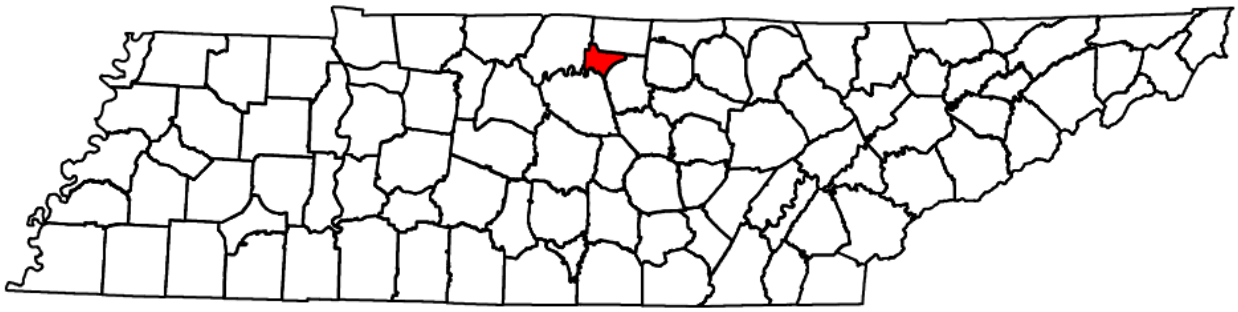
Trousdale County
Hazard Mitigation Plan

2024 Update



Prepared By:
Trousdale County Hazard Mitigation Planning Committee
Trousdale County Emergency Management Agency/Office of Emergency Management

Assistance Provided By:
Tennessee Emergency Management Agency
as part of the Tennessee Mitigation Initiative

September 20, 2024

Executive Summary

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

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

The advantages of developing a local hazard mitigation plan are numerous and include improved post-disaster decision-making, education on mitigation approaches, and an organizational method for prioritizing mitigation projects. Communities with a mitigation plan receive larger amounts of Federal and State funding opportunities to be used on mitigation projects and can receive these funds faster than communities without a plan. This 2024 update of the Trousdale County Hazard Mitigation Plan addresses the requirements for Building Resilient Communities and Infrastructure (BRIC), Flood Mitigation Assistance (FMA), and the Hazard Mitigation Grant Program (HMGP). Hartsville-Trousdale County is a metropolitan jurisdiction.

- Metropolitan Hartsville-Trousdale County

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

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Chapter 1. The Planning Process

1.1 Purpose and Need, Authority and Statement of Problem

1.1.1 Purpose and Need

FEMA defines "hazard mitigation" as any sustained action taken to reduce or eliminate the long-term risk to life and property from a hazard event. Hazard mitigation planning is the process through which hazards are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies defined, prioritized, and implemented. The Hazard Mitigation Plan aims to identify, assess, and mitigate risk to better protect the people and property of Metropolitan Hartsville-Trousdale County from the effects of natural and man-made hazards. This Plan documents the hazard mitigation planning process and identifies relevant hazards, vulnerabilities, and strategies the County and incorporated jurisdictions will use to decrease vulnerability and increase resiliency and sustainability. This Plan demonstrates the participating communities' commitment to reducing risks from identified hazards and serves as a tool to help decision-makers direct mitigation activities and resources.

1.1.2 Authority

This Hazard Mitigation Plan has been adopted by Metropolitan Hartsville-Trousdale County in accordance with the authority granted to local communities by the State of Tennessee. This Plan was updated per state and federal rules and regulations governing local hazard mitigation plans. The Plan shall be reviewed annually and go through a complete update process every five years to remain eligible for hazard mitigation grants. The following legislation was used for guidance:

- Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act or the Act), 42 U.S.C. 5165, enacted under Section 104 of the Disaster Mitigation Act of 2000 (DMA 2000) Public Law 106-390 of October 30, 2000, as implemented at 44 CFR 201.6 and 201.7 dated October 2011.

- Tennessee Code Annotated
  - **T.C.A. 58-2-106(b)(16)**
  - **T.C.A. 58-2-106(b)(1)**
  - **T.C.A. 58-2-103(a)(5)**

1.1.3 Statement of Problem

Each year in the United States, natural disasters take the lives of hundreds of people and injure thousands more. Taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. Unfortunately, this only partially reflects the cost of disasters because additional expenses incurred by insurance companies and non-governmental organizations are not reimbursed by tax dollars. Many

natural disasters are predictable, and much of the damage caused by these events can be reduced or even eliminated.

The original Metropolitan Hartsville-Trousdale County Hazard Mitigation Plan was created and approved by FEMA in 2019. Per federal requirements stated in *44 CFR 201*, all local hazard mitigation plans are required to go through a FEMA approval process every five years to remain eligible for hazard mitigation grants. This plan will be re-evaluated and updated every five years to ensure local governments are continuing to assess the hazards and risks within their communities. This plan update has been prepared to meet requirements set forth by FEMA and the Tennessee Emergency Management Agency (TEMA) to ensure Metropolitan Hartsville-Trousdale County is eligible for funding and technical assistance from state and federal hazard mitigation programs. All communities are welcome to address man-made hazards and risks in their hazard mitigation plan. However, it's important to note that the State and Federal governments only evaluate and approve based on natural hazards as per federal code title 44 CFR 201.

1.2 Methodology, Update Process, and Participation Summary

This Hazard Mitigation Plan was developed under the guidance of a Hazard Mitigation Planning Committee (HMPC), which included representatives of Metropolitan Hartsville-Trousdale County.

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. This plan identifies activities that can be undertaken by both the public and the private sectors to reduce risk to safety, health, and property caused by natural and man-made hazards.

1.2.1 Local Government Participation

The planning regulations and guidance stress that each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the HMPC.
- Detail where, within the planning area, the risk differs from that facing the entire area.
- Identify potential mitigation actions.
- Formally adopt the plan.

For the HMPC, “participation” meant the following:

- Providing facilities for meetings.
- Attending and participating in the HMPC meetings.
- Collecting and providing other requested data (as available).
- Identifying mitigation actions for the plan.

- Reviewing and providing comments on plan drafts.
- Informing the public, local officials, and other interested parties about the planning process and providing opportunities for them to comment on the plan.
- Coordinating and participating in the public input process.
- Coordinating the formal adoption of the plan by the appropriate governing body.

The HMPC met all the above-stated participation requirements. Metropolitan Hartsville-Trousdale County participated in the 2024 plan update and reviewed and provided timely comments on all draft components of the plan. A summary of past and current community participation is shown below in Table 1. The County EMA Director emailed all participants to invite them to this committee and reached out to those who did not originally respond via phone or email.

Table 1: Multi-Jurisdictional HMPC Participation

Jurisdiction	2019 Participation	2024 Participation
Metropolitan Hartsville-Trousdale County	Yes	Yes

The HMPC for the 2024 plan update included key community representatives. *Table 2* details the HMPC members, meeting dates, associated FEMA Lifeline, and committee member attendance. FEMA Lifelines are a fundamental way for a community to recover; however, not all participants might be associated with one. If they are not associated with a FEMA Lifeline, then they will be indicated as not applicable (NA).
The EMA director invited individuals who represented regional and local agencies that have authority in regulating county/city development, individuals that represent vulnerable populations, as well as those that are responsible for responding to the identified hazards of prime concern. These partners include jurisdictional police, fire, public works, and health departments, community representatives, nonprofit organizations, local floodplain administration, the county/city school board, elected officials, and electric utility companies. All committee members provided key information to recognize and mitigate hazards of prime community concern. A more detailed summary of HMPC meeting dates, members seeking approval and FEMA lifeline association follows in *Table 2*. Meeting sign-in sheets are included in Appendix A.

Table 2: HMPC Members

Name	Title	Associated FEMA Lifeline	Organization/ Jurisdiction	Meeting Dates	
				DATE	DATE
Jack McCall	Mayor	ALL	Metro Hartsville Trousdale County	12 June 24	12 Sep 24
Mark Beeler	Fire Chief	Safety & Security/Hazardous Materials	Trousdale County Fire Dept.	12 June 24	12 Sep 24
Christy Cooley	Quality Director	Health & Medical	Trousdale Medical	12 June 24	
Kelly Anderson	Director of	Health &	Trousdale Medical	12 June 24	

	Nursing	Medical			
Candice Hall	Register of Deeds	Food, Hydration, and Shelter	Metro Hartsville-Trousdale County	12 June 24	
Matthew Batey	EMA Director	ALL	Metro Hartsville-Trousdale County	12 June 24	12 Sep 24
Rosalie Myhan	Building & Codes	Food, Hydration, & Shelter	Metro Hartsville-Trousdale County	12 June 24	
Peter Griffin	District Coordinator	Safety & Security	TEMA		12 Sep 24
Robert Perkins	Planner	Safety & Security	TEMA	12 June 24	
Thomas Isbell	Planner	Safety & Security	TEMA		12 Sep 24
Dwight Jewell	Commissioner	ALL	Metro Hartsville-Trousdale County		12 Sep 24
Joseph Nirasadshanow	Manager	ALL	Industry		12 Sep 24

***EMA Director Batey and Rosalie Myhan represented underserved communities and vulnerable populations through community outreach and conversations with persons from these population groups. These outreach efforts ensured the opinions and views of underserved and vulnerable populations were considered and used as part of the planning effort and the development of the mitigation strategy. The needs and unique circumstances surrounding underserved and vulnerable populations were a planning factor in all phases of the development of this Hazard Mitigation Plan.**

1.2.2 Hazard Mitigation Planning Process

The 2024 Metropolitan Hartsville-Trousdale County Hazard Mitigation Plan was updated following guidance put forth by FEMA in the *Local Mitigation Planning Policy Guide,* which became effective on April 19, 2023. This guidance emphasized the need for a whole-community planning approach that includes representatives from all sectors of the community, with an emphasis on the increased need for vulnerable and underserved population representation. The guidance also highlighted the increased emphasis on risk, vulnerability, and resilience assessments, the inclusion of high-hazard dams, and future weather trends/patterns.

FEMA guidance proposes a structured four-phase approach to completing a Hazard Mitigation Plan as follows:

1) Planning Process
2) Risk Assessment
3) Mitigation Strategy
4) Plan Maintenance

Phase I - Planning Process

Organize to Prepare the Plan

The planning process officially began with a meeting held on 12 June 2024 at the Mayor's Conference Room. The meeting covered the scope of hazard mitigation, the purpose of planning, eligible grants, risk assessments, and vulnerabilities impacting the community. During the planning process, the committee communicated through face-to-face meetings,

email, and telephone conversations. The County EMA Director telephonically invited the neighboring communities to the planning committee meetings; however, none chose to attend.

Involve the Public

Early discussions established the significance of involving the public. The HMPC agreed to an approach using established public information mechanisms and resources within the community. Public involvement activities for this plan update included public notices, stakeholder and public meetings, and the collection of public and stakeholder comments on the draft plan. In order to ensure socially vulnerable and underserved populations were included in organizing efforts, the Trousdale County EMA director contacted organizations that had roots within the community, such as churches, civic organizations, and community centers. Due to the nature of the public meetings, neighboring communities, agencies, utilities, academia, civic organizations, and other interested parties were given the opportunity to participate.

A public notice inviting members of the public to attend the 12 September 24 Hazard Mitigation Planning Committee meeting was posted on 15 May 24 in the Trousdale County Courthouse and Library. Appendix A contains documentation to support outreach efforts, such as community flyers and website postings.

Sign-in sheets from all meetings are included in Appendix A. The meeting date and topics discussed are summarized below in *Table 3*. The meeting on 12 September was open to the public and announced via flyers and the County Website; however, no members of the general public chose to attend.

Table 3: Summary of Hazard Mitigation Planning Meetings

Meeting Number	Meeting Topic	Meeting Date	Meeting Location
Meeting # 1	Overview of hazard mitigation	**12 June 24**	**County Mayor's Conference Room**
	Hazard Mitigation Planning Process		
	Purpose of the HMP		
	Area growth and changes		
	Identification of Hazards		
	Future weather predictions		
	Assessment of risk, vulnerabilities, resilience		
	Review of NFIP		
	Previous HMP goals/projects		
	New goals/projects		
Meeting # 2	Overview of hazard mitigation	**12 September 24**	**County Mayor's Conference Room**
	Hazard Mitigation Planning Process		

	Purpose of the HMP		
	Area growth and changes		
	Identification of Hazards		
	Future weather predictions		
	Assessment of risk, vulnerabilities, resilience		
	Review of NFIP		
	Previous HMP goals/projects		
	New goals/projects		

Coordination

Early in the planning process, the committee determined that the risk assessment, mitigation strategy development, and plan approval would be greatly enhanced by inviting other local and state partners to participate in the process. The coordination involved contacting these agencies through email, flyers, in-person, and phone conversations. All groups and agencies were advised on how to become involved in the plan development process and were solicited, asking for their assistance and input. A summary of agencies and organizations actively involved in the HMPC is as follows:

- Tennessee Emergency Management Agency
- Trousdale County Emergency Management Agency / Office of Emergency Management
- Local Health Care Agencies
- County Building Code Enforcement
- County Fire Department
- Weldon Industrial
- County Mayor and Commissioners

Coordination with other community planning efforts was also paramount to the success of this plan. Mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability to hazards. Trousdale County uses a variety of planning mechanisms, such as land development regulations and ordinances, to guide growth and development. Integrating existing planning efforts, mitigation policies, and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs.

Table 4 identifies the existing planning mechanisms that were reviewed and how they were incorporated into the 2024 Hazard Mitigation Plan Update.

Table 4: Planning Mechanism Review

Existing Planning Mechanisms	Reviewed? (Yes/No)	Method of Use in Hazard Mitigation Plan
State Hazard Mitigation Plan	Yes	Identifying hazards, assessing vulnerabilities, and mitigation strategies
Local Emergency Operations Plan	Yes	Identify major capabilities

Community Data Profile	Yes	Development trends, capability assessment
Stormwater Ordinance	Yes	Capability assessment, mitigation strategies
Building and Zoning Codes and Ordinances	Yes	Different years of code regulations utilized in different jurisdictions
CDC Social Vulnerability Index	Yes	Analyze vulnerable populations in jurisdictions
FEMA's National Risk Index	Yes	Analyze natural hazard risk within each jurisdiction
Land Use Maps	Yes	Assessing vulnerabilities, development trends, and mitigation strategies
Critical2TN Infrastructure Database	Yes	Assessing vulnerabilities, mitigation strategies
NOAA Archives	Yes	Analyze weather data and trends
ETSU Geoinformatics & Disaster Science Lab	Yes	Analyze future weather trends and patterns
U.S Census Bureau	Yes	Analyze community demographic data and trends
Local County Hazard Mitigation Plan	Yes	Analyze previous plan for updates
Flood Insurance Rate Maps	Yes	Analyze flood-prone areas within the community
Budget & Finance Plans	Yes	Analyze funding constraints.

These and other documents were reviewed and considered, as appropriate, during the collection of hazard identification, vulnerability assessment, and capability assessment. Data from these plans and ordinances were incorporated into the plan's risk assessment and hazard vulnerability sections as appropriate. The data was also used to determine the community's capability to implement certain mitigation strategies. To further enhance integration, the local hazard mitigation plan will be strategically synchronized with existing county and jurisdictional policies, plans, and procedures, leveraging investments from their own budgets. This coordinated effort maximizes resources and promotes efficient allocation of funds towards mitigation projects, strengthening community resilience against a spectrum of hazards.

Building codes are evaluated on a consistent basis to determine what is most beneficial for the community and how building codes can further mitigate risk. In Trousdale County, no new editions of building codes have been adopted since the last hazard mitigation plan. Currently, Trousdale County has adopted the 2018 ICC codes for both residential and commercial buildings.

Table 5: Planning Mechanism Analysis

Existing Planning Mechanisms	Updated? (Yes/No)	How was it utilized?
Local Basic Emergency Operations Plan	Yes	Identify major capabilities
Stormwater Ordinance	Yes	Capability assessment, mitigation strategies
Building and Zoning Codes and Ordinances	Yes	Different years of code regulations utilized in different jurisdictions
Critical2TN Infrastructure Database	Yes	Assessing vulnerabilities, mitigation strategies
Budget Hearings	Yes	Financial Budgeting

The Trousdale County Emergency Management Agency has inetrated mitigation into other planning mechanisms by incorporating it into the emergency operations plan and by

addressing it to the county comission. With the exception of these limited incorporations, the county has not taken any additional action to incorporate mitigation into other planning mechanisms.

Phase II – Risk Assessment

Identify the Hazard, Assess the Risk and Vulnerabilities

The committee completed a comprehensive effort to identify/update, document, and profile all hazards that have, or could have, an impact on the community. The committee also conducted a capability assessment to review and document the planning area's current capabilities and gaps. By collecting information about existing government programs, policies, regulations, ordinances, and emergency plans, the committee could assess the activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. A more detailed description of the risk assessment process and the results are included in Chapter 2, Risk and Vulnerability Assessment.

Phase III – Mitigation Strategy

Set Goals and Review Actions

This meeting facilitated brainstorming and discussion sessions that described the purpose and process of developing planning goals and objectives, a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. This information is included in Chapter 3, Mitigation Strategy.

Draft an Action Plan

A complete first draft of the plan was prepared based on information and input collected during the HMPC meetings, and various agencies and individuals were invited to comment on this draft. Public and agency comments were integrated into the final draft for TEMA and FEMA Region IV to review and approve, contingent upon final adoption by Metropolitan Hartsville-Trousdale County.

Phase IV – Plan Maintenance

Adopt the Plan

To secure buy-in and officially implement the plan, the plan was reviewed and adopted by the appropriate governing bodies.

Implement, Evaluate, and Revise the Plan

Implementation and maintenance of the plan are critical to the overall success of hazard mitigation planning and actions. Chapter 4, Plan Integration and Maintenance, discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

1.3 Plan Update

The 2024 Metropolitan Hartsville-Trousdale County Hazard Mitigation Plan contained a hazard identification and risk assessment aimed at mitigating risk. Since then, progress has been made in implementing the mitigation strategy, with four completed actions and five

in progress. The HMPC has met annually over the past five years to monitor, implement, and update the plan. This chapter includes an overview of the approach to updating the plan and identifies new analyses and information included in this plan update.

1.3.1 The New Plan

The updated plan involved a comprehensive review and revision of each section of the 2019 plan and included an assessment of the success of the County and the incorporated jurisdictions in evaluating, monitoring, and implementing the mitigation strategy outlined in the 2019 plan. Only the information and data still valid from the 2019 plan were carried forward as applicable in this update. The following requirements were addressed during this plan update process with consideration of the priorities and goals of the Metropolitan Hartsville-Trousdale County Hazard Mitigation Planning Committee:

- Consider changes in vulnerability due to action implementation.
- Document success stories where mitigation efforts have proven effective.
- Document areas where mitigation actions were not effective.
- Document any new hazards that may arise or were previously overlooked.
- Document NFIP as related to the county and jurisdictions.
- Incorporate new data or studies on hazards and risks.
- Incorporate new data related to future climate patterns and trends.
- Incorporate new capabilities or changes in capabilities.
- Incorporate social vulnerability data and vulnerable population information.
- Incorporate growth and development-related changes to inventories.
- Incorporate new action recommendations or changes in action prioritization.
- Enhanced public outreach and multi-agency coordination efforts.

1.3.2 2024 HMP Strategy Review

During the 2024 update of the Metropolitan Hartsville-Trousdale County Hazard Mitigation Plan, the HMPC identified 15 actions as relevant to the county. Of these 15 actions, four have been completed, five are in progress, and eight have not been started. Actions that had not been pursued were discussed for relevance to the new plan and were carried over to the 2024 plan or deleted from the strategy. 11 of these projects were determined to still be viable and will be carried over or revised in this plan update. Details and the status of all previous actions are in *Table 5.*

Table 6: Mitigation Action Progress Summary (2024 Plan)

Action Number	Action Description	Responsible Dept.	Location	Current Status			2024 Plan Update		Funding Source				Priority Score	Est. Cost	New or Existing Infrastructure
				Complete	In-Progress	Not yet Started	Delete Action	Carry Forward or Revise	HMGP	BRIC[1]	FMA	Local			
Flooding															
8	Stormwater drainage system for the downtown Hartsville area.	Mayor's Office	Hartsville			X		X	X	X	X		12	200 K	Existing
9	Buyout of RL and SRL Properties.	Mayor's Office	Countywide			X	X		X	X	X		10	300 K	Existing
11	Procurement of heavy-duty side-mounted equipment used to clear trees and brush along heavy-traffic portions of roadways affected by a disaster.	Highway Dept.	Countywide			X		X	X	X	X		9	240 K	Both
12	Raising Road Elevation on flood-prone roadways.	Highway Dept.	Countywide			X	X		X	X	X		8	1 M	Existing
15	Road Culvert Projects	Highway Dept.	Countywide			X		X	X	X	X		8	500 K	Existing
Severe Storm/ Tornado															
5	Public Safe Space at School	Mayor's Office	School			X		X	X	X			12	1.5 M	Existing
14	Warning Sirens	EMA	Countywide	X			X		X	X		X	8	40 K	Both
Drought															
10	Upgrade water supply systems	Water Dept.	Countywide		X			X	X	X			10	4.5 M	Existing
All															
1	Adding address numbers to all houses.	EMA	Countywide	X			X					X	15	45 K	Both
2	Public Awareness Campaign	EMA	Countywide		X			X				X	14	2 K	Both

[1] BRIC previously referred to as PDM in the 2017 Hazard Mitigation Plan

4	Provide Mitigation Educational Material to the public	EMA	Countywide	X			X					X	12	1 K	Existing
6	Create continuity of operations space for government services with full communication capabilities	EMA	Countywide			X		X	X	X			12	300 K	Both
7	Use GIS Mapping to mark all gas and water shut-offs	Utilities	Countywide	X			X					X	12	10 K	Both

1.4 Multi-Jurisdictional Special Considerations

Hazards Assessment

Most of the natural hazards identified within this plan impact. Some hazards have a larger impact in the more rural areas rather than in the city of Hartsville and vice versa. The impacts of identified hazards differ the most at the rural and urban interface, where flooding can have different severity levels. Therefore, the flooding section emphasizes the depth, duration, and timing of severe flooding events. Trousdale County and the City of Hartsville comprise a Metropolitan County Government.

Hazards	Will the hazard have multi-jurisdictional differences?
Drought	No
Extreme Temperature	No
Flooding	No
Severe Weather	No
Tornado	No

1.5 Public Participation

Public involvement included web announcements, public meetings, and a public comment period on the draft plan. Organizations representing vulnerable and underserved populations were contacted to gain further input from populations most at risk during hazardous events. The formal public meetings for this plan are summarized in Table 3 (Section 1.2.2), discussed early in this chapter. The 12 September 24 HMPC meeting was open to the public; however, no members of the public chose to attend.

A public notice was posted on 1 May 24 at the County Courthouse and Library. Documentation to support the public outreach efforts can be found in Appendix A. Over the past five years, the community was kept involved in the planning process through the implementation of projects in the plan.

County Profile.

HARTSVILLE
TROUSDALE COUNTY
2024 COMMUNITY DATA PROFILE

QUICK FACTS

County Seat	Hartsville
Year Incorporated	1833
Land Area in Square Miles (County)	114
Water Area in Square Miles (County)	2
Latitude	N36° 23.45'
Longitude	W86° 10.03'
Elevation	474'
Market Region	Nashville
Distance From Nashville	45 miles
Time Zone	Central
County Website	www.trousdalecountytn.gov
Additional Incorporated Cities within the County	None
Unincorporated Cities	None

POPULATION

	City	County
2020 (Census)	10,110	11,615
2023 Population	10,447	11,996
2023 Median Age	38.2	38.6
2028 Population Projection	10,764	12,385
Annual Growth Rate (2023-2028 Projected)	0.60%	0.64%

Source: ESRI

CLIMATE

Annual Average Temperature	57.9° F
Average High Temperature	69.2° F
Average Low Temperature	46.6° F
Annual Average Precipitation	53.19"
Annual Average Snowfall	0"
Prevailing Winds	South-Southwest
Mean Length of Freeze-Free Period (days)	180-220

TAX STRUCTURE

LOCAL	City	County
Property Taxes (2023)		
• Rate per $100 value	$2.6108	$2.6608
• Outside City limits		$1.9877
Ratio of Assessment		
• Residential and Farm	25%	25%
• Commercial/Industrial	40%	40%
• Personal (Equipment)	30%	30%
Total Local Assessment (2022)	$69,482,420	$302,727,638
Hotel-Motel Tax	0%	3%
Motor Vehicle Wheel Tax Rate	$0.00	$0.00

Source: Tennessee Comptroller of the Treasury, Division of Property Assessments
Source: County Technical Assistance Service, UTIP

STATE

Sales Tax
- 4% tax on food and food ingredients
- 7% on all other tangible personal property unless specifically exempted

Local Sales Tax Rate
- 2.25%

Local and State Sales Tax Collected (FY2023)
- $7,382,372

Income Tax
- **Personal:** Repealed beginning January 1, 2021
- **Corporate Excise Tax:** 6.5% of Tennessee taxable income
- **Franchise Tax:** .25% of the greater of the Tennessee portion of net worth or the book value of real and tangible property in Tennessee. The minimum tax is $100
- **Unemployment Tax:** New employers is typically 2.7% (based on occupation) of first $7,000

Source: Tennessee Department of Revenue

EDUCATION

District Name	Trousdale County
Type of Public School System	County
District Grades Served	Pre-K-12
Number of Schools	3
Number of Classroom Teachers	89
Student to Teacher Ratio	15:1
Additional Staff	13
Total Number of Students	1,374
Number of Private Schools	0
Total Number of Students	0
Number of Teachers	0
Number of High School Graduates (2023)	79
Graduation Rate	97.5%
Educational Attainment with a Degree (Adults Age 25+)	19.4%

Source: Tennessee Department of Education

REGIONAL HIGHER EDUCATIONAL INSTITUTIONS (within 30 miles)

• Cumberland University	Lebanon
• TN College of Applied Technology	Hartsville
• Volunteer State Community College	Gallatin
• Welch College	Gallatin

Source: National Center for Education Statistics

FastTrack Job Training Assistance Program Available Yes

Source: Tennessee Department of Economic and Community Development

GOVERNMENT

GOVERNING BODY

Metro	County Mayor and Commissioners Meets 4th Monday at 7:00 p.m. Courthouse

Fire Department (Metropolitan Government)

• Full-time fire fighters in county	0
• County volunteers	18-20
• Fire stations in county	1
• County fire trucks	3

Law Enforcement (Metropolitan Government)

• Full-time police officers in urban services district	4
• Full-time police officers in county & sheriff	14
• Urban services district patrol cars	4
• County patrol cars	14

	City	County
Insurance Rating	7	10
Zoning Regulations	Yes	Yes
Planning Commission	Yes	Yes
Industrial Development Corp.	Yes	Yes

TRANSPORTATION

AIR SERVICE

Nearest General Aviation	Sumner County Regional Airport
Location Identifier	XNX
Distance from Hartsville	16 miles
Runway Length	6,301 feet
Surface	Asphalt
Lighting	MIRL/PAPI
Fuel	100LL/Jet A
Repairs	Major/Minor
Storage	Hangar, Tie Down
Transportation	Taxi, Courtesy and Rental Car
Nearest Commercial Service	Nashville International Airport
Location Identifier	BNA
Distance from Hartsville	44 miles

Nashville International Airport (BNA) serves approximately 17 million total passengers annually. BNA is currently served by 22 major carriers, including international carriers. BNA offers 585+ daily flights and provides nonstop air service to more than 101 destinations.

HIGHWAYS

U.S. Highways	231
State Highways	25, 10, 141, 260
Nearest Interstate	20 miles to Interstate 40

COMMON CARRIERS

Air Freight Companies	None
Motor Freight Companies	3
Terminal Facilities	1
Bus Services	
Inter-City	No
Local	No
Carrier Service	UPS

RAILROADS SERVED BY

None

NAVIGABLE WATERWAYS

River	Cumberland
Channel Depth	9 feet
Nearest Port Facility	Nashville
Miles from Port	45

COMMUNICATIONS

Newspapers	Hartsville Vidette The Macon Chronicle The Tennessean
Telephone Companies	Tri-County Electric/Fiber Communications; AT&T; North Central Telephone Coop.
Radio Stations	WTNK Fun Radio (1090 AM/93.5 FM)
Television Networks	Nashville Region
Fiber Optics Available	Yes
Provider	Tri-County Electric/Fiber Communications; North Central Telephone Coop.; Comcast

2024 COMMUNITY DATA PROFILE

COMMUNITY FACILITIES

Health Care	
Doctors	7
Dentists	2
Hospitals	1
Beds	25
Clinics	1
Beds	5
Nursing Homes	1
Beds	95
Retirement Homes	0
Beds	0
Residential Care/ Assisted Living	1
Beds	36
Boarding Home	1
Beds	33

Recreation	
Libraries	1
Parks	2
Golf Courses (Public & Private)	0
Swimming Pools (Public & Private)	1
Country Clubs	0
Theaters	0
Bowling Alleys	0

Hotels & Motels	0
Rooms	0
Bed & Breakfasts	0

Religious Organizations	
Protestant	18
Catholic	0
Jehovah's Witness	0
Jewish	0
Spanish	1
Other	

Largest Meeting Room	
Capacity	500

Restaurants	15

Day Care Centers	5
Day Care Homes	0

Other
Senior Citizen Center, Community Center, Correctional Facility

FINANCIAL INSTITUTIONS

Banks:	Total Number of Institutions	2
	Total Number of Offices	2
	Deposits	240,000,000
Credit Unions:	Total Number of Branches	0
	Total Number of Offices	0
	Deposits	0
Countywide Combined Deposits (Deposits for June 30, 2023)		$240,000,000

Source: Federal Deposit Insurance Corporation and National Credit Union Administration

INDUSTRIAL SUPPORT SERVICES

Service	Location	Distance (Miles)
Tool & Die	Gallatin	16
Heat Treating	Nashville	48
Heavy Hardware	Nashville	48
Sheet Metal	Nashville	48
Lubricants	Nashville	48
Welding Supplies	Nashville	48

SELECTED ECONOMIC INDICATORS

2023 ANNUAL AVERAGES (AGE 16+)

Labor Force	County	Labor Market Area*
Population	10,166	285,065
Employed	5,106	172,040
Unemployed	148	6,453
Unemployment Rate	2.8%	3.6%

* Drive Time: 45 minute radius from Hartsville (County seat)

Source: ESRI

2023 EMPLOYED POPULATION (AGE 16+) BY INDUSTRY

Agriculture/Mining	0.6%
Construction	8.9%
Manufacturing	9.4%
Wholesale Trade	2.9%
Retail Trade	14.4%
Transportation/Utilities	11.7%
Information	0.5%
Finance/Insurance/Real Estate	3.9%
Services	39.9%
Public Administration	7.9%

Source: ESRI

MANUFACTURING IN AREA (Annual Averages 2022)

Number of Units	11
Ann. Avg. Employment	297
Ann. Avg. Weekly Wage	$1,022

Source: Tennessee Department of Labor and Workforce Development

PER CAPITA PERSONAL INCOME

Year	2023
Amount	$23,225

Source: ESRI

MEDIAN HOUSEHOLD INCOME

Year	2023
Amount	$55,019

Source: ESRI

AVERAGE HOME SALES

Year	2022
Number of Homes Sold	179
Average Cost	$320,657
2023 Median Home Value	$212,963

Source: Tennessee Housing Development Agency

RETAIL SALES

Year	2022
Amount	$83,497,286

Source: Tennessee Department of Revenue

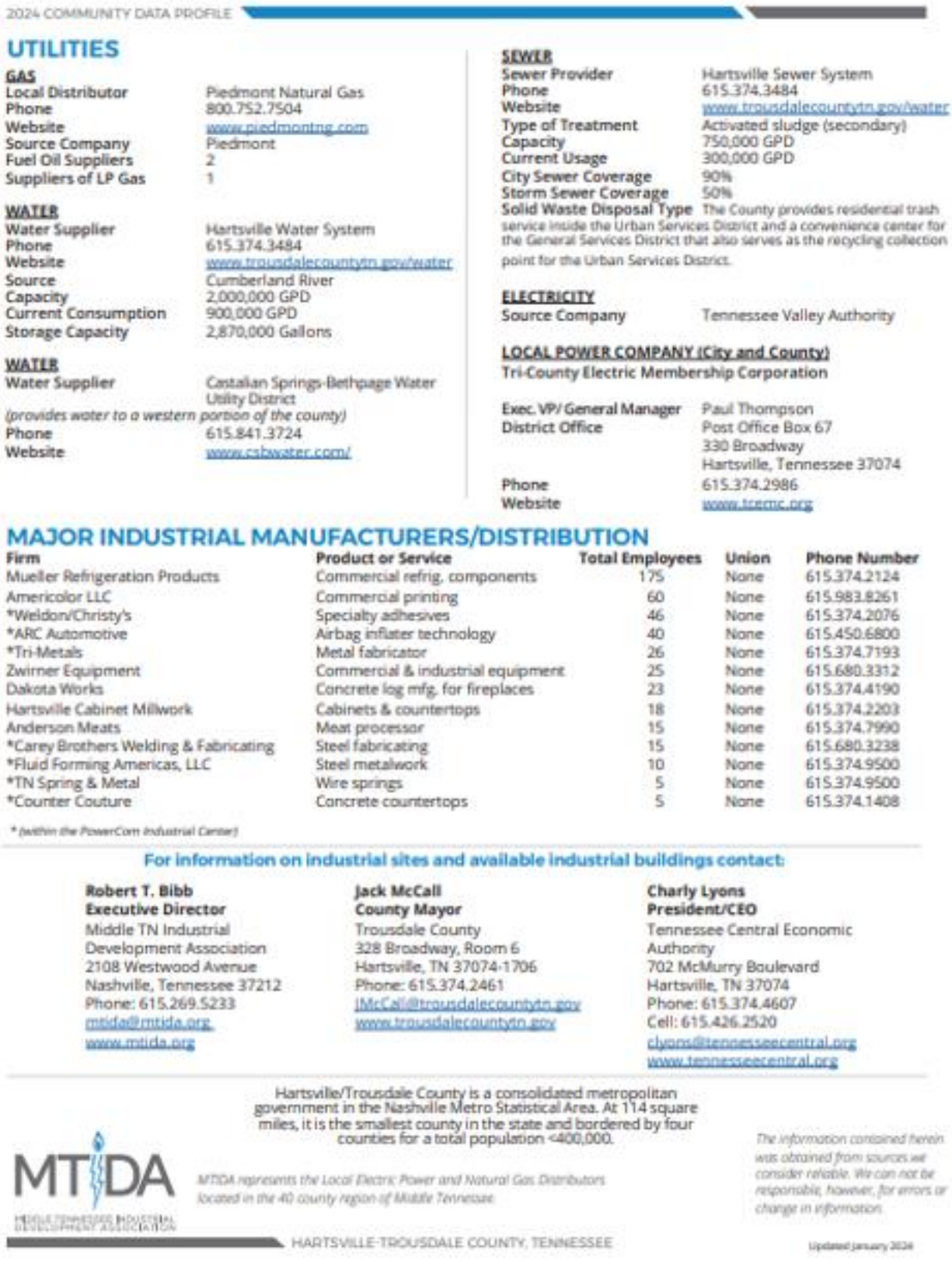
NATURAL RESOURCES

Minerals: Limestone, shale, sandstone and claystone
Timber: Hardwood

AGRICULTURAL

Crops: Hay, soybeans, wheat, tobacco and corn
Livestock: Cattle and goats

HARTSVILLE-TROUSDALE COUNTY, TENNESSEE



2024 COMMUNITY DATA PROFILE

UTILITIES

GAS

Local Distributor	Piedmont Natural Gas
Phone	800.752.7504
Website	www.piedmontng.com
Source Company	Piedmont
Fuel Oil Suppliers	2
Suppliers of LP Gas	1

WATER

Water Supplier	Hartsville Water System
Phone	615.374.3484
Website	www.trousdalecountytn.gov/water
Source	Cumberland River
Capacity	2,000,000 GPD
Current Consumption	900,000 GPD
Storage Capacity	2,870,000 Gallons

WATER

Water Supplier	Castalian Springs-Bethpage Water Utility District

(provides water to a western portion of the county)

Phone	615.841.3724
Website	www.csbwater.com/

SEWER

Sewer Provider	Hartsville Sewer System
Phone	615.374.3484
Website	www.trousdalecountytn.gov/water
Type of Treatment	Activated sludge (secondary)
Capacity	750,000 GPD
Current Usage	300,000 GPD
City Sewer Coverage	90%
Storm Sewer Coverage	50%
Solid Waste Disposal Type	The County provides residential trash service inside the Urban Services District and a convenience center for the General Services District that also serves as the recycling collection point for the Urban Services District.

ELECTRICITY

Source Company	Tennessee Valley Authority

LOCAL POWER COMPANY (City and County)

Tri-County Electric Membership Corporation

Exec. VP/ General Manager	Paul Thompson
District Office	Post Office Box 67 330 Broadway Hartsville, Tennessee 37074
Phone	615.374.2986
Website	www.tcemc.org

MAJOR INDUSTRIAL MANUFACTURERS/DISTRIBUTION

Firm	Product or Service	Total Employees	Union	Phone Number
Mueller Refrigeration Products	Commercial refrig. components	175	None	615.374.2124
Americolor LLC	Commercial printing	60	None	615.983.8261
*Weldon/Christy's	Specialty adhesives	46	None	615.374.2076
*ARC Automotive	Airbag inflater technology	40	None	615.450.6800
*Tri-Metals	Metal fabricator	26	None	615.374.7193
Zwirner Equipment	Commercial & industrial equipment	25	None	615.680.3312
Dakota Works	Concrete log mfg. for fireplaces	23	None	615.374.4190
Hartsville Cabinet Millwork	Cabinets & countertops	18	None	615.374.2203
Anderson Meats	Meat processor	15	None	615.374.7990
*Carey Brothers Welding & Fabricating	Steel fabricating	15	None	615.680.3238
*Fluid Forming Americas, LLC	Steel metalwork	10	None	615.374.9500
*TN Spring & Metal	Wire springs	5	None	615.374.9500
*Counter Couture	Concrete countertops	5	None	615.374.1408

* (within the PowerCom Industrial Center)

For information on industrial sites and available industrial buildings contact:

Robert T. Bibb
Executive Director
Middle TN Industrial Development Association
2108 Westwood Avenue
Nashville, Tennessee 37212
Phone: 615.269.5233
mtida@mtida.org
www.mtida.org

Jack McCall
County Mayor
Trousdale County
328 Broadway, Room 6
Hartsville, TN 37074-1706
Phone: 615.374.2461
JMcCall@trousdalecountytn.gov
www.trousdalecountytn.gov

Charly Lyons
President/CEO
Tennessee Central Economic Authority
702 McMurry Boulevard
Hartsville, TN 37074
Phone: 615.374.4607
Cell: 615.426.2520
clyons@tennesseecentral.org
www.tennesseecentral.org

Hartsville/Trousdale County is a consolidated metropolitan government in the Nashville Metro Statistical Area. At 114 square miles, it is the smallest county in the state and bordered by four counties for a total population <400,000.

MTIDA

MIDDLE TENNESSEE INDUSTRIAL DEVELOPMENT ASSOCIATION

MTIDA represents the Local Electric Power and Natural Gas Distributors located in the 40 county region of Middle Tennessee.

The information contained herein was obtained from sources we consider reliable. We can not be responsible, however, for errors or change in information.

HARTSVILLE-TROUSDALE COUNTY, TENNESSEE

Updated January 2024

1.6 County Data Profile

1.6.1 Resources and Assets

Trousdale Medical Center provides 24-hour emergency care to residents of the county and is home to 12 beds. Highpoint Health – Trousdale with Ascension Saint Thomas provides 24-hour emergency care to residents of the county and is home to 25 beds. The county also has 20 volunteer firefighters with one station and 27 full-time Law Enforcement officers, including the county sheriff. The Trousdale County School District facilitates the learning of approximately 4,407 students via its system of three schools within the region. According to the RWJ Foundation County Health Rankings profile Trousdale County Schools are underfunded by $3,232 per pupil as related to dollars to test score achievement.

Trousdale County houses one radio station (WTNK Fun Radio, Hartsville) and no TV networks. The main phone companies in the area are Tri-County Electric/Fiber, North Centra Telephone Coop, and ATT. Residents in the county can obtain internet via Tri County Eclectic, North Centra Telephone Coop, Comcast, and ATT. Communication resources, a vital component of emergency response and preparedness, are notably lacking in the more rural portions of Trousdale County. Between 2016 and 2020, only 87.5% of households had a computer, and only 79.7% had broadband internet access, according to the United States Census Bureau.

The main roadways that travel through the county are US Highway 231 and State Highways 10, 25, 141, 260, and 376. The nearest interstates are 1-40 (8 miles away). The Tennessee River Just barely enters the Cumberland River, enters western Trousdale County between River Miles 258 and 259, and flows through the county until entering Smith County at approximately River Mile 284. The river can be accessed via four access areas. The main access area, and the only one that has a ramp directly on the Cumberland River, is Taylor's Landing, located at the end of Cemetery Lane. There are two access areas located on Second Creek. The Second Creek ramp is located on Oldham Road and the second ramp is located next to the Pine Cove Campsites and Motel at the end of Boat Dock Lane. Finally, a small boat ramp onto the Big Goose Creek is located on Lock Six Road. The Cumberland's main tributaries in Trousdale County are Goose Creek, Rocky Creek, Second Creek, and Dixon's Creek, all lying north of the river, and Lyles Creek, lying south of the river. A further analysis of these water systems will be explored in the hazard flood section as related to their propensity for flood events.

The nearest international airport is BNA (approx. 40 miles), and the closest general aviation location is LaFayette Municipal (12.3 miles). Given the limited public transportation options and the rural environment of Trousdale County. Using averages, employees in Trousdale County, TN, have a longer commute time (39.7 minutes) than the normal US worker (26.7 minutes). Additionally, 3.32% of the workforce in Trousdale County, TN, have "super commutes" in excess of 90 minutes. In 2022, 80% of workers in Trousdale County, TN,

drove alone to work, followed by those who carpooled to work (15.2%) and those who worked at home (4.84%).

Trousdale County is governed by an elected County Mayor and Board of Commissioners. The jurisdictions within Trousdale County are governed by an elected Mayor and Council. The county Mayor and Board of Commissioners also appoint multiple regulatory committees.

1.6.2 Development and Growth

Like a majority of its counterparts, Trousdale County has been experiencing growth over the past few years. The population of the county increased between the 2010 and 2020 censuses from 7868 to 11,638. 16% of the 3398 Trousdale County households deal with at least 1 severe housing problem (overcrowding, high housing costs, lack of kitchen facilities, or lack of plumbing facilities). Most of Trousdale Counties' employed population work within the services Industry (33.9%) and Retail Trade (14.4%). Trousdale County is not a member of the Joint Economic and Community Development Boards to ensure and promote economic growth within the county and for its constituents. As stated, Trousdale County has experienced growth since the last planning period, specifically residentially, with an average of 250 house permit applications per year over the last 5 years. However, the county has not seen much increase in industrial growth except for a small meat packing plant. (Anderson Meat Process) Commercial growth is slow, too. Commercially, there have been 2 new Dollar General stores built, a Dollar Tree store, and a BP Gas station. Several small coffee shops have also sprung up.

1.6.3 Demographics

Throughout the planning process, Trousdale County HMPC remained committed to recognizing socially vulnerable and underserved populations. To maintain this commitment, the HMPC reached out to key stakeholders as discussed previously and reviewed the CDC/ATSDR Social Vulnerability Index (SVI). SVI information is located in Appendix B.

Table 7 below illustrates the population data of the county according to the 2020 U.S Census. Other important demographics obtained via the U.S Census Bureau and County Health Rankings (RWJ Foundation) are presented in list form. Of the 11596 residents living within Trousdale County:

- The median household income is $62,018.
- County GDP is $256.012 (Thousands of dollars)
- 11.5% live below the national poverty line.
- 100.0% live in rural areas.
- 9.7% are confronted with food insecurity.
- 6.4% of the under 65 years of age population live with a disability.
- 8.7% of the under-65 population do not have health insurance.
- Population as of 2024 was 78 people per square mile.

Table 7: Population Data

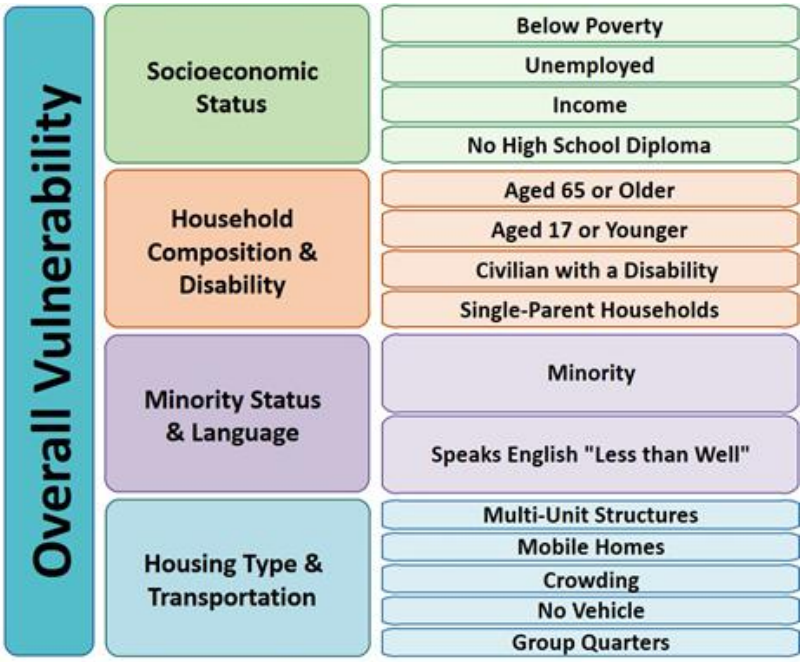
Demographic	Percentage
Identified gender	
Male	53%
Female	47%
Age Group	
Under 5	614
Under 18	2,345
Over 65	1,481
Race/Ethnicity (one)	
White (not Hispanic/Latin)	9,975
Asian	20
Black or African American	1,439
American Indian or Alaskan Native	115
Hispanic/Latino	238
Education	
High School Graduate or Higher	49.2%
Bachelor's Degree or Higher	9.8%

Data sources:
https://www.census.gov/quickfacts/fact/table/US/PST045221
https://www.countyhealthrankings.org/app/tennessee/2022/overview

1.6.4 Social Vulnerability

Social vulnerability refers to a community's capacity to prepare for and respond to the stress of hazardous events ranging from natural disasters, such as tornadoes or disease outbreaks, to human-caused threats, such as toxic chemical spills. Social vulnerability considerations were included in this plan update to identify areas across the planning area that might be more vulnerable to hazard impacts based on several factors. The County BEOP will also incorporate this information to improve response efforts in socially vulnerable neighborhoods.

The Center for Disease Control and Prevention (CDC) has developed a social vulnerability index (SVI) to measure the resilience of communities when confronted by external stresses such as natural or human-caused disasters or disease outbreaks. The SVI is broken down to the census tract level and provides insight into vulnerable populations to assist emergency planners and public health officials in identifying communities more likely to require additional support before, during, and after a hazardous event. The SVI index combines four main themes of vulnerability, which are, in turn, broken down into subcategories for 16 vulnerability factors. The themes are outlined in the below table.



