EASTLAND COUNTY
2025 HAZARD MITIGATION PLAN

Keeping Eastland County Ready

Prepared by:

LANGFORD COMMUNITY MANAGEMENT SERVICES
EST. 1983

Contents

SECTION 1: INTRODUCTION

Background

Eastland County is located in north central Texas, or Region 1 of the Texas Hazard Mitigation Plan (see Figure 1-2). The closest metropolitan area is the Dallas-Fort Worth MSA. Eastland (city), the county seat, is located on Interstate Highway 20 in the north-central part of the county, some ninety-five miles west of Fort Worth and fifty-five miles east of Abilene. Most of the county is drained by the Leon River and its tributaries, though other parts drain into Battle Creek and Sandy Creek in the northwest, Palo Pinto Creek in the northeast, the Sabana River in the south, and tributaries of the Colorado River in the southwest. Soils vary from sandy to loamy. The average annual rainfall is 27.09 inches, and the average temperature ranges from 32° F in winter to 96° in summer.

Figure 1-1: Eastland County

Eastland County is neighbored by the following counties: Palo Pinto to the northeast, Erath to the east, Comanche and Brown to the south, Callahan to the west, and Stephens to the north. Eastland County and its county seat, the City of Eastland, are named after Captain William Eastland who served in the Republic of Texas army. The county has notable cities such as the City of Carbon, the City of Cisco, the City of Gorman, the City of Ranger, and the City of Rising Star. The 2020 decennial census population lists Eastland County at 17,725. Eastland County was a largely rural and unpopulated location, but with economic changes, it grew. The County became a sensational place to visit when a horned lizard was honored and lived in the County Courthouse, named Old Rip. After the lizard's passing, Old Rip is now on display at the County Courthouse behind a display case.

Participation and Scope

The 2025 Eastland County Hazard Mitigation Plan is a multi-jurisdictional Plan covering 7 jurisdictions: City of Eastland, City of Cisco, City of Ranger, City of Carbon, City of Gorman, City of Rising Star, and the unincorporated county. The prior Hazard Mitigation Plan for Eastland County was the 2019 Multi-jurisdictional Hazard Mitigation Plan. This 2025 Plan Update includes similar local government jurisdictions but categorized the Independent School Districts and Water Supply Corporation as stakeholders while updating key sections.

The schools and utility districts were invited to participate but chose to do so as stakeholders, rather than jurisdictions. These parties are listed in Section Two under Public and Stakeholder Involvement. Below is an example of outreach efforts to inform the public about the upcoming Hazard Mitigation Action Plan (HMAP) or Plan development process.

The updated Plan builds on the 2019 version, incorporating new capabilities, updated risk assessments, and mitigation actions that each focus on mitigating a single hazard. The overall plan has many similarities, however, the 2019 plan used different analysis methods that were approved by FEMA at the time. Mitigation actions listed in the plan covered floods, wildfires, tornadoes, droughts, dam failures, expansive soils, extreme heat events, hailstorms, severe winter storms, severe winds, and

lightning storms.

The 2025 Plan scope includes a detailed understanding of the planning area regarding existing capabilities, historical data, and future development patterns. Next, the area's vulnerability to different natural hazards has been studied thoroughly, resulting in a detailed assessment of hazard risk. The assessment was used to assist the planning team in identifying and ranking mitigation activities based on their likelihood of reducing risk.

Purpose

The Mission Statement of the Plan is "to reduce or eliminate the long-term risks to loss of life and property damage in Eastland County and the participating cities from the full range of natural disaster". The Plan was prepared by Langford Community Management Services on behalf of and with extensive input from representatives of Eastland County and participating jurisdictions. The purpose of the Plan is to minimize or eliminate long-term risks to human life and property from known hazards and to break the cycle of high-cost disaster response and recovery throughout Eastland County.

To accomplish this, cost-effective hazard mitigation actions within the planning area are identified along with information critical to successful implementation such as estimated cost, responsible departments, funding sources, and timelines. In addition, an updated FEMA-approved Hazard Mitigation Plan is a condition of eligibility for certain types of non-emergency disaster assistance, including funding for mitigation programs and projects.

A successful Hazard Mitigation Plan will:

1) Align risk reduction with other Federal, State, or community objectives.
2) Build or encourage partnerships for risk reduction involving government, organizations, businesses, and the public.
3) Communicate priorities to potential sources of funding.
4) Identify long-term, broadly supported strategies for risk reduction.
5) Review the Plan with Core Team participants annually.
6) Identify implementation approaches that focus resources on the greatest risks and vulnerabilities; and
7) Increase education and awareness around threats, hazards, and vulnerabilities.

The Core Planning Team has identified 11 natural hazards to be addressed in the 2025 plan. Detailed information about these hazards and risks can be found in Section 4, while detailed risk assessments for each hazard are discussed in Sections 5-15. The Plan's specific goals are identified in Section 16, with mitigation actions outlined in Section 17. Section 18 discusses the ongoing maintenance of the Plan, how information will be incorporated into existing plans (such as land use and ordinances), funding mechanisms, monitoring, and evaluation, annual and 5-year updates, and a commitment to involve the public continuously.

This hazard mitigation plan is a framework for Eastland County, including participating jurisdictions, to address hazard vulnerabilities by reducing the future impact of various hazards on people and property that exist today and in the foreseeable future.

Authority

The Texas Division of Emergency Management (TDEM) and FEMA have the authority to review and approve hazard mitigation plans through the Disaster Mitigation Act of 2000, which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

SECTION 2: PLANNING PROCESS

Plan Preparation and Plan Development

Per FEMA, hazard mitigation is defined as "[a]ny sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards" while mitigation planning "is for State, local, and Indian tribal governments to identify the natural hazards that impact them, to identify actions and activities to reduce any losses from those hazards, and to establish a coordinated process to implement the plan, taking advantage of a wide range of resources." (44 CFR §201.2).

Hazard mitigation planning involves coordination with various constituents and stakeholders to identify risks and vulnerabilities associated with natural disasters and develop long-term strategies for protecting people and property from future hazard events. Mitigation plans are key to breaking the cycle of disaster damage, reconstruction, and repeated damage. This section provides an overview of the planning process including the identification of the key steps of Plan development and a detailed description of how stakeholders and the public were involved.

Figure 2-1: The process of creating a Hazard Mitigation Plan

1. **Organize the Planning Process and Resources** – At the start, the participating jurisdictions focus on assembling the resources needed for a successful mitigation planning process. This includes securing technical expertise, defining the planning area, and identifying key individuals, agencies, neighboring jurisdictions, businesses, and/or other stakeholders to participate in the process. The planning process for local and tribal governments must include opportunities for the public to comment on the

Plan.

2. **Assess Risks** – Next, the local government needs to identify the characteristics and potential consequences of hazards. It is important to understand what geographic areas each hazard might impact and what people, property, or other assets might be vulnerable.
3. **Develop a Mitigation Strategy** – The local government then sets priorities and develops long-term strategies for avoiding or minimizing the undesired effects of disasters. The mitigation strategy addresses how the mitigation actions will be implemented and administered.
4. **Adopt and Implement the Plan** – Once FEMA has received notification of the adoption from the governing body and approved the Plan, the state, county, or local government.

Planning Team

Eastland County, including participating jurisdictions, hired Langford Community Management Services to provide technical support and oversee the Plan's development. The Eastland County Plan update was created using a direct representative model, where each participating jurisdiction chooses and sends a representative to represent their interests.

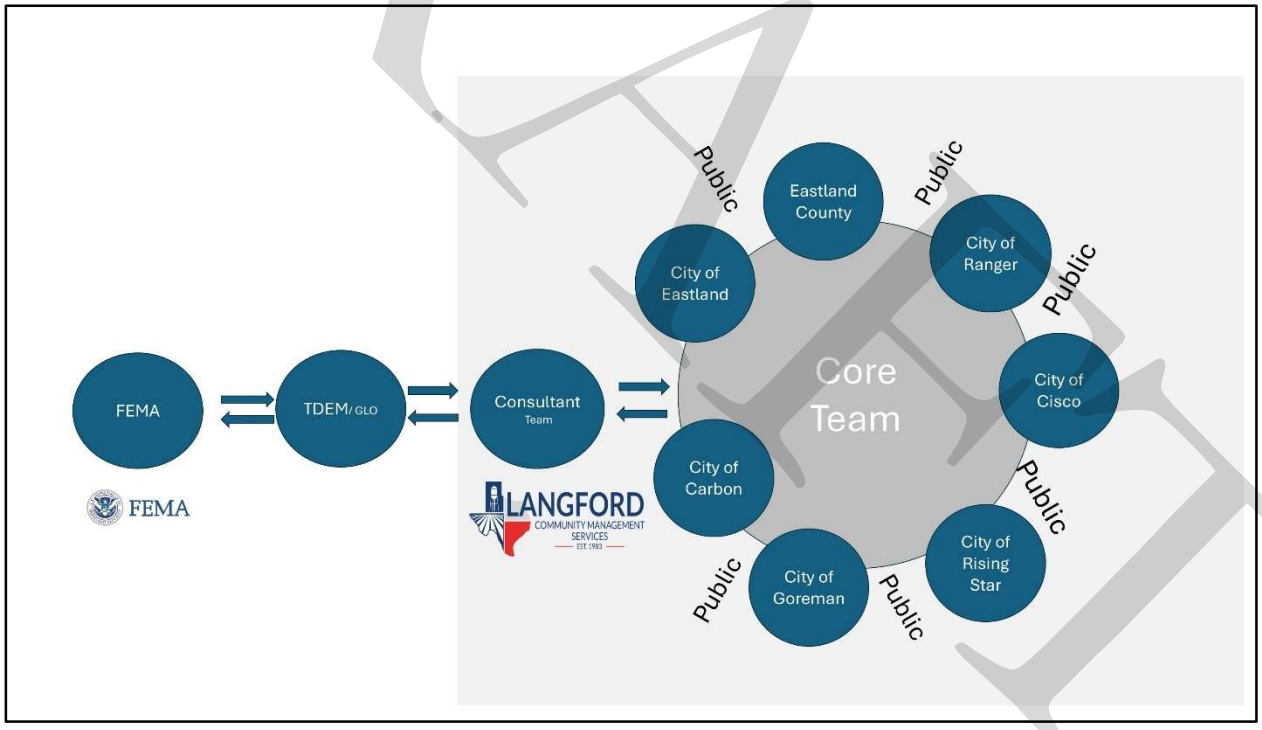


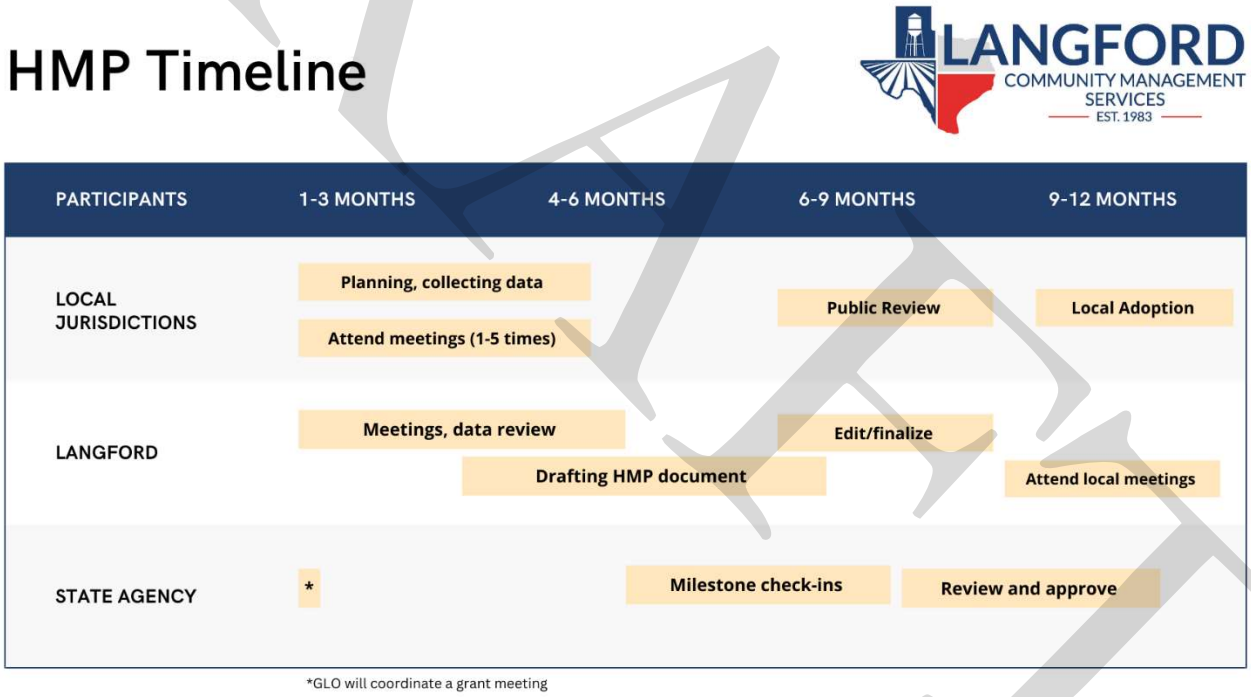
Figure 2-2: The planning process and participants.

A local planning team was also established at the jurisdictional level, which was responsible for assembling representatives to participate in the meetings and complete relevant tasks. This group was primarily responsible for developing, and eventually implementing, the mitigation actions at the local level.

Table 2-1: Core Planning Team

Title	Jurisdiction	Agency or Department
County Judge	Eastland County	County Judge's Office
County Sheriff	Eastland County	County Sheriff's Office
Mayor	City of Eastland	Eastland City Hall
City Manager	City of Eastland	Eastland City Hall
Mayor	City of Cisco	Cisco City Hall
City Manager	City of Cisco	Cisco City Hall
Mayor	City of Ranger	Ranger City Hall
City Administrator	City of Rising Star	Rising Star City Hall
City Secretary	City of Carbon	Carbon City Hall
City Secretary	City of Gorman	Gorman City Hall

Figure 2-3: Plan Schedule



Eastland County met with local jurisdictions, stakeholders and plan consultants on 9/20/2024. For approximately 3 to 4 months after, the County, cities, and key stakeholders attended further meetings and provided key data on their communities. On 11/21/2024, a public outreach meeting was held and the survey was the released to the County and jurisdictions to receive resident's input. After data was compiled, the plan was drafted, and a rough draft is presented to state agencies for milestone check-ins. Prior to state agency input, the completed draft is presented to the residents of Eastland County and local politicians for further feedback. Once a second draft is completed, this is presented to state

agencies for feedback and revisions. Once approved, the plan moves to local adoption, where each community adopts the new HMP as a guideline for their community.

Resources and Existing Plans

Resources

Various resources were used to gather and analyze data on past hazard events and their impact on the planning area to conduct hazard risk assessments. The preliminary findings of the hazard risk assessments were presented at Core Meeting 2 and then shared in their entirety with the participants to develop mitigation actions. The information obtained from these assessments facilitated discussions that helped participants develop actions for their respective communities.

Resources used for the assessments include the National Oceanic and Atmospheric Administration (NOAA, Texas Geographic Society, U.S. Geographic Society (USGS, U.S. Department of Health and Human Services, US Departments of Agriculture, FEMA, U.S. Army Corp of Engineers (USACE, Texas Water Development Board (TWDB, Texas A & M Forest Service, Texas Division of Emergency Management (TDEM, local reporting, and other sources).

Existing Plans and Regulations

The following existing plan and regulations served as a foundation for gathering background information and initiating discussions on past and current capabilities, hazards, and mitigation actions.

Local Mitigation Planning Policy Guide – The Guide was published by Federal Emergency Management Agency (FEMA) in 2022 to provide official policy and guidance on Local Hazard Mitigation planning requirements. The Guide's primary role is to help local government to facilitate consistent evaluation and compliance with planning requirements. Another role is to provide examples for communities on how to leverage community stakeholders and partnerships to increase community resiliency.

Local Mitigation Planning Handbook – FEMA published an updated Handbook for mitigation planning in 2023. The Handbook serves as a supplementary guide to the Local Mitigation Planning Policy Guide. The main role of this Handbook is to provide additional guidance to local governments on how to comply with the rules and regulations of Hazard Mitigation Planning.

Texas State Hazard Mitigation Plan – The primary role of the plan is to motivate state agencies and local government, as well as the private sector, to prevent catastrophic impact to property and people from natural hazards by addressing their potential for risk, identifying mitigation actions; and establishing priorities to follow through with those actions through collaborative, analytical mitigation planning. An additional role of the plan is to provide the framework for local planning teams to use as a springboard and resource when addressing their local mitigation planning requirements and strategies. The 2023 State Plan is the most recent update.

Public and Stakeholder Involvement

The process of hazard mitigation planning presents an opportunity for Eastland County, along with the participating jurisdictions, water utilities, stakeholders, and the general public, to assess and develop effective actions to mitigate the risk of loss of life and property damage that may result from

a disaster occurring within or around the planning area. Public participation and stakeholder involvement in the Plan are critical to ensure that the components of the Plan are accurate and relevant to the needs of the community. The Planning Team develops a greater understanding of local concerns and legacy knowledge with input from individual citizens and the community. If citizens and stakeholders are involved it also imparts more credibility to the final Plan and increases the likelihood of successfully implemented mitigation actions.

Table 2-2. Plan Stakeholders

Position	Organization
Superintendent	Eastland ISD
Superintendent	Cisco ISD
Superintendent	Ranger ISD
Sheriff	Eastland County Sheriff's Department
Fire Chief	Eastland (city) Fire Department
Fire Chief	Ranger Fire Department
Fire Chief	Gorman Fire Department
Fire Chief	Cisco Fire Department

Survey Results

Summary of Findings from the Survey: There was a total of 24 survey responses with zero manually entered.

1. Unincorporated Eastland County represents 29% of respondents, the City of Eastland comprised nearly 33% of respondents, the City of Cisco residents comprised 21% of the survey respondents, and the City of Ranger residents only providing 17% of responses.
2. Wildfires were identified as the highest threat with 54.17% of all responses. Hailstorms and droughts were a distant second and third, respectively, at 21% and 17% of responses.
3. Tornadoes were listed as the second highest threat to the community, with a 25% response rate.
4. Severe winter storms (83%), droughts (71%), and thunderstorms (67%) -- are the more prominent responses to the hazards that have been experienced in Eastland County.
5. Conversely, droughts (83%), severe winter storms (83%) and wildfires (79%) are considered the hazards most likely to be experienced in the County.
6. 20 of the 24 respondents said that they are not located in a floodplain nor have flood insurance, with two not knowing if they were in a floodplain, and two respondents identified their home as being in a floodplain and have flood insurance.
7. A small number of respondents are extremely concerned about being impacted by a disaster at slightly over 16%. The majority of respondents are somewhat concerned at 67%, and a little over 16% are not concerned at all.
8. A minority of respondents, 41%, have taken steps to make their homes, businesses, or community more hazard-resistant; whereas, 83% of respondents would like to know more about how to make their families and homes more resilient.
9. Using internet-based methods was identified as the most effective way for citizens to receive information regarding how to make their homes, businesses, and communities

more resistant to hazards, followed by mail communication.

10. Contact by text or e-mail was identified by 67% of respondents as the best single way to alert the public to an imminent disaster. All the above, including TV, internet, text, or social media was identified by 25% to alert the public to an imminent disaster, indicating less of a concern for the medium through which they're alerted.
11. The top mitigation activities favored by residents to be enacted by their governments were: Working on improving the resilience of utilities, Retrofit infrastructure, elevating roadways and improving drainage systems, and replacing inadequate or vulnerable bridges and roads. The mitigation actions identified as very important by respondents were improving the resistance of public utilities (71%), replacing inadequate or vulnerable bridges or roads (54%), and informing and educating property owners on the ways to mitigate damages tied for second, at 54%.

SECTION 3: PLANNING AREA PROFILE

This section provides a profile of the hazard mitigation of Eastland County and participating jurisdictions.

Eastland County

Eastland County is in the Central Region of Texas around 100 miles West of the Dallas-Fort Worth metropolitan statistical area and 160 miles northwest of Austin. The county seat is the City of Eastland which is located near the center of the County. Eastland County's population has remained relatively stable over the past 15 years, fluctuating around 18,000 residents.

Eastland County has a hilly terrain approximately 1,200 to 1,800 feet above sea level. The County is located in the West Cross Timbers and North Central Prairie resource areas, where the soils range from sandy to loamy. Leon River runs through the County, creating multiple water sources such as Lake Cisco, Lake Eastland and Lake Leon. Throughout the majority of the County's history, it has been a farming and ranching area. Eastland County saw significant growth in the 1870's. At the start of that decade, there were only 5 recorded farms, but by 1880 there were 549 farms on record. The County was then significantly impacted by insects and drought. Shortly after agricultural exports dropped, the County experienced an oil boom in the early 20th century. Since then, the County has remained mostly agricultural, and oil remains to be an important economic factor.

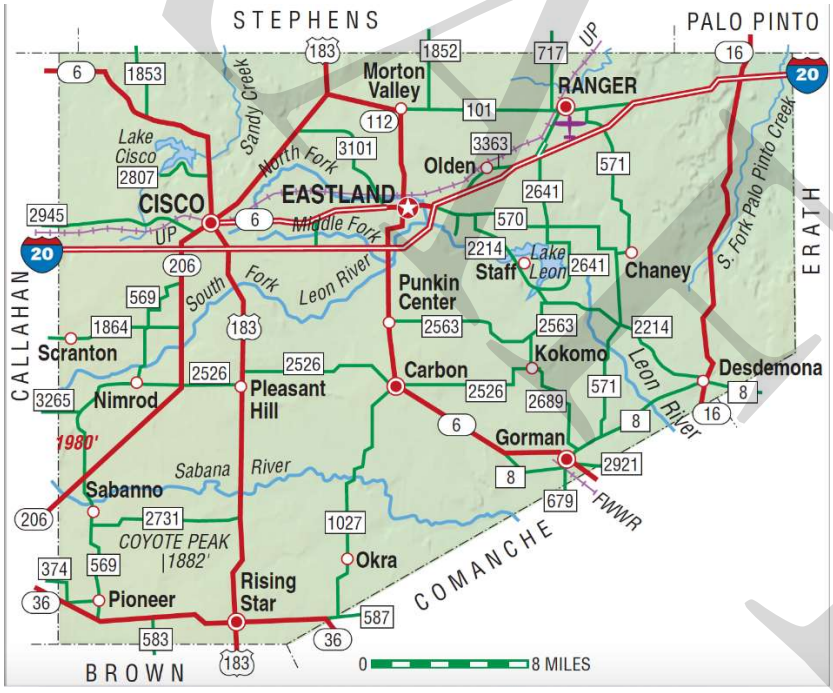


Figure 3-1: Image of Eastland County (Source: Texas Historical Association)

The County has six (6) key jurisdictions that also are participating in this Hazard Mitigation Plan:

- City of Eastland

- City of Carbon
- City of Cisco
- City of Gorman
- City of Ranger
- City of Rising Star

The County has 2 rivers, the Leon River and Sabana River, with two major bodies of water: Lake Cisco and Lake Leon. The County is bisected by major highways: Interstate 20 from east to west, and Highway 183 from north to south. The County is located in the West Cross Timbers region, creating rolling hills that range from sandy to loamy. Eastland County is located in the Brazos G Region of Texas Water Development Board Regional Planning and is in multiple watersheds: Clear Fork, Upper Brazos, and Leon River.

Temperatures range from a low of 27°F during the Winter, and a high of 95°F in the Summer. On average, the County sees 27" of rain; the rainiest months are May, June and October. The average growing season is 229 days per year. The County can see up to an average of 2 inches of snow each year.

