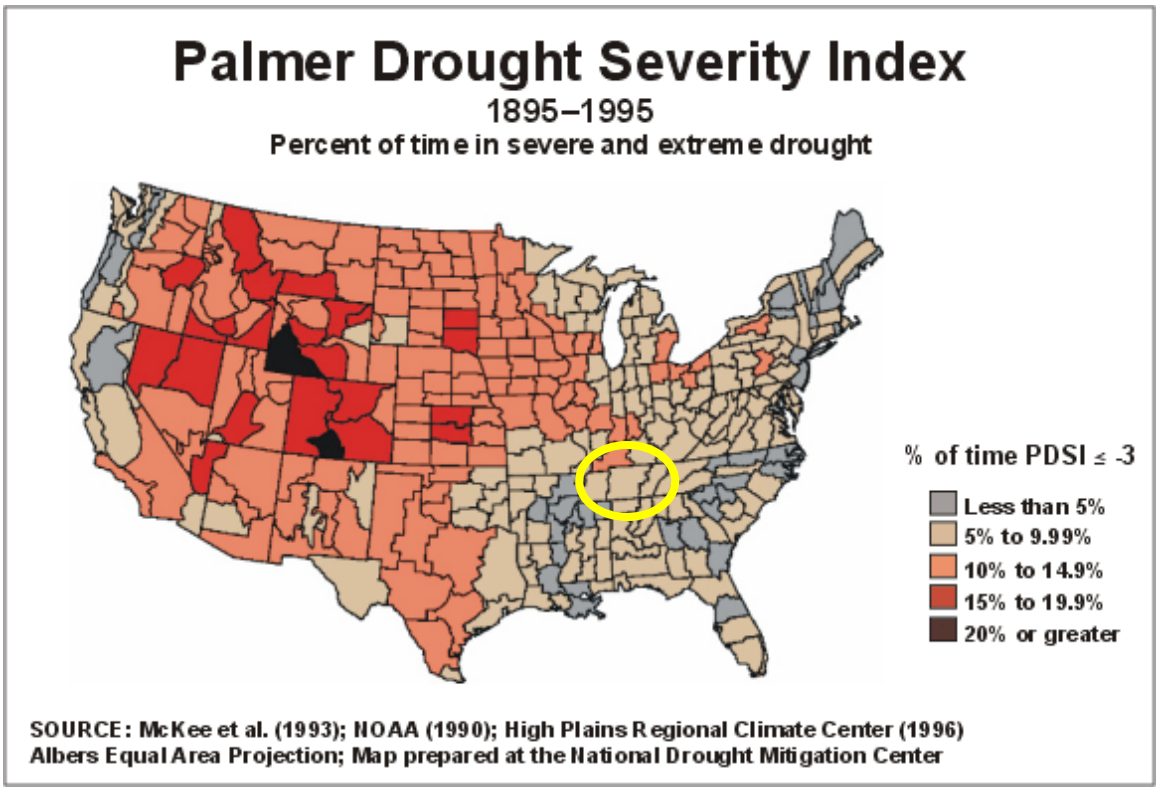


Figure 4-16. Palmer Drought Severity Index

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.

Past Occurrences

There have been 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 current seasonal outlook for the United States is presented in Figure 4-17. The Nashville-Davidson County area is not likely to be entering a period of drought in the near future.

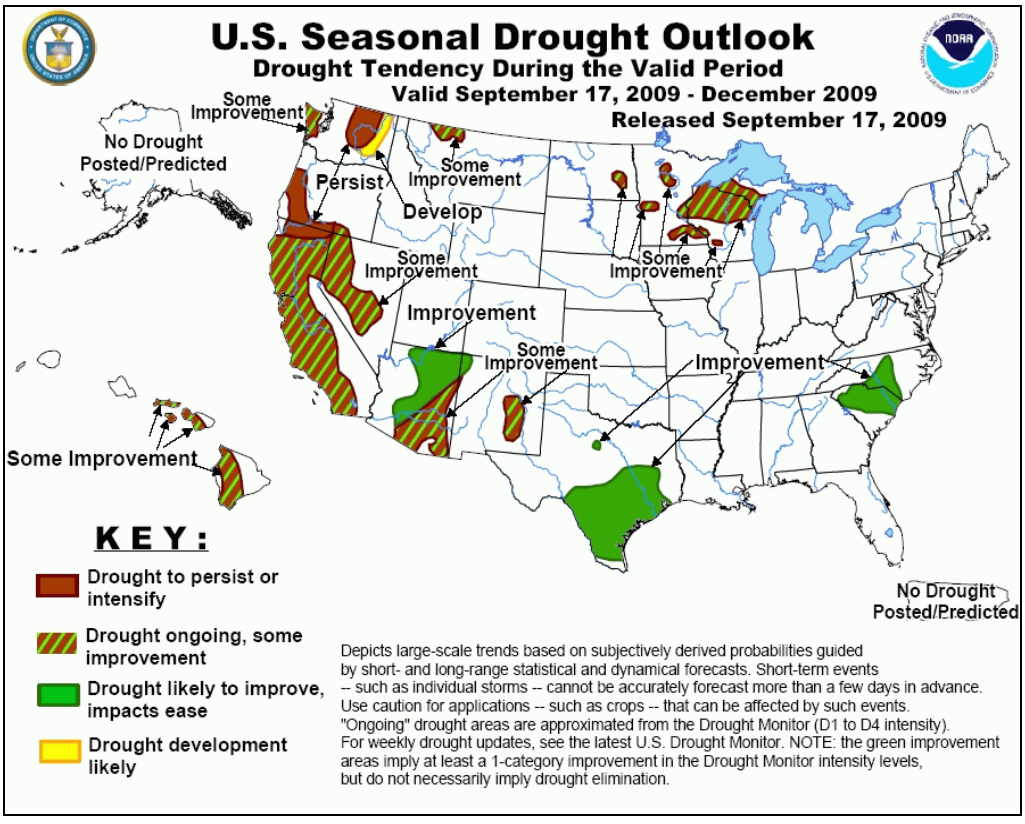


Figure 4-17. U.S. Seasonal Drought Outlook

(This page has been left blank intentionally.)

WILDFIRES

Heavily wooded or forested areas cover only a small portion or Davidson County's total land area. However, when the conditions are right, 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. Fuels 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. 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 4 and 5 (Figure 4-18).

Figure 4-18. Tennessee Forestry Districts

Past Occurrences

There have been 18 recorded wildfire events in the State of Tennessee since 1916. Information about these events is presented in Appendix B.

Likelihood of Future Occurrences

The current US Forest Service forecasts a **low** fire danger potential for Nashville, presented in Figure 4-19.

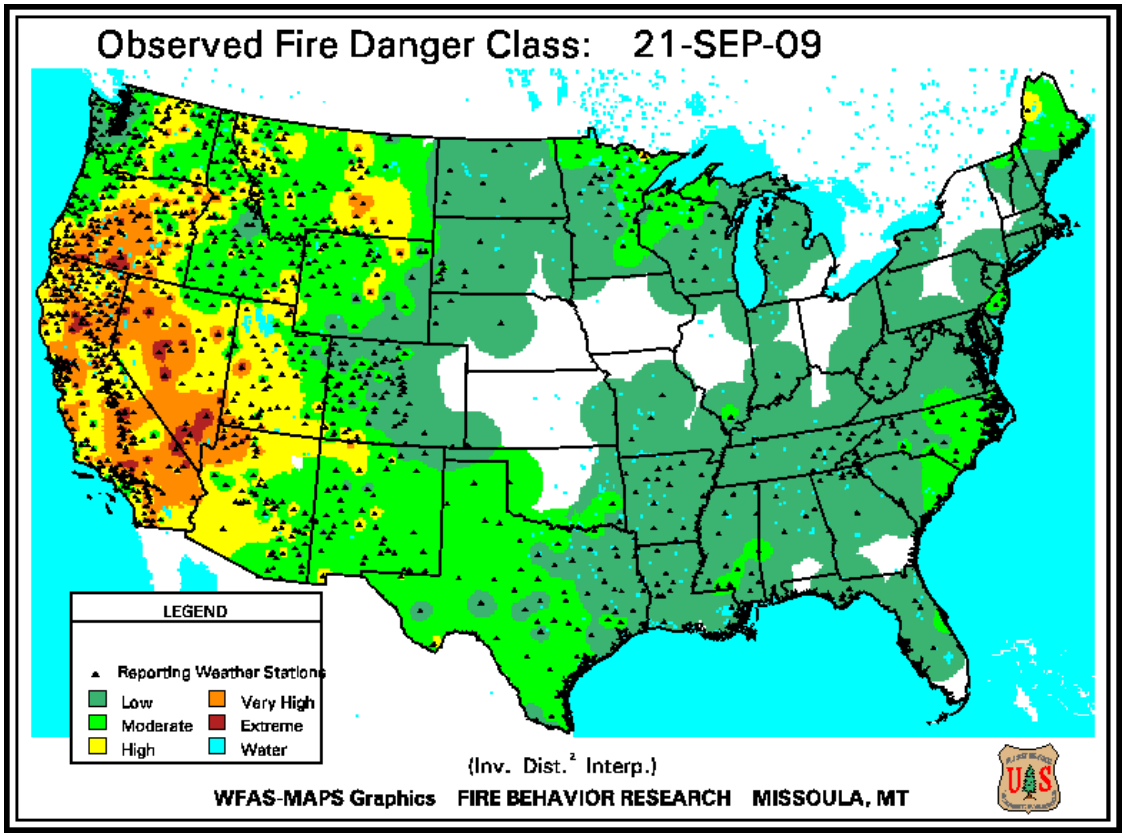


Figure 4-19. Observed Fire Danger Class

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 4-22 and Figure 4-20.

Table 4-22. Temperature Summary (°F)
1971-2000 National Climatic Data Center

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Nashville International Airport	36.8	41.3	50.1	58.5	67.1	75.1	79.1	77.9	71.3	59.9	49.3	40.5	58.9

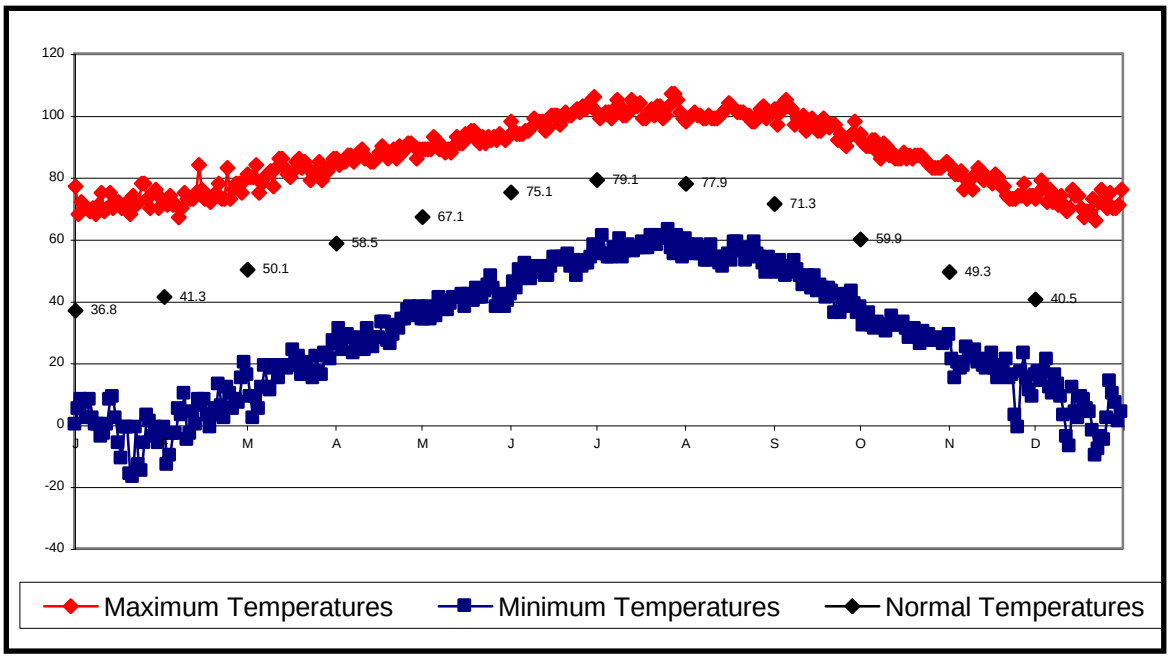


Figure 4-20. Normal Monthly Temperatures

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 4-23 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 80°F. An *Excessive Heat Warning* is issued when the heat index equals or exceeds 115°F for three hours or longer with a minimum heat index of at least 80°F during a 24-hour period. An excessive heat advisory is also issued when heat advisory conditions persist for at least 3 days. In either of these scenarios, the heat becomes dangerous for a large portion of the population.

Table 4-23. Heat Index Values and Effects

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

Cold Temperatures

The National Weather Service will issue a Wind Chill Advisory for Nashville-Davidson County when wind-chill temperatures are expected to reach –4°F to –20°F.

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

Specifically, the new WCT index:

- Calculates wind speed at an average height of five feet (typical height of an adult human face) based on readings from the national standard height of 33 feet (10m);
- Is based on a human face model;
- Incorporates modern heat transfer theory (heat loss from the body to its surroundings, during cold and breezy/windy days);

- Lowers the calm wind threshold to 3 mph;
- Uses a consistent standard for skin tissue resistance; and
- Assumes no impact from the sun (i.e., clear night sky).

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.

(This page has been left blank intentionally.)

THUNDERSTORMS / HIGH WIND

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 ¾ 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.

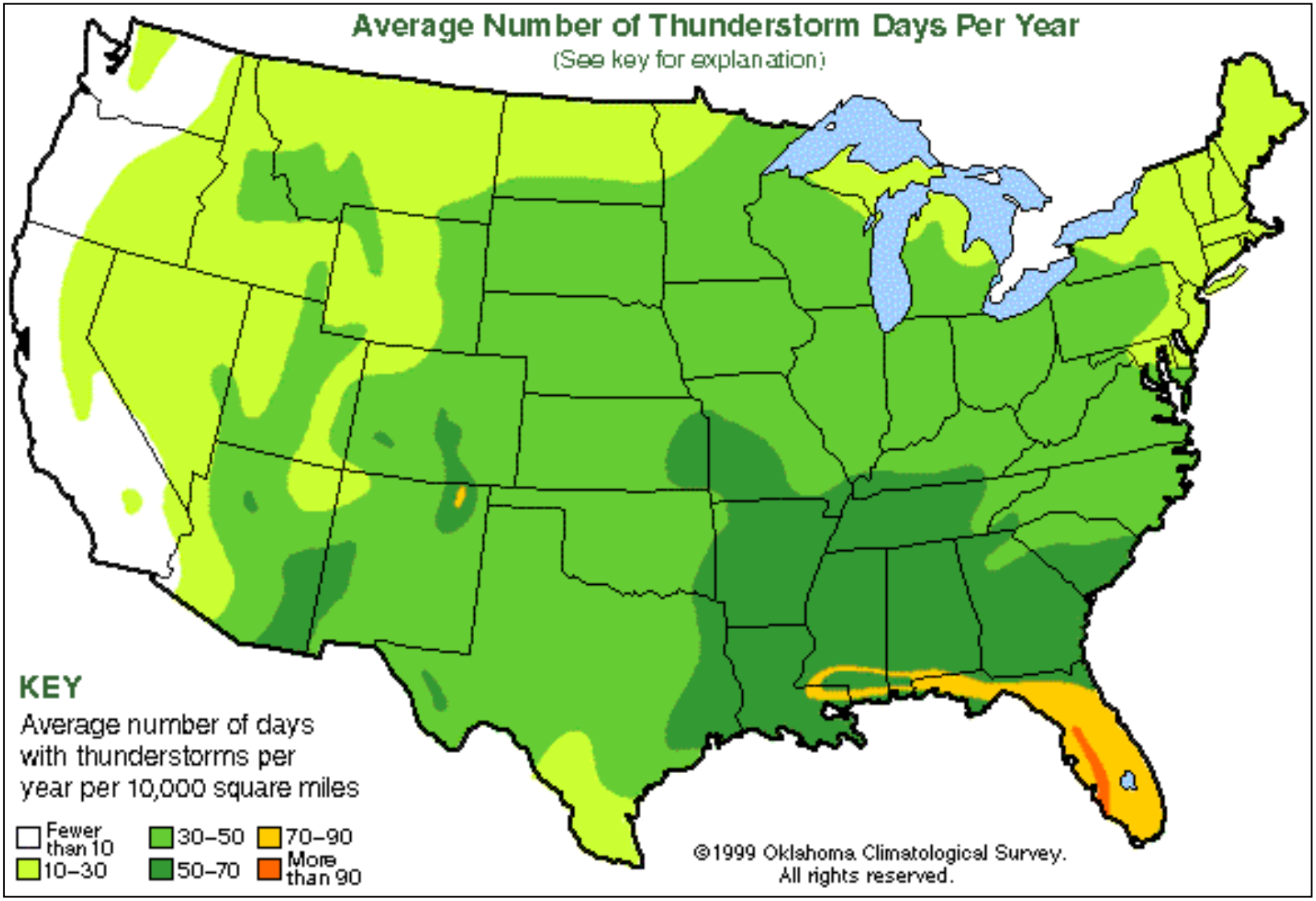


Figure 4-21. Average Number of Thunderstorm Days Per Year

Past Occurrences

There have been over 300 recorded thunderstorm/high wind events in Davidson County since 1872. These events are presented in Appendix B.

Likelihood of Future Occurrences

Thunderstorms are likely to occur in Nashville-Davidson County approximately 50 to 70 days each year (Figure 4-21).

(This page left blank intentionally.)

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 4-24. 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.

Table 4-24. Fujita & Enhanced Fujita Tornado Scale

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**

Past Occurrences

Figure 4-22. 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 4-23). 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. Most recently 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. Updated list of these events are presented in Appendix B.

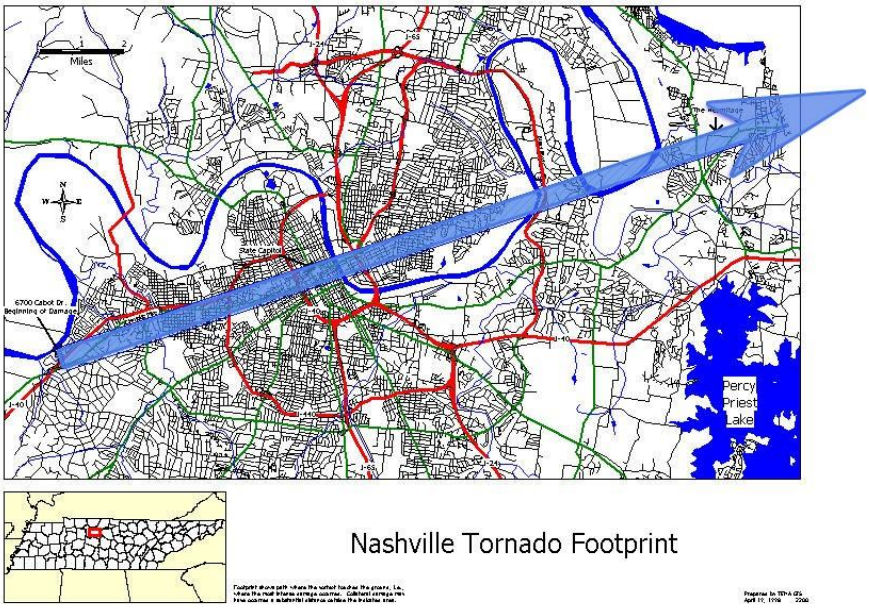


Figure 4-23. Footprint of April 16, 1998 Tornado

Likelihood of Future Occurrences

Based on NOAA, Storm Prediction Center Statistics, Nashville is located in an area of High Risk for tornadoes.

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 in Table 4-25.

Table 4-25. Snowfall Summary (inches)
1948-2003 Southeast Regional Climate Center

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Nashville International Airport	3.9	3.2	1.5	---	---	---	---	---	---	---	0.5	1.2	10.3
Old Hickory Dam	1.2	0.8	---	---	---	---	---	---	---	---	---	0.4	2.4

Past Occurrences

There have been 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 4-24).

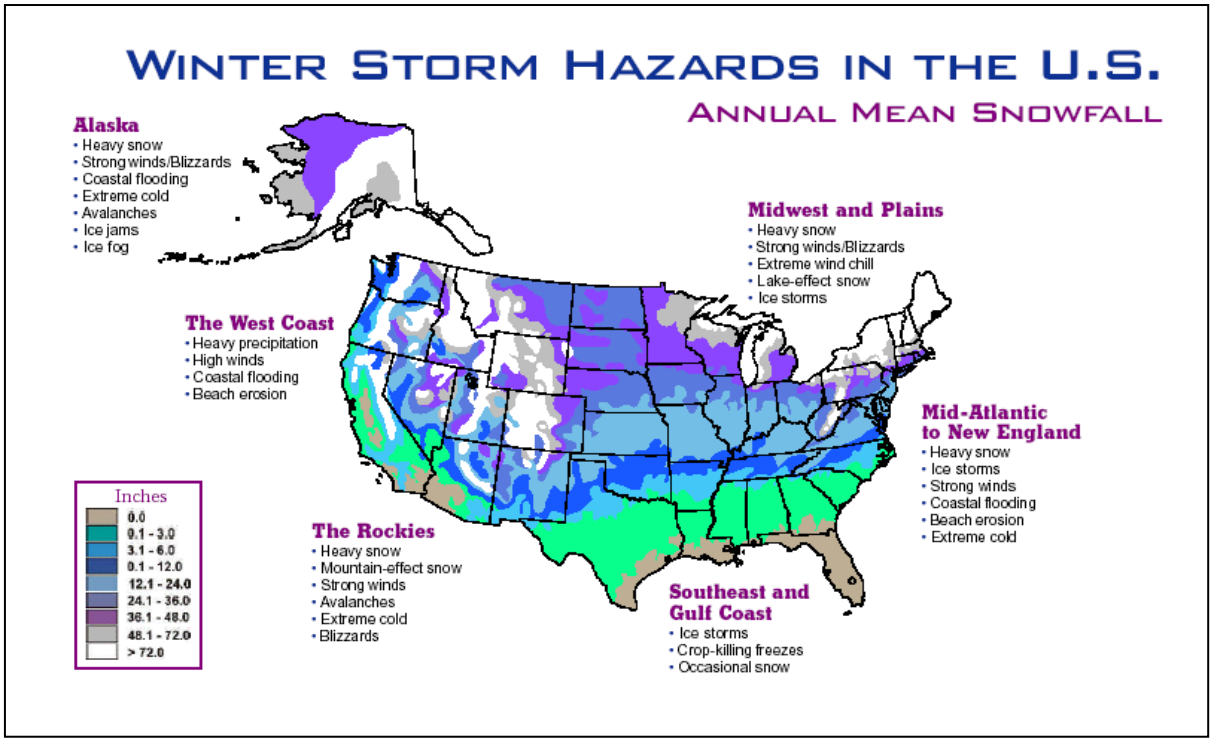


Figure 4-24 Annual Mean Snowfall
(Courtesy of the National Weather Service)

Multi-Hazard Mitigation Plan

4.2 Vulnerability 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. 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 4-26.

Table 4-26. Catastrophic Damages

Property Type	Total Number of Parcels	Number of Parcels with Improvement Value	Improvement Value
Bank / Finance	175	173	$118,402,400
Commercial	12,810	9,365	$7,427,521,627
Education *	296	75	$128,427,425
Emergency / Medical	360	354	$1,137,995,611
Industrial	2,503	2,426	$2,211,135,305
Other (Government/Institutional) **	1,731	1,069	$958,221,580
Residential - Mobile Home	574	562	$10,034,600
Residential - Mobile Home Park	47	47	$32,179,500
Residential	202,933	184,448	$28,497,672,287
Rural	10,606	7,133	$1,020,525,600
Telecommunications	92	30	$3,793,200
Recreation	263	69	$82,101,880
Uncoded Parcels	5,001	2,316	$544,241,600
Total	**237,391**	**205,745**	**42,172,252,615**

* 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.

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 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 4-27) shows those historic structures which are located within the 100 year floodplain.

Table 4-27. 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 7401 Highway 100 (Ensworth School Property)	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 Also known as 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
Whitland Historic District Roughly bounded by Whitland Ave., Bowling Ave., S. Wilson Blvd., and tributary of Richland Creek.	NA	2007

Historic Place And Location	Period of Significance	Date listed on the National Register
Woodmont Terrace Apartments 920 Woodmont Blvd, Nashville	1925-1949, 1950-1974	2003 District - #03000280
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

Natural Resources

Additional vulnerability to the catastrophic event would include natural resources within Metropolitan Nashville-Davidson County. The species listed in Table 4-28 are identified as endangered, threatened, and rare by the Tennessee Department of Environment and Conservation.

Table 4-28. Natural Resources

Scientific Name	Common Name	Federal Status[1]	State Status[2]
PLANTS			
ALLIUM STELLATUM	Glade Onion		E
AMMOSELINUM POPEI	Pope's Sand-parsley		T
AMSONIA TABERNAEMONTANA VAR. GATTINGERI	Limestone Blue Star		S
ANEMONE CAROLINIANA	Carolina Anemone		E
APIOS PRICEANA	Price's Potato-bean	LT	E
ARABIS PERSTELLATA	Braun's Rockcress	LE	E
ARABIS SHORTII	Short's Rock-cress		S
ASTRAGALUS BIBULLATUS	Pyne's Ground-plum	LE	E
ASTRAGALUS TENNESSEENSIS	Tennessee Milk-vetch		S
CAREX DAVISII	Davis' Sedge		S
CAREX HIRTIFOLIA	Pubescent Sedge		S
CASTANEA DENTATA	American Chestnut		S
CIMICIFUGA RUBIFOLIA	Appalachian Bugbane		T
CRATAEGUS HARBISONII	Harbison's Hawthorn		E
DALEA CANDIDA	White Prairie-clover		S
DALEA FOLIOSA	Leafy Prairie-clover	LE	E
DALEA PURPUREA	Purple Prairie-clover		E
ECHINACEA TENNESSEENSIS	Tennessee Coneflower	LE	E
ELYMUS SVENSONII	Svenson's Wild-rye		E
ERYSIMUM CAPITATUM	Western Wallflower		E
EVOLVULUS NUTTALLIANUS	Evolvulus		S
HELIANTHUS EGGERTII	Eggert's Sunflower	DM	S
HYDRASTIS CANADENSIS	Goldenseal		S-CE
JUGLANS CINEREA	Butternut		T
LEAVENWORTHIA EXIGUA VAR. EXIGUA	Glade-cress		S
LESQUERELLA DENSIPILA	Duck River Bladderpod		T

Scientific Name	Common Name	Federal Status[1]	State Status[2]
LESQUERELLA GLOBOSA	Short's Bladderpod	C	E
LESQUERELLA STONENSIS	Stones River Bladderpod		E
LILIUM CANADENSE	Canada Lily		T
LILIUM MICHIGANENSE	Michigan Lily		T
LONICERA FLAVA	Yellow Honeysuckle		T
MIRABILIS ALBIDA	Pale Umbrella-wort		T
PANAX QUINQUEFOLIUS	American Ginseng		S-CE
PERIDERIDIA AMERICANA	Thicket Parsley		E
PHLOX BIFIDA SSP STELLARIA	Glade Cleft Phlox		T
POLYTAENIA NUTTALLII	Prairie Parsley		T
POPULUS GRANDIDENTATA	White Water-buttercup		E
RANUNCULUS AQUATILIS VAR DIFFUSUS	Yellow Sunnybell		T
SCHOENOLIRION CROCEUM	Water Stitchwort		T
STELLARIA FONTINALIS	Willow Aster		E
TALINUM CALCARICUM	Limestone Fame-flower		S
TRIFOLIUM REFLEXUM	Sand Grape		E
VITIS RUPESTRIS	Northern Prickly-ash		S
PLANT COMMUNITY			
MECARDONIA	Limestone Glade Streamside Meadow		
INVERTEBRATES - Crustaceans			
ORCONECTES SHOUPI	Nashville Crayfish	LE	E
INVERTEBRATES - Mollusks			
EPIOBLASMA BREVIDENS	Cumberlandian Combshell	LE	E
EPIOBLASMA FLORENTINA WALKERI	Tan Riffleshell	LE	E
LITHASIA DUTTONIANA	Helmet Rocksnail		
SIMPSONICONCHA AMBIGUA	Salamander Mussel		
INVERTEBRATES - Flatworms			
SPHALLOPLANA BUCHANANI	A Cave Obligate Planarian		
INVERTEBRATES – Insects			
PSEUDANOPHTHALMUS INSULARIS	Baker Station Cave Beetle	C	
VERTEBRATES - Amphibians			
AMBYSTOMA BARBOURI	Streamside Salamander		D
CRYPTOBRANCHUS ALLEGANIENSIS	Hellbender		D
VERTEBRATES - Birds			
AIMOPHILA AESTIVALIS	Bachman's Sparrow		E
DENDROICA CERULEA	Cerulean Warbler		D
FALCO PEREGRINUS	Peregrine Falcon		E
IXOBRYCHUS EXILIS	Least Bittern		D
THRYOMANES BEWICKII	Bewick's Wren		E

Scientific Name	Common Name	Federal Status[1]	State Status[2]
TYTO ALBA	Common Barn-owl		D
Heron Rookery	Heron Rookery		
VERTEBRATES - Fishes			
ACIPENSER FULVESCENS	Lake Sturgeon		E
CYCLEPTUS ELONGATUS	Blue Sucker		T
ETHEOSTOMA LUTEOVINCTUM	Redband Darter		D
ETHEOSTOMA MICROLEPIDUM	Finescale Darter		D
PERCINA PHOXOCEPHALA	Slenderhead Darter		D
VERTEBRATES - Mammals			
NEOTOMA MAGISTER	Eastern Woodrat		D
ZAPUS HUDSONIUS	Meadow Jumping Mouse		D
VERTEBRATES - Reptiles			
MACROCLEMYS TEMMINCKII	Alligator Snapping Turtle		D
OPHISAURUS ATTENUATUS LONGICAUDUS	Eastern Slender Glass Lizard		D

Table 4-28. Natural Resources (continued)

[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

According to *Concept 2010: A General Plan for Nashville and Davidson County*, community growth during the latter half of the 20th century has involved decentralization of commercial and residential activities and continued centralization of office and industrial employment areas. The resulting pattern includes outlying shopping areas, a dominant downtown office and employment concentration, and a range of smaller commercial and industrial locations distributed widely throughout the community.