The specific breakdown for Trousdale County and all participating jurisdictions is as follows:

Trousdale County Social Vulnerability Factors	
Total Square Miles (AREA_SQMI)	114
Total Population (as of 2020) (E_TOTPOP)	11,596
Housing Units Estimated (E_HU)	3,776
Households (E_HH)	3552
Persons below Poverty (E_POV150)	1,668
Age 16+ unemployed (E_UNEMP)	40
Per Capita Income (Found in CENSUS DATA)	$37,448
Age 25+ w/ no HS Diploma (E_NOHSDP)	1,176
Percentage of Persons below poverty (EP_POV150)	18.3%
Unemployment rate (EP_UNEMP)	0.8%
Percentage of persons w/ no HS diploma 25 yo+ (EP_NOHSDP)	14%
Aged 65+ & older (E_AGE65)	1,481
Age 17 & younger (E_AGE17)	1,193
Civilian noninstitutionalized population with a disability (E_DISABL)	1,111
Single Parent HH w/ children under 18 (E_SNGPNT)	213
Percentage of persons aged 65+ (EP_AGE65)	12.8%
Percentage of persons 17 or younger (EP_AGE17)	16.5%
Percentage of civilian noninstitutionalized population with a disability (EP_DISABL)	12.1%
Percentage of single-parent households with children under 18 (EP_SNGPNT)	6%
Minority (all persons except white, non-Hispanic) (E_MINRTY)	2,097

Persons (age 5+) who speak English "less than well" (E_LIMENG)	10
Percentage minority (all persons except white, non-Hispanic) (EP_MINRTY)	18.1
Percentage of persons (age 5+) who speak English "less than well" (EP_LIMENG)	0.1%
Housing in structures with 10 or more units (E_MUNIT)	93
Mobile Homes (E_MOBILE)	757
At Household level (occupied housing units), more people than rooms (E_CROWD)	0
Households w/ no vehicle (E_NOVEH)	82
Persons in Group Quarters (E_GROUPQ)	2,416
Percentage of housing in structures with 10 or more units (EP_MUNIT)	2.5%
Percentage of mobile homes (EP_MOBILE)	20%
Percentage of occupied housing units with more people than rooms (EP_CROWD)	0
Percentage of households with no vehicle available (EP_NOVEH)	2.3%
Percentage of persons in group quarters (EP_GROUPQ)	20.8%

1.6.5 Critical Infrastructure

Critical Infrastructure is assets in a community that is considered vital to the public's health and safety. Due to the sensitivity of these assets in Metropolitan Hartsville-Trousdale County, they are restricted for public viewing; however, the data is viewable to restricted personnel on the State of Tennessee's Critical2TN Database. The county currently has 7 assets identified and 24 Tier 2 Title 3 facilities.

1.7 Resource Capabilities

The committee gathered the following resource capabilities to determine what existing staff and resources are being used to support mitigation programs.

Table 8: Jurisdictional Mitigation Capabilities

Mitigation Capabilities	Hartsville/Trousdale County	Not Used	Not Used	Not Used	Not Used	Not Used
Regulatory Capabilities						
Building Codes	Yes					
Zoning Codes	Yes					
Subdivision Ordinance	Yes					
Stormwater Ordinance	No (Pending MS4)					
Floodplain Ordinance	Yes					
Erosion, Sedimentation and Pollution Control Ordinance	No					
Stormwater Management Program	Yes					
Site Plan Review Requirements	Yes					
Capital Improvements Plan	Yes					
Economic Development Plan	Yes					
Local Emergency Operations Plan	Yes					
Flooding or Engineering Study	Yes					
Repetitive Loss Plan	Yes					
Elevation Certificates	Yes					
Administrative Capabilities						
Grant writer (part-time or full-time)	Yes					
Public Information Officer	Yes					
Floodplain Manager	Yes					
Volunteer Fire Service	Yes					
Full-Time Fire Service	No					
School Resource Officers (SROs)	Yes					
Law Enforcement	Yes					
Emergency Manager	Yes					
GIS Personnel	No					
Fiscal Capabilities						
Capital improvement project funding	Yes					
Fees for utility services	Yes					
Impact fees for new development	Yes					

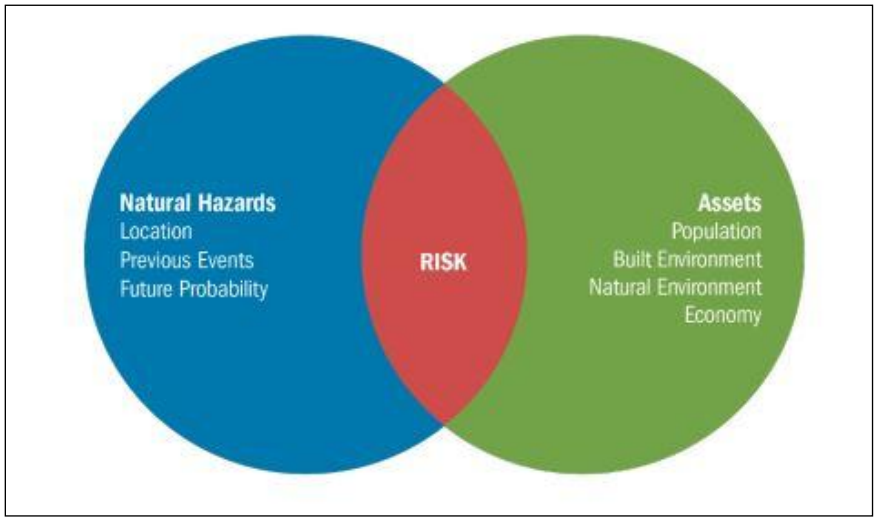
General obligation bonds	No					
Withhold spending in hazard-prone areas	No					

Chapter 2: Hazard and Risk Assessment

2.1 Risk Assessment Overview

Hazard Mitigation Planning involves developing a strategy to reduce risk in the long term. An essential part of the process is identifying hazards, risks, impacts, and vulnerabilities. In mitigation planning, "risk" is the potential for damage or loss when a hazard interacts with an asset. Assets can be people, buildings, infrastructure, the economy, or natural and cultural resources.

The risk assessment helps communicate vulnerabilities, develop priorities, and inform decision-making. It is the factual basis for the mitigation strategy. The hazards and associated impacts in the risk assessment should be the hazards and impacts the mitigation strategy seeks to address. If, for example, the risk assessment shows that the state will have hurricane damage in a specific area, the mitigation strategy should include actions to protect state assets and jurisdictions, especially underserved communities and socially vulnerable populations, in those areas.



The Metropolitan Hartsville-Trousdale County HMPC conducted a hazard identification analysis to determine the natural and man-made hazards that threaten the County. Existing hazard data from TEMA, FEMA, the National Oceanic and Atmospheric Administration (NOAA), and other sources were examined to assess the significance of these hazards to the planning area. Hazard data from the ETSU Geoinformatics & Disaster Science Lab was also analyzed as related to the changing weather trends and their significance. Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries, as well as property and economic damage. Any hazard that has two or more green lifeline categories is considered low risk for damages and, therefore, will not be providing mitigation actions for those specific hazards.

To further focus on the list of identified hazards for this plan update, the HMPC researched past events that resulted in a federal and/or state emergency or disaster declaration in Metropolitan Hartsville-Trousdale County to identify known hazards. *Table 8* presents a list of all major disaster and emergency declarations that have occurred since 1953, illustrating which hazards pose the greatest risk to the County.

Table 9: Presidential Disaster Declarations in Metro Hartsville-Trousdale County (1953-2023)

Declaration #	Date	Event Details	Individual Assistance	Public Assistance
EM-3217-TN	9/5/2005	Hurricane	0	1
EM-3095-TN	3/14/1993	Snowstorm	0	1
DR-1909-TN	5/4/2010	Severe Storm	0	1
DR-1745-TN	2008-02-07T	Severe Storm	1	1
DR-1464-TN	5/8/2003	Severe Storm	1	1
DR-1010-TN	1994-02-28T	Severe Storm	0	1
DR-459-TN	1975-03-22T	Flood	1	1
DR-424-TN	4/4/1974	Tornado	1	1
DR-4514-TN	4/2/2020	Biological	0	1
EM-3473-TN	3/13/2020	Biological	0	1

Table 9 documents the hazards of interest to Metropolitan Hartsville-Trousdale County and the decision to re-evaluate or delete them from this plan update. The hazards of concern were altered as necessary to ensure the Metropolitan Hartsville-Trousdale County Hazard Mitigation Plan was in accordance with the Tennessee Mitigation Strategy.

Table 10: Overview of Updates to Chapter 2: Risk and Vulnerability Assessment

Tennessee 2018 Mitigation Strategy	Trousdale County 2019 HMP	Status	Trousdale County 2024 HMP Update
Communicable Disease	No	Evaluated	Not a Hazard of Prime Concern
Dam Failure	No	Evaluated	Not a Hazard of Prime Concern
Drought	Yes	Re-evaluated Continued	YES
Earthquakes	Yes	Re-evaluated Removed	Not a Hazard of Prime Concern
Extreme Temperatures	No	Re-evaluated Continued	YES
Flooding	Yes	Re-evaluated Continued	YES
Geological Hazard	No	Evaluated	Not a Hazard of Prime Concern
Hazardous Materials Release	No	Evaluated	Not a Hazard of Prime Concern
Infrastructure Incident	No	Evaluated	Not a Hazard of Prime Concern
Terrorism	No	Evaluated	Not a Hazard of Prime Concern
Tornadoes	Yes	Re-evaluated Continued	YES
Severe Weather (thunderstorms,	Yes	Re-evaluate Continued	YES

lightning, hail)			
Wildfire	NO	Evaluated	Not a Hazard of Prime Concern

Summary of changes in the 2024 plan update:

- Earthquake and Freezing Weather was removed as a hazard of prime concern.
- Winter Storms are taken into consideration under Severe Weather.

The complete list of hazards to be addressed in this 2024 Plan Update includes:

- Drought
- Flooding
- Extreme Temperature
- Severe Weather
- Tornadoes

4.3 Drought

2.1.1 Hazard Overview

Drought is a deficiency in precipitation over an extended period. It is a standard, recurrent feature of climate that occurs in virtually all climate zones. The duration of droughts varies widely. In some cases, drought develops relatively quickly and lasts a very short time, exacerbated by extreme heat and/or wind. There are other cases when drought spans multiple years or even decades. Studying the paleoclimate record is often helpful in identifying when long-lasting droughts have occurred. Common types of droughts are detailed below.

Table 11: Drought Classifications

Type	Details
Meteorological Drought	Meteorological Drought is based on the degree of dryness (rainfall deficit) and the length of the dry period.
Agricultural Drought	Agricultural Drought is based on the impacts on agriculture by factors such as rainfall deficits, soil water deficits, reduced groundwater, or reservoir levels needed for irrigation.
Hydrological Drought	Hydrological Drought is based on the impact of rainfall deficits on the water supply, such as stream flow, reservoir and lake levels, and groundwater table decline.
Socioeconomic Drought	Socioeconomic drought is based on the impact of conditions (meteorological, agricultural, or hydrological drought) on the supply and demand of some economic goods. Socioeconomic deficiency occurs when the demand for an economic good exceeds the supply due to a weather-related deficit in the water supply.

The wide variety of disciplines affected by drought, its diverse geographical and temporal distribution, and the many scales drought operates on makes it difficult to develop a definition to describe drought and an index to measure it. Many quantitative measures of droughts have been developed in the United States, depending on the discipline affected, the region being considered, and the particular application. Several indices developed by

Wayne Palmer and the Standardized Precipitation Index help describe the many scales of drought.

- The **U.S. Drought Monitor** summarizes drought conditions across the United States and Puerto Rico. Often described as a blend of art and science, the map is updated weekly by combining a variety of data-based drought indices and indicators and local expert input into a single composite drought indicator.
- The **Standardized Precipitation Index** (SPI) measures drought, which differs from the Palmer Drought Index (PDI). Like the PDI, this index is negative for lack and positive for wet conditions. But the SPI is a probability index that considers only precipitation, while Palmer's indices are water balance indices that consider water supply (rain), demand (evapotranspiration), and loss (runoff).
- The **Palmer Drought Severity Index** (PDSI), devised in 1965, was the first drought indicator to assess moisture status comprehensively. It uses temperature and precipitation data to calculate water supply and demand, incorporates soil moisture, and is considered the most effective for unirrigated cropland. It primarily reflects the Perry-term drought and has been used extensively to initiate drought relief. It is more complex than the SPI and the Drought Monitor.

4.3.1 County Profile

According to the PDSI map shown in *Figure 1*, Middle Tennessee has a relatively low risk of drought hazards. However, drought cannot be confined to geographic or political boundaries, and some areas may experience more severe drought events than what is shown on the map.

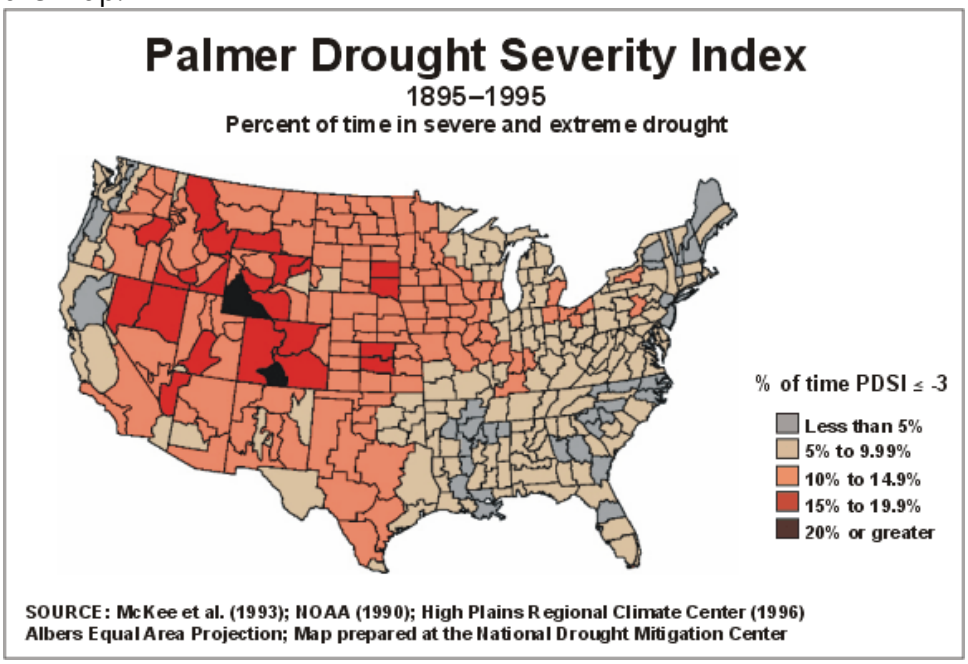


Figure 1 - Palmer Drought Map

Figure 2 - Drought Monitor Time Series (Source: National Drought Mitigation Center)

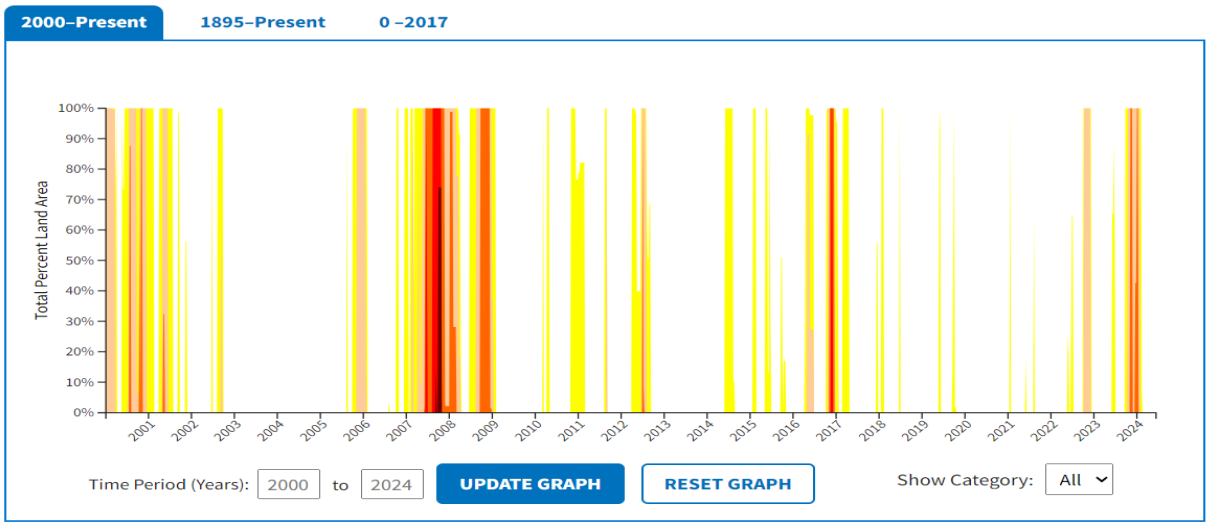


Figure X above illustrates drought conditions within Trousdale County between 2000 and 2024. According to the National Drought Mitigation Center, the last Extreme Drought (D4) period occurred in 2007. D4 (extreme drought) is categorized by browning grass, low lake levels, municipality water restrictions, and increased water prices. D0 (abnormally dry) conditions consist of hard ground and declining agriculture ponds and creeks. A table containing all NOAA-recorded drought events between 2000 - 2024 for Trousdale County is included in Appendix C.

1 January 2024: Severe drought conditions from December 2023 caused farmers to report that drought causing financial struggles.

6 June 2007: Severe drought conditions continue and impacting crops. A hay fire on the Macon-Trousdale County Line on the property of Stanley Holder, across from Sundial Farm, caused Mr. Holder to lose 102 rolls of hay. The drought has caused a hay shortage and rolls of hay have been selling in excess of $50 per roll. Dry conditions have exacerbated the danger of wildfire.

Probability Future Events: One or more events per year over the next Five years
The probability of Metropolitan Hartsville-Trousdale County experiencing a drought event can be challenging to quantify, but based on the historical record of 19 droughts since 2007, it can reasonably be assumed that this type of event has occurred every few years and is likely to occur every year for the next five years. To reference the climate trend analyzed by East Tennessee State University, reference Appendix C.

4.3.2 Risk Assessment

Metropolitan Hartsville-Trousdale County is vulnerable to drought; however, estimated potential losses are inherently difficult to calculate because drought tends to cause minor

damage to the built environment. Therefore, it is assumed that all buildings and facilities in the planning area would technically be exposed to the drought hazard; there is no significant vulnerability to these buildings on a structural level.

Potential drought losses can be calculated in terms of the value of agriculture in the County, which is perhaps most vulnerable to drought. According to the USDA, the net income for agriculture is around $2.6 million. Population growth could contribute directly to this hazard, as more users pull from the available water supply within the region. Drought can also increase the County's vulnerability to wildfires. Dry, hot, and windy weather combined with dry vegetation and a spark through human intent, accident, or lightning can start a wildfire.

The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for natural hazards. It was built and designed by FEMA in close collaboration with various stakeholders and partners in academia and local, state, and federal government. The Risk Index leverages available source data for natural hazards and community risk factors to develop a baseline relative risk assessment for each county and census trace. Some of these community risk factors include social vulnerability, which is determined by the data pulled from the Census performed every ten years. A higher social vulnerability score is proportional to a higher risk score. **Underserved communities and vulnerable populations are especially vulnerable to drought conditions. Financial constraints, lack of transportation, dependency on medical services, and special medical equipment i.e., dialysis equipment, make it more difficult for these populations to endure and recover from drought conditions.**

National Risk Index Score for Drought = Very Low
Social Vulnerability = Relatively Low

Although the National Risk Index is a well-valued tool it fails to properly show the feedback from the participating jurisdictions. Therefore, all identified hazards were evaluated in regard to risk in FEMA lifelines per jurisdiction. The scenario that local jurisdictions would evaluate the conditions off of was a mid-level impact of the identified hazard. The results are below:

Table 12: Drought Risk based on selected FEMA Lifelines

Drought Risk	FEMA Lifelines							
Metropolitan Hartsville-Trousdale County	**Safety & Security**	**Food, Water & Shelter**	**Health & Medical**	**Energy**	**Communications**	**Transportation**	**Hazardous Materials**	**Water Systems**
Metropolitan Hartsville-	Green	Green	Green	Yellow	Yellow	Yellow	Green	Green

Trousdale County								

Colors indicate lifeline or component conditions:	
Red	Significant Impact, Multiple Required Resources
Yellow	Some Impact, Some Outside Resources Required
Green	Little to No Impact, No Outside Resources Required

Given the information above, it becomes vital that all participating jurisdictions are able to prioritize the mitigation actions in the following lifeline categories so that they can become more resilient to the whole community that they serve.

4.3.3 Land Use and Development

According to the National Drought Mitigation Center, how we use land affects our vulnerability to drought. In general, land use patterns that maintain the integrity of watersheds and that have a smaller paved footprint result in greater resilience in the face of drought. The projected increase in population will possibly result in an increase in buildings and infrastructure, leading to increased impervious areas. An increase in population may also put increasing pressure on water and other natural resources, particularly during periods of drought. Therefore, future development could impact drought vulnerability in Metropolitan Hartsville-Trousdale County.

4.3.4 Multi-Jurisdictional Differences

Hartsville and Trousdale County is a Metropolitan.

4.3.5 Summary

Metropolitan Hartsville-Trousdale County is vulnerable to drought. With historical frequency considered there is a significant chance of this event occurring each year. Drought can affect people's health and safety. Examples of drought impacts on society include anxiety or depression about economic losses, conflicts when there is not enough water, reduced incomes, fewer recreational activities, higher incidents of heat stroke, and even loss of human life. Drought conditions can also provide a substantial increase in wildfire risk. As plants and trees wither and die from a lack of precipitation, increased insect infestations, and diseases—all associated with drought—they become fuel for wildfires. **Underserved communities and vulnerable populations are especially vulnerable to drought conditions. Financial constraints, lack of transportation, dependency on medical services, and special medical equipment i.e., dialysis equipment, make it more difficult for these populations to endure and recover from drought conditions.** Metropolitan Hartsville-Trousdale County's periods of drought can equate to more wildfires and more intense wildfires, which affect the economy, the environment, and society in many ways, such as by destroying neighborhoods, crops, and habitats.

4.3 Extreme Temperatures

2.3.1 Hazard Overview

Heat Waves

Excessive Heat is when the heat index reaches at least 105ºF for at least three hours on two consecutive days, and the nighttime air temperature does not drop below 75ºF. The definition of Excessive Heat is a "rule of thumb" because the detrimental effects of high temperatures and humidity vary among segments of the population (old, young, etc.) and whether the population, in general, has built up a heat tolerance (residents in desert communities fair better than visitors). While some may be better able to cope with Excessive Heat as defined, others may still be adversely affected by a lower heat index. A "rule of thumb" works for mitigation planning because the benefits of specific mitigation actions start accruing before conditions reach Excessive Heat levels. Exposure to extreme heat can pose health risks, including sunburn, dehydration, heat cramps, and heat stroke. The National Weather Service Heat Index calculates how hot it feels when relative humidity is factored in with the actual air temperature using a 4-factor scale: caution, extreme caution, danger, extreme danger. The National Weather Service (NWS) also issues Heat Alerts.

- A Heat Advisory is issued 12-24 hours before the onset, at least 100ºF but less than 105ºF for at least 2 hours.
- An Excessive Heat Watch is issued when temperatures of 105ºF or greater are forecasted for the next 24 to 72 hours.
- An Excessive Heat Warning is issued when temperatures of 105°F last for more than 3 hours per day for two consecutive days or temperatures exceed 115°F for any period.

Cold Wave

Extreme cold temperatures occur during the winter months and typically accompany winter storm events. Extended periods of extremely cold temperatures result from the movement of high-pressure systems into the United States. When Arctic air masses are present, extreme winter temperatures hover over Tennessee.

The National Weather Service (NWS) issues the nation's Wind Chill Warning, Watch, and Advisory:

- Wind Chill Warning: NWS issues a wind chill warning when dangerously cold wind chill values are expected or occurring.
- Wind Chill Watch: NWS issues a wind chill watch when dangerously cold wind chill values are possible.
- Wind Chill Advisory: NWS issues a wind chill advisory when seasonably cold wind chill values, but not extremely cold values, are expected or occurring.

The National Weather Service Wind Chill Chart calculates the danger from winter winds and freezing temperatures using a 3-factor time-based scale (30 min, 10 min, 5 min).

4.3.1 County Profile

The following figure provides extreme temperature event information for Metropolitan Hartsville-Trousdale County.

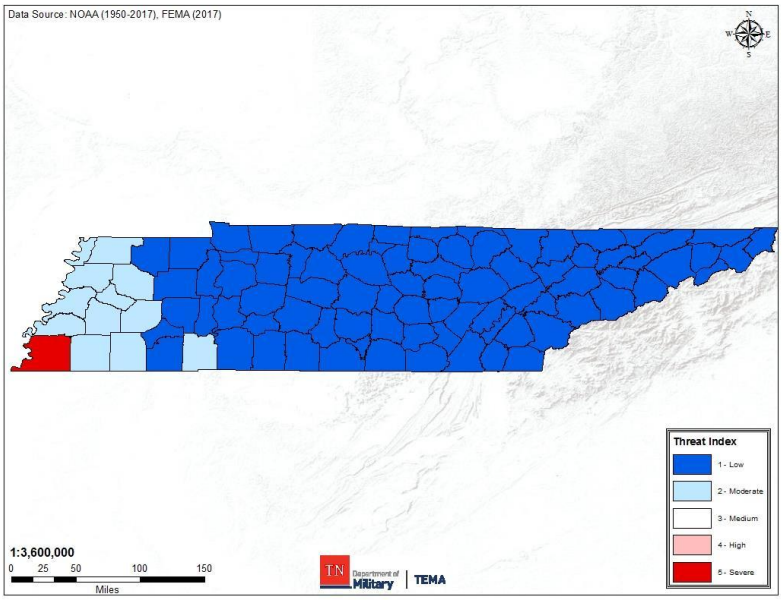


Figure 3 Extreme Temperatures Impact Density (Source: 2018 Tennessee Hazard Mitigation Plan)

The National Weather Service Wind Chill Chart calculates the danger from winter winds and freezing temperatures using a 3-factor time-based scale (30 min, 10 min, 5 min). The following narratives were obtained via the NOAA Storm Event Database for Cold/Wind Chill, Excessive Heat, and Extreme Cold/Wind Chill. A table containing all NOAA-recorded event(s) between 2000-2024 for Trousdale County is included in Appendix C.

23 December 2022: A weather station near Hartsville measured a minimum wind chill of -21 degrees after an abnormally strong and cold upper-level low-pressure system plunged southward through much of the central and eastern United States, bringing a blast of Arctic air. These historically cold temperatures impacted all of Middle Tennessee beginning late on December 22, 2022. As the Arctic front swept eastward through the area, temperatures plummeted with low temperatures on the morning of December 23rd in the single digits and even below zero. This front also brought strong winds, and the combination of very cold air and strong winds resulted in brutal wind chills with values of -15 degrees to -30 degrees common areawide through December 24th. While snow was observed with this system, it did not last long, and snow accumulations of only 1 to 2 inches were found approximately in areas north of Interstate 40. However, this snow resulted in significant impacts by early December 23rd, with numerous traffic accidents and road closures reported.

Probability of Future Events – One to Two Events Per Year.

The probability of Metropolitan Hartsville County experiencing extreme temperature variations is difficult to predict, but based on the historical record of events since 1996, it can reasonably be assumed that this type of event can occur frequently: one to two events per year. To reference the climate trend analyzed by East Tennessee State University, reference Appendix C.

4.3.2 Risk Assessment

In the county, road traveling conditions, electrical lines, human health, and agricultural functions are some of the most vulnerable features. The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for natural hazards. It was built and designed by FEMA in close collaboration with various stakeholders and partners in academia and local, state, and federal government. The Risk Index leverages available source data for natural hazards and community risk factors to develop a baseline relative risk assessment for each county and census trace. Some of these community risk factors include social vulnerability, which is determined by the data pulled from the Census performed every ten years. A higher social vulnerability score is proportional to a higher risk score.

National Risk Index Score for Cold Waves = No Rating (Score of Zero)
National Risk Index Score for Hot Waves = No Rating (Score of Zero)
Social Vulnerability = Very Low

Although the National Risk Index is a well-valued tool it fails to properly show the feedback from the participating jurisdictions. Therefore, all identified hazards were evaluated in regard to risk in FEMA lifelines per jurisdiction. The scenario that local jurisdictions would evaluate the conditions from was a mid-level impact of the identified hazard. The results are below:

Table 13: Extreme Temperature Risk based on selected FEMA Lifelines

Extreme Temperature Risk	FEMA Lifelines							
Jurisdiction	Safety & Security	Food, Water & Shelter	Health & Medical	Energy	Communications	Transportation	Hazardous Materials	Water Systems
Metropolitan Hartsville-Trousdale County	Green	Green	Green	Yellow	Yellow	Yellow	Green	Green

Colors indicate lifeline or component conditions:	
Red	Significant Impact, Multiple Required Resources
Yellow	Some Impact, Some Outside Resources Required
Green	Little to No Impact, No Outside Resources Required

Given the information above it becomes vital that all participating jurisdictions are able to prioritize the necessity of mitigation actions in the following lifeline categories so that they can become more resilient in the whole community that they serve.

Future Heat Events and Social Vulnerability

The cross-examination of NOAA Future Heat Events and CDC Social Vulnerability Index (2018) indicates that in 2030, Metropolitan Hartsville-Trousdale County will have a projected maximum of 78 total (currently 72) days with temperatures over 95 degrees. Multiple determinates such as socioeconomic status, household composition, disability, minority status, language, housing, and transportation heavily indicate how an individual will be affected by extreme temperatures. **Individuals within vulnerable or underserved populations are not only more likely to experience the effects of extreme temperatures but also likely to be impacted to a higher degree than their counterparts. Underserved communities and vulnerable populations are especially vulnerable to extreme temperature conditions. Financial constraints, lack of transportation, dependency on medical services, and special medical equipment make it more difficult for these populations to endure and recover from extreme temperature conditions.**

4.3.3 Land Use and Development

Extreme temperature events have significant or even catastrophic impacts on property and critical infrastructure. Metropolitan Hartsville-Trousdale County is interested in protecting facilities, property, and infrastructure owned and managed by the jurisdictions. Disasters can damage not only private property but government property as well, placing a financial and operational burden on the County. Losses can extend from structures and contents to the interruption of services and the general economy. Many of these structures could receive indirect impacts, such as downed electrical lines that cut off electricity to the facilities, frozen pipelines that crack, destroyed crops, and customers not being able to access travel to the structures due to ice-covered roads.

4.3.4 Multi-Jurisdictional Differences

Due to the nature of extreme temperatures, Metropolitan Hartsville-Trousdale County is susceptible. The entire State is vulnerable to extreme temperatures. Varying land elevations, the landscape's character, and proximity to large bodies of water play a significant role in the State's temperatures.

4.3.5 Summary

Metropolitan Hartsville-Trousdale County is vulnerable to extreme temperatures, which can affect people's health and safety. Therefore, proper measurements are essential to prevent critical structures from being vulnerable to utility failure during extreme temperatures.

4.4 Flood

2.4.1 Hazard Overview

Flooding events occur when excess water from rivers and other bodies of water overflow onto riverbanks and adjacent floodplains. Lower-lying regions can also collect water from rainfall, and poorly drained land can accumulate rain through ponding on the surface. Floods in Metropolitan Hartsville-Trousdale County are usually caused by rain but may also be caused by snowmelt and man-made incidents.

The area adjacent to a channel is the floodplain, as shown in *Figure X*. A floodplain is flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which are areas covered by the flood but do not experience a strong current. Floodplains are made when floodwaters exceed the capacity of the main channel or escape the channel by eroding its banks. When this occurs, sediments (including rocks and debris) are deposited that gradually build up over time to create the floor of the floodplain. Floodplains generally contain unconsolidated sediments, often extending below the stream's bed.

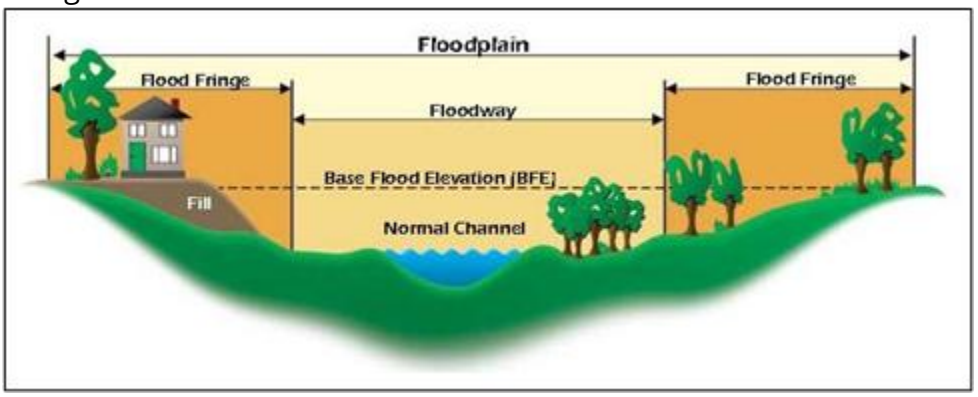


Figure 4 Characteristics of a Floodplain (Source: FEMA)

Three general health hazards common to flood events:

1. Floodwaters carry anything on the ground that the upstream runoff picked up, including dirt, oil, bacteria, animal waste, lawn, farm, and industrial chemicals. Pastures and areas where farm animals are kept, or their wastes are stored can contribute to polluted waters in the receiving streams. Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when flood waters dilute it, raw sewage can be a breeding ground for bacteria such as *E. coli* and other disease-causing agents.
2. The second health problem arises after most water has gone. Stagnant pools can become breeding grounds for mosquitoes, and wet building areas that have not been adequately cleaned breed mold and mildew. A building that is not thoroughly cleaned becomes a health hazard, especially for small children and the elderly.

Another health hazard occurs when ducts in a forced air system are not adequately cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. If the county water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

3. The third problem is the long-term psychological impact of experiencing a flood and seeing one's home damaged and personal belongings destroyed. The cost and labor needed to repair a flood-damaged home severely strain people, especially the unprepared and uninsured. There is also a long-term problem for those who know their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

4.4.1 County Profile

Riverine flooding occurs from inland water bodies such as streams and rivers. In Tennessee, flooding is highly dependent on precipitation amounts and is highly variable within the State.

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

Table 14: Mapped Flood Insurance Zones

Flood Hazard Area	Description
HAZUS (100-yr)	Areas subject to inundation by the 1-percent-annual-chance flood event are generally determined using approximate methodologies. Mandatory flood insurance purchase requirements and floodplain management standards apply.
HAZUS (500-yr)	A 500-year flood zone is a moderate flood hazard area and is an area between the limits of the base flood and the 0.2- percent-annual-chance (or 500-year) flood. Mandatory flood insurance is not required.
Non-highlighted Areas	Minimal risk areas outside the 1-percent and .2 percent-annual-chance floodplains.

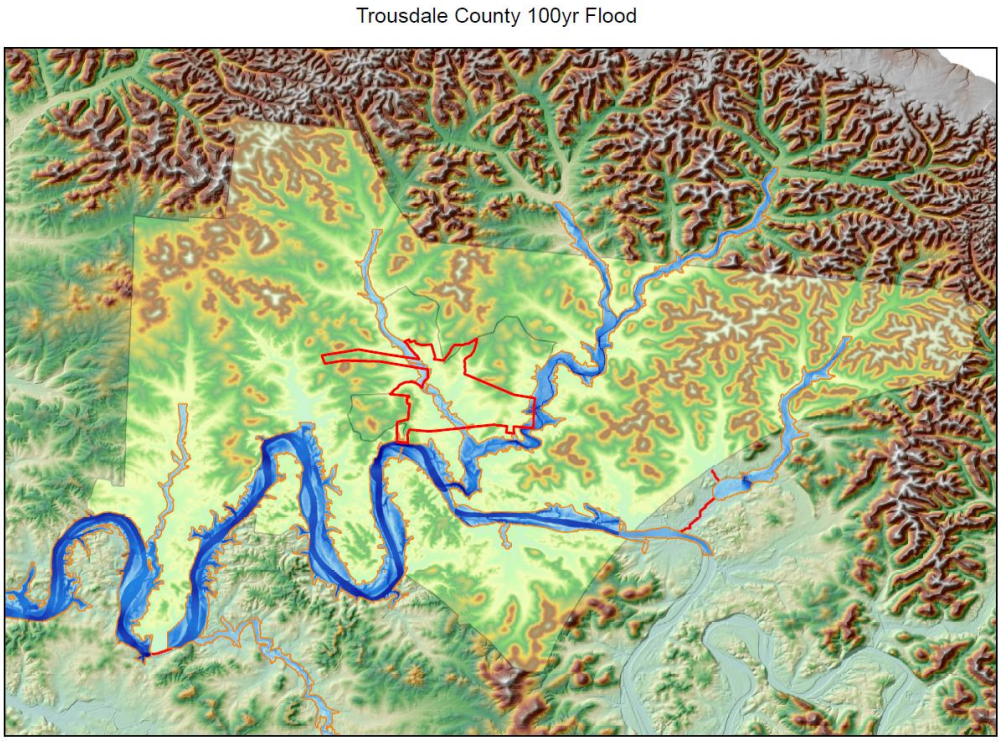


Figure 5: HAZUS 100-year Flood Map

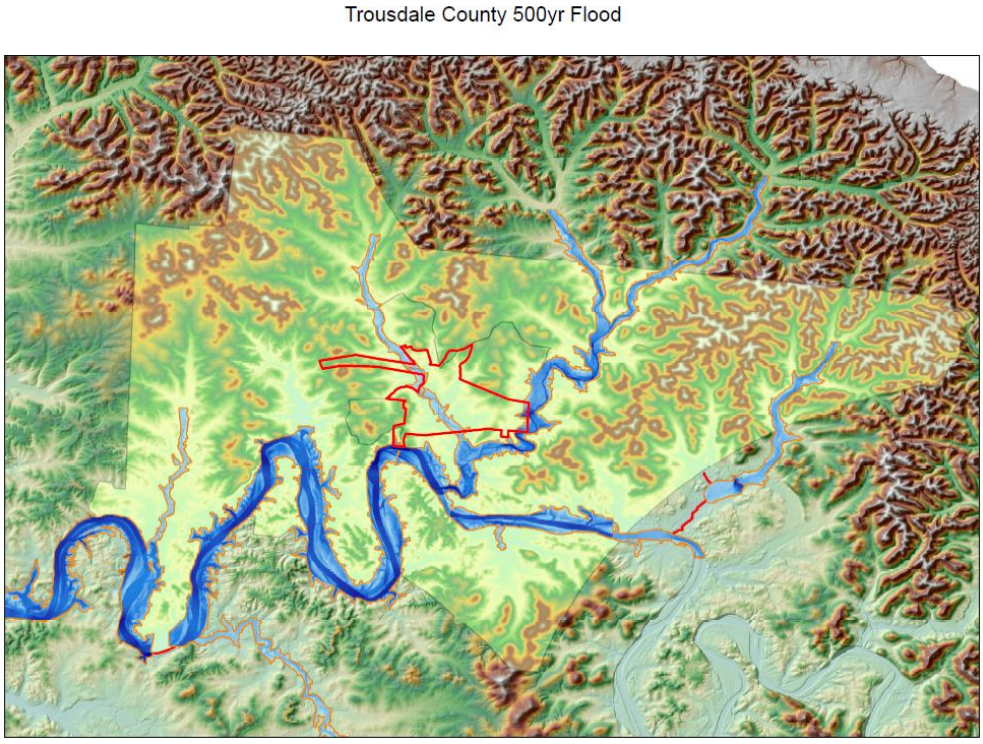


Figure 6: HAZUS 500-year Flood Map

Table 15: NFIP Policy Data

NFIP Policy Data for Trousdale County				
Jurisdiction	**CID Number**	**Policies In-Force**	**Insurance In-Force Whole $**	**Written Premium In-Force**
Trousdale County	(470192)	14	$ 3,234,000	$19,473
Hartsville	(470093)	11	$ 1,070,000	$14,764

Policies In-force: number of NFIP flood insurance policies
Insurance In-force whole $: the value of the building and contents insured by the NFIP
Written Premium In-force: total premiums paid for NFIP insurance policies

According to the National Flood Insurance Program, repetitive flood loss is a facility or structure that has experienced two or more insurance claims of at least $1,000 in any given 10-year period since 1978. Severe repetitive loss is defined as a facility or structure that has experienced four or more insurance claims exceeding $5,000 or two claims exceeding the value of the building. Within the NFIP, flood loss properties are usually considered the most vital structures to mitigate. The chart below provides a summary of repetitive and severe repetitive losses for Metropolitan Hartsville-Trousdale County.

Table 16: NFIP Loss Data

NFIP Loss Data for Trousdale County					
Jurisdiction	**Total Losses**	**Closed Loses**	**Open Loses**	**CWOP Loses**	**Total Payments**
Trousdale County	RL:	14			$143,519
	SRL:				
Hartsville	RL:	11			$8,019
	SRL:				
	RL:				
	SRL:				

*** All losses are residential structures.**
RL: Repetitive Loss
SRL: Severe Repetitive Loss
Total Losses: number of flood insurance claims filed by policyholders
Closed Losses: number of flood insurance claims paid to policyholders
Open Losses: claims that are still being processed
CWOP Losses: claims that were "closed without payment"
Total Payments: total dollars paid to policyholders

Over the past 74 years, there have been approximately 19 flooding events in Metropolitan Hartsville-Trousdale County. A table of NOAA-reported flooding events is located in Appendix C. The following narratives were obtained via the NOAA Storm Event Database.

Only events resulting in injury, death, or extensive damage (greater than $200.0K property/crop damage) were included as expanded narratives.

HartsvilleVidette.com

Storms wreak havoc across Trousdale County

By Roxanne Lambert roxannelambert@hartsvillevidette.com May 11, 2024 0

Storms that hit Middle Tennessee on Wednesday and Thursday caused heavy flooding in Trousdale County.

Jared Ambrose/For the Vidette

Little Goose Creek in Hartsville rose to its limits during Wednesday and Thursday's severe weather.
Roxanne Lambert/Hartsville Vidette

Severe storms ripped through Middle Tennessee on Wednesday and Thursday causing extensive flooding and property damage.

The storms were reminiscent of the 2010 flood, as they dropped between five inches to nearly one foot of rain across Middle Tennessee and Southern Kentucky within a two-day span.

The highest rain totals in Tennessee were in northern Middle Tennessee and along the Cumberland Plateau.

A tornado warning was issued on Wednesday evening for Trousdale County and the surrounding area and was in effect until 6:30 p.m. A tornado watch was then in effect until 3 a.m. on Thursday morning. Flash flood warnings remained in place throughout much of Wednesday and into Thursday.

The storms caused flooding, downed trees and power outages across Trousdale County.

We had a lot of trees down," said Trousdale County Sheriff's Chief Deputy Waylon Cothron. "We also had power lines down. We've had reports of trees on houses, but no injuries.

"Little Goose Creek, through town, was full, but it stayed in its banks," he said. "Big Goose Creek, out on the east side of town, was out of its banks at Highway 25."

The storms were also responsible for school closures in multiple Middle Tennessee school districts.

Trousdale County schools were closed Tuesday through Thursday, with a delayed release on Monday.

> "It's been a rough weather week," said Trousdale County Director of Schools Clint Satterfield. "Early in the week, the school closure was due to the intensity and the timing of the storms. On Monday afternoon, we had to hold buses for 45 minutes before we could release students, because of the violent thunderstorms and hail. In situations like this, we stay in contact with the National Weather Service, and they advised me to not put buses on the road until the fronts went through.
>
> For Tuesday morning, they called for a repeat of what we had on Monday afternoon. The weather was supposed to arrive here around 6 a.m., which is exactly when the buses pick up students. We didn't feel comfortable about that. We didn't want kids out waiting on buses, so we didn't have school on Tuesday. On Wednesday, we had a tornado watch and flash flooding, and on Thursday, there was still flooding. The weather was just so uncertain."
>
> On Thursday, the severe weather continued, as it moved into North Georgia and other areas of the Southeast.

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Losses add up as water recedes in Trousdale County, Tenn.

by Erika Lathon | Wed, May 11th 2016 at 4:27 PM
Updated Wed, May 11th 2016 at 6:15 PM

WZTVThumbnail

Little Goose Creek is more like a raging river after the Trousdale County area got inches of rain Wednesday.

"By the river, we've got numerous creeks going through the county, a lot of hills so you have a lot of this water running off coming off the hills flooding the creeks really fast," Allen Lewis, Trousdale County EMA director said. "That water gets moving really good down through there."

The swift current carried tree limbs and brush miles downstream, making a mess of the City Park in downtown Hartsville.

"Our baseball park and football field received a lot of water damage," Lewis said. "Other areas of town received some water damage. It's just a lot of water in a short time."

The rising water left some businesses under water.

"She said, I hate to tell you, but your shop is underwater again," Dr. Floyd Reed, a flood victim said. "I'm just waiting for it to go down to see what I can salvage."

For some, the loss is even greater. One family said all of their belongings were in a storage unit that flooded.

"I don't know whether to cry or just fall apart," Christy Scrugs, another flood victim said. "Everything, almost everything we own, it was in that storage building. We just got put out of our home."

The water is receding quickly, but the losses are beginning to add up.

"My little girl is like, 'I don't have a stuffed animal anymore mommy, they were all in there.'"

THE TENNESSEAN

Published 5:25 a.m. CT May 11, 2016 | Updated 10:24 p.m. CT May 11, 2016

Several Midstate counties were impacted by flooding after severe storms dumped several inches of rain across the region early Wednesday. Most of the heavy rain fell in the northern part of Middle Tennessee in areas including Gallatin and Hartsville. *Dessislava Yankova/Staff*

Several Midstate counties were impacted by flooding after severe storms dumped several inches of rain across the region early Wednesday, the National Weather Service said.

Most of the heavy rain fell in the northern part of Middle Tennessee in areas including Gallatin and Hartsville. Counties affected include Sumner, Trousdale, Jackson and Macon counties, as well as parts of Robertson, Smith and Wilson counties.

Trousdale County received about 6 inches while the Nashville International Airport logged less than one-tenth of an inch, NWS meteorologist John Cohen said.

In Hartsville, flooding led to water rescues and severe damage to a city park and several homes.

"The Hartsville City Park was basically destroyed by the weather. The baseball and the softball fields are all destroyed. All the fences are torn down. The concessions stands are all flooded," said Matt Batey, deputy director of the Trousdale County Emergency Management Agency.

Goose Creek, located by the park, swelled from the heavy rains and caused the flooding, Batey said. Most of the residences that have been flooded are near the intersection of Highway 141 north and Highway 25 west. A portion of Highway 25 is closed because of high water.

"There are multiple residences that have been inundated with water," Batey said, although the number of homes damaged is unknown. "We haven't gotten to the damage assessment yet.

"They started rescuing people at 3:30 a.m., and since then we've done three water rescues for a total of five individuals and two dogs," Batey said. "So far no injuries or deaths are reported."

Early Wednesday afternoon, the city's baseball fields were covered in about four feet of water.

The downtown Hartsville football field was covered with nearly three feet of water.

Trousdale County's highway department officials said initial road and bridge damage estimates reached close to $100,000.

Trousdale County EMA director Allen Lewis said about $60,000 to $80,000 in damage had been done to the city's three baseball fields, football field and the park.

Table 17: Flooding Extent History

Location	Extent & Impact	Event Date
Metro Hartsville-Trousdale County	On May 08th, 2024, Due to heavy rain, the local HS baseball park was closed for several days due to flooding. It was reported that over 6 inches of water covered the area. This field regularly floods	8 May 2024
Metro Hartsville-Trousdale County	Rankin Road was flooded, and this road continues to flood with 6-8 inches of water covering it regularly. This impacts transportation	30 April 2005
Metro Hartsville-Trousdale County	A retired NWS employee and television media reported minor flooding in and around Hartsville. Several roads had minor flooding, including Brummit Road, where water covered the yards of several homes. It is reported that Brummit Road continues to be impacted by heavy rain and floods regularly, with water up to 3 feet covering the roadway	8 May 2012
Hartsville/Trousdale County	Heavy rain caused major flash flooding, which affected much of Trousdale County. Numerous primary and secondary roads were flooded and closed or even washed out, including Highway 141 North, Highway 25 West, Browning Branch Road, and Hancock Road. Numerous homes and businesses were flooded, including several homes around Highway 141 and Highway 25, and several buildings and a storage facility in downtown Hartsville. The Hartsville city park and Trousdale County High School football and baseball fields, along with their concession stands and bathrooms in downtown Hartsville, were destroyed by flooding from Goose Creek. At least 3 water rescues from vehicles and homes were conducted across Trousdale County. Water depth was reported between 6 inches and 3 feet over different area roads. The cost of the repair was significant	11 May 2016

Probability of Future Events - Tw or more events over the next Five years

The impact of extreme weather events may increase the frequency and intensity of flash flooding within Tennessee, particularly in highly urbanized regions such as Memphis, Nashville, Knoxville, and Chattanooga. Any area with extreme changes in deep terrain, predominately in East Tennessee, will experience significant flooding impacts.

Based on a historical record of 19 flood events over 74 years (1950 - 2024) but this doesn't paint a full picture and due to recent climate trends it is estimated that Trousdale County will experience at a number of flooding events over the next 5 years and likely at least 2

significant flooding events over the next 5 years To reference the climate trend analyzed by East Tennessee State University, reference Appendix C.

4.4.2 Risk Assessment

The HMPC meeting cited flooding as a repetitive hazard in the county and jurisdictions. It discussed commonly flood-prone areas and mentioned improvements that have already been made to mitigate risks, such as the clearing of ditches and the installation of culverts.