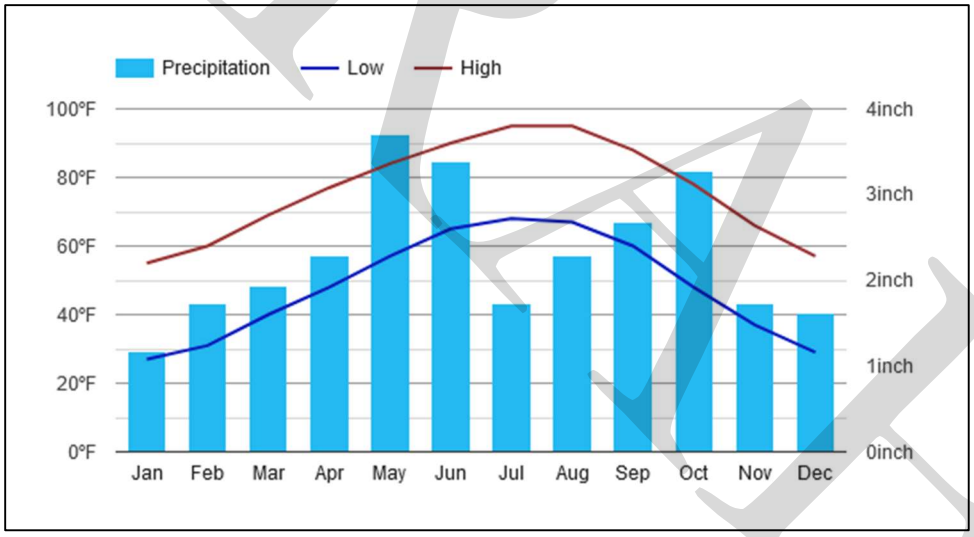


Figure 3-2: Eastland County Climate Graph (Source: U.S. Climate Data)

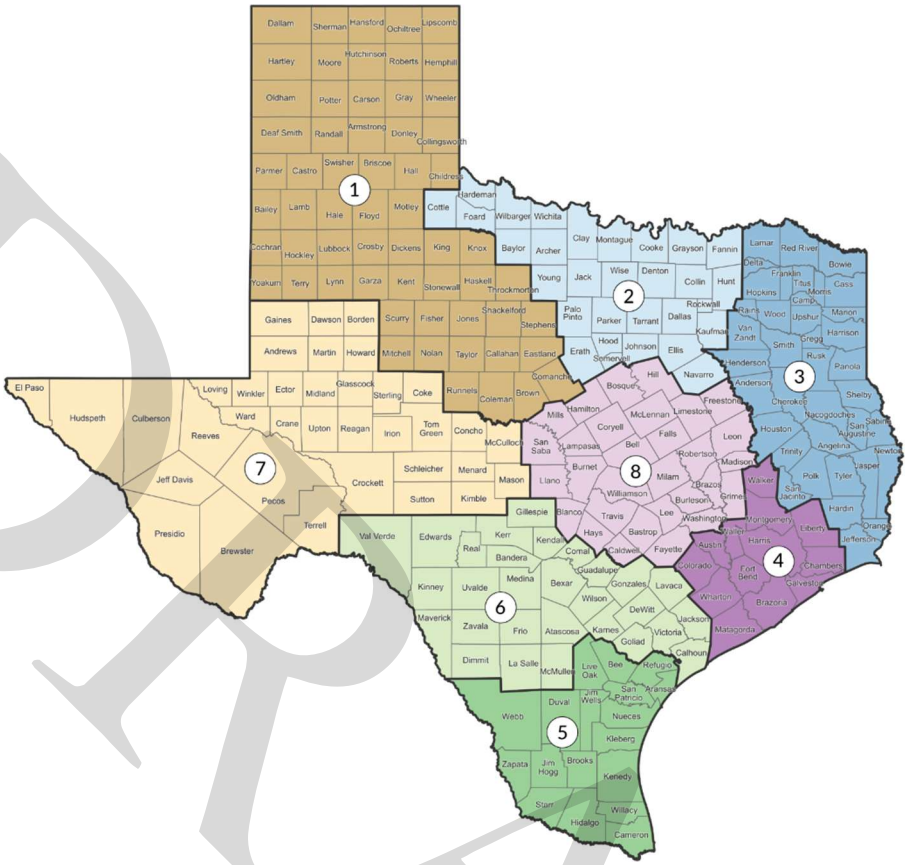


Figure 3-3: Texas Regions (Source: Texas Hazard Mitigation Plan)

These hazards can be life-threatening, destroy property, disrupt the economy, and lower the overall quality of life for individuals. Hazard mitigation is defined by the Federal Emergency Management Agency (FEMA) as sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects. FEMA is the federal agency responsible for preparing for, responding to, and recovering from disasters in the United States. Hazard mitigation planning is an investment in a community's safety and sustainability. It is widely accepted that the most effective hazard mitigation measures are implemented at the local government level, where decisions on the regulation and control of development are ultimately made.

Similar to other Region 1 communities, Eastland County has a high likelihood of experiencing drought, severe winds, hail, floods, and fires. With climate change affecting weather patterns over the State, these and other hazards are forecast by national weather monitors to become more frequent and greater in magnitude.

Social and Physical Vulnerability Across Eastland County

The Center for Disease Control uses census data and other reliable sources to create a Social Vulnerability Index. Social Vulnerability is defined as the characteristics of a person or group in terms of their capacity to cope with and recover from the impacts of a disaster. Social Vulnerability Indices are tools that government officials use to identify areas that may be more vulnerable (i.e. areas that have higher proportions of people with characteristics that might make preparing for

and recovering from a disaster more difficult). Examples of these groups include those who have physical or mental disabilities, those who do not speak English as a first language, and those who do not own a vehicle with which they could evacuate.

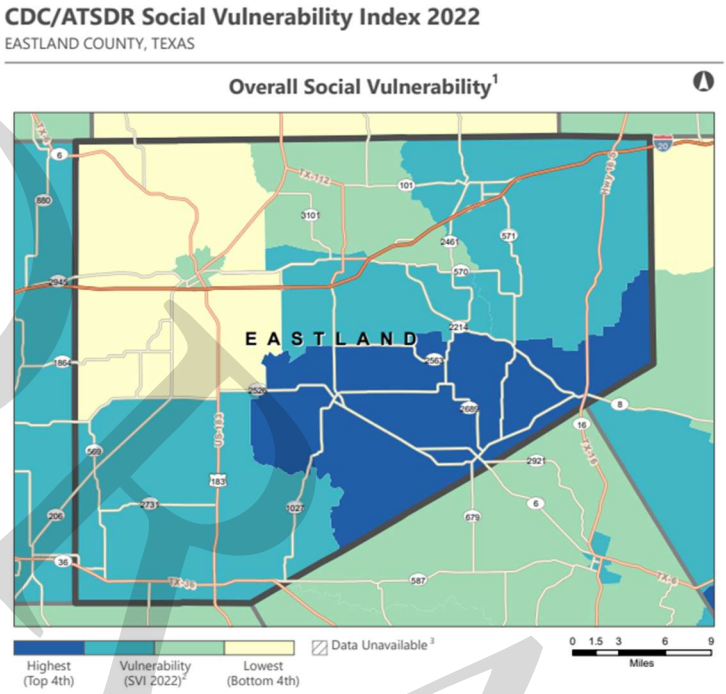


Figure 3-3: Social Vulnerability Index (Source: CDC)

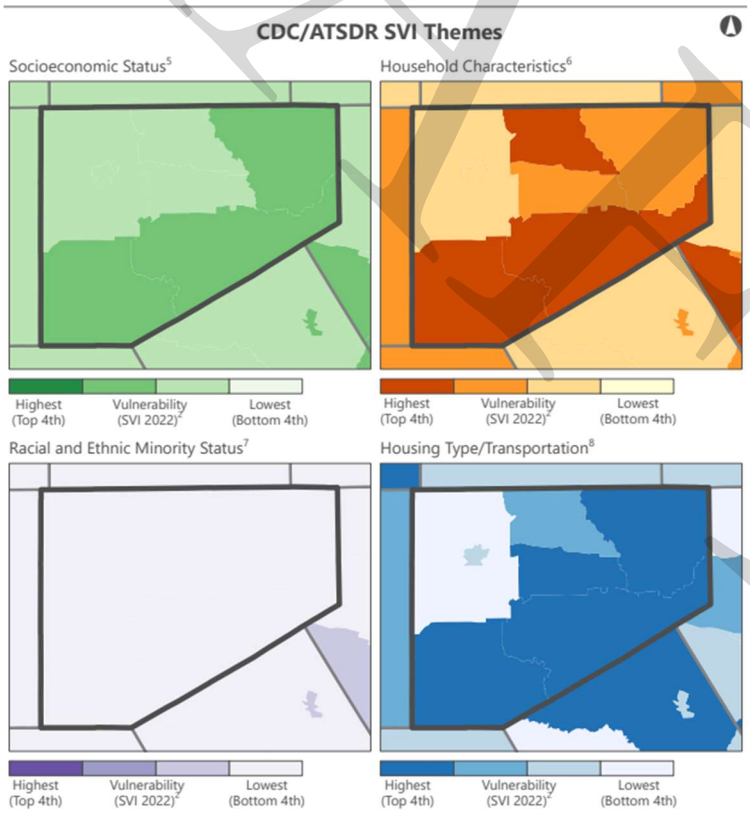


Figure 3-4: Categories of Social Vulnerabilities, detailed. (Source: CDC)

Social Vulnerability geographical data will help guide jurisdictions to determine which populations may need assistance with communications, shelter, or resources to ensure safety to all residents. Across all census tracts in Eastland County, the southeastern corner containing the City of Carbon and the City of Gorman is the most vulnerable region of the county, primarily due to a concentration of vulnerable housing types such as mobile homes, vulnerable populations such as those over the age of 65, and lower socioeconomic standing.

Table 3-1: Vulnerable populations based on Census data by jurisdictions (Source: data.census.gov)

	2020	2023	Estimated Vulnerable or Sensitive Populations			
Jurisdiction	Census Population	Population Estimate	Youth (Under 5) (2023)	Elderly (Over 65) (2023)	Below Poverty Level (2023)	% of Low to Moderate Income
Eastland County	17,725	18,037	993	3,910	2634	44.7%
City of Eastland	3,609	3631	252	845	698	43.7%
City of Carbon	281	285	11	58	14	41.7%
City of Gorman	976	1056	28	188	490	57.2%
City of Rising Star	756	734	47	169	169	56.6%
City of Cisco	3883	3926	218	767	83	25.4%
City of Ranger	2300	2541	232	404	544	63.1%

Census data shows that elderly and low-income households are a high vulnerability, particularly in the areas shown in the Social Vulnerability Index.

Municipal History and Economies

City of Eastland

Established and made the County Seat in 1875, Eastland is located at the intersection of State Highway 6 and 112, and just northwest of IH20. It was finally incorporated in 1891, after the town and population grew, particularly from a new railroad from Texas and Pacific Railway in 1880. The community continued to grow slowly through the years. Its economy was focused on cotton and agriculture until 1917. From 1917-1920, the City of Eastland saw an oil boom. The community grew rapidly around this newfound income source, with some claims stating the town reached 10,000 residents in 1919. The influx of money allowed the town to develop and establish new key facilities, like a Courthouse, schools, and infrastructure. Since the peak in the early 1900s, Eastland diversified and now most of the economy is built on government, agriculture, printing, and manufacturing.

City of Carbon

Located on SH6, Carbon's economy and city name is derived from the mineral deposits in the area. While mining was the original focus, the city's economy mostly focused on agriculture, forestry, and printing. The City of Carbon printed *The Carbon Herald*, which carried most of the County's important news and information.

City of Cisco

Originally the City of Cisco was a settlement named Red Gap. It was later renamed, incorporated, and had its first post office in 1884. The City if located at the intersection of US Highway 183 and IH20. In 1881, a new railway was placed near the settlement, which encouraged development. The railways bought up land and resold it to settlers, claiming the town is the "Gate City of the West." Agriculture boomed with the new population in the late 19th century. The economy was based mostly on trade, ranching, fruit farming, and mining of limestone, coal, and iron. Manufacturing started to develop in time; however, a tornado destroyed many homes and businesses. Cisco was ancillary in the oil boom in Eastland County and benefited from oil and gas for many years. Education became a key economic factor, with the establishment of Cisco Junior College.

City of Gorman

Located at the Southeastern portion of the county, on Highway 6, is the City of Gorman. The City was incorporated in 1902, and grew to be an economic hub of trade, agriculture and manufacturing. During the oil boom, Gorman was a central supply center, and the population grew considerably. After the oil boom, the City became a peanut shelling hub, with some of the fastest and most efficient peanut shelling factories around. This industry helped Gorman develop in the mid to late 20th century, and while manufacturing is a key economic factor, it has diversified with the larger population.

City of Ranger

The City of Ranger has a similar start as the city of Cisco, originally a settlement that eventually got railroad tracks laid nearby. After the railway was established, and property bought by the rail company to be resold to settlers, the City grew. Due to the location, Ranger became a trade center for Stephens County to the north for all the wheat grown. The City of Ranger was significantly impacted by the oil

boom when the Texas Pacific Coal and Oil Company drilled 22 wells and had 8 refineries in the area. During this oil boom, the City also experienced two significant disasters: flooding that destroyed enough buildings and crowded people in the remaining buildings which then caused a significant influenza outbreak, and a wildfire that destroyed nearly 2 city blocks. The oil boom helped the town weather these disasters and continued to grow until 1921. Peanut manufacturing became important to the City shortly after, and a college was established in 1926. This helped develop the town further, and now the economy is focused on education and various manufacturing outlets.

City of Rising Star

While the City of Rising Star was incorporated in 1980, the city has a long history dating back to 1876. Originally a settlement named Copperas Creek, settlers suggested changing the name to Rising Star due to the ability of the soil to grow crops while many surrounding areas were barren. Agriculture became a vital aspect of the town's economics. Corn, cotton, oats and fruits were the main producers. The town saw further expansion when a railway was built in 1911. Rising Star was the town closest to the very first oil discovery, initiating the Eastland County oil boom; however, besides the first discovery, a major well was not placed until 1920. This late production allowed for Rising Star to enact key building regulations that allowed for continued growth after the boom. Today, the City still extracts oil, and has agriculture and businesses that maintain the City's economics.

School Districts

Table 3-2: Number of students, staff, and details of each ISD in Eastland County.

ISD	Number of Employees	Number of Students	Children (under 5)	Staff with Outdoor Jobs
Gorman ISD				
Cisco ISD	171	838	40	5
Ranger ISD	78	300	34	4
Eastland ISD	171	955	35	6

Population Growth

The population of Eastland County has grown by an estimated 1.8% since 2020. The population estimate for 2023 was 18,037, which is an increase of 312 people from the 2020 census. The County and participating jurisdictions have experienced fluctuations in populations, although overall many locations remaining steady over the 13-year period. The City of Gorman and Ranger have recently experienced another boom in population, growing by 8.2% and 10.5% respectively.

Table 3-3: Population growth by jurisdictions from 2010-2020 decennial data (Source: data.census.gov)

Jurisdiction	2010 Census	2020 Census	2023 Estimate	Pop. Change 2010-20	% Change 2010-20	Pop. Change 2010-23	% Change 2010-23	Pop change 2020-23	% Change 2020-23
Eastland County	18,583	17,725	18,037	-858	-4.6%	-546	-2.9%	312	1.8%
City of Eastland	3960	3,609	3631	-351	-8.8%	-329	-8.3%	22	0.6%
City of Carbon	272	281	285	9	3.3%	13	4.8%	4	1.4%
City of Gorman	1083	976	1056	-107	-9.9%	-27	-2.5%	80	8.2%
City of Rising Star	835	756	734	-79	-9.5%	-101	-12.1%	-22	-2.9%
City of Cisco	3899	3883	3926	-16	-0.4%	27	0.7%	43	1.1%
City of Ranger	2468	2300	2541	-168	-6.8%	73	2.9%	241	10.5%

Population Projections

Population projections are a valuable resource for assessing how future growth and development may influence vulnerability to hazards. Planning and growth management strategies will help direct city infrastructure investments away from areas susceptible to hazards, considering both developed and undeveloped lands for future expansion. The Texas Water Development Board (TWDB) developed population projections between 2030 to 2080 from the demand forecasts used in the 2027 State Water Plan (Table 3-4). Population projections are based on county-level 1.0 migration scenario projections from the Texas Demographic Center (TDC), which used migration rates between the 2010 and the 2020 decennial Census to project future growth. The population projections show a decrease in population for Eastland County of 2,372 persons or a change of -13% over the 50-year period. It is evident that as Texas continues to urbanize, rural areas particularly outside of the "Texas Triangle" might lose population share to migration to large metropolitan areas such as Dallas and Fort Worth.

Table 3-4: TWDB Population Projections by Jurisdiction

Jurisdiction	2030	2040	2050	2060	2070	2080
Eastland County	17,747	17,307	16,722	16,295	15,846	15,375
City of Eastland	3,515	3,187	2,908	2,684	2,499	2,357
City of Cisco	3,947	4,027	4,135	4,172	4,225	4,295
City of Gorman	952	886	798	745	685	619
City of Ranger	2,273	2,146	2,039	1,959	1,899	1,865
City of Rising Star	698	659	626	601	583	572
Unincorporated County & City of Carbon	6,362	6,402	6,216	6,134	5,955	5,667

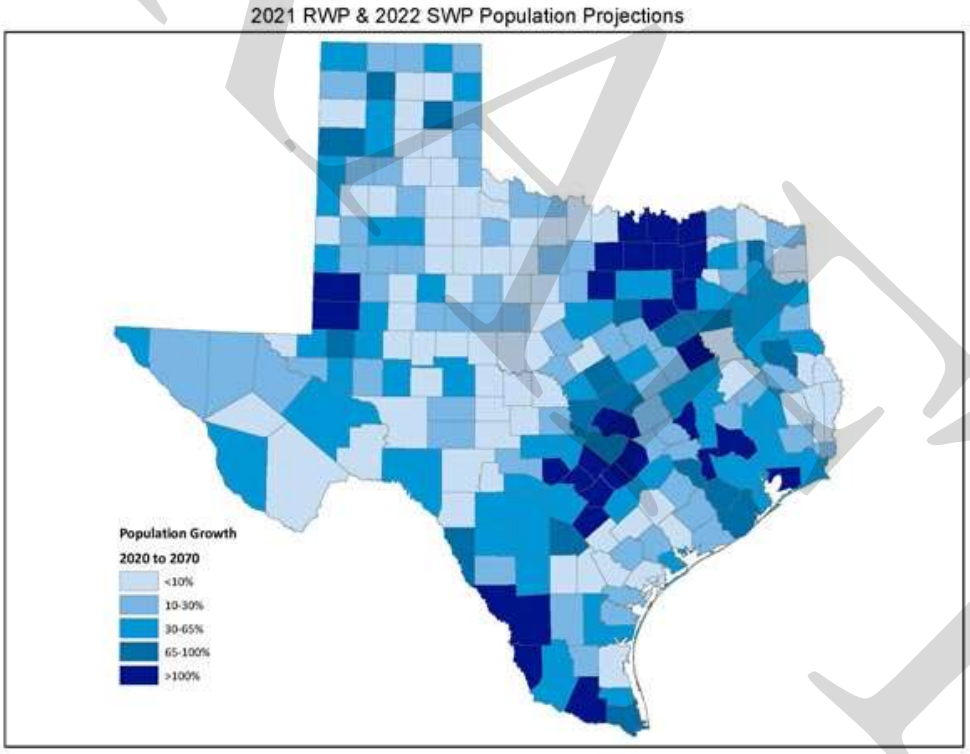


Figure 3-5: Population growth map of Texas Counties from 2020-2070. (Source: Texas Water Development Board)

SECTION 4: HAZARDS AND RISKS

Based upon a full review of the range of hazards suggested under FEMA planning guidance and input from Eastland County Core Team members, 11 hazards have been identified as important to be addressed in the Eastland County Hazard Mitigation Plan Update. These were chosen based upon a review of the State Hazard Mitigation Plan, a review of the historical record of disaster declarations for the Eastland County planning area, historical incidents contained in the National Centers for Environmental Information (NCEI), and local records and accounts of magnitude and damages from different and distinct hazard events.

According to the State Hazard Mitigation Plan, Eastland County is located within the Southern portion of the Texas Division of Emergency Management Region 1 where droughts, hailstorms, and thunderstorm wind events can be expected to dominate the hazard profile.

Table From 2023 State Hazard Mitigation Plan

Region 1 Hazard Rankings by Total Damages

Hazard	Hazard Ranking	Total Damages
Drought	1	$8,884,557,572
Hailstorm	2	$3,137,164,306
Severe Wind	3	$802,369,476
Flood	4	$795,375,227
Wildfire	5	$566,115,418
Tornado	6	$178,984,720
Severe Winter Weather	7	$152,270,542
Lightning	8	$3,621,021
Extreme Heat	9	$736,422
Hurricane	10	$0
Grand Total		**$14,521,194,704**

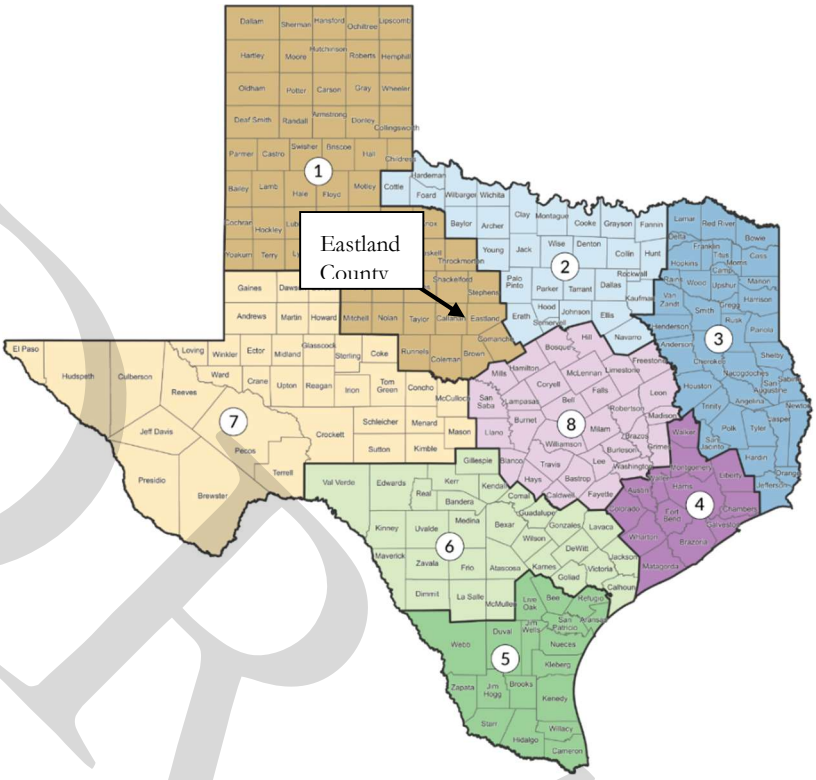


Figure 4-1: Texas State Texas Division of Emergency Management Regions (Source: Texas Division of Emergency Management)

The increased risk for these specific hazards in the planning area is confirmed in the table below. Disaster declarations are made at the county level and are not specific to any one city or sub- area, however, it is illustrative for local emergency planners to understand the type and frequency of the hazards impacting the larger region. Keep in mind that the incidents listed are only those that had a level of impact sufficient to necessitate a disaster declaration and that hazards have affected the area more frequently than what the table may initially suggest. Statewide disaster declarations are not included in this list.

Table 4-1: Disaster Declarations in Eastland County (Source: www.FEMA.gov)

Declaration Date	Disaster Number	Incident Subcategory
5/17/2024	4781	Flood
2/19/2021	4586	Severe Ice Storm
3/25/2020	4485	Biological
6/11/2016	4272	Flood
5/29/2015	4223	Severe Storm
7/1/2011	1999	Fire
6/29/2007	1709	Severe Storm
1/11/2006	1624	Fire
9/24/2005	1606	Hurricane
7/4/2002	1425	Flood

8/26/1998	1239	Severe Storm
7/7/1997	1179	Flood
12/26/1991	930	Flood
5/2/1990	863	Severe Storm

Since the U.S. Federal Government began issuing disaster declarations in 1953, Eastland County has had 14 major disaster declarations where individual and/or public assistance has been approved. Based on Table 4-1 above, 10 of the 14 disaster declarations have been issued in the past 25 years (since 2000). The infographics below provide a summary of the type of hazard, year, and time of year in which it occurred. The types of hazards that have had disaster declarations for the Eastland County planning area since 1953 are shown in Figure 4-2 below.

Figure 4-2: Eastland County Disaster Declarations Since 1953 by Type

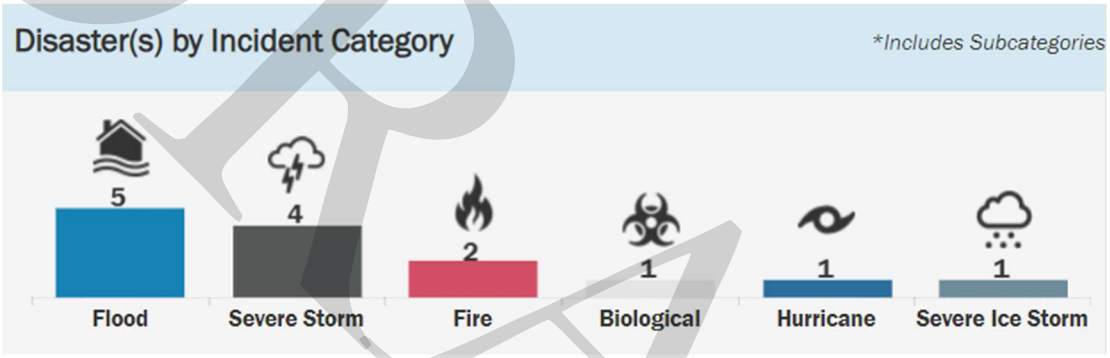
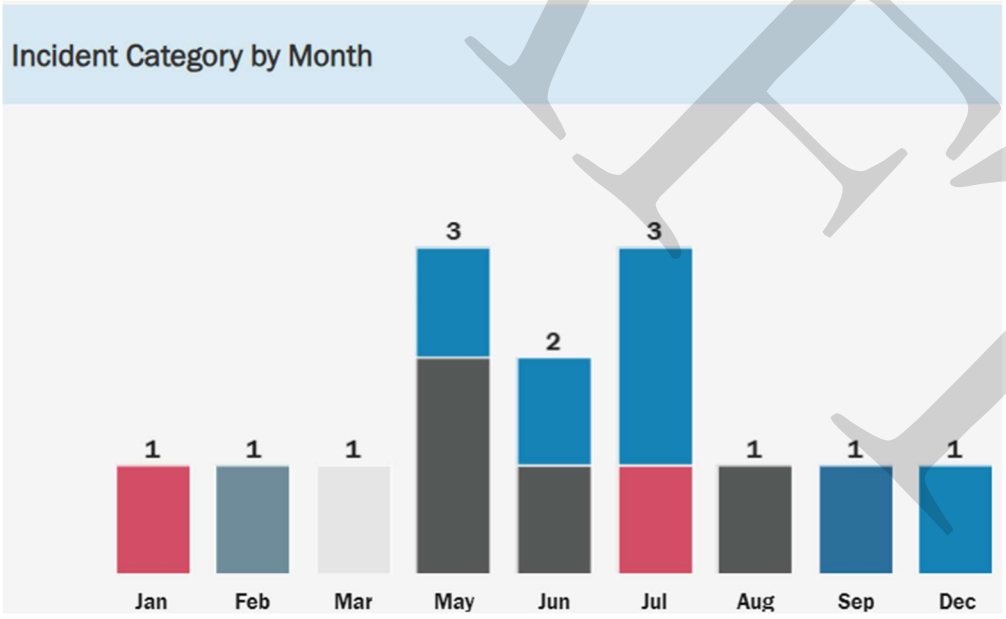


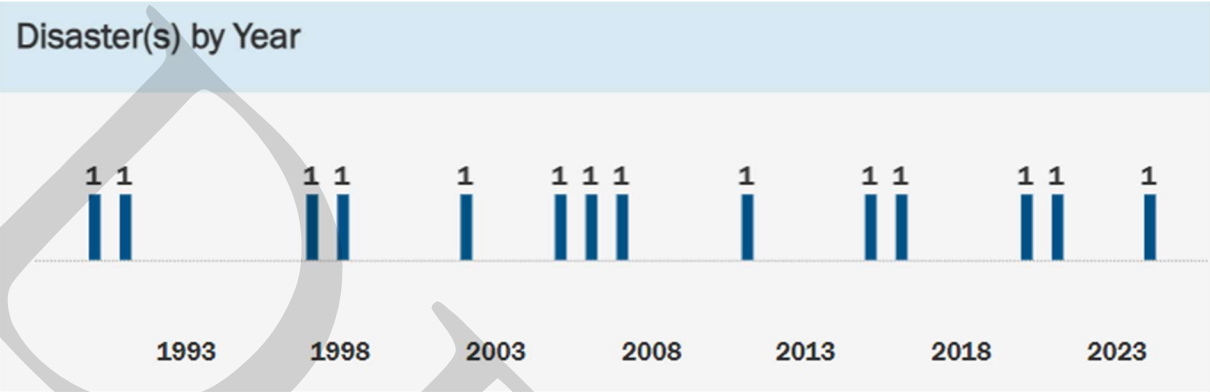
Figure 4-3: Eastland County Disaster Declarations Since 1953 by Month of Occurrence



The years in which disasters have been declared in the planning area are shown in Figure 4-4 below.