Within Davidson County there are not only urban development issues, but also suburban and rural development issues as well. In effect, Nashville is confronted with several different planning environments, each with its own separate concerns. Rural parts of the county that are not expected to develop in the next twenty years require protection from untimely development. In predominately open areas that are beginning to develop, the provision of infrastructure and urban services, as well as the appropriateness of development, are major issues. In developed sections of the county, primary planning concerns include service delivery and development compatibility. Finally, bypasses and re-developable tracts need to be integrated into the existing urban fabric at the proper level of intensity.

Planning is expected to focus on creating a more efficient overall urban pattern that minimizes land use conflicts and traffic congestion while facilitating cost effective urban service delivery. Planning for a more efficient urban structure will include:

- The organization of an urban structure that will lend itself to the widespread use of public transportation and other alternatives to single occupancy automobiles;

- Preservation and enhancement of the unique functions of downtown;

- Creation of several centers of commercial, industrial, and residential activity, each with its own specialized functions; and

- Facilitating an orderly pattern of residential growth with appropriate densities.

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.

Table 4-29 presents the probable risk and vulnerability for identified hazards within the community.

Table 4-29. Summary of Probable Hazard Risk and Vulnerability

Hazard	Risk	Vulnerability
Dam and Levee Failures	Moderate	Moderate
Drought	Low	Low
Floods	High	High
Geological Hazards	Moderate	Low
Severe Weather	Moderate	High
Natural Biological Hazards	Low	Low

DROUGHT

Risk – Low; Vulnerability – Low

Drought impacts may include physical, bio- physical, social and economic consequences. Physically, there may be a reduction in water 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.

The seasonal outlook as prepared by the Climate Prediction Center, does not predict that the Metro area is likely to enter a period of drought in the near future.

The main water supply is the Cumberland River. The two water treatment plants, Omohundro and K. R. Harrington, have a daily capacity output of 162 million gallons per day. On an average day, both plants pump 78 million gallons. If one plant is out of service, the other can supply the entire community's water needs.

DAM & LEVEE FAILURES

Risk – Moderate; Vulnerability – Moderate

Based on Table 4-2 (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.

Table 4-2. Dams affecting Davidson County

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

FLOOD

Risk – High; Vulnerability – High

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.

In order to determine vulnerability, the 100-year floodplain map was overlaid onto the Metro parcel data. The properties that intersected the floodplain were then queried for property improvements greater than $0.00. Improvement values are tied to the parcel data, not to building footprints. This gave an indication of an improvement to a piece of property that touched the floodplain, i.e. count of structures in floodplain. There are approximately 12,040 parcels that intersect the floodplain with an improvement value greater than $0.00. These properties represent approximately six percent of the properties of Metropolitan Nashville and Davidson County (Table 4-30).

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

- St. Thomas Hospital;
- Metro Police Department South Precinct;
- Omohundro Drive Water Treatment Plant;
- County Government Complex;
- Whites Creek High School;
- Nashville State Technical Institute;

- WNQM AM 1300;
- WUPX UPN 30;
- WVOL AM 1470;
- Williams Energy Ventures (4);
- Marathon Ashland Petroleum (4);
- BP Amoco Oil;
- Citgo Petroleum Company;
- Perk's Products & Chemical Company;
- Dupont; and
- K.R. Harrington Water Treatment Plant.

An additional 70 repetitive loss structures are located within the 100-year floodplain. Repetitive loss structures are those structures that have been paid two flood insurance claims of $1,000 or more within any 10-year period since 1978.

Table 4-30. 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	10	9	$5,344,500
Commercial	988	635	$1,294,540,222
Education *	35	8	$38,777,030
Emergency / Medical	14	13	$141,912,400
Industrial	415	260	$539,177,700
Other (Government/Institutional) **	1,706	1,058	$924,074,080
Residential - Mobile Home	91	90	$1,991,800
Residential - Mobile Home Park	11	11	$16,838,800
Residential	11,267	9,843	$1,695,517,743
Rural	2,165	1,387	$216,727,400
Telecommunications	8	2	$2,511,800
Recreation	47	14	$13,751,870
Uncoded Parcels	213	24	$15,536,300
Total	**16,970**	**205,745**	**4,906,701,645**

* 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.

Of the 206,834 parcels located within the Metro area, 15,420 are located within the 100-year floodplain, seven percent of the total properties in Metro. Similarly, of the total $29.1 billion in improvement values, $3.3 billion are located within the 100-year floodplain. This means that eleven percent of the total property value of the community is located within the 100-year floodplain.

GEOLOGICAL HAZARDS

Risk – Moderate; Vulnerability –Low

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.

Table 4-31. Earthquake Hazard Damages

Impacts / Earthquake	7.5 at 10 KM Depth
Residential Bldgs. Damaged *(Based upon 181,898 buildings)*	0.0
Injuries *(Based upon 569,891 people)*	0.0
Displaced Households	0.0
Economic Loss	0.0
Damage to Schools *(Based upon 194 buildings)*	0.0
Damage to Hospital	0.0
Damage to Transportation Systems	0.0
Households w/out Power & Water Service *(Based upon 2374,000 households)*	0.0
Debris	0.0

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 4-11, 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 4-32). 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 4-32. 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.

(This page left blank intentionally.)

SEVERE WEATHER

(Extreme Temperature, Thunderstorms, Tornadoes, and Winter Storms)
Risk – Moderate; Vulnerability – High

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, all of the presidential disaster declarations for Davidson County since 1994 have been a result of severe storms and tornadoes.

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.

Tornadoes

There are 71 pole-mounted sirens utilized by OEM to warn residents of severe weather tornadoes. 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 4-25 presents the siren locations with a one-mile radius. The greatest concentration of sirens is the downtown/central area of Metro. Areas such as Bellevue and Joelton have less coverage.

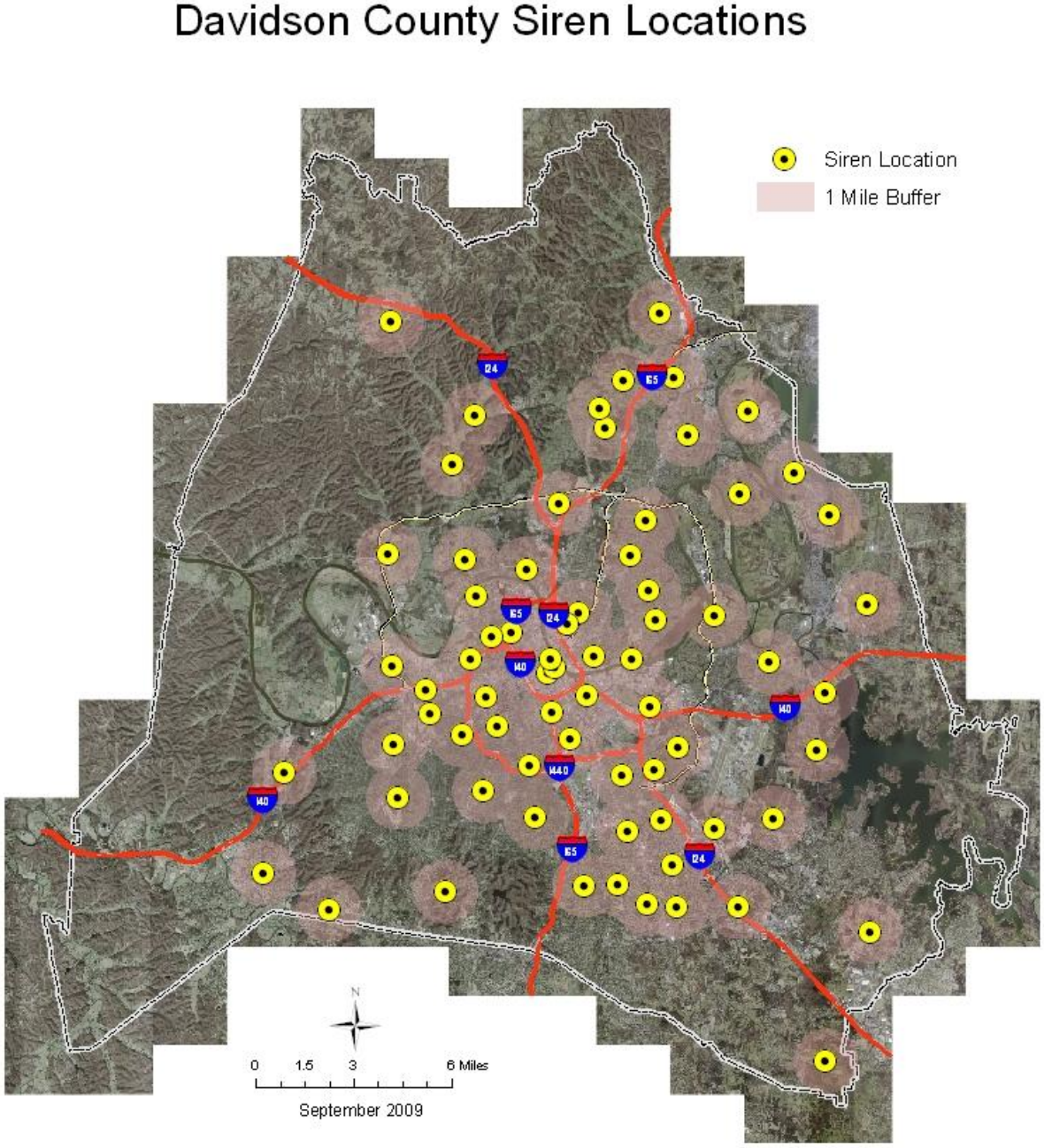


Figure 4-25 Tornado Siren Locations

NATURAL BIOLOCIAL HAZARDS

West Nile Virus: Risk – Low; Vulnerability – Low

The impacts of West Nile Virus within the Metro area may include the loss of life or either short or long term debilitation for the victims. It may also include economic hardship for the individuals or their families. Lost work time affects not only the employee, but also the employer. Loss of productivity due to individual illnesses is a major business problem today without taking into account the effects of a major epidemic.

In addition, a serious epidemic would likely cause a strain on current public health and medical resources. Response efforts cause an economic impact on the community including the cost of spraying, data collection and testing efforts, and public information.

Both the risk and vulnerability to Tennessee from West Nile Virus (WNV) is considered low, based on the percentage of total population that actually contracts the disease. The first appearance of WNV in North America occurred in 1999. As of August 2003, WNV has been documented in 46 states and the District of Columbia. Positive cases of West Nile Virus in Metro Nashville-Davidson County were first reported in 2002 in birds, humans, and veterinary animals. According to the Tennessee State Department of Health, the number of confirmed human cases for the State for 2001, 2002, 2003 and 2004 are 1, 141, 103, and 1, respectively. This is consistent with the natural trends that indicate the second year of exposure to WNV is the worst.

(This page left blank intentionally.)

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 4-33 presents the inventory of existing mitigation capabilities within Metropolitan Nashville-Davidson County. An evaluation of key capabilities follows.

Table 4-33. Metropolitan Nashville-Davidson County Mitigation Capability

Capability	Metropolitan Nashville-Davidson County
Comprehensive Plan	Land Use Policy Plan – Divided by designated sub-areas within Davidson County. Updated on a rotating sub-area schedule.
Land Use Plan	
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
- Substantial Damage language?	Cumulative Substantial Damage
- Certified Floodplain Manager?	No Certified Floodplain Managers (CFM) through the Association of State Floodplain Managers (ASFPM)
- # of Floodprone Buildings?	Approximately 10,000 bldg footprints within floodplain
- # of NFIP policies	Approximately 3,733 policies in force
- Maintain Elevation Certificates?	Yes
- # of Repetitive Losses?	102 structures; 1,000 structures identified in repetitive loss areas
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)?	Yes
- 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	Billing Stuffers; Website – MWS has Public Information Officer; meet NPDES public information requirements.
Environmental Education Program?	

Explanation of Capability Assessment Matrix

Comp Plan: Comprehensive Long-Term Community Growth Plan

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

Subdivision Ordinance: Regulates platting, recording, infrastructure improvement

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

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

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

Administrator: 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.)

# of FP Bldgs: How many buildings are in the Floodplain?

# of policies? How many buildings are insured against flood through the NFIP?

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

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

BCEGS: Building Code Effectiveness Grading System Rating

LEOP: Do you have a Local Emergency Operations Plan – a disaster RESPONSE plan

HM Plan: Do you have a Hazard Mitigation Plan

Warning: 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"?

GIS: Geographic Information System

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

Property Protection Projects: (buy-outs, elevation of structures, floodproofing, small "residential" levees or berms/floodwalls)

Critical Facility Protection: (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)

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

Erosion Or Sediment Control: Do you have any projects or regulations in place?

Public Information And/Or Environmental Education Program: 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 10,000 structures located within the 100-year floodplain, but only 3733 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 $144,000 in insurance premiums.

- Metro cannot improve its classification in the CRS 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). Operated through the Mayor's Office of Emergency Management, CERT Training allows citizens to manage utilities, putout 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 flood 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. The 2009 plan will change the trim cycle from a 3 year cycle to a 4 year cycle where an approximate 1,200 miles of power lines will be trimmed each year of the 4 year cycle.

- 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.

The MWS Stormwater Division Maintenance Staff members are responsible for placing the temporary barricades at the locations described above. This duty is not currently tied to specific flood heights, only to subjective determinations during rainfall events.

- 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.

Multi-Hazard Mitigation Plan

5.0 Mitigation Strategy

This Multi-Hazard Mitigation Plan was originally created in 2005. In 2009, 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, although only 3,733 policies are in effect, representing 37 percent of the 10,000 building footprints located within the floodplain;

2. Metro has an existing Floodplain Management Plan for Repetitive Loss Areas;

3. The stormwater regulations were recently updated to clarify and strengthen existing policies.

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. The NPDES water quality requirements may offer an opportunity to coordinate flood warning capabilities and stream gauging;

9. OEM has recently updated the severe weather warning siren capabilities of the community with 71 sirens;

10. Public information could be made available to inform residents about the risks of hazards (earthquakes, floods, and tornadoes, predominantly) and appropriate risk reduction actions that they can undertake; and

11. Metro does not support flood protection and retrofitting as standard solutions for residential flooding problems.

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.

.

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, 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; and
- 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.

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).

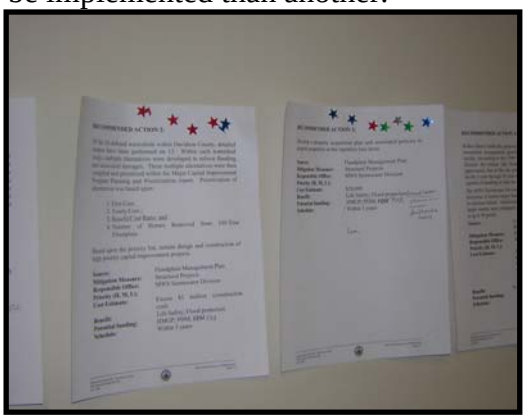


Figure 5.1 Priority "Stars"

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.

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:

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 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

RECOMMENDED ACTION 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 Mayor's 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.

RECOMMENDED ACTION 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.

RECOMMENDED ACTION 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.

RECOMMENDED ACTION 6:

OEM has installed and continually updates a software program (E-Stat) that provides 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.

RECOMMENDED ACTION 7:

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
Mitigation Category:	Prevention; Natural and Beneficial Functions
Responsible Office:	MWS; Metro Legal
Priority (H, M, L):	High
Cost Estimate:	Two to three days for developing the ordinance and procedures. The cost of enforcing the regulations is not included here, as that would be dependent on the number of violators.
Community Benefit:	Maintaining a stormwater drainage system that operates at design capacity
Potential funding:	Existing Budget
Schedule:	Within 5 years

2009 Update: Nothing new to report at this time.

RECOMMENDED ACTION 8:

Metro's emergency management program, in conjunction with Public Works, has installed several flood-warning gages in some county streams and creeks. The coverage of these gages is for only three of the county's 14 repetitive flooding creeks and streams.

An additional 11 gages are recommended for total coverage of the community.

Source:	OEM Local Hazard Mitigation Plan
Mitigation Category:	Emergency Services
Responsible Office:	OEM
Priority (H, M, L):	Medium
Cost Estimate:	$10,000 - $15,000 annual maintenance
Community Benefit:	Improved warning, increased lead time on warning systems and mitigation efforts, reduced losses, life safety
Potential funding:	Coordinate with NPDES gauging needs where possible; USGS
Schedule:	Within 5 years

2009 Update: This action item is being amended to include the recommendation of a flood gage on Mansker Creek in Goodlettsville (automatic notification gage). 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 gages were installed in 2009 at Mill Creek and in the process of being installed at Seven Mile Creek.

RECOMMENDED ACTION 9:

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.

RECOMMENDED ACTION 10:

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 11:

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
Mitigation Category:	Prevention
Responsible Office:	MWS; Metro Codes
Priority (H, M, L):	Medium
Cost Estimate:	Staff Time
Community Benefit:	Life Safety
Potential funding:	Existing Budget
Schedule:	Within 2 years

2009 Update: The provisions of the Stormwater Regulations are being fully implemented and enforced.

RECOMMENDED ACTION 12:

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.

RECOMMENDED ACTION 13:

The CPT determined that severe weather hazard mitigation actions and coordination would be best addressed under the goal of public awareness (Goal #2, Recommended Action 15).

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 14:

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:	OEM
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.

RECOMMENDED ACTION 25: (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

RECOMMENDED ACTION 26: (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

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 15:

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 Mayor's 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".

RECOMMENDED ACTION 16:

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 coverages by the policy holder.
Potential Funding:	None required. This is a service of the state NFIP Coordinator.
Schedule:	2010

RECOMMENDED ACTION 17:

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.

RECOMMENDED ACTION 18:

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.

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 20:

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 gages to predict flood crests and times. Flood crest prediction programs are currently in place on the Cumberland and Harpeth Rivers.

The Mayor's 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 gages.

There are more rain and river gages on smaller streams and additional work would be needed to translate readings into a crest prediction for these areas. These gages 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:	OEM in conjunction with MWS
Priority (H, M, L):	Medium
Cost Estimate:	One half (½) day of staff time for documentation of the Cumberland and Harpeth River gages; $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.

RECOMMENDED ACTION 21:

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.

RECOMMENDED ACTION 22:

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

RECOMMENDED ACTION 23:

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.

RECOMMENDED ACTION 24:

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.

(This page has been left blank intentionally.)

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 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 floodprone 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.

RECOMMENDED ACTION 19:

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
Mitigation Category:	Emergency Services; Public Information
Responsible Office:	OEM
Priority (H, M, L):	Low
Cost Estimate:	Staff Time
Community Benefit:	Life Safety
Potential funding:	Existing Budget; TEMA
Schedule:	Within 2 years

2009 Update: Due to legality concerns, this recommended action will not be implemented.

(This page has been left blank intentionally.)

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.

- 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.

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.

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. A copy of this statement is in Appendix A. This action will complete Step 9 of the Plan Development Process: Formal Plan Adoption.

(This page has been left blank intentionally.)

Multi-Hazard Mitigation Plan

7.0 Plan Implementation and Maintenance

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."

IMPLEMENTATION

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.

This monitoring and updating will take place through a semi-annual review by OEM, an annual review through 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.

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 every 6 months to ensure the action items contained in this plan are maintained and updated.

Plan Record of Changes

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/HJ

Table 7-1. Plan Record of Changes

(This page has been left blank intentionally.)

Metropolitan Nashville - Davidson County Multi-Hazard Mitigation Plan

APPENDIX A – PLANNING PROCESS

The Mayor's Office of Emergency Management (OEM) facilitated revision of this 2009 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.

(This page left blank intentionally.)

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:

Attendee	Agency / Company	Phone	E-mail
Heidi Jordan	OEM	862-8530	Heidi.jordan@nashville.gov
Kevin Penney	OEM	862-8530	Kevin.Penney@nashville.gov
Tom Palko	MWS	862-4510	Tom.Palko@nashville.gov
Stan Robinson	MWS	862-4516	Stan.Robinson@nashville.gov
Jim Tarpy	MWS	862-4503	Jim.Tarpy@nashville.gov
Michael Hunt	MWS	880-2420	Michael.Hunt@nashville.gov
Eddie Andrews	NES	747-3810	eandrews@nespower.com
Bob Leeman	Metro Planning	862-7183	bob.leeman@nashville.gov
Jennifer Higgs	Metro Planning	880-3416	Jennifer.higgs@nashville.gov
Manley Biggers	Metro Codes	862-6521	Manley.Biggers@nashville.gov
Ronald Holt	Metro Fire	862-5230	Rholt@nashville.gov
Randall Hickerson	Metro Police	880-2091	randall.hickerson@nashville.gov
Steve Lewis	Metro Police	880-3032	Stephen.lewis@nashville.gov
Tom Johnston	National Weather Service	754-8506	thomas.johnstone@noaa.gov
James LaRosa	National Weather Service	754-8506	james.larosa@noaa.gov

Table 4-35 CPT Members

Additional Agencies and Organizations

Additional agencies and organizations interested in Metro Nashville and/or natural hazards were contacted at the beginning of the planning process 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:

- Tennessee Emergency Management Agency;
- FEMA Region IV;
- U.S. Army Corps of Engineers, Nashville District;
- Natural Resource Conservation Service, State Conservationist;
- National Flood Insurance Program (NFIP) State Coordinator; and
- Tennessee Natural Resource Conservation Service.

A sample of the invitation sent to the additional agencies and organizations is presented on the following page. Representatives from the National Weather Service participated as members

of the CPT. 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 and provided with a copy of the Draft plan for review and comment. These communities included:

- Belle Meade;
- Berry Hill;
- Forest Hills;
- Goodlettsville;
- Lakewood;
- Oak Hill; and
- Ridgetop.

MAYOR'S OFFICE OF EMERGENCY MANAGEMENT

EMERGENCY OPERATIONS CENTER

Karl F. Dean, Mayor

SAMPLE

August 20, 2009

Bobby Franklin
City Manager
3401 Hadley Ave
Old Hickory, TN 37138

Re: Multi-Hazard Mitigation Plan Update

Dear Mr. Franklin:

As required in 44 CFR §201.6, Local Hazard Mitigation Plans must be reviewed, revised and resubmitted to the Federal Emergency Management Agency (FEMA) for approval every 5 years. This review and revision must reflect changes i.e., hazard identifications/priorities, demographics, etc. that have occurred since the initial federal approval. The regulation further states that local plans must be submitted in order to maintain continued eligibility for any of the following mitigation grant programs administered by FEMA:

Hazard Mitigation Grant Program (HMGP) (post disaster funding)
Pre-Disaster Mitigation Competitive Program (PDM-C)
Flood Mitigation Assistance Program (FMA)
Severe Repetitive Loss Program (SRL)

In order to ensure continued eligibility, Nashville must resubmit their revised plan no later than September 27th.

Because of your interest in Metro Nashville and/or natural hazards, we are sending you this notice to ask that you please advise us if you have any plans, programs, activities or ideas that could help us in our efforts to identify the best ways to reduce the dangers and damage from natural hazards.

If you are interested in participating or commenting in this review and revision process, please do not hesitate to let us know and we will inform you of future meetings and opportunities.

Thank you for your assistance,

Heidi J. Jordan, MEP
Planning, Training & Exercise Program Manager

cc: Kevin Penney, OEM Deputy Director

2060 15th Avenue South * Nashville, TN 37212 * Phone: (615) 862-8530 * Fax: (615) 862-8534

Figure A-1 **Sample letter to additional agencies**

PROMULGATION STATMENT

Date: TBD

To: Metro Departments and the Citizens of Metropolitan Nashville and Davidson County.

The Metro Nashville-Davidson County government 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 2009 Metro Nashville Natural Hazards 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 Metro Nashville-Davidson County, I hereby promulgate and issue, effective this date, the Metro Nashville-Davidson County Natural Hazards Mitigation Plan. Further, I declare this plan to be the official natural hazards mitigation plan for Metro Nashville-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 Mayor's 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 Dean, Mayor

Metropolitan Government of Nashville and Davidson County

Figure A-2 Mayor's Promulgation Statement

MEETING MINUTES

The CPT met several times during the planning process. Meeting dates were scheduled for the following:

- July 23rd – Initial Review Meeting with Metro Water Services
- September 1st – First Community Planning Team Meeting, Assignments
- September 14th – Community Planning Team Meeting, Plan Review Updates
- September 15th – Community Input Plan Review Public Meeting
- September 21st – Community Planning Team Final Review Meeting

(This page has been left blank intentionally.)

CPT MEETING MINUTES

Metropolitan Nashville and Davidson County

Multi-Hazard Mitigation Plan Revision

MEETING #1 INITIAL REVIEW MEETING

0900-1000, July 23, 2009

1. Introductions

The initial meeting was intended for OEM and MWS to review the requirements of the Hazard Mitigation Plan Revision crosswalk document, prior to the CPT meeting. This meeting was attended by the following:

Attendee	Agency / Company	Phone	E-mail
Heidi Jordan	OEM	880-2950	Heidi.Jordan@nashville.gov
Kevin Penney	OEM	862-8530	Kevin.Penney@nashville.gov
Jim Tarpy	MWS	862-4503	Jim.Tarpy@nashville.gov

2. Crosswalk Review

This meeting was to introduce MWS to the crosswalk provided with the plan guidance. Jim Tarpy was present to represent the MWS Stormwater Division. A copy of the crosswalk was given to Mr. Tarpy and was reviewed during the meeting. Assignments with MWS were started.