The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for natural hazards. It was built and designed by FEMA in close collaboration with various stakeholders and partners in academia and local, state, and federal government. The Risk Index leverages available source data for natural hazards and community risk factors to develop a baseline relative risk assessment for each county and census trace. **Some of these community risk factors include social vulnerability, which is determined by the data pulled from the Census performed every ten years. A higher social vulnerability score is proportional to a higher risk score. Individuals within vulnerable or underserved populations are likely to be impacted to a higher degree than their counterparts. Underserved communities and vulnerable populations are especially vulnerable to flooding conditions. Financial constraints, lack of transportation, dependency on medical services, and special medical equipment make it more difficult for these populations to evacuate and live in shelters due to special needs and financial constraints.**

National Risk Index Score for Flooding = Very Low
Social Vulnerability = Very Low

Although the National Risk Index is a well-valued tool it fails to properly show the feedback from the participating jurisdictions. Therefore, all identified hazards were evaluated in regard to risk in FEMA lifelines per jurisdiction. The scenario that local jurisdictions would evaluate the conditions from was a mid-level impact of the identified hazard. The results are below:

Table 18: Flooding Risk based on selected FEMA Lifelines

Flooding Risk	FEMA Lifelines							
Jurisdiction	Safety & Security	Food, Water & Shelter	Health & Medical	Energy	Communications	Transportation	Hazardous Materials	Water Systems
Metropolitan Hartsville-Trousdale County	Green	Green	Yellow	Yellow	Yellow	Green	Green	Green

Colors indicate lifeline or component conditions:	
Red	Significant Impact, Multiple Required Resources
Yellow	Some Impact, Some Outside Resources Required
Green	Little to No Impact, No Outside Resources Required

Given the information above it becomes vital that all participating jurisdictions are able to prioritize the necessity of mitigation actions in the following lifeline categories so that they can become more resilient in the whole community that they serve.

HAZUS Data and Methodology

A Level I HAZUS analysis was completed using a probabilistic risk assessment for the 100-year and 500-year return periods. The Level I vulnerability assessment is presented below by return period.

Building Inventory (General Building Stock)

HAZUS estimates that 4,184 buildings in the region have an aggregate total replacement value of 1,374 million dollars.

- **Essential Facility Inventory:** HAZUS indicates that there is one hospital in the region with a total capacity of 12 beds. There are also three schools, one fire station, three police stations, and one emergency operation center.
- **General Building Stock Damage:** For the 100-year flood scenario, HAZUS estimates that about six buildings will be at least moderately damaged. This is over 50% of the total number of buildings in the scenario. An estimated one building will be destroyed completely.

Debris Generation

- ***100-year Scenario:*** The model estimates that 282 tons of debris will be generated. Of this, Finishes comprise 43%, Structure 30%, and Foundation 28%. If the debris tonnage is converted into an estimated number of truckloads, it will require 12 truckloads (@ 25 tons/truck) to remove the debris generated by the flood.
- ***500-year Scenario:*** The model estimates that 392 tons of debris will be generated. Of this, Finishes comprise 38%, Structure 32%, and Foundation 30%. If the debris tonnage is converted into an estimated number of truckloads, it will require 25 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Shelter Requirements

HAZUS estimates the number of households expected to be displaced due to the flood and the associated potential evacuation. HAZUS also estimates those displaced people who will require accommodations in temporary public shelters.

- ***100-year Scenario:*** The model estimates 63 households (or 188 people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 58 people (out of a total population of 11,606) will seek temporary shelter in public shelters.

- ***500-year Scenario:*** The model estimates 71 households (or 212 people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 61 people (out of a total population of 11,606) will seek temporary shelter in public shelters.

4.4.3 Land Use and Development

All future developments within the floodplain may be considered at risk. An increase in population will likely increase the number of buildings and infrastructure. New development in unincorporated areas could potentially occur in areas prone to flooding and increase vulnerabilities and potential losses; however, most land use regulations require the consideration of flooding during the development process.

4.4.4 Multi-Jurisdictional Differences

Flooding affects all jurisdictions differently; that is why it is essential to document the depth, duration, and time that flooding occurred. These differences are noted in past occurrences to demonstrate the toll that flooding can take on the county's rural and urban areas. Due to the topography of Trousdale County, with its rolling hills and deep valleys, flood events are prone to occur near the streams within the county. FIRM Panels are located within Appendix D to help illustrate the areas at risk and depth of flooding within the county and its incorporated jurisdictions.

Intersections & Roads that Consistently Flood in Metropolitan Hartsville-Trousdale County:

- Brumitt Road//Rankin
- Latti Reese Road//Goose Creek
- Middle Fork//Cellsor Road to Shoot Road
- Darwin Branch
- Wrights Lane

Waterways that are prone to flooding in Metropolitan Hartsville-Trousdale County:
:

- Rocky Creek
- Big Goose Creek
- Little Goose Creek

4.4.5 Summary

Severe flooding has the potential to inflict significant damage in Metropolitan Hartsville-Trousdale County. The total economic loss estimated for the 100-year riverine flood is $76.19 million. The total economic loss estimated for the 500-year riverine flood is $94.78 million. Residential, commercial, and public buildings and critical infrastructures such as transportation, water, energy, and communication systems may be damaged or destroyed by flood waters. During a flood event, chemicals and other hazardous substances may

contaminate local water bodies. Flooding kills animals and, in general, disrupts the ecosystem. Snakes and insects may also make their way to the flooded areas.

4.5 Severe Weather

2.5.1 Hazard Overview

Thunderstorms

Thunderstorms result from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, it cools, condenses, and forms cumulonimbus clouds that can reach heights greater than 35,000 ft. Thunderstorms are responsible for developing and forming many severe weather phenomena, posing significant hazards to the population and landscape. Damage from thunderstorms is mainly inflicted by downburst winds, large hailstones, and flash flooding caused by heavy precipitation. Stronger thunderstorms can produce tornadoes and waterspouts.

Wind

All jurisdictions are vulnerable to receiving damage from severe winds. The NOAA Storm Data Preparation document categorizes wind into three different types, as defined below.

- High Wind: Sustained non-convective winds of 40mph or greater lasting for one hour or longer or winds (sustained or gusts) of 58 mph for any duration on a widespread or localized basis.
- Strong Wind: Non-convective winds gusting less than 58 mph or sustained winds less than 40 mph, resulting in a fatality, injury, or damage.
- Thunderstorm Wind: Winds arising from convection (occurring within 30 minutes of lightning being observed or detected), with speeds of at least 58 mph, or winds of any speed (non-severe thunderstorm winds below 58 mph) producing a fatality, injury, or damage.

Historically, severe wind events occur multiple times yearly in Trousdale County. It is not unusual for Trousdale County to experience wind speeds up to 70 Knots (80 MPH), causing structural damage, power outages, and downed trees. Based on a historical record of 66 wind events over 52 years (1971- 2023), the historic frequency calculates an event will likely happen around 2 times per year. To reference the climate trend analyzed by East Tennessee State University, reference Appendix C.

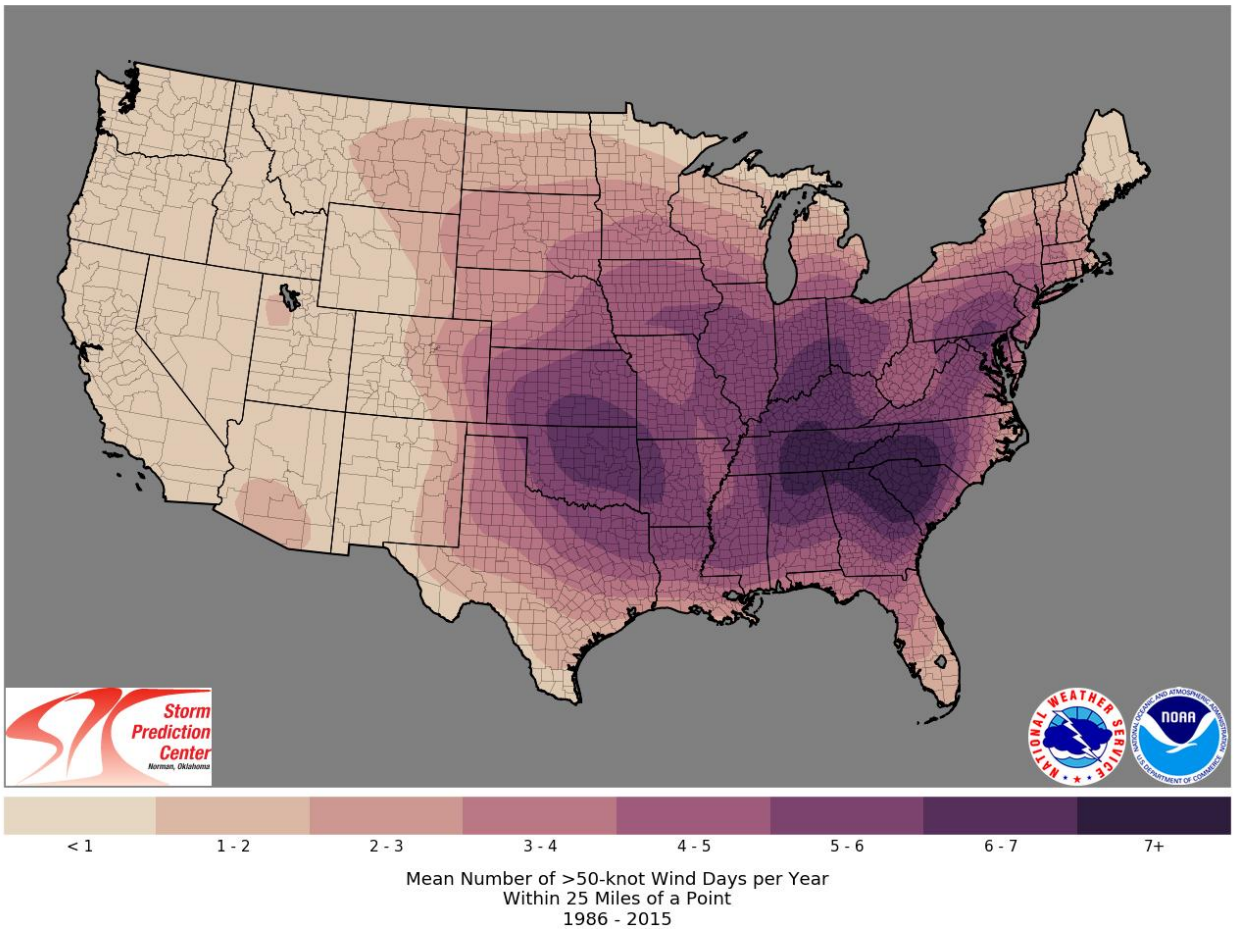


Figure 7 Mean Number of >50-knot Wind Days per Year (1986-2015) (source: NOAA)

Hail

Hail forms when updrafts carry raindrops into icy areas of the atmosphere, where they freeze into ice. Hailstorms occur throughout the spring, summer, and fall but are more frequent in late spring and early summer. Hailstones are usually less than two inches in diameter and can fall at speeds of 120 mph. Hail causes nearly $1 billion in damage to crops and property yearly in the United States. *Table 19* provides an overview of the typical impacts on a community related to hailstone size.

Table 19: TORRO Hail Index (Source: The Tornado and Storm Research Organization)

Scale	Description	Max Diameter (mm)	Typical Damage
H0	Pea	5-9	No damage
H1	Mothball	10-15	Slight general damage to crops and plants
H2	Marble	16-20	Significant damage to crops and vegetation
H3	Walnut	21-30	Severe damage to fruits and crops, damage to glass and plastic structures, wood and paint scored
H4	Pigeons Egg	31-40	Widespread glass damage, auto-body damage
H5	Golf Ball	41-50	Destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Hens Egg	51-60	Grounded aircrafts dented; brick walls pitted
H7	Tennis Ball	61-75	Severe roof damage and risk of serious injury

H8	Softball	76-90	Severe damage to aircrafts
H9	Grapefruit	91-100	Extensive structural damage, risk of severe or fatal injuries to people caught in storm
H10	Melon	>100	Extensive structural damage, risk of severe or fatal injuries to people caught in storm

Lightning

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. Lightning is one of the more dangerous weather hazards in the United States. Annually, lightning is responsible for deaths, injuries, and millions of dollars in property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning also causes forest and brush fires and deaths, and injuries to livestock and other animals. According to the National Lightning Safety Institute, lightning causes more than 26,000 fires in the United States annually. The institute estimates property damage, increased operating costs, production delays, and lost revenue from lightning and secondary effects to be more than $6 billion annually. Impacts can be direct or indirect. People or objects can be struck or damaged when the current passes through or nearby.

Winter Weather

A freeze occurs when temperatures are below 32 degrees Fahrenheit for a period. These temperatures can damage crops, burst water pipes, and create layers of “black ice.” Winter storms are events that can range from a few hours of moderate snow to blizzard-like circumstances that can affect driving conditions and impact communications, electricity, and other services. In Trousdale County, all jurisdictions are vulnerable to freezes and moderate winter storms, but not to the severity level seen in much of the northern U.S. Based on previous occurrences, Trousdale County can experience multiple winter weather events in one year affecting all jurisdictions equally The severity of winter storms is commonly measured by inches of snowfall. It is possible for snowfall to accumulate up to 6 inches in Trousdale County with an average of around 3” per year. Trousdale County’s average elevation is 512’ above sea level which is significantly less than areas such as Cookeville (1089’) to the east. As such winter weather events are significantly less. U.S. Mean snowfall per year is from 6-12” annually average mean snowfall per year is below in *Figure 8.*

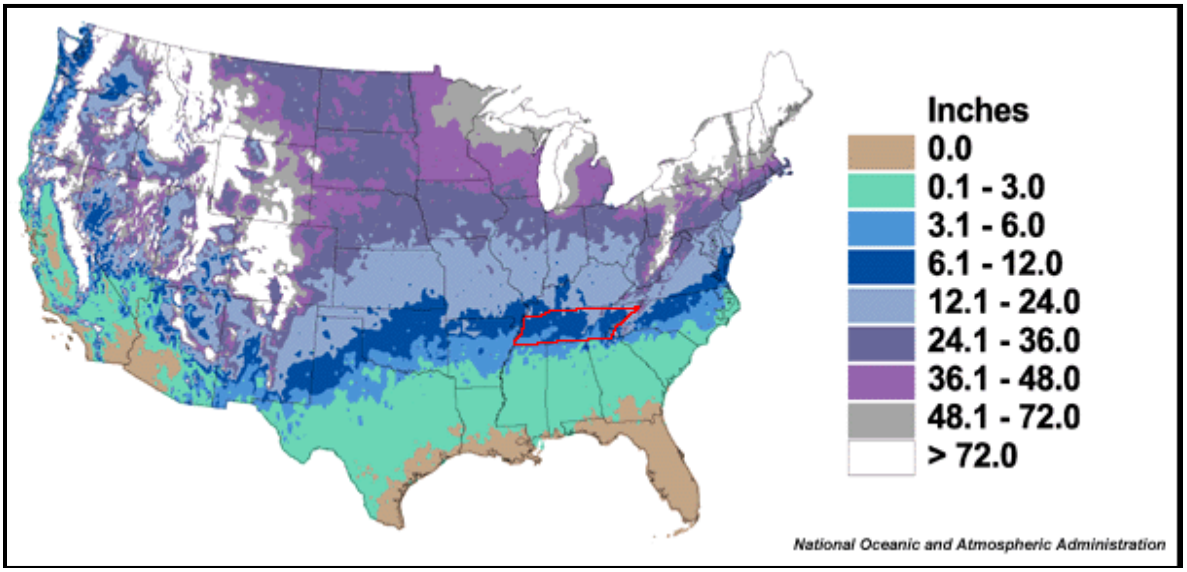


Figure 8 Average Snowfall per Year (Source: NOAA)

4.5.1 County Profile

The entirety of Metropolitan Hartsville-Trousdale County is at risk of severe weather. Severe weather events are most likely in the spring and summer months and during the afternoon and evening hours, but they can occur year-round and at all hours. In terms of magnitude, the NWS defines thunderstorms in terms of severity. A severe thunderstorm produces winds greater than 57 miles per hour and/or hail greater than 1 inch in diameter and/or a tornado. The NWS chose these severity measures as parameters more capable of producing considerable damage. Hail stones can vary in diameter, and in Tennessee, there have been records of hail up to 2.75 inches.

Event narratives were obtained via the NOAA Storm Event Database and are included below for each severe weather category. Tables containing all NOAA-recorded severe weather events between 1950- 2024 for Metropolitan Hartsville-Trousdale County are contained in Appendix C.

Thunderstorms and Wind

4 May 2021: A QLCS (Quasi-linear Convective System) moved across Middle Tennessee during the early morning hours of May 4, 2021. This line of thunderstorms spawned a total of 14 EF-0 tornadoes throughout Middle Tennessee, at least 4 of which were captured on video by local residents. In addition to the tornadoes, significant straight-line wind damage also affected many other areas of Middle Tennessee. The EF-0 West Trousdale tornado dissipated into a large downburst that caused widespread straight-line wind damage along Highway 25 as well as in and around the city of Hartsville. This severe incident blew down

numerous trees and destroyed several barns in the area around Highway 231 and Davenport Lane.

11 June 2014: Thunderstorms developed during the afternoon hours of June 11 across much of Middle Tennessee. The sheet metal roof of a large storage shed behind the sanitation department building in downtown Hartsville was blown off, damaging a nearby vehicle. Two people inside the storage shed were not injured.

23 October 2013: A powerful storm system moved across the Tennessee & Ohio Valleys during the afternoon and evening hours on October 31. A very strong southerly low-level jet, measured at 82 knots, caused strong to damaging gradient winds at the surface of 50 to 60 mph for many hours west of the Cumberland Plateau. Scattered showers and thunderstorms also developed during the evening hours as a cold front swept across Middle Tennessee, with several reports of damaging winds received. Numerous Trees were reported down within Trousdale County.

Hail

6 May 2022: Trousdale County was affected by a hail of 1” in diameter following scattered multicell and a few supercell thunderstorms across Middle Tennessee during the afternoon and evening hours. One supercell caused significant hail and wind damage.

24 May 2011: Large hail of about 1” was reported in Hartsville after Severe thunderstorms occurred between the early morning and midafternoon hours, affecting Trousdale County.

Lightning

There is no NOAA record of lighting producing damage in Metropolitan Hartsville-Trousdale County.

Winter Weather

6 January 2022: Seven inches of snow in Metropolitan Hartsville-Trousdale County caused multiple issues for automobile traffic and pedestrians.

7 January 2010: As a cold front moved through Middle Tennessee in association with a strong upper-level low moving across the Southern Ohio Valley Region, a winter weather event developed across the area from the early morning through late afternoon hours. This event brought one to two inches of snow to a large part of Middle Tennessee. One inch was reported across the county by the Trousdale County Sheriff's Office. Multiple roads across the county became snow-covered, causing hazardous driving conditions and several car accidents. Details on any damage amounts or injuries associated with these accidents were unknown.

Probability of Future Events – Two to Three events over a five-year period.
In order to determine the likelihood of future severe weather occurrences in Trousdale County, historic data and weather patterns were analyzed. Since 1950, there have been 71 Strong Wind/Thunderstorm Wind events, 17 Hail events, 0 Ice Storm events, and 19 Winter Storm events. A total of 107 combined severe weather events have occurred within the county. To reference the climate trend analyzed by East Tennessee State University, reference Appendix C.

4.5.2 Risk Assessment

Severe weather is not as spatially defined in any location in Metropolitan Hartsville-Trousdale County; therefore, the entire area is equally at risk of severe weather. This includes the entire County population, all critical facilities, buildings (commercial and residential), and infrastructure.
The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for natural hazards. It was built and designed by FEMA in close collaboration with various stakeholders and partners in academia and local, state, and federal government. The Risk Index leverages available source data for natural hazards and community risk factors to develop a baseline relative risk assessment for each county and census trace. **Some of these community risk factors include social vulnerability, which is determined by the data pulled from the Census performed every ten years. A higher social vulnerability score is proportional to a higher risk score. Individuals within vulnerable or underserved populations are likely to be impacted to a higher degree than their counterparts. Underserved communities and vulnerable populations are especially vulnerable to severe weather conditions. Financial constraints, lack of transportation, dependency on medical services, and special medical equipment make it more difficult for these populations to evacuate and live in shelters due to special needs and financial constraints.**

National Risk Index Score for Hail = Relatively Low
National Risk Index Score for Strong Wind = Relatively Low
National Risk Index Score for Ice Storm = Relatively Low
National Risk Index Score for Winter Weather = Relatively Low
Social Vulnerability = Relatively Low

Although the National Risk Index is a well-valued tool it fails to properly show the feedback from the participating jurisdictions. Therefore, all identified hazards were evaluated in regard to risk in FEMA lifelines per jurisdiction. The scenario that local jurisdictions would evaluate the conditions from was a mid-level impact of the identified hazard. The results are below:

Table 20: Severe Weather Risk based on selected FEMA Lifelines

Severe Weather Risk	FEMA Lifelines							
Jurisdiction	Safety & Security	Food, Water & Shelter	Health & Medical	Energy	Communications	Transportation	Hazardous Materials	Water Systems
Metropolitan Hartsville - Trousdale County	Green	Green	Yellow	Yellow	Yellow	Green	Green	Green
Colors indicate lifeline or component conditions:								
Red	Significant Impact, Multiple Required Resources							
Yellow	Some Impact, Some Outside Resources Required							
Green	Little to No Impact, No Outside Resources Required							

Given the information above, it becomes vital that all participating jurisdictions are able to prioritize the mitigation actions in the following lifeline categories so that they can become more resilient to the whole community that they serve.

4.5.3 Land Use & Development

Increased development and population growth can reasonably translate to increased damages resulting from severe weather events. The population in Metropolitan Hartsville - Trousdale County is expected to rise similarly to its surrounding counties and Tennessee. An increase in population will lead to an increase in the number of residential and commercial structures as well as new and improved infrastructure, which in turn means an increase in the number and value of assets at risk of wind damage.

4.5.4 Multi-Jurisdictional Differences

The entirety of Metropolitan Hartsville -Trousdale County, including all assets, can be considered equally at risk of severe weather events. This includes the entire population, all critical facilities, buildings (commercial and residential), and infrastructure.

4.5.5 Summary

Metropolitan Hartsville -Trousdale County is subject to severe weather hazards, including thunderstorms, wind, lightning, and hail. Associated damages include impacts to utilities, residential and commercial buildings/property, and agricultural losses. High wind can cause trees to fall and potentially result in injuries or death; lightning can lead to house fires and serious injury. Hail can cause injury and severe property damage to homes and automobiles.

4.6 Tornadoes

2.6.1 Hazard Overview

Tornadoes have the potential to produce winds over 200 mph (EF5 on the Enhanced Fujita Scale) and can be very expansive. Before February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage. *Table 21* shows the wind speeds associated with the enhanced Fujita scale ratings and the damage that could result at different intensity levels.

Table 21: Enhanced Fujita Scale

EF Rating	3 Second Wind Gust (mph)	Estimated Damage
0	65-85	**Light Damage.** Slight damage to roofs, gutters, siding, tree branches broken, shallow-rooted trees overturned
1	86-110	**Moderate Damage**. Mobile homes damaged, exterior portions of homes damaged or lost (i.e., roofs, doors, windows)
2	111-135	**Considerable Damage**. Mobile homes destroyed, cars lifted, well-constructed home frames shifted, roofs torn off, light-object missiles generated, large trees uprooted or snapped.
3	136-165	**Severe Damage**. Severe damage to large buildings, entire home stories destroyed, trees debarked, trains overturned, heavy vehicles lifted and thrown, structures with weaker foundations thrown
4	166-200	**Devastating Damage.** Well-constructed houses and whole frame houses leveled, cars thrown, small missiles generated
5	200+	**Incredible Damage**. Substantial frame houses leveled off foundations and the automobile-sized missiles generated, and high rises experience considerable damage and deformation

According to the Glossary of Meteorology (AMS 2000), a tornado is "a violently rotating column of air, pendant from a cumuliform cloud or underneath a cumuliform cloud, and often (but not always) visible as a funnel cloud." Most tornadoes move from southwest to northeast or west to east.

Although tornadoes can occur in any location, most of the tornado activity in the United States exists in the Midwest and Southeast. An exact season does not exist for tornadoes; however, most occur between early spring and mid-summer (February – June). The onset of tornado events is rapid, giving those in danger minimal time to seek shelter. The current average lead time, according to NOAA, is 13 minutes. A tornado can reach wind speeds of 40 mph to 250 mph and higher. The following map illustrates the frequency of tornadoes in Tennessee.

4.6.1 County Profile

Figure 9 Tornadoes by County (NWS/NOAA)

Figure 10 illustrates the track of tornadoes through Metropolitan Hartsville-Trousdale County as recorded by the National Weather Service Nashville and the National Climatic Data Center and compiled into a visual database by Mississippi State University.

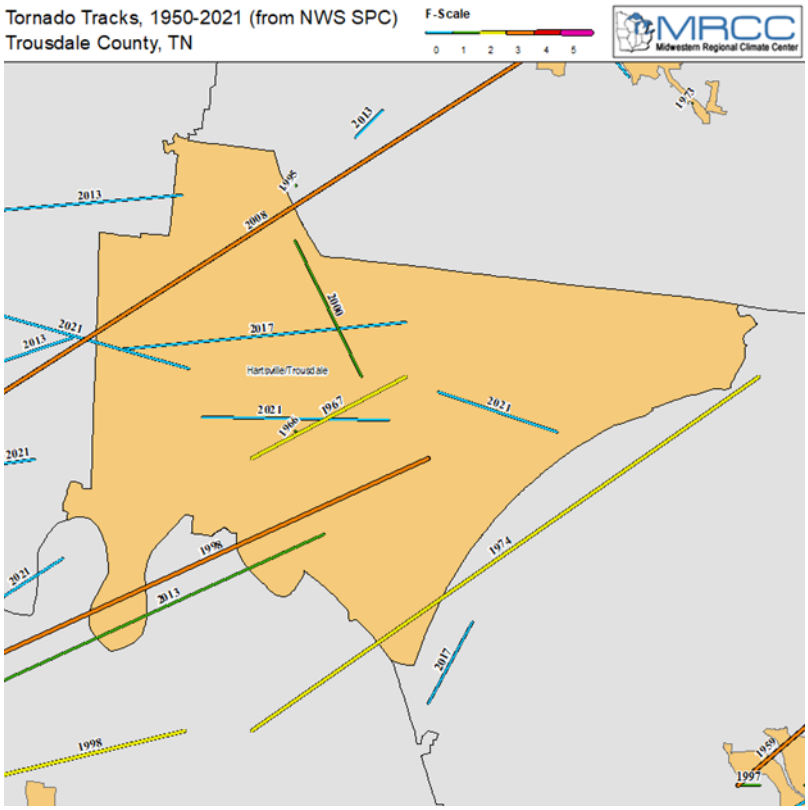
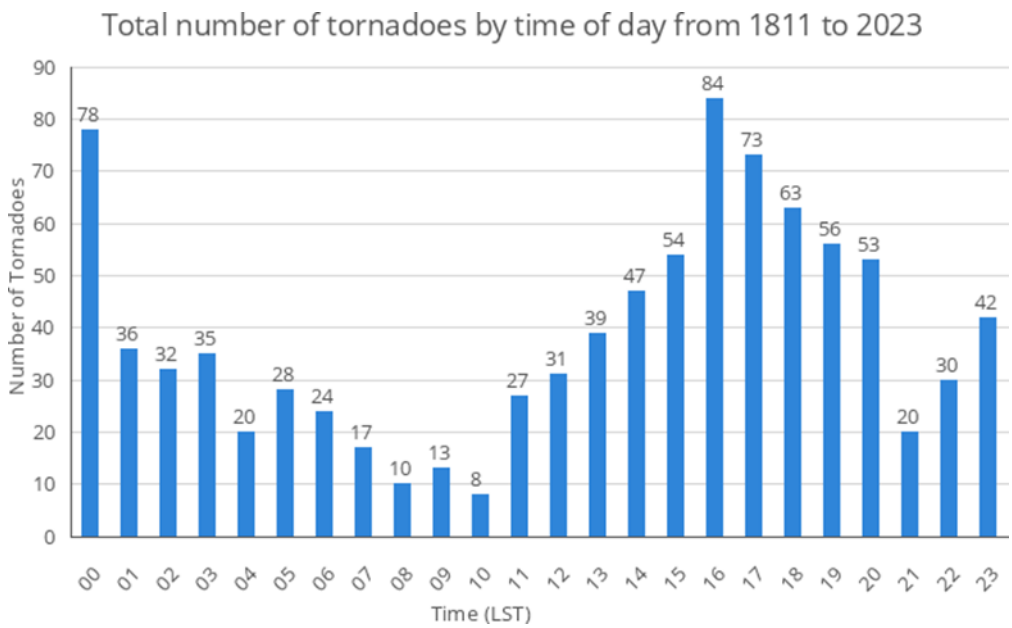


Figure 10

Table 22 provides a breakdown of tornado frequency by the hour in Metropolitan Hartsville-Trousdale County; tornadoes commonly hit between 4 p.m. and 12 a.m.



The following narratives were obtained via the NOAA Storm Event Database. Only events resulting in injury, death, or extensive damage (greater than $200K property/crop damage) were included as expanded narratives. A table containing all NOAA-recorded tornadoes between 1950- 202X for Metropolitan Hartsville-Trousdale County is contained in Appendix C.

5 February 2008: At just after 22:00, an EF2 Tornado ripped through a gas plant, causing a gas leak and fire at the Columbia Gulf Transmission Company at 5422 Green Grove Road in Hartsville, TN. The fire eventually burned itself out. Two people were killed, and 5 people were injured. Ten homes were destroyed, and 23 homes had major damage.

1 January 2013: An EF1 tornado moved into far southern Trousdale County from northern Wilson County. The tornado moved across Highway 231, causing significant roof damage to homes and destroying some outbuildings. Numerous trees were also snapped or uprooted. The tornado then crossed the Cumberland River back into northern Wilson County.

18 November 2017: News Channel 5 reported the following in November 2017: EF0 Tornado Confirmed In Trousdale County. The National Weather Service has confirmed that an EF0 tornado ripped through Trousdale County over the weekend. The NWS confirmed the tornado had winds of up to 85mph and was 125 yards wide, lasting for seven miles, according to the survey team. Residents on Crenshaw Road said they had no warning.

4 May 2021: An EF-0 tornado touched down along Rock Springs Road south of Chenault Lane, heavily damaging a barn and blowing down numerous trees. The tornado then moved east across Lauderdale Lane and Homer Scott Road, continuing to blow down trees. Turning more southeast and entering Trousdale County, the tornado damaged several homes and blew down dozens of trees along Highway 231, Templow Road, Bass Road, Walnut Grove Road, and Gore Lane. The total path length was 5.05 miles.

Wednesday marked the 50th anniversary of the April 3-4, 1974 Super Tornado Outbreak, which killed 330 people and injured more than 6,000.

Submitted

Family members came to the aid of the Martin family after a tornado touched down in Hartsville during the 1974 Super Tornado Outbreak.

Wednesday marked the 50th anniversary of the two-day 1974 Super Tornado Outbreak that began on April 3, and lasted for roughly 16 hours across 13 states.

Over the two-day span, 148 tornadoes touched down from the Great Lakes to the Southeast, killing 330 people and injuring more than 6,000.

On that terrible Wednesday in 1974, also called Black Wednesday, an F3 tornado ripped through Trousdale, Wilson and Smith Counties and was one of 24 tornadoes that touched down in the state that left 38 Middle Tennesseans dead.

While the tornado that hit Hartsville had a path of 21 miles and was approximately 300 yards in width, thankfully, there were no fatalities.

Former Trousdale County teacher and Hartsville resident Kenny Martin, 74, remembers that day clearly, as he and his family lost their home.

"The afternoon of the tornado, I was helping Jim Satterfield coach football," said Martin. "We were having spring practice. There had been reports about storms, but when lightning hit a house, we decided that we'd better shut practice down. So, I came home. I got home at around 5 p.m. We lived close to the (Trousdale County/Smith County) line. We were living in a house that my uncle owned on his farm.

"My wife, Diane, was very afraid of storms. She had come out of the bedroom after changing our daughter Cynthia's diaper and said, 'listen to that thunder.' Our daughter was two-and-a-half years old at the time. But I said to my wife, 'That's not thunder.' It sounded exactly like a train."

Martin quickly realized that the sound they were hearing was a tornado and told his wife and daughter to take cover in the innermost part of the house.

"I told my wife to take my daughter and lay in the hallway," said Martin. "When I got up and looked outside, I could see the tornado. It looked like it was standing still. I learned later that when it looks like it is standing still, it means that it is actually coming toward you.

"I started opening the windows because we'd done it as part of a drill at the school where I was teaching — we raised the windows. But when I raised one of the windows in my house, the curtains blew back in my face, so I thought I'd better go lay down in the hallway."

As the tornado passed over, it threw the Martin family out of their house.

"By the time I laid down, it was getting pretty loud," said Martin. "Of course, Diane and Cynthia were laying right beside me. But I happened to raise up to look for a moment and saw the picture window from the den blow into the couch.

"We were laying under a pulldown staircase, and I looked up at it, and when I did, the staircase flopped open and I could see the sky. At that moment in time, I got up to get out, but something hit me in the back of the head, so I thought I'd better lay back down again. Then I felt a lifted feeling. It actually lifted us up and blew us out of the house. We ended up laying on top of the end wall of the house. Everything was gone. There was nothing left of the foundation. Our house just exploded."

All of the Martins' belongings were destroyed, in addition to their home.

"The tornado took our car and truck around the house and totaled both of them," said Martin. "Our washer and dryer ended up way out in a field on the farm, and some of our canceled checks were found in Tompkinsville, Kentucky."

What seemed like an eternity at the time was, in reality, over in less than five minutes.

"It takes me longer to tell the story than when it actually happened," said Martin. "From the time that I realized that it was a tornado, until it hit, was probably three to four minutes. When it hit us, it was over in, probably, less than a minute."

Although the tornado took his material belongings, Martin says he is grateful to God that his family was spared.

> "When I raised up, I hollered for my wife, but she didn't answer," said Martin. "So, I hollered again, and right beside me, she raised up and then my daughter popped her head out from under her just grinning — I always say that my daughter thought she'd been on a roller coaster ride.
>
> "I had stitches in the back of my head and in my arm, my wife had whiplash in her neck, and my daughter had a little puncture wound in her thigh, but we survived. We walked away with bruises and a few injuries, but we were all OK. And if you look at the pictures from that day, there is no explanation as to how we got out, except to say that the Lord really blessed us."
>
> According to Martin, it was the support of others that helped his family in the aftermath of the tornado.

"When something like this happens, it makes me sad to hear people say that they don't have anybody to turn to," said Martin. "My family and my church and the community were there for us after the tornado, and that really meant a lot."

The damage from the tornado across Trousdale, Wilson and Smith Counties totaled $1 million.

The 1974 Super Tornado Outbreak is considered to be one of the worst outbreaks to hit the U.S., and to this day is considered to be the worst tornado outbreak to hit the Upper Cumberland region of Tennessee.

Probability of Future Events – One to Two Events over the next 5 Years
Historical data and weather patterns were analyzed to determine the likelihood of future tornado occurrence in Trousdale County. Since 1996, 14 tornadoes have occurred within the county. Therefore, it is likely that Trousdale County can expect at least one or two Tornado events over the next 5 years. To reference the climate trend analyzed by East Tennessee State University, reference Appendix C.

4.6.2 Risk Assessment

Metropolitan Hartsville-Trousdale County can be considered at risk for a tornado. This includes the entire population, all critical facilities, buildings (commercial and residential), and infrastructure. Tornadoes tracked in Tennessee predominantly travel in a northeasterly direction in the state. While all assets are considered at risk from this hazard, a particular tornado would only cause damages along its specific track.
The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for natural hazards. It was built and designed by FEMA in close collaboration with various stakeholders and partners in academia and local, state, and federal government. The Risk Index leverages available source data for natural hazards and community risk factors to develop a baseline relative risk assessment for each county and census trace. Some of these community risk factors include social vulnerability, which is determined by the data pulled from the Census performed every ten years. A higher social vulnerability score is proportional to a higher risk score. **Individuals within vulnerable or underserved populations are likely to be impacted to a higher degree than their**

counterparts. Underserved communities and vulnerable populations are especially vulnerable to tornados. Financial constraints, lack of transportation, dependency on medical services, and special medical equipment make it more difficult for these populations to evacuate, receive warning notifications, and live in shelters due to special needs and other constraints, i.e., dependency on specialized medical equipment and supplies.

National Risk Index Score for Tornado = Relatively Low
Social Vulnerability = Relatively Low

Although the National Risk Index is a well-valued tool it fails to properly show the feedback from the participating jurisdictions. Therefore, all identified hazards were evaluated in regard to risk in FEMA lifelines per jurisdiction. The scenario that local jurisdictions would evaluate the conditions from was a mid-level impact of the identified hazard. The results are below:

Table 23: Tornado Risk based on selected FEMA Lifelines

Tornado Risk	FEMA Lifelines							
Jurisdiction	Safety & Security	Food, Water & Shelter	Health & Medical	Energy	Communications	Transportation	Hazardous Materials	Water Systems
Metropolitan Hartsville-Trousdale County	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow

Colors indicate lifeline or component conditions:	
Red	Significant Impact, Multiple Required Resources
Yellow	Some Impact, Some Outside Resources Required
Green	Little to No Impact, No Outside Resources Required

Given the information above it becomes vital that all participating jurisdictions are able to prioritize the necessity of mitigation actions in the following lifeline categories so that they can become more resilient in the whole community that they serve.

4.6.3 Land Use and Development Trends

Metropolitan Hartsville-Trousdale County codes include proper wind strength and safety regulations consistent with state and federal regulations. While the adopted code provides adequate protection, older and mobile homes are highly susceptible to tornado events. There are mobile home areas in the county.

4.6.4 Multi-Jurisdictional Differences

Metropolitan Hartsville-Trousdale County is at risk for a tornado event; however, historically, a large portion of tornado events have taken place in the middle region of the county. It is also worth noting that given the county's sizeable rural component, some tornadic events may have gone unreported.

4.6.5 Summary

This includes the entire County population, all critical facilities, buildings (commercial and residential), and infrastructure. While all assets are considered at risk from this hazard, a tornado would only cause damages along its specific track. The weakest tornadoes, EF0, can cause minor roof damage, and stronger tornadoes can destroy frame buildings and badly damaged steel-reinforced concrete structures. Given the strength of the wind impact and construction techniques, buildings are vulnerable to direct impact, including potential destruction, from tornadoes and wind debris that tornadoes turn into missiles. Structures constructed of light materials, such as mobile homes, are most susceptible to damage.

Chapter 3. Mitigation Strategy

3.1 Mitigation Goals

Goals are general guidelines that explain what is to be achieved. They are usually broad-based policy-type statements, long-term, and represent global visions. Goals help define the benefits that the plan is trying to achieve.

Goal Setting Exercise

In 2019, the HMPC agreed upon the goals for its hazard mitigation plan. It was decided that the goals from the 2019 plan should be carried over into the 2024 plan. They still reflect the current hazards and current conditions in the community. Goal 4 was added to reflect our need to identify and assist our most vulnerable individuals during an emergency or disaster.

Resulting 2024 Plan Update Goals

At the end of the meeting, the HMPC agreed upon three general goals for planning efforts. Those goals are as follows:

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

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

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

Goal 4: Increase understanding of the needs of our most vulnerable and underserved populations during emergencies or disasters.

Expanding & Improving Mitigation Programs

The jurisdiction determined which areas they could improve or expand based on the table below. The mitigation strategy may address each jurisdiction's gaps and limitations.

Table 24: Expansion Narrative

Jurisdiction/Applicant	How are you able to expand?
Metropolitan Hartsville-Trousdale County	Heightened Awareness, Mitigation Actions, **Heightened Awareness of the Needs of Underserved and Vulnerable Populations**

3.2 Compliance with NFIP

Metropolitan Hartsville-Trousdale County participate in FEMA's National Flood Insurance Program (NFIP). The community enforces a flood damage prevention ordinance that regulates development within the Special Flood Hazard Area (SFHA). Additionally, as members of FEMA's NFIP, Elevation Certificates are required on all new buildings and substantial improvements within the SFHA. Given the flood hazards in the planning area, an emphasis will be placed on continued compliance with the NFIP. Metropolitan Hartsville-Trousdale County adopted minimum Floodplain Management Criteria in 2010.

Permit Applications Review for SD/SI Buildings Located in Special Flood Hazard Areas

The review of permit applications for structures designated as Substantially Damaged (SD) or Substantially Improved (SI) in special flood hazard areas is conducted with meticulous attention to building codes. Our review process involves a comprehensive assessment of proposed construction to determine compliance with floodplain management criteria. We collaborate closely with relevant stakeholders, such as building officials, engineers, and architects, to ensure accurate interpretation and application of regulatory requirements. Permit applications are evaluated based on their potential impact on flood risk reduction and community resilience, with a focus on promoting sustainable development practices and safeguarding against future flood hazards. The County provides information on how property owners can decrease flood insurance costs.

Performing Damage Assessments and Substantial Damage Determinations

The Metropolitan Hartsville-Trousdale County Emergency Management Director, along with trained staff, makes damage assessments and determinations after a flooding event. If the scope of the event is beyond their ability or capability, they reach out to state and local partners, including other counties and TEMA District Coordinators.

Officials are responsible for regulating all development in SFHAs by issuing permits and enforcing local floodplain requirements, including SD, for the repairs of damaged buildings. After an event, they must:

- Determine where the damage occurred within the community and if the damaged structures are in an SFHA.
- Consistently determine what to use for "market value" and the cost to repair; uniformly applying regulations will protect against liability and promote equitable administration.
- Determine if repairing plus improving the damaged structure equals or exceeds 50% of the structure's pre-damage value.
- Require permits for floodplain development.

Following a disaster event, the floodplain manager should act quickly to move forward with the SI/SD process. If it is determined that the cost to repair is 50% or more of the market value, the structure is considered Substantially Damaged and must be brought into compliance with current local floodplain management standards. Rebuilding to current standards decreases peril to life and property and prevents future disaster suffering. if the proposed work to improve a structure will cost 50% or more of the value, the structure is considered to be Substantially Improved and must be brought into compliance with current local floodplain management standards.

Informing Property Owners for SD/SI Permits

The community is informed via websites, word of mouth, and community partners. The unincorporated County does not review buildings in special flood areas; however, the municipalities conduct construction reviews in their jurisdictions. Code enforcement personnel conduct visits and inspections during the construction process. Property owners coordinate directly with insurance carriers. The County provides information on how property owners can decrease flood insurance costs.

Ongoing Involvement and Engagement

Each jurisdiction participates in NFIP Webinars hosted by the State National Flood Insurance Program Office, as illustrated in *Table 25*. Each participating community will take the following steps to meet or exceed the following minimum requirements as set by the NFIP:

- Issuing or denying floodplain development/building permits;
- Inspecting all development to ensure compliance with the local ordinance;
- Maintaining records of floodplain development;
- Assisting in the preparation and revision of floodplain maps; (See Appendix D)
- Helping residents obtain information on flood hazards, floodplain map data, flood insurance, and proper construction measures.

Table 25: NFIP Designee

Jurisdiction	Title of NFIP Designee
Rosalie Myhan	Building and Codes Official

3.3 Prioritization Process

The prioritization process was necessary as most mitigation projects represent a significant investment of financial and personal resources. By evaluating each project's degree of feasibility and the level of costs versus benefits, Metropolitan Hartsville-Trousdale County could determine which projects should be included based on the available funding and time. The HMPC used the SAFE-T method to prioritize these projects. This approach was adopted from the successful methodology used by other counties in FEMA Region IV. This rating system uses five variables to evaluate each project's overall feasibility and appropriateness. *Figure 11* further explains this method.

Project Prioritization Method: SAFE-T			
Variable		**Value**	**Description**
S	**Societal:** The public must support the overall implementation strategy and specified mitigation actions. The projects will be evaluated in terms of community acceptance, social vulnerability and societal benefits	**1**	Low community acceptance/priority
		2	Moderate community acceptance/priority
		3	High community acceptance/priority
A	**Administrative:** The projects will be evaluated for anticipated staffing and maintenance requirements to determine if the jurisdiction has the personnel and administrative capabilities necessary to implement the project or whether outside help will be needed.	**1**	High staffing, outside help needed
		2	Some staffing, no outside help needed
		3	Low staffing, no outside help needed
F	**Financial:** The projects will be evaluated on their general cost-effectiveness and whether additional outside funding will be required.	**1**	Somewhat cost-effective
		2	Moderately cost effective
		3	Very cost-effective
E	**Environmental:** The projects will be evaluated for any immediate or long-term environmental impacts caused by their construction or operation.	**1**	Many environmental impacts
		2	Some environmental impacts
		3	Few environmental impacts
T	**Technical:** the projects will be evaluated on their ability to reduce losses in the short term or long term.	**1**	Short-term fix
		2	Medium-term fix
		3	Long-term fix

Figure 11 SAFE-T Project Prioritization

The identification and analysis process of mitigation alternatives allowed the HMPC to come to a consensus and prioritize recommended mitigation actions. The HMPC discussed the contribution of the effort to save lives or property first and foremost, with additional consideration given to the benefit-cost aspect of a project; however, this was not a quantitative analysis. The team agreed that prioritizing the actions collectively enabled the actions to be ranked in order of relative importance and helped steer the development of additional actions that meet the more essential objectives while eliminating some of the actions that did not garner much support. The cost-effectiveness of any mitigation

alternative will be considered in greater detail by performing benefit-cost project analyses when seeking FEMA mitigation grant funding for eligible actions associated with this plan.

3.4 Mitigation Action Plan

The Mitigation Action Plan was developed to present the recommendations developed by the HMPC for how the communities can reduce the risk and vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. Emphasis was placed on both future and existing development. The action plan summarizes who is responsible for implementing each of the prioritized actions and when and how the actions will be implemented. Due to funding availability and other criteria, it should be clarified that the actions included in this mitigation strategy are subject to further review and refinement, alternative analyses, and reprioritization. In this plan, the term “local funding” occurs when the local governments use revenue to fund mitigation projects. In table 26 below, the column titled Jurisdiction indicates which local government is using its revenue received via taxes, charges, or fees to fund the mitigation project.

This document does not obligate Metropolitan Hartsville-Trousdale County to implement any or all of these projects. Rather, this mitigation strategy represents the community's desire to mitigate the risks and vulnerabilities of identified hazards.