Table 4-1 on the previous page can be used as a reference for more detail.

Figure 4-4: Disaster Declaration Timeline



Hazard Descriptions

The following 11 hazards are included in the State of Texas Hazard Mitigation Plan and are determined to be a risk to the planning area. Coastal erosion was left off this list due to the subject area not being on the Texas Gulf Coast with no history of impact.

Table 4-2: Hazards Impactful to Eastland County

HAZARD	DESCRIPTION
HYDROLOGIC	
Drought	A deficiency in precipitation over an extended period, usually a season or more, results in a water shortage causing adverse impacts on vegetation, animals, and/or people.
Floods	Flooding is a general or temporary condition of partial or complete inundation of water, usually floodplains. A floodplain is an area of land susceptible to being inundated by floodwater from any source.
Expansive Soils	Expansive soils are soils with a relatively high percentage of clay minerals that are subject to volume changes as changing moisture conditions cause them to swell and shrink. This can cause adverse impacts on infrastructure.
ATMOSPHERIC	
Extreme Heat	Extreme Heat is a condition when temperatures hover above local excessive heat criteria combined with high humidity levels.
Hailstorm	Hail is showery precipitation in the form of irregular pellets or balls of ice more than 5 mm (about 0.2 in) in diameter.
Lightning	These are sudden charges of electricity that develop from storms or excessive heat.

Severe Winter Storms	A condition when temperatures hover below freezing and can include ice, snow, and sleet.
Tornado	A tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground.
Thunderstorm Winds	Severe windstorms can occur alone, or when accompanied by severe thunderstorms. Flying debris can cause major damage to utilities, infrastructure, and property.
Other	
Wildfire	Wildfires are unplanned, unwanted fires burning in a natural area, like a forest, grassland, or prairie. Buildings and human development that are susceptible to wildfires are considered the wildland-urban interface.
Dam Failure	A structural failure of a dam that results in the sudden, rapid, and often uncontrolled release of impounded water

Earthquakes and Hurricanes have had negligible to no impact on the participating jurisdictions and the planning area, so they will not be discussed in the mitigation action plan for the next five years.

Table 4-3: County Hazard Impact Summary (1999-2024)

Hazard	Deaths	Injuries	Property Damage	Crop Damage	Frequency
Drought	0	0	$10,000	$1,094,000	Annual
Floods	0	0	$1,406,000	$31,000	Annual
Expansive Soils	0	0	$0	$0	Infrequent
Extreme Heat	0	0	$0	$0	Annual
Hailstorm	0	0	$3,562,000	$15,000	Annual
Lightning	0	0	$154,000	$0	Annual

Severe Winter Storms	0	0	$495,000	$0	Annual
Tornado	1	2	$590,000	$100,000	Once every three years
Thunderstorm Winds	0	0	$901,750	$5,000	Annual
Wildfire	1	7	$6,412,000	$161,000	Once every three years
Dam Failure	0	0	$0	$0	Infrequent

Natural Hazards and Climate Change

Climate change describes the rapid and relatively recent increase in global average temperatures that has helped drive a fivefold increase in the number of weather-related disasters in the last 50 years. Climate change means disasters are happening simultaneously, too.

Figure 4-5 Climate-Related Hazards by Region (Source: Climate Adaptation Planning: Guidance for Emergency Managers)

With increasing global surface temperatures, the possibility of more droughts and increased intensity of storms will likely occur. As more water vapor evaporates into the atmosphere it becomes fuel for more powerful storms to develop. More heat in the atmosphere and warmer ocean surface temperatures can lead to increased wind speeds in tropical storms. Rising sea levels expose higher locations not usually subjected to the power of the sea and to the erosive forces of waves and currents.

Texas is considered one of the more vulnerable states in the U.S. to abrupt climate changes and to the impact of gradual climate changes to the natural and built environments. Texas is one of the highest-ranked states in the U.S. concerning the frequency in which they experience natural and climate-driven disasters. Extreme heatwaves and hurricanes will become more frequent and coastal Texas will face significant sea-level rise. Megadroughts can trigger abrupt changes to regional ecosystems and the water cycle, drastically increase extreme summer temperature and fire risk, and reduce the availability of water resources, as Texas experienced during 2011-2012. Adapting to climate change through efforts like flood control measures or drought-resistant crops partially reduces climate change risks, although some limits to adaptation have already been reached.

Overview of Hazard Analysis

The hazard risk analysis methodology involves reviewing historical data and conducting statistical analysis on the impact of hazards in the planning area. To gather this information, we retrieved records from the National Centers for Environmental Information (NCEI) and the National Oceanic and Atmospheric Administration (NOAA) that were reported for Eastland County. We also evaluated other local, and state records whenever they were available.

Additionally, we used geographic information system (GIS) mapping software to identify and assess the risks for Eastland County and other participating jurisdictions by evaluating community critical facilities and their vulnerability to hazards.

The Risk Assessment includes general parameters for each hazard, such as the location in the planning area, the expected extent or magnitude of the hazard, the frequency of its occurrence based on the number of historical events over the study period, the approximate annualized losses, a description of the general vulnerability, and a statement of the hazard's impact.

The Priority Risk Index definitions are defined in Table 4-3 and were adapted from Brazos County OEM and North Carolina Emergency Management Division. Contributing to community risk are three major factors: population growth, changes in development, and a shifting global and local climate. It's essential for communities to consider how their growth and broad climate phenomena will impact them in the future, to avoid putting current and future community members at risk.

Table 4-3: Priority Risk Index definitions

	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Probability	Unlikely	Event Possible in the next 10 years	1	30%
	Possible	Event Possible in the next 5 years	2	
	Likely	Event probably in the next 3 years	3	
	Highly Likely	Event nearly certain to occur in the next year	4	
Impact (Impact is subdivided into 3 categories: social, property, and CIKR impact.)	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of deaths/injuries possible.	4	

		More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 day or more.		
Spatial Extent	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
Warning time	More than 24 hours	Self-explanatory	1	10%
	12 to 24 hours	Self-explanatory	2	
	6 to 12 hours	Self-explanatory	3	
	Less than 6 hours	Self-explanatory	4	
Duration	Less than 6 hours	Self-explanatory	1	10%
	Less than 24 hours	Self-explanatory	2	
	Less than one week	Self-explanatory	3	
	More than one week	Self-explanatory	4	
Source: Adapted from North Carolina Emergency Management Division				

The Priority Risk Index aligns with the priority disasters established by the 2023 State of Texas Hazard Mitigation Plan for Eastland County. Drought, wildfires, and lightning are the most concerning natural hazards. While the historical impact of some of these lower-ranked disasters may not be severe, most still have the potential to produce unprecedented destruction and damage and severely impact critical infrastructure.

Table 4-4: Priority Risk Index analysis for Eastland County

	PROBABILITY	EXTENT	IMPACT							
			Social Impact		Property Impact	Critical Infrastructure Impact		Incident Exposure		
	Probability	*Spatial Extent*	*Historical Human*	*Possible Human*	*Extent of Damage*	*Duration of Shutdown*	*Average Impact*	*Duration of Exposure*	*Warning Time*	***Priority Risk Index***
Weights	**0.3**	**0.2**					**0.3**	**0.1**	**0.1**	
Eastland County										
Drought	4	4	3	4	4	3	3.5	4	1	3.55
Wildfire	3	4	4	4	4	4	4	3	4	3.6
Lightning	4	4	2	3	3	1	2.25	1	3	3.075
Floods	4	3	4	4	4	3	3.75	3	2	3.425
Thunderstorm Winds	4	4	2	3	3	2	2.5	2	3	3.25
Tornados	3	3	4	4	4	2	3.5	2	4	3.15
Expansive Soils	1	4	1	1	3	2	1.75	2	2	2.025
Severe Winter Storms	4	4	2	3	4	3	3	3	2	3.4
Hail	4	4	2	2	4	2	2.5	2	2	3.15
Extreme Heat	4	4	2	3	2	3	2.5	4	2	3.35
Dam Failure	1	3	1	4	4	3	3	2	3	2.3

Climate Change, Population Growth, and Development Changes

Drought

Climate Change: Climate change is expected to cause decreased precipitation and increased temperatures over a broad time scale, leading to water sources such as lakes and underground aquifers drying up which will increase the frequency and intensity of droughts.

Population Growth: As the population grows, the demand for water resources also increases, leading to higher water consumption. This can exacerbate drought conditions, especially in regions already experiencing water scarcity.

Increased Development: Land development can alter natural landscapes, leading to reduced water retention and increased runoff. This alteration of the natural hydrological cycle can worsen drought

conditions by reducing groundwater recharge and surface water availability.

Floods

Climate Change: With climate change leading to more intense and frequent rainfall events, riverine flooding and flash flood events are expected to increase in frequency and intensity.

Population Growth: As population growth continues in Eastland County, more people will be exposed to flood hazard risks, putting more lives at risk of flooding. Population growth will increase the strain on existing drainage systems, in addition to emergency response efforts.

Increased Development: Increased development in flood-prone areas can lead to increased impervious surface area and the reduction of natural water storage areas such as wetlands which can lead to more severe flooding, even sunny-day flooding.

Extreme Heat

Climate Change: As mean annual temperatures continue to increase due to climate change, extreme heat events will be more intense and frequent.

Population Growth: With a growing population, there may be an increased demand for water resources, which could impact water supply for both households and agriculture during extreme heating events. Population growth especially of vulnerable populations such as children and elderly can lead to increased strain on cooling centers and medical facilities to treat heat-related illness.

Increased Development: Rapid development in urban areas could increase the

urban heat index which would require more planning and development strategies to mitigate. Additionally, more development can strain the power grid, especially during extreme heat events, where infrastructure may be more likely to fail due to damaging temperatures, leading to power outages.

Hailstorm

Climate Change: Evidence shows that warming temperatures may make hail events less frequent as hail formation requires sufficiently cold temperatures but will likely lead to far more intense hailstorms with larger hail sizes, given increased atmospheric moisture.

Population Growth: As more people move into County, more people and their properties will be impacted by more intense hailstorms, as essential items such as vehicles and residential structures will experience significant damage, leading to significant hardship especially for those already experiencing financial hardship.

Increased Development: Increased development will dramatically increase the damages of hailstorms, where increased demand for housing may result in less resilient building construction, especially as hailstorm intensity increases.

Lightning

Climate Change: While research on the topic is still evolving, as average temperatures increase, and atmospheric moisture increases, lightning strikes will likely increase in frequency and result in more cloud-to-ground strikes, increasing the intensity of lightning events.

Population Growth: Increased population growth means a more dense population which increases

the likelihood of lightning causing death, injury, or property damage when concentrated in an area.

Increased Development: Increased development, especially in suburban and rural WUI areas means that lightning-ignited wildfires are likely to put more lives and property at risk, in addition to the overall likelihood of property damage and injury from lightning as the potential area of impact to humans increases.

Severe Winter Storms

Climate Change: The impacts of climate change on the frequency and severe winter storms in Texas are complex and hard to clearly predict, as they depend on interactions between the stratospheric and tropospheric polar vortexes, in addition to if Texas is experiencing dry La Nina or wet El Nino conditions. Overall, there are likely to be less frequent but more intense winter storms.

Population Growth: Population growth will lead to a greater concentration of vulnerable populations to extreme cold brought on by severe winter storms, particularly young and elderly populations.

Increased Development: Increased development can lead to increased strain on grid infrastructure exacerbated by a need for significant power to heat homes during extreme winter events and common occurrences such as damaged power lines leading to a greater proportion of community members at risk as development increases. Urbanization and changes in land use can disrupt local microclimates, leading to altered patterns of snow accumulation and melt. When snow does melt, increased impervious surface area may lead to an increased risk of flooding.

Tornado

Climate Change: Changes in the frequency and severity of Tornadoes due to climate change are uncertain for Texas, according to the 2022 State Climate Summary for the State of Texas provided by the NOAA National Centers for Environmental Information.

Population Growth: A higher population density in tornado-prone regions increases the potential for casualties and property damage during tornado events. Increased Development: An increase in infrastructure can obstruct natural wind patterns, potentially enhancing localized wind damage during tornadoes.

Expansive Soils

Climate Change: As climate change impacts the extremes of weather, the County will experience more intense rains and floods, and longer drier periods of drought that will impact expansive soils in areas with high clay. This change will make it more necessary to update construction regulations.

Population Growth: Increased population growth in County will create more single-family homes that will need to adjust for possible expansive soils. The populations that most likely impacted are vulnerable populations like those living in older homes, and low-income families that cannot afford the necessary repairs in the event of property damage. Not accounting for this may hinder housing development while the population expands.

Increased Development: Development under the right contexts may be beneficial to preventing expansive soils, with appropriate construction regulations and requirements. However, general infrastructure may be impacted, and families in low-income areas may be adversely impacted and be forced to move away from their family homes.

Thunderstorm Winds

Climate Change: As stated for tropical storms, depressions, and hurricanes, the frequency of thunderstorm wind events is not likely to increase but the intensity of the winds will increase, leading to more damage.

Population Growth: With increasing populations in County, population density will increase, and thunderstorm winds will have a more significant impact on a higher number of people, especially those living in mobile homes and older or more vulnerable structures.

Increased Development: Increased development in a less stringent regulatory environment that's responding to housing demand could result in more vulnerable structures not built to withstand the significant and increasing windspeeds brought by thunderstorms.

Wildfire

Climate Change: County may experience more frequent droughts caused by climate change combined with higher overall temperatures this will lead to more frequent wildfires as fuel levels will increase. The intensity of wildfires is also likely to increase with increased fuel levels.

Population Growth: As more people move into wildland-urban interface areas (where human development meets natural vegetation), the risk of wildfires and their impacts on communities increase. Human activities can also inadvertently trigger wildfires.

Increased Development: Construction in fire-prone areas may lead to an accumulation of combustible materials, such as buildings, which can serve as fuel sources during wildfire events

Dam Failure

Climate Change: As rainfall events become more extreme from climate change, dam infrastructure that is built for a certain capacity of water is likely to fail more often. Therefore, dam failures are more likely to occur and become more frequent given the increased frequency of intense hurricanes that weaken dam infrastructure.

Population Growth: In the unlikely event of a dam failure, the effects on the population within the surrounding area could be catastrophic. With a growing population, especially in areas surrounding the dam, the risk for loss of life and loss of property from a high-hazard dam breach would be severe.

Increased Development: Land development near high-hazard dams should be closely monitored. Any development around dams should be subject to adhering to guidelines laid forth in stormwater and floodplain management plans.

SECTION 5: DROUGHT

Description

Drought is a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. Droughts are defined as a moisture deficit at a magnitude high enough to have social, environmental, or economic effects and can become very prolonged and persist from one year to the next. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality. The Texas Hazard Mitigation Plan describes the climate of 2/3 of Texas Counties as arid or semi-arid with these Counties almost always in varying stages of drought.

Location

Droughts vary greatly in their intensity and duration and can occur regularly throughout Eastland County, including all participating jurisdictions, equally. Drought is monitored nationwide by the National Drought Mitigation Center (NDMC) which provides the Drought Monitor map in Figure 5-1 showing the entirety of the planning area currently experiencing moderate drought (D1) conditions or abnormally dry conditions (D0). The planning area has experienced exceptional drought conditions within the last fifteen years, particularly during the drought of summer 2011 when the entire state of Texas was at some level of drought (Figure 5-1).

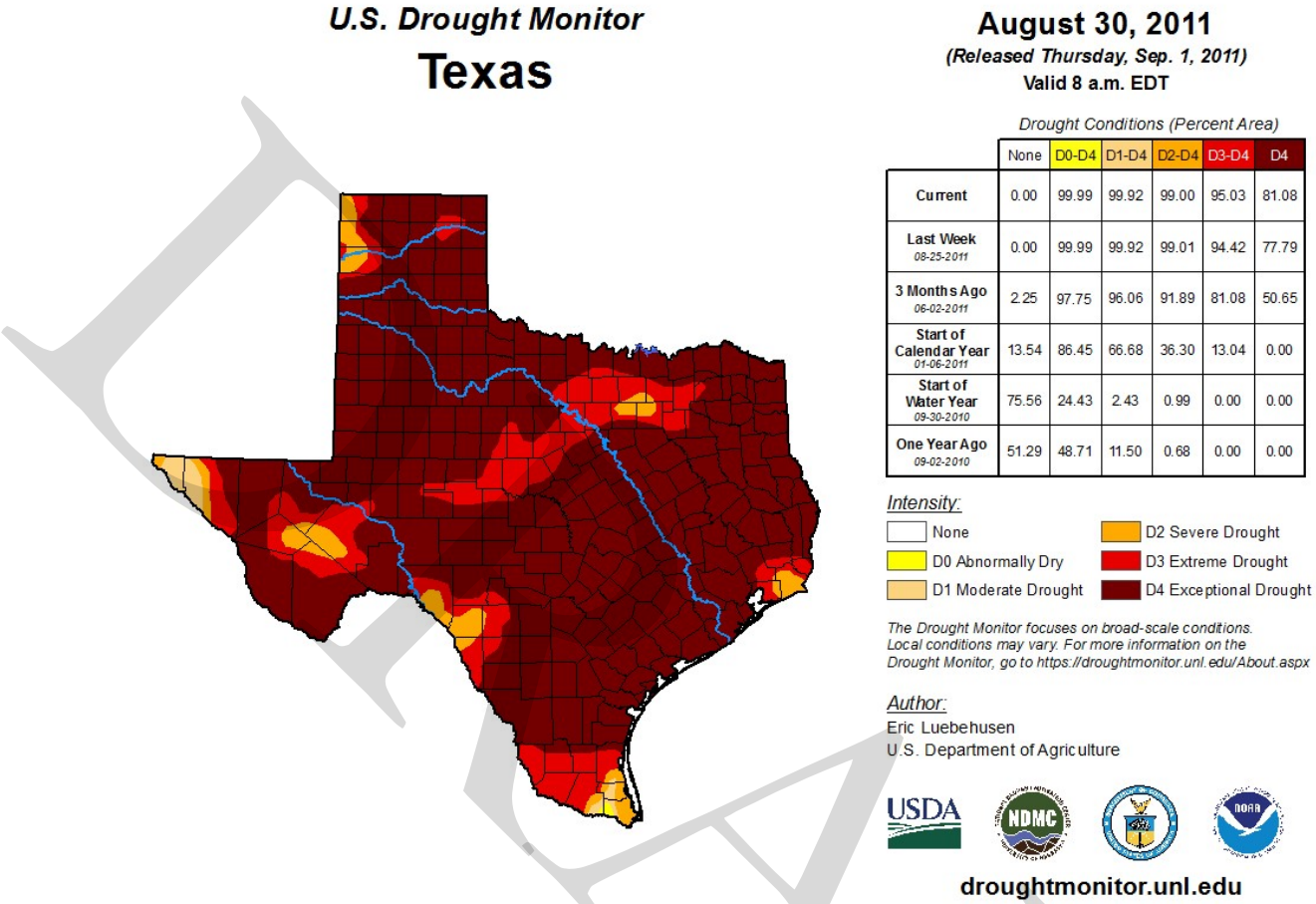


Figure 5-1: US Drought Monitor, August 30, 2011

Extent

The Palmer Drought Severity Index (PDSI) is based on precipitation and temperature and is used to measure the extent of drought. The index measures the moisture supply of the environment. The PDSI classifications vary roughly between -4.0 and +4.0 ranging from extremely dry to extremely wet periods. NOAA's United States Drought Monitor (USDM) Categories range from D0 to D4 according to the intensity of drought, and are based on several indicators, including the PDSI, and are used to describe broad-scale drought conditions across the United States. Table 5- 1 describes the basic PDSI classification descriptions and depicts the magnitude of drought with descriptions of possible impacts.

Table 5-1: PDSI Classifications and Descriptions (source: drought.unl.edu)

Category	Description	Possible Impacts	Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)

D0	Abnormally Dry	Going into drought: short-term dryness slows planting, growth of crops or pastures. Coming out of drought: some lingering water deficits pastures or crops not fully recovered	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	Some damage to crops, pastures, streams, reservoirs, or wells low. Some water shortages developing, or imminent voluntary water-use restrictions requested.	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	Crop or pasture losses are likely. Water shortages common, and water restrictions imposed.	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	Major crop and pasture losses. Widespread water shortages or restrictions.	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses. Shortages of water in reservoirs, streams and wells creating water emergencies.	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

Based on the extent and location for historic and current drought conditions, the Eastland County planning area can anticipate a range of drought from abnormally dry to exceptional, or D0 to D4 based on the USDM Drought Intensity Category.

The Keetch-Byram Drought Index is used by the Texas Forest Service to determine the fire potential based on daily water balance, precipitation, and soil moisture. Figure 5-1 shows the Keetch-Byram Drought Index rating classification for all of Texas and color-coded by County with a scale of 0 to 800 (low risk to high risk). Eastland County was recorded in the 400-600 risk category at the time this report was written. The Keetch-Byram Drought Index is also discussed in relation to wildfires in section 6.

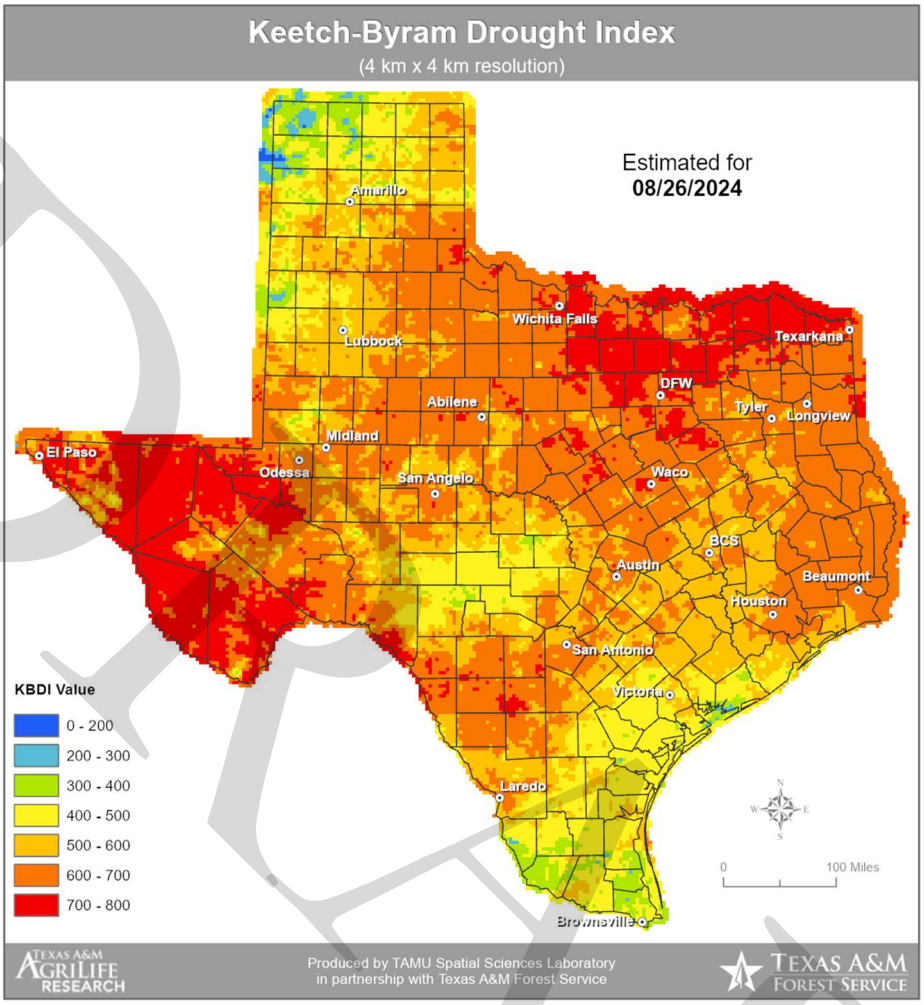


Figure 5-2: Keetch-Bryam Drought Index for Texas

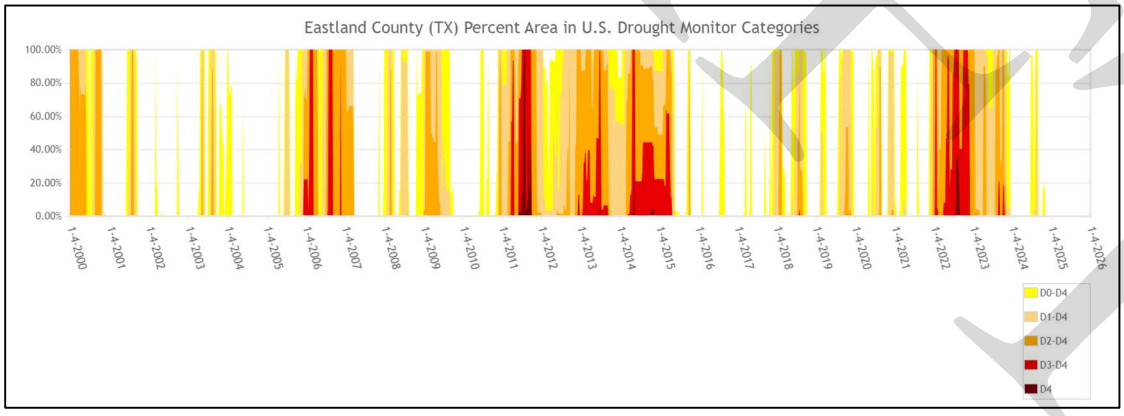


Figure 5-3: Drought Index Timeline from 2000-2024

Historical Occurrences

Droughts are difficult to pin down a start date, as conditions continually evolve over time. As such, start and end times of historical droughts may vary greatly. Droughts are a hazard that occurs overtime,

with particular conditions. Each community may experience drought at different paces in the same planning area. In Eastland, there have been five (5) significant droughts documented in the past 25 years.