3. Next Meeting

The first scheduled CPT is scheduled for September 1st. Detailed assignments will be presented to all participants and suggested revisions will start to be addressed.

(This page left blank intentionally.)

CPT MEETING MINUTES

Metropolitan Nashville and Davidson County

Multi-Hazard Mitigation Plan Revision

MEETING #2 – FIRST CPT MEETING

1000 - 1130, September 1, 2009

1. Attendance

The DMA planning regulations and guidance ardently stress that each local government seeking the required FEMA approval of their mitigation plan must participate in the process. The Community Planning Team (CPT) is composed of Metro staff and stakeholders. The following members attended this second meeting:

Attendee	Agency / Company	Phone	E-mail
Heidi Jordan	OEM	880-2950	Heidi.Jordan@nashville.gov
Kevin Penney	OEM	880-2951	Kevin.penney@nashville.gov
Bob Leeman	Metro Planning	862-7183	Bob.Leeman@nashville.gov
Jack Baxter	NES	747-3683	jbaxter@nespower.com
Steve Lewis	Metro Police	880-3032	stephen.lewis@nashville.gov
Paul Harbin	Metro Police	880-3015	Paul.Harbin@nashville.gov
Tom Johnston	NWS	754-4634	thomas.johnston@noaa.gov
Jim Tarpy	MWS	862-4503	Jim.Tarpy@nashville.gov
Tom Palko	MWS	862-4510	Tom.Palko@nashville.gov
Michael Hunt	MWS	880-2426	Michael.Hunt@nashville.gov
James LaRosa	NWS	754-4634	James.larosa@noaa.gov

2. Multi-Hazard Mitigation Plan Status

The lead agency, OEM, started the meeting off with handing out the plan crosswalk, and explaining the past planning experience and the requirement with the 5 year revision cycle. The deadline was also discussed, and future meeting dates were agreed upon.

The 2005 plan is currently posted on the Nashville network in a shared drive. This will ensure that there is only one draft plan being edited. All those on the CPT have already been given access to this shared drive. Those outside the Nashville network will be given a disk with the plan on it, and will just have to email or deliver edits to OEM to incorporate into the master draft plan.

The CPT is expected to meet two more times during the planning process. Meeting dates are scheduled as follows:

- September 14th – CPT Plan Review Updates Meeting
- September 15th – Community Input Plan Review Public Meeting
- September 21st – CPT Final Review Planning Meeting

Based on the requirements with the plan revision, the community must have plenty of opportunity to give input into the revisions or this plan. With that said, OEM's public information officer will ensure numerous notices are sent out via different avenues, and posted in different areas. We will be holding a Community Input Plan Review Public Meeting on the 15th at East Police Precinct.

3. Review of the Crosswalk

Review of the plan crosswalk given to us with the plan guidance. Each item was discussed and assignments were made based on the primary agency responsible for that area of expertise. Revisions to the plan are due by September 11th, to ensure time to prepare for the public input meeting.

4. Next Meeting

The next meeting is on the 14th to go over final edits before the public meeting on the 15th.

CPT MEETING MINUTES

Metropolitan Nashville and Davidson County

Multi-Hazard Mitigation Plan Revision

MEETING #3 – CPT UPDATE REVIEW

0900 - 1000, September 14, 2009

1. Attendance

The following members attended this meeting:

Attendee	Agency / Company	Phone	E-mail
Heidi Jordan	OEM	880-2950	Heidi.Jordan@nashville.gov
Kevin Penney	OEM	880-2951	Kevin.penney@nashville.gov
Bob Leeman	Metro Planning	862-7183	Bob.Leeman@nashville.gov
Jack Baxter	NES	747-3683	jbaxter@nespower.com
Wade Hill	Metro Codes	862-6520	Wade.hill@nashville.gov
Jennifer Higgs	Metro Planning	880-3416	Jennifer.higgs@nashville.gov
Tom Palko	MWS	862-4510	Tom.Palko@nashville.gov
Jack Tompkins	Goodlettsville	859-2740	amurray@cityofgoodlettsville.org

2. Review of the Crosswalk and Revisions

Review of the plan crosswalk and discussions of revisions completed or in the process of being completed took place. Goals, Objectives and Mitigation measures were agreed upon to keep from the original plan. It was discussed that there needs to be a better plan in place for ensuring follow up on the action items. OEM suggested meetings every 6 months to review the actions. This is on top of the annual meetings the CPT will need to ensure.

3. Next Meeting

The next meeting is the public meeting on the 15th. CPT members are encouraged to attend to be able to answer any possible questions from the public.

The next CPT meeting will be on the 21st and that will be the final meeting to go over final edits to the plan.

(This page left blank intentionally.)

CPT MEETING MINUTES

Metropolitan Nashville and Davidson County

Multi-Hazard Mitigation Plan Revision

MEETING #4 – COMMUNITY INPUT SESSION

1800 - 1900, September 15, 2009

1. Attendance

The following members attended this session:

Attendee	Agency / Company	Phone	E-mail
Heidi Jordan	OEM	880-2950	Heidi.Jordan@nashville.gov
Kevin Penney	OEM	880-2951	Kevin.penney@nashville.gov
Larry Vannozzi	NWS	754-4634	larry.vannozzi@noaa.gov
Jennifer Higgs	Metro Planning	880-3416	Jennifer.higgs@nashville.gov
Tom Palko	MWS	862-4510	Tom.Palko@nashville.gov

There were 0 community members present for this input review session.

2. Next Meeting

The next CPT meeting will be on the 21st and that will be the final meeting to go over final edits to the plan.

(This page left blank intentionally.)

CPT MEETING MINUTES

Metropolitan Nashville and Davidson County

Multi-Hazard Mitigation Plan Revision

MEETING #5 – CPT FINAL REVISION MEETING

0900 - 1000, September 21, 2009

1. Attendance

The following members attended this meeting:

Attendee	Agency / Company	Phone	E-mail
Heidi Jordan	OEM	880-2950	Heidi.Jordan@nashville.gov
Michael Hunt	MWS	880-2426	Michael.Hunt@nashville.gov
Bob Leeman	Metro Planning	862-7183	Bob.Leeman@nashville.gov
Jack Baxter	NES	747-3683	jbaxter@nespower.com
Wade Hill	Metro Codes	862-6520	Wade.hill@nashville.gov
Jennifer Higgs	Metro Planning	880-3416	Jennifer.higgs@nashville.gov
Steve Lewis	Metro Police	880-3032	stephen.lewis@nashville.gov
Manley Biggers	Metro Codes	862-6521	Manley.Biggers@nashville.gov
David Cagle	Lipscomb University	966-7600	David.cagle@lipscomb.edu

2. Review of the Crosswalk and Revisions

Review of the plan crosswalk and discussions of revisions completed or in the process of being completed took place. There were no outstanding issues with the revisions or the crosswalk. The team decided to start meeting on Monday's in March 2010 for reviews associated with this plan. OEM will ensure invitations are sent out for the meetings. Progress of the remaining edits to the plan and the final draft plan will be shared with the CPT members.

3. Next Meeting

The next meeting will be scheduled for March 2010 to review the action items and any possible revisions necessary on the plan. This will occur every 6 months until the next revision cycle in 5 years.

(This page has been left blank intentionally.)

Advertisements referencing the Public Meeting are to follow.

METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY

Karl F. Dean
Mayor

Laura Hokenstad
Director

OFFICE OF EMERGENCY MANAGEMENT
2060 15TH AVENUE SOUTH
NASHVILLE, TENNESSEE 37212

FOR IMMEDIATE RELEASE
August 14, 2009

Contact: Amanda Sluss
(615) 880-2962 office
(615) 533-0978 cell
Amanda.Sluss@nashville.gov

PUBLIC NOTICE
METRO HOLDS MULTI-HAZARD PLAN PUBLIC MEETING

NASHVILLE, Tenn. – Metro government is holding a public input meeting for the revision of the Multi-Hazard Mitigation Plan, which the Metro Council, the state and the Federal Emergency Management Agency (FEMA) need to approve this fall. The meeting will be held Tuesday, September 15, 2009 from 6-7:30 p.m. at the East Police Precinct, located at 936 East Trinity Lane.

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 is available at the Public Library's Main branch, located at 615 Church Street, or online at www.nashville.gov/oem.

###

Figure A-3 Press Release announcing notice of public meeting

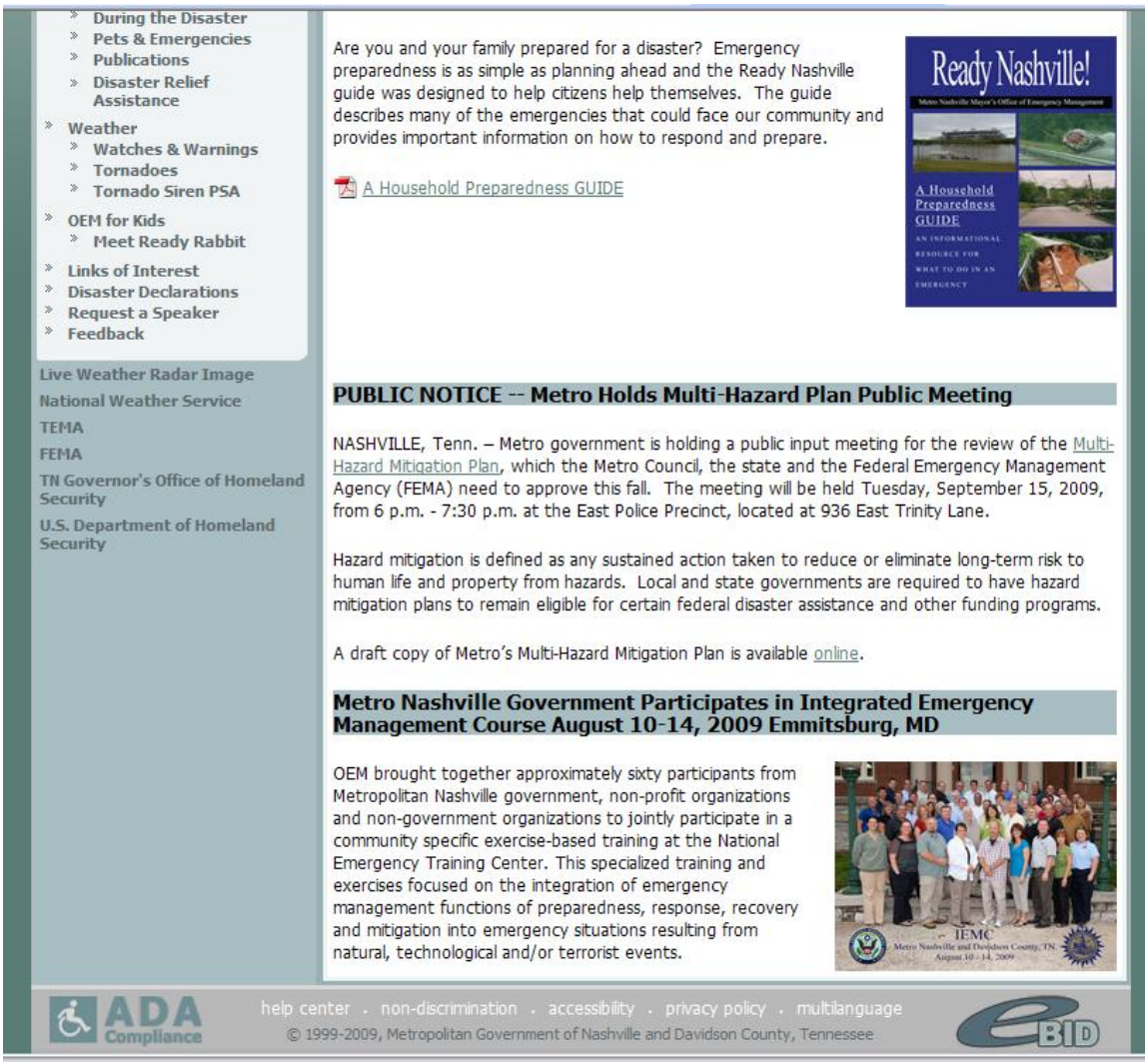
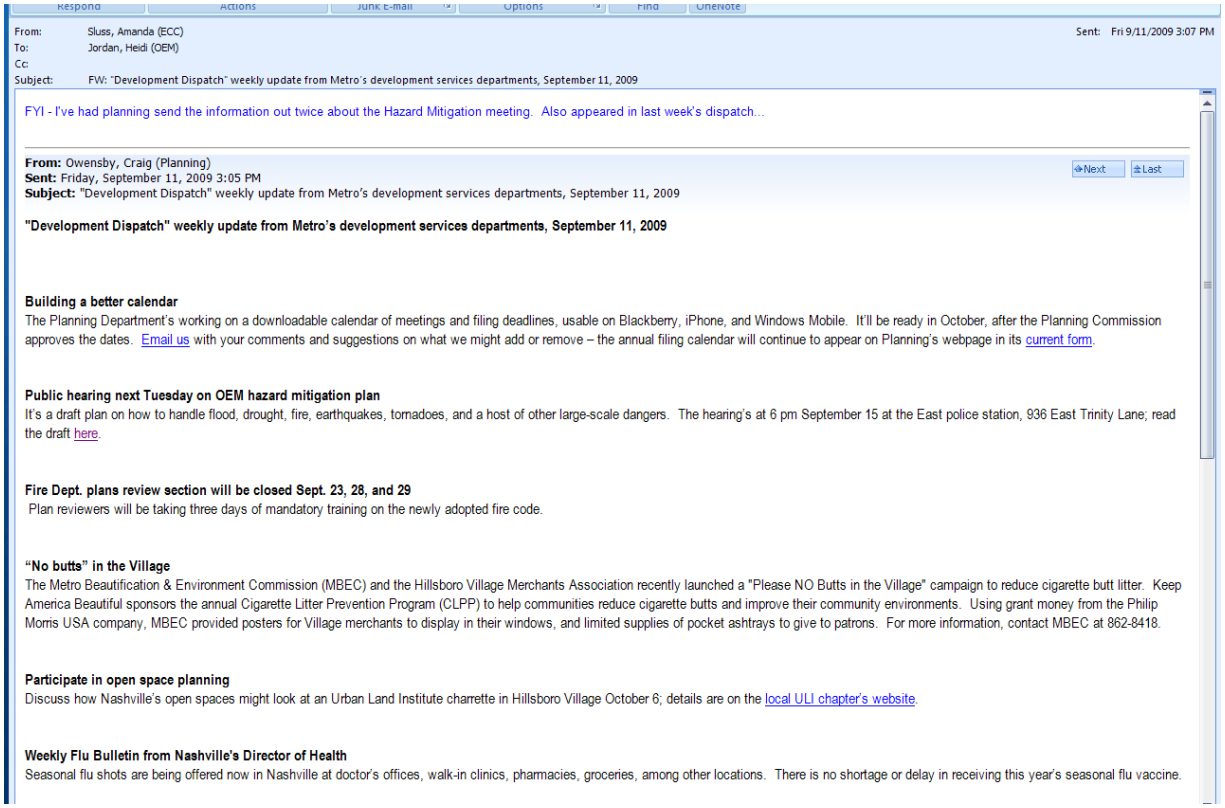


Figure A-4 Screen Shot of OEM's website www.nashville.gov/oem

Advertising Public Meeting



From: Sluss, Amanda (ECC)
To: Jordan, Heidi (OEM)
Cc:
Subject: FW: "Development Dispatch" weekly update from Metro's development services departments, September 11, 2009
Sent: Fri 9/11/2009 3:07 PM

FYI - I've had planning send the information out twice about the Hazard Mitigation meeting. Also appeared in last week's dispatch...

From: Owensby, Craig (Planning)
Sent: Friday, September 11, 2009 3:05 PM
Subject: "Development Dispatch" weekly update from Metro's development services departments, September 11, 2009

"Development Dispatch" weekly update from Metro's development services departments, September 11, 2009

Building a better calendar
The Planning Department's working on a downloadable calendar of meetings and filing deadlines, usable on Blackberry, iPhone, and Windows Mobile. It'll be ready in October, after the Planning Commission approves the dates. Email us with your comments and suggestions on what we might add or remove – the annual filing calendar will continue to appear on Planning's webpage in its current form.

Public hearing next Tuesday on OEM hazard mitigation plan
It's a draft plan on how to handle flood, drought, fire, earthquakes, tornadoes, and a host of other large-scale dangers. The hearing's at 6 pm September 15 at the East police station, 936 East Trinity Lane; read the draft here.

Fire Dept. plans review section will be closed Sept. 23, 28, and 29
Plan reviewers will be taking three days of mandatory training on the newly adopted fire code.

"No butts" in the Village
The Metro Beautification & Environment Commission (MBEC) and the Hillsboro Village Merchants Association recently launched a "Please NO Butts in the Village" campaign to reduce cigarette butt litter. Keep America Beautiful sponsors the annual Cigarette Litter Prevention Program (CLPP) to help communities reduce cigarette butts and improve their community environments. Using grant money from the Philip Morris USA company, MBEC provided posters for Village merchants to display in their windows, and limited supplies of pocket ashtrays to give to patrons. For more information, contact MBEC at 862-8418.

Participate in open space planning
Discuss how Nashville's open spaces might look at an Urban Land Institute charrette in Hillsboro Village October 6; details are on the local ULI chapter's website.

Weekly Flu Bulletin from Nashville's Director of Health
Seasonal flu shots are being offered now in Nashville at doctor's offices, walk-in clinics, pharmacies, groceries, among other locations. There is no shortage or delay in receiving this year's seasonal flu vaccine.

Figure A-5 Mass email sent out from the Planning Commission on 9/11/09

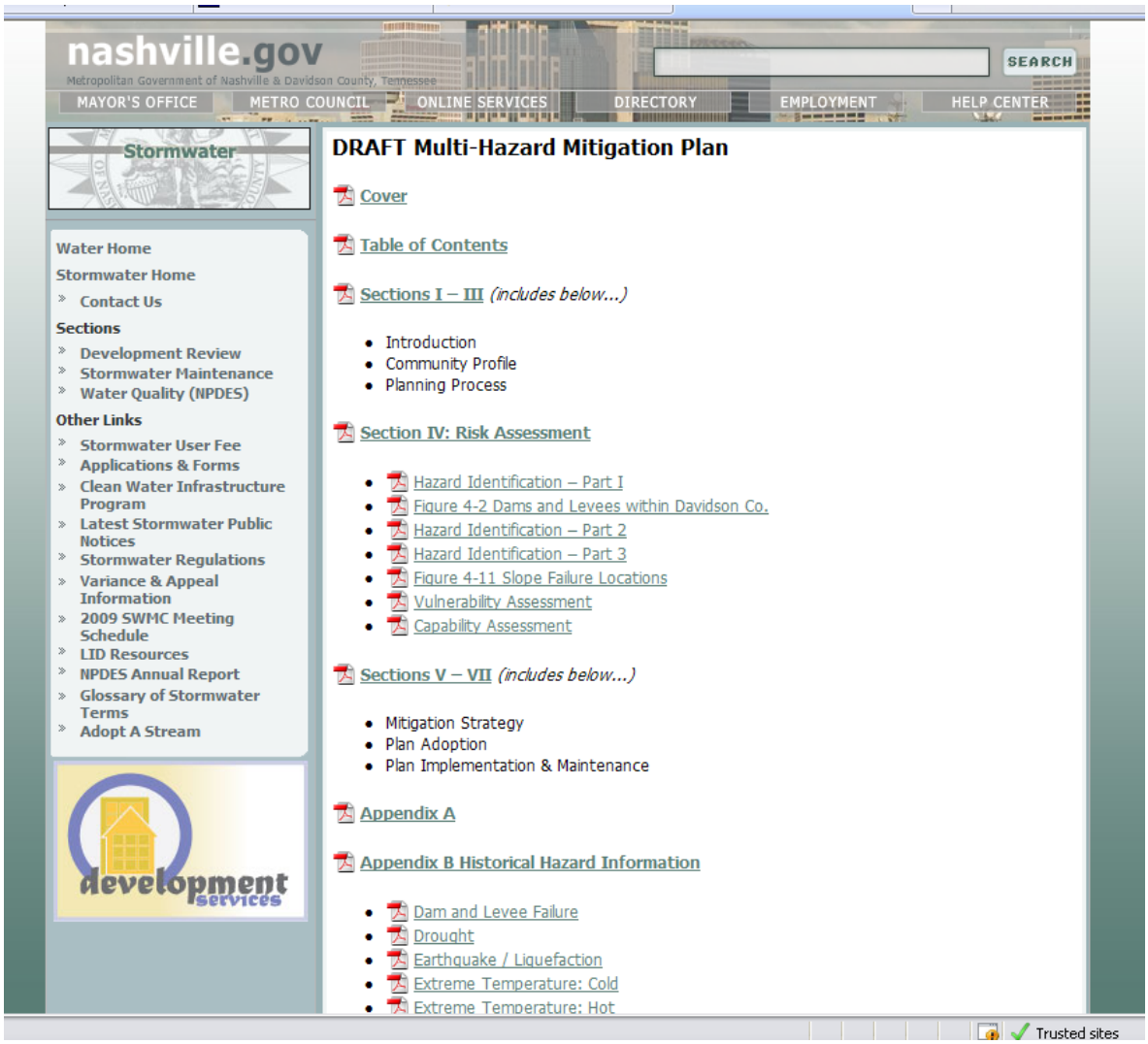


Figure A-6 Draft Multi-Hazard Mitigation Plan Available on Metro Water Services Website

(This page left blank intentionally.)

Metropolitan Nashville - Davidson County

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;
- Infestations;
- Manmade Hazards; and
- Severe Weather, which includes:
  - Droughts / Wildfires;
  - Extreme Temperatures;
  - Thunderstorms / High Winds;
  - Tornadoes; and
  - Winter Storms.

(This page has been left blank intentionally.)

No.	Location	Historical Event	Source of Information	Dam Failure-1
1	Nashville Eighth Avenue Reservoir Break	5-Nov-12	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	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.	
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.	
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	6:45 AM	Urban/sml Stream Fld	0	0	0	0	Street flooding at intersection of Ellington and McGavock Pike.	
24	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.	
25	Nashville	5-Mar-97	8:34 AM	Urban/sml Stream Fld	0	0	0	0	Street flooding at Davidson Road and Harding Road.	
26	Nashville	5-Mar-97	8:45 AM	Urban/sml Stream Fld	0	0	0	0	Street flooding at Tulip Grove Road and Chandler Road.	
27	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.	
28	Nashville	13-Jun-97	11:30 PM	Flash Flood	0	0	0	0	Several roads had high water.	
29	Whites Creek	30-Jun-97	3:50 PM	Flash Flood	0	0	0	0	A creek was out of its banks.	
30	Northeast Davidson County	30-Jun-97	4:00 PM	Flash Flood	0	0	0	0	Many streets were Flooded in northeast Davidson county.	
31	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.	
32	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.	
33	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.	
34	Hermitage	16-Apr-98	6:25 AM	Flash Flood	0	0	0	0	One half foot of water at Lebanon Road and Matterhorn Road.	
35	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.	

FLOODING-1

No.	Location	Historical Event	Time	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
36	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
37	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
38	Goodlettsville	10-Jun-98	10:30 AM	Flash Flood	0	0	0	0	Street Flooding was reported by the local EMA.	
39	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.	
40	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.	
41	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.	
42	Belle Meade	16-Feb-01	9:50 AM	Flood	0	0	0	0	Highway 100 flooded at Warner Park.	
43	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.	
44	Nashville	12-Aug-01	1:15 PM	Flash Flood	0	0	0	0	Two roads were covered with water and were impassable.	
45	Nashville	12-Aug-01	1:45 PM	Flash Flood	0	0	0	0	Flooding reported along Brown's Creek near Lipscomb University.	
46	Nashville	12-Aug-01	1:55 PM	Flash Flood	0	0	0	0	Street Flooding off Harding Place.	
47	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.	
48	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.	
49	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.	
50	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.	
51	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.	
52	Nashville	6-Jun-02	3:00 AM	Flash Flood	0	0	0	0	Several roads closed in Nashville due to high water.	
53	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.	
54	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
55	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
56	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.	
57	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.	
58	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.	
59	Nashville	30-Aug-03	5:40 PM	Flash Flood	0	0	0	0	Spotter reported street flooding near Vanderbilt Hospital.	
60	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.	
61	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.	
62	Nashville	30-May-04	10:50 PM	Flash Flood	0	0	1	0	Numerous flooding at Harding Place and Bellmeade Rd.	
63	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.	
64	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.	
65	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.	
66	Nashville	19-Oct-04	1:11 AM	Flash Flood	0	0	1	0	Harding and Hillwood Road flooded	
67	Nashville	19-Oct-04	1:12 AM	Flash Flood	0	0	5	0	Vehicles trapped in flooded road at Edmonson Pike and Blackman Rd.	
68	Nashville	19-Oct-04	1:36 AM	Flash Flood	0	0	5	0	Mill Creek was out of its banks and into nearby homes.	
69	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.	
70	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.	
71	Nashville	27-Jun-05	4:55 PM	Flash Flood	0	0	1	0	Street flooding reported at Eight Avenue and Lafayette Streets.	
72	Goodlettsville	22-Jan-06	9:30 PM	Flash Flood	0	0	1	0	Low water bridge at Hix Road was covered with water.	
73	Hermitage	31-May-06	4:50 PM	Flash Flood	0	0	1	0	I-40 westbound lanes in Hermitage was flooded over.	
74	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.	

FLOODING-2

No.	Location	Historical Event	Time	Type	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
75	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
76	Donelson	2-Apr-09	16:00 PM	Flash Flood	0	0	5	0	Street flash flooding was reported in Donelson.	
77	Goodlettsville	9-May-09	4:00 AM	Flash Flood	0	0	100	0	Several people were rescued from their homes.	

FLOODING-3

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.	Earthquake Information Bulletin, Volume 9, Number 2, March - April 1977.
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.	
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.	

EARTHQUAKES-1

No.	Date	Richter Magnitude	Associated Fault	Comment	Source of Information
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.	Earthquake Information Bulletin, Volume 9, Number 2, March - April 1977.
8	March 29, 1955	VI	New Madrid	An early morning shock (3:02 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.	
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

EARTHQUAKES-2

No.	Historical Event	Width (ft)	Length (ft)	Relief (ft)	Scarp (ft)	Material	Probable Cause	Damage	Comment	Source of Information
1	Winter 1975	138	125	38	7	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.
		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		
		162	105	47	9	colluvium		minor		
		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				
2	Bellevue 1979					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			
						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

West Nile Virus	Location	Year	Positive Cases	Comment	Source of Information
1	Davidson County	2001	No Data - Human 0 - Bird 0 - Veterinary No Data - Mosquito		United States Geological Survey http://westnilemaps.usgs.gov/
2	Davidson County	2002	1 - Human 138 - Bird 2 - Veterinary 0 - Mosquito		
3	Davidson County	2003	1 - Human 3 - Bird 1 - Veterinary 25 - Mosquito		
4	Davidson County	2004	0 - Human 1 - Bird 1 - Veterinary 5 - Mosquito	http://westnilemaps.usgs.gov/	United States Geological Survey http://westnilemaps.usgs.gov
5	Davidson County	2005	0 - Human 0 - Bird 0 - Veterinary 3 - Mosquito		United States Geological Survey http://westnilemaps.usgs.gov
6	Davidson County	2006	1 - Human 0 - Bird 0 - Veterinary 21 - Mosquito		United States Geological Survey http://westnilemaps.usgs.gov/
7	Davidson County	2007	1 - Human 0 - Bird 0 - Veterinary 1 - Mosquito		United States Geological Survey http://westnilemaps.usgs.gov/
			Type of Infestation		
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	

INFESTATIONS-1

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		

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	2002	Not listed for Tennessee	U.S. Fish and Wildlife Service http://fire.fws.gov/fm/stats/stats.htm
17	Statewide	2002	Not listed for Tennessee	National Interagency Fire Center http://www.nifc.gov/fireinfo/nfnmap.html
18	Statewide	2003	1089 fires, 7110 acres burned	Tennessee Department of Agriculture http://www.state.tn.us/agriculture/forestry/fires/statistics.html
19	Statewide	2004	1565 fires, 14,513 acres burned	TN Dept of Agricutlture, Division of Forestry, http://burnsafetn.org/pdfs/summary.pdf
20	Statewide	2005	2,073 fires, 24,744 acres burned	
21	Statewide	2006	2,198 fires, 30,800 acres burned	
22	Statewide	2007	3,000 fires, 44,126 acres burned	
23	Statewide	2008	1,290 fires, 18,068 acres burned	
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 state's request for federal fire suppression aid was approved last night 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

WILDFIRES-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) Allen P. Coggins, 1993
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.	
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.	
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.	