Table 26: Metropolitan Hartsville-Trousdale County Mitigation Actions and Projects

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Action Description and *Hazard Mitigated*	Responsible Department	Jurisdiction	Time Frame	Priority Score						Est. Cost	Funding Sources	Infrastructure
				Societal	Administrative	Financial	Environmental	Technical	Total			
Retrofit or Hallway Hardening in all three schools *Severe Weather, Tornado*	Trousdale Board of Education	Metro Hartsville-Trousdale County	3 to 5 Years	3	3	3	3	3	**15**	4 MIL	HMGP BRIC	Existing
Mylar Window Film on Community Center *Severe Weather, Tornado*	EMA	Metro Hartsville-Trousdale County	3 to 5 Years	3	3	3	3	3	**15**	500 K	HMGP BRIC	Existing
Back-Up Generators • Schools • Water Plant • Admin Bldg *All Hazards*	Mayor's Office	Metro Hartsville-Trousdale County	3 to 5 Years	3	3	3	3	3	**15**	5 MIL	HMGP BRIC	Both
Upgrade Water Lines *Drought, Extreme Temps, Flooding*	TC Water & Sewer	Metro Hartsville-Trousdale County	3 to 5 Years	3	2	3	3	3	**14**	6 MIL	HMGP BRIC	Both

Public Awareness Campaign *All Hazards*	EMA	Metro Hartsville-Trousdale County	3 to 5 Years	3	3	3	3	3	**15**	100 K	HMGP BRIC	Both
NOAA Weather Radios *All Hazards*	EMA	Metro Hartsville-Trousdale County	3 to 5 Years	3	3	3	3	3	**15**	10 K	HMGP BRIC	Both
Downtown Area Storm Water Drainage System *Flooding*	TC Water & Sewer	Metro Hartsville-Trousdale County	3 to 5 Years	3	3	2	1	3	**12**	2 MIL	HMGP BRIC FMA	New
Flood Wall Downtown • Goose Creek *Flooding*	Mayor's Office	Metro Hartsville-Trousdale County	3 to 5 Years	3	2	3	1	3	**12**	5 MIL	FMA BRIC HMGP	New
Stormwater Road Culvert Projects *Flooding*	TC Water & Sewer	Metro Hartsville-Trousdale County	3 to 5 Years	3	2	2	1	3	**11**	3 MIL	FMA BRIC HMGP	Both
Public Park Stormwater Drainage System *Flooding*	TC Water & Sewer	Metro Hartsville-Trousdale County	3 to 5 Years	3	2	2	1	2	**12**	3 MIL	FMA HMGP BRIC	Both

Warning Sirens (3) *All Hazards*	TC Fire	Metro Hartsville-Trousdale County	3 to 5 Years	3	2	2	3	2	**12**	150K	HMGP BRIC	New
Permeable Pavement for New Jail *Flooding*	TC Sheriff	Metro Hartsville-Trousdale County	3 to 5 Years	3	2	2	3	3	**13**	2 MIL	FMA BRIC HMGP	New
Develop public awareness campaign to inform public on the need and contents of a disaster/first aid kit and importance having a personal disaster plan. *All Hazards*	EMA	Metro Hartsville-Trousdale County	3 to 5 Years	3	3	3	3	2	**14**	2 K	Local	Both
Emergency Operations Center – Hold Emergency Equipment, Central Command	TC Fire Dept.	Metro Hartsville-Trousdale County	3 to 5 Years	3	3	3	3	2	**14**	4 MIL	HMGP BRIC	New

Conduct a mitigation study to determine which flood projects could be most effective in Trousdale County and where these projects would need to be conducted.	EMA	Metro Hartsville-Trousdale County	3-5 Years	3	1	3	3	2	**12**	400 K	FMA BRIC HMGP Local	Both
Procurement of heavy-duty side-mounted equipment used to clear trees and brush along heavy-traffic portions of roadways affected by a disaster.	Highway Department	Metro Hartsville-Trousdale County	0-3 Years	3	3	2	3	1	**12**	350 K	FMA BRIC HMGP Local	New

*** Please note that some of the actions appearing on pages 14 and 15 have been modified and updated. They will not appear in this table exactly as they do in the previous table.** ***ALL OF THE ACTIONS TO CARRY FORWARD ARE INCLUDED IN THIS TABLE; however, some are modified.***

Chapter 4. Implementation, Integration, and Maintenance

This section provides an overview of the overall plan implementation, integration, and maintenance strategy and outlines the method and schedule for monitoring, evaluating, and updating the plan. It also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

4.1 Plan Adoption, Implementation, Monitoring, and Evaluation

4.1.1 Plan Adoption

The purpose of formally adopting this plan is to secure buy-in, raise awareness of the plan, and formalize the plan's implementation. This plan will be adopted by the appropriate governing body for each participating community. Copies of the executed resolutions are shown below.

Note to Reviewer: Executed resolutions will be inserted when they become available.

4.1.2 Implementation

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This section provides an overview of the overall strategy for plan implementation and maintenance.

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of the government. Implementation will be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the multi-objective benefits to each program and the community. This effort is achieved through the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. Additional mitigation strategies could include consistent and ongoing enforcement of existing policies and vigilant review of programs for coordination and multi-objective opportunities.

Simultaneous to these efforts, it is important to maintain constant monitoring of funding opportunities that can be leveraged to implement some of the more costly actions. This will include creating and maintaining a list of ideas on how to meet local match or participation requirements. When funding does become available, the communities will be able to capitalize on the opportunity due to the diligence of the HMPC. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal funds, benefit assessments, and other grant programs, including those that can serve or support multi-objective applications.

Elected officials, officials appointed to head community departments and community staff are charged with the implementation of various activities in the plan. Recommendations will be made to modify timeframes for the completion of activities, funding resources, and responsible entities. On an annual basis, the priority standing of various activities may also be changed. Some activities that are found unachievable may be removed from the plan

entirely, and activities addressing problems unforeseen during plan development may be added.

4.2 Integration into Local Planning Mechanism

A vital implementation mechanism that is highly effective and low-cost is the incorporation of the Hazard Mitigation Plan recommendations and their underlying principles into other plans and tools. All plan participants will use existing methods and programs to implement hazard mitigation actions where possible. As previously stated, mitigation is most successful when it is incorporated into government and public service's day-to-day functions and priorities. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms. These existing mechanisms include:

- Regularity Capabilities
- Administrative Capabilities
- Fiscal Capabilities
- Budget Planning
- BEOP Planning
- Zoning and Building Code Regulation and Enforcement
- Subdivision Ordinance Planning
- Floodplain Ordinance Planning
- Growth and Development Planning
- Capital Improvement Planning
- Economic Development Planning

For further information regarding the different capabilities, refer to Chapter 3 – Mitigation Strategy. Implementation and incorporation into existing planning mechanisms will be conducted by respective planning authorities and will be done through the routine actions of:

- Monitoring other planning/program agendas.
- Attending other planning/program meetings.
- Participating in other planning processes.
- Monitoring community budget meetings for other community program opportunities.

The successful implementation of this mitigation strategy will require constant and vigilant review of existing plans and programs for coordination and multi-objective opportunities that promote a safe, sustainable community. Continuous efforts should be made to monitor the progress of mitigation actions implemented through other planning mechanisms. Where appropriate, priority actions should be incorporated into Hazard Mitigation Plan updates.

4.3 Monitoring, Evaluating, Updating

For the Hazard Mitigation Plan update review process, the Metropolitan Hartsville-Trousdale County Emergency Management Agency Director will be responsible for facilitating, coordinating, and scheduling reviews and maintenance of the plan. The review of the Hazard Mitigation Plan will be conducted as follows:

- The Metropolitan Hartsville-Trousdale County Emergency Management Agency will be responsible for leading the meeting to review the plan.
- Notices advising the members of the HMPC, federal, state, and local agencies, non-profit groups, local planning agencies, representatives of business interests, neighboring communities, and others of the date, time, and place for the review will be emailed to them.
- Local City officials will be notified by email or phone call.
- Before the review, department heads and others tasked with implementing various projects/actions will be queried concerning progress in their area of responsibility and asked to present a report at the review meeting.
- A copy of the current plan will be available for public comment.
- After the review meeting, a status report outlining the implementation of projects over the past year will be developed.

Criteria for Annual Reviews

The criteria recommended for annual reviews will include the following:

- Community growth or change in the past year to include residential, commercial, and industrial growth trends.
- The number of substantially damaged or improved structures by flood zone and review of jurisdictional NFIP membership.
- Renovations to public infrastructure, including water, sewer, drainage, roads, bridges, gas lines, and buildings.
- Natural hazard occurrences that required activation of the Emergency Operations Center (EOC) and whether the event resulted in a presidential disaster declaration.
- Natural hazard occurrences that were not of a magnitude to warrant activation of the EOC or a federal disaster declaration but were severe enough to cause damage in the community or closure of businesses, schools, or public services.
- The dates of hazardous events, narratives, and documented damages.
- Closures of places of employment or schools and the number of days closed.
- Road or bridge closures due to the hazard and the length of time closed.
- Assessment of the number of private and public buildings damaged and whether the damage was minor, substantial, major, or if buildings were destroyed. The assessment will include residences, mobile homes, commercial structures, industrial structures, and public buildings, such as schools and public safety buildings.
- Review of any changes in federal, state, and local policies to determine the impact of these policies on the community and how and if the policy changes can or should be incorporated into the Hazard Mitigation Plan.
- Review of the implementation status of projects/actions (mitigation strategies). The

reason for delay will be discussed for any projects that are behind schedule or not yet started.

4.3.1 Continued Public Involvement

Continued public involvement is imperative to the overall success of the plan's implementation. The update process provides an opportunity to solicit participation from new and existing stakeholders, publicize mitigation success stories, and seek additional public comment. The plan maintenance and update process will include continued public and stakeholder involvement and input through attendance at designated committee meetings, web postings, press releases to local media, and public hearings.

Public Involvement Process for Annual Reviews

The public will be notified via the Metropolitan Hartsville-Trousdale County website or any other form of a publicized social platform (i.e., local newspaper, Facebook, Twitter) well in advance of any public meetings or comment periods.

Public Involvement for Five-year Update

When the HMPC reconvenes for the five-year update, it will coordinate with all stakeholders participating in the planning process—including those who joined the committee since the planning process began—to update and revise the plan. In reconvening, the HMPC will develop a plan for public involvement and will be responsible for disseminating information through various media channels detailing the plan update process. As part of this effort, public meetings will be held, and public comments will be solicited on the plan update draft.

APPENDIX A

Planning Documentation

DATE: JUNE 12 2024 LOCATION: 328 BROADWAY HARTSVILLE. USE BOTH SIDES

Name		Title	Organization/Jurisdiction	Contact #
John	Smith	Director	County Hospital	615 ### ###
Christy Cooley		Quality Director - ~~Trousdale~~	Trousdale Medical Center	615-328-6710
Mark Beeler		Fire Chief	Hartsville/Trousdale Vol FD	615-347-0417
Kelly Anderson		Director of Nursing	Trousdale Medical Center	(615) 328-10461
Candice Hall		Register of Deeds	Trousdale County	615-374-2921
Matt Batey		EMA Dir.	Trousdale Co EMA	615-428-86083
Jack McCALL		Mayor	Trousdale Co.	615-973-8645
ROSALIE MyHAN rosalie.myhan@trousdalecounty.gov		Interim Building Inspector	HARTSVILLE/ TROUSDALE County	615-374-50840
Rob Parris		TEMA PLANNER	MIDDLE REGION	615 306 8264

TN Department of Military | TEMA

TENNESSEE EMERGENCY MANAGEMENT AGENCY
TRAINING COURSE ROSTER

Page_____ of_____

COURSE TITLE: Trousdale County Hazard Mitigation Briefing COURSE #:_____

LEAD INSTRUCTOR: Andy Isbell LOCATION: Hartsville, TN DATE: September 12, 2024

	STUDENT NAME (PRINT: First, ~~Middle~~, Last) ~~LAST 4 NUMBERS of SSN~~	~~MAILING ADDRESS: Street City, State, Zip Code~~	CONTACT PHONE NUMBER E-mail ADDRESS	COUNTY OF WORK RESPONSE AGENCY
1	Pete Griffin		(615) 970-0032 peter.griffin@tn.gov	TEMA
2	Matt Batey		(615) 428-8693 matthew.batey@trousdalecountytn.gov	Trousdale EMA
3	Jack McCall		(615) 374-2461 jmccall@trousdalecountytn.gov	Hartsville/Trousdale Mayor
4	Dwight A. Jewell		(615) 374-9412	HTC
5	Rosalie Myhan		(615) 374-5006 rosalie.myhan@trousdalecountytn.gov	HTC - Building + Codes
6	Mark Beeler		Mark.beeler@trousdalecountytn.gov (615) 347 0917	

TN Department of Military | TEMA

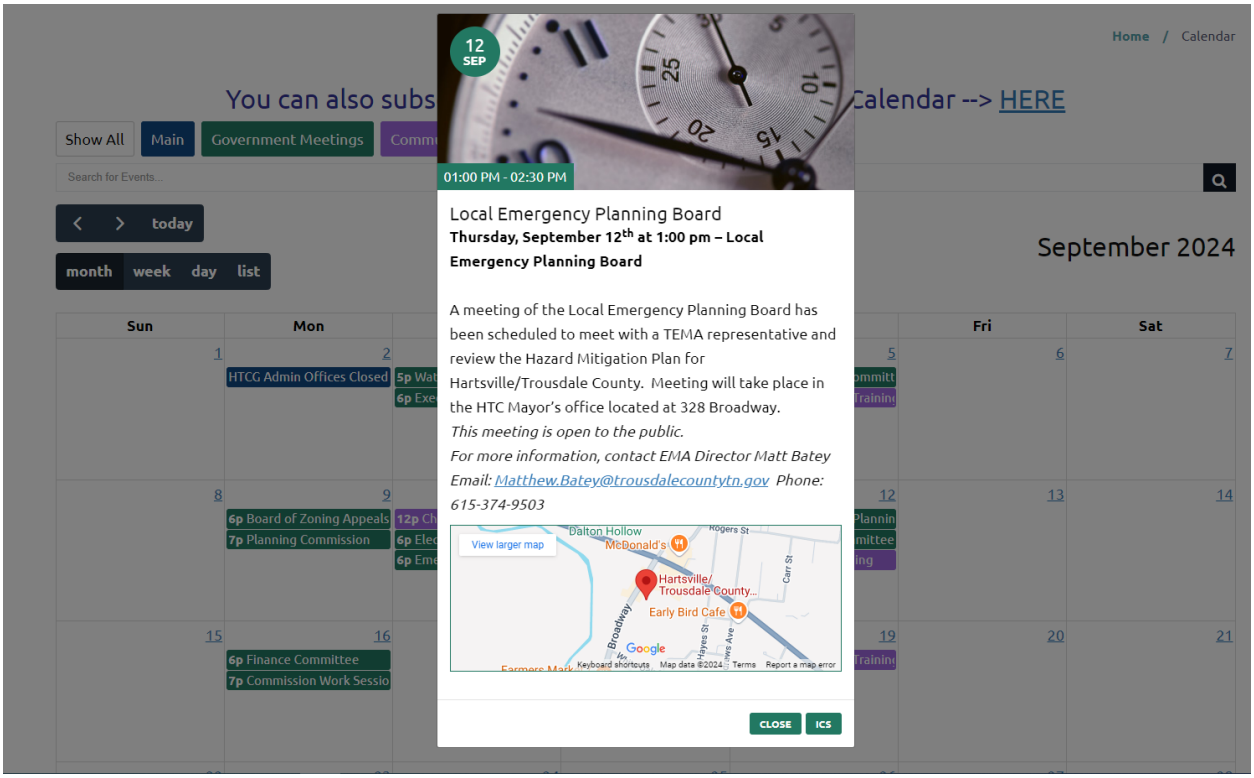
TENNESSEE EMERGENCY MANAGEMENT AGENCY
TRAINING COURSE ROSTER

Page_____ of_____

COURSE TITLE: Trousdale County Hazard Mitigation Briefing COURSE #:_____

LEAD INSTRUCTOR: Andy Isbell LOCATION: Hartsville, TN DATE: September 12, 2024

	STUDENT NAME (PRINT: First, ~~Middle~~, Last) ~~LAST 4 NUMBERS of SSN~~	~~MAILING ADDRESS: Street City, State, Zip Code~~	CONTACT PHONE NUMBER E-mail ADDRESS	COUNTY OF WORK RESPONSE AGENCY
1	Joseph Mirsadshanow		(615) 788-1633 Joseph.Mirsadshanow@weldon.com	Industry Weld. On
2			( )	
3			( )	
4			( )	
5			( )	
6			( )	



https://www.trousdalecountytn.gov/calendar.php?view=day&month=09&day=12&year=2024&calendar=&id=223

Trousdale County invites you to a

Public Meeting on the Trousdale County Hazard Mitigation Plan

Trousdale County is preparing a Hazard Mitigation Plan to reduce the county's vulnerability to hazards such as flooding, wildfires, and winter storms and to increase its resilience to these natural hazards.

Please join us for a public presentation and discussion about Hazard Mitigation for your community.

We want to hear your concerns and ideas for mitigating natural hazards in our community!

Date: September 12th, 2024

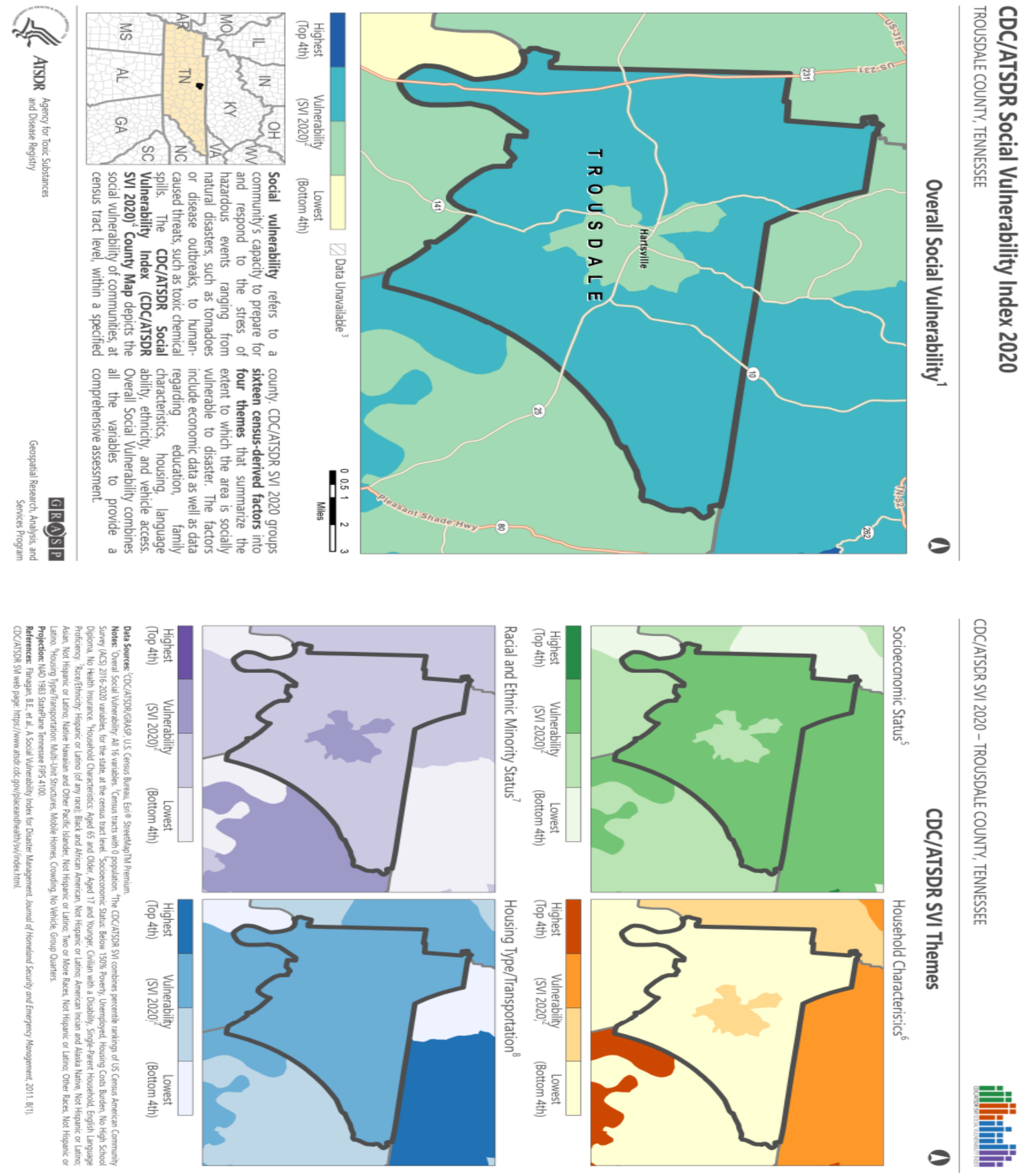
Time: 1 P.M.

Location: HTC Mayor's Office

328 Broadway, Hartsville, TN

APPENDIX B

County Overview



APPENDIX C
Historical Hazard Data

Tornado

COUNTY	LOCATION	DATE	TIME	EVENT	SCALE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
TROUSDALE CO.		6/16/1966	1500	Tornado	F1	0	0	25000	0
TROUSDALE CO.		5/7/1967	330	Tornado	F2	0	0	25000	0
TROUSDALE CO.	HARTSVILLE	4/16/1998	1531	Tornado	F2	0	0	0	0
TROUSDALE CO.	WILLARD	5/24/2000	1810	Tornado	F1	0	0	0	0
TROUSDALE CO.	PAYNES STORE	2/5/2008	2207	Tornado	EF2	2	5	1000	0
TROUSDALE CO.	TEMPLOW	1/30/2013	342	Tornado	EF0	0	0	0	10000
TROUSDALE CO.	ANTIOCH	1/30/2013	343	Tornado	EF1	0	0	100000	30000
TROUSDALE CO.	PROVIDENCE	1/30/2013	348	Tornado	EF1	0	0	15000	10000
TROUSDALE CO.	PAYNES STORE	11/18/2017	1704	Tornado	EF0	0	0	25000	0
TROUSDALE CO.	PAYNES STORE	5/4/2021	541	Tornado	EF0	0	0	15000	0
TROUSDALE CO.	BEECH GROVE	5/4/2021	554	Tornado	EF0	0	0	15000	0
TROUSDALE CO.	PAYNES STORE	12/6/2021	559	Tornado	EF0	0	0	15000	0
TROUSDALE CO.	BEECH GROVE	3/31/2023	2353	Tornado	EF0	0	0	50000	0
TROUSDALE CO.	TEMPLOW	12/9/2023	1724	Tornado	EF2	0	0	200000	0

Winter Weather/Storm

COUNTY	LOCATION	DATE	TIME	EVENT	SCALE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
TROUSDALE (ZONE)	County Wide	1/6/1996	1700	Winter Storm		0	0	0	0
TROUSDALE (ZONE)	County Wide	12/24/1998	800	Winter Storm		0	0	0	0
TROUSDALE (ZONE)	County Wide	1/22/2000	1430	Winter Storm		0	0	0	0
TROUSDALE (ZONE)	County Wide	12/4/2002	600	Winter Storm		0	0	0	0
TROUSDALE (ZONE)	County Wide	12/22/2004	2100	Winter Storm		0	0	0	0
TROUSDALE (ZONE)	County Wide	3/7/2008	2100	Winter Storm		0	0	0	0
TROUSDALE (ZONE)	County Wide	12/19/2009	2100	Winter Weather		0	0	0	0
TROUSDALE (ZONE)	County Wide	1/7/2010	530	Winter Weather		0	0	0	0
TROUSDALE (ZONE)	County Wide	12/12/2010	700	Winter Weather		0	0	0	0
TROUSDALE (ZONE)	County Wide	12/24/2010	2100	Winter Weather		0	0	0	0
TROUSDALE (ZONE)	County Wide	1/10/2011	100	Winter Weather		0	0	0	0
TROUSDALE (ZONE)	County Wide	1/20/2011	1600	Winter Weather		0	0	0	0
TROUSDALE (ZONE)	County Wide	1/26/2011	300	Winter Weather		0	0	0	0
TROUSDALE (ZONE)	County Wide	2/9/2011	1500	Winter Weather		0	0	0	0
TROUSDALE (ZONE)	County Wide	1/12/2012	1630	Winter Weather		0	0	0	0
TROUSDALE (ZONE)	County Wide	2/16/2015	0	Winter Storm		0	0	50000	0
TROUSDALE (ZONE)	County Wide	2/14/2016	700	Winter Weather		0	0	0	0
TROUSDALE (ZONE)	County Wide	2/17/2021	1600	Winter Storm		0	0	0	0
TROUSDALE (ZONE)	County Wide	1/6/2022	800	Winter Storm		0	0	0	0

Thunderstorm and Strong Wind Events

COUNTY	LOCATION	DATE	TIME	EVENT	SCALE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
TROUSDALE CO.		3/15/1971	410	Thunderstorm Wind	0	0	0	0	0
TROUSDALE CO.		5/26/1989	1630	Thunderstorm Wind	0	0	0	0	0
TROUSDALE CO.		5/27/1990	1400	Thunderstorm Wind	0	0	0	0	0
TROUSDALE CO.		8/27/1992	1945	Thunderstorm Wind	0	0	0	0	0
TROUSDALE CO.	Hartsville	5/18/1995	1200	Thunderstorm Wind	0	0	0	1	0
TROUSDALE CO.	Hartsville	6/6/1995	1730	Thunderstorm Wind	0	0	0	2000	0
TROUSDALE CO.	CATO-HARTSVILLE	5/26/1996	1550	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	WALNUT GROVE	5/27/1996	1230	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	CATO	1/4/1997	2220	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	3/5/1997	630	Thunderstorm Wind		0	0	1000	0
TROUSDALE CO.	CATO	6/13/1997	1440	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	WILLARD	6/13/1997	1915	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	7/28/1997	1605	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	8/19/1997	1710	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	NORTH PORTION	4/3/1998	1530	Thunderstorm Wind		0	0	50000	0
TROUSDALE CO.	HARTSVILLE	4/8/1998	230	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	6/14/1998	1012	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	1/17/1999	2100	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	5/5/1999	1914	Thunderstorm Wind	50	0	0	25000	0
TROUSDALE CO.	HARTSVILLE	5/5/1999	2114	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	8/24/1999	1715	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	1/3/2000	1748	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	5/3/2000	1500	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	COUNTY WIDE	11/9/2000	1245	Thunderstorm Wind	55	0	0	0	0
TROUSDALE CO.	COUNTY WIDE	10/24/2001	1915	Thunderstorm Wind	57	0	0	0	0
TROUSDALE CO.	COUNTY WIDE	5/13/2002	345	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	9/5/2002	1440	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	4/6/2003	1315	Thunderstorm Wind	60	0	0	5000	0
TROUSDALE CO.	HARTSVILLE	5/1/2003	1525	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	5/5/2003	130	Thunderstorm Wind	80	0	0	50000	0
TROUSDALE CO.	HARTSVILLE	5/7/2003	141	Thunderstorm Wind	55	0	0	0	0
TROUSDALE CO.	COUNTY WIDE	5/11/2003	300	Thunderstorm Wind	55	0	0	0	0
TROUSDALE CO.	HARTSVILLE	7/9/2003	1650	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	7/16/2003	215	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	7/21/2003	1316	Thunderstorm Wind	60	0	0	0	0
TROUSDALE CO.	HARTSVILLE	6/12/2004	1402	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	7/5/2004	1407	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	7/6/2004	1619	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	7/27/2005	1233	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	8/13/2005	1518	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	11/15/2005	2025	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	COUNTY WIDE	4/3/2006	2104	Thunderstorm Wind	50	0	0	0	0
TROUSDALE CO.	HARTSVILLE	1/29/2008	1945	Thunderstorm Wind	50	0	0	5000	0
TROUSDALE CO.	PROVIDENCE	8/6/2008	2043	Thunderstorm Wind	70	0	0	5000	0
TROUSDALE CO.	JOHNTOWN	8/6/2008	2050	Thunderstorm Wind	50	0	0	1000	0
TROUSDALE CO.	HARTSVILLE	3/11/2009	1235	Thunderstorm Wind	55	0	0	6000	0
TROUSDALE CO.	HARTSVILLE	10/26/2010	1153	Thunderstorm Wind	55	0	0	10000	0
TROUSDALE CO.	HARTSVILLE	4/4/2011	1340	Thunderstorm Wind	55	0	0	10000	0
TROUSDALE CO.	HARTSVILLE	5/26/2011	1235	Thunderstorm Wind	65	0	0	15000	0
TROUSDALE CO.	HARTSVILLE	5/31/2012	2010	Thunderstorm Wind	55	0	0	15000	0
TROUSDALE CO.	PROVIDENCE	7/5/2012	1500	Thunderstorm Wind	52	0	0	0	0
TROUSDALE CO.	HARTSVILLE	8/9/2012	903	Thunderstorm Wind	48	0	0	1000	0
TROUSDALE CO.	TE MPLOW	1/30/2013	340	Thunderstorm Wind	70	0	0	25000	0
TROUSDALE CO.	JOHNTOWN	1/30/2013	355	Thunderstorm Wind	60	0	0	10000	0
TROUSDALE (ZONE)		10/31/2013	1200	Strong Wind	43	0	0	5000	0
TROUSDALE CO.	HARTSVILLE	11/17/2013	1915	Thunderstorm Wind	50	0	0	1000	0
TROUSDALE CO.	PROVIDENCE	12/21/2013	2203	Thunderstorm Wind	52	0	0	2000	0
TROUSDALE CO.	HARTSVILLE	6/11/2014	1415	Thunderstorm Wind	52	0	0	15000	0
TROUSDALE CO.	HARTSVILLE	5/12/2016	1334	Thunderstorm Wind	56	0	0	10000	0
TROUSDALE CO.	TE MPLOW	6/15/2016	1523	Thunderstorm Wind	52	0	0	5000	0
TROUSDALE CO.	TE MPLOW	7/4/2016	1405	Thunderstorm Wind	48	0	0	3000	0
TROUSDALE CO.	HARTSVILLE	7/6/2016	1516	Thunderstorm Wind	50	0	0	1000	0
TROUSDALE CO.	HARTSVILLE	7/7/2016	1432	Thunderstorm Wind	50	0	0	3000	0
TROUSDALE CO.	HARTSVILLE	3/30/2017	1906	Thunderstorm Wind	50	0	0	3000	0
TROUSDALE CO.	HARTSVILLE	5/27/2017	1830	Thunderstorm Wind	50	0	0	5000	0
TROUSDALE CO.	HARTSVILLE	3/30/2019	1811	Thunderstorm Wind	50	0	0	5000	0
TROUSDALE CO.	HARTSVILLE	6/21/2019	1910	Thunderstorm Wind	52	0	0	5000	0
TROUSDALE CO.	HARTSVILLE	5/3/2020	1615	Thunderstorm Wind	65	0	0	30220	0
TROUSDALE CO.	ANTIOCH	5/4/2021	541	Thunderstorm Wind	70	0	0	15000	0
TROUSDALE CO.	HARTSVILLE	5/4/2021	545	Thunderstorm Wind	61	0	0	10000	0
TROUSDALE CO.	HARTSVILLE	3/31/2023	2345	Thunderstorm Wind	50	0	0	5000	0

Hail

COUNTY	LOCATION	DATE	TIME	EVENT	SCALE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
TROUSDALE CO.	PROVIDENCE	3/28/1997	2055	Hail	0.75	0	0	0	0
TROUSDALE CO.	COUNTYWIDE	1/17/1999	2100	Hail	0.75	0	0	0	0
TROUSDALE CO.	HARTSVILLE	4/19/1999	2005	Hail	1.75	0	0	0	0
TROUSDALE CO.	HARTSVILLE	5/3/2000	1500	Hail	0.75	0	0	0	0
TROUSDALE CO.	HARTSVILLE	4/2/2006	2112	Hail	0.75	0	0	0	0
TROUSDALE CO.	HARTSVILLE	5/14/2010	1210	Hail	1	0	0	0	0
TROUSDALE CO.	BEECH GROVE	4/24/2011	1249	Hail	0.75	0	0	0	0
TROUSDALE CO.	HARTSVILLE	5/24/2011	1148	Hail	1	0	0	0	0
TROUSDALE CO.	HARTSVILLE	5/24/2011	1215	Hail	1	0	0	0	0
TROUSDALE CO.	PROVIDENCE	8/20/2014	1254	Hail	1	0	0	0	0
TROUSDALE CO.	HARTSVILLE	6/23/2015	1850	Hail	0.75	0	0	0	0
TROUSDALE CO.	HARTSVILLE	5/31/2018	1730	Hail	0.75	0	0	0	0
TROUSDALE CO.	BEECH GROVE	5/31/2018	1736	Hail	1.5	0	0	0	0
TROUSDALE CO.	TEMPLOW	5/3/2022	1415	Hail	0.88	0	0	0	0
TROUSDALE CO.	CATO	5/5/2022	1508	Hail	1	0	0	0	0
TROUSDALE CO.	HARTSVILLE	3/31/2023	2345	Hail	1	0	0	0	0
TROUSDALE CO.	TEMPLOW	12/9/2023	2350	Hail	1	0	0	0	0

Drought

COUNTY	LOCATION	DATE	TIME	EVENT	SCALE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
TROUSDALE	Countywide	5/1/2007	0	Drought		0	0	0	0
TROUSDALE	Countywide	6/1/2007	0	Drought		0	0	0	5000
TROUSDALE	Countywide	7/1/2007	0	Drought		0	0	0	0
TROUSDALE	Countywide	8/1/2007	0	Drought		0	0	0	0
TROUSDALE	Countywide	9/1/2007	0	Drought		0	0	0	0
TROUSDALE	Countywide	10/1/2007	0	Drought		0	0	0	0
TROUSDALE	Countywide	11/1/2007	0	Drought		0	0	0	0
TROUSDALE	Countywide	2/1/2008	0	Drought		0	0	0	0
TROUSDALE	Countywide	3/1/2008	0	Drought		0	0	0	0
TROUSDALE	Countywide	4/1/2008	0	Drought		0	0	0	0
TROUSDALE	Countywide	9/1/2008	0	Drought		0	0	0	0
TROUSDALE	Countywide	10/1/2008	0	Drought		0	0	0	0
TROUSDALE	Countywide	11/1/2008	0	Drought		0	0	0	0
TROUSDALE	Countywide	12/1/2008	0	Drought		0	0	0	0
TROUSDALE	Countywide	7/3/2012	0	Drought		0	0	0	0
TROUSDALE	Countywide	11/1/2016	0	Drought		0	0	0	0
TROUSDALE	Countywide	12/1/2016	0	Drought		0	0	0	0
TROUSDALE	Countywide	12/1/2023	0	Drought		0	0	0	0
TROUSDALE	Countywide	1/1/2024	0	Drought		0	0	0	0

Flood/Flash Flood

COUNTY	LOCATION	DATE	TIME	EVENT	SCALE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
TROUSDALE CO.	COUNTYWIDE	6/10/1998	1059	Flash Flood		0	0	0	0
TROUSDALE CO.	HARTSVILLE	6/21/2000	1930	Flash Flood		0	0	0	0
TROUSDALE CO.	HARTSVILLE	12/16/2000	1430	Flash Flood		0	0	0	0
TROUSDALE CO.	HARTSVILLE	1/24/2002	600	Flash Flood		0	0	0	0
TROUSDALE CO.	COUNTYWIDE	5/7/2003	141	Flash Flood		0	0	0	0
TROUSDALE CO.	HARTSVILLE	7/21/2008	1330	Flash Flood		0	0	10000	0
	S								
TROUSDALE CO.	NORTH PORTION	3/5/2004	1800	Flash Flood		0	0	0	0
TROUSDALE CO.	HARTSVILLE	12/7/2004	545	Flash Flood		0	0	1000	0
TROUSDALE CO.	HARTSVILLE	4/30/2005	0	Flash Flood		0	0	1000	0
TROUSDALE CO.	HARTSVILLE	5/2/2010	1200	Flood		0	0	250000	1000
TROUSDALE CO.	PAYNES STORE	8/4/2012	1500	Flood		0	0	0	0
TROUSDALE CO.	PAYNES STORE	8/5/2012	1100	Flood		0	0	0	0
TROUSDALE CO.	TEMPLOW	5/11/2016	200	Flash Flood		0	0	2000000	0
TROUSDALE CO.	TEMPLOW	7/7/2016	500	Flash Flood		0	0	0	0
TROUSDALE CO.	TEMPLOW	3/29/2018	142	Flash Flood		0	0	5000	0
TROUSDALE CO.	CATO	8/17/2018	500	Flash Flood		0	0	10000	0
TROUSDALE CO.	PROVIDENCE	10/2/2018	630	Flash Flood		0	0	0	0

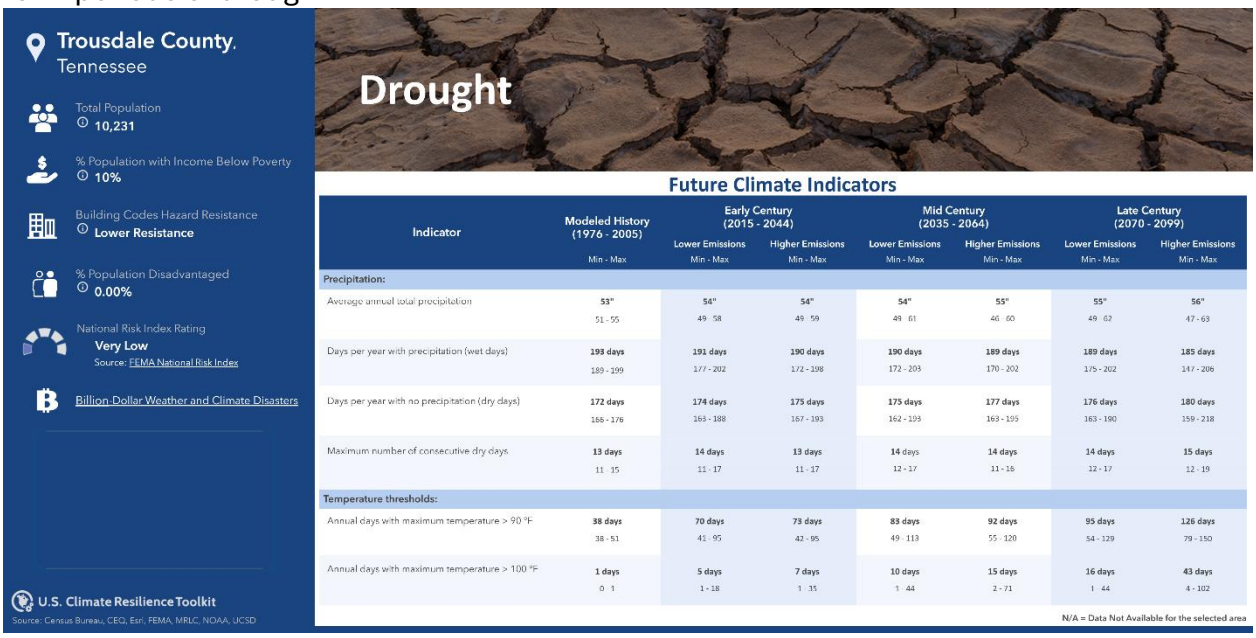
Extreme Cold

COUNTY	LOCATION	DATE	TIME	EVENT	SCALE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
TROUSDALE	Countywide	12/24/2022	0844	Extreme Cold/Wind Chill		0	0	0	0

Trousdale County Climate Trends and Variations

Drought

The future risk of drought in Trousdale County is tied to changes in the precipitation and temperature patterns the county may experience due to climate trends and variations. The Fourth National Climate Assessment (2018, NCA4) states climate variability is expected to increase the average temperature and the number of high-heat days in the southeastern United States and intensify the hydrologic cycle, leading to an increase in both extreme precipitation events and periods of drought in the southeastern United States. The Climate Mapping Risk Assessment (CMRA) Report for Trousdale County shows that while overall annual precipitation may increase, the number of dry days is expected to increase through the 21st century. Also, high-heat days are expected to increase, which could favor short-term periods of drought.



Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Average annual total precipitation	53" 51 - 55	54" 49 - 58	54" 49 - 59	54" 49 - 61	55" 46 - 60	55" 49 - 62	56" 47 - 63
Days per year with precipitation (wet days)	193 days 189 - 199	191 days 177 - 202	190 days 172 - 198	190 days 172 - 203	189 days 170 - 202	189 days 175 - 202	185 days 147 - 206
Days per year with no precipitation (dry days)	172 days 166 - 176	174 days 163 - 188	175 days 167 - 193	175 days 162 - 193	177 days 163 - 195	176 days 163 - 190	180 days 159 - 218
Maximum number of consecutive dry days	13 days 11 - 15	14 days 11 - 17	13 days 11 - 17	14 days 12 - 17	14 days 11 - 16	14 days 12 - 17	15 days 12 - 19
Temperature thresholds:							
Annual days with maximum temperature > 90 °F	38 days 38 - 51	70 days 41 - 95	73 days 42 - 95	83 days 49 - 113	92 days 55 - 120	95 days 54 - 129	126 days 79 - 150
Annual days with maximum temperature > 100 °F	1 days 0 - 1	5 days 1 - 18	7 days 1 - 35	10 days 1 - 44	15 days 2 - 71	16 days 1 - 44	43 days 4 - 102

N/A = Data Not Available for the selected area

Figure 1: Climate Mapping Risk Assessment Report for Drought in Trousdale County. (Source: US Climate Resilience Toolkit)

The increasing trends in average temperature and total precipitation in Trousdale County are also supported by observed historical data available from the NOAA National Centers for Environmental Information Climate-at-a-Glance tool (refer to subsequent figures). The trends of increasing temperature and annual precipitation have been more pronounced over the past several decades compared to the longer-term (1895-2023) trend. The long-term trend in temperature is slightly positive but less than +0.1°F per decade due to several warm decades in the early 20th century followed by a cool period from the 1950's to the early 1980's, and then years that were mostly warmer than the 20th century average after 1985. The medium-term (1961-2023) shows an increased warming trend of +0.5°F per decade and the short-term (1991-2023) also shows a trend of +0.5°F per decade. Additionally, the county's climate stripes graphics from NOAA show that aside from a few warmer than

normal years early in the period, most of the above average temperature years have occurred in the past two decades. This indicates that warming has substantially increased in Trousdale County and, based on the NCA4, this trend is expected to continue in the future.

However, total precipitation has also been increasing in Trousdale County, with the long-term (1895-2023) trend in precipitation having a +0.33" increase per decade, the medium-term (1961-2023) shows a slightly stronger trend of +0.36" increase per decade, and the short-term (1991-2023) shows an even stronger increasing trend of +0.99" per decade. This indicates that precipitation has increased in Trousdale County; however, there is a large amount of inter-annual variability. Based on the NCA4, this trend is expected to continue in the future. Refer to Figures 19-21 in the Flood section for additional information. An increasing trend in precipitation may infer a decrease in drought potential; however, the observed pattern has been highly variable year-to-year and on shorter time periods. As temperatures increase, there can be more rapid evapotranspiration, potentially leading to more rapid onset of drought occurrences (i.e., Flash Droughts).

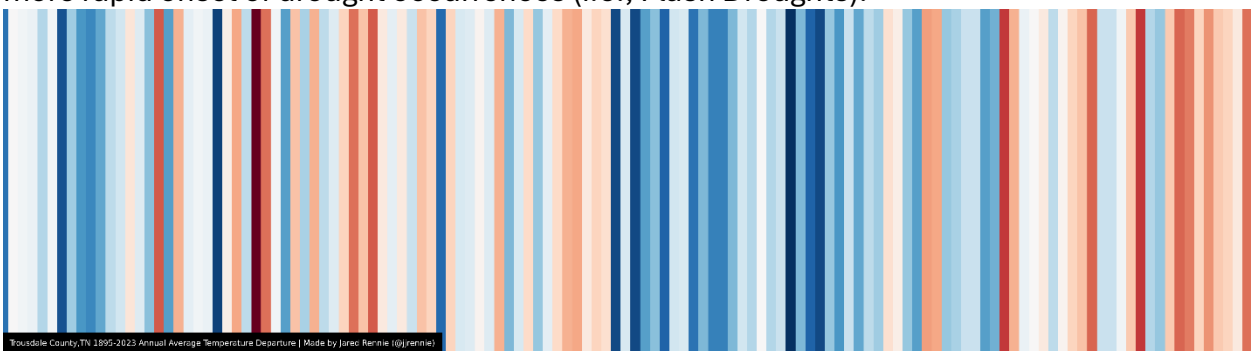


Figure 2: Observed (1895-2023) Annual Temperature for Trousdale County, Tennessee, Compared to the 20th Century Average with Darkening Shades of Blue for Below Average Temperature and Darkening Shades of Red for Above Average Temperature.
(Source: NOAA NCEI)

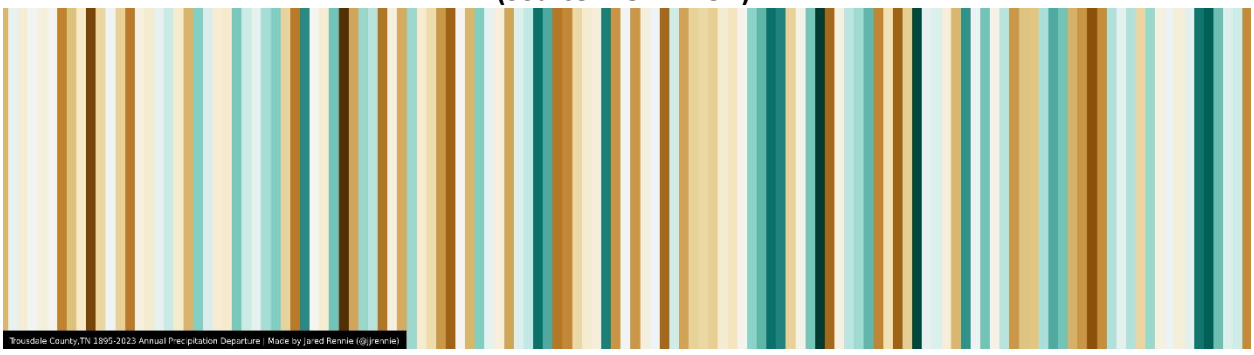


Figure 3: Observed (1895-2023) Annual Precipitation for Trousdale County, Tennessee, Compared to the 20th Century Average with Darkening Shades of Brown for Below Average Precipitation and Darkening Shades of Green for Above Average.
(Source: NOAA NCEI)

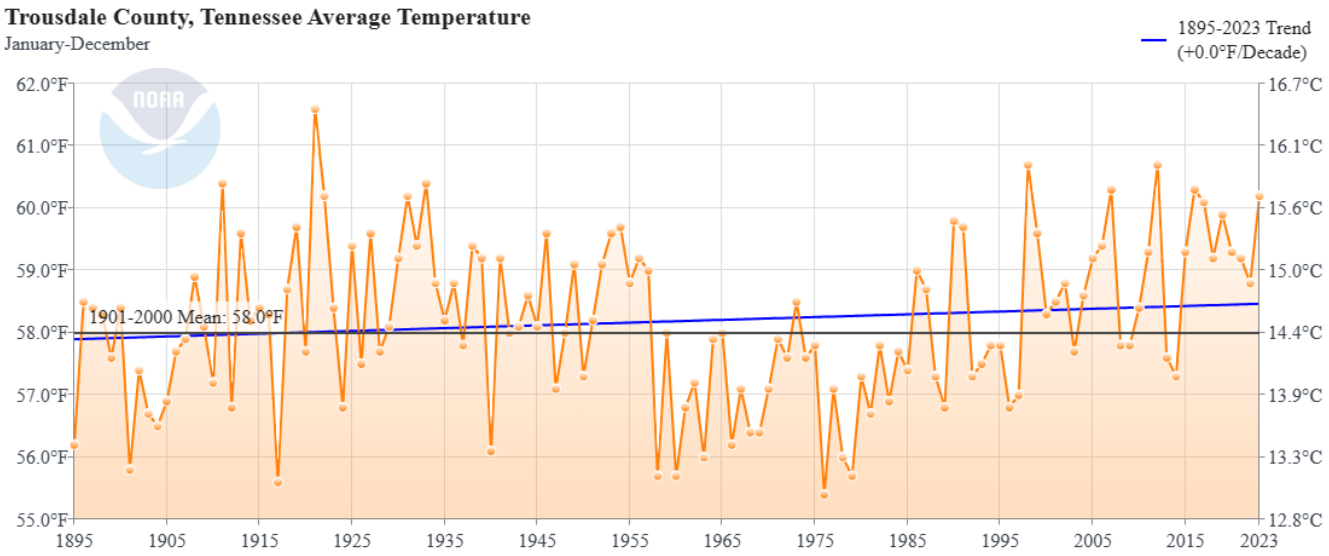


Figure 4: Annual Average Temperature for Trousdale County Tennessee, Showing a less than +0.1˚F Increase per Decade Since 1895.
(Source: NOAA NCEI, Climate-at-a-Glance: County Time Series)

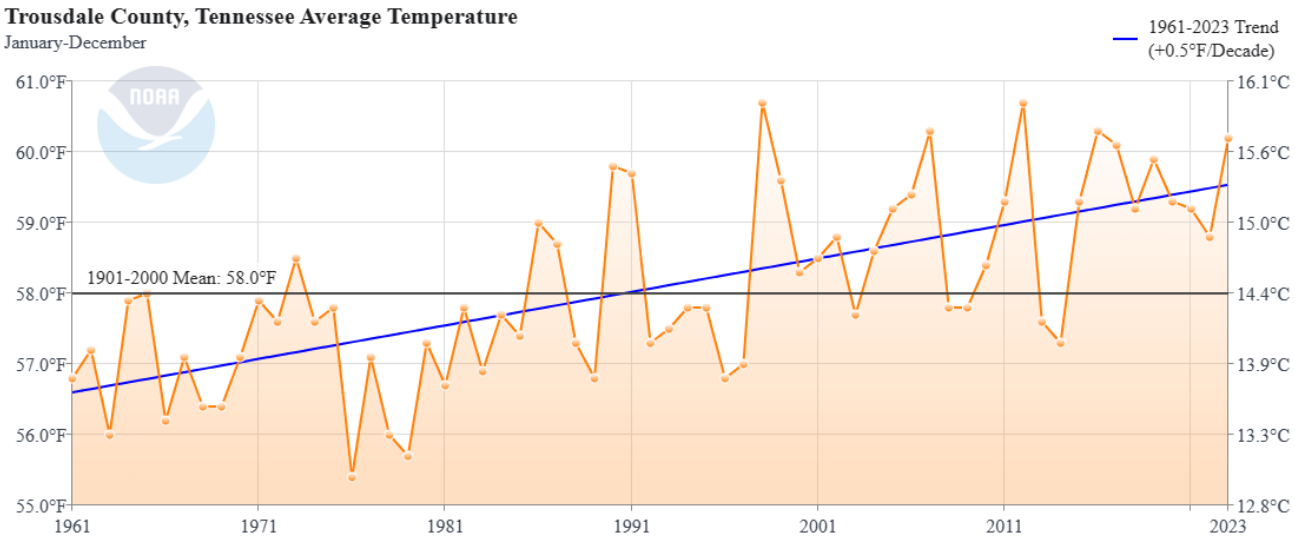


Figure 5: Annual Average Temperature for Trousdale County, Tennessee, Showing a +0.5˚F Increase per Decade Since 1961.
(Source: NOAA NCEI, Climate-at-a-Glance: County Time Series)

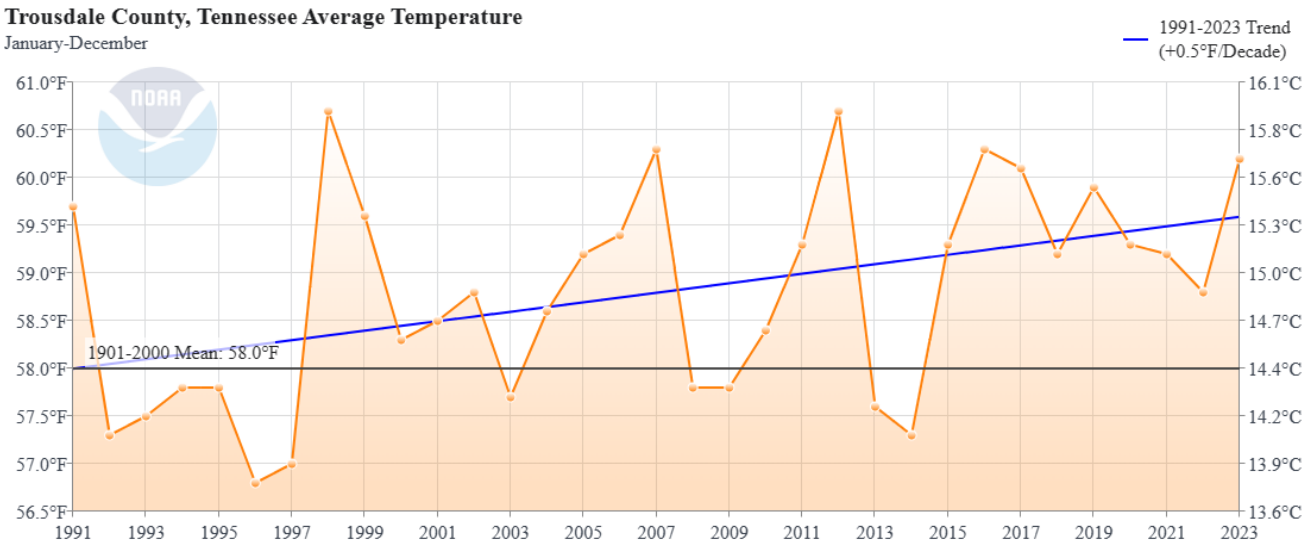


Figure 6: Annual Average Temperature for Trousdale County, Tennessee, Showing a +0.5˚F Increase per Decade Since 1991.
(Source: NOAA NCEI, Climate-at-a-Glance: County Time Series)

The U.S. Drought Monitor (USDM) provides a weekly snapshot of drought conditions across the United States, starting in January of 2000 and continuing through the present. Using the timeline of drought conditions from the USDM, the cyclical nature of drought in Trousdale County is clear. Several periods of drought were recorded in this time, with the most intense drought seen in 2007, but several other short periods of severe drought observed, including 2016 and the later parts of 2023. The Tennessee Climate Office (TCO) analyzed trends in the USDM throughout Tennessee from 2000 to 2022. County-level trends were developed based on the amount of each county that was covered in D1 (Moderate Drought) or worse, D2 (Severe Drought) or worse, D3 (Extreme Drought) or worse, and D4 (Exceptional Drought) each week. Trends were assessed using space-time cube analysis tools in ArcGIS Pro, with the results shown subsequently. There was no significant trend in the amount of time that Trousdale County spent in drought conditions over this period.