Drought of 2005-2006

The start of this drought was recorded in May of 2005. By December, many northern counties of Texas were classified as D3 or D4. These dry conditions led to numerous wildfires throughout North Texas. After nearly a year of drought conditions, Eastland County was in a 15-24 inch deficit of water, putting extreme stress on water demands for residents. As the drought continued into the spring and summer of 2006, intermittent rainfall would alleviate the conditions, but not enough to make up for the severe deficit. The drought conditions finally ended by November 2006, leaving Eastland County with over $800,000 in crop damages over the 19-month period.

2011 Drought

In 2011, Eastland County started to experience significant drought conditions. The Ketch-Bryam marked the start of it in January/February at a D0/D1. The conditions worsened to a D4 by October and November. In late November and December, 2 inches of rain fell, reducing the drought conditions for a few months. Over this 10-month period, the County experienced losses of $166,000 from crops and $2,000 in property damage. These droughts made an environment vulnerable to fires (see Section 6).

Drought of 2012-2013

It has been considered that the drought conditions in 2011 never recovered enough, making the drought in 2012 and 2013 an extension to the 2011 drought. The 2011 drought experienced a small reprieve by December 2011, and the 2012 drought started in the Summer of 2012, with d2 conditions by September 2012. Rain storms would not make enough difference in the water levels in the County, despite raining on and off for a few months. This continues until June of 2013 when conditions worsen, reaching a D3/D4 for Eastland County. By September, rainfall events happened enough to resolve the severe drought in Eastland County. Over this time period, the drought caused $31,000 in crop damages, and $2,000 in property damage.

Drought of 2014-2015

March in Eastland County is usually the fourth wettest month of the year, except in 2014 it was abnormally dry. The conditions by the end of the month got Eastland County classified as D1 to D2. The drought conditions continued, despite many areas in South Texas experiencing a surplus of rain. By August 2014, the County was classified as a D3, or in extreme drought conditions. This level continues, particularly for the eastern portion of the county, until March 2015. These conditions caused $32,000 in crop damages, and $5,000 in property damages.

Drought of 2022-2023

Much of north and central Texas started to see drought conditions in January 2022, with many counties, including Eastland, being classified as D3. Conditions fluctuated slightly, but there was never

enough rainfall to make a significant difference in local water levels. Eastland County, like many north central counties, saw worsening conditions over the next 23 months. Rainfall that occurred was not enough to make significant changes to the environment. By November 2023 there was enough rain to take Eastland County out of a drought. This drought may have been one of the longest droughts in Eastland County's history; however, there were no reported crop or property damage.

Historical Data Source

The data used to assess the historical experience with drought for the planning area came from the NOAA's NCEI National Storms Database. This database contains extensive and authoritative information for weather-related events in the country from 1999 through 2024 (25 years). Agricultural producers such as farmers and ranchers purchase crop insurance to protect their yield in a natural disaster such as drought, hail, or flood. Historical crop damages are typically not found in the public record and are likely much higher than quantified by NCEI data due to agricultural losses being a transaction between the agricultural landowner and insurance policyholder. Furthermore, the extent of crop loss due to drought is difficult to quantify because a drought during a growing season can impact the next two years of crop production. Table 5-2 lists historical events that have occurred in Eastland County as reported in the NCEI.

Data provided by the NOAA drought monitor also provides a perspective of historical occurrences of drought in the planning area by summarizing the percentage of area in each drought category weekly. The table below (Table 5-2) provides a summary of the number of weeks in each drought category or the magnitude of the drought that describes the drought condition for most of the county for each weekly period from January 1, 1999, to November 19, 2024. This nearly 25-year window of drought data provides a clear picture as to how often the occurrence of different drought categories can be expected in the future. The NCEI, organized under the National Oceanic and Atmospheric Administration, is the largest archive available for climate data, however, it is important to note that only incidents and damages reported to the NCEI have been factored into this risk assessment.

There have not been any events recorded prior to the listed dates under NOAA NCEI data. However, droughts may have occurred prior to 1999 and were not recorded.

Table 5-2: Historical Occurrences of Drought in Eastland County (1999-2024)

Start	End	Duration of drought (days)	Deaths	Injuries	Property Damage	Crop Damage
7/8/2000	9/30/2000	84	0	0	$0	$0
7/1/2005	7/31/2005	30	0	0	$0	$0
11/1/2005	5/8/2006	188	0	0	$0	$0
7/1/2006	11/30/2006	152	0	0	$0	$800,000
2/1/2009	5/30/2009	118	0	0	$0	$48,000
12/12/2010	11/28/2011	351	0	0	$2,000	$172,000
9/1/2012	9/30/2012	29	0	0	$0	$2,000
11/20/2012	9/30/2013	314	0	0	$2,000	$29,000

3/11/2014	3/31/2015	385	0	0	$5,000	$32,000
10/20/2015	10/25/2015	5	0	0	$1,000	$0
1/23/2018	2/21/2018	29	0	0	$0	$0
7/24/2018	8/31/2018	38	0	0	$0	$1,000
10/1/2019	11/30/2019	60	0	0	$0	$0
8/25/2020	9/7/2020	13	0	0	$0	$0
12/15/2020	12/31/2020	16	0	0	$0	$0
1/1/2022	1/30/2023	394	0	0	$0	$0
5/1/2023	5/15/2023	14	0	0	$0	$0
8/8/2023	11/13/2023	97	0	0	$0	$0

The NOAA also provides additional perspectives to the historical data by summarizing the area's percentage of drought in each category. Table 7-3 below provides a summary of the number of weeks in each drought category or the magnitude of the drought for each weekly period from January 2000 to January 2025.

Table 7-3: Historical Drought Magnitude weekly since 2000. (Source: NOAA)

Drought Category	Description	Eastland County	
None	Normal to Wet Conditions	593	45.4%
D0	Abnormally Dry	182	13.9%
D1	Moderate Drought	223	17%
D2	Severe Drought	232	17.8%
D3	Extreme Drought	72	5.5%
D4	Exceptional Drought	5	.4%
Total		1307	100%

Probability of Future Events

Based on available records of historic events from NCEI, there have been 18 periods of drought since 1999. Eight of the eighteen droughts have occurred in the past 6 years, with the longest drought occurring over a year, at 394 days long. This provides a probability of occurrence of one event every year. Based on the drought monitor data for a 25-year reporting period, the planning area is in moderate to exceptional drought approximately 40.7% of the time. This frequency supports a "Highly Likely" probability of future events occurring within the Eastland County planning area which means that an event is probable in the next three years.

Frequency of Occurrence
Highly likely: Event probable in the next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in the next 10 years.

Vulnerability and Impacts

Drought affects large areas creating vulnerability for people, animals, property, agriculture, and the environment. Over the entirety of the planning area, the biggest impacts of drought are dead crops and grazing land, edible plants for animals, and even trees. This primarily affects farming and wildlife, but people can be directly impacted as well due to shortages of potable water supply. Communities will also ration the use of water during prolonged drought, particularly for lawn care, swimming pools, and irrigation. Drought is related to, and can exacerbate, the natural hazards of wildfires and extreme heat. Drought can contribute to the cause of wildfires due to dying vegetation serving as ignition fuel and can be intensified by extreme heat. The impacts of drought mostly affect water shortages and crop/livestock losses and do not typically extend to buildings and critical facilities.

The entire population of Eastland County is vulnerable to water supply shortages which present widespread health risks since people can only survive a few days without water. Potable water is used for many essential functions such as drinking, bathing, heating and cooling systems, and some electricity production. This affects vulnerable populations more acutely such as children, older adults, and people with illnesses or fragile health conditions. Also, vulnerable populations that do not have adequate air conditioning units in their homes are more at risk for injury or death.

The planning area has a total population of 18,037 according to the 2023 ACS population estimate. Those over the age of 65 represent 5.5% (993) of the total population and children under the age of 5 represent 21.7% (3910) of the total population. The total population of the county that is estimated to be below the poverty level is 14.6% (2,634). Table 5-4 presents the 2023 American Community Survey population and age cohort estimates below.

Table 5-4: Populations at Greater Risk by Jurisdiction (Source: 2023 5-year ACS data; data.census.gov)

Jurisdiction	Population 65 and Older	Population Under 5	Population below Poverty Level
Eastland County	993	3,910	2634
City of Eastland	252	845	698
City of Carbon	11	58	14

City of Gorman	28	188	490
City of Rising Star	47	169	169
City of Cisco	218	767	83
City of Ranger	232	404	544

The environment of the Eastland County planning area is also vulnerable to damage during drought. Through lack of food and water and habitat degradation, aquatic and terrestrial species both can experience significant reductions due to death and lower reproduction rates. Water is central to the ability of people to inhabit and transact commerce in a region and the economic impacts of drought can be significant, especially during prolonged drought. The ability to produce goods and provide services is dependent on direct and indirect access to clean water. Due to the interconnected nature of supply and production chains, the negative effects of droughts can have ripple effects on many industries and sectors of the economy. The overall impact of damage caused by periods of drought is dependent on its extent and duration. It is rare that drought alone leads to a direct risk to the health and safety of people in the Eastland County planning area, however severe water shortages could lead to a direct risk to the health and safety of the population. The severity of the impact of a drought can be mitigated by preparedness and planning by the community comprised of government, businesses, and citizens.

The National Drought Mitigation Center (NDMC) at the University of Nebraska-Lincoln developed the drought impact reporter to provide a national database of drought impacts by county. The number of impacts in ten distinct impact categories from 1999-2024 are provided below. Table 7-5 lists the drought impacts in Eastland County based on reports received by the Drought Impact Reporter. These reports are predominantly provided by the media, but can also come from NWS, other agencies, CoCoRaHS, legacy reports, and user reports.

Figure 5-4: Drought Impacts, 2005-2024

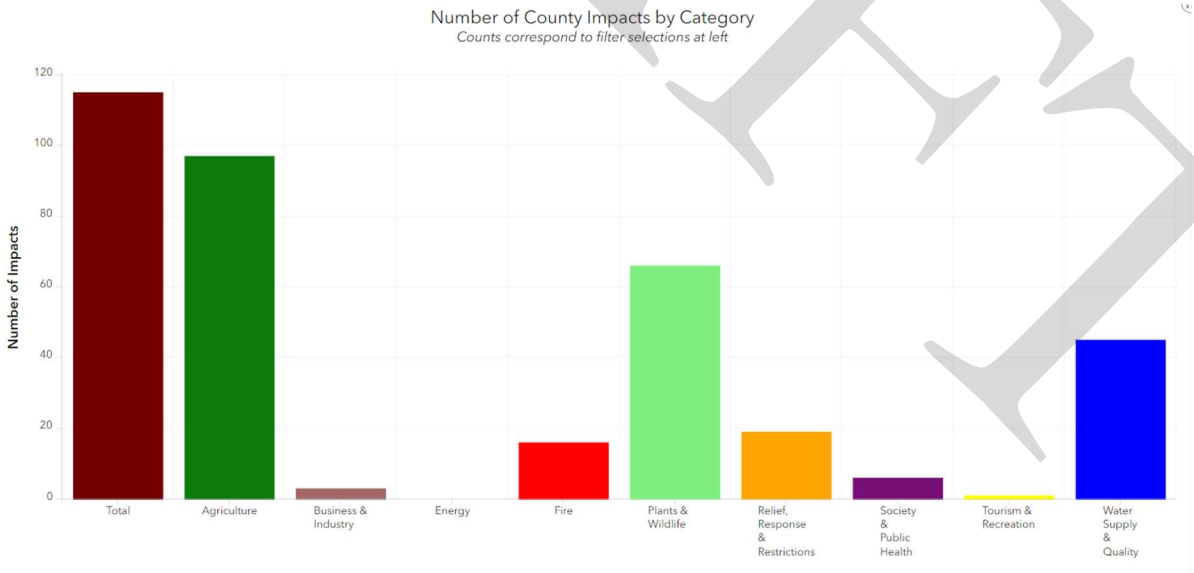


Table 5-5 Drought Impacts, 2005-2024

Eastland County	
Total	115
Agriculture	97
Business & Industry	3
Energy	1
Fire	16
Plants & Wildlife	66
Relief, Response & Restrictions	19
Society & Public Health	6
Tourism & Recreation	1
Water Supply & Quality	45

Based on 25 years of data from the NCEI, the direct impacts of droughts in the Eastland County planning area have resulted in approximately $1,084,000 in crop damage and $10,000 in property damage, with no known injuries and fatalities. The impact of drought on the planning area has been significant based on data from the NCEI from 1999-2024. Drought impact reports like those presented above, however, come from several different sources and provide a different perspective of the impact that drought can have on communities beyond direct monetary property or crop damages that typically aren't reported publicly. It is important to consider that crop damage information is rarely publicly reported, and water availability issues are not easily quantified so the impact is likely much more pronounced than the direct losses attributed to this hazard.

Historic Drought Impacts

No injuries or fatalities were reported in the 25-year period of analysis. There has been $1,084,000 in losses to crops, a large economic player in Eastland, and $10,000 in property damage. Based on historical records, drought impacts are high to personal property and crops.

Drought Impacts Forecast

No injuries or fatalities have been reported as of yet; however, as droughts become more frequent and/or more severe, it is expected that more vulnerable populations will experience health concerns. In addition, droughts have a high economic impact in Eastland County and participating jurisdictions. It is forecasted that droughts will have a high impact on the County and participating jurisdictions in the future.

SECTION 6: WILDFIRE

Description

Wildfires are unplanned, unwanted fires burning uncontrolled in a natural area rich with vegetative fuels, like a forest, grassland, or prairie. Meteorological conditions such as high temperatures, low humidity, droughts, and high wind increase wildfire risk. Sparks from agricultural, industrial, or automobile activity are often the cause of wildfires with humans the most common source of initial ignition. Wildfires can also be naturally ignited by lightning strikes as a part of the natural management of forest ecosystems. While wildfires can occur any time of year, they are especially likely over the spring and summer months, when fuel is often dry so flames can move unchecked through a highly vegetative area.

Location

Wildfires are most likely to occur in open grasslands but are not confined to any specific geographic location and can vary greatly in terms of size, location, intensity, and duration. The populated, urban areas of the planning area are less likely to experience large, sweeping fires. The more rural and sparsely populated unincorporated areas of Eastland County are more vulnerable to large sweeping wildfire events. The threat to people and property is greatest in the wildland-urban interface/intermix, however, the entire planning area of Eastland County is at risk for wildfires.

Extent

The likelihood that a wildfire event will occur in the planning area is measured using the Keetch Byram Drought Index (KBDI) and the Texas Forest Service's Fire Intensity Scale (FIS). The KBDI describes the potential for wildfire based upon weather conditions such as daily water balance, precipitation, and soil moisture (Table 6-1). The index ranges from 0-800 with a score of 0 indicating no moisture depletion and a score of eight hundred representing completely dry conditions.

Table 6-1: Keetch Byram Drought Index Descriptions

KBDI Score Range	Description
0-200	Soil moisture and large-class fuel moisture are high and do not contribute much to fire intensity. Typical early spring following winter precipitation.
200-400	Fuels are beginning to dry and contribute to wildfire intensity. Heavier fuels will still not readily ignite and burn. This is often seen in late spring or early summer.
400-600	Lower litter and duff layers contribute to fire intensity and will burn actively. Wildfire intensity begins to increase significantly. Larger fuels could burn or smolder for several days. This is often seen in late summer and early fall.
600-800	Often associated with more severe drought with increased wildfire occurrence. Intense, deep-burning fires with extreme intensities can be expected. Live fuels can also be expected to burn actively at these levels.

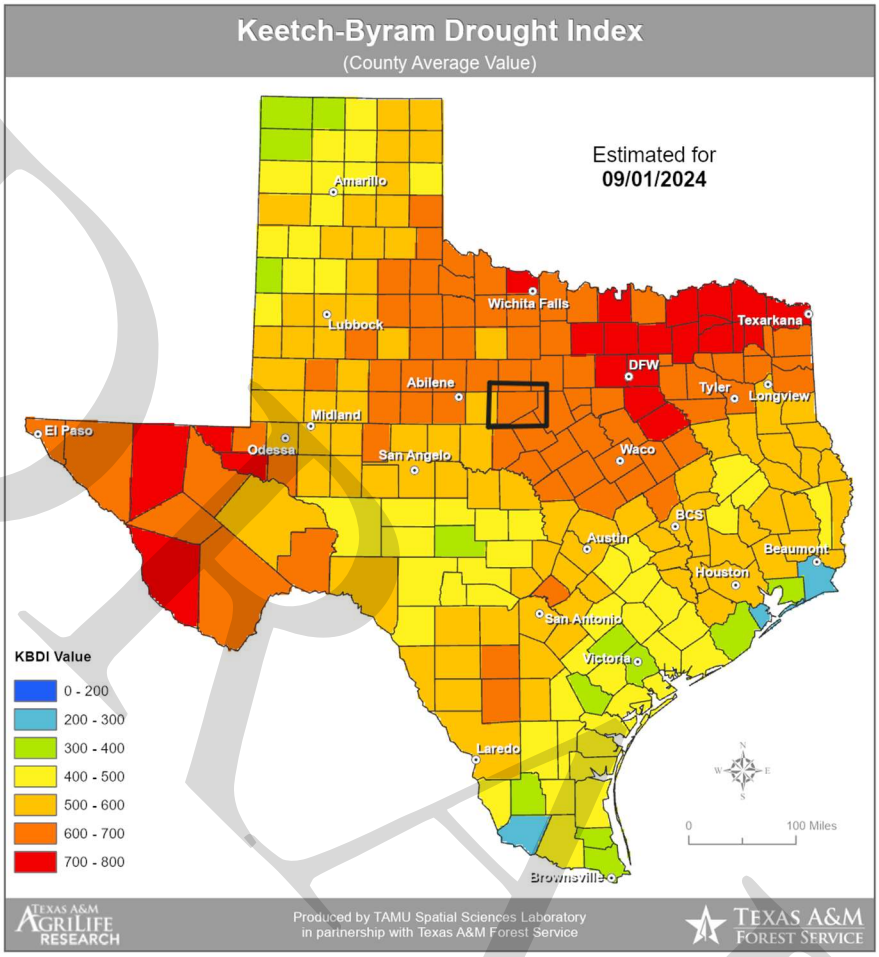


Figure 6-1: Keetch-Byram Drought Index by County Averages – September 2024

The KDBI for an area is frequently updated based on environmental conditions. While based on the drought analysis, a majority of Eastland County has been in the 0-200 value region for 60% of the past 25 years, short-term drought measurements can show significant conditions that contribute to wildfire ignition. Based on Figure 6-1 above showing recent averages, the Eastland County planning area exhibits values in the 600-700. At these levels, often associated with more severe drought, fire intensity, and occurrence begin to increase significantly, and fires could burn for significant durations. The KBDI is a good measure of the readiness of fuels to ignite in the event of a wildfire. Drought or extreme weather conditions can greatly influence the KDBI in a short period of time so current KBDI should always be monitored to more accurately assess risk.

The Texas Wildfire Risk Assessment Portal (TXWRAP) is the primary mechanism for the Texas A&M Forest Service to deploy risk information and create awareness about wildfire issues across the state. www.TexasWildfireRisk.com The tool uses the Fire Intensity Scale (FIS) layer to determine the potential fire intensity for the specified location. FIS quantifies potential fire intensity based on high to extreme weather conditions, fuels, and topography. It is similar to the Richter scale for earthquakes, providing a standard scale to measure potential wildfire intensity by magnitude. FIS consists of five

classes where the order of magnitude between classes is ten- fold. The minimum class, Class 1, represents very low wildfire intensities and the maximum class, Class 5, represents very high wildfire intensities.

Class 1, Very Low: Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and nonspecialized equipment.

Class 2, Low: Small flames, usually less than two feet long; small amount of very short-range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.

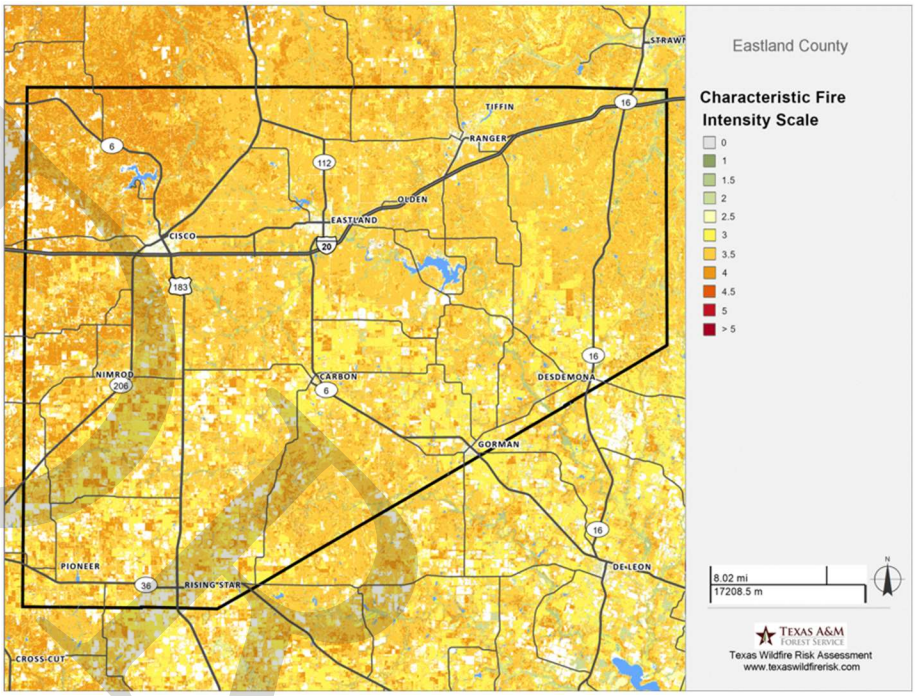
Class 3, Moderate: Flames up to eight feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozers and plows are generally effective. Increasing potential for harm or damage to life and property.

Class 4, High: Large Flames, up to 30 feet in length; short-range spotting common; medium-range spotting. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.

Class 5, Very High: Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack is marginally effective at the head of the fire. Great potential for harm or damage to life and property.

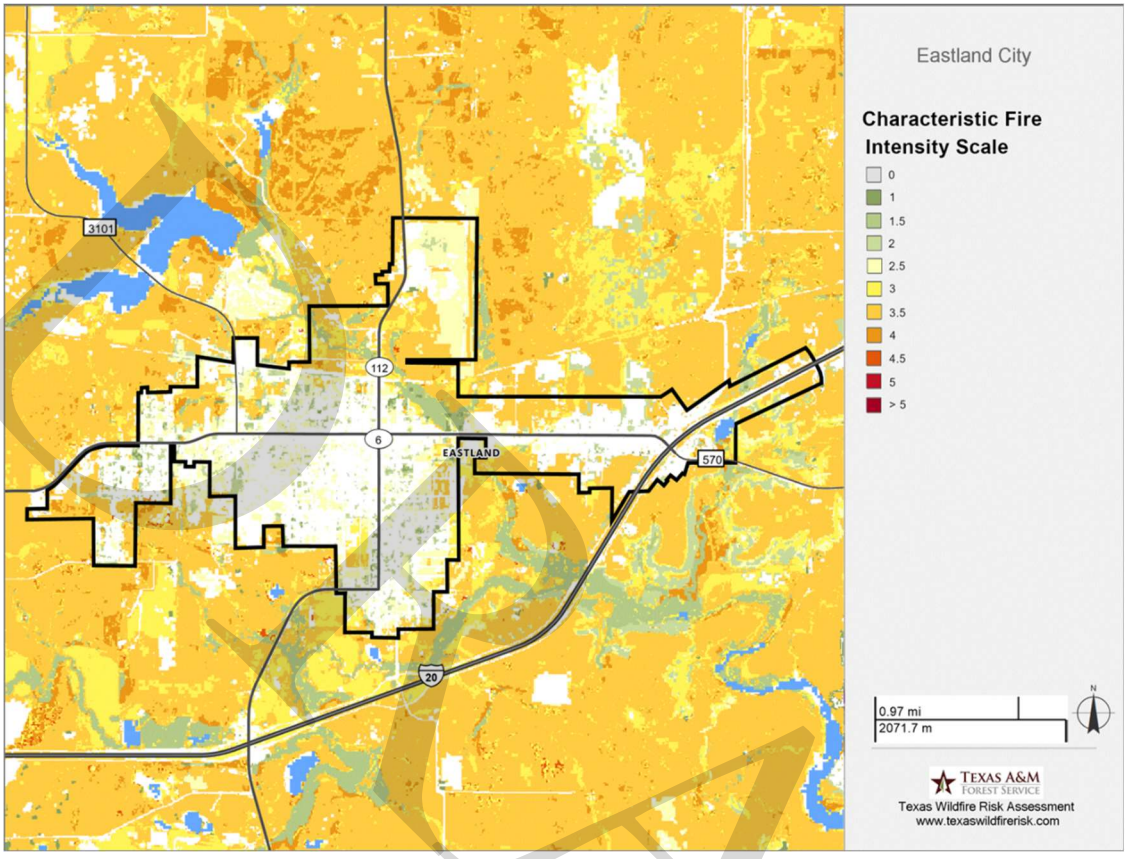
The Fire Intensity Scale evaluates the potential fire behavior for an area, regardless of whether any fires have occurred there in the past. This additional information allows local officials and mitigation planners to quickly identify areas where dangerous fire behavior potential exists in relation to nearby homes or other valued assets. **The wildfire risk for the Eastland County planning area is Moderate to High, with 83% of the County at and above Class 3.** Fifteen percent of the county is below Class 3.