EXTREME COLD 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
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.	
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	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	1-May-63		34 Low	Cold	0	0	0	0	Temperature at Nashville dropped to 34, setting a record low for the month	
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.	

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
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.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
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
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.	
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

EXTREME COLD 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
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.	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	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.	
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.	
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).	
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						Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1989
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.	

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
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.	
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.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
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.	
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.	
38	Nashville	27-Dec-82		75 High	Hot	0	0	0	0	Middle Tennessee experienced record warmth, as Nashville's high reached 75 degrees.	
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.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
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 -- the 9th in the last	
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.	

EXTREME HOT TEMPERATURES-2

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.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
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; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
15	Nashville	23-Mar-01		wind			0	0	0	0	Wind gust of 58 mph is recorded at Nashville.	
16	Nashville	28-Sep-06		rain		2.6	0	0	0	0	Nashville culminates its second-wettest September ever with 2.60" of rainfall	
17	Nashville	17-Nov-06		rain		3.17	0	0	0	0	Nashville measures 3.17" of rainfall.	
18	Nashville	23-Feb-09		rain		3.69	0	0	0	0	Nashville measures 3.69" of rain.	
19	Nashville	21-Sep-09		wind			0	0	0	0	Wind gust of 60 mph is recorded at Nashville.	
20	Nashville	24-Jun-10		wind			0	0	0	0	Wind gust of 60 mph is recorded at Nashville.	
21	Nashville	6-Oct-10		rain		2.41	0	0	0	0	Nashville is hit with 2.41" of rain.	
22	Nashville	4-Apr-11		wind			0	0	0	0	Wind gust of 62 mph is recorded at Nashville.	
23	Nashville	25-Jun-11		rain		3.79	0	0	0	0	Nashville sees a remarkable 3.79" of rainfall.	
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.	
25	Nashville	26-Dec-11		rain		4.06	0	0	0	0	Nashville measures 4.06" of rainfall.	
26	Nashville	5-Jun-14		wind			0	0	0	0	Wind gust of 65 mph is recorded at Nashville.	
27	Nashville	17-Dec-15		rain		2.72	0	0	0	0	Nashville records 2.72" of rainfall.	
28	Nashville	1-Aug-16		rain		2.58	0	0	0	0	Nashville measures 2.58" of rain.	
29	Nashville	27-Jan-18		rain		2.88	0	0	0	0	Nashville measures 2.88" of rain.	
30	Nashville	26-Oct-20		rain		2.08	0	0	0	0	Nashville gets soaked with 2.08" of rain.	
31	Nashville	19-Jul-21		rain		4.02	0	0	0	0	Nashville records greatest one-day rainfall for July, with 4.02".	
32	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. Coggins, 1988
33	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
34	Nashville	27-Jun-23		wind			0	0	0	0	Wind gust of 62 mph is recorded at Nashville.	
35	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.	
36	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.	
37	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".	
38	Nashville	17-Oct-28		rain		3.18	0	0	0	0	Nashville records its greatest one-day rainfall for October, with 3.18".	
39	Nashville	21-Oct-29		rain		2.14	0	0	0	0	Nashville is drenched with 2.14" of rain.	
40	Nashville	14-Aug-30		rain		3.98	0	0	0	0	Nashville gets 3.98" of rainfall.	
41	Nashville	16-Oct-32		rain		2.98	0	0	0	0	A wet day for Nashvillians, as 2.98" of rain is measured.	
42	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
43	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
44	Nashville	14-Dec-51		rain		2.91	0	0	0	0	Nashville gets soaked with 2.91" of rainfall.	
45	Nashville	13-Jun-53		wind			0	0	0	0	Wind gust of 61 mph is recorded at Nashville.	
46	Nashville	22-Mar-55		rain			0	0	0	0	Nashville measures precipitation for the 11th consecutive day, setting a record.	
47	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
48	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
49	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 / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
50	Davidson County	18-Nov-57	2:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
51	Davidson County	5-Apr-58	6:30 PM	tstm wind	0 kts.		0	0	0	0	None Reported	

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
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".	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
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 / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
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	
72	Davidson County	26-May-65	10:35 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
73	Davidson County	2-Jul-65	9:22 PM	tstm wind	53 kts.		0	0	0	0	None Reported	
74	Davidson County	27-Aug-65	3:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
75	Davidson County	26-Nov-65	11:03 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
76	Nashville	12-Apr-66		hail			0	0	0	0	Three-inch 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
77	Davidson County	12-Apr-66	7:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
78	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
79	Davidson County	5-Jul-66	4:30 PM	tstm wind	59 kts.		0	0	0	0	None Reported	
80	Davidson County	7-Jul-66	2:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
81	Davidson County	7-Jul-66	2:05 PM	tstm wind	60 kts.		0	0	0	0	None Reported	
82	Davidson County	10-Jul-66	11:15 PM	tstm wind	50 kts.		0	0	0	0	None Reported	
83	Davidson County	15-Jul-66	12:00 AM	tstm wind	50 kts.		0	0	0	0	None Reported	
84	Davidson County	6-Mar-67	4:05 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
85	Davidson County	22-Nov-67	1:30 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
86	Davidson County	1-Jul-68	10:45 PM	tstm wind	70 kts.		0	0	0	0	None Reported	
87	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
88	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
89	Davidson County	3-Jul-70	8:05 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
90	Davidson County	3-Aug-70	6:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
91	Davidson County	27-Jun-71	4:20 PM	tstm wind	50 kts.		0	0	0	0	None Reported	
92	Nashville	7-Apr-72		wind			0	0	0	0	Wind gust of 63 mph is recorded at Nashville.	
93	Davidson County	7-Apr-72	5:17 PM	tstm wind	63 kts.		0	0	0	0	None Reported	
94	Davidson County	28-Jun-72	4:20 AM	tstm wind	0 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
95	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 http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
96	Davidson County	12-Aug-72	12:00 PM	Tstm Wind	0 kts.		0	0	0	0	None Reported	
97	Davidson County	12-Aug-72	12:15 PM	Tstm Wind	65 kts.		0	0	0	0	None Reported	
98	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
99	Davidson County	10-Jul-73	2:00 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
100	Davidson County	30-Aug-73	2:20 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
101	Davidson County	4-Mar-74	6:35 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
102	Nashville	1-Apr-74		wind			0	0	0	0	Wind gust of 82 mph is recorded at Nashville -- the fastest known wind gust ever recorded in the city.	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
103	Davidson County	1-Apr-74	7:15 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
104	Davidson County	1-Apr-74	7:20 PM	tstm wind	82 kts.		0	0	0	0	None Reported	
105	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
106	Davidson County	13-Jan-76	3:04 PM	tstm wind	57 kts.	4.66	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
107	Davidson County	17-Jul-77	5:54 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
108	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; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
109	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").	
110	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
111	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
112	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
113	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 http://www.srh.noaa.gov/ohx/climate/calendar.htm
114	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").	
115	Davidson County	10-Jun-81	3:00 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
116	Davidson County	10-Jun-81	3:23 PM	tstm wind	51 kts.		0	0	0	0	None Reported	
117	Davidson County	25-Jun-81	2:42 PM	tstm wind	50 kts.		0	0	0	0	None Reported	
118	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
119	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 / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
120	Davidson County	11-Aug-83	5:19 PM	tstm wind	50 kts.		0	0	0	0	None Reported	
121	Davidson County	23-Aug-83	6:00 PM	tstm wind	52 kts.		0	0	0	0	None Reported	
122	Davidson County	15-Mar-84	11:50 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
123	Davidson County	28-Apr-84	6:00 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
124	Davidson County	7-May-84	2:00 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
125	Davidson County	7-May-84	2:00 PM	tstm wind	54 kts.		0	0	0	0	None Reported	
126	Davidson County	4-Jul-84	2:55 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
127	Davidson County	3-Sep-84	9:30 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
128	Davidson County	27-Nov-84	10:30 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
129	Davidson County	31-May-85	6:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
130	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
131	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
132	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; Calendar of Significant Weather Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
133	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
134	Davidson County	27-Nov-85	5:15 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
135	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
136	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
137	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-win/wwcgi.dll?wwevent~storms
138	Davidson County	18-Mar-87	3:58 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
139	Davidson County	24-Jun-87	3:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
140	Davidson County	13-Jul-87	1:30 PM	tstm wind	0 kts.		0	1	0	0	None Reported	
141	Davidson County	23-Jul-87	2:15 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
142	Davidson County	9-May-88	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
143	Davidson County	26-Jun-88	3:15 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
144	Davidson County	20-May-89	3:00 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
145	Nashville	29-Aug-90		wind			0	0	0	0	Wind gust of 70 mph is recorded at Nashville	
146	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
147	Davidson County	11-Sep-90	6:30 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
148	Davidson County	4-Oct-90	2:00 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
149	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
150	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
151	Davidson County	22-Mar-91	7:10 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
152	Davidson County	27-Mar-91	4:15 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
153	Davidson County	27-Mar-91	4:30 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
154	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
155	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
156	Davidson County	9-Apr-91	12:16 PM	tstm wind	0 kts.		0	4	0	0	None Reported	
157	Davidson County	21-Jun-91	5:00 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
158	Davidson County	2-Jul-91	4:10 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
159	Davidson County	8-Jul-91	9:00 PM	tstm wind	0 kts.		0	1	0	0	None Reported	
160	Davidson County	10-Jul-91	3:45 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
161	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
162	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
163	Davidson County	3-Jul-92	2:50 AM	tstm wind	0 kts.		0	0	0	0	None Reported	
164	Davidson County	16-Jul-92	8:15 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
165	Davidson County	27-Aug-92	5:00 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
166	Davidson County	27-Aug-92	6:15 PM	tstm wind	0 kts.		0	0	0	0	None Reported	
167	Southeast Davidson County	21-Feb-93	1:30 PM	tstm wind	N/A		0	0	1	0	A few trees were blown down.	
168	Davidson County	4-Mar-93	10:30 PM	tstm wind	51 kts.		0	0	0	0	None Reported	
169	Donelson	31-Mar-93	3:20 PM	tstm wind	N/A		0	0	1	0	A few trees were knocked down.	
170	Nashville	6-May-93	6:00 PM	tstm wind	N/A		0	0	1	0	A few trees were knocked down.	
171	West Nashville	25-Aug-93	2:38 PM	tstm wind	N/A		0	0	1	0	Some trees 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
172	Lakewood	3-Sep-93	2:45 PM	tstm wind	N/A		0	0	1	0	Some trees and power lines were blown down.	
174	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	
175	Nashville	27-Apr-94	9:00 AM	tstm wind	N/A		0	0	5	0	A few trees and power lines were blown down.	
176	Goodlettsville	29-Apr-94	1:45 PM	tstm wind	N/A		0	0	1	0	A few trees were blown down	
177	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.	
178	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.	
179	Southern Davidson County	25-Jun-94	3:30 PM	tstm wind	N/A		0	0	1	0	A few power lines were blown down.	
180	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 down as well.	
181	Nashville	23-Sep-94		rain		2.86	0	0	0	0	Nashville measures 2.86" of rainfall.	
182	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.	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
183	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
184	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.	
185	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.	
186	Southeastern Davidson County	18-May-95	6:25 PM	tstm wind	N/A		0	0	2	0	A few trees were knocked down.	
187	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 Events in Middle TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
188	Nashville	7-Jun-95	7:00 PM	tstm wind	N/A		0	0	2	0	Some trees were blown down.	
189	Nashville	4-Jul-95		wind			0	0	0	0	Wind gust of 58 mph is recorded at Nashville.	
190	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
191	Nashville	22-Jul-95	2:40 PM	tstm wind	N/A		0	0	2	0	Several power lines were blown down.	
192	Hermitage	22-Jul-95	2:55 PM	tstm wind	N/A		0	0	2	0	A couple of trees were blown down.	
193	Nashville	8-Aug-95	12:40 PM	tstm wind	N/A		0	0	0	0	Tennessee Highway Patrol reported a couple of trees down.	
194	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.	
195	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.	
196	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.	
197	Joelton	3-Jun-96	6:25 PM	tstm wind	50 kts.		0	0	0	0	Power lines and trees were blown down.	
198	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.	
199	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.	
200	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.	
201	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.	
202	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.	
203	Nashville	21-Jul-96	6:05 PM	tstm wind	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.	
204	Hermitage	21-Jul-96	6:12 PM	tstm wind	50 kts.		0	0	0	0	Numerous trees and power lines down.	
205	Madison	21-Jul-96	6:12 PM	tstm wind	50 kts.		0	0	0	0	Numerous trees and power lines blown down.	
206	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.	
207	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.	
208	Antioch	27-Sep-96	6:10 AM	tstm wind	50 kts.		0	0	0	0	Power company reported tree limbs down on power lines.	
209	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.	
210	Nashville	7-Nov-96	1:40 PM	tstm wind	50 kts.		0	0	1	0	Numerous trees and power lines were down.	
211	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.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
212	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.	
213	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.	
214	Antioch	5-Mar-97	6:14 AM	tstm wind	50 kts.		0	0	0	0	Large tree limbs were blown down.	
215	Nashville	5-Mar-97	6:28 AM	tstm wind	50 kts.		0	0	0	0	Large tree limb was down at downtown Nashville.	
216	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.	
217	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.	
218	Bellevue	26-May-97	10:20 AM	tstm wind	50 kts.		0	0	0	0	A few trees were blown down.	
219	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.	
220	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.	
221	Goodlettsville	4-Jul-97	4:10 AM	tstm wind	0 kts.		0	0	1	0	Trees down over the road	
222	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.	
223	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.	
224	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.	

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	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
226	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 Stones River on the north side of Interstate 40.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
227	Inglewood	8-Mar-98	5:10 PM	tstm wind	50 kts.		0	0	0	0	Large tree limbs were blown down.	
228	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 http://www.srh.noaa.gov/ohx/climate/calendar.htm
229	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
230	Donelson	8-Apr-98	2:15 AM	tstm wind	50 kts.		0	0	0	0	Local law enforcement reported trees and powerlines down.	
231	Donelson	8-Apr-98	11:48 AM	tstm wind	60 kts.		0	0	0	0	Local law enforcement reported 2 trees blown down.	
232	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.	
233	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 http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
234	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.	
235	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.	
236	Inglewood	4-Jun-98	6:20 AM	tstm wind	50 kts.		0	0	0	0	8 inch diameter wide branch snapped off a tree.	
237	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.	
238	Goodlettsville	10-Jun-98	8:30 AM	tstm wind	50 kts.		0	0	0	0	Trees were blown down.	
239	Nashville	10-Jun-98	9:46 AM	tstm wind	50 kts.		0	0	0	0	EMA reported trees and power lines down.	
240	Nashville	10-Jun-98	10:02 AM	tstm wind	0 kts.		0	0	5	0	Tree fell on a house.	
241	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.	
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	Northeast 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 http://www.srh.noaa.gov/ohx/climate/calendar.htm
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 Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
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.	
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.	
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.	
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.	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
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.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
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 fell on cars.	
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 Nashville.	
284	Goodlettsville	28-Jul-01	3:39 PM	tstm wind	50 kts.		0	0	0	0	Metro EOC reported power lines down.	
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.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
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.	
299	Southeast Davidson County	2-Jul-02	1:25 PM	tstm wind	50 kts.		0	0	0	0	TV-2 reported numerous trees down on Nolensville Rd.	
300	Nashville	2-Jul-02	11:30 PM	tstm wind	50 kts.		0	0	0	0	Trees and pwer lines were down in the Bordeaux area.	
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.	
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.	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
309	Nashville	1-May-03	2:45 PM	tstm wind	55 kts.		0	0	0	0	Numerous 3 to 8 inch diameter trees down.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
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 thunderstorms which began on Sunday , May 4, 2003.	
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.	
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.	
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 http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
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 30 boats were overturned and part of the Elm Hill Marina was destroyed. 4 people were injured, and 2 of them had to be hospitalized. The storms struck during a fishing tournament.	
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.	
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.	
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.	
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.	
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.	

No.	Location	Historical Event	Time	Type	Magnitude (knots)	Precipitation (in.)	Death (#)	Injury (#)	Property Damage	Crop Damage	Comment	Source of Information
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.	

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 TN http://www.srh.noaa.gov/ohx/climate/calendar.htm
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 http://www.srh.noaa.gov/ohx/climate/calendar.htm
	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

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
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 surrounding country. It moved eastwardly across the Dickerson and Gallatin pikes, through the village of Edenwold, across the Cumberland River into the Powder Plant, and on into the southern part of Sumner County, where it spent its force. The length of the path was about 10 miles. Its width varied from 50 to 200 yards, being determined to some extent, no doubt, by the rolling character of the country. Fortunately, it passed mostly through open country and not much timber was destroyed. A few large trees were in the path, some being uprooted, others twisted into shreds, while still others were carried away entirely leaving only a portion of the trunk standing. The storm crossed the Dickerson Pike near Lowe's Store, about three miles south of Goodlettsville. Here one residence and five barns were damaged to the extent of about $2,500. A house a mile or so east of this pike was partly wrecked and a portion of the roof dropped into a yard near Edenwold, more than a mile away. From that point the destruction was of little consequence until it struck a large handsome residence a little east of the Gallatin Pike, tearing a gaping hole in the roof and wrenching off and carrying away a two-story veranda extending a distance of 125 feet along two sides of the house. The village of Edenwold, next in its path, suffered severely, several residences, two stores, and the schoolhouse being completely demolished and other buildings partly so. Six persons were injured at this point, one seriously, but, strange to say, no lives were lost. In one instance, there was nothing left of an eight-room cottage except the floor, and yet the occupants, a mother and two daughters, received only slight injuries. A man was buried beneath a pile of brick and debris as the roof of another house collapsed, but escaped with only cuts about the head. One house clearly showed the effect of the sudden expansion of the air within. The roof was entirely gone and two of the walls were flat on the ground, as if pushed outward, while the remaining walls were unharmed. The loss from the storm in the vicinity of Edenwold was probably not less than $35,000, at least half of which was suffered by the large mansion, mentioned above. The storm turned slightly outheastward from Edenwold and after crossing a mile or two of open country it devastated an area of the U. S. Government Powder Plant (Old Hickory), wrecking seven iron buildings, either partially or totally, the estimated loss being $25,000. Fortunately, the government stores, consisting of smokeless powder, were not damaged by water as they are contained in water-proof boxes. Had the storm taken a different course through the reservation the loss might have been tremendous, in as much as the buildings are compactly arranged and represent a total outlay of more than $50,000,000. After leaving the powder plant the storm crossed the river again and continued somewhat southeastward into Sumner County, where it is reported that any trees were uprooted.	
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	
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	
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

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
24 cont.	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; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
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
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 http://www.srh.noaa.gov/ohx/tornado/davidson.htm
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	
32	Davidson County	10-Apr-73	12:45 PM	Tornado	F1	0	0		3K	0	Near Madison	
33	Davidson County	1-Apr-74	7:10 PM	Tornado	F2	1	12	12	3K	0	From Belle Meade to Nashville airport	
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.	National Weather Service Forecast Office; Nashville, TN; Tornado Database http://www.srh.noaa.gov/ohx/tornado/davidson.htm
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.	

TORNADOES-3

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
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
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 across the runway, closing the airport for several hours. A total of 6 tornadoes strike, the 9th largest tornado outbreak in mid state history.	
	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 Airpor	24-May-00	10:58 PM	Tornado	F1	0	0	0.8	20K	0	Trees blown down on Belmont and Caldwell Ave.	
46	Nashville Metro Airpor	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 Airpor	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.	

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
50	Nashville	15-Nov-05		Tornado	F0	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	F3	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	F0	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.	
53	Nashville	2-Apr-09		Tornado	F1	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.	

TORNADOES-5

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.	
26	Nashville	16-Jan-48		snow	7.0	0	0	0	0	Nashville receives 7" of snow.	
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 http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
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	

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
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 http://www.srh.noaa.gov/ohx/climate/calendar.htm
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
43	Davidson County	10-Jan-63	9:00 PM	hail	0.8	0	0	0	0	None Reported	
44	Davidson County	10-Jan-63	11:35 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
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	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN
46	Davidson County	7-Jul-63	10:30 AM	hail	0.8	0	0	0	0	None Reported	
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	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
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
51	Davidson County	12-Apr-66	6:15 PM	hail	1.0	0	0	0	0	None Reported	
52	Davidson County	12-Apr-66	7:05 PM	hail	3.0	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
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
54	Davidson County	23-Apr-67	1:10 PM	hail	0.8	0	0	0	0	None Reported	
55	Davidson County	19-May-67	4:30 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
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
57	Davidson County	23-Apr-68	12:15 PM	hail	1.8	0	0	0	0	None Reported	
58	Davidson County	21-Apr-69	9:35 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
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
62	Davidson County	27-Apr-71	7:35 PM	hail	1.0	0	0	0	0	None Reported	
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	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
65	Davidson County	10-May-73	12:45 PM	hail	1.0	0	0	0	0	None Reported	
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	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
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
74	Davidson County	4-Jun-85	4:10 PM	hail	4.5	0	0	0	0	None Reported	
75	Davidson County	4-Jun-85	4:25 PM	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
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
78	Davidson County	2-Aug-88	2:15 PM	hail	0.8	0	0	0	0	None Reported	
79	Davidson County	6-May-89	4:40 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-win/wwcgi.dll?wwevent~storms
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
82	Hermitage	15-Apr-93	1:30 PM	hail	1.3	0	0	0K	0	Ping-Pong ball-size hail was reported	
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.	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
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	National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN
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	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 power lines fell as well.	
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,	
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	
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.	

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
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 / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
98	Nashville	29-Apr-96	2:25 PM	hail	0.8	0	0	0	0	Dime size hail reported at Long Hunter State Park.	
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	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
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.	

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage (in $1000)	Crop Damage (in $1000)	Comment	Source of Information
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.	
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	
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 2-3 SPRINGFIELD 3-4 LIVINGSTON 2-3 CENTERVILLE	
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.	
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.	

National Climatic Data Center
NCDC / Climate Resources / Climate Data / Events / Storm Events
http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

No.	Location	Historical Event	Time	Type	Magnitude (inches)	Death (#)	Injury (#)	Property Damage	Crop Damage	Comment	Source of Information
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	National Climatic Data Center NCDC / Climate Resources / Climate Data / Events / Storm Events http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms
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	
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.	
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.	

WINTER STORMS-6

Metropolitan Nashville - Davidson County

Multi-Hazard Mitigation Plan

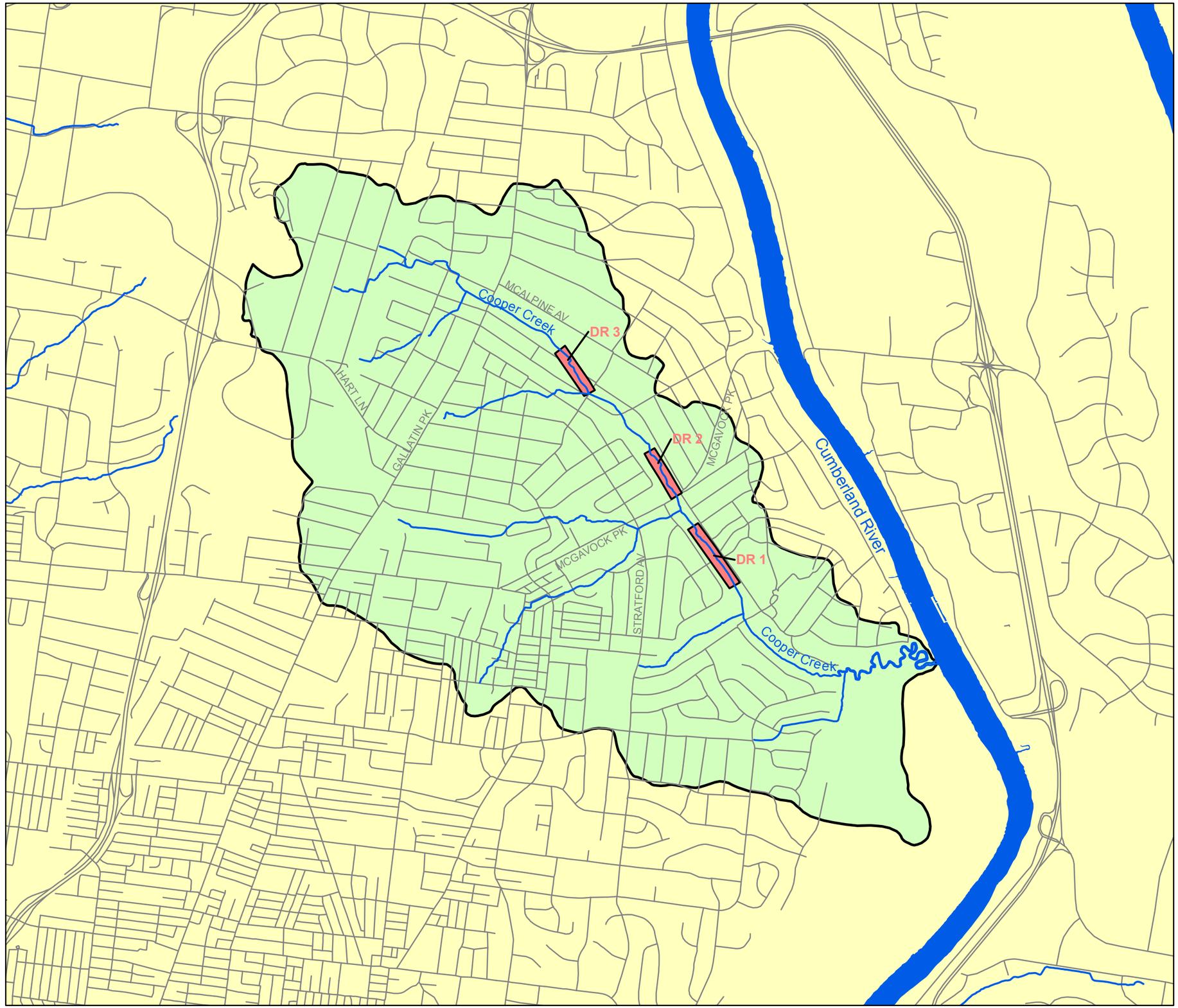
APPENDIX C

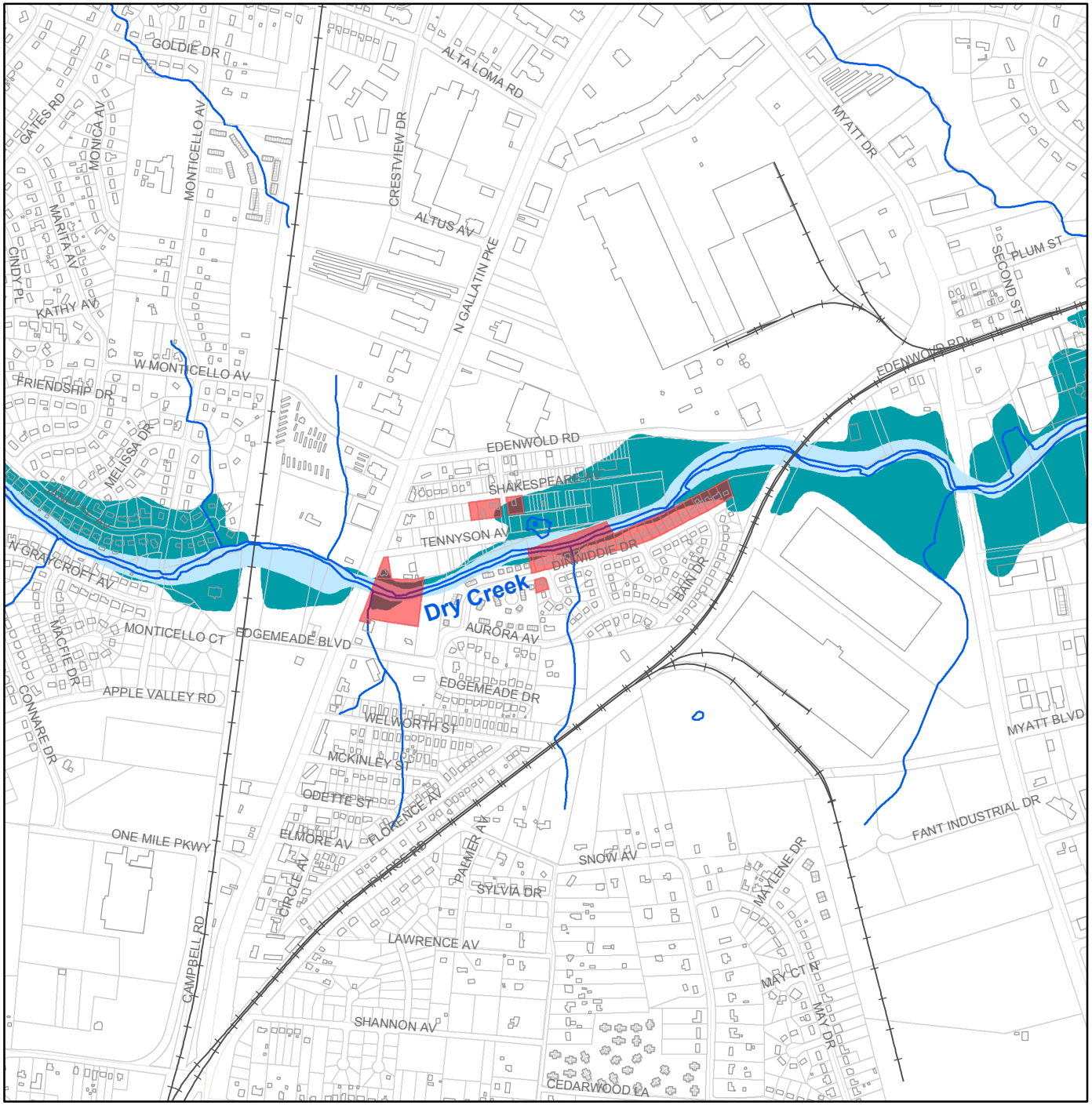
This appendix contains location maps of the damage reaches and repetitive loss areas identified and investigated in the Metropolitan Nashville-Davidson County area located on the following streams:

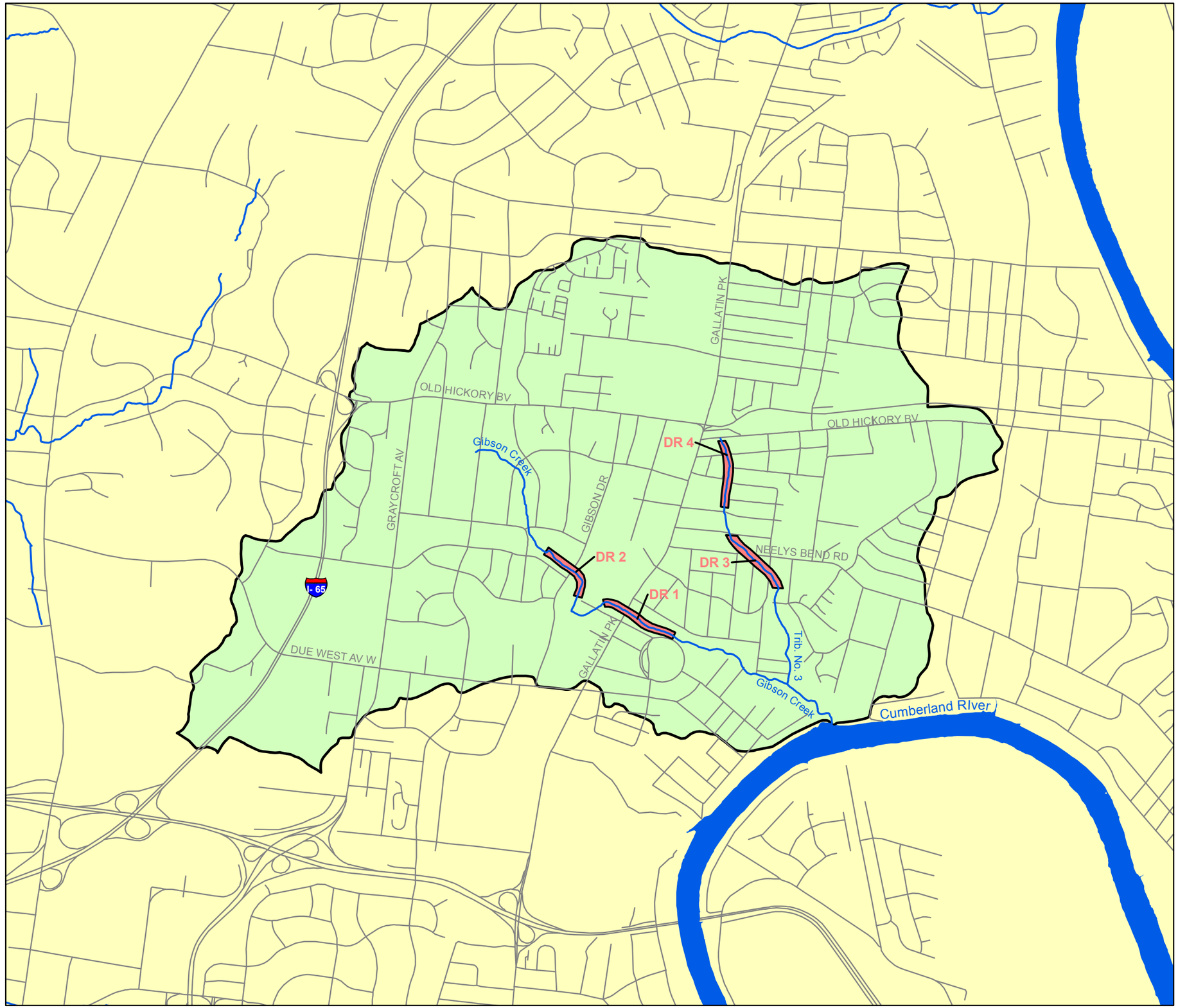
Watershed Index Map

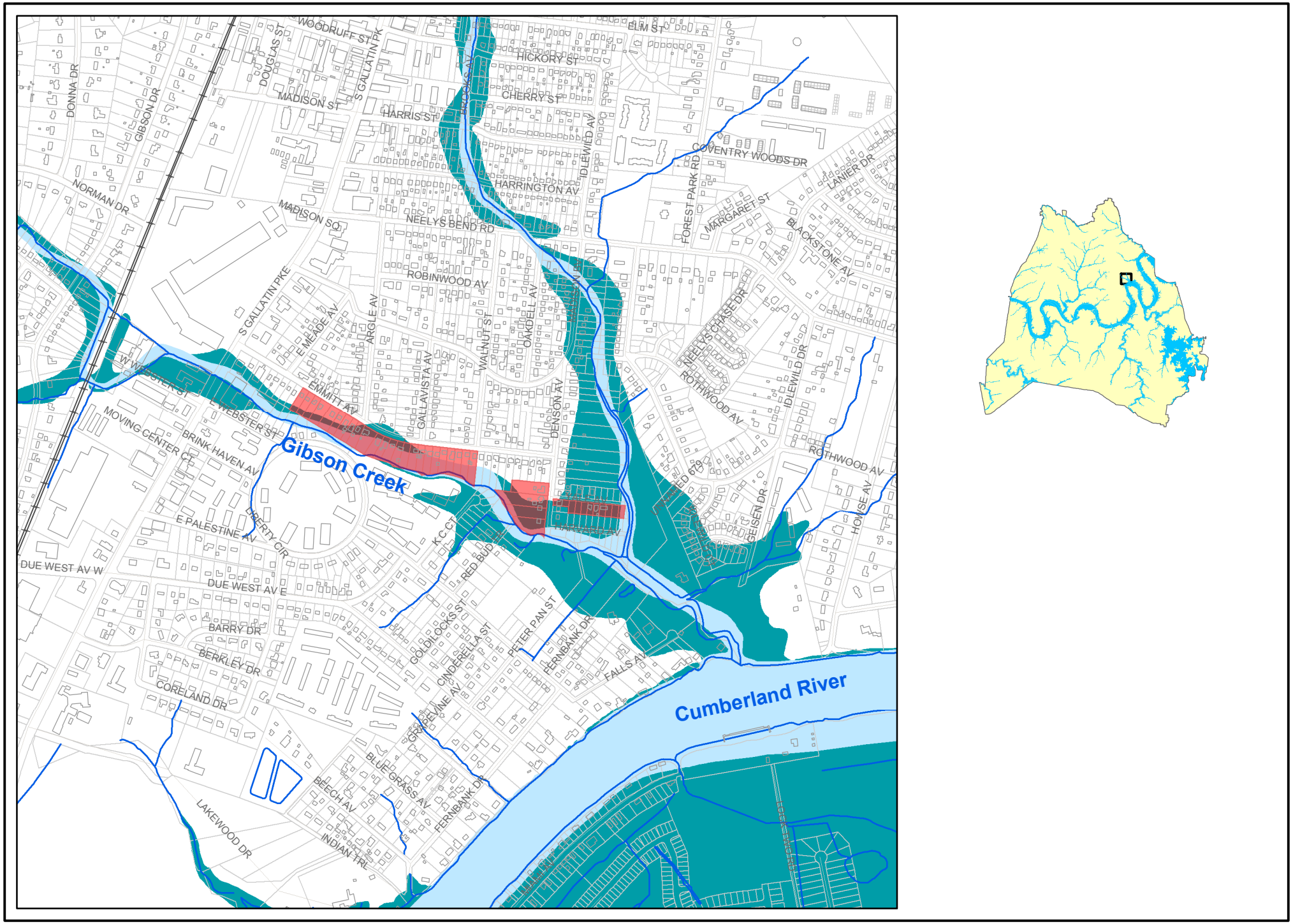
Figure C.1a	Browns Creek Damage Reach Map
Figure C.1b	Browns Creek Repetitive Loss Area Map
Figure C.1c	West Fork/Middle Fork Browns Creek Repetitive Loss Area Map
Figure C.2	Cooper Creek Damage Reach Map
Figure C.3	Dry Creek Repetitive Loss Area Map
Figure C.4a	Gibson Creek Damage Reach Map
Figure C.4b	Gibson Creek Repetitive Loss Area Map
Figure C.5	Buffalo Creek Repetitive Loss Area Map
Figure C.6a	Mill Creek Damage Reach Map
Figure C.6b	Mill Creek Repetitive Loss Area Map
Figure C.7a	Seven-Mile Creek Damage Reach Map
Figure C.7b	Seven-Mile Creek Repetitive Loss Area Map
Figure C.8	Mill Creek-Sorghum Branch Damage Reach Map
Figure C.9a	Whittemore Branch Damage Reach Map
Figure C.9b	Whittemore Branch Repetitive Loss Area Map
Figure C.10	Pages Branch Damage Reach Map
Figure C.11	Richland Creek Damage Reach Map
Figure C.12	Sugartree Creek Repetitive Loss Area Map
Figure C.13	Stones River-East Fork Hamilton Creek Damage Reach Map
Figure C.14a	McCrory Creek Damage Reach Map
Figure C.14b	McCrory Creek Repetitive Loss Area Map
Figure C. 15	Stones River-Scotts Creek Damage Reach Map
Figure C.16a	Whites Creek Damage Reach Map
Figure C.16b	Whites Creek Repetitive Loss Area Map
Figure C.17	Cumberland River Repetitive Loss Area Map

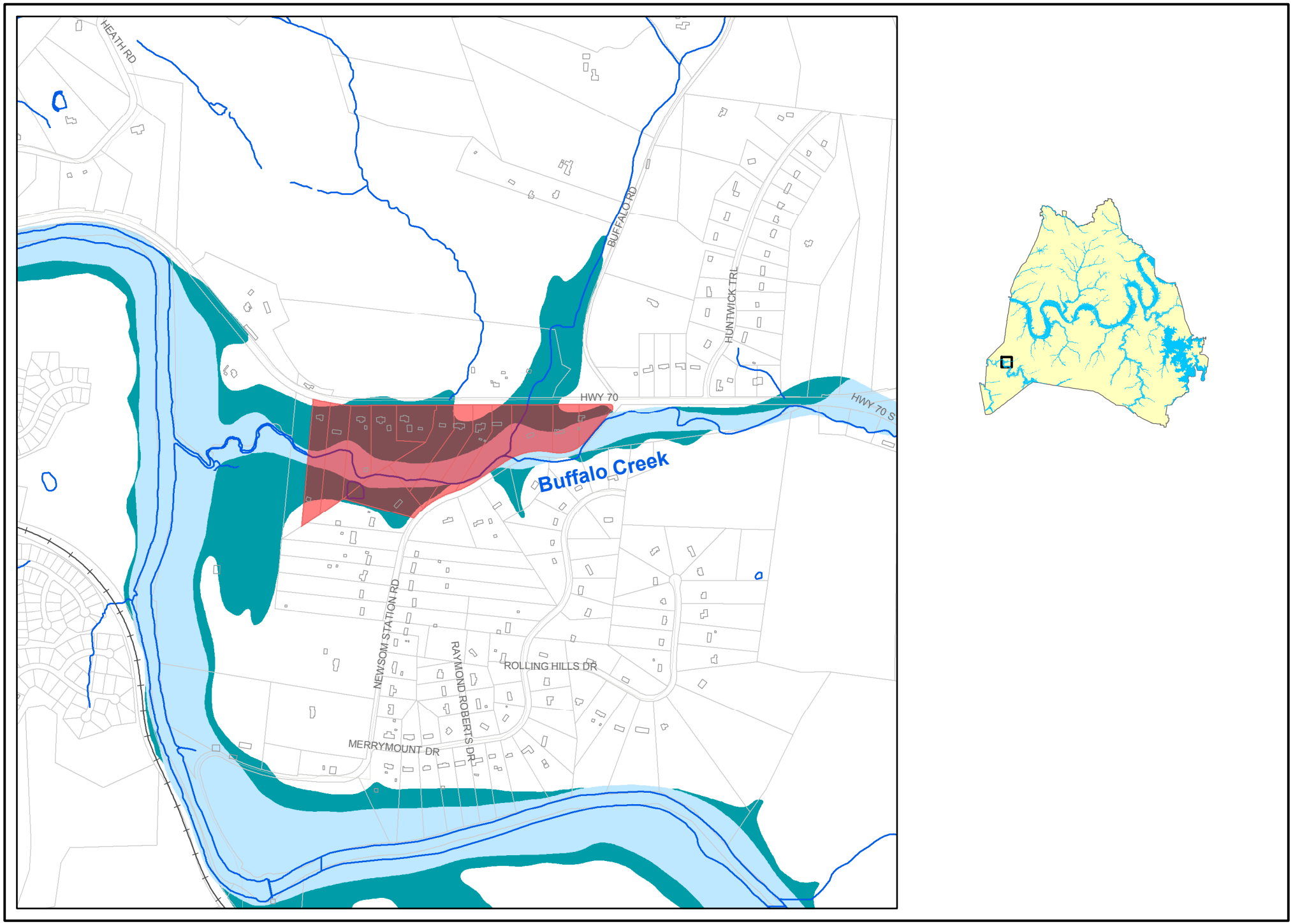
(This page has been left blank intentionally.)

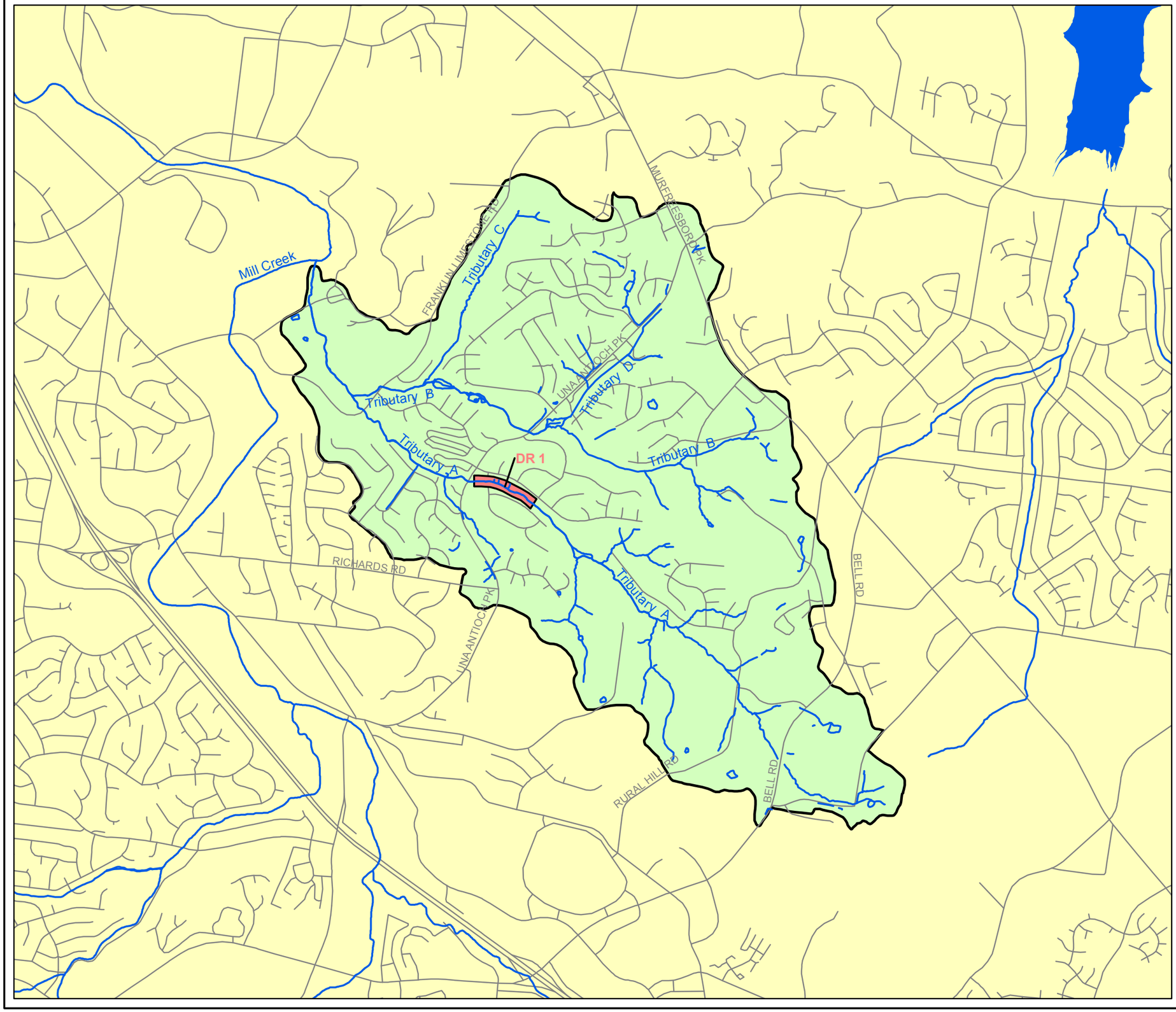

MCALPINE AV
Cooper Creek
DR 3
HART LN
GALLATIN PK
DR 2
MCGAVOCK PK
Cumberland River
MCGAVOCK PK
STRATFORD AV
DR 1
Cooper Creek

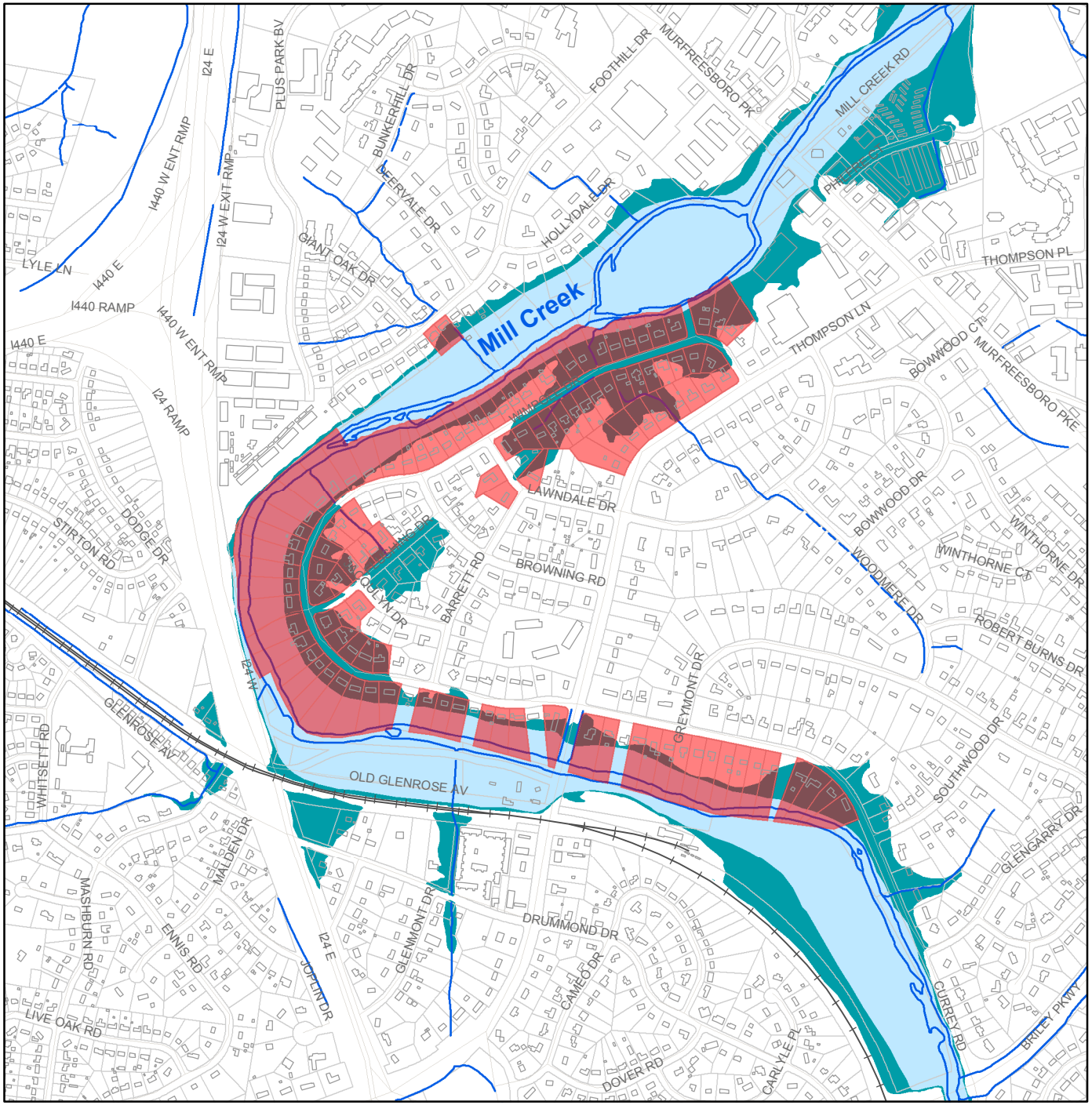

GOLDIE DR
ALTA LOMA RD
GATES RD
MONICA AV
MONTICELLO AV
CRESTVIEW DR
MYATT DR
MARITA AV
CINDY PL
ALTUS AV
N GALLATIN PKE
PLUM ST
SECOND ST
KATHY AV
EDENWOLD RD
W MONTICELLO AV
FRIENDSHIP DR
MELISSA DR
EDENWOLD RD
SHAKESPEARE
TENNYSON AV
DINWIDDIE DR
N GRAYCROFT AV
Dry Creek
BAIN DR
MACFIE DR
MONTICELLO CT
EDGEMEADE BLVD
AURORA AV
CONNARE DR
APPLE VALLEY RD
EDGEMEADE DR
MYATT BLVD
WELWORTH ST
MCKINLEY ST
ODETTE ST
FLORENCE AV
FANT INDUSTRIAL DR
ONE MILE PKWY
ELMORE AV
FLORENCE RD
PALMER AV
SNOW AV
MAYLENE DR
CIRCLE AV
SYLVIA DR
CAMPBELL RD
LAWRENCE AV
MAY CT N
MAY DR
SHANNON AV
CEDARWOOD LA

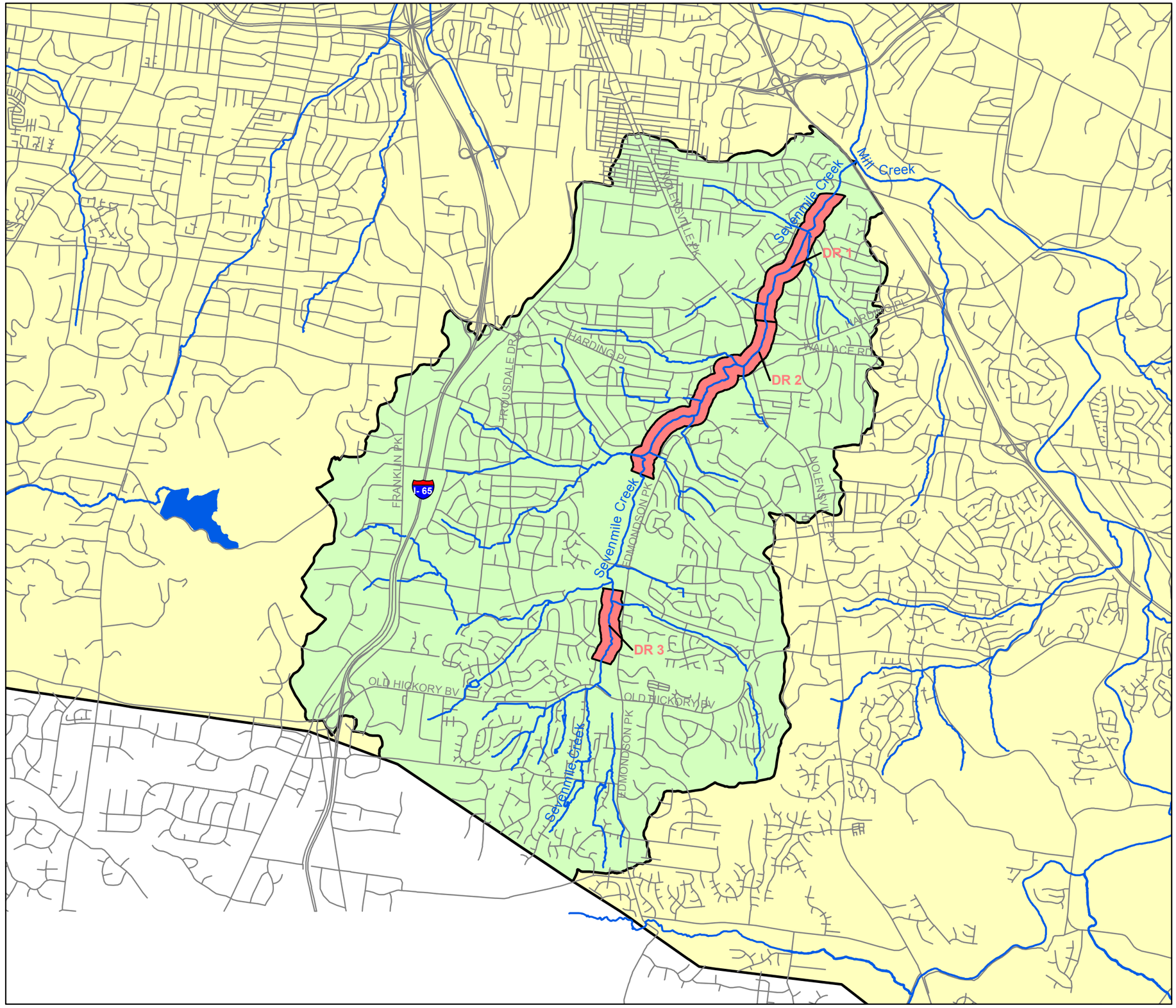

GALLATIN PK
OLD HICKORY BV
OLD HICKORY BV
Gibson Creek
GRAYCROFT AV
GIBSON DR
DR 4
DR 2
DR 3
DR 1
NEELYS BEND RD
I- 65
DUE WEST AV W
GALLATIN PK
Trib. No. 3
Gibson Creek
Cumberland RIver