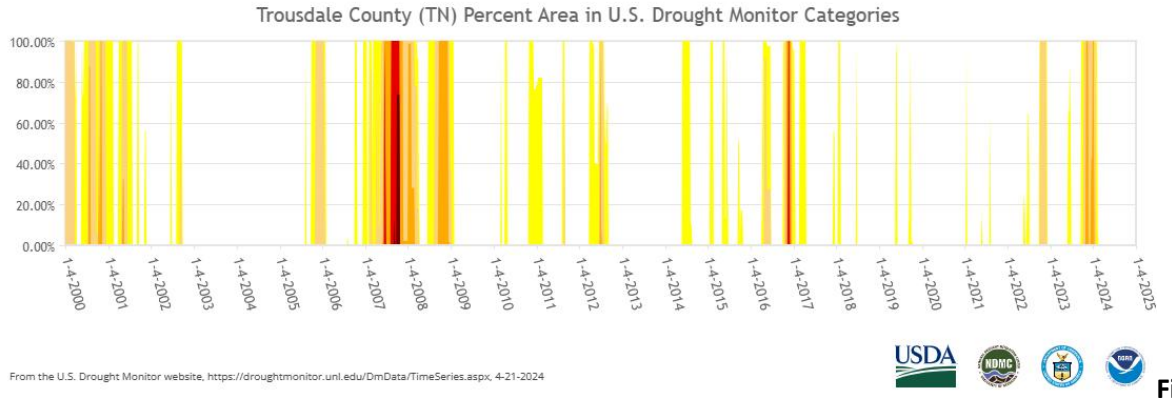


Figure 7: Timeline of drought conditions from the U.S. Drought Monitor from 2000 – 2023 for Trousdale County.

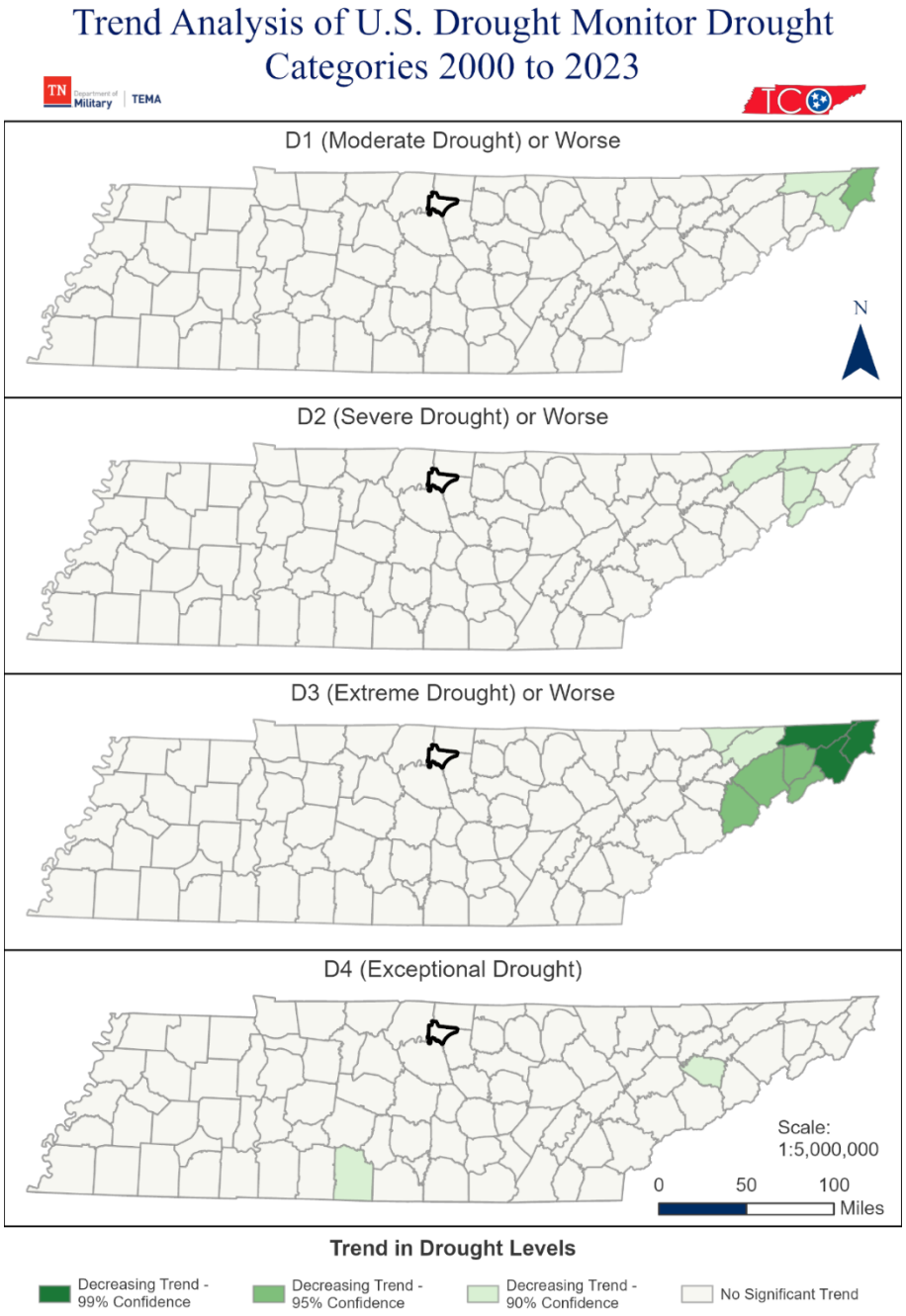


Figure 8: Trend Analysis of U.S. Drought Monitor from 2000 – 2023, Trousdale County Outlined in Bold.

Since the USDM only dates back to 2000, other metrics must be used to examine longer trends in drought occurrences. The Standardized Precipitation Index (SPI) is another metric that can quantify drought and periods of wetness by capturing how observed precipitation deviates from the climatological average. Drought.gov provides a timeline of the SPI derived from the Global Historical Climatology Network (GHCN), with data back to 1895 for the contiguous U.S. Red hues indicate drier conditions, while blue hues indicate wetter

conditions. With this longer dataset the cyclical nature of dry and wet periods across Trousdale County is even more apparent. It also shows that the shorter and less intense dry periods observed from 2008 to 2023 is one of the longer periods of time with minimal long-term drought impacts for the county.

Looking at the longer-term Standardized Precipitation Index (SPI) from the NCEI nClimGrid-monthly dataset (starting 1895) there is an increasing trend in the 3-month SPI value, indicating an increasing trend in precipitation (averaged over 3-months) across all of Tennessee with a slight to moderate increase in values across Trousdale County. A gridded SPI dataset is also available at a 5km resolution from NCEI. This gridded dataset with data from 1895 to 2023 was used to analyze the linear trend in 3-month SPI values (SPI value calculated from the dryness or wetness values of the previous 3 months), shown in the following figure. All areas of Tennessee had an increasing trend in SPI values over this time period, indicating an increasing trend in precipitation that is consistent with other observed records and climate models signifying that Tennessee is seeing a decrease in the risk for longer-term droughts. The overall trend in increasing wetness will not prevent future periods of drought, especially short-duration high-intensity Flash Droughts.

Table 1: SPI Category and Value Definitions.

SPI Category	SPI Value	Description
D4	≤ -2	Exceptionally Dry
D3	-1.6 to -1.9	Extremely Dry
D2	-1.3 to -1.5	Severely Dry
D1	-0.8 to -1.2	Moderately Dry
D0	-0.5 to –0.7	Abnormally Dry
W0	+0.5 to + 0.7	Abnormally Wet
W1	+0.8 to +1.2	Moderately Wet
W2	+1.3 to +1.5	Severely Wet
W3	+1.6 to +1.9	Extremely Wet
W4	≥ 2.0	Exceptionally Wet

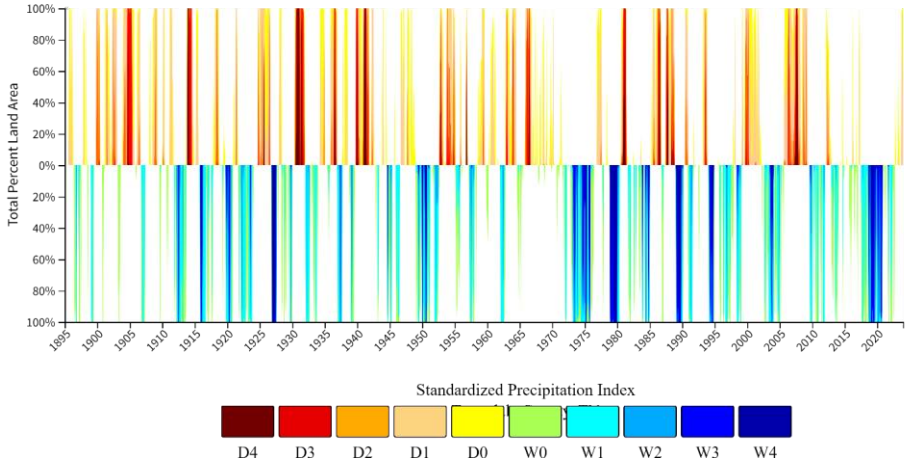


Figure 9: Periods of Drought and Wetness in Trousdale County, Tennessee from 1895 to 2023.

(Source: Drought.gov)

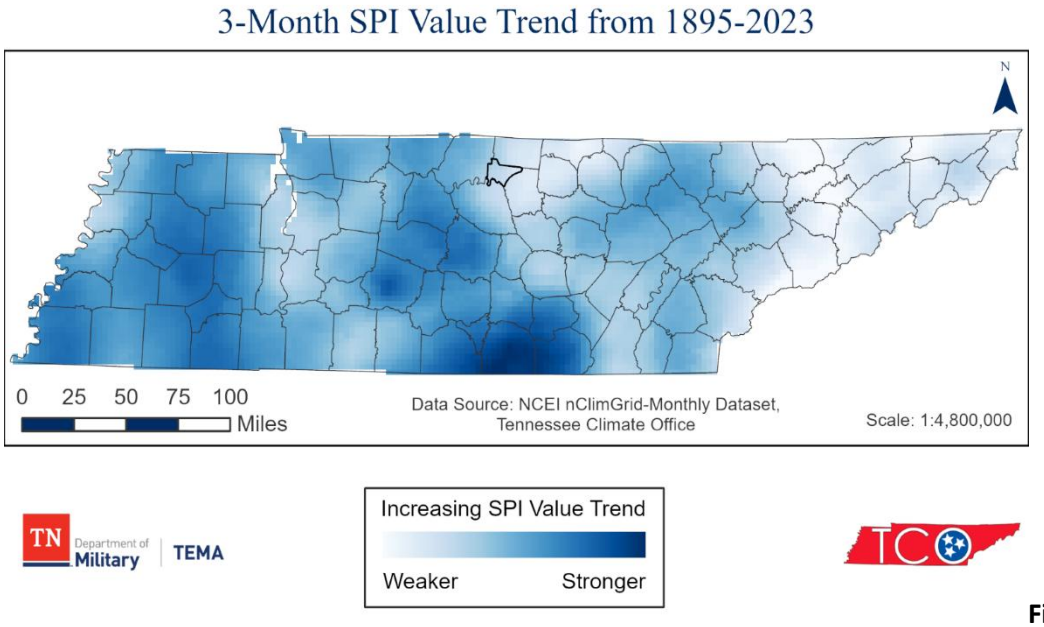


Figure 10: SPI Value Trend for 3-Months from 1895 to 2023, Trousdale County Outlined in Bold.

The previous trends are based on observed historical data, but the Climate Mapping for Resilience and Adaptation (CMRA) Assessment tool provides county-level output from future climate projections. Data from this tool indicates Trousdale County could expect an increase in the number of dry days per year due to climate variability. However, the tool provides a range of possible outcomes, with higher and lower greenhouse gas emission scenarios, for Early-Century (2015-2044), Mid-Century (2035-2064), and Late Century (2070-2099) time periods, and maximum, minimum, and mean projected values. The following table shows the projected change in the number of dry days per year for Trousdale County. The Early-, Mid-, and Late-Century values represent the increase (positive values) or decrease (negative values) in dry days per year compared to the number of dry days per year from modeled history. In the mean projection, Trousdale County could see an increase of 2.8 to 4.4 dry days per year by Mid-Century and an increase of 3.8 to 7.5 dry days per year by Late-Century.

Table 2: Possible Change in the Number of Dry Days per Year for Trousdale County, Tennessee.

High Emissions Scenario	Modeled History (1976-2005)	Early Century (2015-2044)	Mid Century (2035-2064)	Late Century (2070-2099)
Driest Projection	176.3	+16.4	+18.3	+41.3
Mean Projection	172.2	+2.7	+4.4	+7.5
Wettest Projection	165.9	+0.8	-2.6	-7
Low Emissions Scenario	**Modeled History (1976-2005)**	**Early Century (2015-2044)**	**Mid Century (2035-2064)**	**Late Century (2070-2099)**
Driest Projection	176.3	+11.6	+16.9	+13.6
Mean Projection	172.2	+2.1	+2.8	+3.8
Wettest Projection	165.9	-2.9	-4.2	-3.2

The projected increase in high-heat days and the intensification of the hydrologic cycle will likely lead to more Flash Droughts, defined by the rapid onset or intensification of drought conditions. Flash Droughts in the southeastern United States are often connected to short periods of time (a couple of weeks or months) with much higher-than-normal temperatures and much lower-than-normal precipitation leading to the rapid depletion of soil moisture and streamflow. September 2019 and October 2023 are prime examples of recent Flash Droughts in Tennessee, and more broadly across the Southeast. During the 2023 fall flash drought, Trousdale County went from 0% of the county in drought conditions (D1-4) on the October 3rd release of the U.S. Drought Monitor to 100% of the county being in Severe Drought (D2) conditions on the November 7th release of the US Drought Monitor.

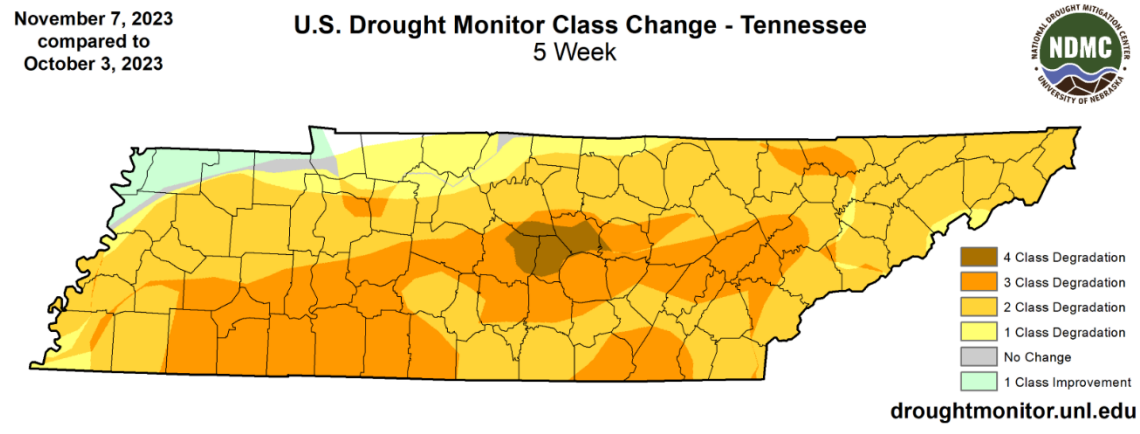


Figure 11: U.S. Drought Monitor Five Week Class Change in the State of Tennessee from October 3, 2023 to November 7, 2023.
(Source: National Drought Mitigation Center)

A study conducted by the U.S. Department of Agriculture (USDA) and U.S. Forest Service Office of Sustainability and Climate compared the length of a 10-year Drought, defined as a once in a decade drought as measured by the number of consecutive dry days (days with less than 0.1 inches of rain) during the summer season (May – September) between historical data and future climate models. For this study, the historical period was based on observed data from 1975 to 2005, and the future scenario was for the 2080's based on the RCP8.5 (higher emissions) ensemble mean of 20 global climate models from the CMIP5 experiment. The output of this study, shown in the following figure, indicates that most areas of Tennessee could expect a 10-year Drought (10% annual probability of occurrence) to maintain its current length or increase by as much as 6 days in the 2080's compared to a 1-year Drought from 1975-2005. In Trousdale County, a 10-year drought could increase in length from 0.1 to 4 days compared to the modeled history. This demonstrates that although the average annual precipitation amount may increase in Tennessee and in Trousdale County, periods between precipitation events could get longer, leading to flash droughts or shorter-term drought periods.

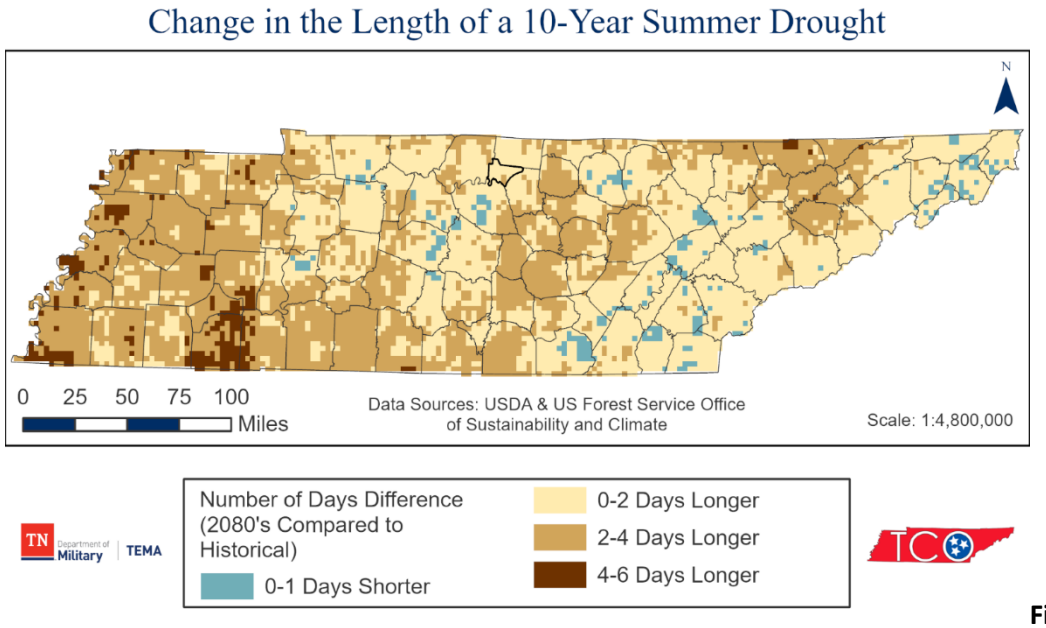


Figure 12: Change in the Length of a 10-Year (10% Annual Probability of Occurrence) Drought from Historical Data (1975-2005) to a 10-Year Drought in the 2080s (RCP8.5 Scenario), Trousdale County Outlined in Bold.

In addition to the variable climate, population growth and development in Tennessee means that the state will be at a higher risk for hydrological and socioeconomic droughts in the future as water demand increases.

Earthquake

There is little to no direct impact of climate trends and variations on the earthquake risk in Trousdale County. However, there are some USGS and NASA scientists who believe melting glaciers in mountainous regions and at the poles could induce tectonic activity due to the tremendous amount of weight that is shifted on the earth's crust as water melts and runs off. This newly freed crust can experience post-glacial isostatic uplift, which could cause seismic plates to slip and stimulate seismic activity as it returns to its original, pre-glacial shape. These shifts in tectonic plates would not directly impact Tennessee, but changes to stress/strain in other parts of the North American tectonic plate could impact existing faults/seismic zones in Tennessee indirectly. Also, secondary impacts of earthquakes such as liquefaction or mass wasting may increase due to soils saturated from repetitive or extreme precipitation.

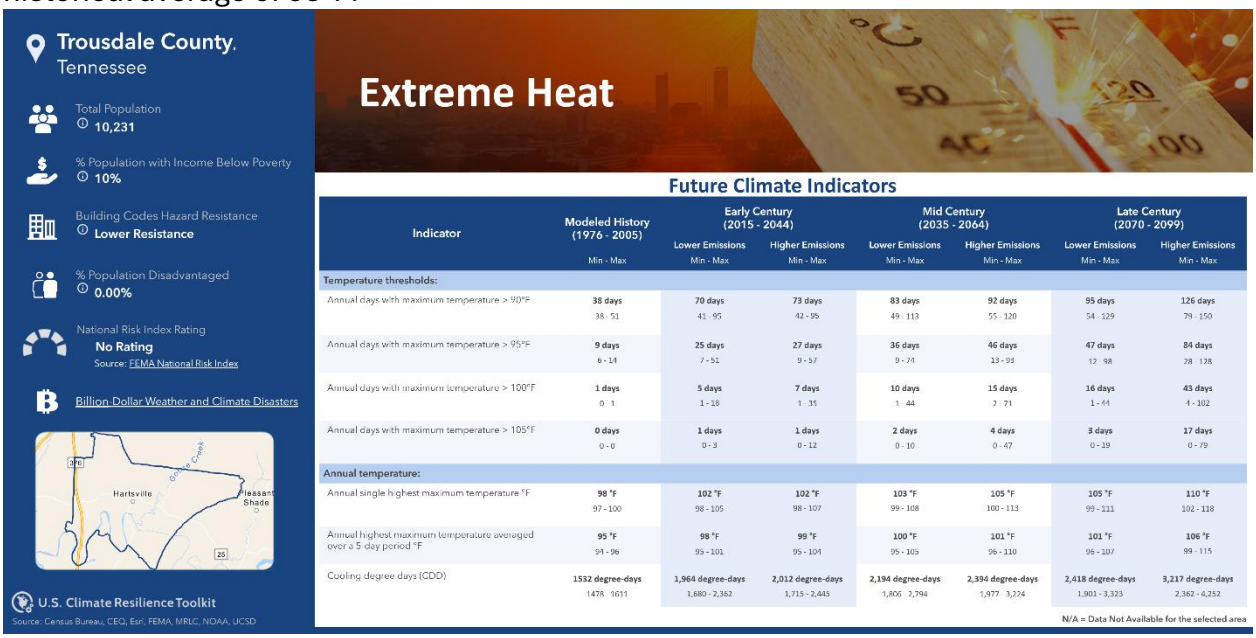
Extreme Temperature

The Fourth National Climate Assessment (2018, NCA4) states climate variability is expected to increase the average temperature and the number of high-heat days in the southeastern United States and intensify the hydrologic cycle, leading to an increase in both extreme temperature and precipitation events in the southeastern United States. The increasing trend in average temperature in Trousdale County is also supported by observed historical data available from the NOAA National Centers for Environmental Information Climate-at-

a-Glance tool (refer to Figures 4-6 in the Drought section of this appendix), and based on the NCA4, this trend is expected to continue in the future.

Heat

The Climate Mapping Risk Assessment (CMRA) Report for Trousdale County shows the potential for an increase in high heat days, when examining temperature thresholds and annual temperatures. By mid-century, Trousdale County could experience between 83 and 92 days of maximum temperatures exceeding 90°F, compared to an historical (1976-2005) average of 38 days. There could be 10-15 days of maximum temperatures exceeding 100°F by mid-century, compared to an historical average of 1 day per year. Additionally, the annual single highest maximum temperature could be 103-105°F by mid-century, compared to an historical average of 98°F.



Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Temperature thresholds:							
Annual days with maximum temperature > 90°F	38 days 38 - 51	70 days 41 - 95	73 days 42 - 95	83 days 49 - 113	92 days 55 - 120	95 days 54 - 129	126 days 79 - 150
Annual days with maximum temperature > 95°F	9 days 6 - 14	25 days 7 - 51	27 days 9 - 57	36 days 9 - 71	46 days 13 - 93	47 days 12 - 98	84 days 28 - 128
Annual days with maximum temperature > 100°F	1 days 0 - 1	5 days 1 - 18	7 days 1 - 35	10 days 1 - 44	15 days 2 - 71	16 days 1 - 44	43 days 4 - 102
Annual days with maximum temperature > 105°F	0 days 0 - 0	1 days 0 - 3	1 days 0 - 12	2 days 0 - 10	4 days 0 - 47	3 days 0 - 19	17 days 0 - 79
Annual temperature:							
Annual single highest maximum temperature °F	98 °F 97 - 100	102 °F 98 - 105	102 °F 98 - 107	103 °F 99 - 108	105 °F 100 - 113	105 °F 99 - 111	110 °F 102 - 118
Annual highest maximum temperature averaged over a 5 day period °F	95 °F 94 - 96	98 °F 95 - 101	99 °F 95 - 104	100 °F 95 - 105	101 °F 96 - 110	101 °F 96 - 107	106 °F 99 - 115
Cooling degree days (CDD)	1532 degree-days 1478 - 1611	1,964 degree-days 1,680 - 2,362	2,012 degree-days 1,715 - 2,445	2,194 degree-days 1,806 - 2,794	2,394 degree-days 1,977 - 3,224	2,418 degree-days 1,901 - 3,323	3,217 degree-days 2,362 - 4,252

N/A = Data Not Available for the selected area

Figure 13: Climate Mapping Risk Assessment Report for Extreme Heat in Trousdale County. (Source: US Climate Resilience Toolkit)

Trend analysis of heat advisories/excessive heat warnings showed an increasing trend for Trousdale County, significant to the 95% confidence level, meaning that these types of advisories and warnings (issued by the National Weather Service) have increased between 2005 and 2023. Trousdale County was also identified as a new hot spot for heat advisories/excessive heat warnings; meaning it was statistically more likely to have heat advisories or warnings than other parts of the state in 2023.

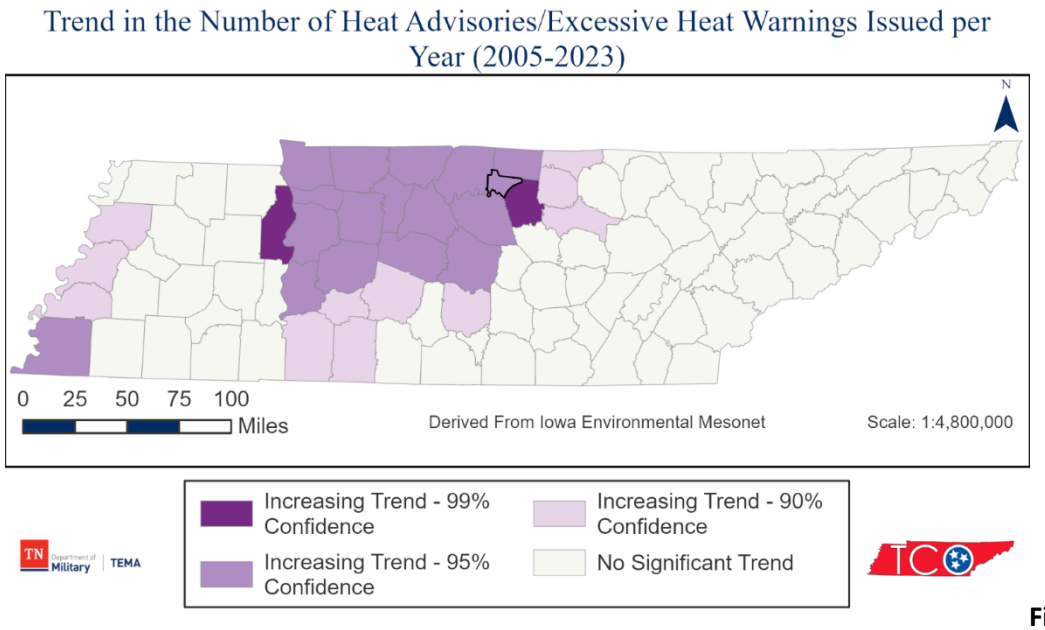


Figure 14: Trend in the Number of Heat Advisories/Excessive Heat Warnings Issued per Year, Trousdale County Outlined in Bold.

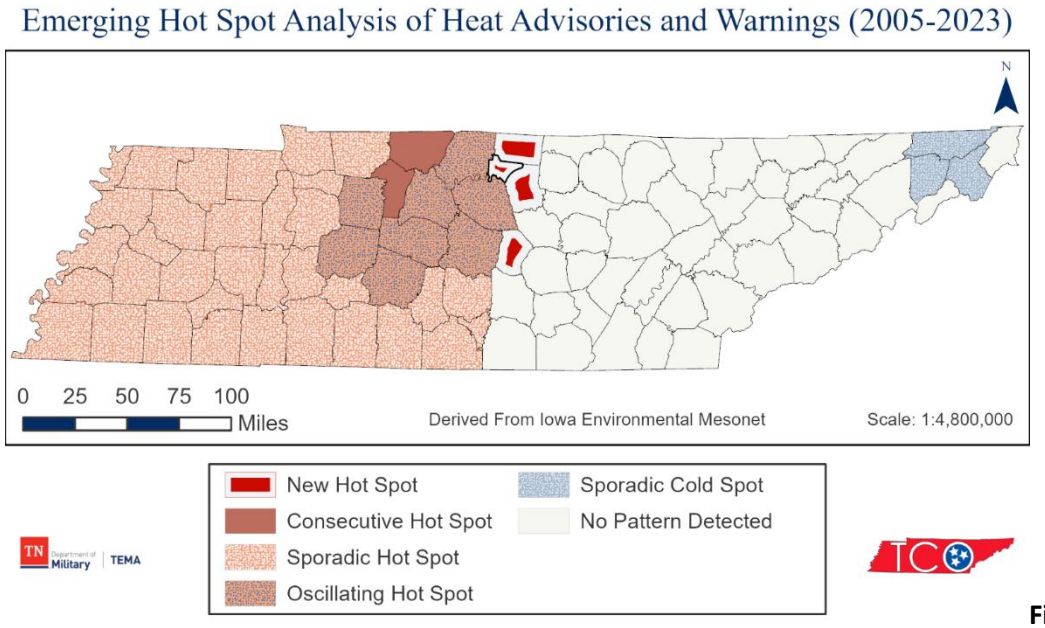


Figure 15: Emerging Hot Spot Analysis of Heat Advisories/Warnings Issued per Year, Trousdale County Outlined in Bold.

Cold

Trend analysis of cold/windchill advisories and extreme cold/extreme windchill warnings showed no significant increasing or decreasing trend for Trousdale County, meaning that these types of advisories and warnings (issued by the National Weather Service) have remained relatively stable from 2005 to 2022. Trousdale County was also not identified as an emerging hot or cold spot for cold temperature or wind chill-based advisories or

warnings; meaning it was not statistically more or less likely to have heat advisories or warnings than other parts of the state.

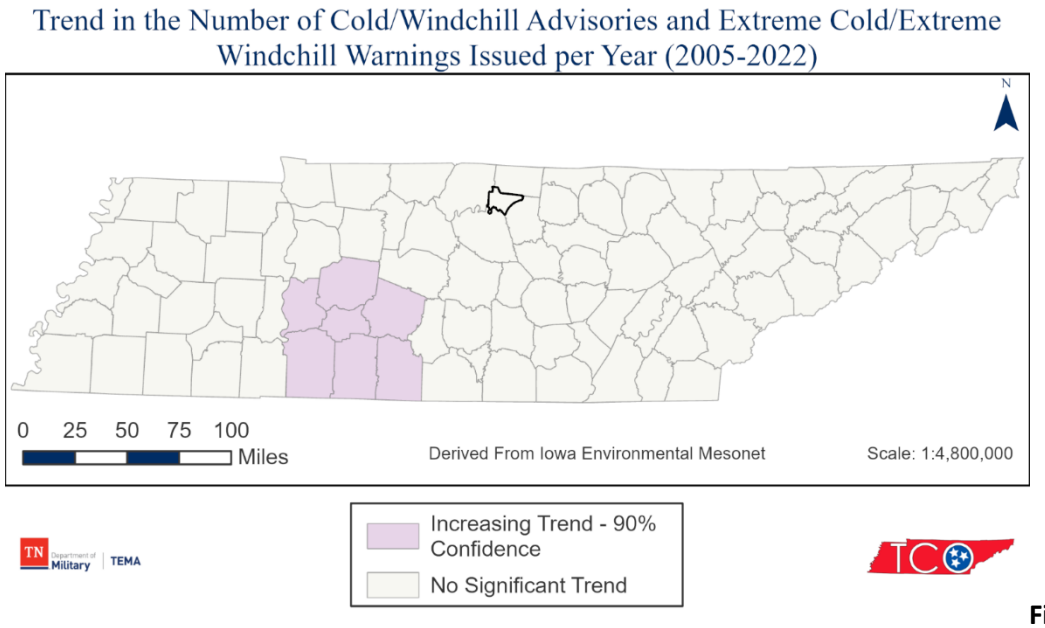


Figure 16: Trend in the Number of Cold/Windchill Advisories and Extreme Cold/Extreme Windchill Warnings Issued per Year, Trousdale County Outlined in Bold.

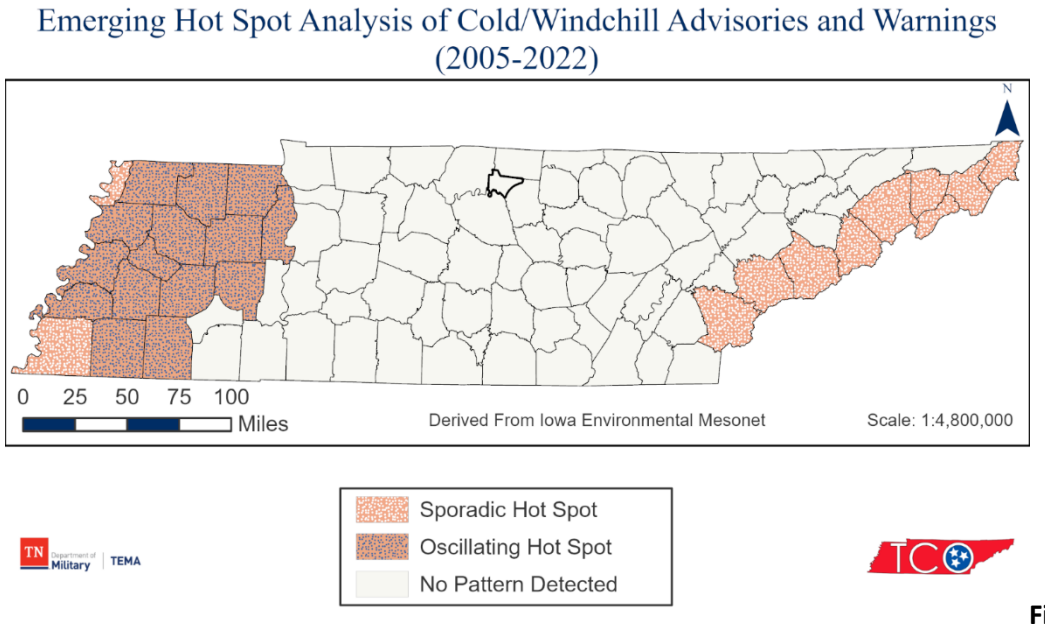


Figure 17: Emerging Hot Spot Analysis of Cold/Windchill Advisories/Warnings, Trousdale County Outlined in Bold.

Flooding

The future risk of flooding in Trousdale County is tied to predicted changes in the precipitation patterns. Tennessee and Trousdale County have increasing trends in observed precipitation, and the Fourth National Climate Assessment (2018) reports that the broader Southeast region has seen an increase in the frequency and intensity of extreme rainfall

events. There is high confidence that this trend will continue in the future. According to the Climate Mapping Risk Assessment (CMRA) Report, Trousdale County is expected to experience a modest increase in various flood indicators by mid- and late-century. Both the increase in total precipitation and extreme rainfall events will increase the risk of flooding in Trousdale County. The long-term (1895-2023) trend in annual precipitation shows an increase of +0.33" per decade, the medium-term (1961-2023) trend in precipitation shows a slightly stronger increasing trend of +0.36" per decade, and the short-term (1991-2023) trend shows an even stronger increase of 0.99" per decade. This indicates that precipitation has increased in Trousdale County over the past several decades, but with a large amount of inter-annual variation, with the third driest and third wettest years observed occurring since 2000.

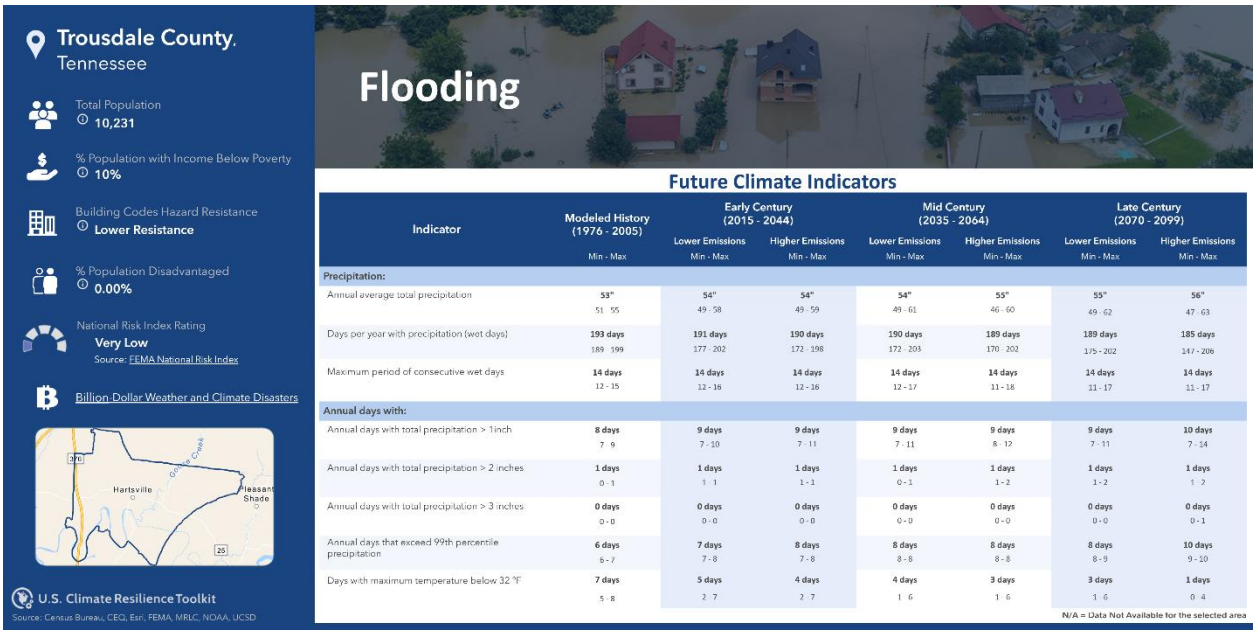


Figure 18: Climate Mapping Risk Assessment Report for Flooding in Trousdale County. (Source: US Climate Resilience Toolkit)

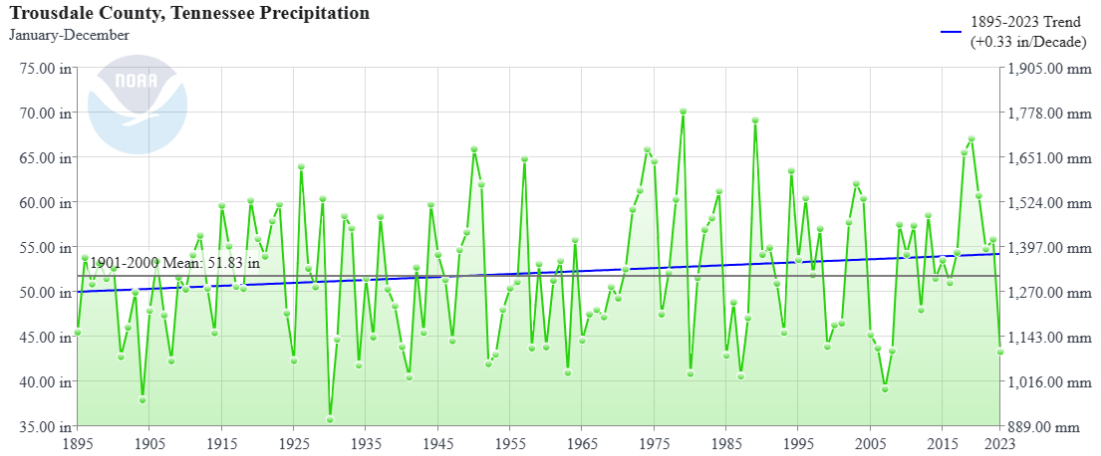


Figure 19: Total Annual Precipitation for Trousdale County, Tennessee, Showing a +0.33-inch Increase per Decade Since 1895.

(Source: NOAA NCEI, Climate at a Glance: County Time Series)

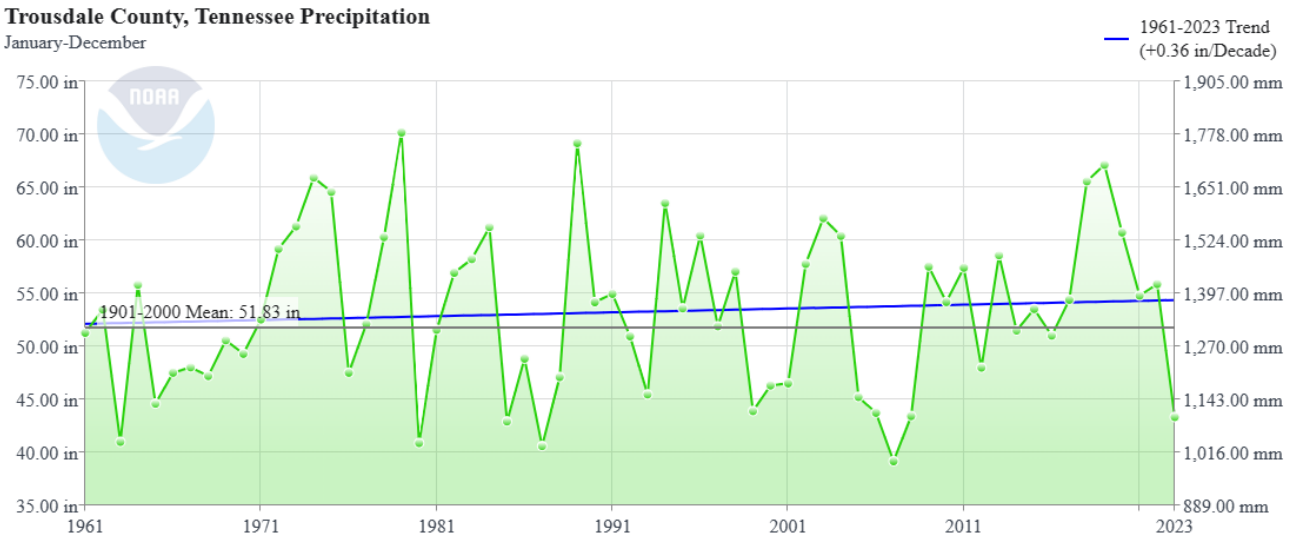


Figure 20: Total Annual Precipitation for Trousdale County, Tennessee, Showing a +0.36-inch Increase per Decade Since 1961.
(Source: NOAA NCEI, Climate at a Glance: County Time Series)

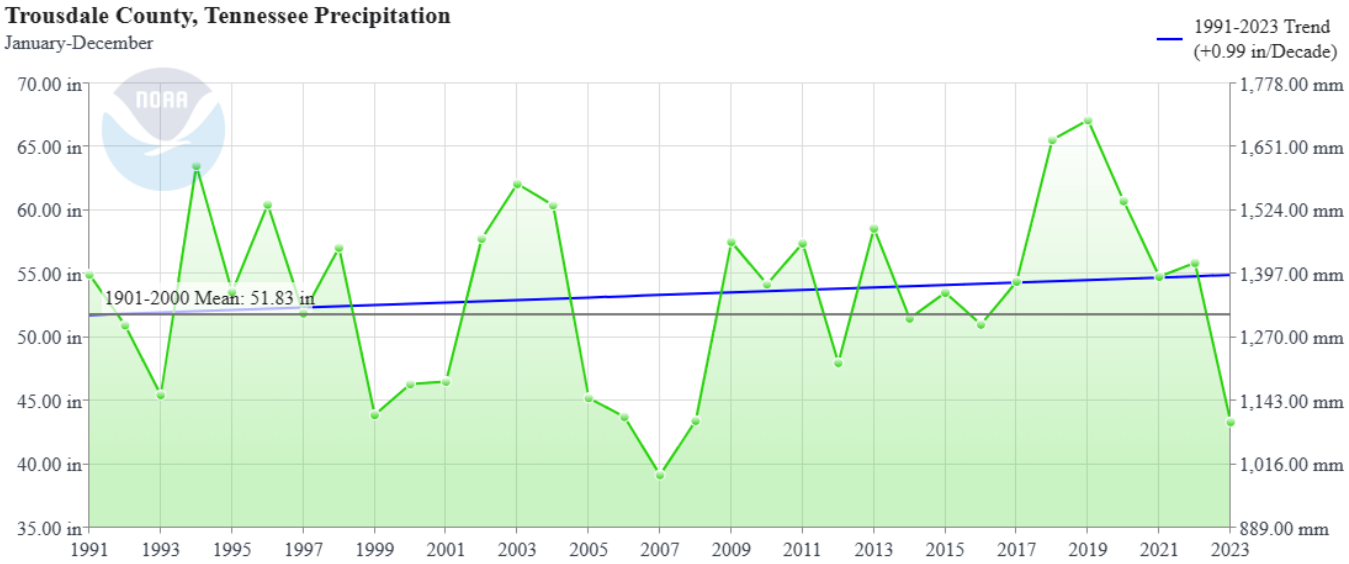


Figure 21: Total Annual Precipitation for Trousdale County, Tennessee, Showing a +0.99-inch Increase per Decade Since 1991.
(Source: NOAA NCEI, Climate at a Glance: County Time Series)

Using the NOAA Storm Events Database, flood events and flood damages (dollars) were examined for trends between 1996 and 2022. Trousdale County showed no significant increasing trend in the number of flood events or amount of flood damages in the Storm Events Database in this time period. The trends in flood events and flood damages presented above are for riverine flooding, but as overall rainfall increases and trends

towards higher intensity precipitation events continue flash flooding may become a higher concern for parts of Tennessee, including Trousdale County. The TCO analyzed trends in flash flood events and flash flood related damages from the NOAA Storm Events Database from 1996 to 2022. Trousdale County showed no significant trend in these events.