Table and Figure 6-2: Fire Intensity Scale Mapping and Percent of Area for Eastland County



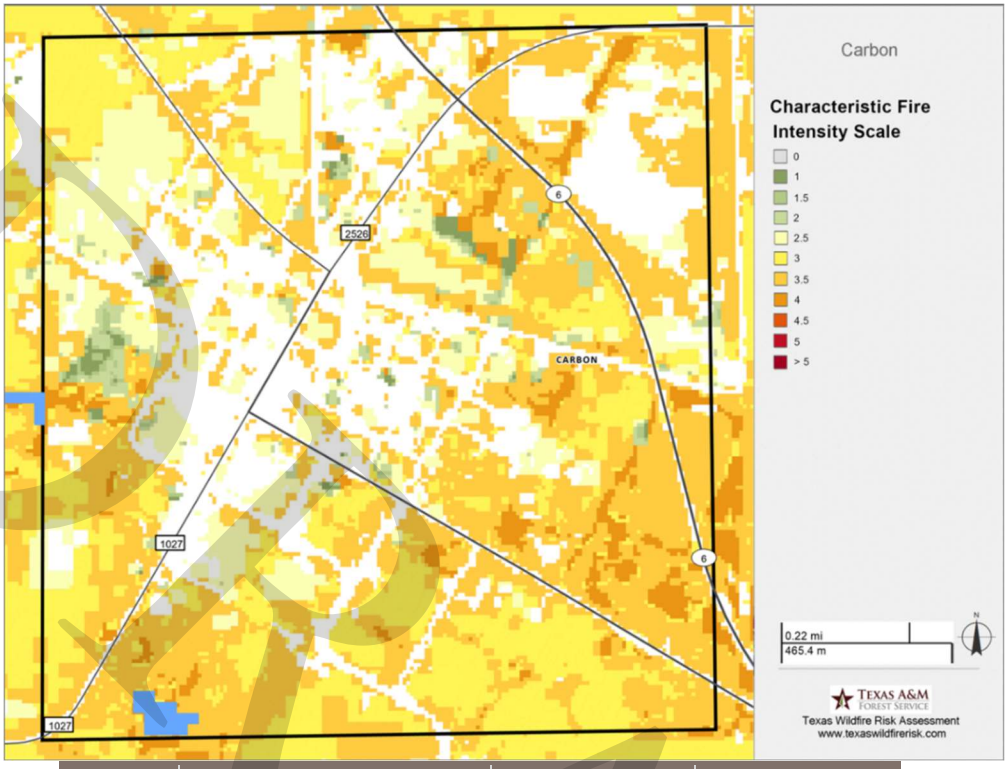
	Characteristic Fire Intensity Scale Category	Acres	Percent
	0	62,448	10 %
	1	1,104	0 %
	1.5	12,838	2 %
	2	8,470	1 %
	2.5	14,709	2 %
	3	113,656	19 %
	3.5	292,492	49 %
	4	86,781	15 %
	4.5	2,683	0 %
	5	0	0 %
	> 5	0	0 %
	Total	**595,180**	**100 %**

Table and Figure 6-3: Fire Intensity Scale Mapping and Percent of Area for the City of Eastland



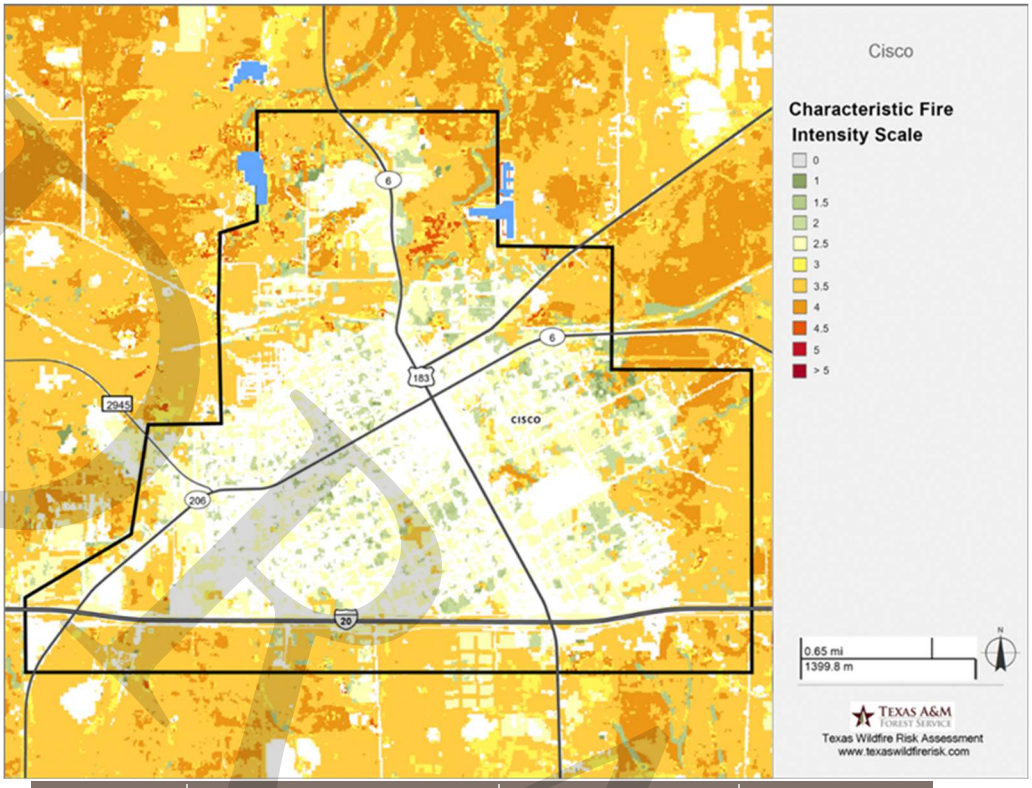
	Characteristic Fire Intensity Scale Category	Acres	Percent
	0	1,095	48 %
	1	12	1 %
	1.5	82	4 %
	2	120	5 %
	2.5	333	15 %
	3	119	5 %
	3.5	483	21 %
	4	20	1 %
	4.5	1	0 %
	5	0	0 %
	> 5	0	0 %
	Total	**2,266**	**100 %**

Table and Figure 6-4: Fire Intensity Scale Mapping and Percent of Area for the City of Carbon



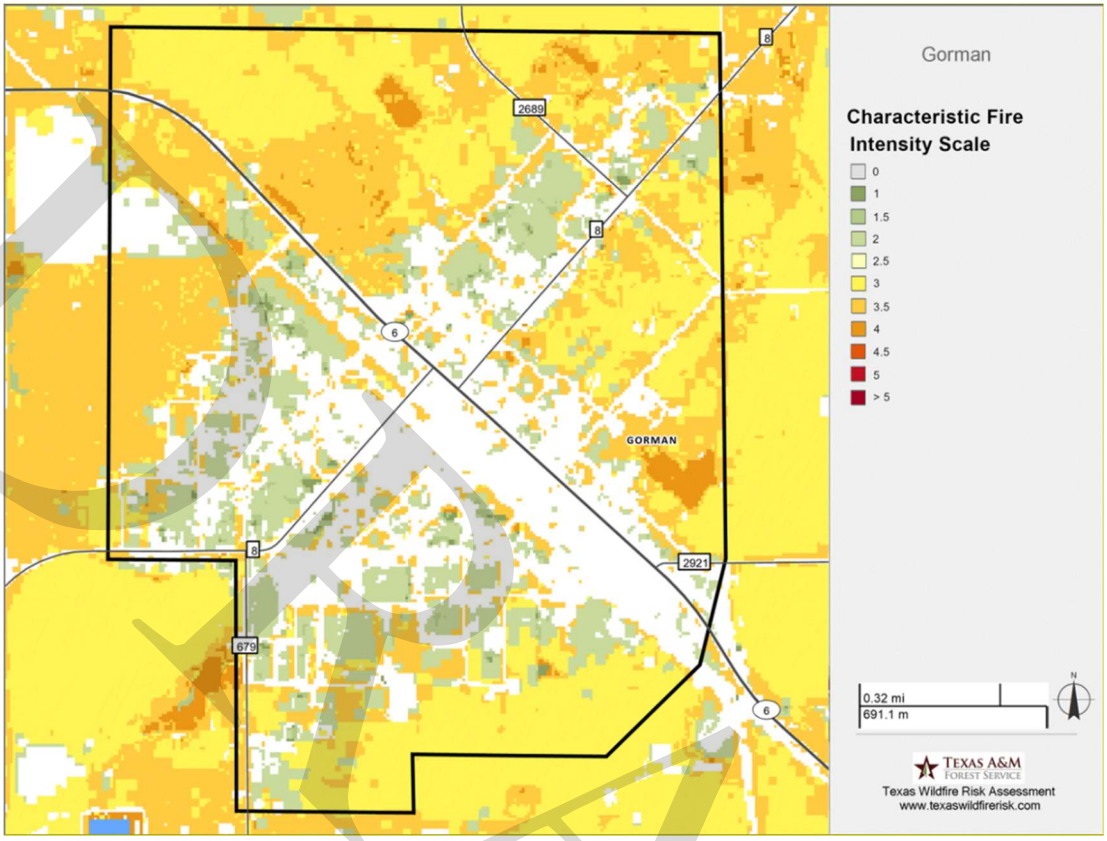
	Characteristic Fire Intensity Scale Category	Acres	Percent
	0	164	27 %
	1	3	1 %
	1.5	3	1 %
	2	10	2 %
	2.5	83	13 %
	3	110	18 %
	3.5	218	36 %
	4	23	4 %
	4.5	0	0 %
	5	0	0 %
	> 5	0	0 %
	Total	614	100 %

Table and Figure 6-5: Fire Intensity Scale Mapping and Percent of Area for the City of Cisco.



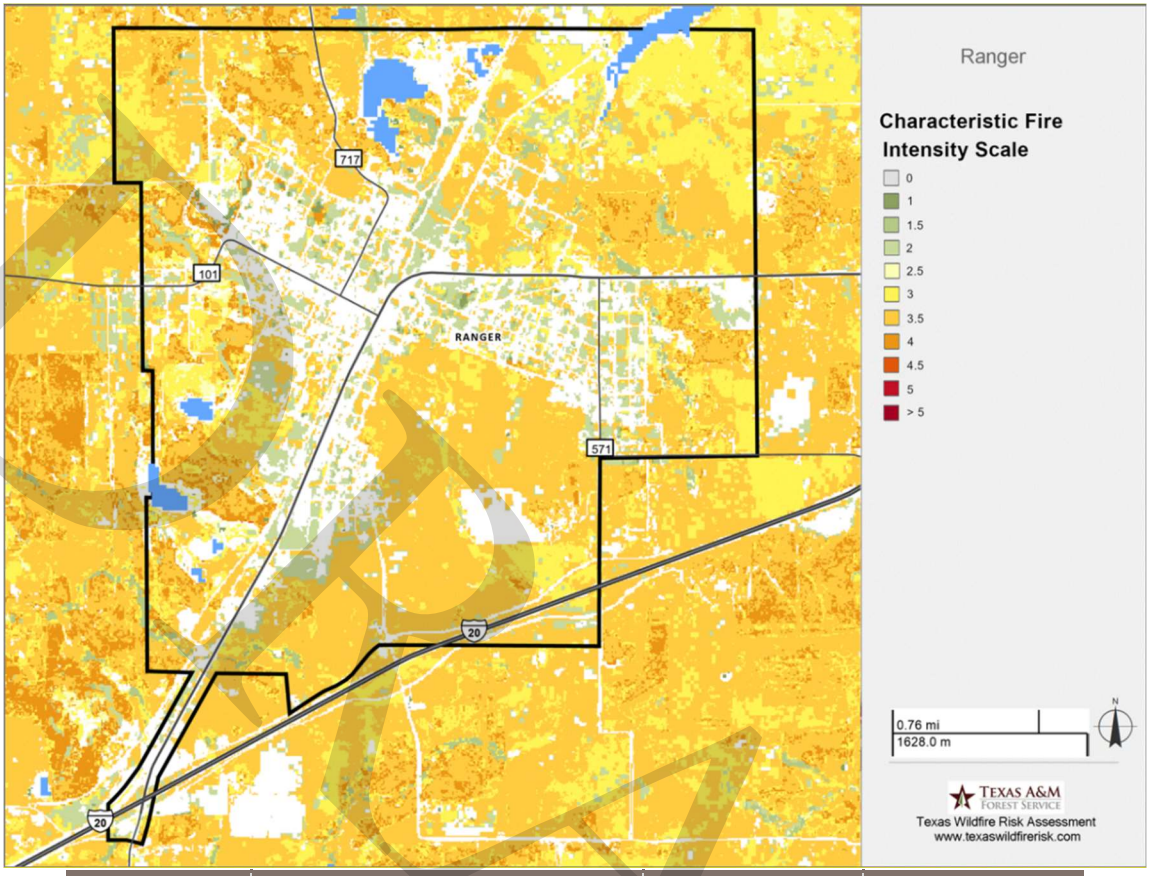
	Characteristic Fire Intensity Scale Category	Acres	Percent
	0	1,217	39 %
	1	12	0 %
	1.5	46	1 %
	2	175	6 %
	2.5	509	16 %
	3	102	3 %
	3.5	848	27 %
	4	158	5 %
	4.5	18	1 %
	5	0	0 %
	> 5	0	0 %
	Total	3,085	100 %

Table and Figure 6-5: Fire Intensity Scale Mapping and Percent of Area for the City of Gorman.



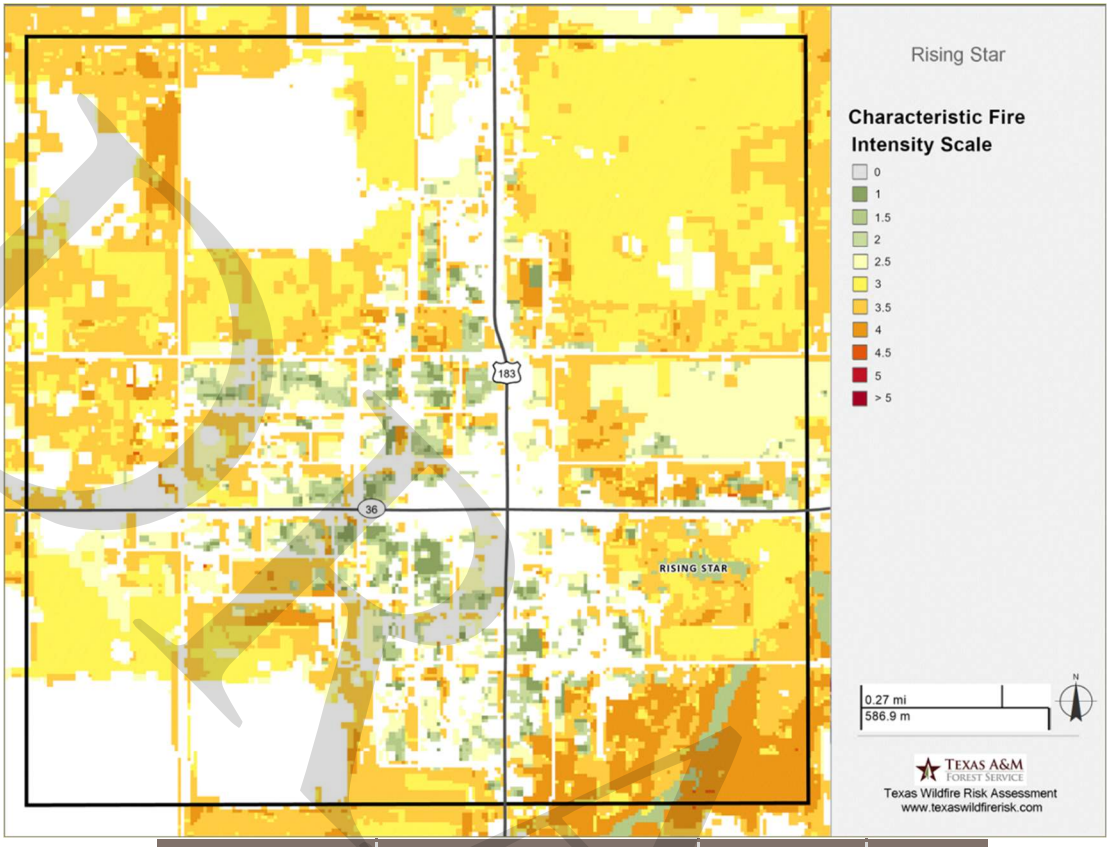
	Characteristic Fire Intensity Scale Category	Acres	Percent
	0	323	32 %
	1	4	0 %
	1.5	14	1 %
	2	140	14 %
	2.5	0	0 %
	3	250	25 %
	3.5	263	26 %
	4	15	2 %
	4.5	0	0 %
	5	0	0 %
	> 5	0	0 %
	Total	1,009	100 %

Table and Figure 6-5: Fire Intensity Scale Mapping and Percent of Area for the City of Ranger.



	Characteristic Fire Intensity Scale Category	Acres	Percent
	0	1,231	28 %
	1	12	0 %
	1.5	64	1 %
	2	336	8 %
	2.5	62	1 %
	3	748	17 %
	3.5	1,837	41 %
	4	146	3 %
	4.5	0	0 %
	5	0	0 %
	> 5	0	0 %
	Total	4,436	100 %

Table and Figure 6-5: Fire Intensity Scale Mapping and Percent of Area for the City of Rising Star



	Characteristic Fire Intensity Scale Category	Acres	Percent
	0	353	34 %
	1	12	1 %
	1.5	23	2 %
	2	25	2 %
	2.5	95	9 %
	3	230	22 %
	3.5	232	23 %
	4	58	6 %
	4.5	0	0 %
	5	0	0 %
	> 5	0	0 %
	Total	1,028	100 %

Historical Occurrences

The NCEI storm events database for Eastland County is listed in Table 6-6 below. Over the nearly 25-year period, Eastland County had two (2) deaths, seven (7) injuries, $161,000 in crop damages, and $6,412,000 in property damage.

Table 6-6: Historical Occurrences of Drought in Eastland County (1999-2024)

Start	End	Deaths	Injuries	Property Damage	Crop Damage
11/27/2005	11/27/2005	0	0	$20,000	$0
1/1/2006	1/2/2006	0	0	$5,000,000	$0
1/27/2006	1/27/2006	0	0	$50,000	$0
4/9/2009	4/10/2009	0	0	$0	$100,000
2/24/2011	2/26/2011	0	0	$0	$2,000
2/27/2011	2/28/2011	0	1	$350,000	$7,000
3/1/2011	3/2/2011	0	0	$0	$0
4/15/2011	4/18/2011	1	6	$0	$50,000
4/15/2011	4/17/2011	0	0	$40,000	$0
4/16/2011	4/24/2011	0	0	$900,000	$0
7/26/2011	7/27/2011	0	0	$40,000	$0
7/27/2011	7/27/2011	0	0	$10,000	$0
8/12/2011	8/24/2011	0	0	$2,000	$2,000
3/16/2022	3/31/2022	1	0	$0	$0

Wildfires in the Urban Interface parts of Eastland County and participating jurisdiction are at a high risk of death and injury. Fires spread fast, and drought conditions can cause multiple fires at different locations around the same time (e.g. April fires of 2011).

Figure 6-6 below identifies the wildfires reported in Eastland County by agency from 2005 to 2021. Figure 6-7 and Table 6-7 show the ignition causes for all wildfires in the planning area between 2005-2021, the number of times of each unique ignition cause, and the percentage of total ignitions.

Figure 6-6: Wildfires Reported by State and Local Agencies from 2005-2021

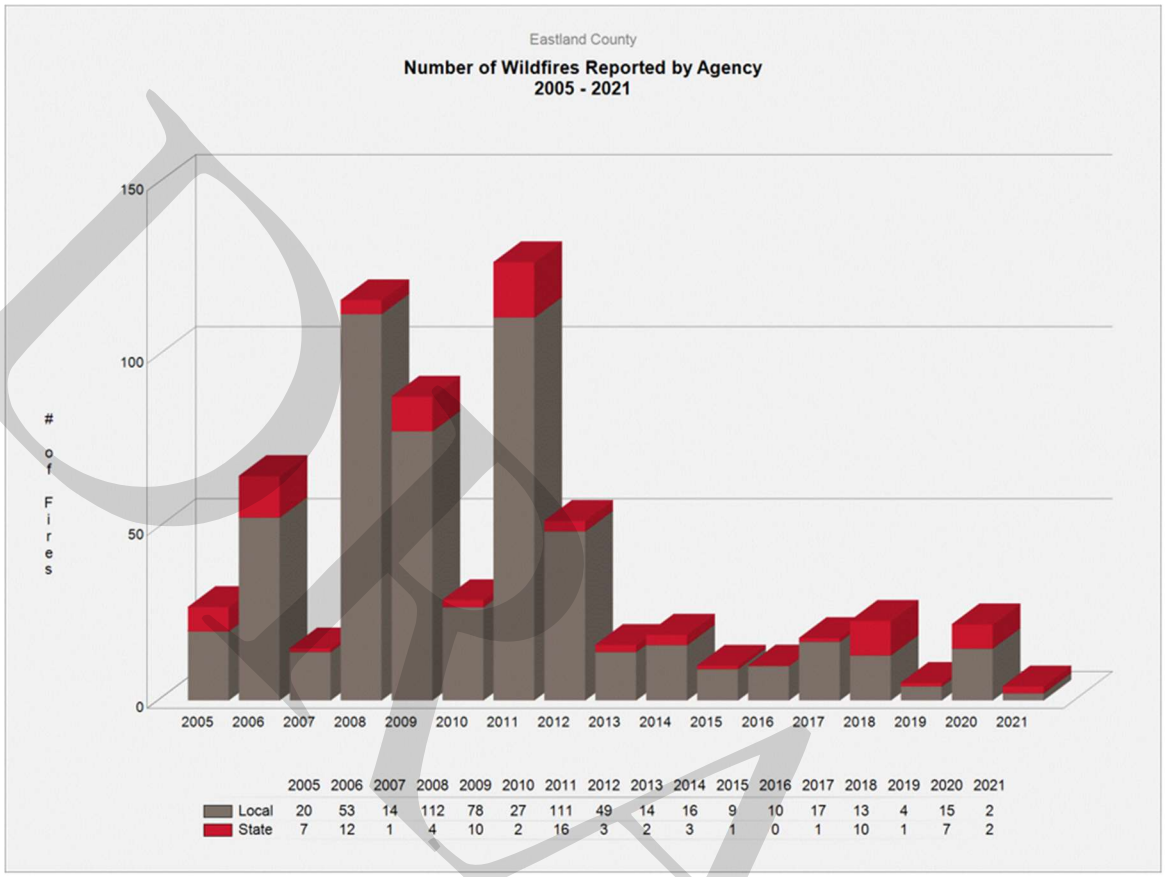


Figure 6-7: Wildfire Ignition Causes from 2005-2021 in Eastland County

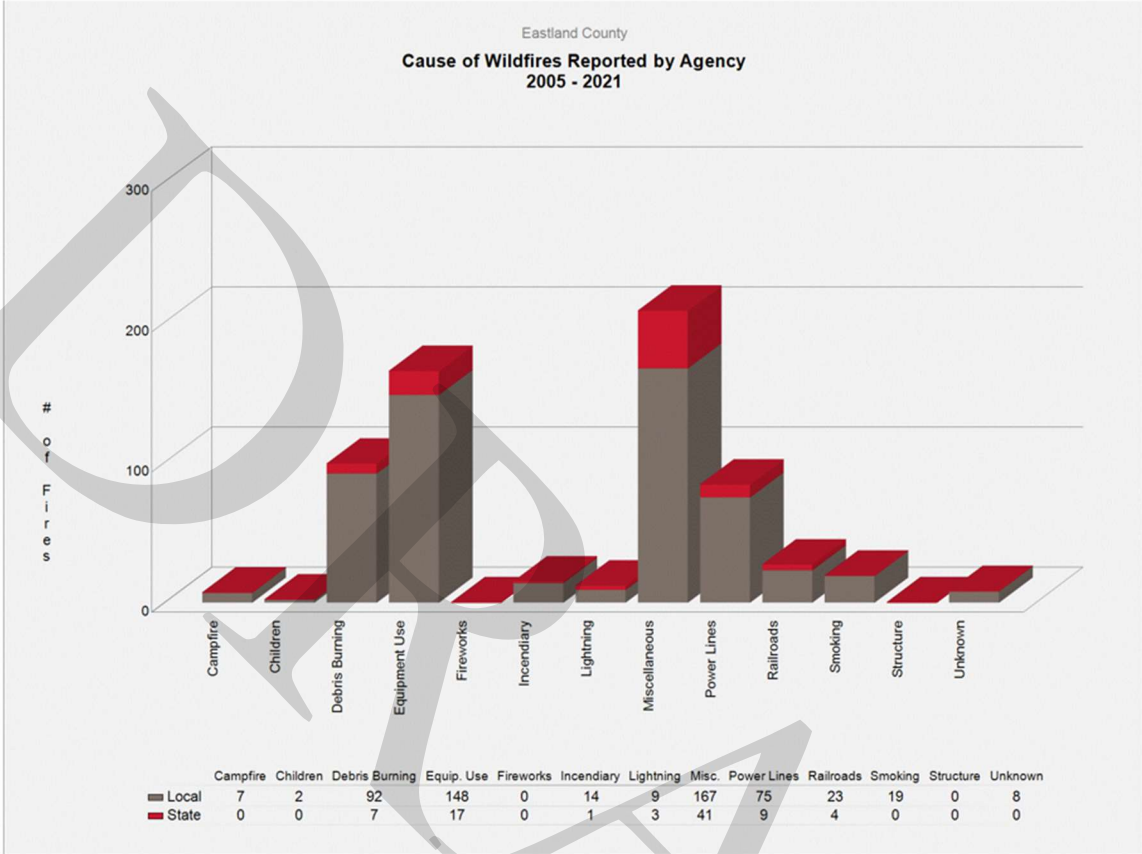


Table 6-7, Wildfire ignition causes from 2005-2021

Ignition Cause	Count	% of Total
Campfire	7	1.1%
Children	2	.3%
Debris Burning	99	15.3%
Equipment Use	165	25.5%
Fireworks	0	0%
Incendiary	15	2.3%
Lightning	12	1.9%
Miscellaneous	208	32.2%
Power Lines	84	13%
Railroads	27	4.2%
Smoking	19	3%

Structure	0	0%
Unknown	8	1.2%
Total	646	100%

Source: Texas Wildfire Risk Assessment Portal (TxWRAP)

Significant Events

New Year's Day Fire, 2006

With extensive drought conditions, the grassland wildfire quickly spread through southeastern parts of the County, quickly burning up to 35,000 acres of land. Carbon, Gorman and Desdemona had forced evacuations, and the community of Kokomo was essentially demolished. Thirty-six buildings, including homes, were destroyed. At the peak, the fire was thirty-five miles long. The fires caused approximately $5,000,000 in property damage between burnt houses, buildings, and lost livestock.