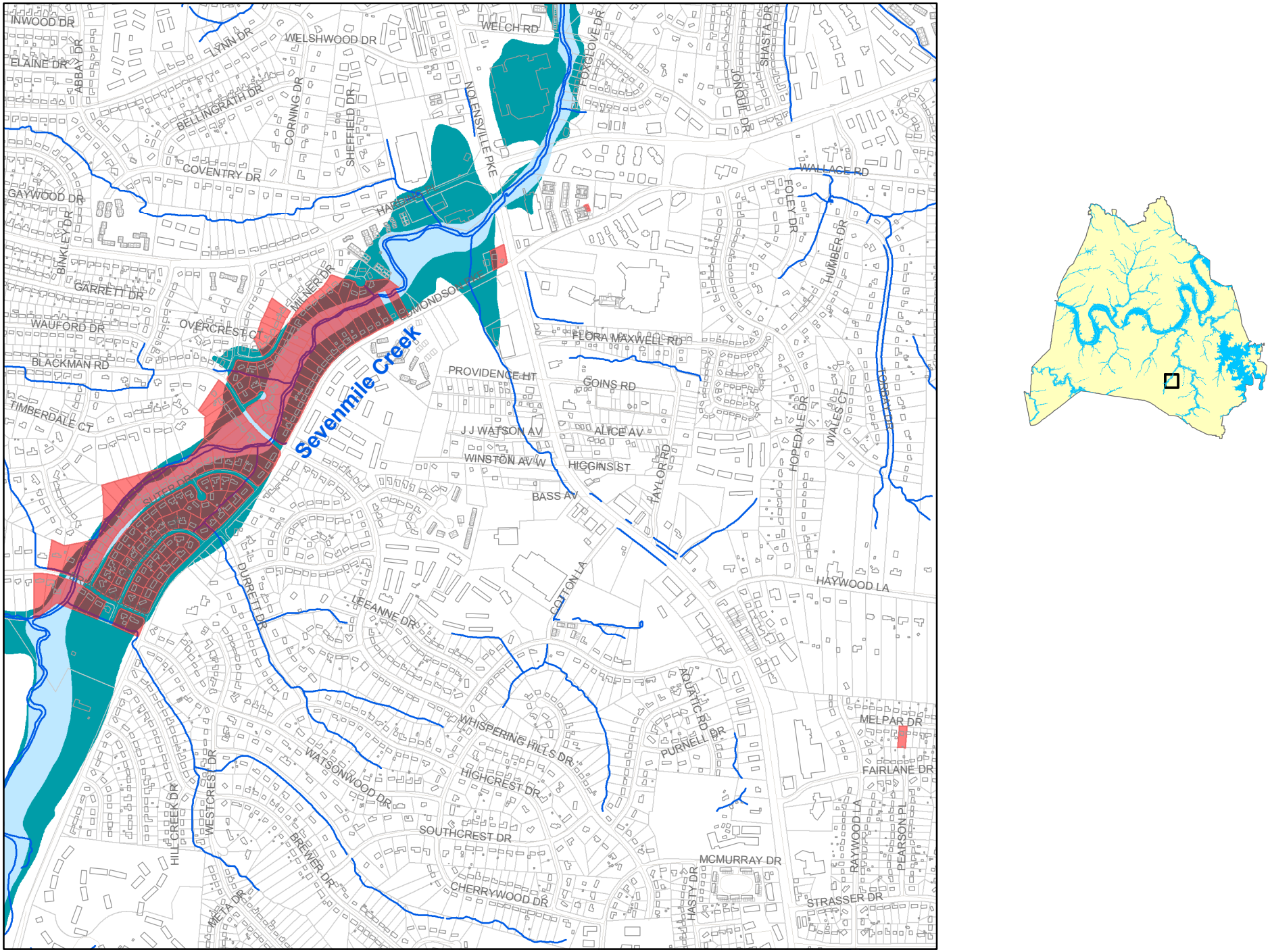

Gibson Creek
Cumberland River
WOODRUFF ST
DOUGLAS ST
S GALLATIN PK
DONNA DR
GIBSON DR
MADISON ST
HARRIS ST
BROOKS AV
HICKORY ST
ELM ST
CHERRY ST
IDLEWILD AV
COVENTRY WOODS DR
LANIER DR
FOREST PARK RD
MARGARET ST
BLACKSTONE AV
NORMAN DR
HARRINGTON AV
MADISON SQ
NEELYS BEND RD
ROBINWOOD AV
S GALLATIN PKE
E MEADE AV
ARGLE AV
OAKDELL AV
WALNUT ST
DENSON AV
NEELYS CHASE DR
ROTHWOOD AV
IDLEWILD DR
W WEBSTER ST
E WEBSTER ST
EMMITT AV
GALLAVISTA AV
MOVING CENTER CT
BRINK HAVEN AV
LIBERTY CIR
E PALESTINE AV
KC CT
RED BUD
DUE WEST AV W
DUE WEST AV E
BARRY DR
BERKLEY DR
CORELAND DR
GOLDILOCKS ST
CINDERELLA ST
PETER PAN ST
FERNBANK DR
FALLS AV
GRAPEVINE AV
BLUE GRASS AV
BEECH AV
LAKEWOOD DR
INDIAN TRL
GEISEN DR
HOWISE AV
ROTHWOOD AV


HEATH RD
BUFFALO RD
HUNTWICK TRL
HWY 70
HWY 70 S
Buffalo Creek
NEWSOM STATION RD
RAYMOND ROBERTS DR
ROLLING HILLS DR
MERRYMOUNT DR

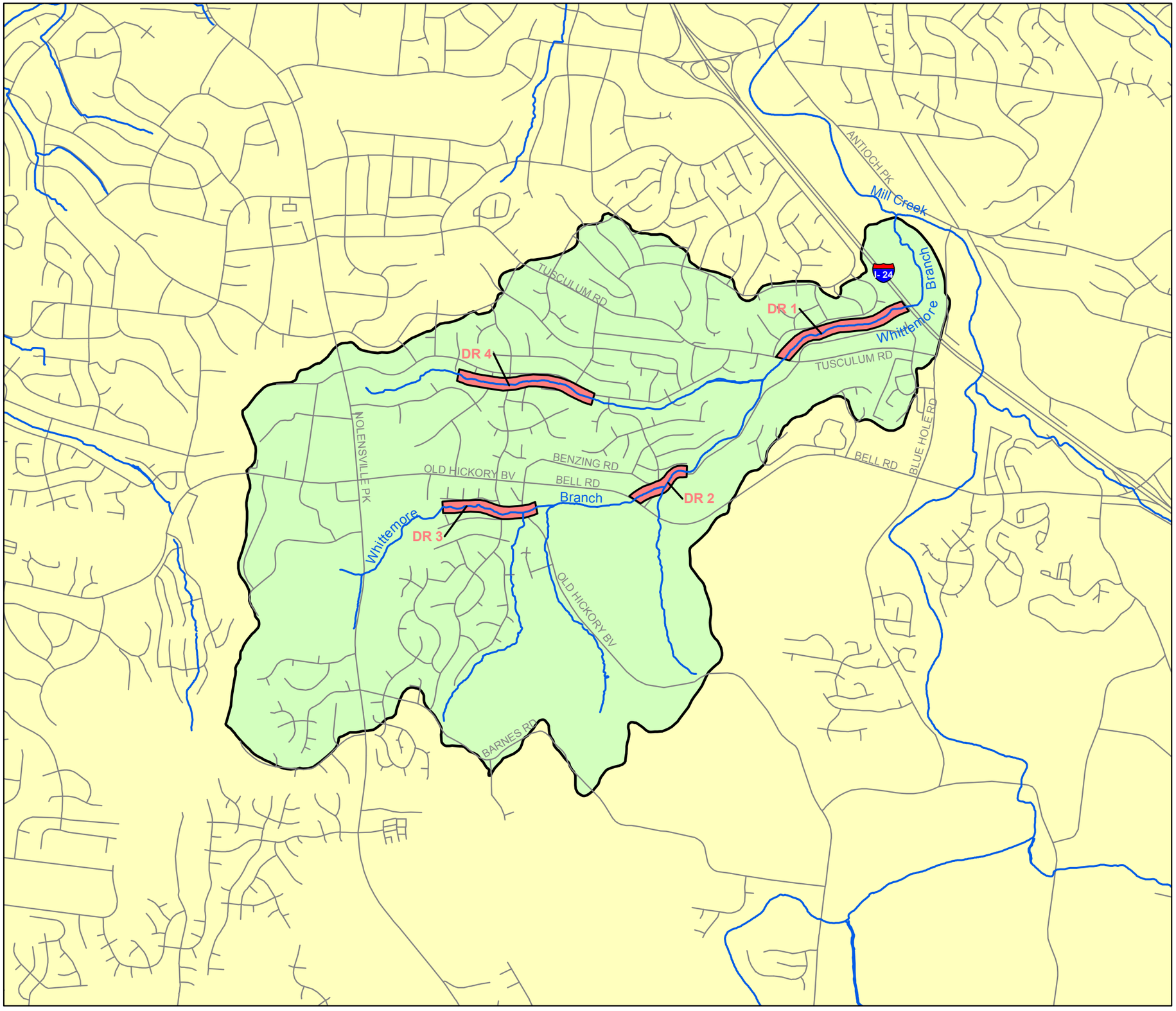

Mill Creek
FRANKLIN LIMESTONE RD
Tributary C
MURFREESBORO PK
UNA ANTIOCH PK
Tributary D
Tributary B
Tributary A
DR 1
Tributary B
RICHARDS RD
UNA ANTIOCH PK
Tributary A
BELL RD
RURAL HILL RD
BELL RD

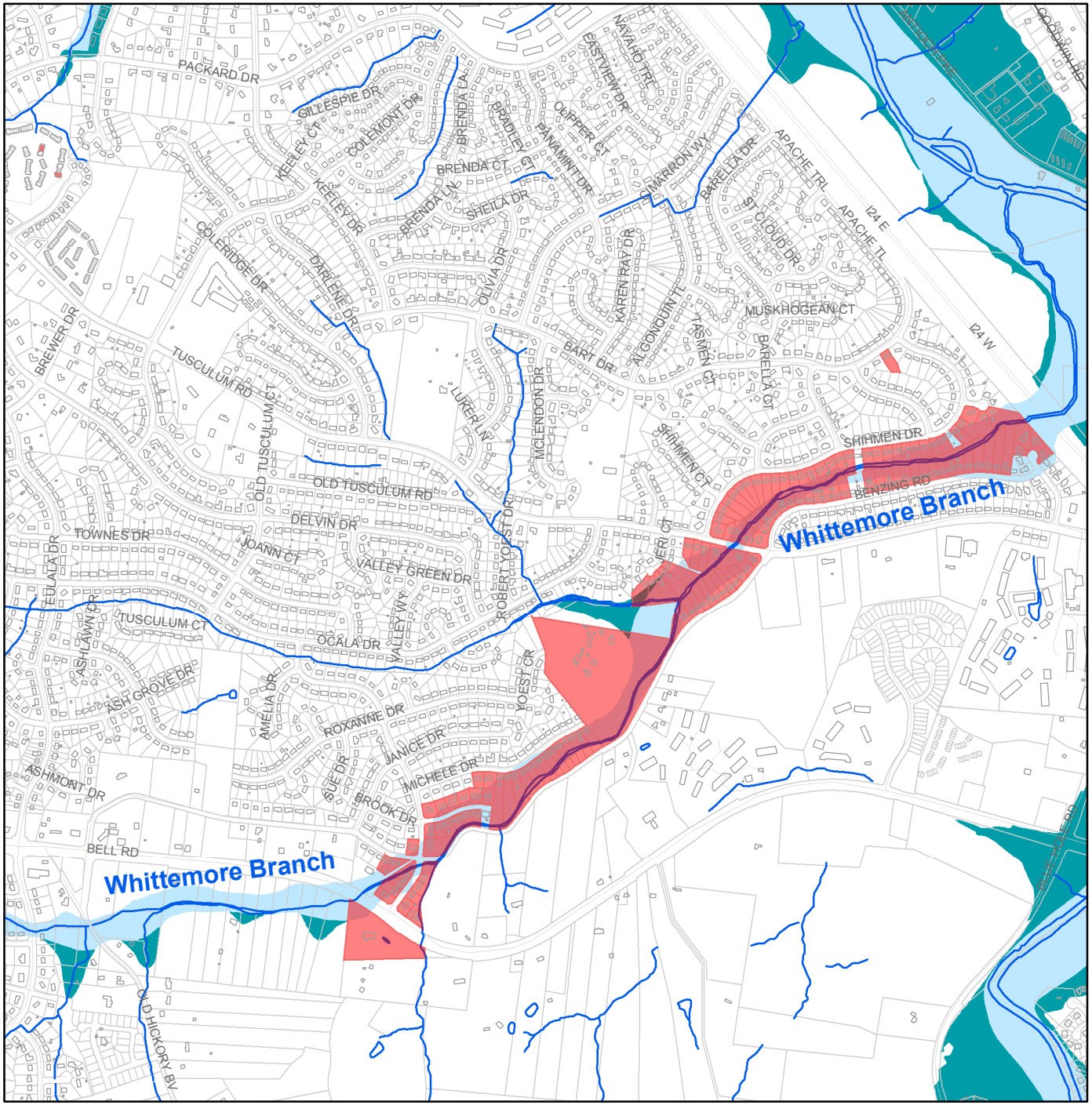

Mill Creek
I24 E
I440 W ENT RMP
I24 W EXIT RMP
PLUS PARK BV
BUNKERHILL DR
FOOTHILL DR
MURFREESBORO PK
MILL CREEK RD
DEERVALE DR
HOLLYDALE DR
GIANT OAK DR
LYLE LN
I440 E
I440 RAMP
I440 W ENT RMP
I24 RAMP
THOMPSON PL
THOMPSON LN
BOWWOOD CT
MURFREESBORO PKE
LAWNDALE DR
BOWWOOD DR
WINTHORNE CT
WINTHORNE DR
WOODMERE DR
ROBERT BURNS DR
SOUTHWOOD DR
GLENGARRY DR
CURREY RD
BRILEY PKWY
DODGE DR
STIRTON RD
COLLYN DR
BARRETT RD
BROWNING RD
GREYMONT DR
I24 W
GLENROSE AV
OLD GLENROSE AV
WHITSETT RD
MALDEN DR
MASHBURN RD
ENNIS RD
LIVE OAK RD
JOPLIN DR
I24 E
GLENMONT DR
DRUMMOND DR
CAMEO DR
DOVER RD
CARLYLE PL

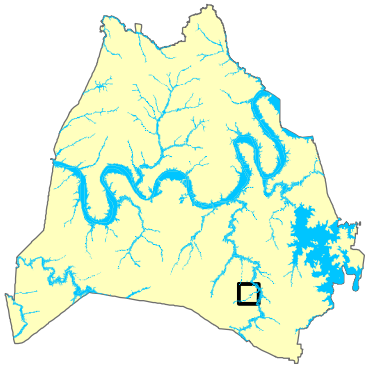

Sevenmile Creek
Mill Creek
DR 1
DR 2
DR 3
HARDING PL
WALLACE RD
FROUSDALE DR
EDMONDSON PK
NOLENSVILLE PK
FRANKLIN PK
I- 65
OLD HICKORY BV
Sevenmile Creek
EDMONDSON PK
OLD HICKORY BV
Sevenmile Creek

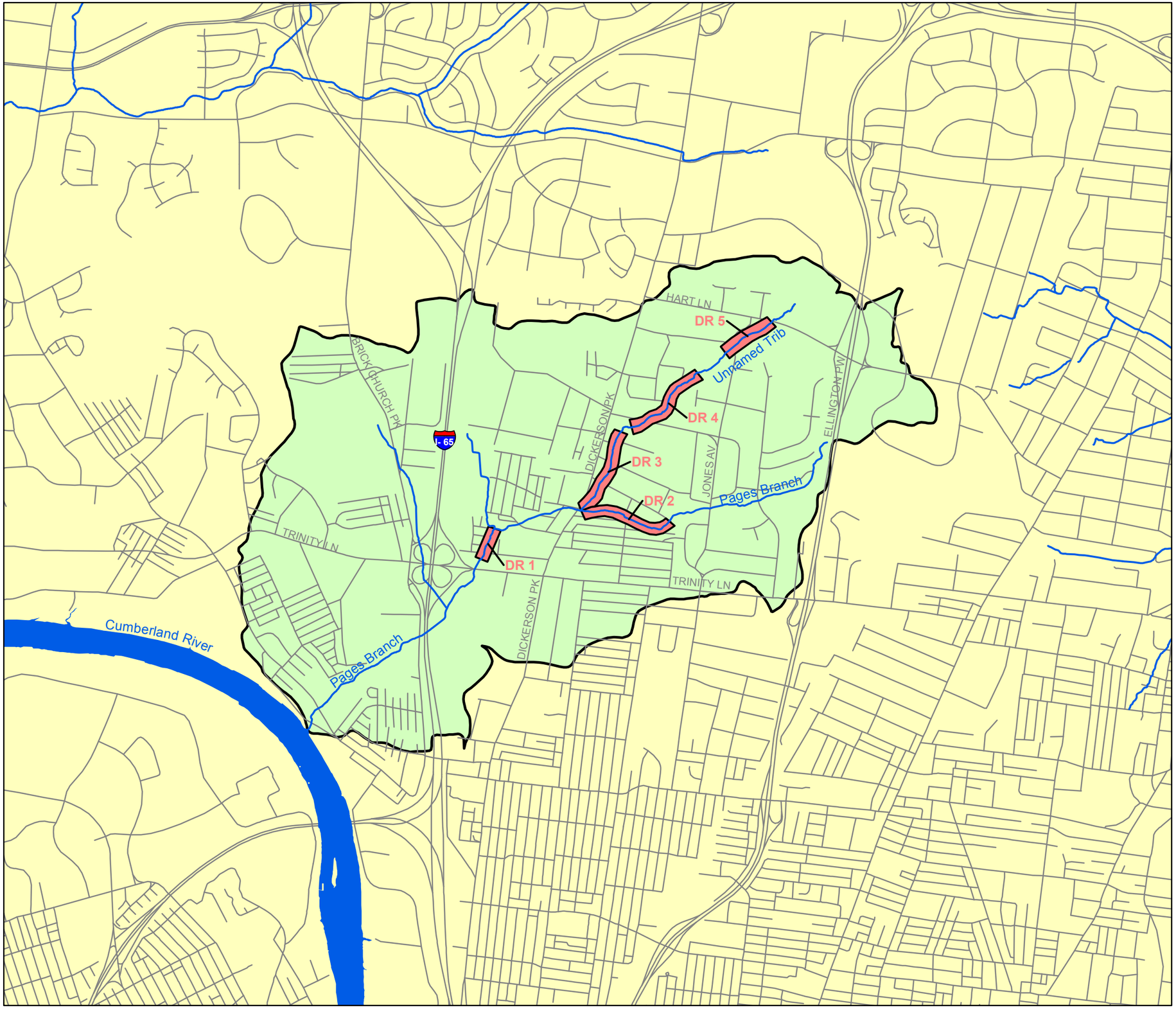

Sevenmile Creek
WELCH RD
WELSHWOOD DR
INWOOD DR
ELAINE DR
ABBAY DR
LYNN DR
BELLINGRATH DR
CORNING DR
SHEFFIELD DR
COVENTRY DR
GAYWOOD DR
BINKLEY DR
GARRETT DR
WAUFORD DR
BLACKMAN RD
TIMBERDALE CT
OVERCREST CT
MILNER DR
NOLENSVILLE PKE
FOXGLOVE DR
LONDON DR
SHASTA DR
WALLACE RD
FOLEY RD
HUMBER DR
FLORA MAXWELL RD
PROVIDENCE HT
COINS RD
J J WATSON AV
ALICE AV
WINSTON AV W
HIGGINS ST
BASS AV
TAYLOR RD
HOPEDALE DR
WALES CT
TORRAY DR
HAYWOOD LA
COTTON LA
BURRETT DR
LEEANNE DR
WHISPERING HILLS DR
HIGHCREST DR
WATSONWOOD DR
SOUTHCREST DR
CHERRYWOOD DR
BREWER DR
WESTCREST DR
HILLCREEK DR
META DR
AQUATIC RD
PURNELL DR
MELPAR DR
FAIRLANE DR
MCMURRAY DR
HASTY DR
RAYWOOD LA
PEARSON PL
STRASSER DR

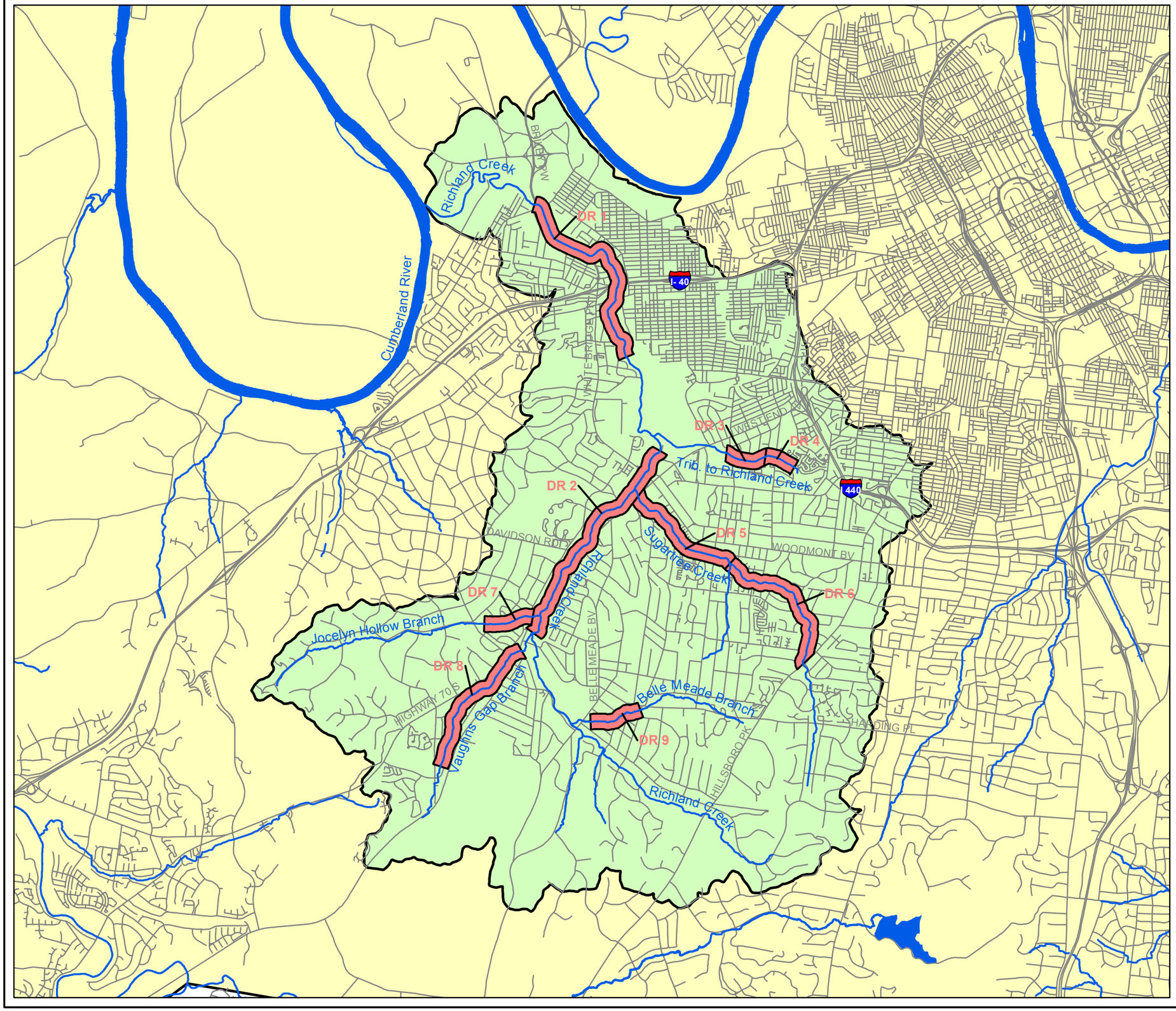
Mill Creek
Sorghum Branch
ANTIOCH PK
HARDING PL
EZELL PK
PARAGON MILLS RD
HARDING PL
LUNA DR
WALLACE RD
WILLARD DR
HAYWOOD LN
HAYWOOD LN
DR 1
EAST RIDGE DR
MELPAR DR
MADELINE DR
HAYWOOD LN
Sorghum Branch
TUSCULUM RD
DR 2
BREWER DR
TUSCULUM RD

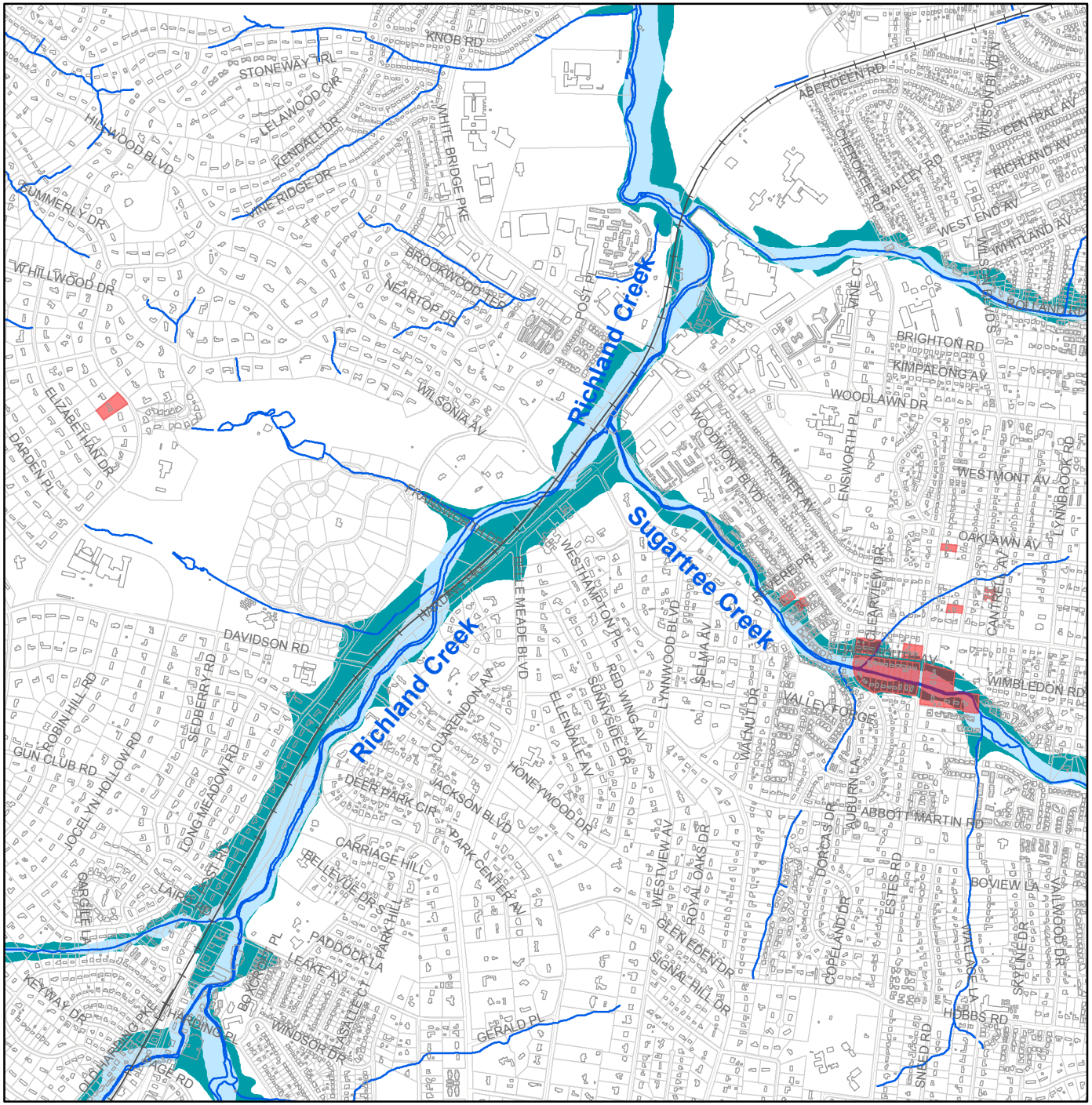

ANTIOCH PK
Mill Creek
I - 24
Whittemore Branch
TUSCULUM RD
DR 1
DR 4
TUSCULUM RD
NOLENSVILLE PK
OLD HICKORY BV
BENZING RD
BELL RD
Branch
DR 2
DR 3
Whittemore
BELL RD
BLUE HOLE RD
OLD HICKORY BV
BARNES RD