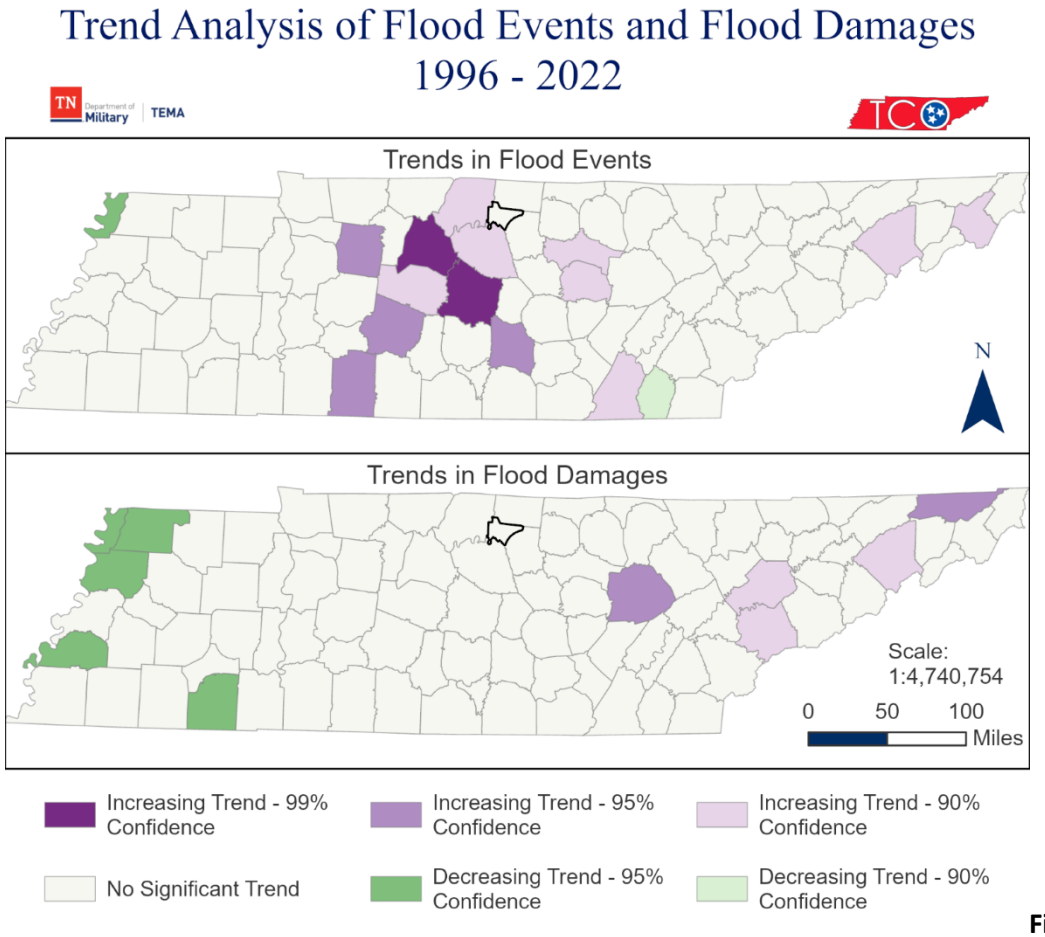


Figure 22: Trend in Flood Events and Flood Damages Reported in the NCEI Storm Events Database from 1996 to 2022, Trousdale County Outlined in Bold.

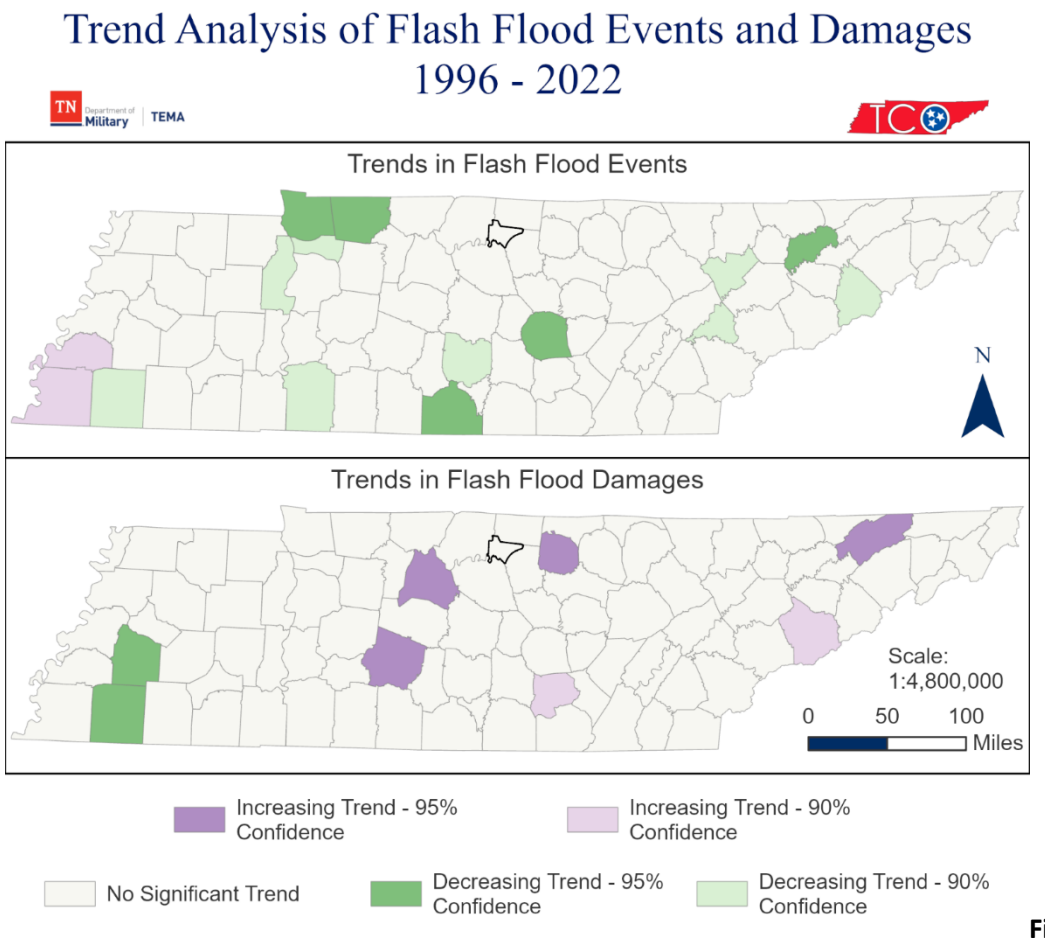


Figure 23: Trend in Flash Flood Events and Flash Flood Damages Reported in the NCEI Storm Events Database from 1996 to 2022, Trousdale County Outlined in Bold.

Extreme rainfall events are often categorized based on how much above or below their amounts were compared to the 100-year, or 1% annual probability, rainfall amounts. For Trousdale County, a 100-year 1-hour extreme rainfall total would be approximately 3.01-3.25 inches. For a 100-year 24-hour extreme rainfall event, Trousdale County would experience 7-8 inches of rain.

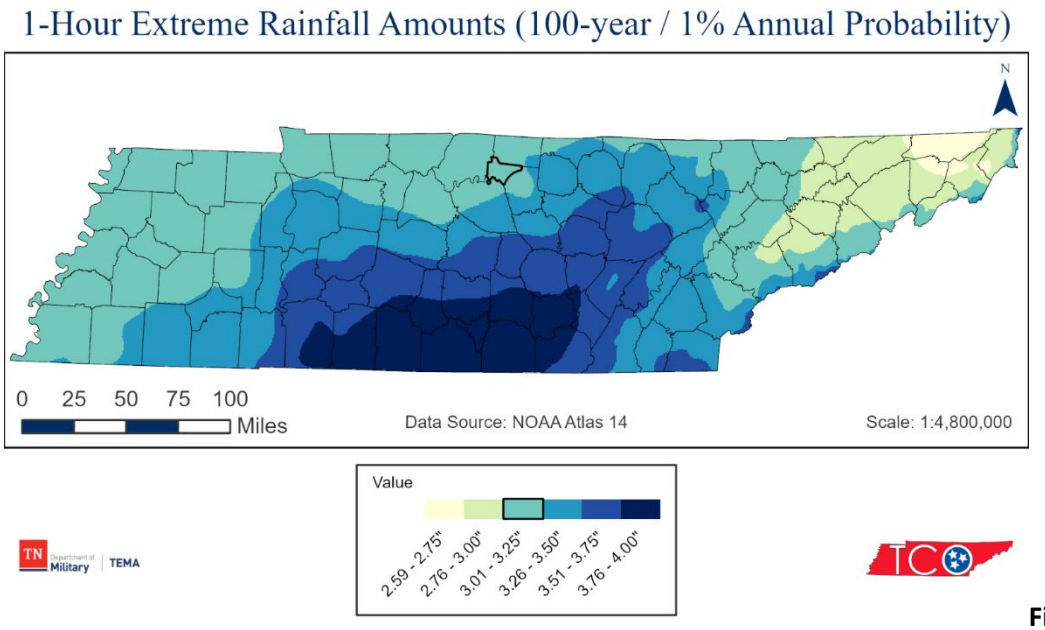


Figure 24: 1-hour Extreme Rainfall Estimates for 100-year Return Period (1% Annual Probability of Exceedance) using NOAA Atlas 14, Trousdale County, Outlined in Bold.

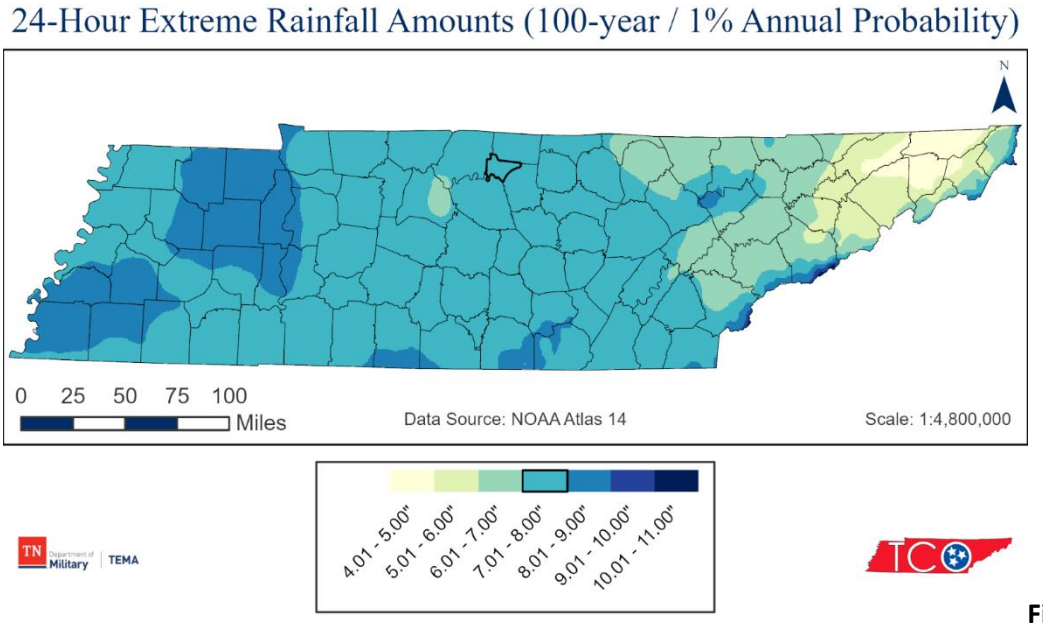


Figure 25: 24-hour Extreme Rainfall Estimates for 100-year Return Period (1% Annual Probability of Exceedance) using NOAA Atlas 14, Trousdale County, Outlined in Bold.

The TCO analyzed trends in heavy precipitation days per year in counties across Tennessee, these were the number of days that daily rainfall totals exceeded a 1-year (100% chance of annual probability), 2-year (50% chance of annual probability), or 5-year (20% chance of annual probability) event. Trousdale County showed no significant trend for these heavy precipitation events.

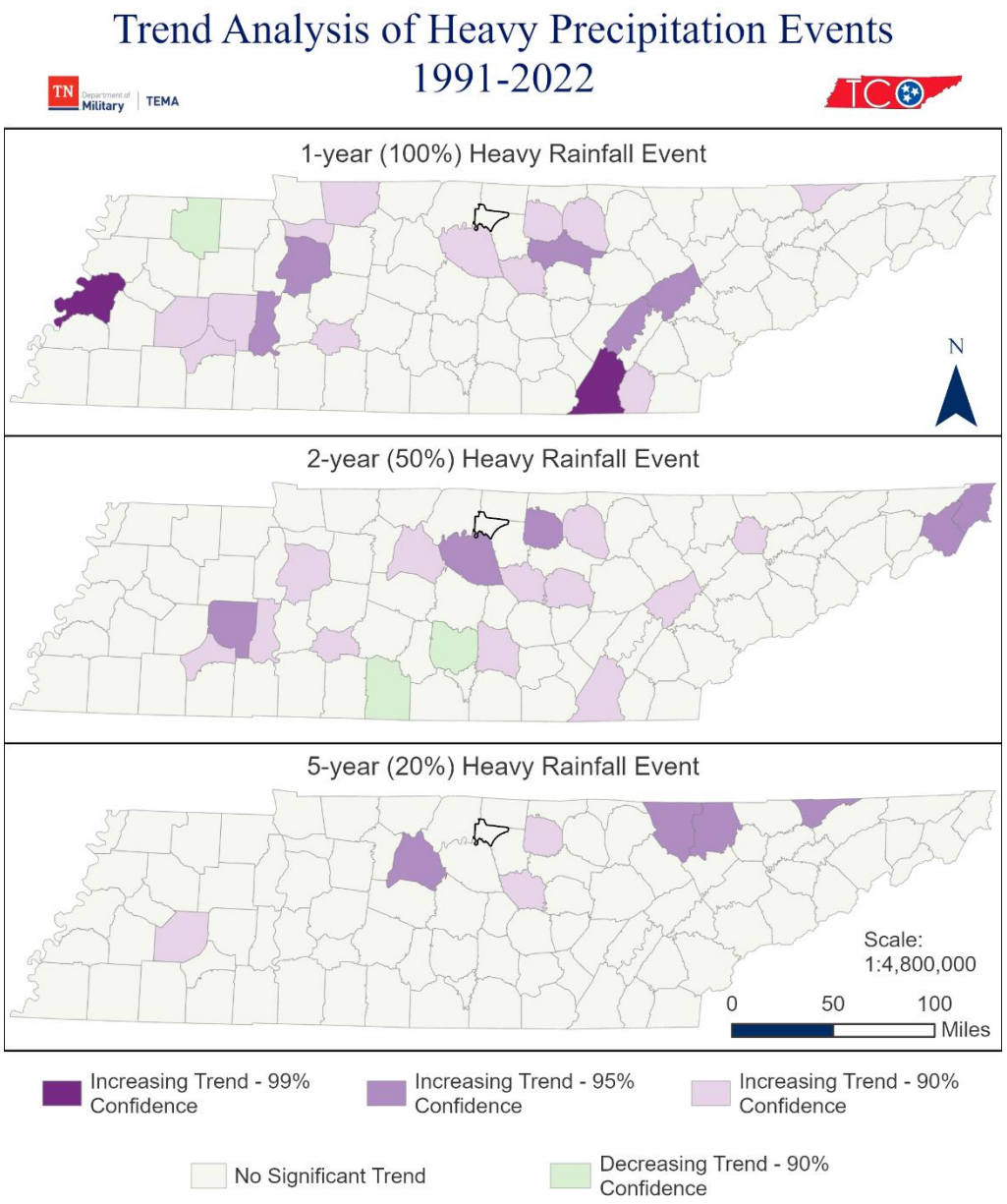


Figure 26: Trend in Heavy Precipitation Events (1-year, 2-year, and 5-year Return Period Exceedance Events), Trousdale County Outlined in Bold.

Additional data from the CMRA report for Trousdale County predicts an increase in the number of days per year with extreme precipitation throughout the 21st century. Based on analysis by the NCICS and NOAA, Hartsville (the county seat of Trousdale County) currently has a 100-year 24-hour extreme rainfall amount of 7.44 inches and that amount is predicted to rise by as much as 1.24 inches (to 8.68") by 2055.

Table 3: Possible Change in the Number of Days per Year with Precipitation Exceeding 99th Percentile (Extreme Precipitation Days).

High Emissions Scenario	Modeled History (1976-2005)	Early Century (2015-2044)	Mid Century (2035-2064)	Late Century (2070-2099)

Driest Projection	6.3	+1.1	+1.6	+3.1
Mean Projection	6.4	+1.2	+1.8	+3.4
Wettest Projection	6.5	+1.2	+1.8	+3.6
Low Emissions Scenario	**Modeled History (1976-2005)**	**Early Century (2015-2044)**	**Mid Century (2035-2064)**	**Late Century (2070-2099)**
Driest Projection	6.3	+1.0	+1.4	+1.8
Mean Projection	6.4	+1.0	+1.5	+2.0
Wettest Projection	6.5	+1.2	+1.6	+2.1

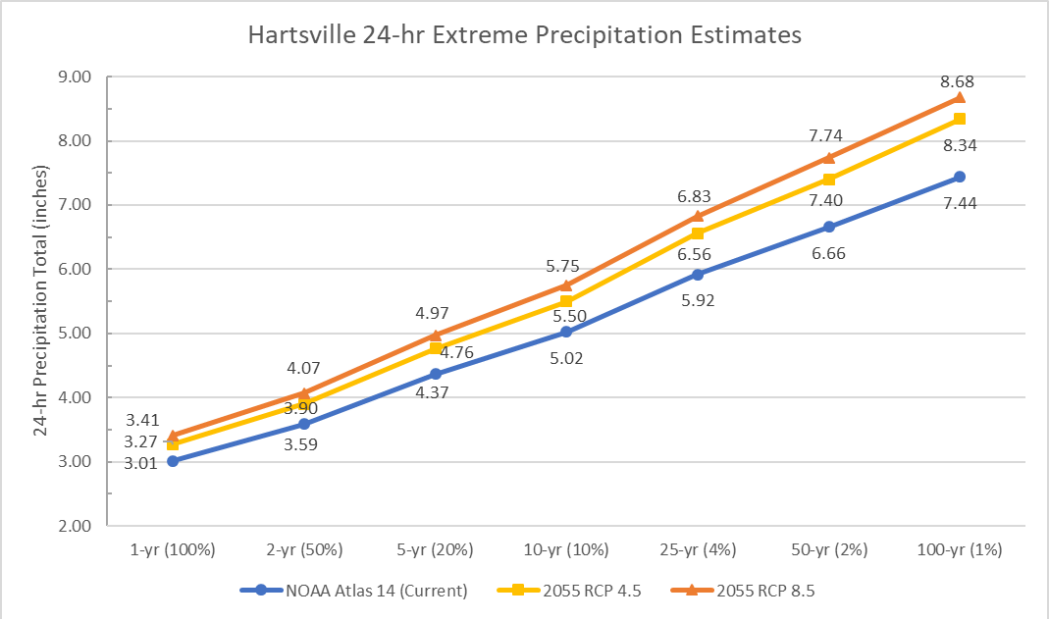


Figure 27: 24-hour Extreme Rainfall Estimates for 1-year, 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year Return Periods using NOAA Atlas 14 (historical data) and Mid-Century Values for 2055 using RCP4.5 and RCP8.5 Emission Scenarios.

The US Department of Agriculture and US Forest Service created a report based on models and projection data from Multivariate Adaptive Constructed Analogs (MACA), that show most of Tennessee is expected to see an increase in annual precipitation by the late 21st century. Trousdale County is projected to see an increase of 4-6% in annual precipitation by the late 21st century. However, potential changes in precipitation are not expected to be spread equally across all four seasons. The largest change for Trousdale County is projected to come in the spring season, with an increase of 8-10% compared to the historical average for spring. Fall and winter precipitation are both projected to increase by 4-6% compared to the historical average of those seasons. Summer precipitation is projected to decrease by 0.1-2% compared to the historical average summer precipitation.

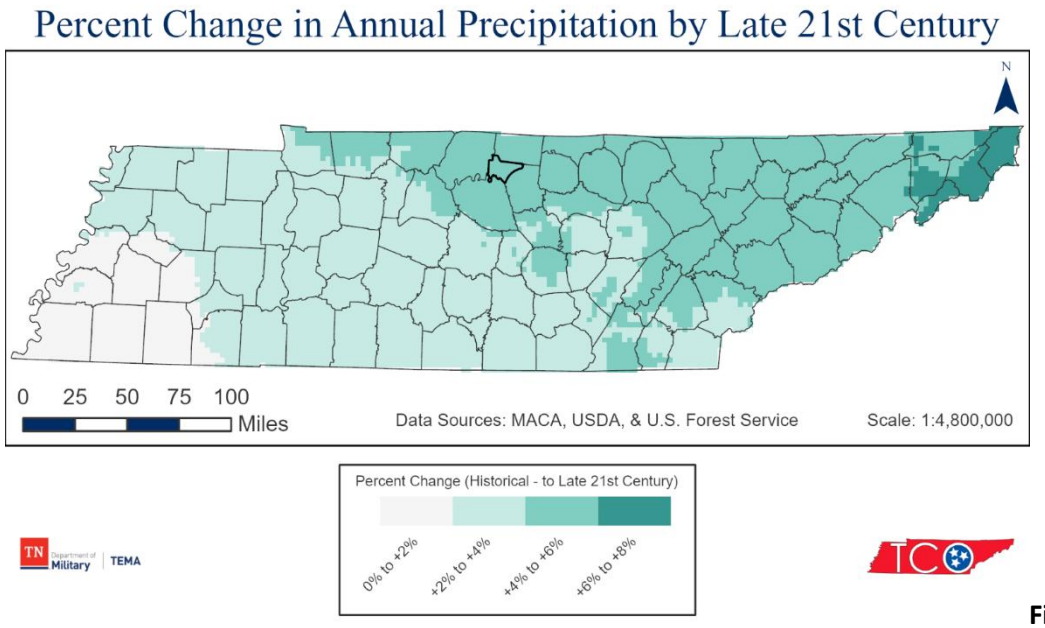


Figure 28: Projected Change in Annual Precipitation for Tennessee, Trousdale County Outlined in Bold.

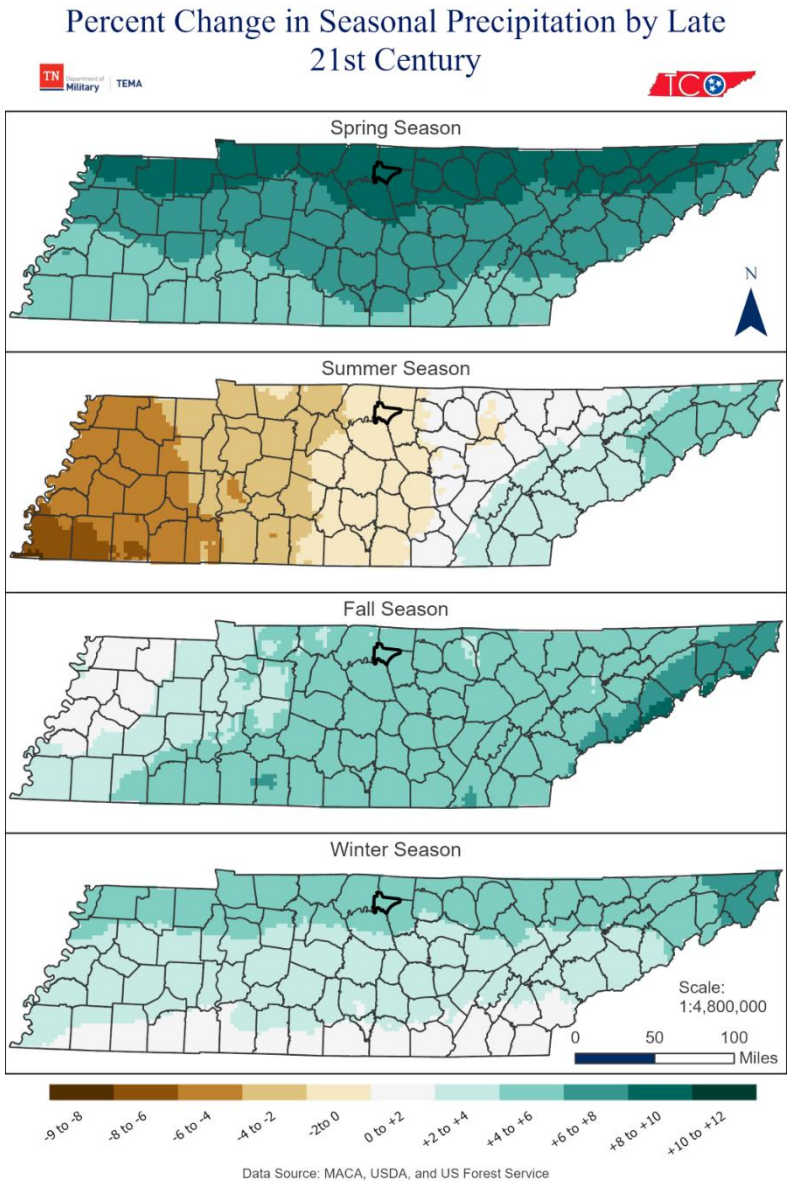


Figure 29: Projected Change in Seasonal Precipitation for Tennessee, Trousdale County Outlined in Bold.

Geologic Hazards

Specific impacts of climate on geologic hazards may vary depending on the local geological conditions of the area. Other factors, such as land use practices and human interventions, can interact with climate to influence the occurrence and severity of geologic hazards. Increased precipitation can result in greater soil moisture content, causing expansive soils to swell more and potentially lead to landslides and damage to infrastructure. Conversely, increased frequency and severity of drought can cause soils to shrink and crack, leading to subsidence and foundation problems in structures. The impacts of climate on landslides would be increased water from intense rainfalls that would weaken the soil's stability due to an increase in saturation which increases pore water pressure. Landslides and other

types of mass wasting events can be triggered by weather events like extreme rainfall or repeated freeze-thaw cycles that destabilize slopes and cause fracturing in exposed rock surfaces. Climate variability is expected to increase the number and severity of extreme precipitation events in the Southeast U.S. (see the Flood section for more details about expected changes in extreme precipitation), which could increase the likelihood of landslides in parts of Trousdale County. Climate can also alter vegetation patterns which could drastically impact landslides since vegetation plays a crucial role in stabilizing slopes, and any changes can affect slope stability, potentially leading to increased landslide occurrences.

A study conducted by the USDA and U.S. Forest Service Office of Sustainability and Climate found that the frost-free season (the longest period of the year during which the temperature does not drop below freezing) could increase in length by 51 to 55 days in Trousdale County by the late 21st century. The lengthening of the frost-free season and overall decrease in number of days with temperatures below freezing would reduce the amount of time during the year rock surfaces and soils would be exposed to freeze-thaw cycles. This reduction could reduce the number of localized rockfalls in Trousdale County. See the Winter Weather sub-section of Severe Weather section of this appendix for more information on observed and expected changes to winter temperatures in Trousdale County.

Changes in precipitation patterns and groundwater recharge rates can alter water table levels. These fluctuations in the water table can lead to the dissolution of soluble rocks, potentially increasing the formation of sinkholes in most areas of Trousdale County that have underlying karst geology.

Severe Weather

Climate trends and variations may lead to an increase in frequency and intensity of certain types of severe storms. Warmer air temperatures can contribute to more moisture in the atmosphere, providing fuel for stronger rainfall events and potentially more intense thunderstorms. The increased energy in the atmosphere can also contribute to the development of more powerful storms. Climate trends can also result in altered precipitation patterns influencing the distribution, timing, and intensity of rainfall during storms. Climate trends can influence the paths and tracks of severe storms too. Changes in atmospheric circulation patterns may lead to shifts in the regions where storms typically form or move, potentially affecting the areas that are historically vulnerable to specific types of storms. This can result in new areas being exposed to severe storms while other areas experience a decrease. Research by Ashley et al. (2023) into supercell thunderstorm formation compared historical data (1990-2005) and future climate models for the late 21st century (2085 – 2100), which indicate that the mid-South region of the U.S. could see an increase in the number of supercell thunderstorms capable of producing severe thunderstorm hazards and tornadoes. These increases were mostly found in the late winter to early spring months of February, March, and April. Additionally, they found that an increasing number of supercell thunderstorms in this region could form in the late afternoon to overnight hours. Climate trends can contribute to compound events where multiple extreme weather events can occur simultaneously or in succession. These compound

events can amplify the overall impacts on communities and ecosystems, making them more challenging to manage and recover from.

Severe Thunderstorms (Convective Wind, Hail, and Lightning)

Using data from the NOAA Storm Prediction Center severe storm reports archive from 1980-2022, Trousdale County has a moderate number of severe thunderstorm wind damage and moderate number of severe hail reports compared to other parts of the state. Trousdale County averages less than 0.5 severe thunderstorm wind damage report per square mile in the northern and eastern ends of the county, and 0.51-1.0 reports per square mile in the majority of the county. Trousdale County averages and 0.11-0.2 severe hail reports per square mile. Trousdale County has a moderate density of lightning strikes per year compared to other areas in the state. The Tennessee Climate Office (TCO) analyzed trends for thunderstorm winds (convective wind) and severe hail reports in counties across Tennessee using the NOAA Storm Events Database with data from 1996 to 2022, and lightning strikes per county from 1996 to 2023 from the NOAA Severe Weather Data Inventory (SWDI). The trend analysis for convective wind reports showed a decreasing trend for Trousdale County, significant to the 95% confidence level. The trend analysis for severe hail reports showed no significant trend in the number of severe hail reports in Trousdale County. Trend analysis for lightning strikes showed a decreasing trend for the county that was significant to the 99% confidence level.

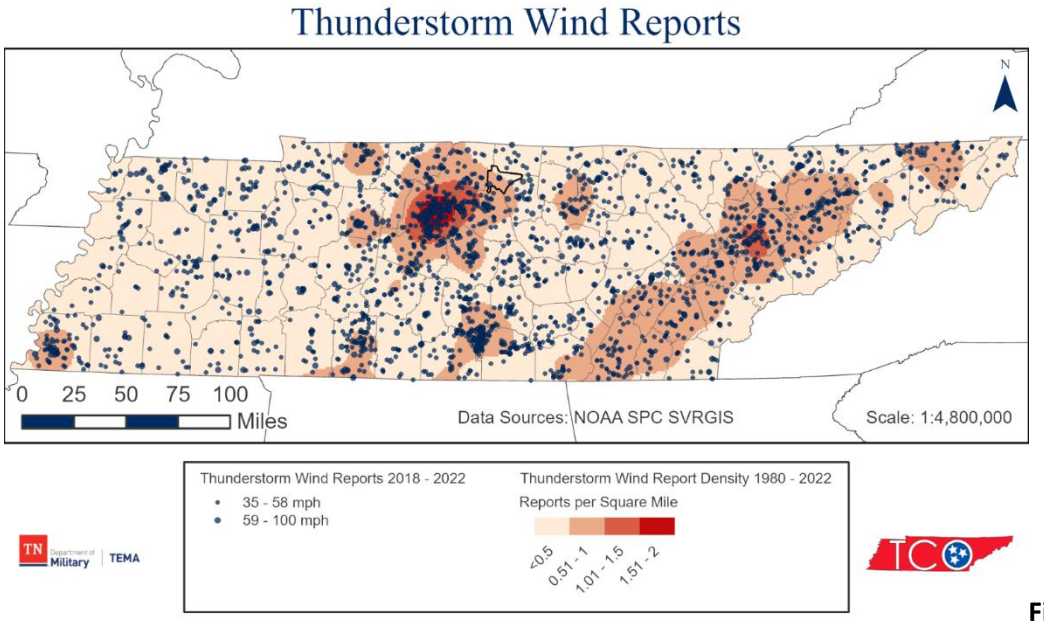


Figure 30: Severe Thunderstorm Wind Reports from 2018-2022 and Severe Thunderstorm Wind Report Density from 1980-2022, Trousdale County Outlined in Bold.

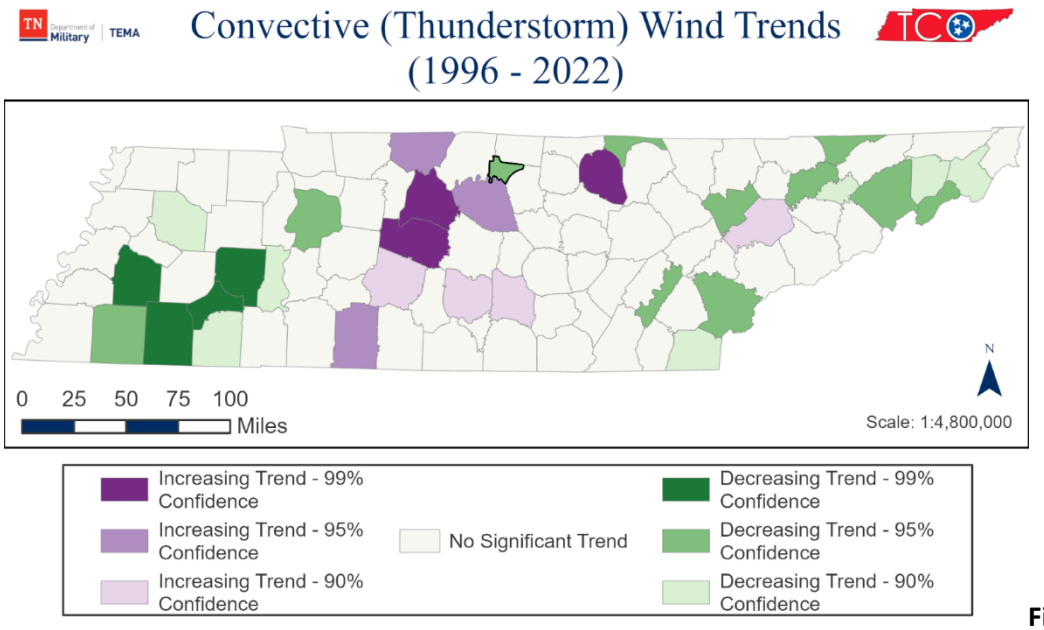


Figure 31: Trends in the Number of Thunderstorm Wind Events Recorded in the NCEI Storm Events Database from 1996 to 2022, Trousdale County Outlined in Bold.

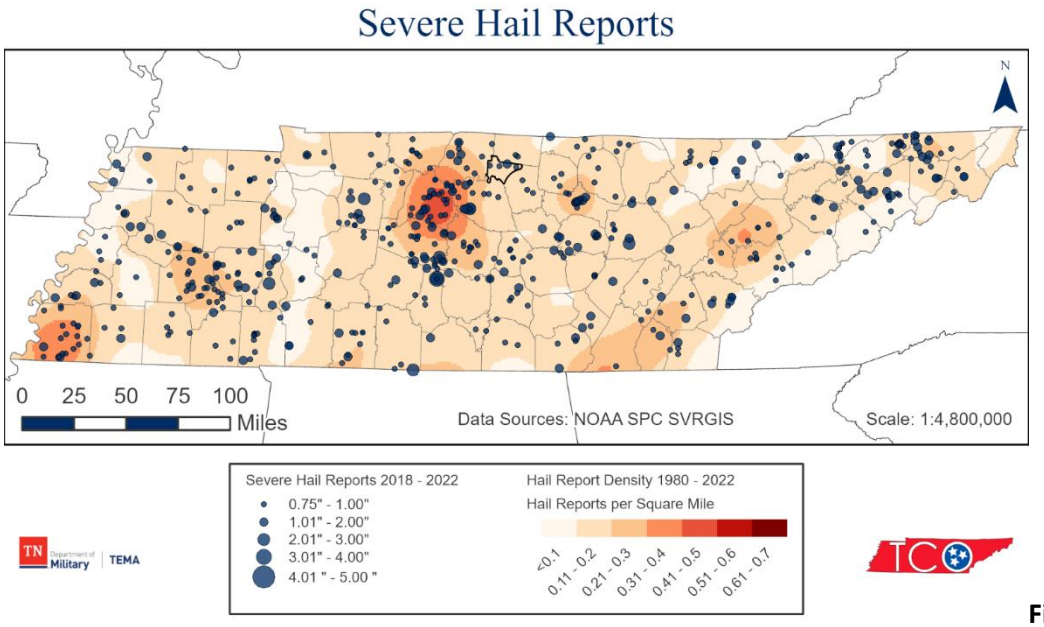


Figure 32: Severe Hail Reports from 2018-2022 and Severe Hail Density from 1980-2022, Trousdale County Outlined in Bold.

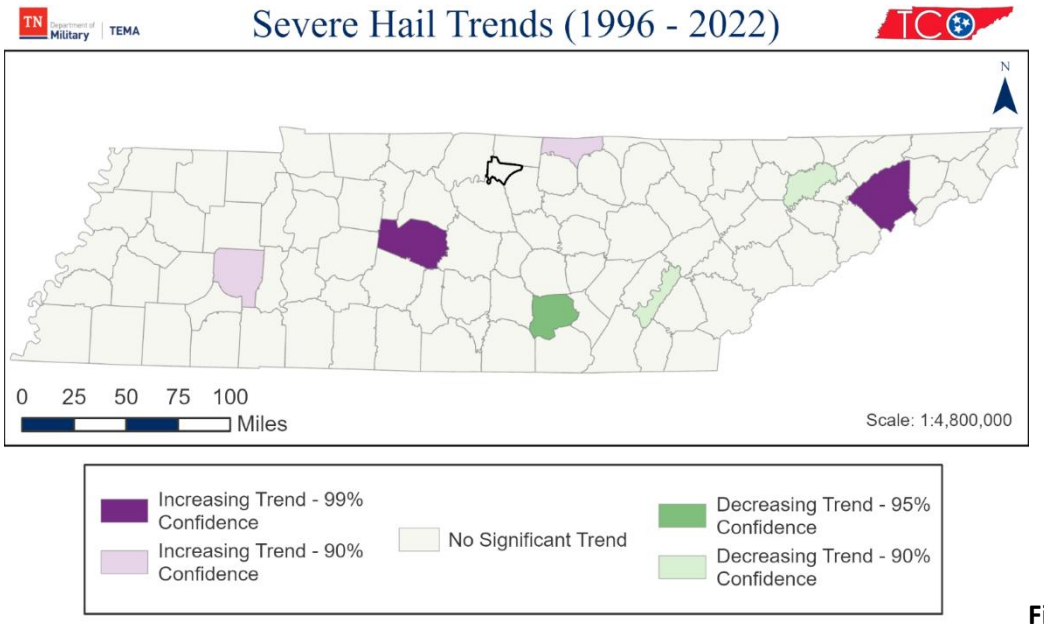


Figure 33: Trends in the Number of Severe Hail Events Recorded in the NCEI Storm Events Database from 1996 to 2022, Trousdale County Outlined in Bold.

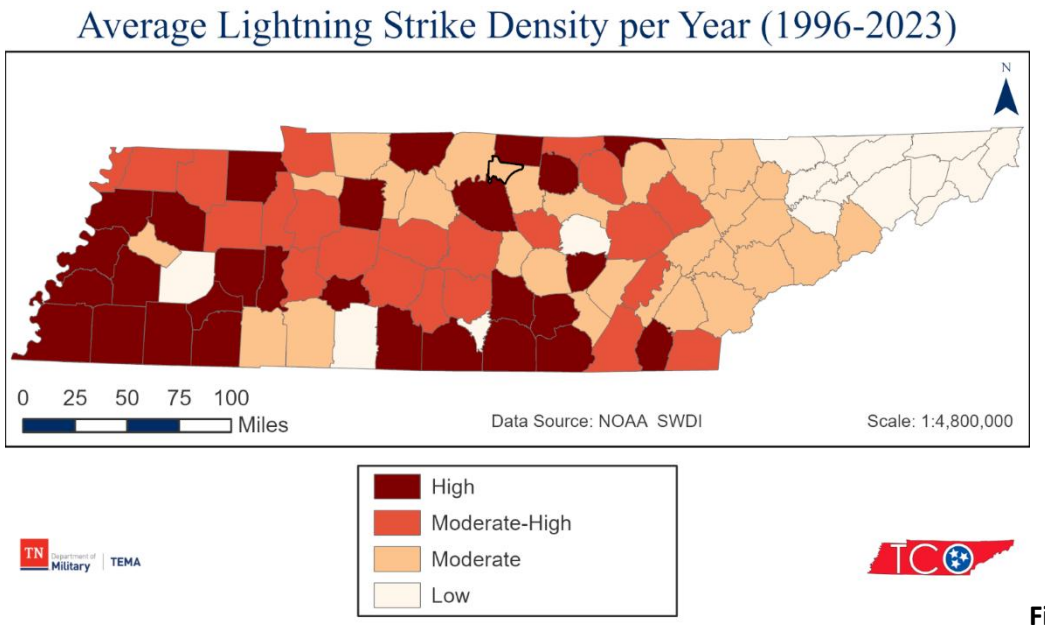


Figure 34: Average Annual Lightning Strike Density 1996 to 2023, Trousdale County Outlined in Bold.

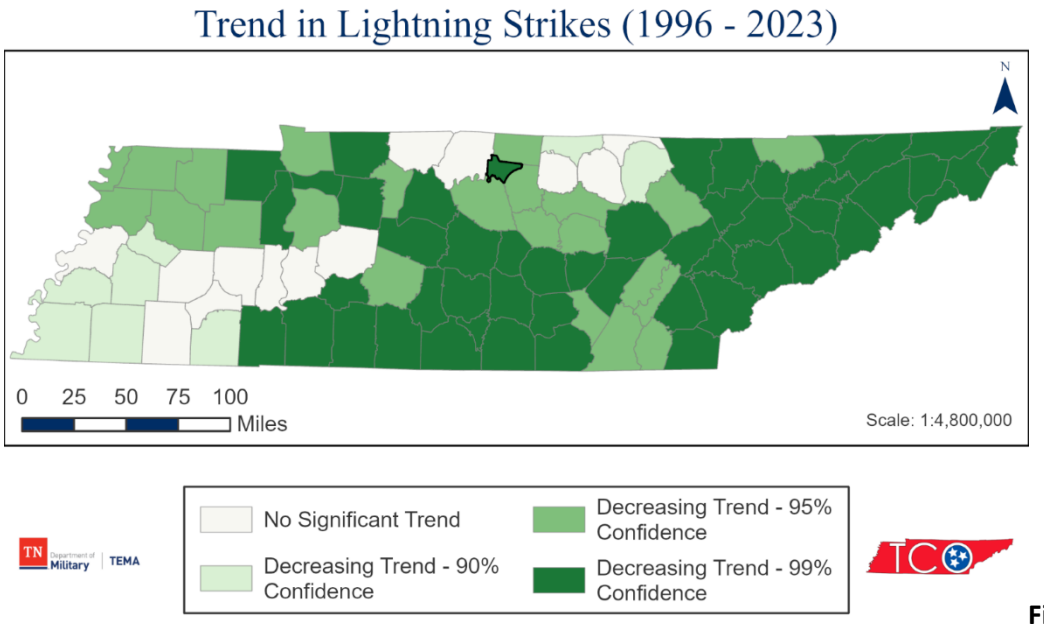


Figure 35: Trends in the Number of Lightning Strikes per County Recorded in the NOAA Severe Weather Data Inventory from 1996 to 2023, Trousdale County Outlined in Bold.

Non-Thunderstorm Winds

The Tennessee Climate Office (TCO) also analyzed trends for non-convective (non-thunderstorm) wind reports in counties across Tennessee using the NOAA Storm Events Database with data from 1996 to 2022, and Trousdale County showed no significant trend in non-convective wind events during this time.

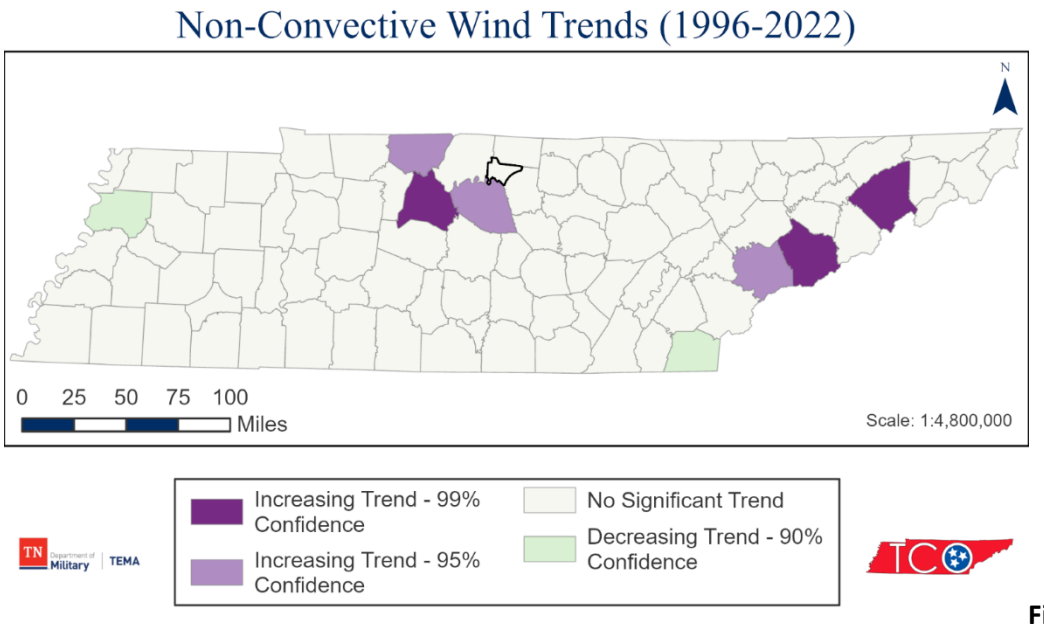


Figure 36: Trends in the Number of Non-Convective Wind Events Recorded in the NCEI Storm Events Database from 1996 to 2022, Trousdale County Outlined in Bold.

Winter Weather

Data from the National Weather Service NOHRSC National Gridded Snowfall Analysis webpage covering the winters of 2008-2009 to 2022-2023 (the last 15-years) indicates that the average annual snowfall for Trousdale County ranges from 4 to 8-inches per year, with higher snowfall found in the far eastern portion of the county. Using data from the NOAA Storm Events Database, trend analysis was performed on winter weather-related storms from 1996 to 2022 across the state of Tennessee. In this time period there was no significant trend in the number of winter storms impacting Trousdale County, however most surrounding counties showed an increasing trend over this time.