April 2009 Fire

Figure 6-8: Images of fires during the 2009 fires in north-central Texas (Source: Texas A&M)

April is a precarious time, as dead plant matter from winter still remains on the ground, along with potential early drought conditions. Fires burned throughout north-central Texas, and a fire started north of Lake Cisco. In just a day, nearly 10,000 acres of land were burned, costing over $100,000 in crop damages. This fire moved northeast and jumped HWY 183. It then continued to move towards the community of Morton Valley where evacuations were ordered. The total burn area was 12 miles from west to east and 10 miles from south to north.

Fire of February 2011

Drought conditions started in December of 2010, and a wildfire south of Cisco that burned about 700 acres of land. One firefighter was hospitalized for smoke inhalation, and four structures were lost. About $7,000 was lost due to crop damage and $350,000 in property damage.

April 2011 Fires

Wildfires in Texas were rampant in 2011, covering swaths of West, North, Central and East Texas. The drought discussed in Section 5 exacerbated the wildfires, creating wildland fuels for any kind of sparks. Across Texas, 31,453 fires occurred and 4,011,709 acres were burned. In Eastland County, three major fires were documented between 4/15 and 4/24/2011. One fire was east of Carbon, another near Lake Cisco, and another north of Cisco. Residents were evacuated throughout the region, and six firefighters were injured. A firefighter died while helping put out the fires. The longest fire was north of Cisco, ranging from 4/16-4/24. It burned 200 acres, and caused $900,000 in property damage. In total these April fires caused $940,000 in property damage, and $50,000 in crop damage.

Eastland Complex Fire - 2022

Figure 6-9: Photo of a water drop during the Eastland Complex fires, March 2011 (Source NBC News)

Figure 6-10: A firefighter works near Rising Star, Texas (Source: NBC News)

Dry conditions and high winds combined to create a devastating complex fire in Eastland County. Multiple wildfires started in Eastland County, and were combined into the Eastland Complex. The complex consisted of the Walling, Wheat Field, Kidd, Oak Mott, Blowing Basin, Mangum, and Cedar Mountain Fires. The initial fire was the Walling Fire that started on March 16th. Three more fires started on March 17th, and the final three began on March 20th. A total of 54,513 acres were burned in this complex. The Kidd Fire burned the most at 42,333 acres and burned through the town of Carbon causing major damage. An Eastland County Sheriff's Office deputy lost their life while trying to save elderly residents from the approaching fire. Property and crop damages were minimal due to the quick response and coordinated efforts to contain the fire.

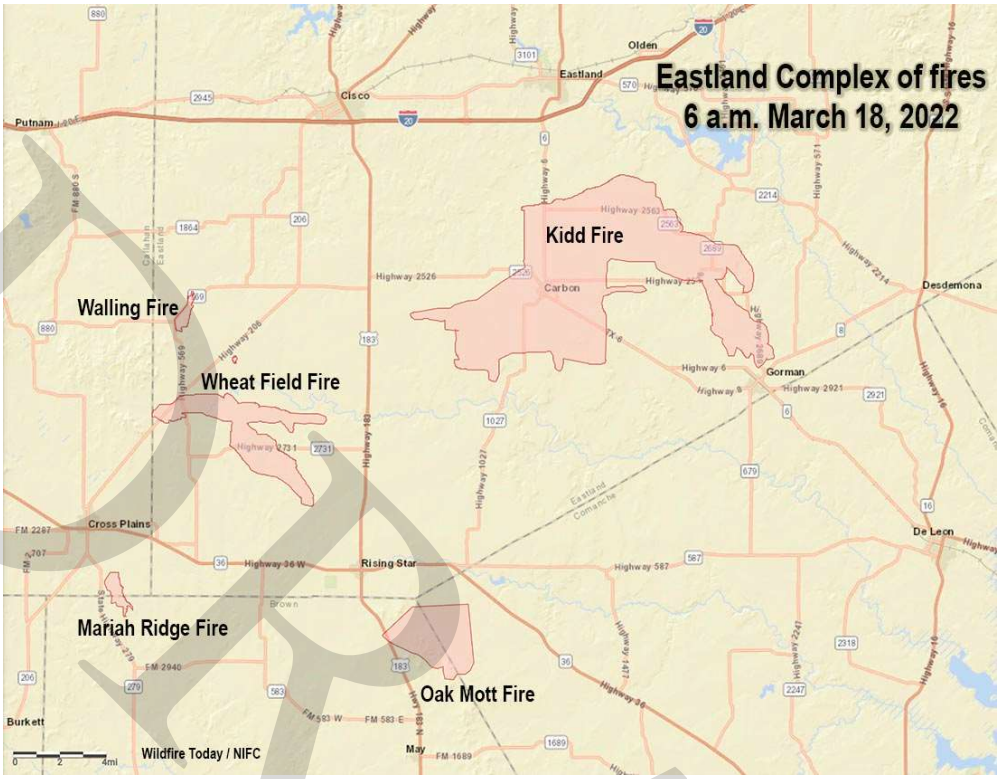


Figure 6-11: Map of Eastland Complex fires dated 3/18/22 (Source: Wildfire Today)

Probability of Future Events

Based on reported historical occurrences of wildfire, 14 wildfire events occurred in a 25-year reporting period for Eastland County. This data establishes an approximate probability of occurrence of 1 event every two years. This frequency supports a Likely Frequency of Occurrence, and will likely occur in the next three years. The risk of future wildfires with greater impact on people and property will increase if existing development patterns continue into the wildlands.

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

Vulnerability and Impact

Populations and structures that are most susceptible to wildfire risk are located in the wildland-urban interface and/or intermix (WUI). WUI fires occur in areas where the built environment meets undeveloped wildland or vegetative fuels. Natural vegetation provides the fuel for wildfires in natural

uninhabited areas, while WUI fires consume both vegetation and materials from the built environment.

The severity of the impact of major wildfire events can be substantial. Such events have caused deaths and injuries, damaged or destroyed property and critical facilities, and disrupted infrastructure and services. The severity of impact is gauged by homes and structures lost, acreage burned, and the number of resulting injuries and fatalities. The vulnerability of the jurisdictions in the planning area to wildfire events is increased where critical facilities are in the WUI as they are more likely to sustain damage from the hazard event.

Functional WUI represents a classification of the land near buildings into zones that describe the wildfire risk mitigation activities appropriate for each zone.

Direct Exposure—The Direct Exposure zone is burnable land cover within 75 m of a structure. Reducing fire intensity and ember production in this zone would reduce the exposure of nearby buildings to heat and embers. Buildings in this zone also require hardening of the structure to resist ignition.

Indirect Exposure—The Indirect Exposure zone is non-burnable land cover within 1500 m of burnable land cover that is within 75 m of a structure, meaning that embers and home-to-home spread could reach within this zone. Indirectly exposed structures would benefit from the hardening of the structure to resist ignition from embers and nearby structures, but defensible space is usually not required due to the heavily developed nature of the zone.

Critical Fireshed—The Critical Fireshed is the unpopulated land within about 2.4 km of a group of structures. Fires that originate within or spread to the Critical Fireshed have an immediate threat of reaching the nearby structures; fuel treatments that slow fire spread in this zone can reduce risk to these structures.

Sources of Ember Load to Buildings—These are areas of burnable land cover that produce embers capable of reaching nearby buildings. Ember production is a function of fire type and intensity, and ember travel is a function of wind speed and direction. Fuel treatment in this zone is a priority for reducing ember load to the nearby buildings.

Little-to-no Exposure—The Little-to-no Exposure zone is non-burnable land that is within 75 m of a structure but greater than 1500 m from a large (500 ha) contiguous block of burnable land cover. Flames—even from home-to-home spread—and embers are unlikely to reach the Little-to-no-Exposure zone, but smoke and evacuations could still impact this area.

*Buildings used in producing Functional WUI are defined as greater than 40 sq meters.

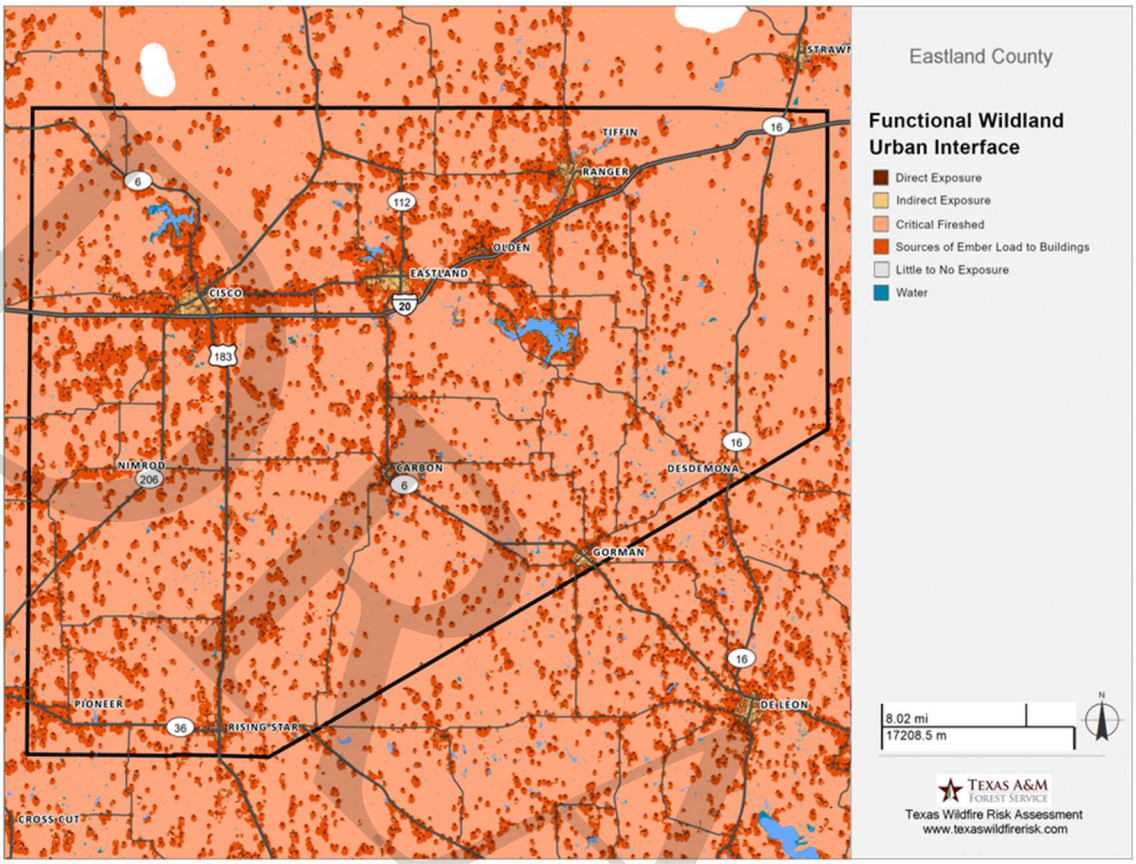


Figure 6-12: Eastland County Wildland Urban Interface map (Source: TxWRAP A&M)

78% of Eastland County is under threat of direct exposure from wildfires, with a significant portion of the county belonging to the Critical Fireshed classification (74%) and Sources of Ember Load to Buildings classification (20%). Indicating a prioritization of fuel treatments to reduce wildfire risk should be considered to reduce the risk to vulnerable communities and structures nearby.

The impacts from a wildfire on the Eastland County planning area would be severe based on the overall moderate to high-risk rating. Impacts would include air quality degradation due to the wildfire producing large amounts of smoke and other pollutants. This situation can cause health problems for residents, especially those with respiratory issues. If the wildfire is severe enough, or close enough to populated areas, it can result in the need for evacuations.

Evacuation can be a traumatic experience for many people, especially if they must leave their homes and possessions behind, including pets. Wildfire often harms or destroys homes, businesses, and other buildings, leading to significant property damage. They can cause power outages, which can disrupt normal life and can cause economic impacts, especially in places that depend on tourism or agriculture. The loss of power and disruption to normal life can result in financial losses for businesses and individuals.

To reduce these vulnerabilities and impacts, cities can take steps to prepare for wildfires, such as creating evacuation plans, conducting regular fire drills, implementing building codes and other regulations to reduce fire risk, and working with fire departments to improve fire suppression and

response capabilities. Additionally, the County and jurisdictions can create a Wildfire Protection Plan to help coordinate local efforts, create significant plans to reduce and prepare for wildfires, and seek funding to support fire departments.

SECTION 7: LIGHTNING

Description

Lightning is sudden electrical charges that develop from storms or excessive heat. This massive electrostatic discharge can occur between electrically charged regions within clouds, or between a cloud and the Earth's surface. A bolt of lightning, or the visible sparks, can cause air temperatures surrounding the bolt to approach 50,000°F causing rapid air expansion leading to thunder, which often accompanies lightning strikes. Lightning is most often affiliated with severe thunderstorms and often strikes outside of heavy rain and can occur as far as ten miles away from any rainfall.

Location

The Eastland County planning area is located in a region of the country that is very susceptible to lightning strikes. Lightning can occur at any location within the entire planning area, and it is assumed that all areas within Eastland County are uniformly exposed to the threat of lightning due to the consistent geography and terrain found throughout.

Extent

Lightning's extent is defined in terms of the frequency of lightning strikes within a defined geographic area and a set time period. The Vaisala's U.S. National Lightning Detection Network lightning flash density map, Figure 7-1, shows the average number of lightning events per km2 per year. According to the map below, the Eastland County planning area has a total lightning density of 45.4 events/km2/year for the planning area from 2016-2022.

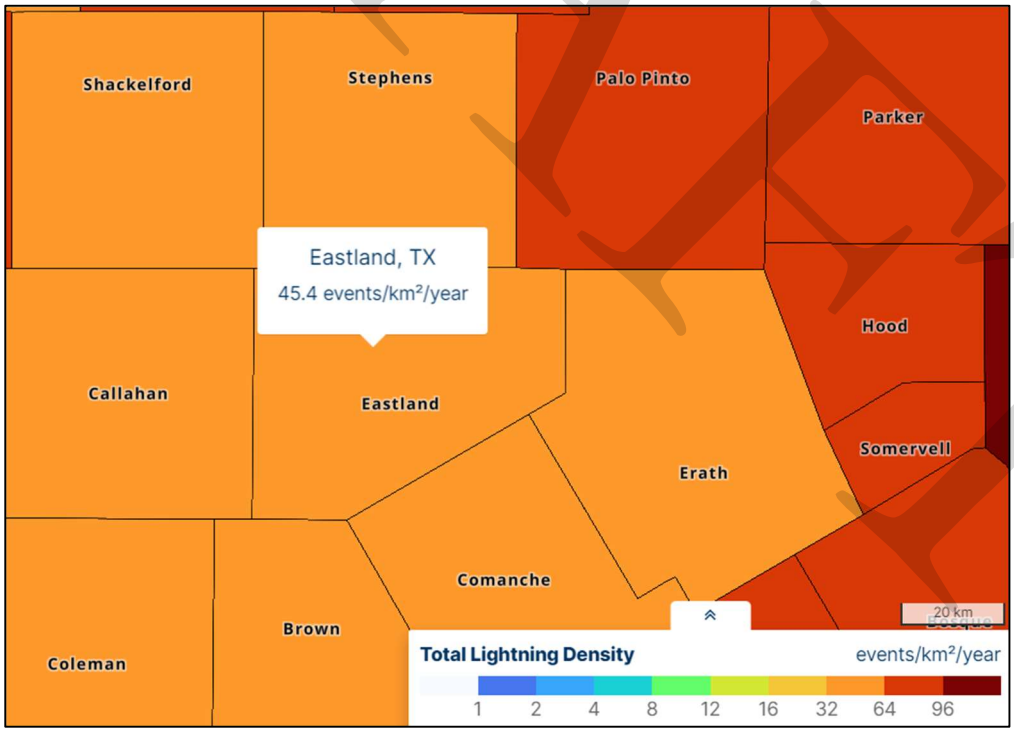


Figure 7-1: Lightning Density of Eastland County. (Source: https://interactive-lightning-map.vaisala.com/)

A total lightning density of more than 64 events/km2/year in an area is considered to be a major severity and a total lightning density of more than 96 events/km2/year in an area is considered to be an extreme severity. Any lightning strike that causes death or property damage is likewise considered a major severity. The lightning hazard is considered to be a high severity for the planning area, given the density of 45.4 events/km2/year.

The magnitude of lightning hazard events can also be measured in terms of the number of strikes in a smaller interval of time. The Lightning Activity Levels (LALs) scale is used by NOAA to express the extent of lightning events and is on a scale of 1 to 6 along with descriptions of corresponding cloud and thunderstorm development. The LAL rankings scale reflects the frequency of lightning strikes from cloud to ground within a 15-minute interval. Lightning activity levels are described in more detail in Table 7-1 below.

Table 7-1: Lightning Activity Level scale description (Source: NOAA)

LAL	Cloud and Storm Development	Lightning Strikes/15 Min
1	No thunderstorms.	0
2	Cumulus clouds are common but only a few reach the towering cumulus stage. A single thunderstorm must be confirmed in the observation area. The clouds produce mainly virga, but light rain will occasionally reach the ground. Lightning is very infrequent.	1-8
3	Towering cumulus covers less than two-tenths of the sky. Thunderstorms are few, but two to three must occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent.	9-15
4	Towering cumulus covers two to three-tenths of the sky. Thunderstorms are scattered and more than three must occur within the observation area. Moderate rain is common, and lightning is frequent.	16-25
5	Towering cumulus and thunderstorms are numerous. They cover more than three-tenths and occasionally obscure the sky. Rain is moderate to heavy, and lightning is frequent and intense.	>25
6	Similar to LAL 3 except thunderstorms are dry.	9-15

The Eastland County planning area can generally experience all lightning activity levels based on the extent and location of thunderstorm and tornado conditions and all areas are vulnerable to a LAL of 5, the most severe threat of lightning.

Historical Occurrences

While lightning occurs quite frequently in the planning area, the only lightning data contained within NOAA Storm Data are lightning events that result in fatality, injury, and/or property and crop damage. Eastland County and participating jurisdictions have reported 6 lightning events since 1999. Structural damages resulting from lighting events are considered severe with the risk of injury or death representing the greatest risk.

Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Ranger	5/28/2009	0	0	$4,000	$0
Eastland	10/6/2008	0	0	$10,000	$0
Cisco	6/12/2007	1	0	$100,000	$0
Cisco	5/1/2007	0	0	$15,000	$0
Eastland	4/19/2006	0	0	$20,000	$0
Gorman	8/8/2005	0	0	$5,000	$0

Significant Events

Eastland 2006

A storm hit the City of Eastland in April 2006 that caused a house fire on Doughtery street. The fire was quickly contained, leaving only the attic damaged. The fire cost $20,000 in property damages.

Cisco June 2007

A cool front created an atmosphere that led to a lightning storm over Cisco. Lightning struck a chemical plant, causing an explosion and subsequent fires. One person was killed by the fires following the lightning strike, and caused $100,000 in property damages.

Texas A&M Forest Service (Wildfires Caused by Lightning)

Lightning occurrences and damage are not well documented in the NCEI data but other sources and accounts from the Core planning team members indicate that lightning strikes occur frequently in the planning area. The Texas A&M Forest Service maintains a wildfire occurrence database based on state and local reports. The local reports are based on a voluntary online fire department reporting system that is used by both paid and volunteer fire departments. Table 10- 3 lists wildfires caused by lightning

strikes recorded by the Texas Forest Service from 2005 to 2021 within the planning area.

Table 10-3: Wildfire Ignitions Caused by Lightning (Source: Texas Wildfire Risk Assessment Portal TxWRAP)

Location	Ignitions Caused By Lightning
Eastland County	12
City of Eastland	1
City of Carbon	0
City of Gorman	0
City of Rising Star	1
City of Cisco	0
City of Ranger	0

Lightning is believed to be responsible for only 12 of the 646 (1.9%) of the recorded wildfire ignitions from 2005 through 2021, indicating that while lightning is a significant hazard, it has a relatively minimal history of being a compounding or coupled hazard.

Probability of Future Events

With limited reported incidents in the planning area, the team utilized the most current lightning flash density estimate developed by Vaisala, Figure 10-1, for the risk assessment. The most current lightning flash density estimate indicates a probability of occurrence of approximately 45.4 lightning events per square kilometer per year. Eastland County is 932 square miles or 2413.9 square kilometers. The Vaisala flash density estimate combined with the total area produces an estimate of approximately 109,600 flashes per year. A Highly Likely probability of occurrence for future lightning events in the Eastland County planning area is supported by this frequency. This means that an event is probable in the next year.

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

Vulnerability and Impacts

Lightning strikes are random making all property and people within the planning area vulnerable to the impact of lightning. Lightning can also be responsible for damage to buildings, electrical systems, forest and/or wildfires, and damage to infrastructure such as power transmission lines and communication towers. Lightning is attracted to tall metal structures making water towers, electric power stations, and power poles particularly vulnerable to strikes. Lightning strikes can disrupt communication systems, including telephone and internet services, which can impact emergency response times and communication between businesses and customers. Lightning strikes can cause power outages that can affect large areas and cause disruption to businesses, transportation, and other essential services. The damage caused by lightning strikes can have a significant economic impact on cities, particularly in areas where businesses and tourism are major industries. Damage to buildings and electrical equipment can result in costly repairs and downtime. Lightning strikes can cause fires that can spread quickly and cause extensive damage to buildings and surrounding areas and are a cause of wildfires making agricultural land vulnerable as well. Agricultural losses from this hazard can be extensive.

Lightning strikes can also pose a risk to public safety, particularly in outdoor areas such as parks, sports fields, and other public spaces. The peak lightning season in the State of Texas is from June to August; however, the most fatalities occur in July as fatalities occur most often when people are outdoors, working, or participating in some form of recreation. Moving inside will decrease a person's vulnerability to injury or death due to lightning strikes.

Communities can take steps to mitigate the impact of lightning strikes by implementing lightning protection systems, maintaining electrical infrastructure, and educating the public on lightning safety measures. Doing so can minimize the risks associated with lightning strikes and ensure the safety and well-being of their residents and visitors.

SECTION 8: FLOODS

Description

Floods are defined as the accumulation of water within a water body and the overflow of excess water into adjacent floodplain lands. When surface water runoff enters streams, rivers, or dry creek beds, riverine flooding conditions occur whenever the water carrying capacity of the water channel is compromised by excess runoff. Types of flooding include riverine flooding, coastal flooding, and shallow flooding. If the local basin drainage area is relatively flat, then slow-moving floodwater can last for days. In drainage areas with substantial slopes, or the channel is narrow and confined, rapidly moving and extremely high-water conditions called a flash flood can occur.

Common impacts of flooding include damage to personal property, buildings, and infrastructure; bridge and road closures; service disruptions; and injuries and fatalities. In this report, historical damage from flooding is reported here and in Chapter 1 (along with other hurricane-related damages).

Location

The Flood Damage Prevention Ordinance renewed in 2021 by Eastland County uses the 2010 Digital Flood Insurance Rate Map (DFIRM) data provided by FEMA for Eastland, which delineates the Special Flood Hazard Areas (SFHAs) as those at the highest risk of flooding. The Flood Damage Prevention Ordinance renewed in 2021 by Eastland County uses the 2010 Digital Flood Insurance Rate Map (DFIRM) data provided by FEMA for Eastland, which delineates the Special Flood Hazard Areas (SFHAs) as those at the highest risk of flooding. The DFIRM, however, only contains the unnumbered Zone A Designation. FEMA has recently released Estimated Base Flood Elevation data which updated the floodplain area zones for Eastland County and identifies .2% or a 500-year floodplain in Eastland County. Though not officially adopted, it is important to plan with the most accurate and future-looking flood hazard data. Preventing development in the 500-year floodplain is essential for comprehensively reducing flood risk.