PACKARD DR
GILLESPIE DR
KEELEY CT
COLEMONT DR
BRENDA LN
BRENDA CT
BRADLEY CT
PANAMINT DR
CUPPER CT
EASTVIEW DR
NAVAJO TRL
GOODWALL RD
SHEILA DR
KEELEY DR
COLERIDGE DR
DARLENE DR
OLIVIA DR
KAREN RAY DR
ALGONQUIN TL
TASMEN CT
BARELLA DR
CLOUD DR
APACHE TRL
APACHE TL
I24 E
I24 W
MUSKHOGEAN CT
BREWER DR
TUSCULUM RD
TUSCULUM CT
OLD TUSCULUM CT
OLD TUSCULUM RD
LUKER LN
MCLENDON DR
BART DR
SHIHMEN CT
SHIHMEN DR
BENZING RD
DELVIN DR
TOWNES DR
JOANN CT
VALLEY GREEN DR
ROBERT YOEST DR
EULALA DR
ASHLAWN CT
OCALA DR
VALLEY LN
YOEST CIR
ASH GROVE DR
AMELIA DR
ROXANNE DR
JANICE DR
MICHELE DR
SUE DR
BROOK DR
ASHMONT DR
BELL RD
OLD HICKORY BV
Whittemore Branch
Whittemore Branch




HART LN
DR 5
Unnamed Trib
BRICK CHURCH PK
DICKERSON PK
DR 4
DR 3
I- 65
JONES AV
ELLINGTON PWY
Pages Branch
DR 2
TRINITY LN
DR 1
TRINITY LN
DICKERSON PK
Cumberland River
Pages Branch


Richland Creek
Cumberland River
DR 1
I - 40
DR 3
DR 4
Trib. to Richland Creek
440
DR 2
DR 5
Sugartree Creek
Richland Creek
DR 6
DR 7
Jocelyn Hollow Branch
DR 8
Vaughns Gap Branch
Belle Meade Branch
DR 9
Richland Creek
BRIDGETOWN
WHITEBRIDGE PK
DAVIDSON RD
WESTLEND DR
WOODMONT BV
BELLEMEADE BV
HILLSBORO PK
HARDING PL
HIGHWAY 70 S


Richland Creek
Sugartree Creek
Richland Creek
KNOB RD
STONEWAY TRL
LELAWOOD DR
KENDALL DR
VINE RIDGE DR
HILLWOOD BLVD
SUMMERLY DR
W HILLWOOD DR
WHITE BRIDGE PKE
BROOKWOOD TER
NEARTOP DR
POST PL
WILSONIA AV
ELIZABETH HART DR
DARDEN PL
ABERDEEN RD
WILSON BLVD
CHEROKEE RD
VALLEY RD
CENTRAL AV
RICHLAND AV
WEST END AV
WHITLAND AV
PORTLAND PL
VINE CT
BRIGHTON RD
KIMPALONG AV
WOODLAWN DR
ENSWORTH PL
WOODMONT BLVD
KENNEY AV
WESTMONT AV
LYNNBROOK RD
OAKLAWN AV
CANTRELL AV
CLEARVIEW DR
WIMBLEDON RD
VALLEY FORGE
WALNUT DR
SELMA AV
LYNNWOOD BLVD
WESTHAMPTON PL
LE MEADE BLVD
HARDING PL
DAVIDSON RD
ROBIN HILL RD
SEDBERRY RD
GUN CLUB RD
JOCELYN HOLLOW RD
LONGMEADOW RD
CLAREMONT AV
CLAREDON AV
ELLENDALE AV
SUNNYSIDE DR
RED WING AV
HONEYWOOD DR
JACKSON BLVD
DEER PARK CIR
PARK CENTER AV
CARRIAGE HILL
BELLEVUE DR S
PARK HILL
LAIRDSTONE RD
ABBOTT MARTIN RD
AUBURN LA
DORCAS DR
COPELAND DR
ESTES RD
BOVIEW LA
WESTVIEW AV
ROYAL OAKS DR
GLEN EDEN DR
SIGNAL HILL DR
SKYLINE DR
WILLOWOOD DR
HOBBS RD
SNEED RD
PADDOCK LA
LEAKE AV
KEYWAY DR
WINDSOR DR
GERALD PL
HASTINGS PL
AGE RD

J. Percy Priest Reservoir

East Fork Hamilton Creek

Trib No. 2

Trib No. 1

DR 1

DR 2

DR 3

DR 4

DR 5

DR 6

BELL RD

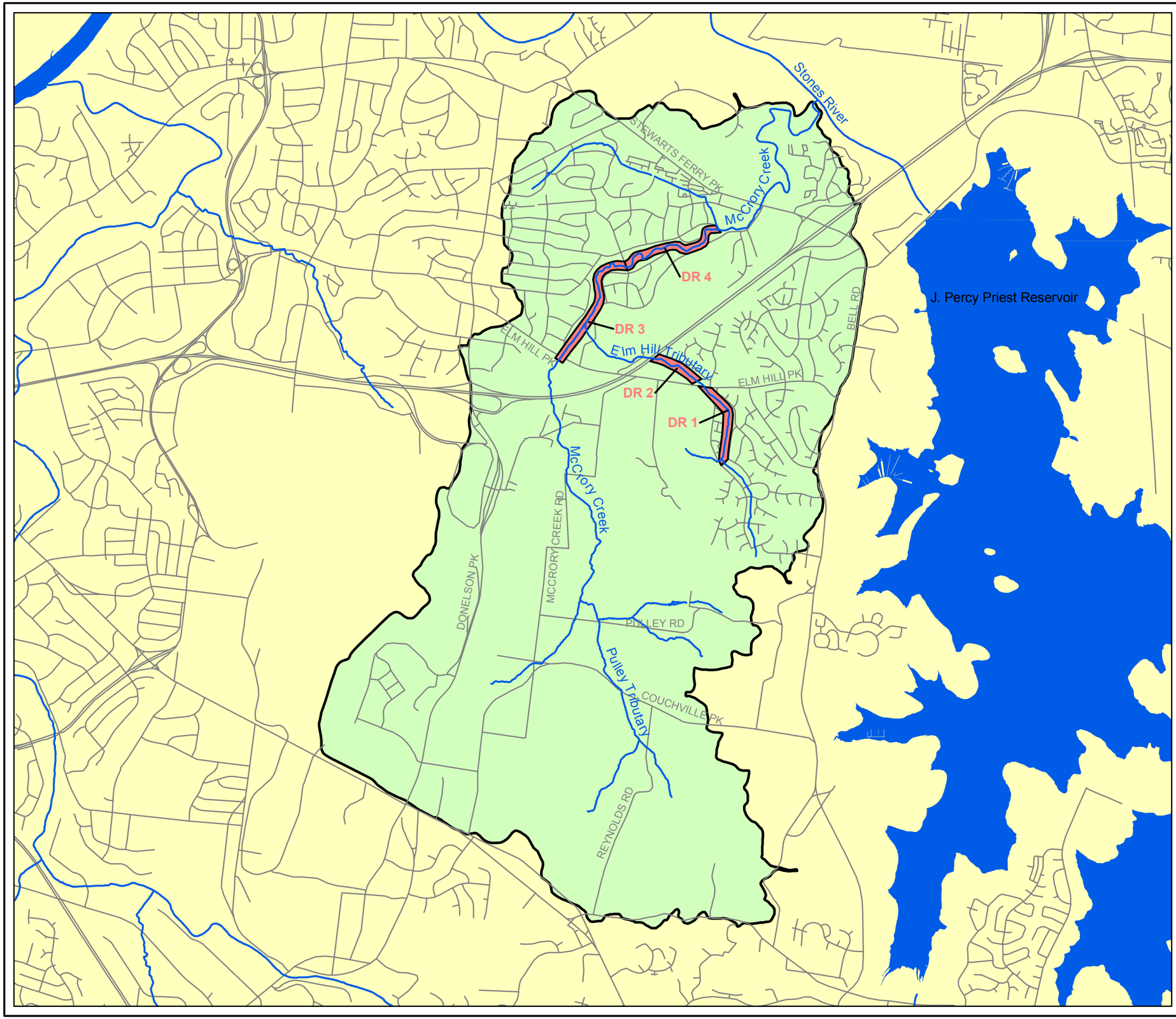
MOSSDALE DR

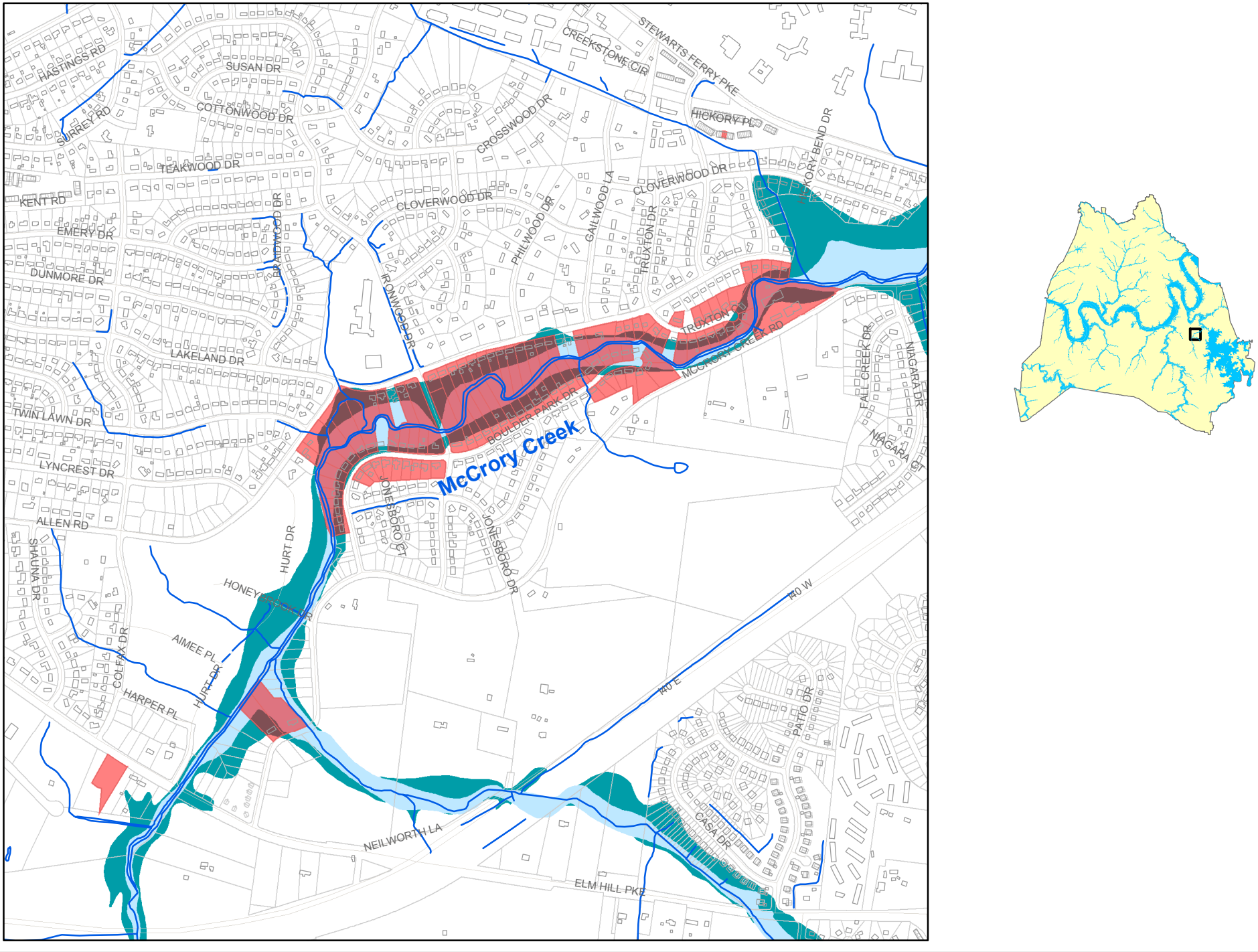
ANDERSON RD

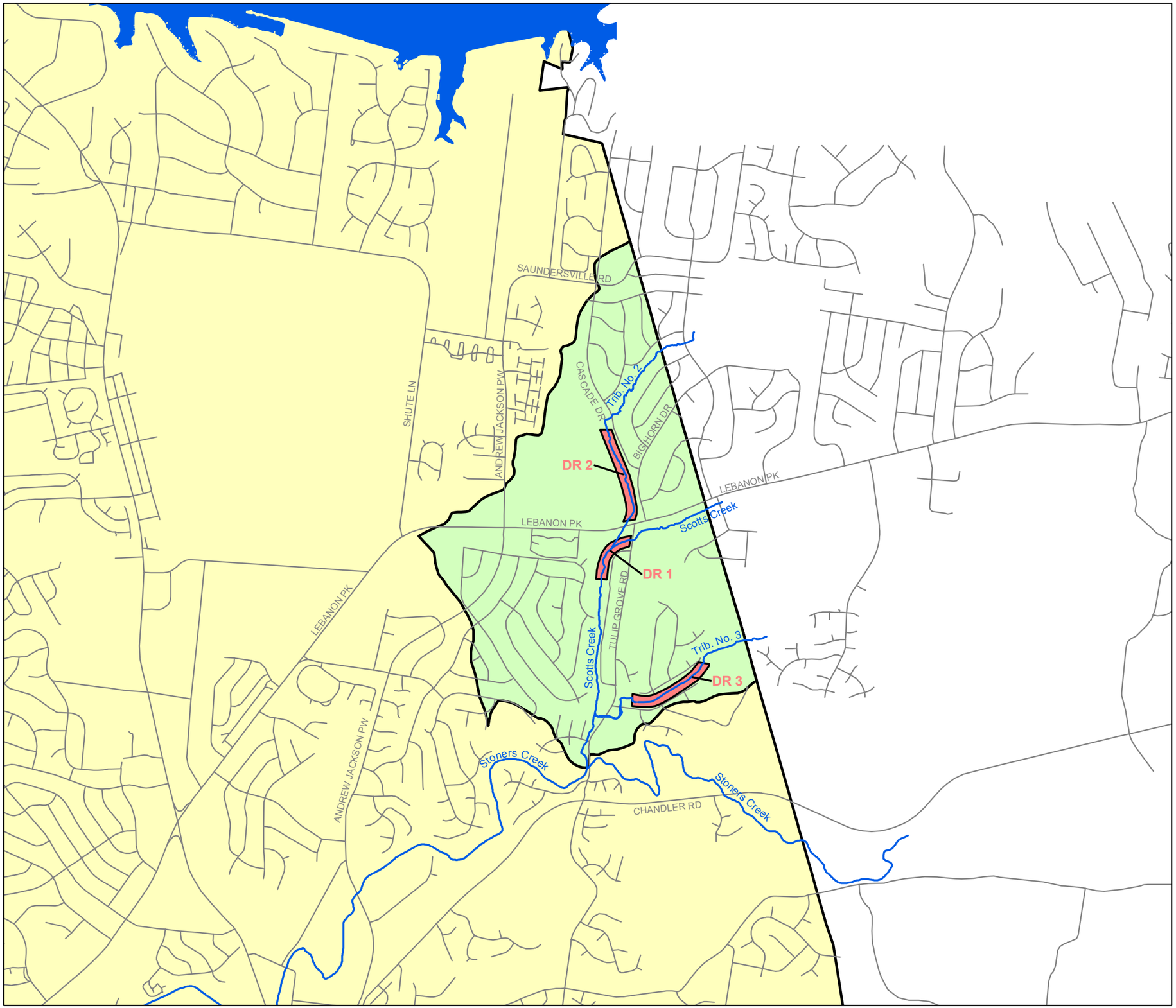
MURFREESBORO PK

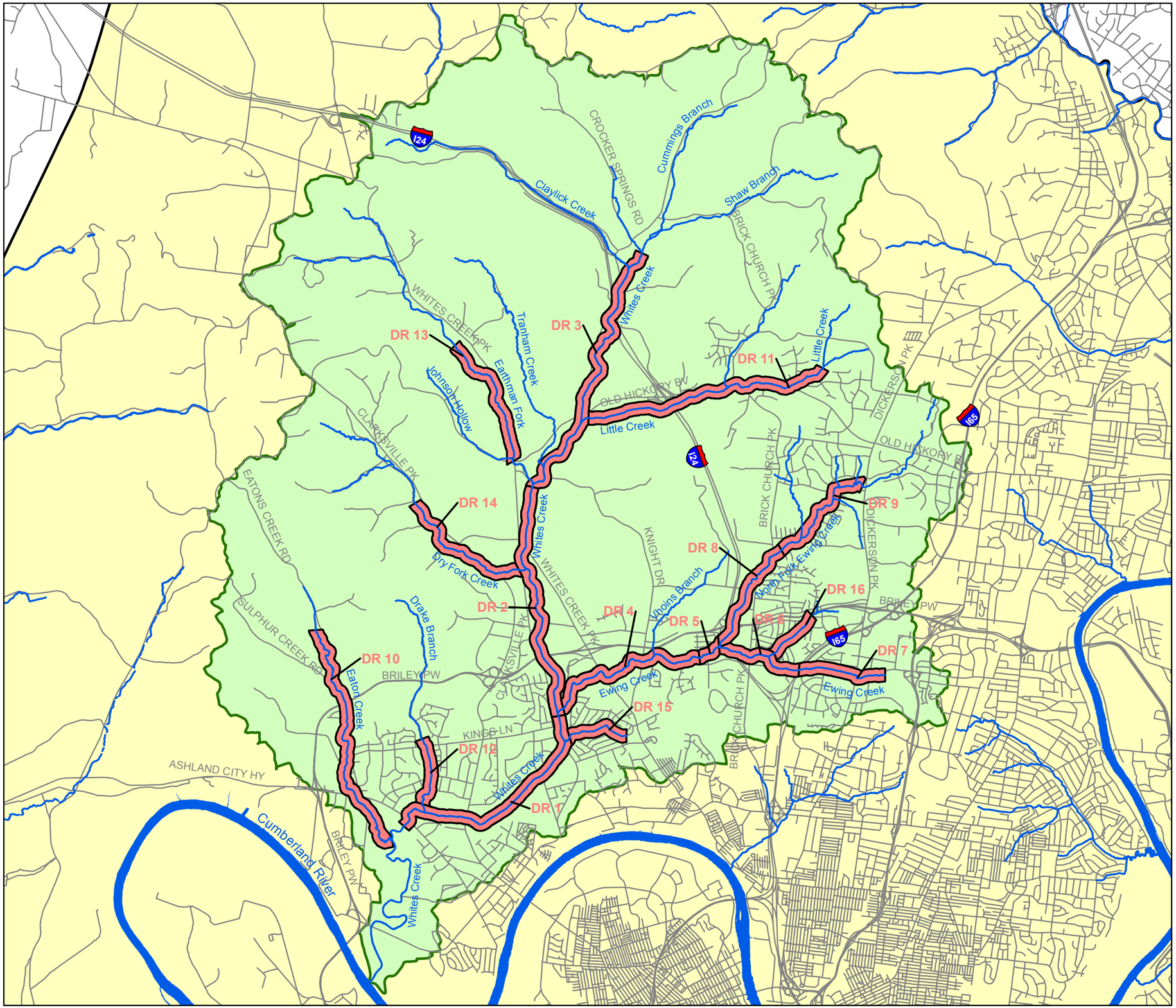
BELL RD

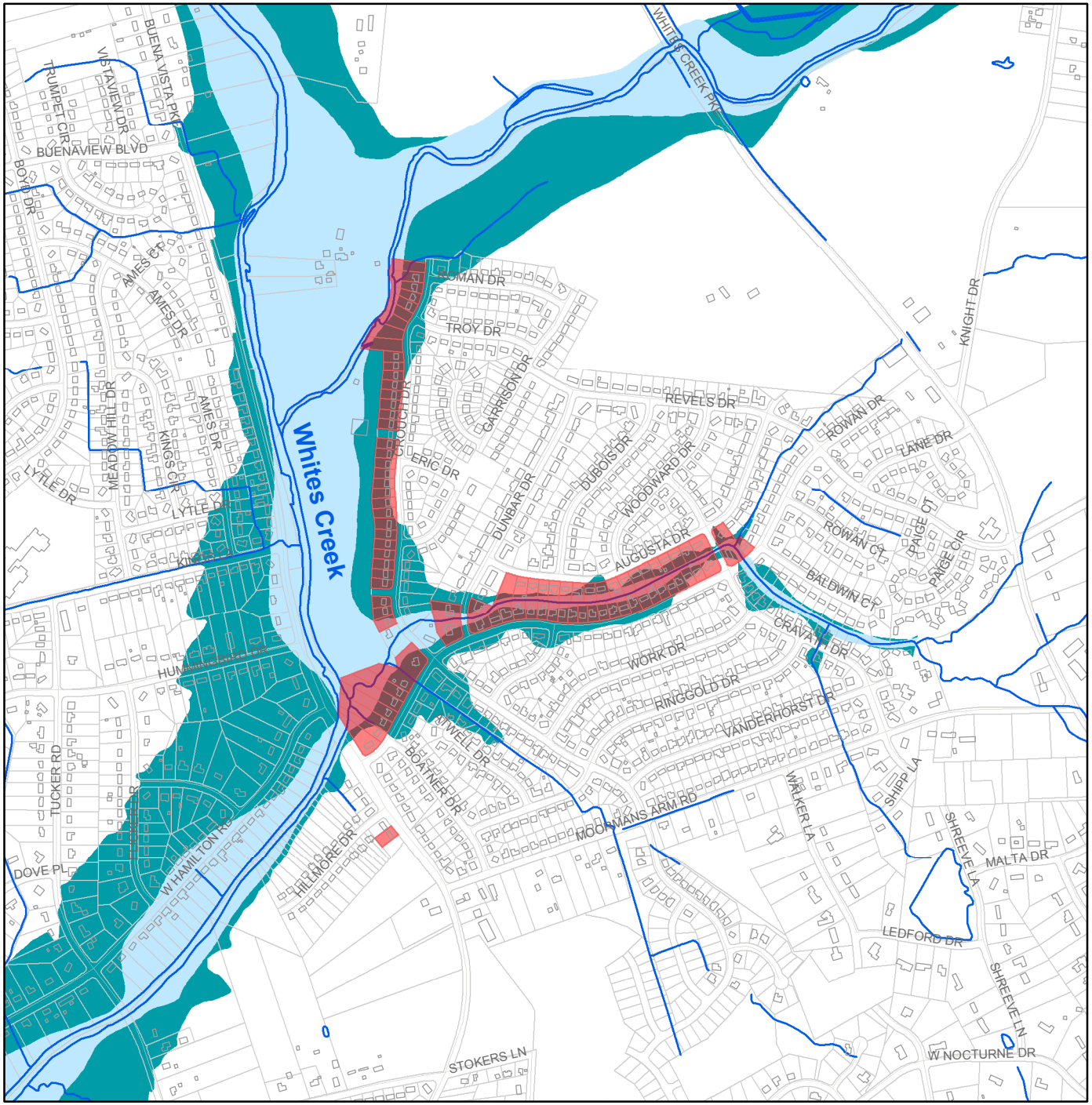
HAMILTON CHURCH RD

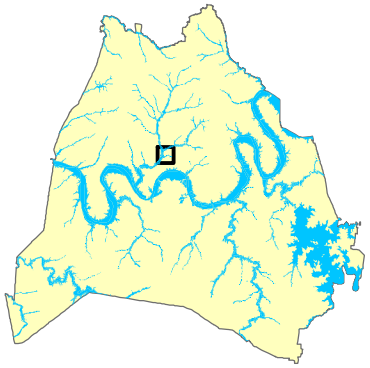

Stones River
STEWARTS FERRY PK
McCrory Creek
DR 4
DR 3
Elm Hill Tributary
DR 2
DR 1
ELM HILL PK
BELL RD
McCrory Creek
MCCRORY CREEK RD
DONELSON PK
PULLEY RD
Pulley Tributary
COUCHVILLE PK
REYNOLDS RD
J. Percy Priest Reservoir