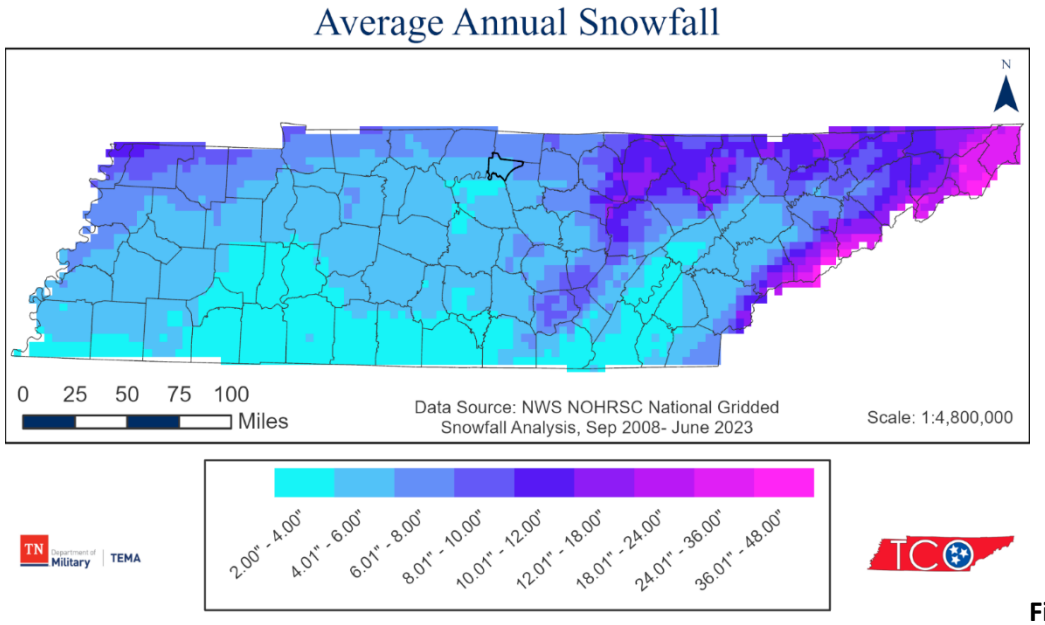


Figure 37: Average Annual Snowfall from the Winter of 2008/2009 to the Winter of 2022/2023, Trousdale County Outlined in Bold.

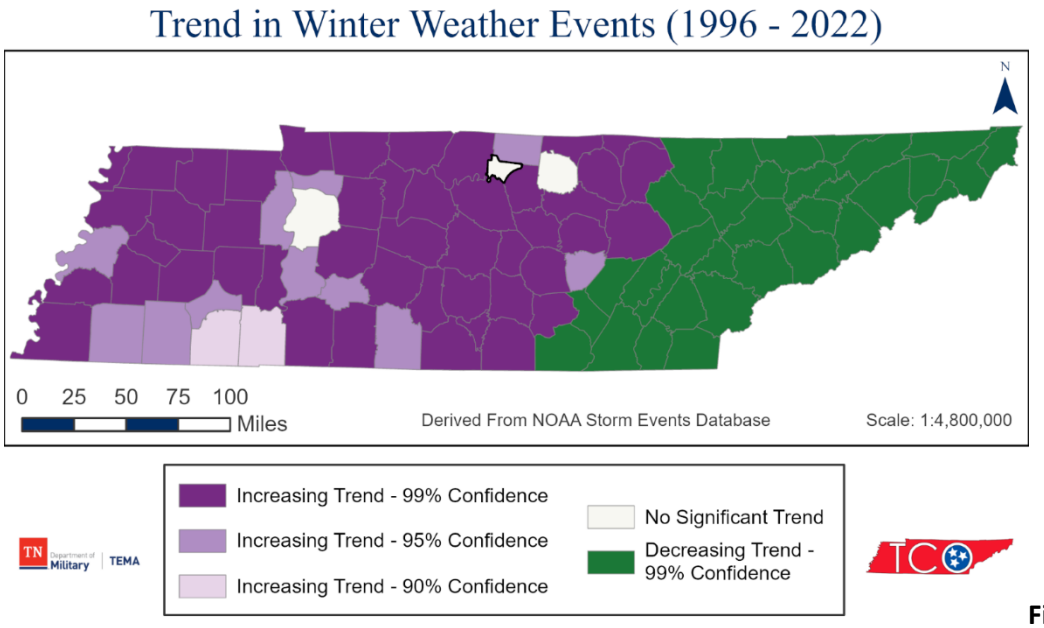


Figure 38: Trends in the Number of Winter Weather-Related Events Recorded in the NCEI Storm Events Database from 1996 to 2022, Trousdale County Outlined in Bold.

Climate trends and variability will impact the future likelihood of winter weather events or severe winter storms in Tennessee, likely decreasing but not eliminating the overall risk. Average annual temperatures are expected to increase across the Southeast US, including temperatures during the winter season. Trousdale County has an observed warming trend of +0.2°F per decade from 1896 to 2024 throughout the meteorological/climatological winter season (December – February). In the medium-term (1961 - 2024) the winter temperature trend shows greater warming at +0.9°F per decade, however the short-term (1991 - 2024) trend shows slightly moderated warming of +0.7°F per decade during the winter season. The moderation was caused by the exclusion of the very cold winters of 1963-1964, 1970, and 1977-1979.

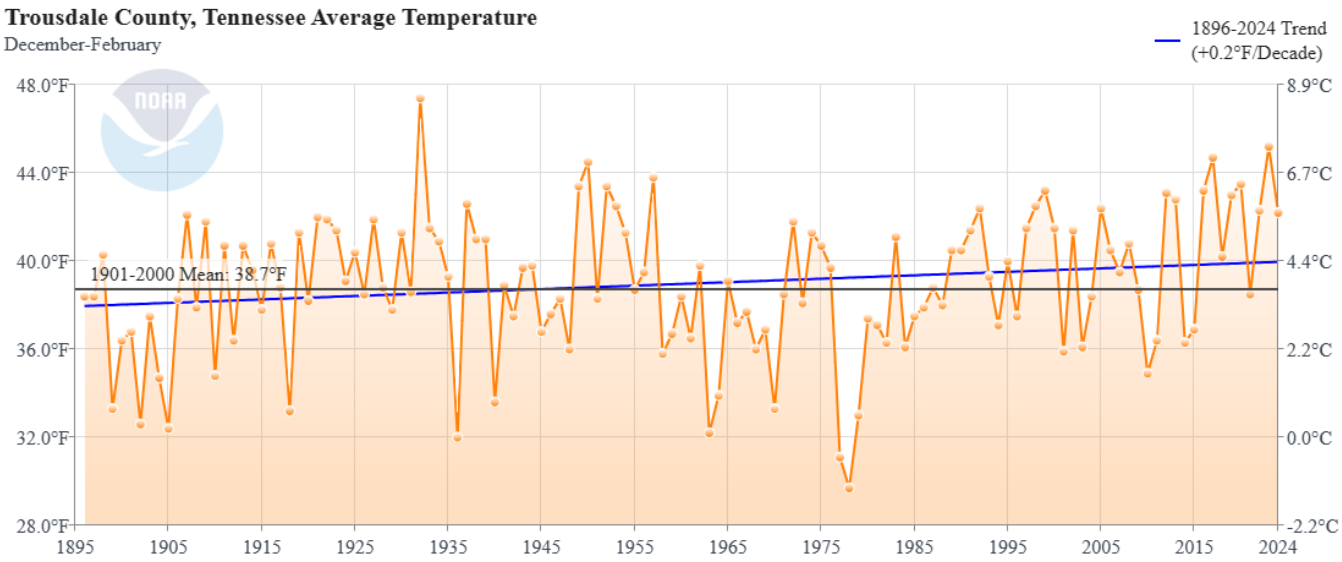


Figure 39: Winter (December to February) Mean Temperature for Trousdale County, Tennessee, Showing a +0.2°F Increase per Decade Since 1895.
(Source: NOAA NCEI, Climate-at-a-Glance: County Time Series)

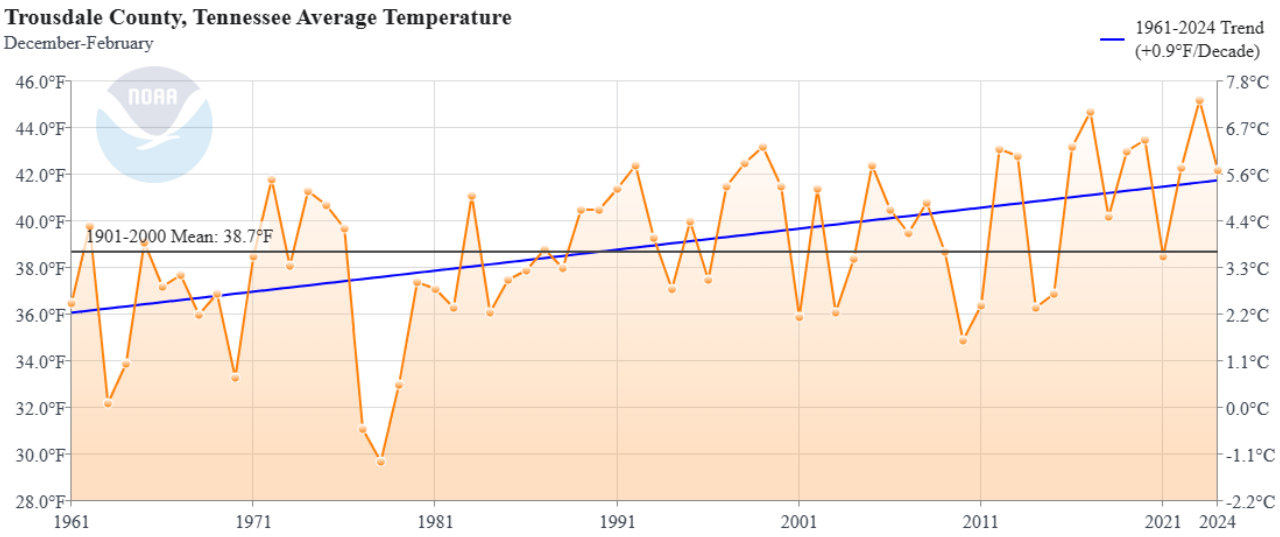


Figure 40: Winter (December to February) Mean Temperature for Trousdale County, Tennessee, Showing a +0.9°F Increase per Decade Since 1961.
(Source: NOAA NCEI, Climate-at-a-Glance: County Time Series)

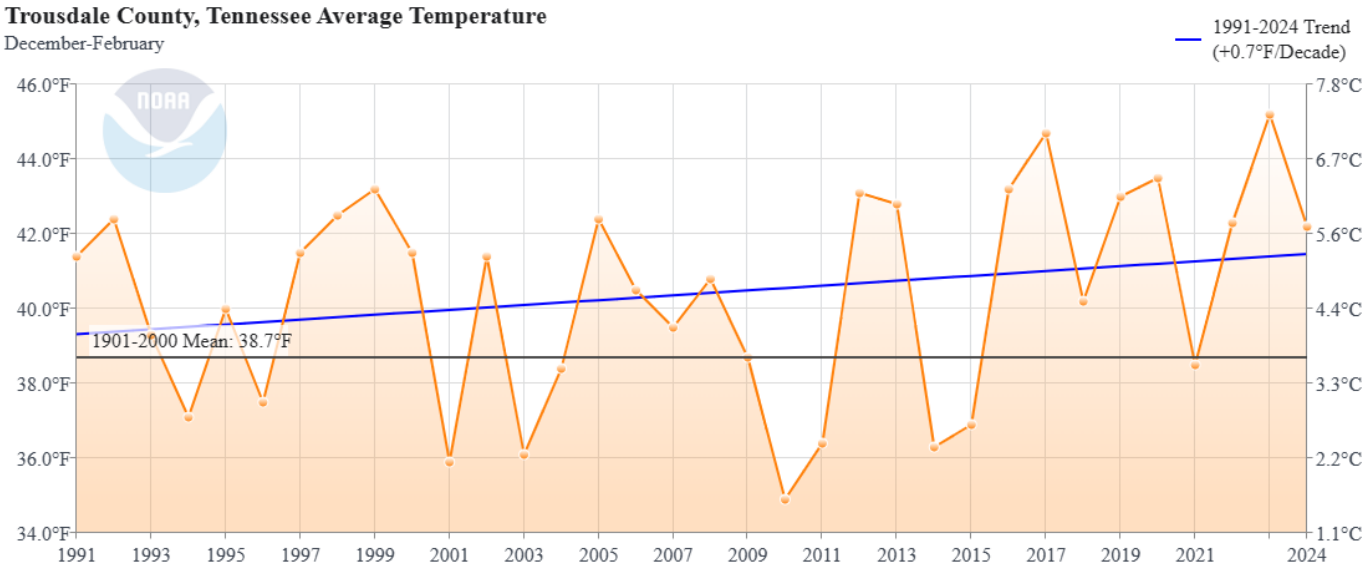


Figure 41: Winter (December to February) Mean Temperature for Trousdale County, Tennessee, Showing a +0.7°F Increase per Decade Since 1991.
(Source: NOAA NCEI, Climate-at-a-Glance: County Time Series)

In addition to the increasing average annual and winter temperatures, the USDA and U.S. Forest Service Office of Sustainability and Climate projects that the length of the frost-free season will increase by 51-55 days across Trousdale County by the late 21st century. This means that the amount of time during the year where winter weather is possible will decrease. Currently, the average frost season in Trousdale County lasts for about five months of the year (from late October until early April), but by the late 21st century that is projected to decrease to just about three and a half to four months of the year. In the following two figures the historical and projected number of Frost Days (days with a minimum temperature below freezing) and Icing Days (days with a maximum temperature below freezing) are shown for Trousdale County from the U.S. Climate Resilience Toolkit Climate Explorer. The mean projection for the low emissions scenario indicates that Trousdale County could have 27 fewer Frost Days per year by the end of the century, while the mean projection for the high emissions scenario indicates there could be 41 fewer Frost Days per year than the 1961-1990 observed average number of frost days. The mean projection for the low emissions scenario shows that Trousdale County could observe approximately six fewer Icing Days per year, while the high emissions scenario shows that there could be approximately seven fewer Icing Days per year by the end of the century compared to the 1961-1990 observed average.

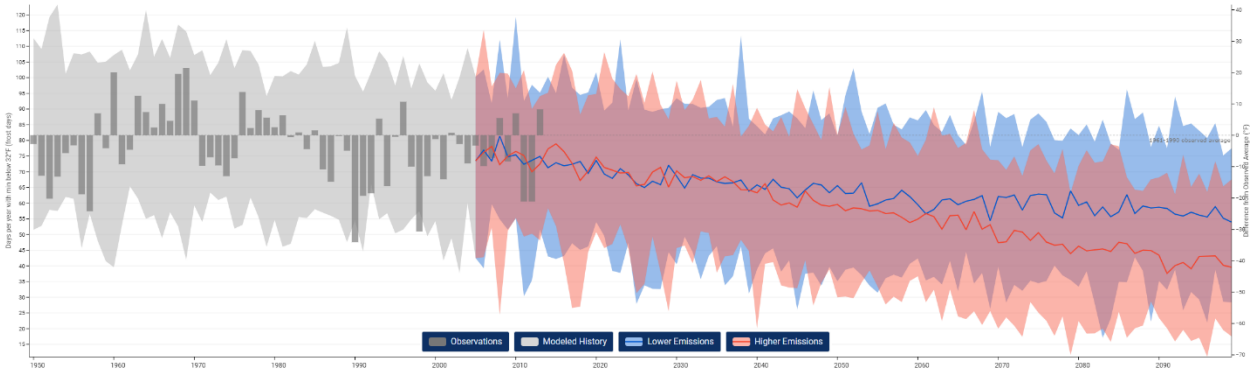


Figure 42: Days Per Year with Minimum Temperature Below 32°F (Frost Days) with Historical Observations from 1950 to 2013 and High (red) and Low (blue) Emission Scenarios Going to 2100 for Trousdale County, Tennessee.
(Source: U.S. Climate Resilience Toolkit Climate Explorer)

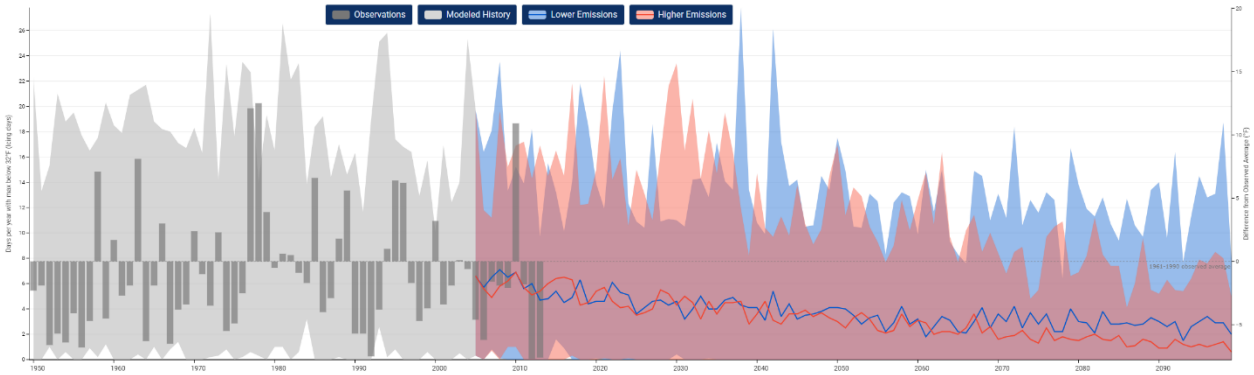


Figure 43: Days per Year with a Maximum Temperature Below 32°F (Icing Days) With Historical Observations from 1950 to 2013 and High (red) and Low (blue) Emission Scenarios Going to 2100 for Trousdale County, Tennessee.
(Source: U.S. Climate Resilience Toolkit Climate Explorer)

Additionally, the USDA forecasted changes in plant hardiness zones for the Southeast U.S. The following figure, from the Fourth National Climate Assessment (2018) indicates that Trousdale County may transition from Plant Hardiness Zone 6b/7a (historical data, 1976-2005) to Plant Hardiness Zone 8a by 2070-2099, based on climate models using the RCP8.5 (higher emissions) greenhouse gas emissions scenario. That would correlate to a warming of approximately 10-15 degrees in the average coldest temperature expected in parts of the county, from historical values of -5°F to +5°F to future values of +10°F to +15°F.

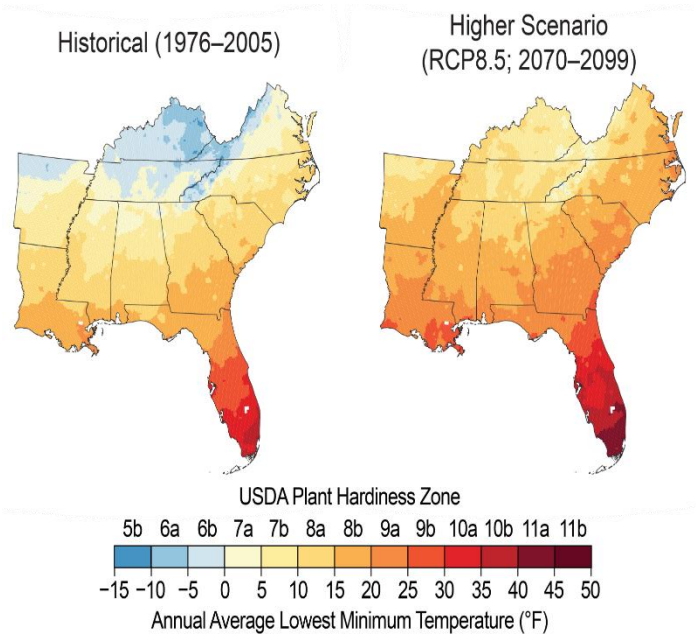


Figure 44: Comparison of Plant Hardiness Zones Across the Southeast U.S. from Historical Averages and Projected Values for Late Century using RCP8.5 (high emissions) Scenario Models. (Source: Fourth National Climate Assessment (Southeast Chapter))

Tornado

It is uncertain how climate trends will impact the overall frequency of tornadoes, with convective storms (from which tornadoes form) being the least well understood extreme events when it comes to attributing future changes to climate trends and variations. However, some studies suggest that the number of days conducive to severe thunderstorms, which can spawn tornadoes, may increase in certain regions. Additionally, warmer temperatures can provide more energy to storms, potentially leading to more intense tornadoes. Tornado formation depends on the interaction of multiple atmospheric factors, including temperature, humidity, wind shear, and instability. While climate trends may alter some of these factors, the precise impact on tornado formation remains uncertain. Warmer temperatures and increased moisture content in the atmosphere can contribute to more favorable conditions for tornado formation, but other factors like wind shear patterns may also change and reduce the chances for tornado formation.

Using historical data from 1980 to 2022, Trousdale County has a moderate-to-high density for tornadoes in Tennessee, with an average of 0.11 to 0.2 tornado tracks per square mile in the eastern end of the county to 0.21 to 0.3 tornado tracks per square mile in the western end of the county.

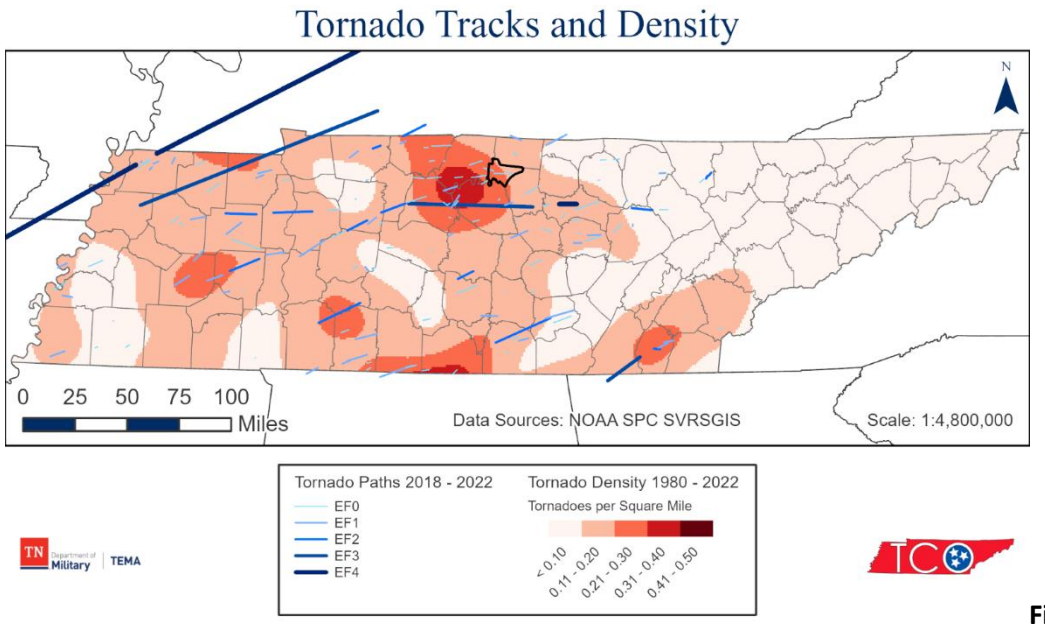


Figure 45: Tornado Tracks from 2018-2022 and the Density of Tornado Tracks across Tennessee from 1980 to 2022, Trousdale County Outlined in Bold.

Using data from the NOAA Storm Events Database, trend analysis and emerging hotspot analysis were performed on the number of tornadoes reported in each county of Tennessee from 1996 to 2022. There was no significant increasing or decreasing trend in the number of tornadoes observed in Trousdale County. However, it was identified as a sporadic hot spot, meaning it was a significant hot spot for tornadoes in 2022 and on and off again through the period, but Trousdale County was a hot spot for tornadoes less than 90% of the time.

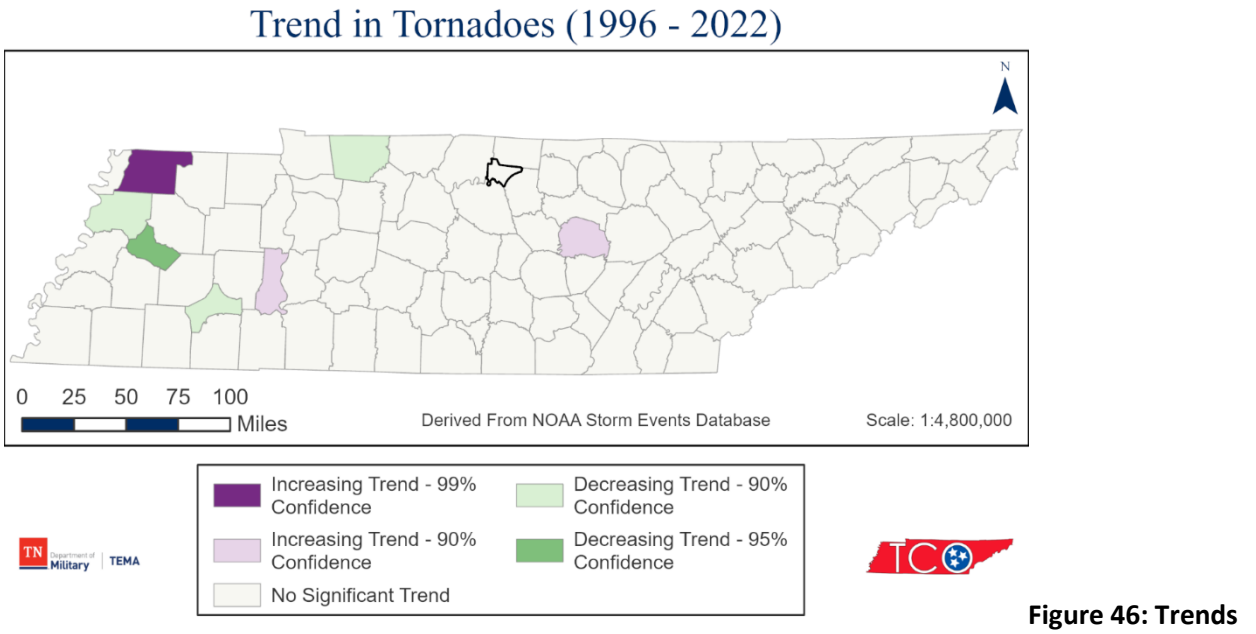


Figure 46: Trends in the Number of Tornadoes Recorded in the NCEI Storm Events Database from 1996 to 2022, Trousdale County Outlined in Bold.

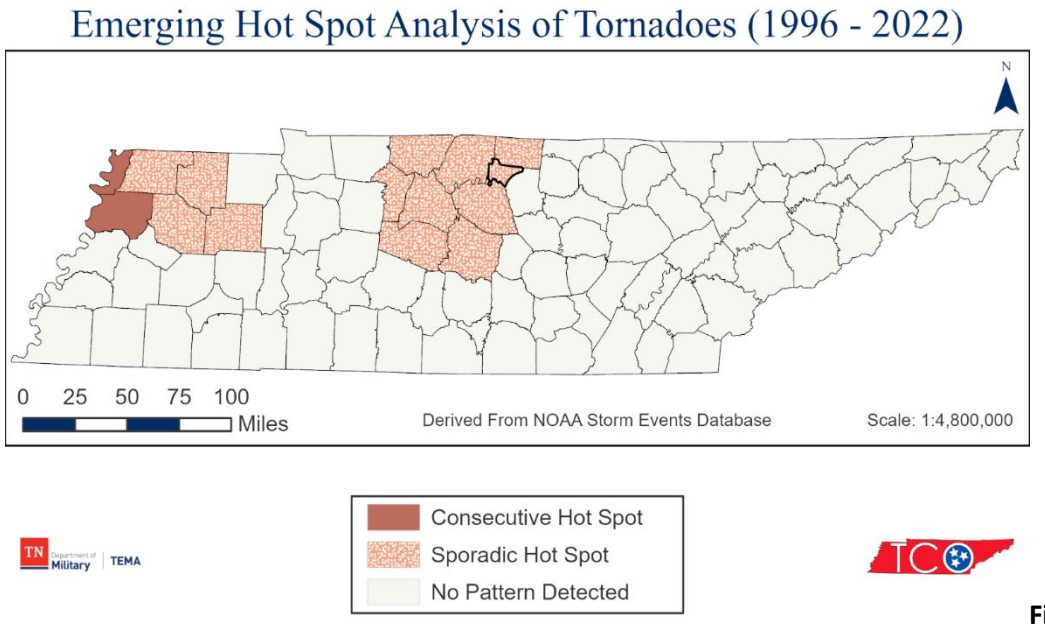


Figure 47: Emerging Hot Spot Analysis based on the Number of Tornadoes per Year Recorded in the NCEI Storm Events Database from 1996 to 2022, Trousdale County Outlined in Bold.

APPENDIX D

HAZUS/FIRM Panels

Hazus: Flood Global Risk Report

Region Name:	Trousdale_100yr
Flood Scenario:	Trousdale_100yr
Print Date:	Tuesday, May 28, 2024

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

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

Table of Contents

General Description of the Region

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

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

- Tennessee

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

The geographical size of the region is approximately 5 square miles and contains 278 census blocks. The region contains over 3 thousand households and has a total population of 11,606 people. The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 4,184 buildings in the region with a total building replacement value (excluding contents) of 1,374 million dollars. Approximately 92.09% of the buildings (and 67.30% of the building value) are associated with residential housing.

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Building Inventory

General Building Stock

Hazus estimates that there are 4,184 buildings in the region which have an aggregate total replacement value of 1,374 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	924,604	67.3%
Commercial	266,921	19.4%
Industrial	45,083	3.3%
Agricultural	7,279	0.5%
Religion	31,669	2.3%
Government	19,498	1.4%
Education	78,897	5.7%
Total	**1,373,951**	**100%**

Building Exposure by Occupancy Type for the Study Region
($1000's)

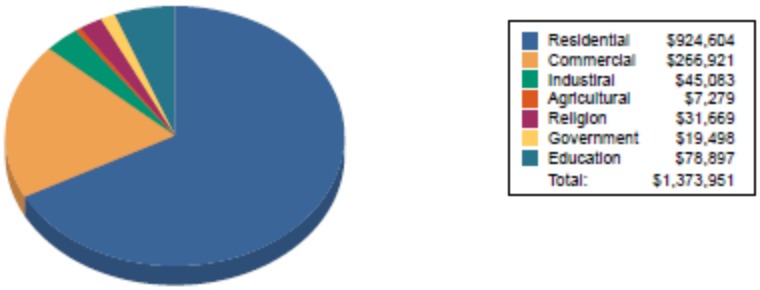

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	299,919	66.7%
Commercial	77,956	17.3%
Industrial	8,144	1.8%
Agricultural	1,652	0.4%
Religion	12,970	2.9%
Government	6,890	1.5%
Education	42,243	9.4%
Total	**449,774**	**100%**

Building Exposure by Occupancy Type for the Scenario ($1000's)

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 25 beds.
There are 4 schools, 1 fire station, 3 police stations and 1 emergency operation center.

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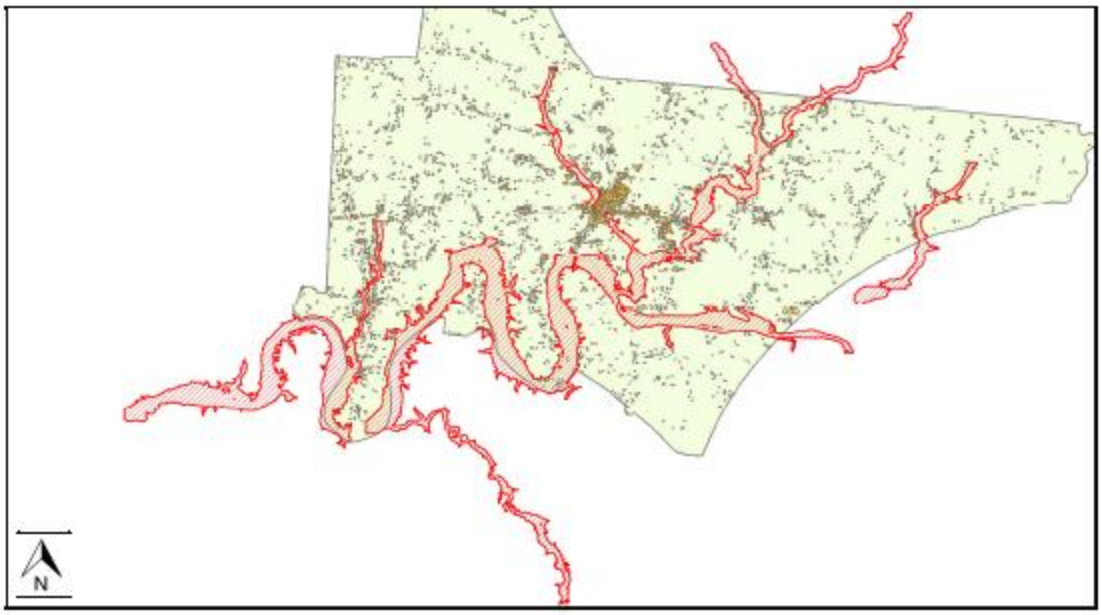
Flood Scenario Parameters

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

Study Region Name:	Trousdale_100yr
Scenario Name:	Trousdale_100yr
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

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



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Building Damage

General Building Stock Damage

Hazus estimates that about 6 buildings will be at least moderately damaged. This is over 50% of the total number of buildings in the scenario. There are an estimated 1 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

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

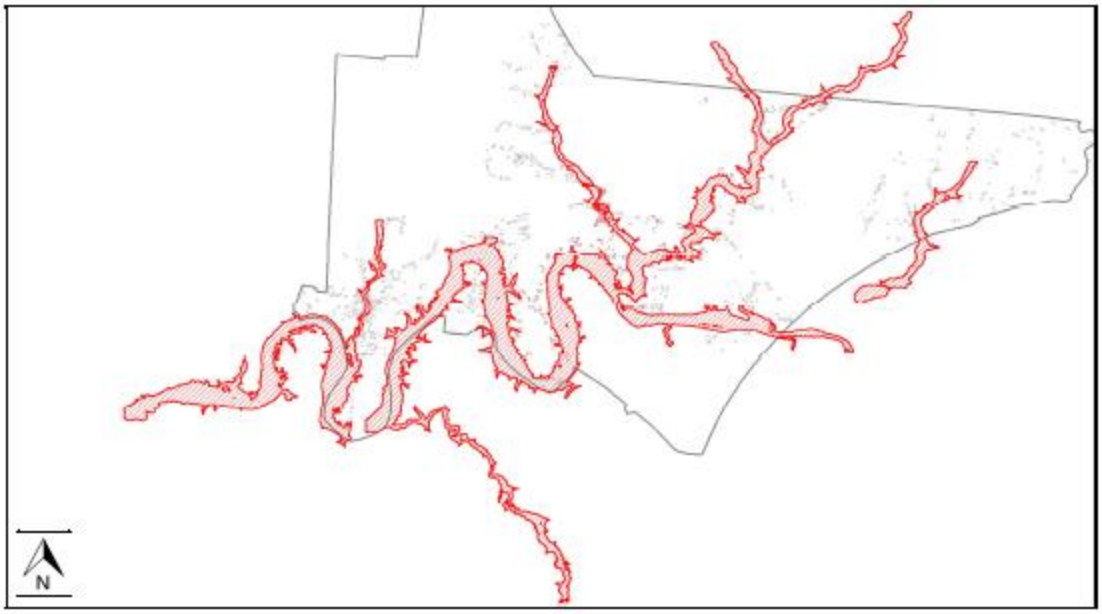

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Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	0	0	1	17	2	33	1	17	1	17	1	17
Total	**0**		**1**		**2**		**1**		**1**		**1**	

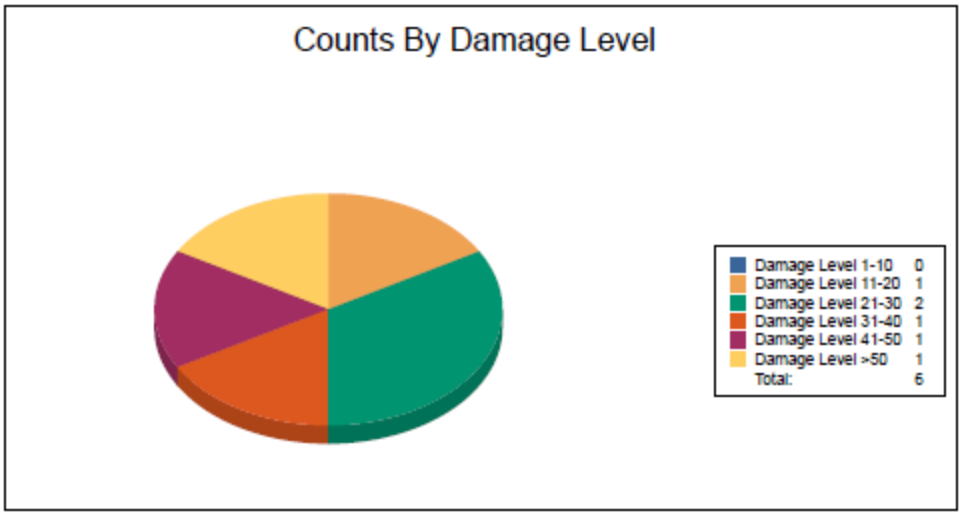

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	0	0	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	0	0	1	17	2	33	1	17	1	17	1	17

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 25 hospital beds available for use. On the day of the scenario flood event, the model estimates that 25 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

	# Facilities			
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	1	0	0	0
Fire Stations	1	0	0	0
Hospitals	1	0	0	0
Police Stations	3	0	0	0
Schools	4	0	0	0

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

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

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

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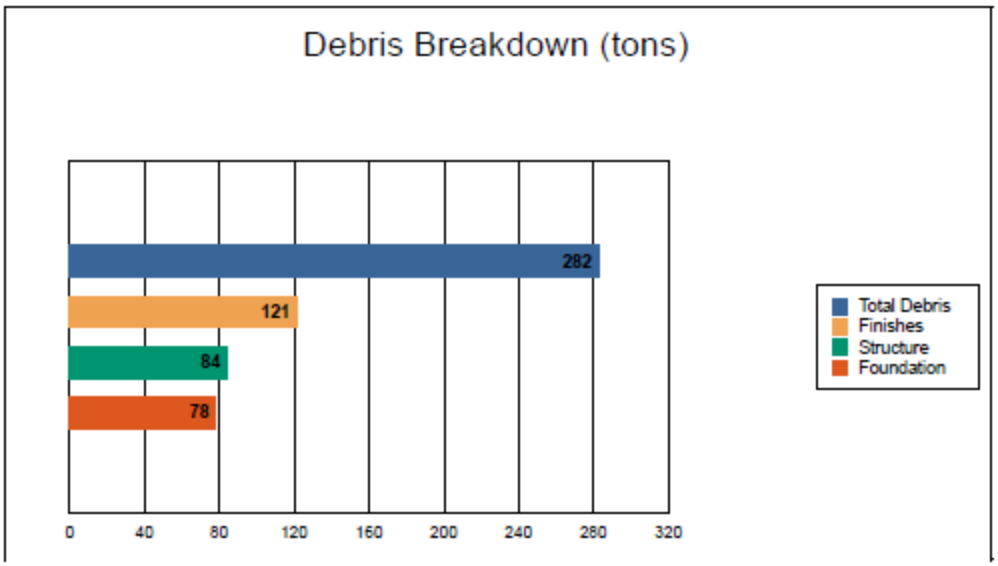
Induced Flood Damage

Debris Generation

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

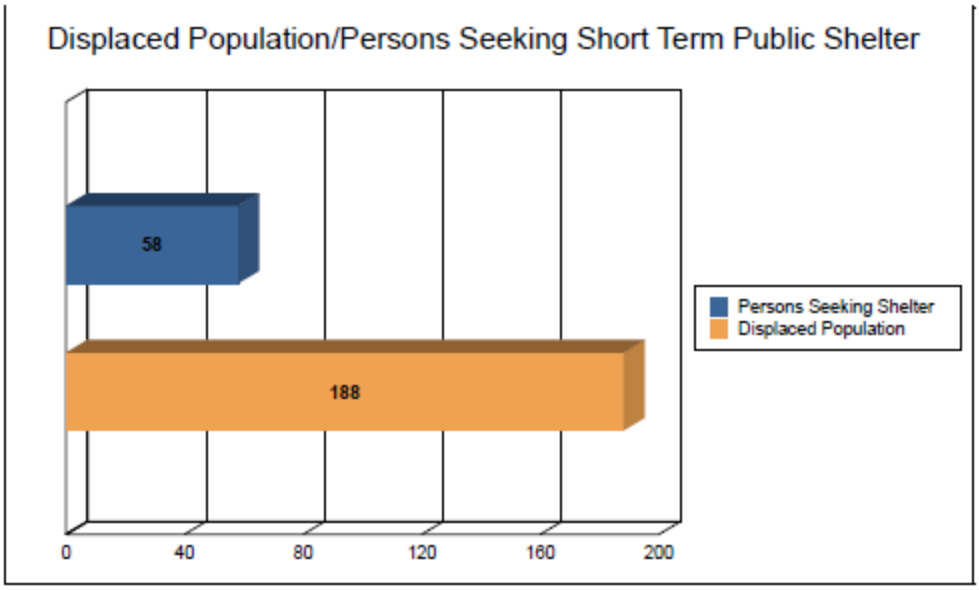


The model estimates that a total of 282 tons of debris will be generated. Of the total amount, Finishes comprises 43% of the total, Structure comprises 30% of the total, and Foundation comprises 28%. If the debris tonnage is converted into an estimated number of truckloads, it will require 12 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 63 households (or 188 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 58 people (out of a total population of 11,606) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 76.19 million dollars, which represents 16.94 % of the total replacement value of the scenario buildings.

Building-Related Losses

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

The total building-related losses were 20.03 million dollars. 74% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 11.58% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

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Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	5.01	1.66	0.36	0.55	7.58
	Content	2.49	5.29	0.74	2.73	11.25
	Inventory	0.00	0.98	0.11	0.12	1.21
	Subtotal	**7.50**	**7.93**	**1.21**	**3.40**	**20.03**
Business Interruption						
	Income	0.00	4.65	0.01	0.65	5.31
	Relocation	0.98	0.89	0.00	0.52	2.38
	Rental Income	0.34	0.62	0.00	0.03	1.00
	Wage	0.01	5.23	0.02	42.22	47.47
	Subtotal	**1.33**	**11.38**	**0.04**	**43.42**	**56.16**
ALL	**Total**	**8.83**	**19.31**	**1.24**	**46.81**	**76.19**

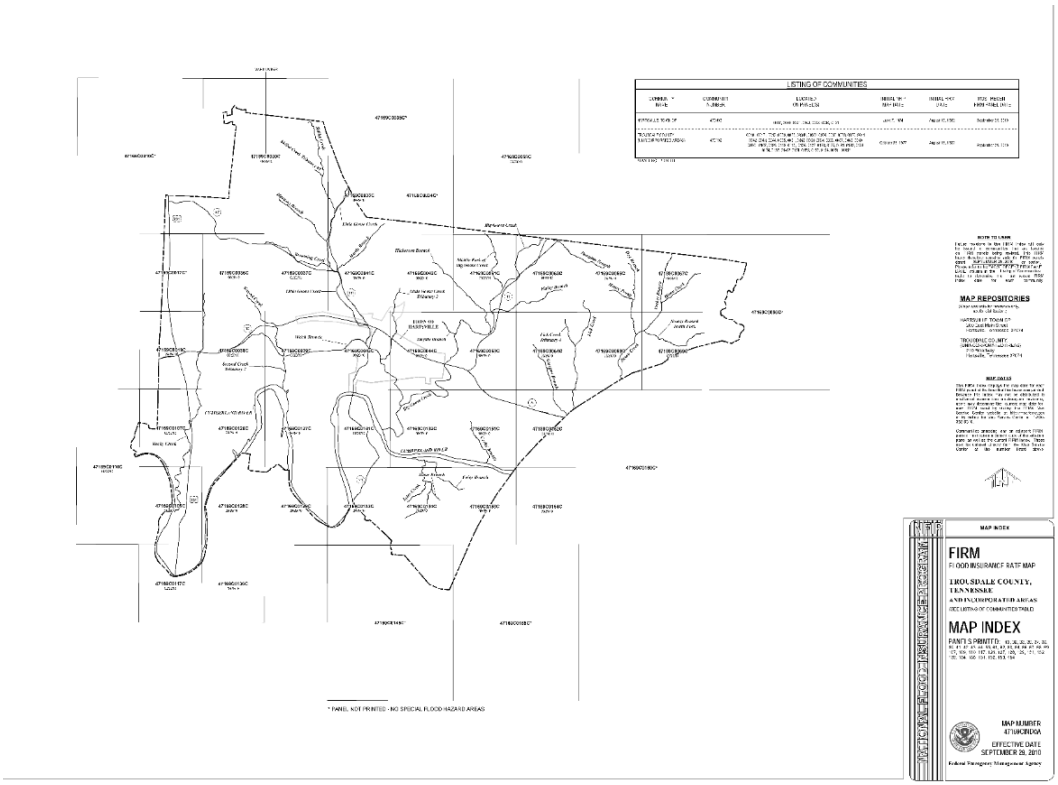
Losses by Occupancy Types ($M)