Table 8-1: List of jurisdictions and percent of area in floodplains

Jurisdiction	Floodplain Type	Percent of Community Area
Eastland County	1% Annual	23.5%
Eastland	1% Annual	39.51%
Ranger	1% Annual	38.52%
Cisco	1% Annual	18.99%
Carbon	1% Annual	32.34%
Gorman	1% Annual	22.61%
Rising Star	1% Annual	52.98%

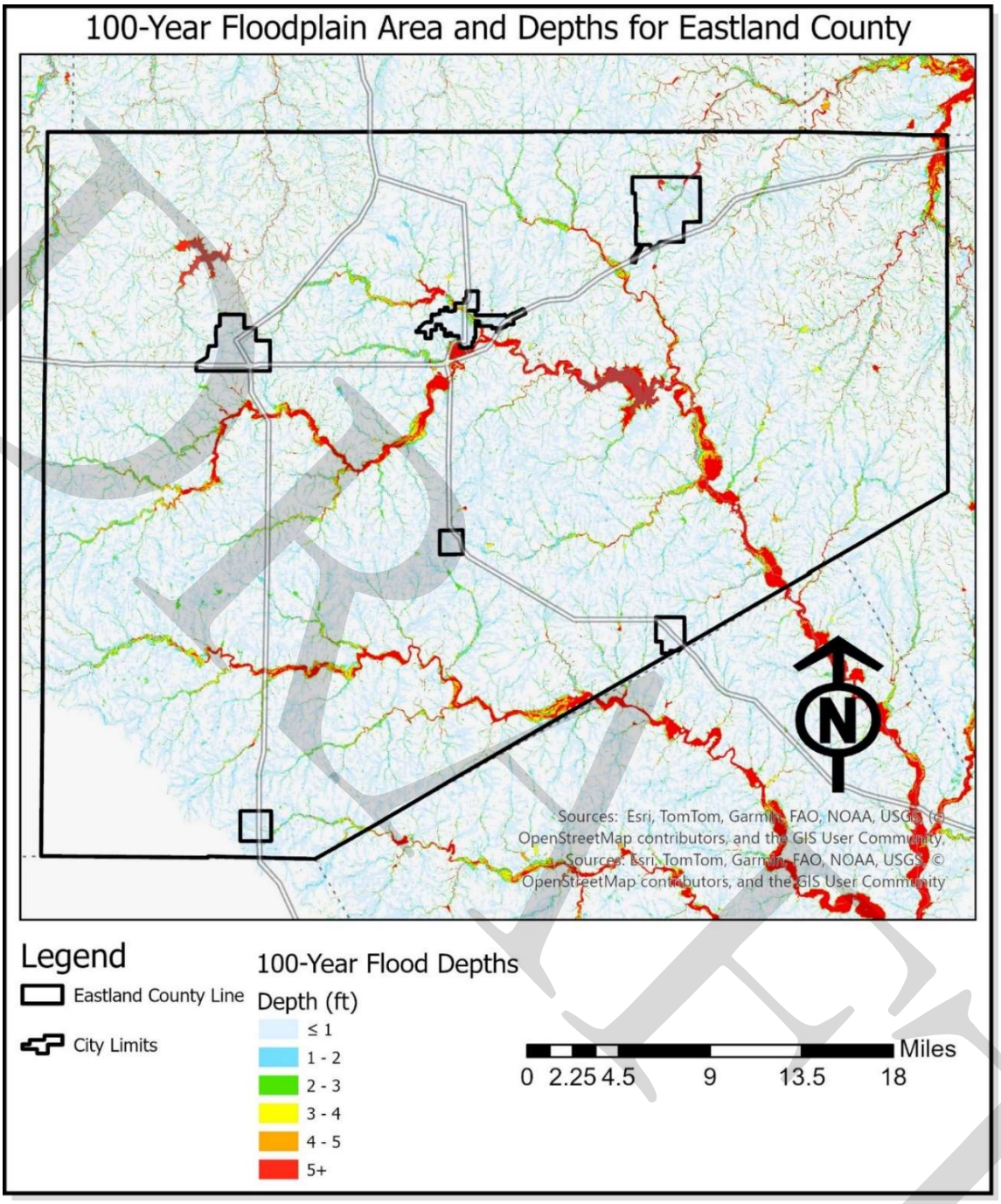


Figure 8-1: Eastland County 100-year flood plain map

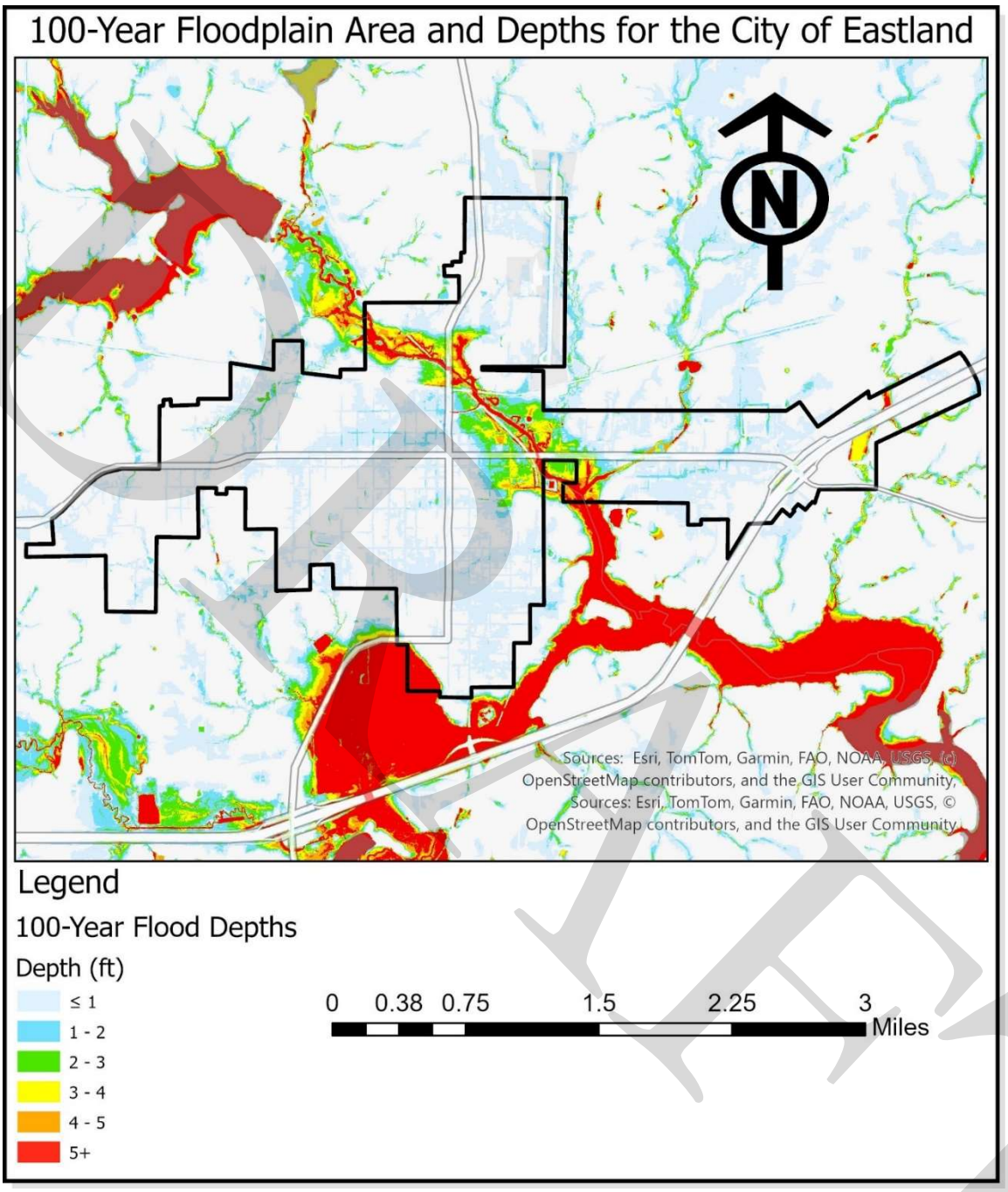


Figure 8-2: City of Eastland 100-year floodplain map

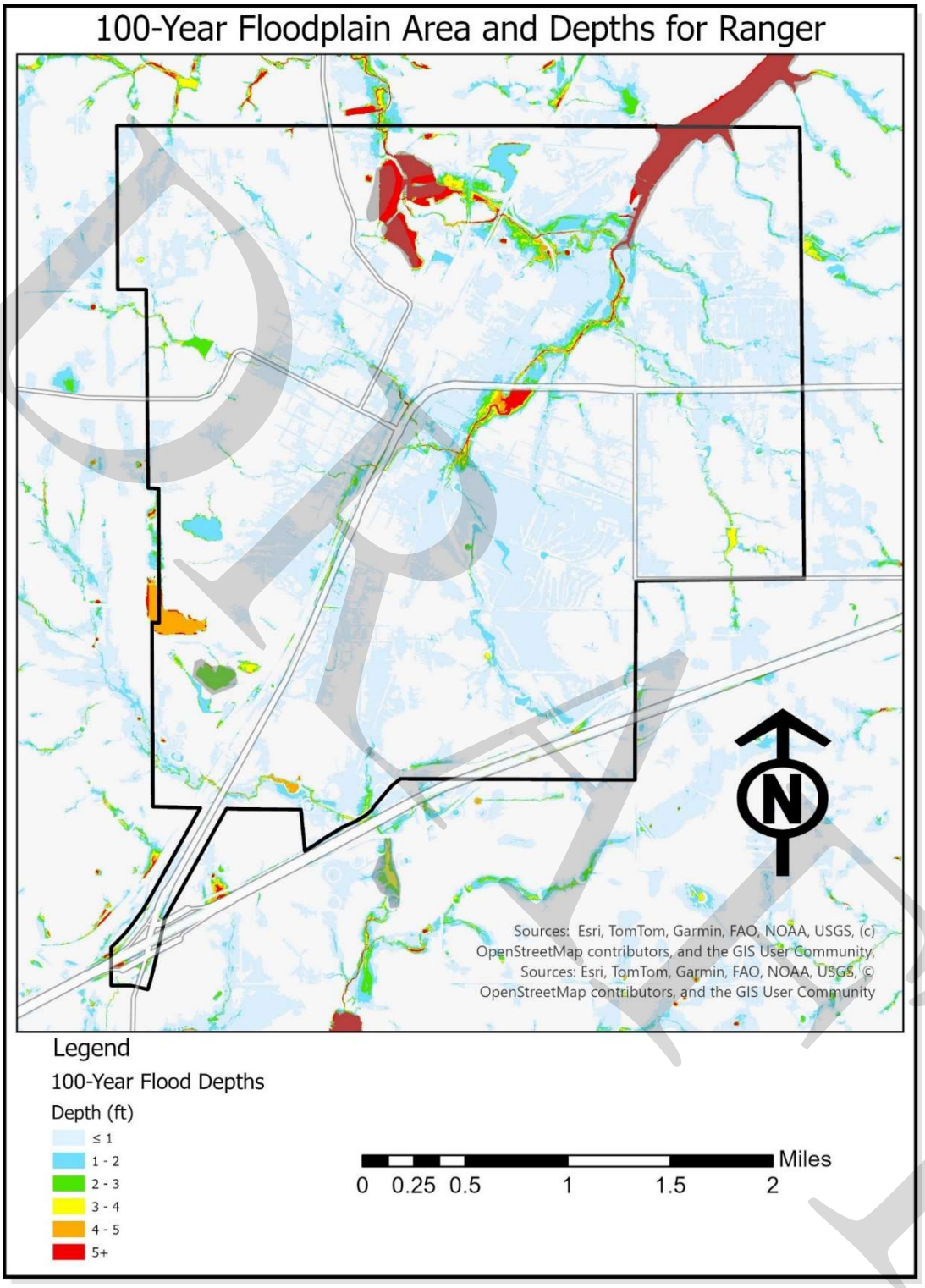


Figure 8-3: City of Ranger 100-year floodplain map

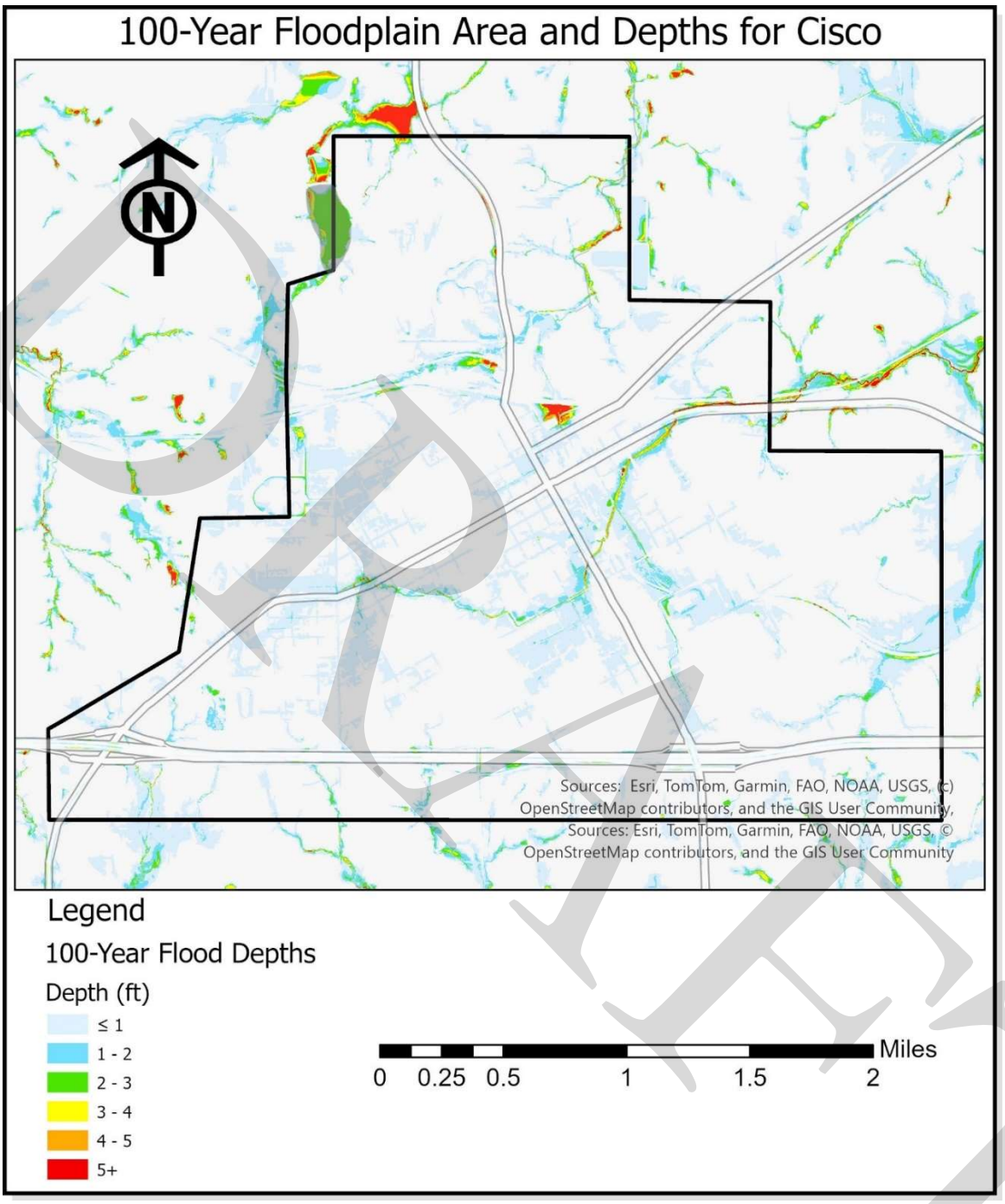


Figure 8-4: City of Cisco 100-year floodplain map

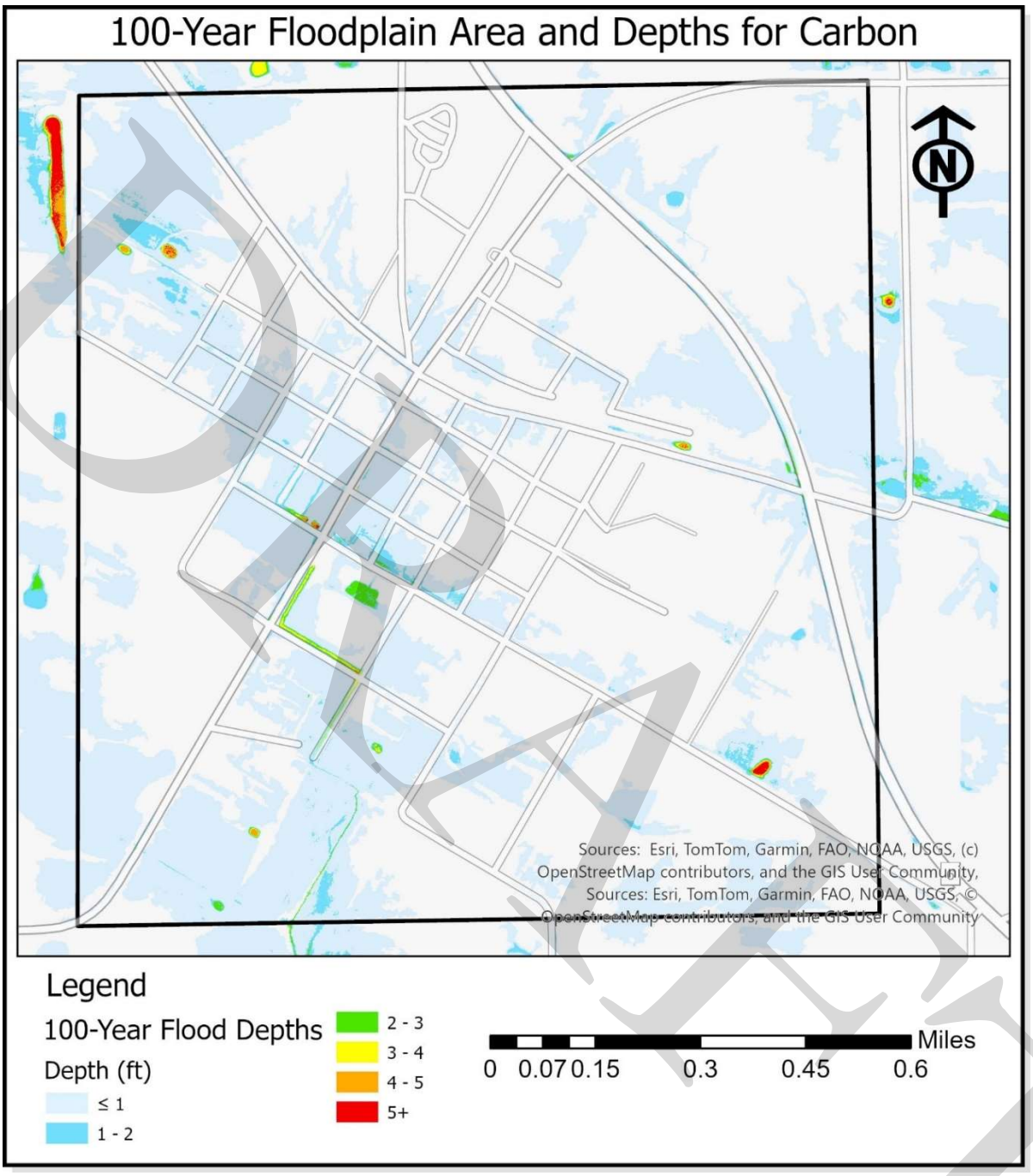


Figure 8-5: City of Carbon 100-year floodplain map

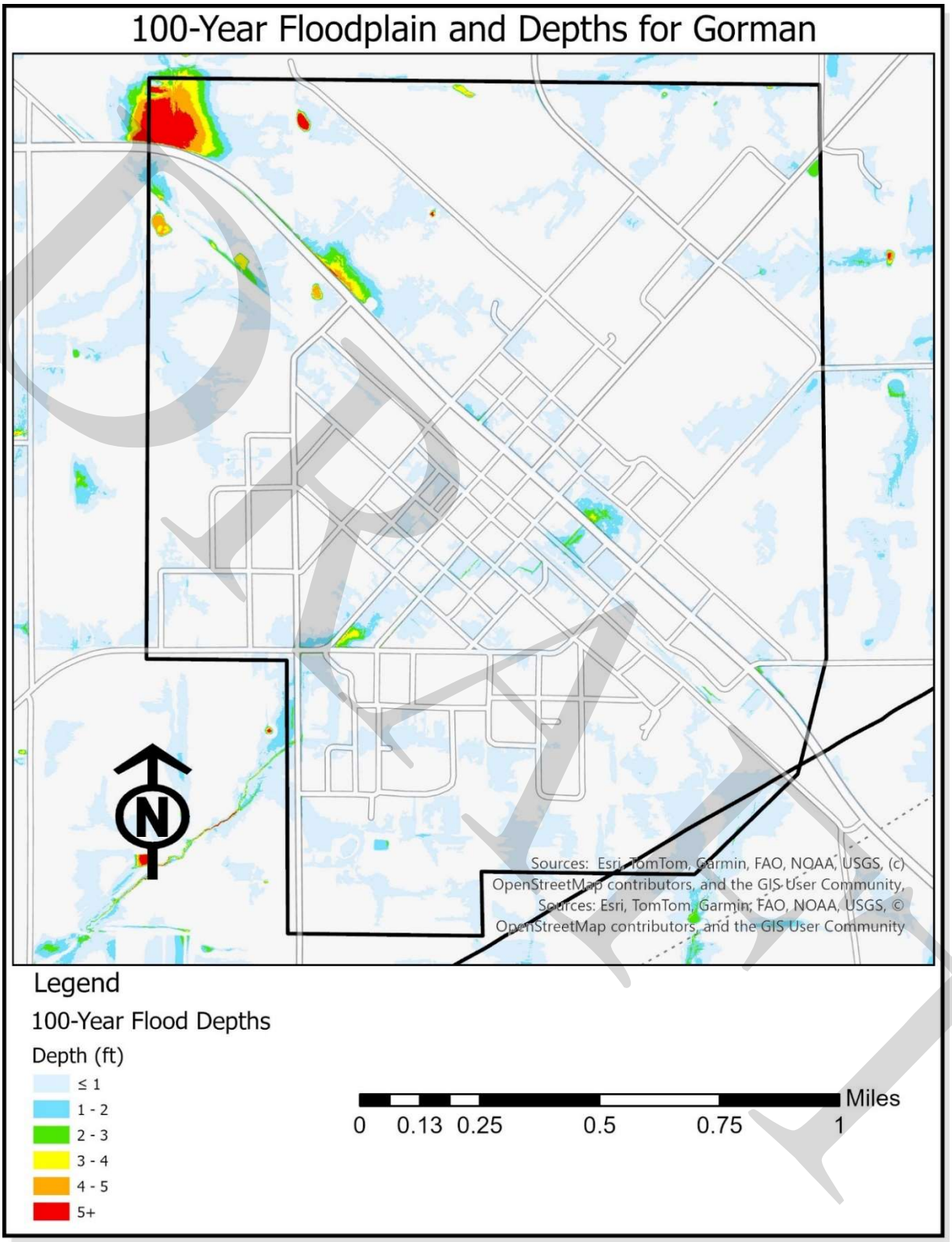


Figure 8-6: City of Gorman 100-year floodplain map

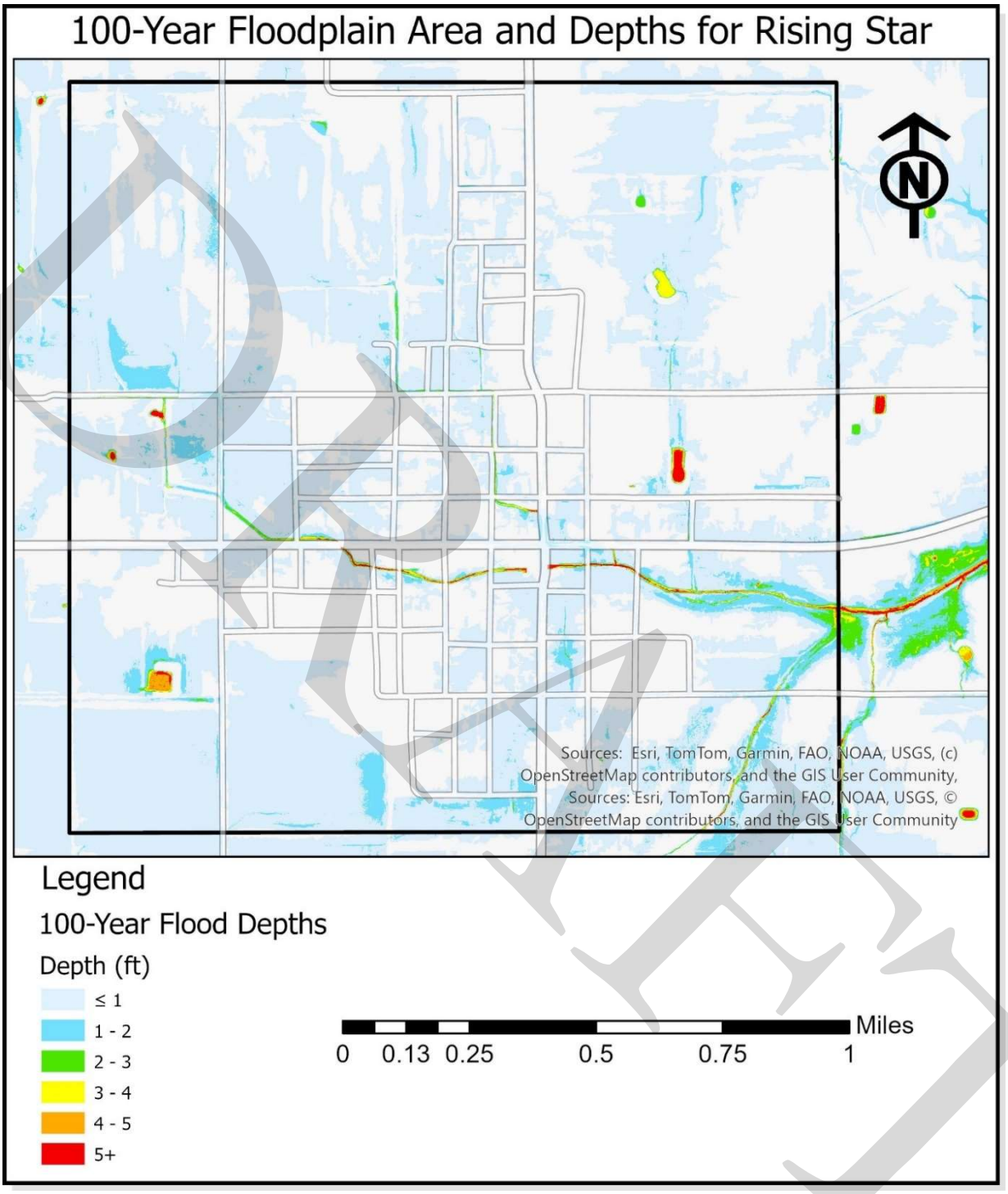


Figure 8-7: City of Rising Star 100-year floodplain map

Extent

Flood event severity is a complex science studied by hydrologists and engineers. The severity of a flood event is established by a combination of several factors including stream and river basin topography and physiography, precipitation, weather patterns, recent soil moisture conditions, and

degree of vegetative clearing and impervious surface. Urbanization, due to its relationship to increased impervious cover, contributes to flood severity. Based on historical occurrences, flood events can last anywhere from a couple of hours to several days.