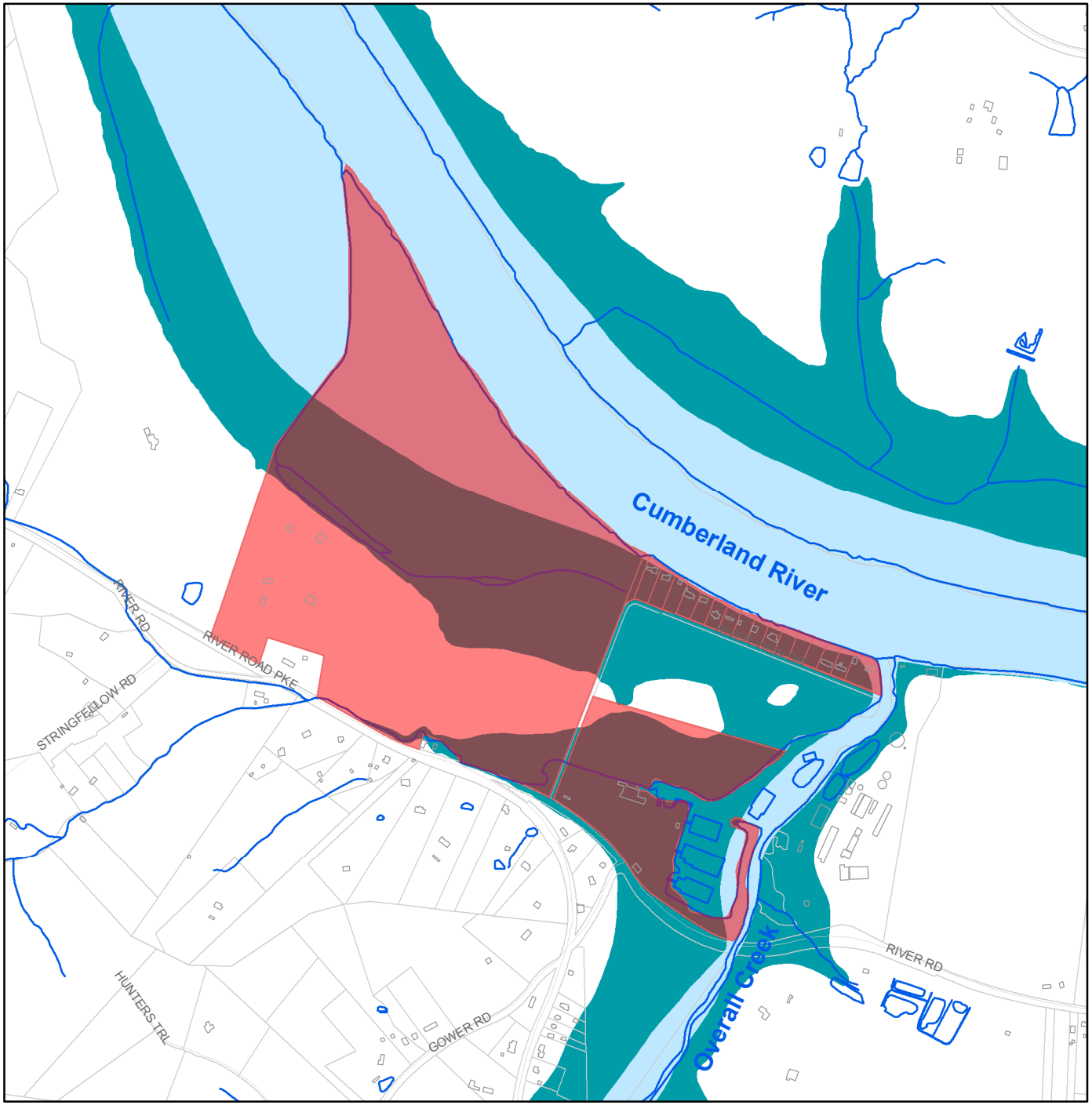

McCrory Creek
HASTINGS RD
SUSAN DR
SURREY RD
COTTONWOOD DR
TEAKWOOD DR
KENT RD
EMERY DR
DUNMORE DR
BRADWOOD DR
LAKELAND DR
TWIN LAWN DR
LYNCREST DR
ALLEN RD
SHAUNA DR
COLFAX DR
HARPER PL
AIMEE PL
HURT DR
HONEY
CREEKSTONE CIR
STEWARTS FERRY PKE
CROSSWOOD DR
HICKORY PL
HICKORY BEND DR
CLOVERWOOD DR
PHILWOOD DR
GAILWOOD LA
TRUXTON DR
IRONWOOD DR
MCCRORY CREEK RD
FALL CREEK DR
NIAGARA DR
NIAGARA ST
BOULDER PARK DR
JONESBORO CT
JONESBORO DR
40 W
PATIO DR
CASA DR
NEILWORTH LA
ELM HILL PKE


SAUNDERSVILLE RD
SHUTE LN
ANDREW JACKSON PW
CASCADE DR
Trib. No. 2
BIGHORN DR
DR 2
LEBANON PK
Scotts Creek
LEBANON PK
DR 1
TULIP GROVE RD
Scotts Creek
Trib. No. 3
DR 3
LEBANON PK
ANDREW JACKSON PW
Stoners Creek
Stoners Creek
CHANDLER RD

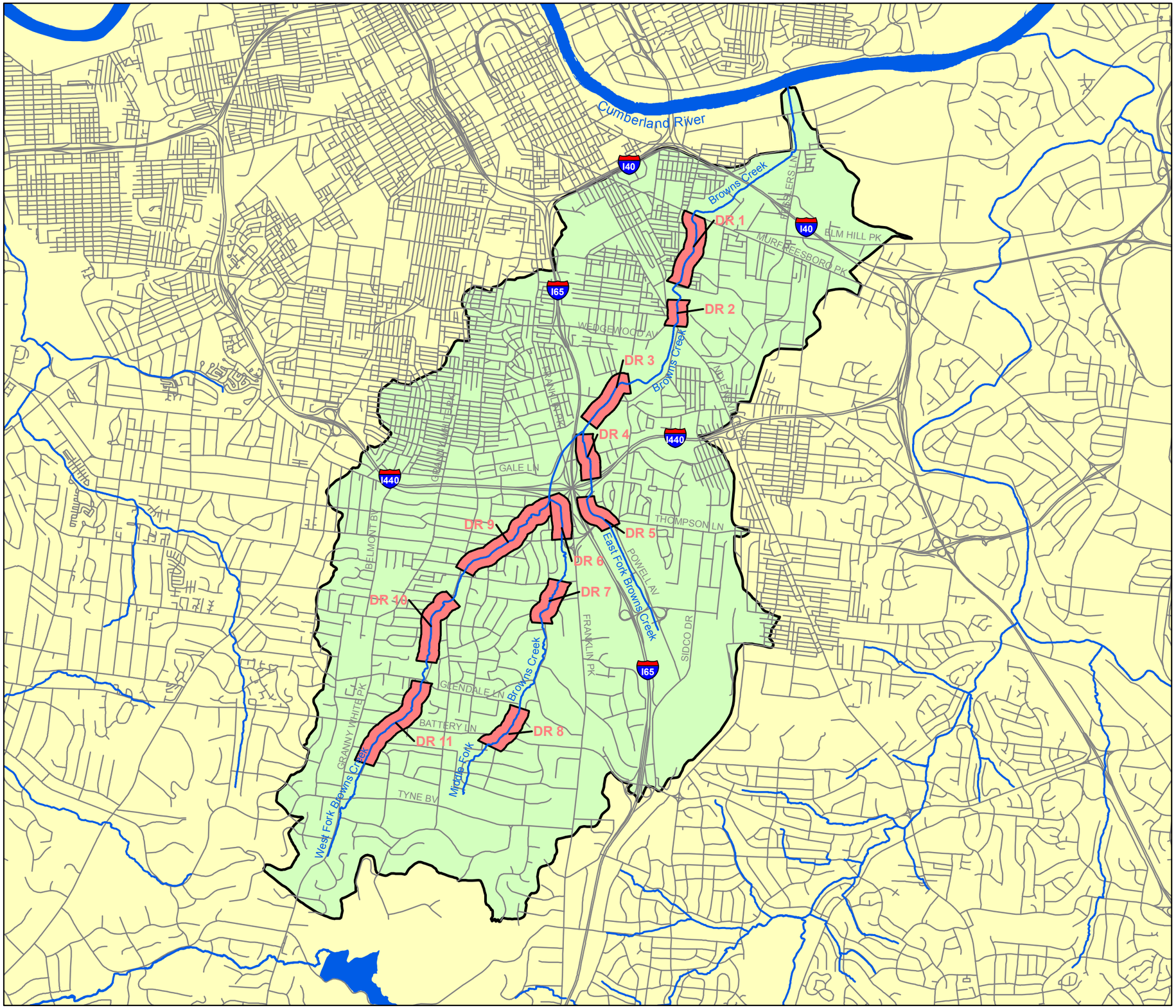

I24
I65
Claylick Creek
CROCKER SPRINGS RD
Cummings Branch
Shaw Branch
BRICK CHURCH PK
WHITES CREEK PK
Tranham Creek
Earthman Fork
Johnson Hollow
Whites Creek
DR 13
DR 3
DR 11
Little Creek
OLD HICKORY BV
DICKERSON PK
CLARKSVILLE PK
EATONS CREEK RD
DR 14
Dry Fork Creek
KNIGHT DR
DR 8
DR 9
Vhoins Branch
Mowm Fork Ewing Creek
DR 16
DR 2
DR 4
DR 5
DR 6
DR 7
SULPHUR CREEK RD
Drake Branch
DR 10
BRILEY PW
Eaton Creek
Ewing Creek
DR 15
KINGS LN
DR 12
DR 1
ASHLAND CITY HY
Cumberland River


Whites Creek
WHITES CREEK PKY
BUENA VISTA PKE
TRUMPET CIR
VISTAVIEW DR
BUENAVIEW BLVD
BOAT DR
AMES CT
AMES DR
MEADOW HILL DR
KINGS CT
LYTLE DR
KIN
HUN
TUCKER RD
DOVE PL
W HAMILTON RD
HILLMORE DR
BOATNER DR
TWELL DR
STOKERS LN
COMAN DR
TROY DR
GARRISON DR
TOUCH DR
ERIC DR
DUNBAR DR
DUBOIS DR
REVELS DR
WOODWARD DR
AUGUSTA DR
KNIGHT DR
ROWAN DR
LANE DR
ROWAN CT
PAIGE CT
PAIGE CIR
BALDWIN CT
CRAVATH DR
WORK DR
RINGGOLD DR
VANDERHORST DR
MOORMANS ARM RD
WALKER LA
SHIPP LA
SHREEVE LA
MALTA DR
LEDFORD DR
SHREEVE LN
W NOCTURNE DR




Cumberland River
RIVER RD
RIVER ROAD PKE
STRINGFELLOW RD
HUNTERS TRL
GOWER RD
Overall Creek
RIVER RD


Mansker Creek
Sycamore Creek
Marrowbone Creek
Dry Creek
Whites Creek
Gibson Creek
Island Creek
Bull Run
Sulphur Creek
Back Creek
Loves Branch
Cumberland River
Scotts Creek
Pages Branch
Cooper Creek
Cub Creek
Cumberland River
Cumberland River
Pond Creek
Indian Creek
Sandy Creek
Stones River
McCrory Creek
Overall Creek
Davidson Branch
Mill Creek
Richland Creek
Browns Creek
Sorghum Branch
Mill Creek Trib 1
East Fork Hamilton Creek
Sevenmile Creek
Harpeth River
Whittemore Branch
Mill Creek


Cumberland River
Browns Creek
I40
I65
I440
DR 1
DR 2
DR 3
DR 4
DR 5
DR 6
DR 7
DR 8
DR 9
DR 10
DR 11
BLM HILL PK
MURFREESBORO PK
WEDGEWOOD AV
GALE LN
THOMPSON LN
POWELL AV
SIDCO DR
FRANKLIN PK
BELMONT BV
GRANNY WHITE PK
GLENDALE LN
BATTERY LN
TYNE BV
East Fork Browns Creek
West Fork Browns Creek
Middle Fork

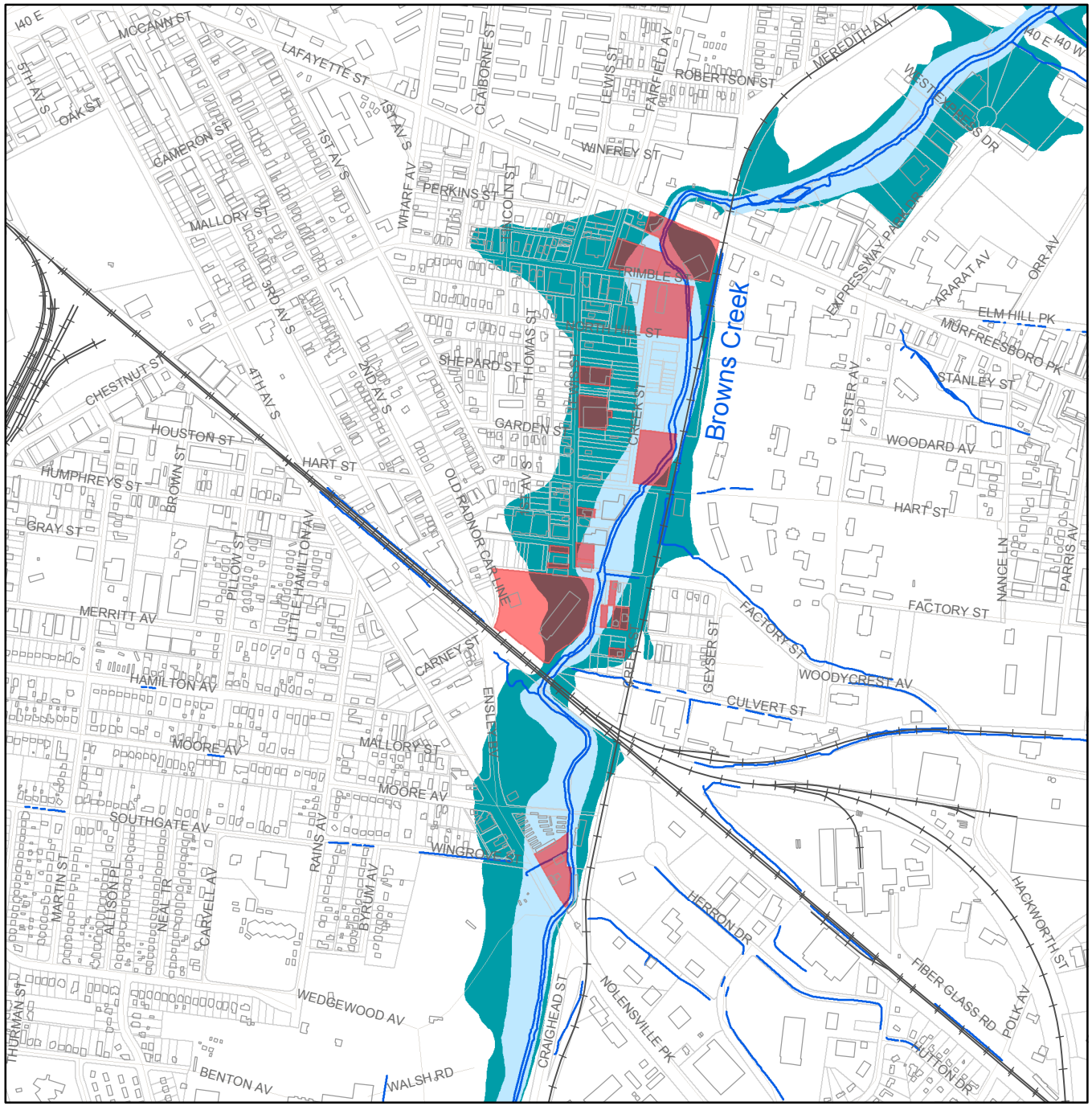
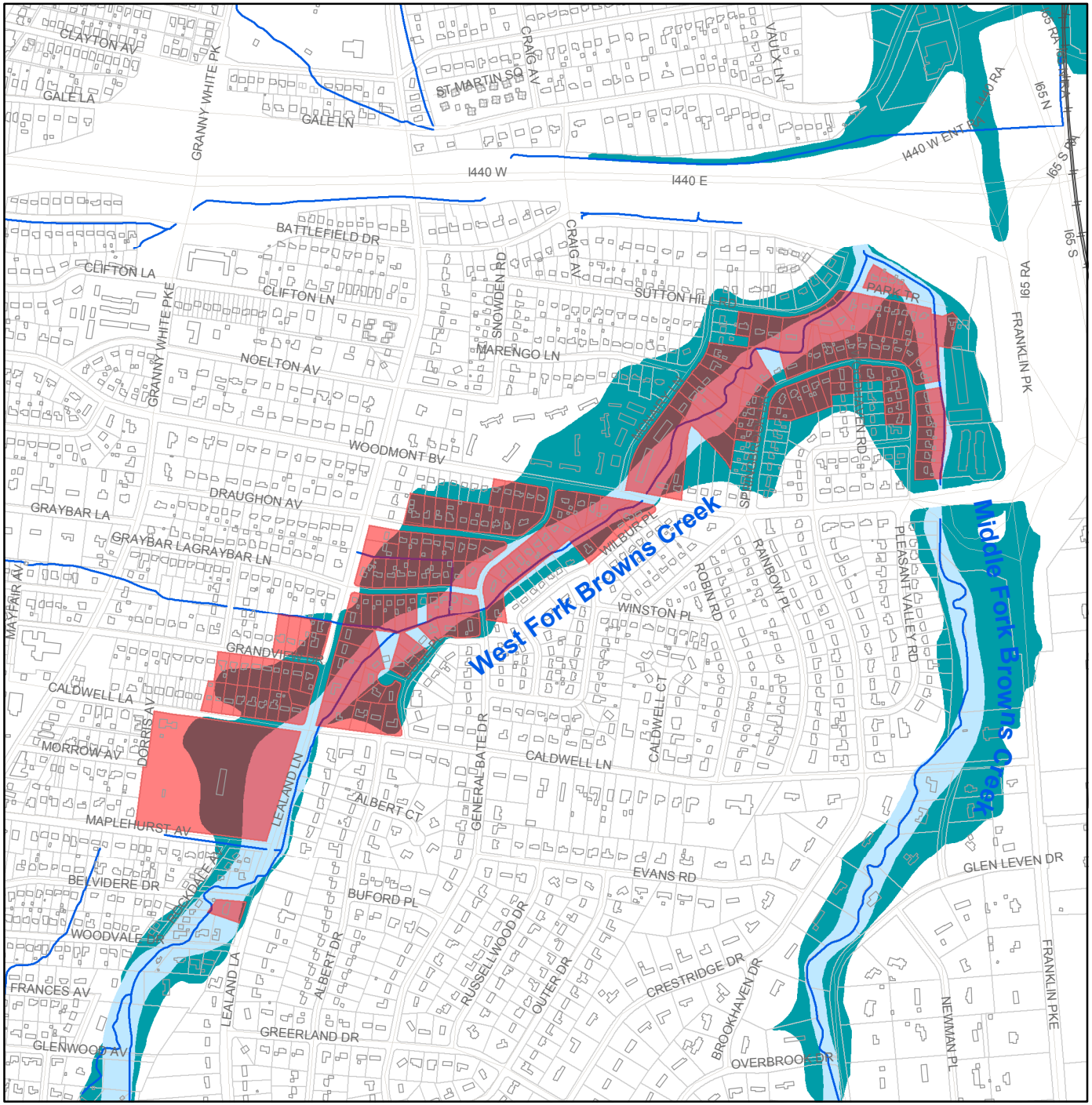


Figure C.1b
Browns Creek
Repetitive Loss Area

amec

Figure C.1c
West/Middle Forks of Browns Creek Repetitive Loss Area



- Railroads
- Building
- Repetitive Loss Area
- Streams
- Parcels
- Floodway
- 100-Year Floodplain

N
W E
S

0 1,000 2,000 Feet

amec

Metropolitan Nashville - Davidson County

Multi-Hazard Mitigation Plan

APPENDIX D - References

Dam and Levee Failure

Safe Dams Program Overview, Tennessee Department of Environment and Conservation.

Flood Insurance Study, Metropolitan Nashville Davidson County, Tennessee, and incorporated Areas, FEMA, November 21, 2002.

Earthquake

A comparison of New Madrid and East Tennessee Seismicity by J. W. Munsey
http://tanasi.gg.utk.edu/quakes.html

Earthquake Information Bulletin, Volume 9, Number 2, March - April 1977.

Southeast Missouri State University, Center for Earthquake Studies
http://www2.semo.edu/ces/Homepage.html

Tennessee Emergency Management Agency
http://www.tnema.org/EP/Earthquake.htm

Flooding

Flood Insurance Study, Metropolitan Nashville Davidson County, Tennessee, and Incorporated Areas, FEMA, November 21, 2002.

Floodplain Management Report, Metropolitan Nashville and Davidson County, Community Rating System, October 1, 2002.

Metropolitan Nashville Department of Public Works

Browns Creek Basin Plan, Nashville-Davidson County, Stormwater Management Study. ERC/EDGe. June 1990.

Cooper Creek Basin Plan, Nashville-Davidson County, Stormwater Management Study. IDE Associates, Inc and Ogden Environmental and Energy Services. December 1994, Revised May 1997.

East Fork Hamilton Creek Basin Plan, Nashville-Davidson County, Stormwater Management Study. ERCE. December 1991.

Gibson Creek Basin Plan, Nashville-Davidson County, Stormwater Management Study. John Coleman Hayes, P.C. and Aubrey L. Fly and Associates. June, 1996

MS4 NPDES Permit No. TNS068047, Annual Report for Permit Year Two. Metropolitan Nashville Department of Public Works. December 1998.

McCrory Creek Basin Plan, Nashville-Davidson County, Stormwater Management Study. Engineering, Design, and Geosciences Group, Inc. June 1988.

Mill Creek, Sorghum Branch, Nashville-Davidson County, Stormwater Management Study. PSI Professional Services, Inc. and Aubrey L Fly and Associates. February 9, 1996

Mill Creek, Tributary 1, Nashville-Davidson County, Stormwater Management Study. Psi Professional Services, Inc. and Aubrey L. Fly and Associates. January 3, 1996

Pages Branch Basin Plan, Nashville-Davidson County, Stormwater Management Study. ERC Environmental and Energy Services Co., Inc. January 1991.

Richland Creek Basin Plan, Nashville-Davidson County, Stormwater Management Study. ERC/EDGe and CH2M Hill. March 1990.

Scotts Creek Basin Plan, Nashville-Davidson County, Stormwater Management Study. John Coleman Hayes, P.C. and Aubry L. Fly and Associates. May 1997.

Whites Creek Basin Plan, Nashville-Davidson County, Stormwater Management Study. Engineering, Design, and Geosciences Group, Inc. and CH2M Hill. December 1988.

Whittemore Branch Basin Plan, Nashville-Davidson County, Stormwater Management Study. July 1996.

Metropolitan Nashville Department of Water Services

Effect of Nashville's Combined Sewer Overflows on the Water Quality of the Cumberland River, Technical Report No. 43. Adams, W.R., Thackston, E.L., Speece, R.E., Wilson, D.J., Cardozo, R., Environmental and Water Resources Engineering, Vanderbilt University. June 1993.

The BETTER Model for Cheatham Lake, Brown, R.T., Gordon, J.A., Roberts, K.L., and Crouch, A.G., Center for the Management, Utilization, and Protection of Water Resources, College of Engineering, Tennessee Technological University (TTU). January 1989.

Tennessee Department of Environment and Conservation (TDEC)

Final 1998 303(d) List. June 1998. Revised July and September 1998.

The Status of Water Quality in Tennessee 1998 305(b) Report, Division of Water Pollution Control. September 1998.

The Tennessee Rivers Assessment Summary Report, Tennessee Department of Environment and Conservation. 1998.

Davidson County Rare Species Data, 24 January 2008

Tennessee Natural Heritage Inventory Program

United States Army Corps of Engineers, Nashville District Basin Plans

Cumberland River

Final Feasibility Report and Environmental Assessment Flood Damage Reduction, Metro Center Levee Cumberland River, Nashville, Tennessee. April 1998.

Metropolitan Nashville Regional Environmental Engineering Study, TN, Reconnaissance Report, Volume 1 and 2, Main Report. May 1993.

Reconnaissance Report Cumberland River Mainstem, Metro-Nashville, Davidson County, Tennessee. August 1989.

Water Supply Study Metropolitan Region of Nashville, Tennessee, Urban Study. September 1987.

Flood Damage Survey, Cumberland River Basin, March 1975. Prepared by Gannet Fleming Corddry and Carpenter, Inc., Engineers, Harrisburg, Pennsylvania. December 1975.

Mill Creek

Mill Creek Basin, Metropolitan Nashville, Tennessee, Communication from The Assistant Secretary of the Army (Civil Works). March 15, 1990.

Addendum to Final Interim Feasibility Report and Environmental Impact Statement, Mill Creek, Metro Region of Nashville, Tennessee. March 1987.

Mill Creek Final Interim Feasibility Report and Environmental Impact Statement, Metro Region of Nashville, Tennessee. June 1986.

Mill Creek Final Interim Feasibility Report, Technical Appendices, Metro Region of Nashville, Tennessee. June 1986.

Mill Creek Interim Plan Formulating Briefing Package, Metropolitan Region of Nashville. September 1984.

Mill Creek and Wimpole Drive Area, Final Detailed Project Report and Environmental Assessment, Nashville, Davidson County, Tennessee. April 1984.

Mill Creek and Wimpole Drive Area, Detailed Project Report, Nashville, Davidson County, Tennessee. July 1983.

Feasibility Report Mill Creek, Metropolitan Region of Nashville, Tennessee. November 1982.

Metropolitan Area of Nashville, Tennessee, Urban Study Interim No. 1 - Mill Creek 12088A, Public Meeting Transcript, Meeting Held At Apollo Junior High School, Antioch, Tennessee, 27 January 1981 at 7:00 PM.

Reconnaissance Report for Flood Damage Reduction and Related Purposes, Mill Creek, Tennessee. February 1980.

Flood Plain Information, Mill Creek - Sevenmile Creek, City of Nashville, Tennessee. January 1973.

Survey Report on Mill Creek, Tennessee. October 1972.

Richland Creek

Reconnaissance Report for Flood Damage Reduction, Richland and Sugartree Creeks, Nashville, Tennessee. December 1980.

Whites Creek

Appraisal Report, Flood Damage Reduction Under Section 205, Whites and Ewing Creeks, Nashville, Tennessee. September 1983. Revised April 1987.

Reconnaissance Report for Flood Damage Reduction, Whites and Ewing Creeks, Nashville, Tennessee. December 1980.

Dry Creek

Final Detailed Project Report and Environmental Assessment (Includes Supplemental FDPR and Supplement to Original EA), Dry Creek, Nashville, Davidson County, Tennessee. March 1986. Revised May 1987. Revised November 1988.

Gibson Creek

Gibson Creek Flood Control Study, Reconnaissance Report.

Browns Creek

West and Middle Forks of Brown's Creek, Section 205 Nonstructural Master Plan, Nashville, Davidson County, Tennessee. June 1988.

Detailed Project Report and Environmental Assessment, Browns Creek, Nashville, Davidson County, Tennessee. August 1985.

Draft Detailed Project Report and Environmental Assessment, Volume 1, Browns Creek, Nashville, Davidson County, Tennessee. March 1985.

McCrory Creek

Potential Flood Damage Study for McCrory Creek, Davidson County, Tennessee. November 1978.

Geological Hazards – Landslides and Sinkholes

USGS - *http://landslides.usgs.gov/html_files/nlic/page5.html*

Environmental Geology Summary of The Bellevue Quadrangle, Tennessee, Robert A. Miller, Tennessee Division of Geology, Environmental Geology Series No. 7, 1980.

Landslides in the Nashville, Tennessee Area – Winter 1975, State of Tennessee, Department of Conservation, Division of Geology, Nashville, Tennessee, 1975, Robert A. Miller and John D. Wiethe, Environmental Geology Series No. 3.

Soil Survey Geographic (SSURGO) database for Davidson County, Tennessee, U.S. Department of Agriculture, Natural Resources Conservation Service, 1981

Slopes >= 25% - Interpreted from Davidson Co. 2007 LiDAR, Kucera International Inc., Interpolated by Metropolitan Planning Department of Nashville and Davidson County

Infestations

Tennessee Department of Health
http://www2.state.tn.us/health/CEDS/wnvhome.asp

United States Geological Survey
http://westnilemaps.usgs.gov/.

Severe Weather

Drought and Brush Fire

Climate Prediction Center; National Weather Service.
http://www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html

National Climatic Data Center; Climate Resources, Climate Data, Events, Storm Events.
http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

National Drought Mitigation Center, University of Lincoln, Nebraska.
http://www.drought.unl.edu/

Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1991

The Oak Ridger newspaper
http://www.oakridger.com/stories/092199/com_0921990036.html

U.S. Fish and Wildlife Service
http://fire.fws.gov/fm/stats/stats.htm

Regulatory Intelligence Data - November 3, 2000
http://www.highbeam.com/library/doc0.asp?docid=1P1:37954085&refid=ink_key

National Interagency Fire Center
http://www.fs.fed.us/land/wfas/fd_class.gif

Extreme Temperatures

Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1993

National Climatic Data Center; Climate Resources, Climate Data, Events, Storm Events. http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

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/High Wind

Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1993.

National Climatic Data Center; Climate Resources, Climate Data, Events, Storm Events. http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

National Weather Service Forecast Office; Nashville, TN; Calendar of Significant Weather Events in Middle TN
http://www.srh.noaa.gov/ohx/climate/calendar.htm

Tornadoes

National Weather Service
http://www.srh.noaa.gov/ohx/tornado/davidson.htm

Winter Storms

Chronology of Disasters in TN (Including Natural and Man caused Disasters, Epidemics and Civil Disturbances) Allen P. Coggins, 1993

National Climatic Data Center; Climate Resources, Climate Data, Events, Storm Events. http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

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 – The Deceptive Killers, A Preparedness Guide; U.S. Department of Commerce, National Oceanic and Atmospheric Administration; National Weather Service; December 2001.