Appendix A: County Listing for the Region

Tennessee
- Trousdale

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Tennessee				
Trousdale	11,606	924,604	449,347	1,373,951
Total	**11,606**	**924,604**	**449,347**	**1,373,951**
Total Study Region	**11,606**	**924,604**	**449,347**	**1,373,951**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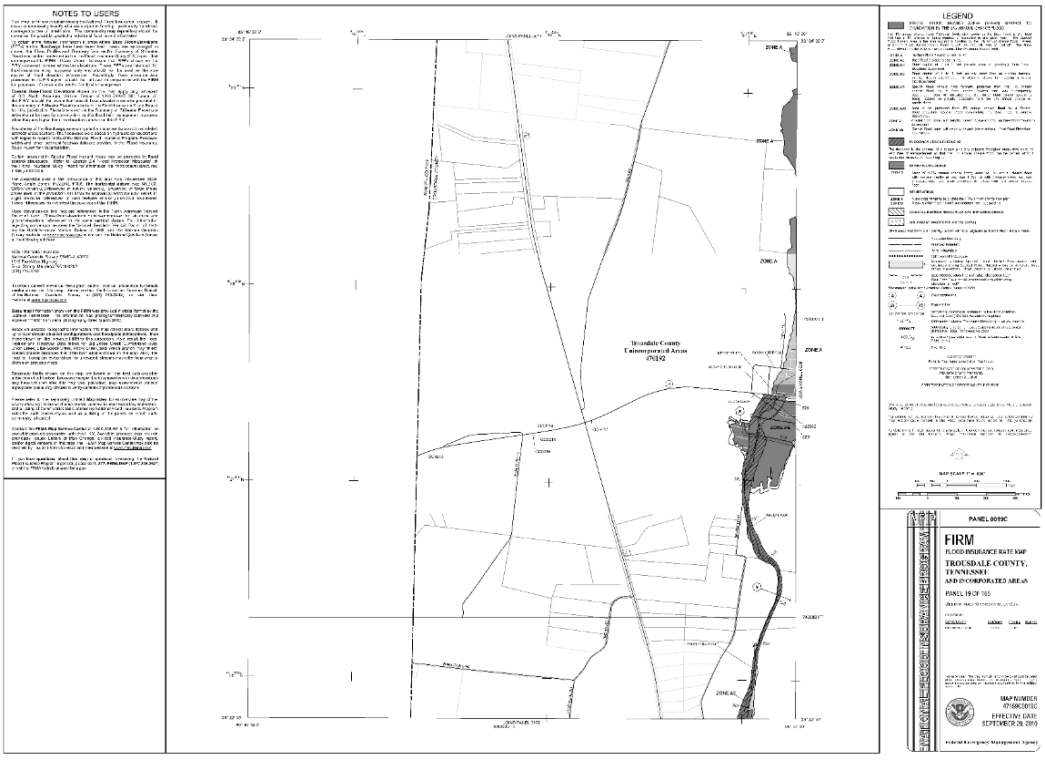
MAP REPOSITORIES
MAP INDEX
FIRM
FLOOD INSURANCE RATE MAP
TROUSDALE COUNTY, TENNESSEE
AND INCORPORATED AREAS
MAP NUMBER
47169C0100A
EFFECTIVE DATE
SEPTEMBER 29, 2010
* PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS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Trousdale County
Unincorporated Areas
470292
ZONE A
ZONE AE
PANEL 0050C
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PANEL 50 OF 100
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47169C0050C
EFFECTIVE DATE
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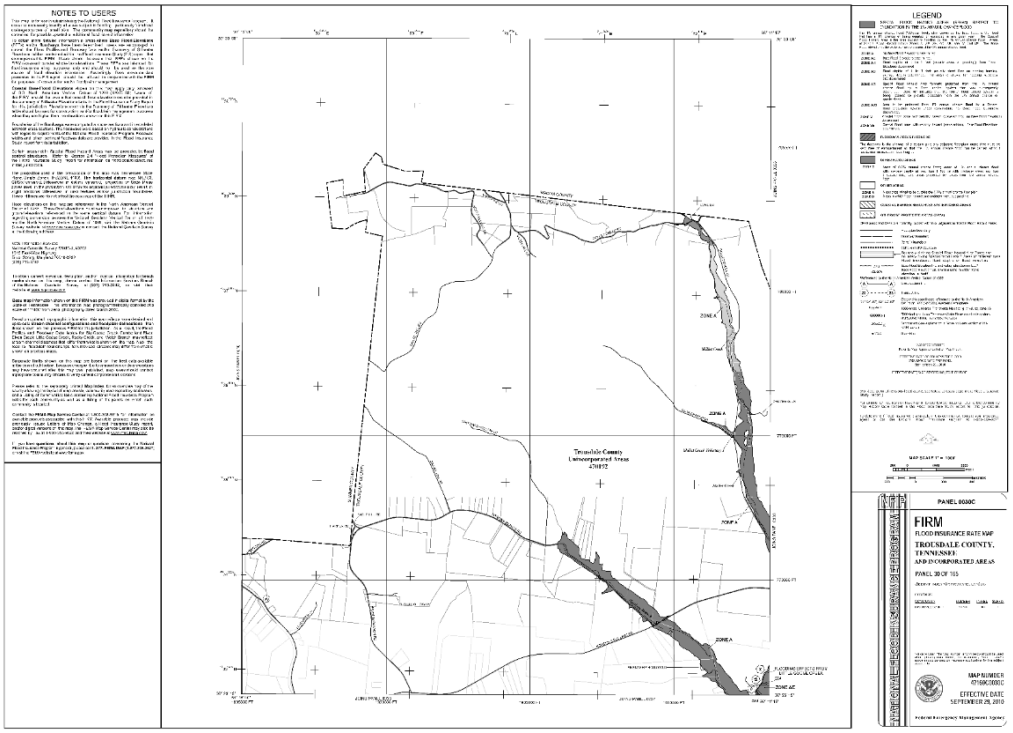
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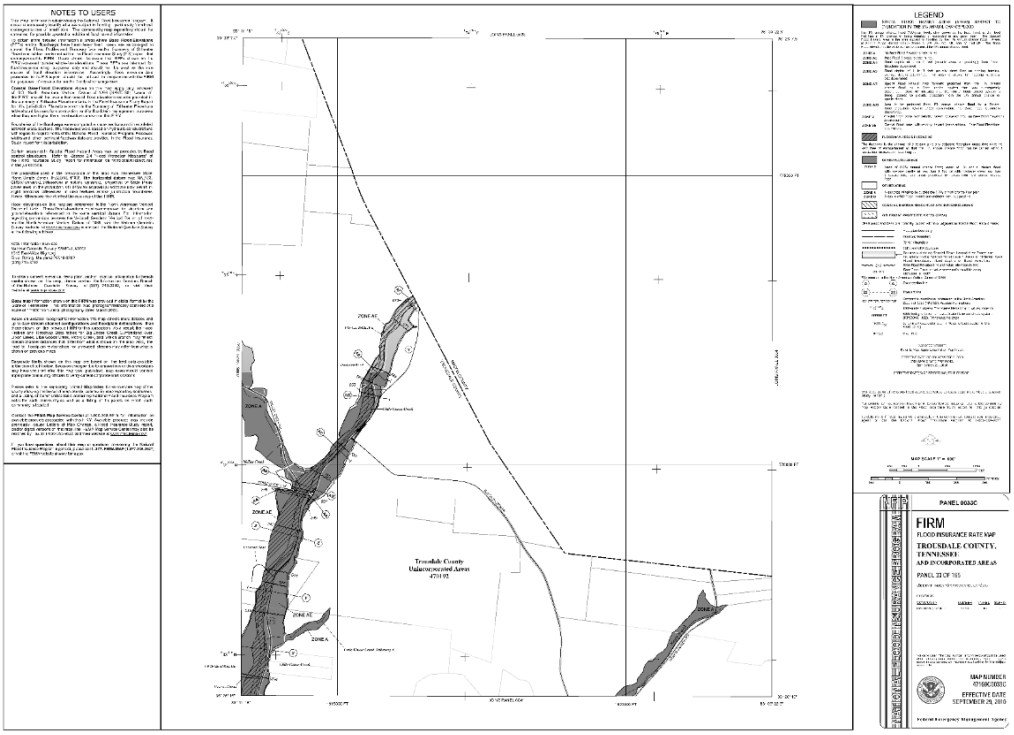
Federal Emergency Management Agency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ZONE AE
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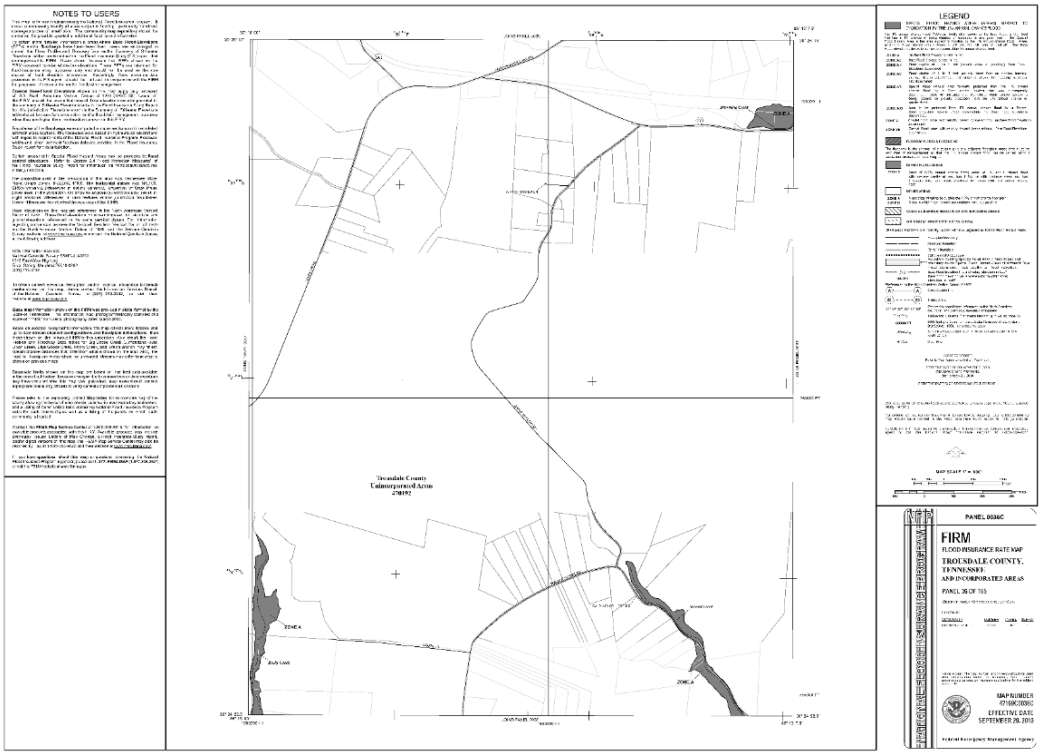
TROUSDALE COUNTY, TENNESSEE
AND INCORPORATED AREAS
PANEL 30 OF 155
MAP NUMBER
47169C0030C
EFFECTIVE DATE
SEPTEMBER 29, 2010
Federal Emergency Management Agency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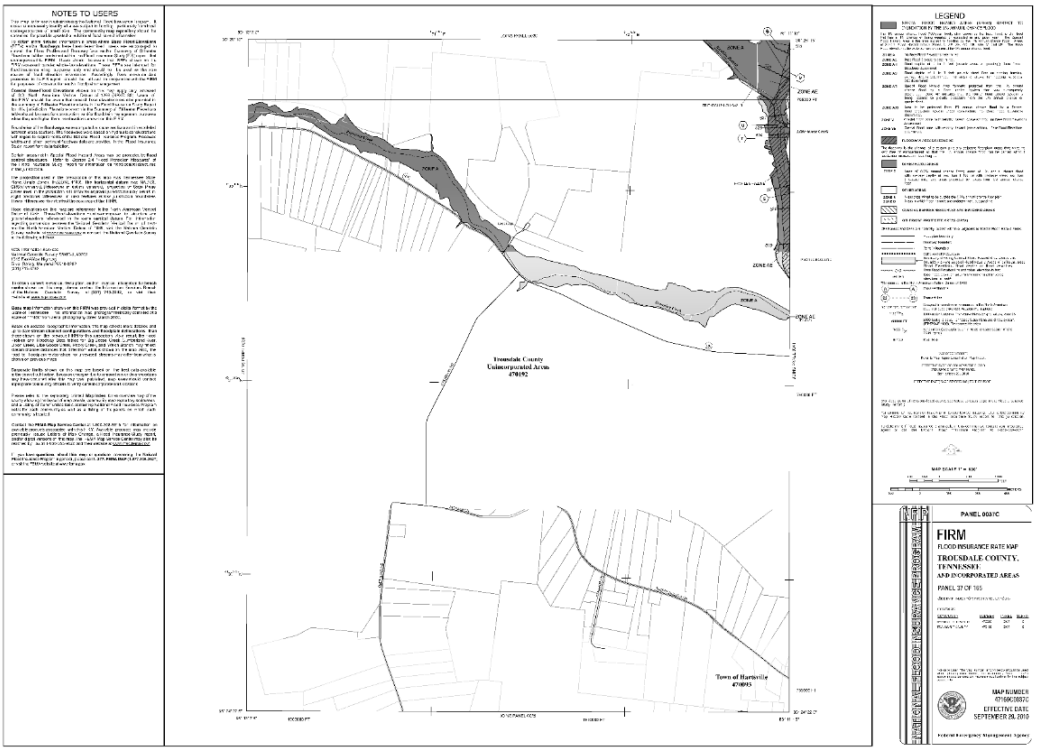
TENNESSEE
AND INCORPORATED AREAS
PANEL 36 OF 105
MAP NUMBER
47169C0036C
EFFECTIVE DATE
SEPTEMBER 26, 2008
Federal Emergency Management Agency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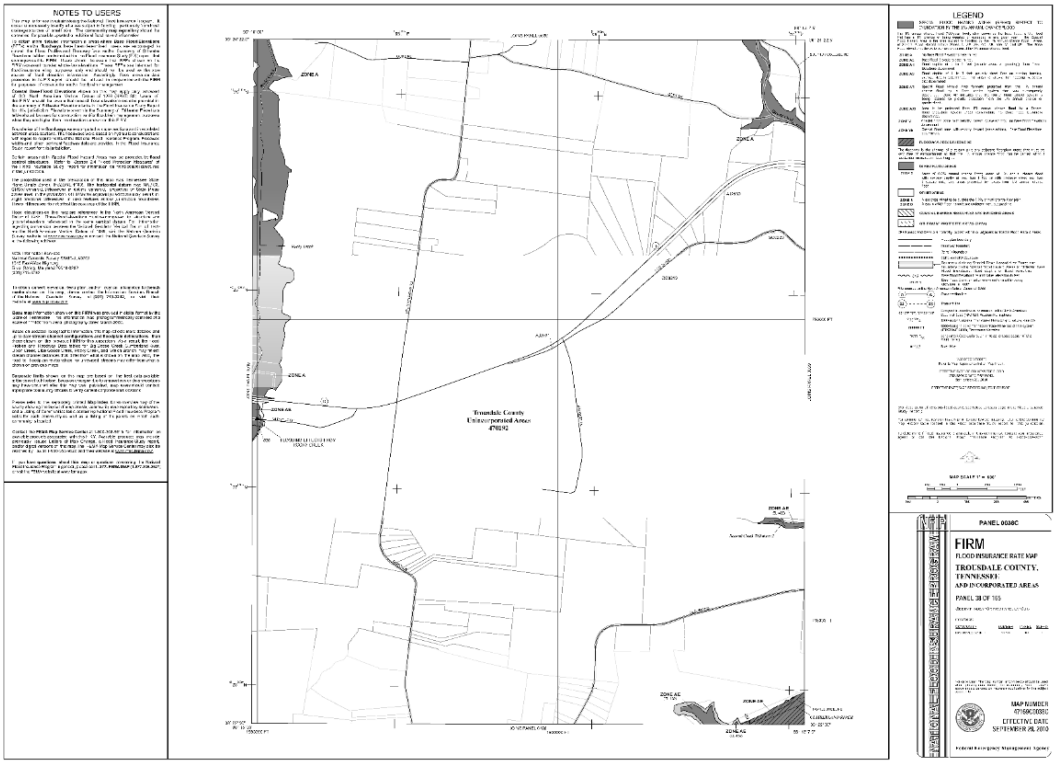
Federal Emergency Management Agency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MAP NUMBER
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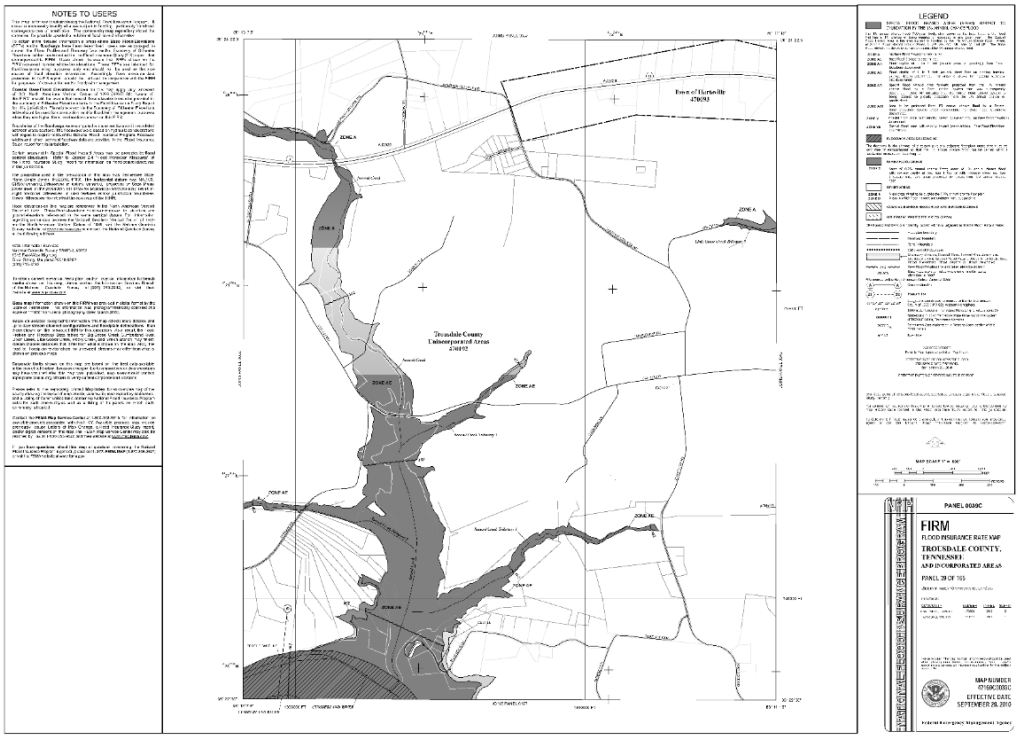
EFFECTIVE DATE
SEPTEMBER 28, 2010
Federal Emergency Management Agency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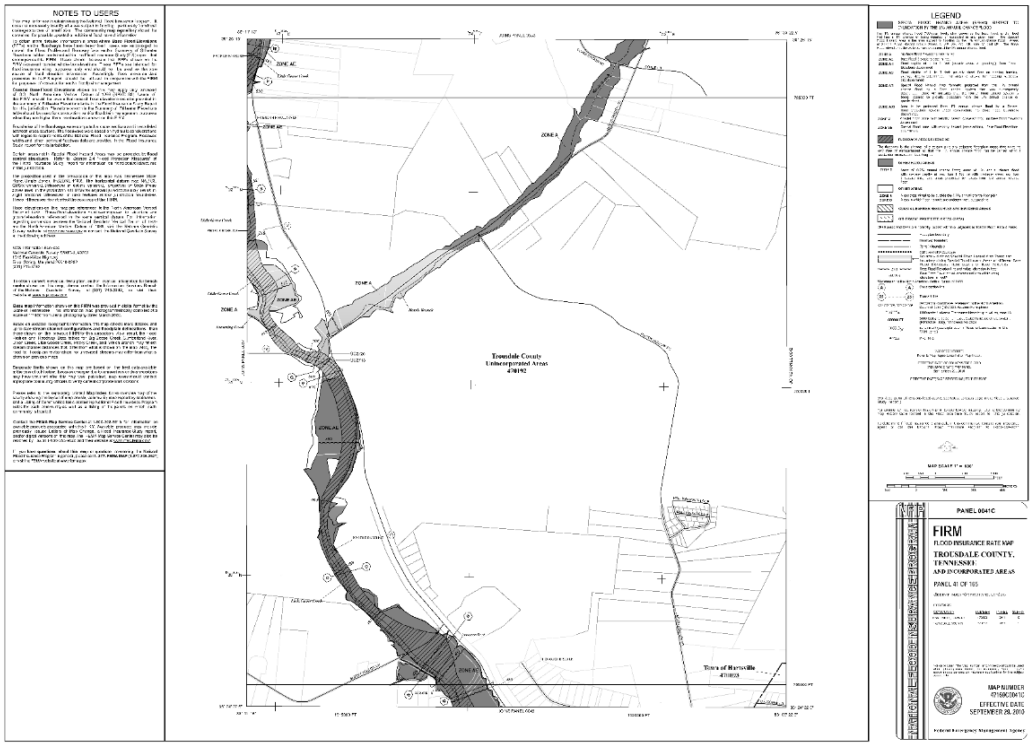
Federal Emergency Management Agency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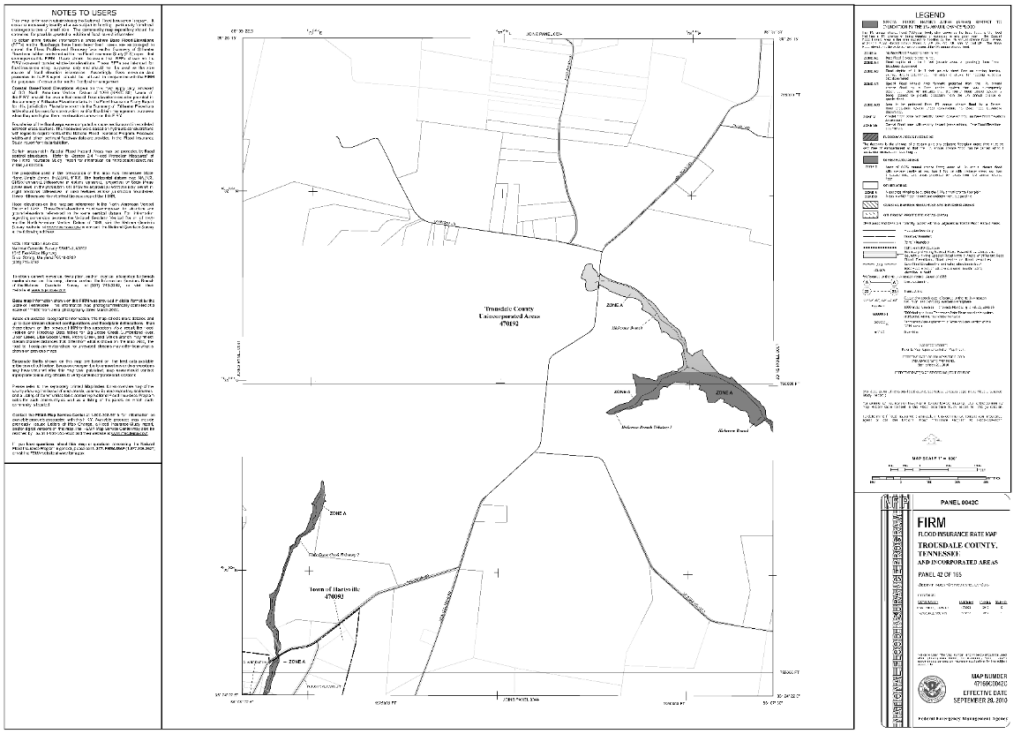
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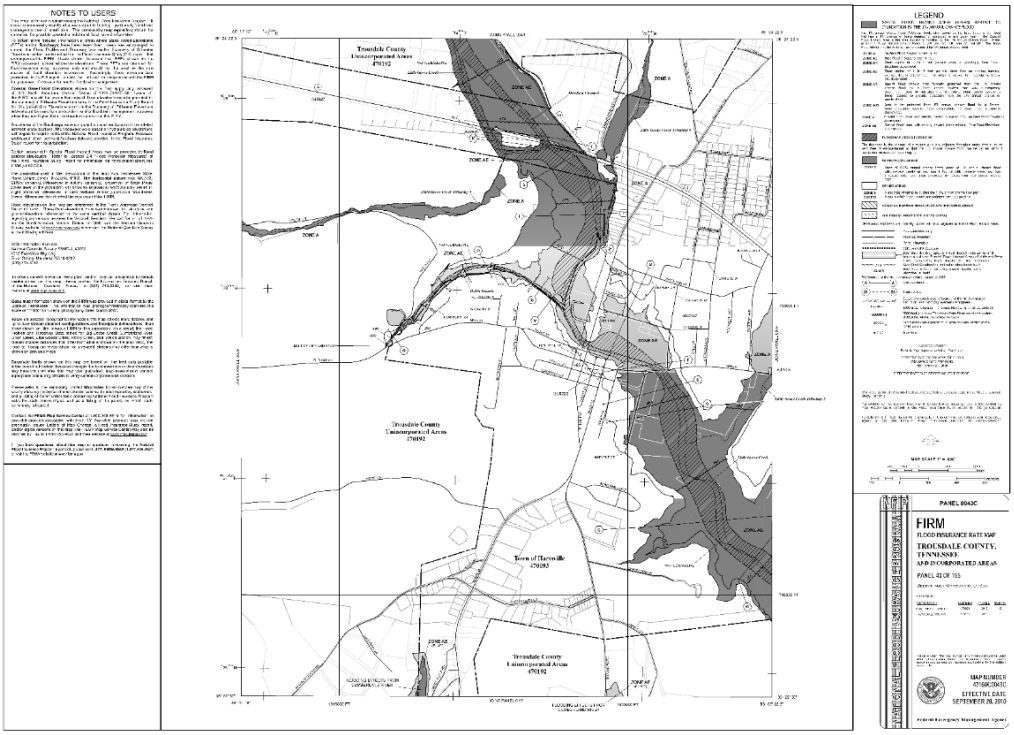
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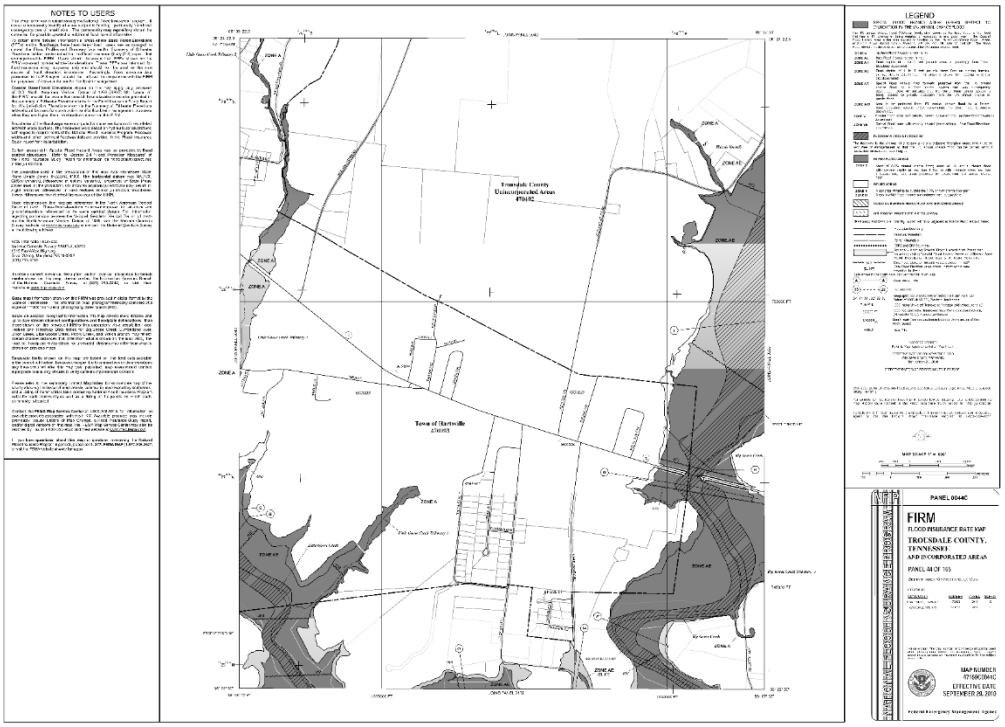
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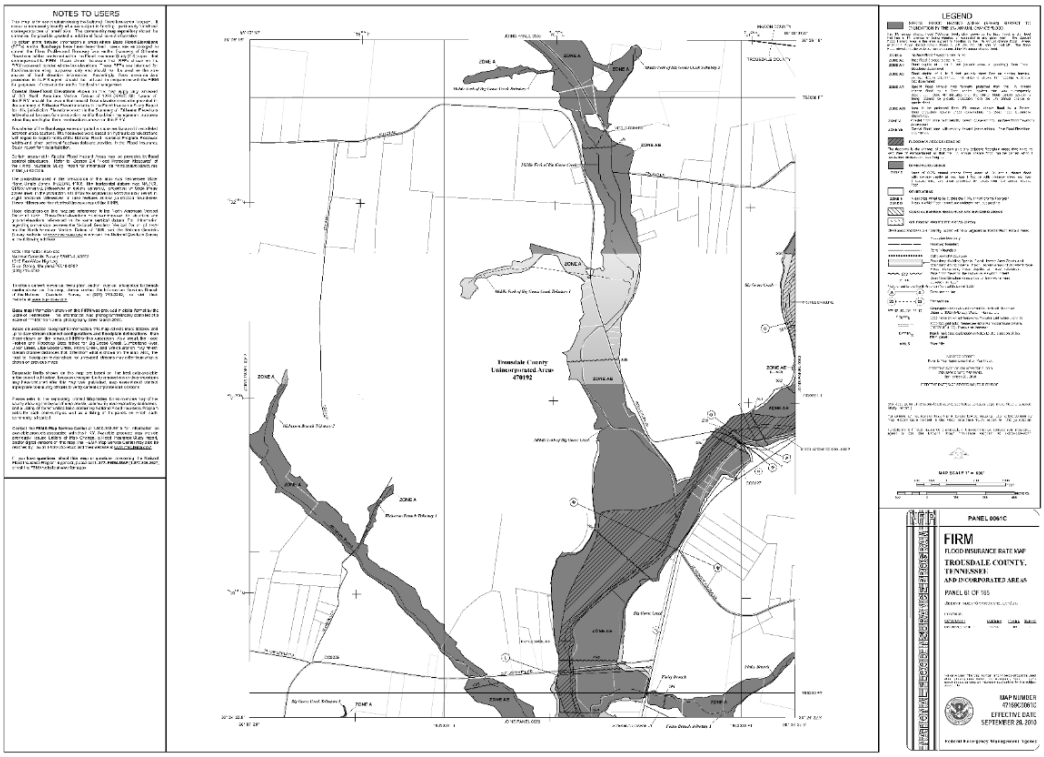
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TROUSDALE COUNTY, TENNESSEE
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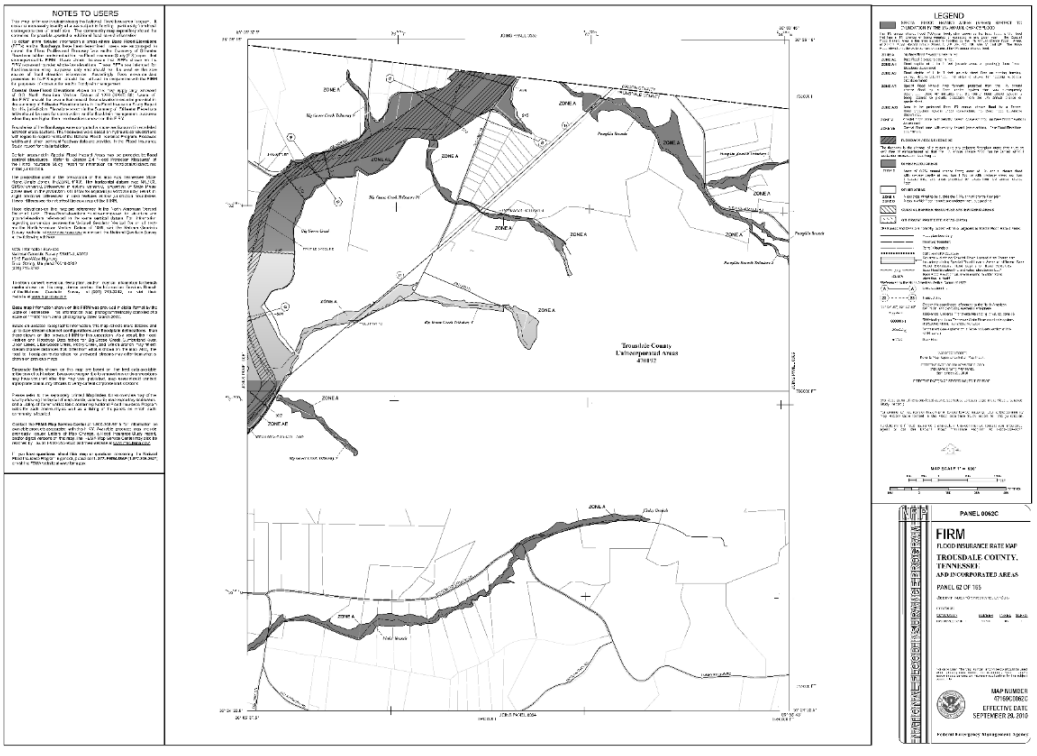
Federal Emergency Management Agency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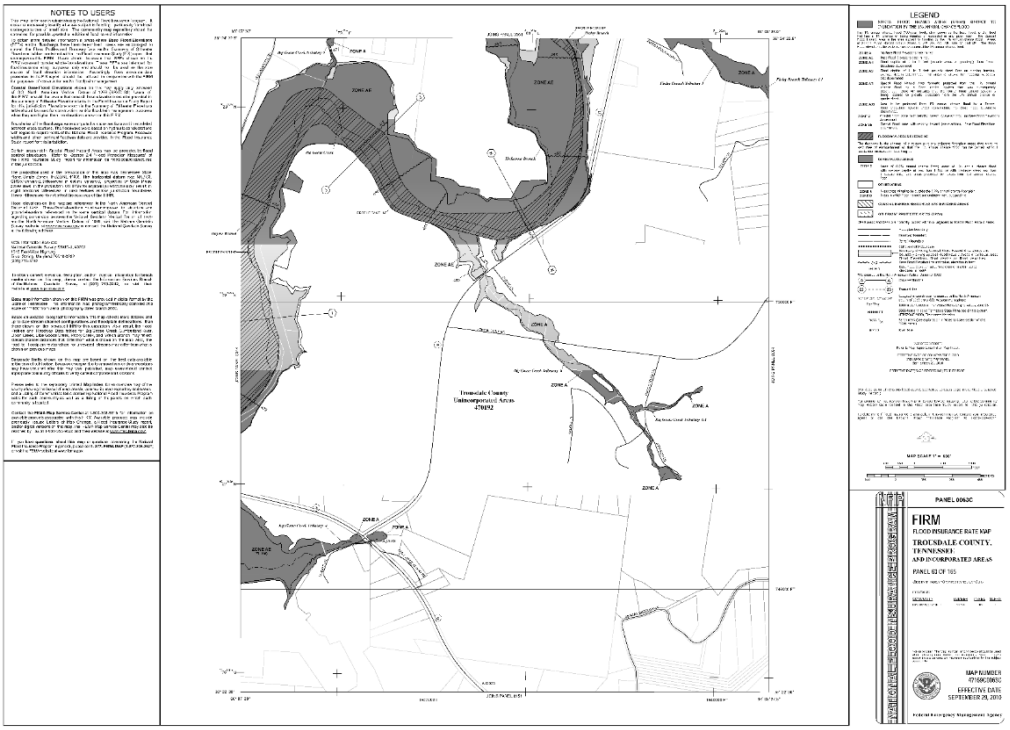
Federal Emergency Management Agency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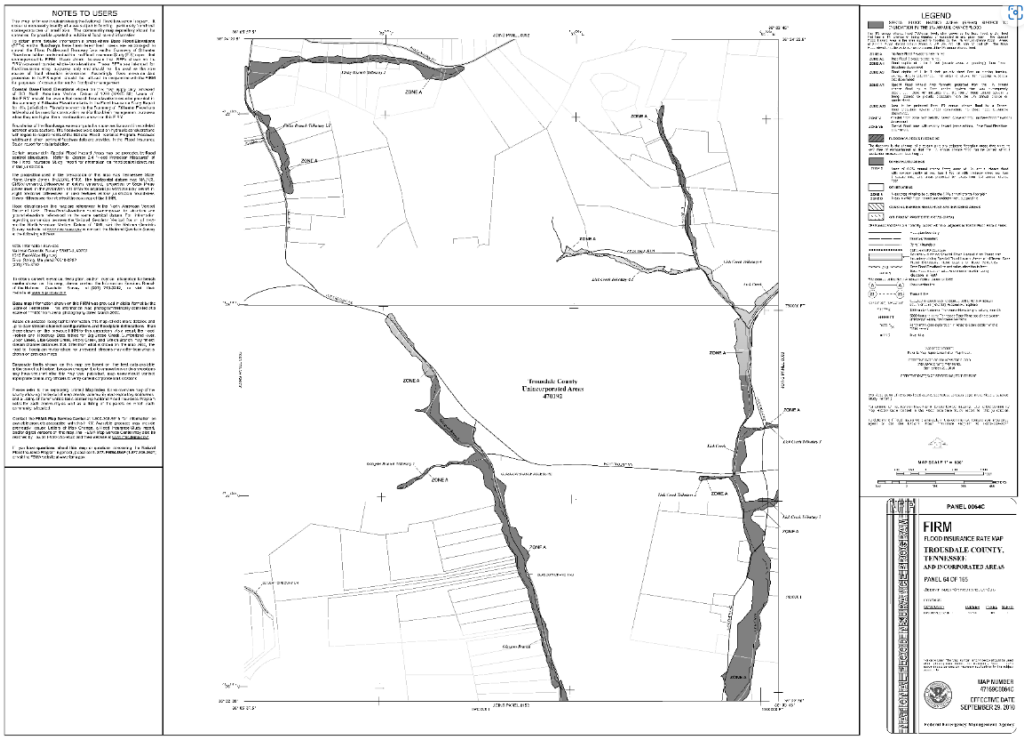
ZONE AE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Trousdale County Unincorporated Areas
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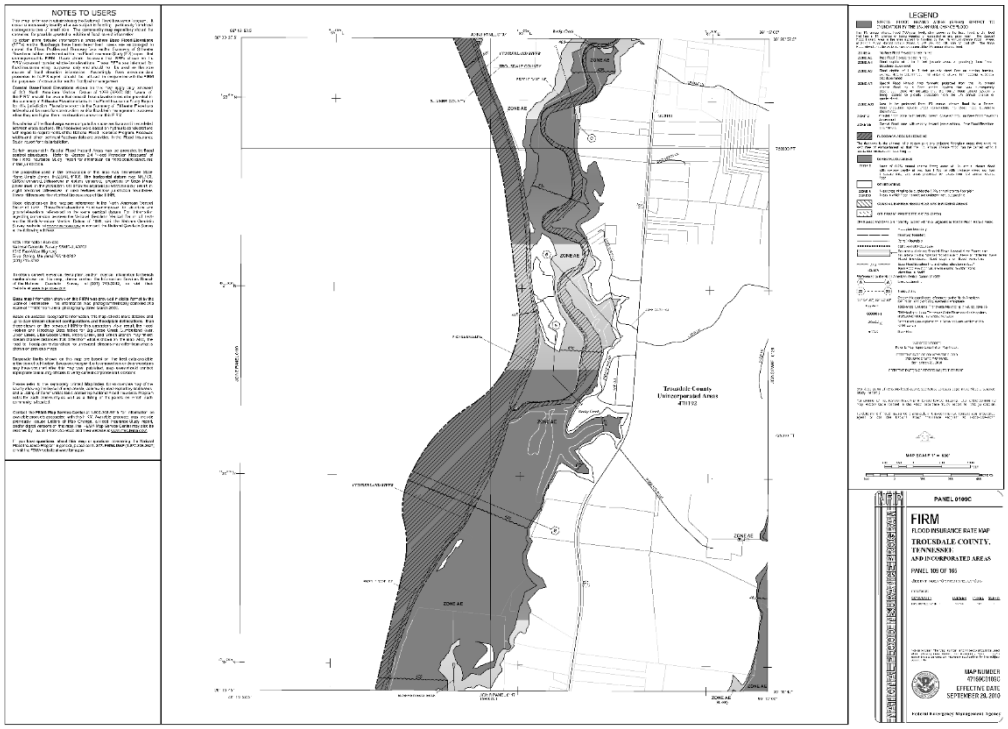
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AND INCORPORATED AREAS
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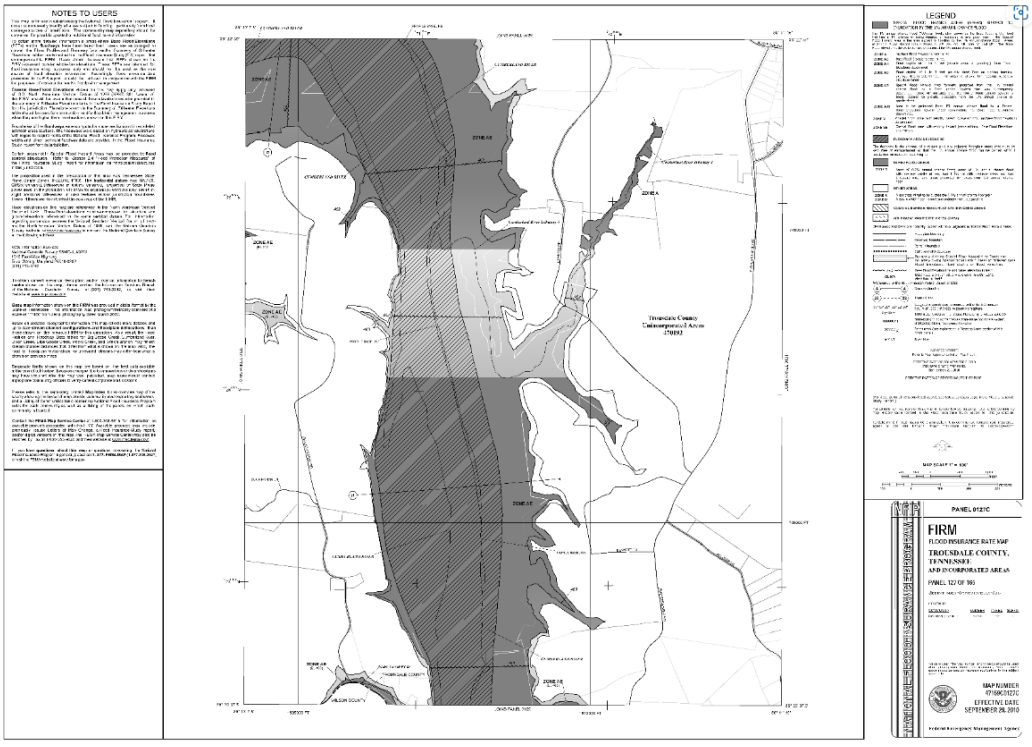
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AND INCORPORATED AREAS
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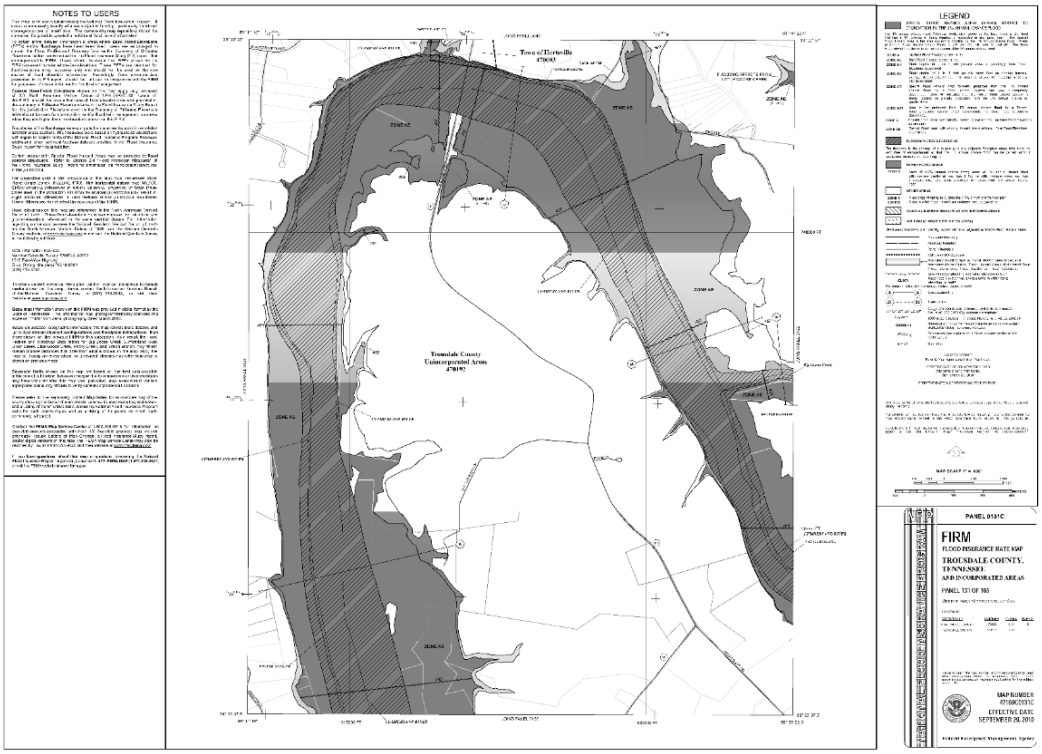
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Trousdale County Unincorporated Areas
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AND INCORPORATED AREAS
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SEPTEMBER 26, 2018
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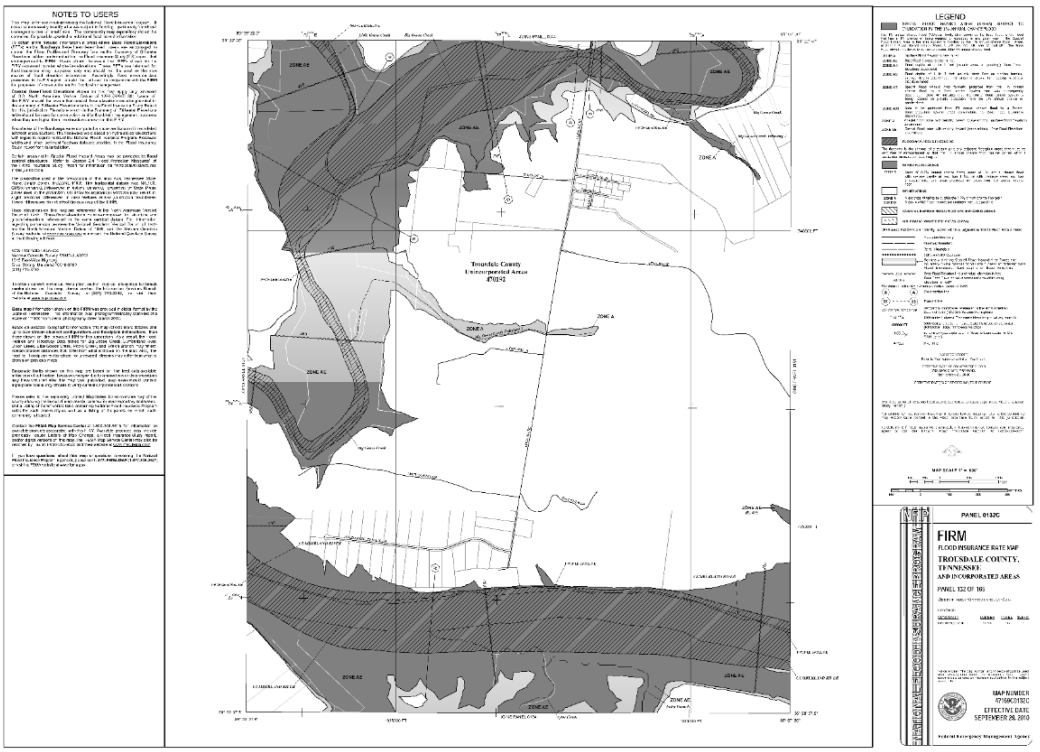
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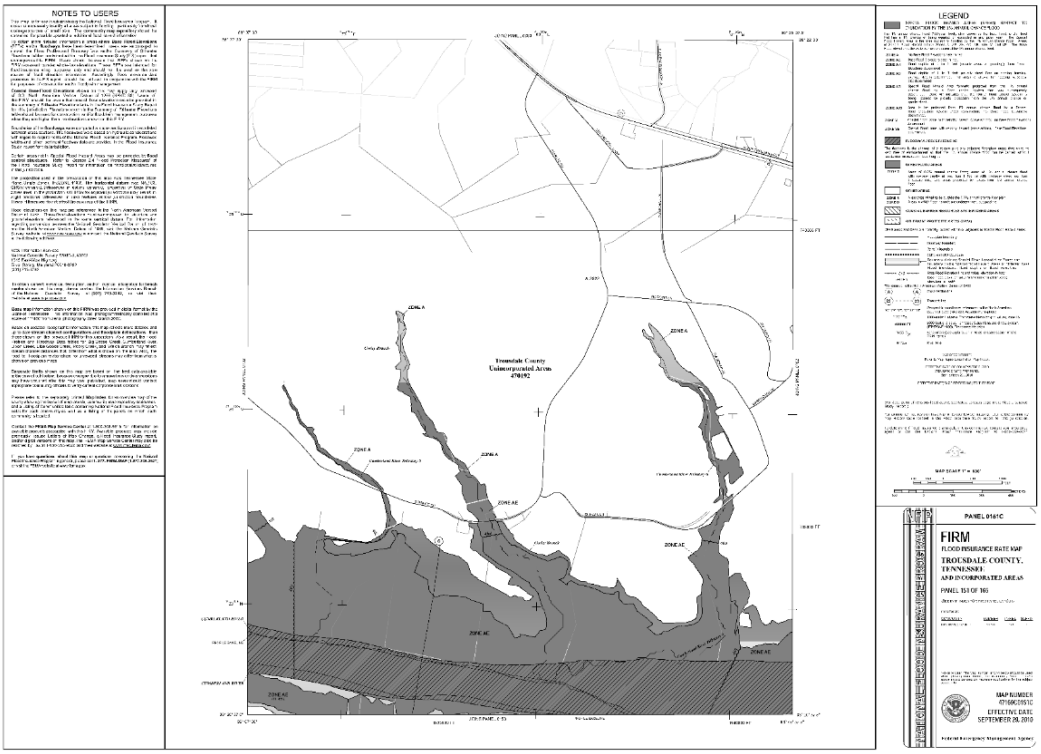
SEPTEMBER 26, 2018
Federal Emergency Management Agency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FLOOD INSURANCE RATE MAP
TROUSDALE COUNTY, TENNESSEE
AND INCORPORATED AREAS
PANEL 161 OF 165
MAP NUMBER
47169C0161C
EFFECTIVE DATE
SEPTEMBER 26, 2008

APPENDIX E

Dam Inundation Maps

NOT USED

APPENDIX F

References

- **CDC Social Vulnerability Index**
- **County Building and Zoning Codes and Ordinances,**
- **County CDC Social Vulnerability Index**
- **Community Data Profile,**
- **Critical2TN Infrastructure Database**
- **ETSU Geoinformatics & Disaster Science Lab**
- **FEMA Hazard Mitigation Assistance Program and Policy Guide**
- **FEMA's National Risk Index**
- **Flood Insurance Rate Maps Land Use Maps**
- **Local County Hazard Mitigation Plan,**
- **Trousdale County Local Hazard Mitigation Committee Meeting Notes, Hickman**
- **NOAA: National Oceanic and Atmospheric Administration. (Archives)**
- **MRCC: Midwestern Regional Climate Center County Local**
- **Midwest Climate Watch, Midwestern Regional Climate Center. Purdue University**
- **Emergency Operations Plan Clay County**
- **State Hazard Mitigation Plan, Tennessee**
- **Stormwater Ordinance, Clay County and Jurisdictions**
- **Tennessee Government Sites www.tn.gov/**
- **U.S Census Bureau**