A flood zone provides a measure of a flood's intensity and magnitude. A base flood is defined by FEMA as a flood having a one percent chance of being equaled or exceeded in any given year. It is also known as the "100-year flood" or the "1% annual chance event". The base flood is the national standard used by the National Flood Insurance Program. Flood zones are delineated on Flood Insurance Rate Maps, and the depths of flooding can be interpreted from the summary data and profiles in the Flood Insurance Study. Flood depths may range from less than one foot to more than five feet in places, depending on the severity of the event (as measured in annual chance exceedance). Table 6-1 provides a description of FEMA flood zones and the flood impact in terms of severity or potential harm. Flood Zones A, AE, AO, and X are the hazard areas mapped in the planning area and determine the intensity of a potential flood event. As stated previously, a majority of Eastland County is designated as Zone A, with BFE now available through new hydrological studies accessible through the FEMA Estimated Base Flood Elevation Viewer.

Table 8-2: FEMA Flood Zone Categories

Floodway	A "Regulatory Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure that there are no increases in upstream flood elevations. For streams and other watercourses where FEMA has provided Base Flood Elevations (BFEs), but no floodway has been designated, the community must review floodplain development on a case-by-case basis to ensure that increases in water surface elevations do not occur or identify the need to adopt a floodway if adequate information is available.
Zone A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
Zone AE	Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.
Zone AO	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply.
0.2 SFHA	These are the areas that have a 0.2 percent chance of being equaled or exceeded in any given year.

Zone X	The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood, are Zone X.

Historical Occurrence

Historical evidence indicates that areas within the planning area are susceptible to flooding, especially in the form of flash flooding. It is important to note that only reported flood events have been factored into this risk assessment; therefore, it is likely that additional flood occurrences have gone unreported before and during the recording period. Table 8-3 identifies historical flood events that resulted in damage, injuries, or fatalities within the planning area. Historical Data is provided by the Storm Prediction Center (NOAA), NCEI database for Eastland County. There have not been any events recorded prior to the listed dates.

Table 8-3: Historical Flood Events, 1999-2024

Location	Date	Injuries	Fatalities	Crop Damage	Property Damage
Ranger	3/18/1999	0	0	$0	$0
Ranger	3/18/1999	0	0	$0	$0
Ranger	6/25/1999	0	0	$0	$0
Gorman	7/6/1999	0	0	$0	$0
Cisco	4/30/2000	0	0	$0	$0
Scranton	7/6/2002	0	0	$2,000	$0
Eastland	7/6/2002	0	0	$0	$0
Countywide	7/6/2002	0	0	$25,000	$25,000
Cisco	10/18/2002	0	0	$0	$0
Countywide	10/18/2002	0	0	$100,000	$0
Eastland	10/18/2002	0	0	$0	$0
Cisco	6/4/2005	0	0	$0	$0
Cisco	8/8/2005	0	0	$10,000	$0
Cisco	8/9/2005	0	0	$0	$0
Cisco	8/9/2005	0	0	$0	$0
Eastland	5/24/2007	0	0	$0	$0
Carbon	6/25/2007	0	0	$0	$0
Rising star	6/26/2007	0	0	$0	$0
Olden	6/26/2007	0	0	$0	$0
Olden	6/27/2007	0	0	$1,200,000	$0
Gorman	6/28/2007	0	0	$0	$0
Cisco	6/28/2007	0	0	$0	$0
Cisco	6/20/2008	0	0	$3,000	$0
Cisco	7/16/2013	0	0	$0	$6,000
Cisco airport	7/16/2013	0	0	$6,000	$0

Rising star	5/29/2016	0	0	$0	$0
Tiffin	5/29/2016	0	0	$0	$0
Cisco airport	5/30/2016	0	0	$0	$0
Cisco airport	6/2/2016	0	0	$0	$0
Cisco airport	6/2/2016	0	0	$50,000	$0
Rising star	5/18/2017	0	0	$0	$0
Eastland	5/31/2021	0	0	$0	$0
Olden	5/31/2021	0	0	$0	$0
Rising star	5/4/2024	0	0	$10,000	$0

Significant Events

May 2024 – Rising Star Flood

In early May of 2024, Eastland County experienced a major storm event resulting in flooding throughout Rising Star. Sheriff Jason Weger announced that highway 183 and highway 36 were flooded throughout the town. The flooding reportedly caused damage to more than 30 homes.

June 2016 – State Highway 6 Collapse

Figure 8-8: Photo of floods on SH 6 (Source: Weather.com)

After a significant storm event on June 2nd, a portion of State Highway 6 was washed out in Eastland County by rising floodwaters, completely shutting down all transportation.

May 2015 – State of Disaster

On May 11th, Governor Abbott declared a state of disaster for Eastland County following a severe weather event. Flooding along Lake Leon inundated approximately 20 homes, and the residents of more than 100 other homes in the area were asked to evacuate.

Probability of Future Events

FEMA states that flooding is the most common natural disaster in the United States, affecting every region and every state. Based on recorded historical occurrences and extent within the Eastland County planning area, 34 recorded flooding events in the 25-year reporting period provide a probability of occurrence of at least one flood event per year. This frequency supports a highly likely probability of future events, meaning that an event is probable in the next year.

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

Vulnerability and Impacts

The flood hazard areas throughout Eastland County are subject to periodic inundation, which may result in loss of life and property, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief, all of which adversely affect public safety. Riverine Flooding has killed and injured more people than any other weather-related hazard and the greatest number of deaths is due to people driving into water going over roads. For this study, the location and proximity to the floodplain or SFHA determines a property's vulnerability to a flood. Structures that lie along the banks of a waterway are the most vulnerable and are often repetitive loss structures. Future development outside of a floodplain is encouraged, although there are some critical facilities, homes, and businesses already located in the floodplain due to their development before current floodplain regulations.

Table 8-4: Facilities in the 1% or 0.2% Annual Chance Floodplain by Jurisdiction

Jurisdiction	Facilities
Eastland County	1 Single Family Residence
City of Eastland	1 Airport, 1 Emergency Response Facility, 2 Assisted Living Facilities, 1 Healthcare Center, 1 Fire Department, 1 Maintenance Facility, and 1 Maintenance Facility
City of Cisco	1 University
City of Ranger	1 Fire Department, 1 Wastewater Treatment Plant, 1 Assisted Living Facility, 1 K-12 School, 1 Airport, 1 College, 1 Religious Center, and 3 Single Family Residences

City of Rising Star	1 Assisted Living Facility
City of Carbon	1 Fire Department, 1 Government Administration Facility
City of Gorman	1 K-12 School and 2 Government Administration Facilities

Flood losses are exacerbated by the cumulative effect of obstructions in floodplains. Occupancy of flood hazard areas is especially hazardous when development is inadequately elevated, flood-proofed, or otherwise protected from flood damage. Moreover, increased development in floodplains can increase flood heights and velocities making flooding more intense and widespread than predicted. Mitigation actions are included to address flood maintenance issues as well (Section 15), such as routinely clearing debris from roadside ditches and bridges. Expanding drainage culverts and stormwater structures to convey flood waters more adequately is critical to flood mitigation as well. Table 8-5 below shows Eastland County dollar losses between 1999 to 2024.

Table 8-5: Eastland County Impact from Flooding

Time Period	Deaths	Injuries	Property Damage	Crop Damage
Loss Summary, Eastland County				
25-year Total	0	0	$2,606,000	$31,000
Per Year	0	0	$104,240	$1,240
Per Capita Dollar Losses (2020 Pop.)				
25-year Total	0	0	$141.72	$1.69
Per Year	0	0	$5.67	7 ¢

Table 8-6 below distributes the countywide impacts presented previously in Table 8-5 amongst the various participating jurisdictions based on the historic records and scale of flooding impact.

Table 8-6: Flood Losses by Jurisdiction 1999-2024

Jurisdiction	**Est. Prop. Losses**	**Est. Crop Losses**	**Total Est. Losses**
Eastland County*	$125,000	$25,000	$150,000
City of Eastland	$0	$0	$0
City of Cisco	$66,000	$6,000	$72,000

City of Ranger	$0	$0	$0
City of Rising Star	$10,000	$0	$10,000
City of Carbon	$0	$0	$0
City of Gorman	$0	$0	$0

National Flood Insurance Program (NFIP) Participation

Eastland County and the participating jurisdictions are enrolled in the National Flood Insurance Program. The NFIP protects businesses and homeowners from devastating losses in the event of a flood hazard. As an additional indicator of floodplain management responsibility, communities may choose to participate in FEMA's Community Rating System (CRS). This is an incentive-based program that allows communities to undertake flood mitigation activities that go beyond NFIP requirements. Currently, none of the communities in Eastland County participate in CRS. It is the purpose of all NFIP jurisdictions participating in the Hazard Mitigation Plan to continue to promote public health, safety, and general welfare by minimizing public and private losses due to flood conditions in specific areas. According to the NFIP Community Status Book and confirmed by the jurisdictions, all jurisdictions in this plan have adopted a Flood Damage Prevention Ordinance. They will continue to comply with NFIP requirements through their local permitting, inspection, and record-keeping requirements for new and substantially improved or damaged construction. Per the 2023 NFIP changes, the Substantial Damage Estimator and Repetitive Damage forms have been incorporated into the Subdivision Rules and Regulations. The Floodplain Administrator for unincorporated Eastland County, the City of Eastland, the City of Cisco, the City of Ranger, the City of Rising Star, the City of Carbon, and the City of Gorman is the Permitting Supervisor in the Eastland County Permit Office.

Table 8-7: Total number of repeat structure damage and losses (Source: FEMA NFIP)

Jurisdiction	**Number of Structures**	**Number of Losses**
Eastland County	17	36
City of Eastland	5	15
City of Cisco	1	2
City of Rising Star	1	2
Total	**24**	**55**

Table 8-8: List of repeat property losses by community (Source: FEMA)

Property Number	Reported City	NFIP Community Name	Property Type	Total Losses
1	Cisco	City of Cisco	Single Family Residence	2
2	Eastland	City of Eastland	Non-residential Building	3
3	Eastland	City of Eastland	Single-Family Residential Building	4
4	Eastland	City of Eastland	Single Family Residence	2
5	Eastland	City of Eastland	Single Family Residence	3
6	Eastland	City of Eastland	Single Family Residence	3
7	Eastland	Eastland County	Non-residential Building	2
8	Eastland	Eastland County	Single Family Residence	3
9	Eastland	Eastland County	Single Family Residence	2
10	Eastland	Eastland County	Single Family Residence	2
11	Eastland	Eastland County	Single-Family Residential Building	2
12	Eastland	Eastland County	Single Family Residence	2
13	Eastland	Eastland County	Single Family Residence	2
14	Eastland	Eastland County	Single Family Residence	3
15	Eastland	Eastland County	Single Family Residence	2
16	Eastland	Eastland County	Single Family Residence	2
17	Eastland	Eastland County	Single Family Residence	2
18	Eastland	Eastland County	Single Family Residence	2
19	Eastland	Eastland County	Non-residential Building	2
20	Eastland	Eastland County	Single Family Residence	2
21	Eastland	Eastland County	Single Family Residence	2

22	Eastland	Eastland County	Single Family Residence	2
23	Eastland	Eastland County	Single Family Residence	2
24	Rising Star	City of Rising Star	Non-residential Building	2

Floodplain Management

The Flood Damage Prevention Ordinances for the County, and the six municipalities: Eastland, Cisco, Ranger, Rising Star, Carbon, and Gorman fully define and address bringing substantial improvement/damage properties up to the most recent flood mitigation standards through the floodplain ordinance permitting process by requiring substantially improved or damaged properties to be elevated or mitigated according to the most recent flood map data. The County Commissioners' Court will also be reviewing building codes for flood resilience in the future and examining strategies to meet the most recent NFIP requirements for structural resilience in flood-hazard areas.

In correspondence with the Floodplain Administrator, it was indicated that no permits have been issued and no floodplain records were available.

SECTION 9: THUNDERSTORM WIND

Description

Severe Wind can occur as straight-line events (derechos), or with other natural hazards including hurricanes and severe thunderstorms. According to the National Weather Service (NWS), a thunderstorm occurs when thunder accompanies rainfall. Thunderstorms create extreme wind events when heat and moisture near the Earth's surface are transported to the upper levels of the atmosphere. The clouds, precipitation, and severe wind that become thunderstorms are the result of this process. Straight-line winds can have gusts of 87 knots (100 mph) or more and are responsible for most thunderstorm wind damages. One type of straight-line wind, the downburst, is a small area of rapidly descending air beneath a thunderstorm. A downburst can cause damage equivalent to a strong tornado and make air travel extremely hazardous.

Location

Thunderstorms are unpredictable and can occur anywhere in the planning area. Eastland County, along with all participating jurisdictions, is equally at risk of thunderstorm winds. According to FEMA's Wind Zones map of the United States (Figure 9-1), the planning area falls under Wind Zone IV (4), associated with winds reaching up to 200 mph. This area is also vulnerable to tornadoes, which is discussed in Section 10, and can cause high wind speeds.

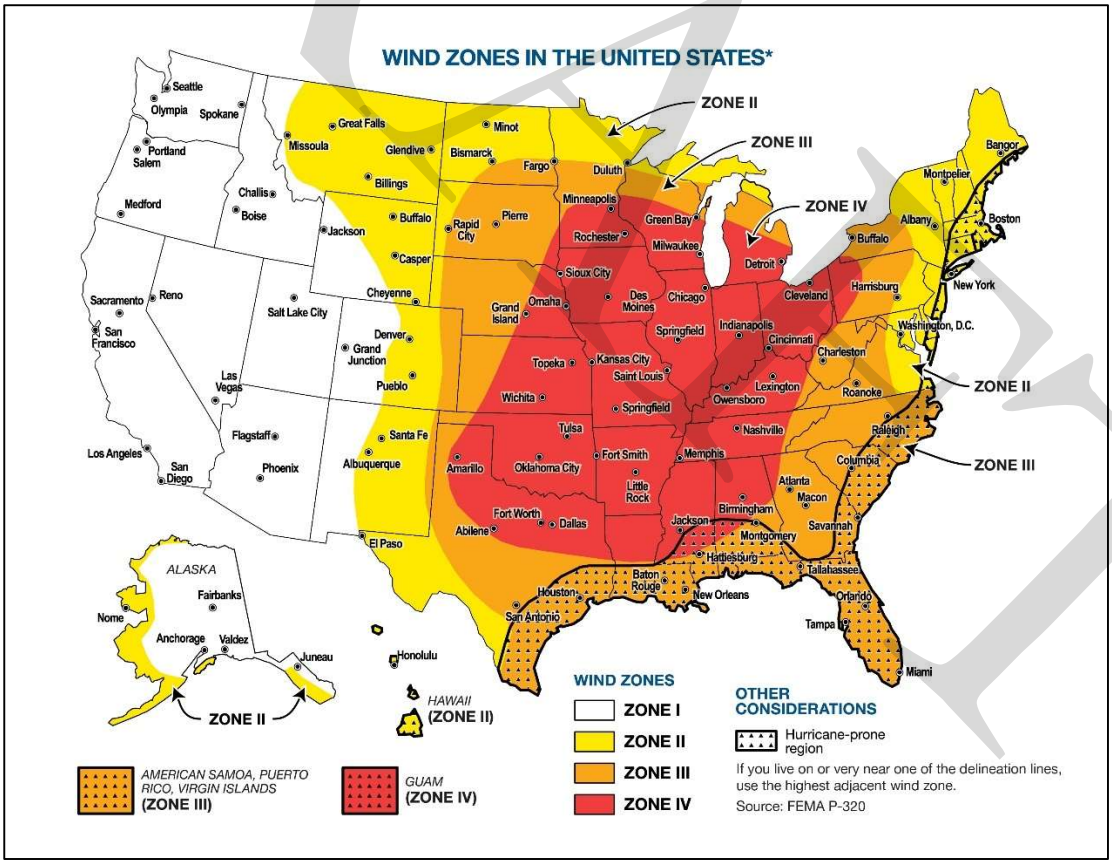


Figure 9-1: Wind Zones in the U.S. (Source: FEMA)

Extent

The extent or magnitude of a specific thunderstorm wind event is measured by the Beaufort Wind Scale, developed in 1805. Table 9-1 describes the Beaufort Wind Scale, with different intensities of wind events in terms of speed and effect, from calm to violent and destructive. Based on historical occurrences, the planning area is expected to experience a windstorm with a maximum magnitude of 10, or storm levels at 55-63 mph.

Table 9-1: Beaufort Wind Scale

Beaufort Number	MPH range	Level - Effect
0	0	Calm – smoke rises vertically
1	1-3	Light air – wind motion is visible in smoke
2	4-7	Light breeze – wind felt on skin
3	8-12	Gentle breeze – leaves in constant motion
4	13-18	Moderate breeze – loose paper is raised
5	19-24	Fresh breeze – small trees sway
6	25-31	Strong breeze – large branches in motion
7	32-38	Near gale – whole trees in motion, difficulty walking
8	39-46	Gale – twig break off trees, cars veer on road
9	47-54	Severe gale – light structure damage
10	55-63	Storm – considerable structure damage
11	64-73	Violent storm – widespread structural damage
12	74-95	Hurricane – considerable and widespread damage

Historical Occurrences

Historical occurrences of thunderstorm wind events with resulting damage that have impacted Eastland County and participating jurisdictions are shown in Table 9-2 on the next page. Only high wind events associated with thunderstorm wind are considered in this section. Wind damage associated with other hazards, such as tornadoes or hurricanes, is accounted for in other sections. From 1999 to 2024, 50 thunderstorm wind events have been recorded in the NCEI storm events database that have impacted the planning area. Some occurrences appear multiple times due to reports from various locations throughout the planning area. There have not been any events recorded past the listed dates.

Table 9-2: Historical Thunderstorm-Wind Events, 1999-2024

Location	Start Date	Wind speeds	Deaths	Injuries	Property Damage	Crop Damage
RANGER	5/11/1999		0	0	$25,000	$0
EASTLAND	6/11/1999	52	0	0	$0	$0
GORMAN	7/6/1999		0	0	$5,000	$0
RISING STAR	8/28/1999		0	0	$10,000	$0
RISING STAR	2/9/2001	52	0	0	$0	$0
EASTLAND	3/24/2001	52	0	0	$0	$0

RANGER	3/24/2001	52	0	0	$5,000	$0
CARBON	4/11/2001	52	0	0	$0	$0
CARBON	4/22/2001		0	0	$15,000	$0
RANGER	4/22/2001		0	0	$10,000	$0
EASTLAND	9/20/2001	52	0	0	$0	$0
EASTLAND	6/15/2002	52	0	0	$3,000	$0
COUNTYWIDE	6/15/2002	52	0	0	$5,000	$0
CISCO	10/6/2002		0	0	$2,000	$0
RISING STAR	3/4/2004	60	0	0	$15,000	$0
GORMAN	3/4/2004	60	0	0	$10,000	$0
EASTLAND	5/27/2004	52	0	0	$0	$0
RISING STAR	11/23/2004	52	0	0	$5,000	$0
EASTLAND	12/6/2004	61	0	0	$1,000	$0
RISING STAR	6/17/2006	50	0	0	$0	$0
RANGER	3/30/2007	61	0	0	$10,000	$0
LAKE LEON	5/7/2007	50	0	0	$1,000	$0
CARBON	6/1/2007	50	0	0	$1,000	$0
CISCO	6/20/2007	50	0	0	$0	$0
EASTLAND	4/10/2008	52	0	0	$20,000	$0
RISING STAR	5/14/2008	50	0	0	$15,000	$0
RISING STAR	2/10/2009	65	0	0	$10,000	$0
EASTLAND	2/10/2009	50	0	0	$0	$0
RISING STAR	5/8/2009	61	0	0	$250	$0
EASTLAND	7/30/2009	53	0	0	$5,000	$0
CHUCKVILLE	1/28/2010	55	0	0	$20,000	$0
CARBON	1/28/2010	52	0	0	$0	$0
GORMAN AIRPORT	1/28/2010	50	0	0	$5,000	$0
CISCO	6/2/2010	52	0	0	$15,000	$0
EASTLAND	6/2/2010	52	0	0	$25,000	$0
RANGER	6/15/2010	52	0	0	$20,000	$0
RISING STAR	8/24/2010	56	0	0	$9,000	$0
RISING STAR	6/12/2012	52	0	0	$5,000	$0
MANGUM	10/10/2014	56	0	0	$0	$5,000
RISING STAR	4/26/2015	61	0	0	$30,000	$0
EASTLAND	5/16/2015	50	0	0	$0	$0
RANGER	8/25/2015	43	0	0	$500	$0
RISING STAR	3/13/2019	50	0	0	$3,000	$0
EASTLAND MUNICIPAL AIRPORT	4/23/2019	61	0	0	$0	$0
EASTLAND	4/23/2019	56	0	0	$600,000	$0
EASTLAND MUNICIPAL AIRPORT	6/18/2019	54	0	0	$5,000	$0

RANGER MUNICIPAL AIRPORT	10/6/2019	54	0	0	$0	$0
LAKE LEON	5/31/2021	50	0	0	$1,000	$0
EASTLAND MUNICIPAL AIRPORT	5/13/2022	56	0	0	$0	$0
EASTLAND	3/24/2023	51	0	0	$0	$0

Significant Events

One significant windstorm event from 1999 to 2024 has caused over $100,000 in damages.

Eastland Winds, April 2019

Figure 9-2: Wind damages to dealership. (Source: FOX West Texas)

Storms that developed along a slow-moving cold front produced pockets of wind damage in north-central Texas. The City of Eastland saw winds that hit up to 70mph at the Eastland Airport. A car dealership saw extensive damages, with buildings damaged and vehicles totaled. This cost approximately $600,000 in property damages.

Probability of Future Events

Thunderstorm season and the winds they bring are commonly associated with late spring and early summer. The months with the highest number of thunderstorm wind incidents are June with 11 incidents, May with 8 incidents, and April with 4 incidents. Wind events categorized as Forces 10-12 on the Beaufort scale with hurricane-force winds have routinely impacted the area and is the level of windstorm hazard the area should mitigate for in the future. The Eastland County planning area has experienced on average 2 thunderstorm wind events every year, meaning that an event is FoO within the next year for the planning area. This constitutes a frequency of "Highly Likely."

Frequency of Occurrence
Highly likely: Event probable in the next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in the next 10 years.

Vulnerability and Impacts

Thunderstorm winds exist at different strength levels and occur randomly throughout the planning area with the potential to cause injury and property damage. All people, animals, existing and future structures, and facilities in the planning area could potentially be impacted and remain vulnerable to strong winds. A thunderstorm wind event can impact human health including injuries from windblown debris, direct injuries, traffic accidents, and in rare cases, fatalities. Debris from damaged structures can also cause damage to other buildings not directly impacted by the event. Infrastructure, such as power lines, poles, radio towers, water towers, and streetlights are vulnerable to the impacts of severe thunderstorm winds. In addition, street signs, garbage cans, outdoor furniture, storage sheds, roofs, vehicles, trees, and other objects commonly found outdoors are at risk. While these vulnerabilities do exist, the overall impacts of thunderstorm wind are limited in scope and have not yet resulted in any reported injuries or fatalities.

The Eastland County planning area features mobile and manufactured home parks which are more vulnerable to thunderstorm winds than site-built structures. These types of homes are also located in rural areas throughout the county, which could result in limited access to essential services and emergency aid in the event of a disaster. Based on 2023 American Community Survey estimates, there are 9,391 housing units in the County of which 13%, or 1,194 units, are mobile or manufactured homes. In addition, 6,453 (69%) of the housing units in the overall planning area were built before 1980. These structures are likely to have been built to less stringent construction standards than newer construction and could be more susceptible to damage during significant events. Jurisdiction data is further detailed in Table 9-3 below.

Table 9-3: Structures at Greatest Risk by Jurisdiction (Source: 2023 ACS 5-year estimate)

Jurisdiction	Total Housing Units	Mobile Housing Units	Housing Built Before 1980
Eastland County	9,391	1,194	6,453
City of Eastland	1,901	110	1,510
City of Carbon	161	48	82

City of Cisco	1,589	72	1,238
City of Gorman	525	40	467
City of Ranger	1,343	247	998
City of Rising Star	473	71	374

*County totals include all jurisdictions, ISDs, and unincorporated areas.

Historic Thunderstorm Winds Impacts

On the next page is the Eastland County Loss Summary Table, 9-4, which shows the 25-year column totals and the average annual (Per Year) losses in these categories. The bottom half of each table shows per capita dollar loss rates for the total and average annual losses. These rates are important measures for comparing losses between different areas. The average annual loss estimate of property and crops is $36,670 in Eastland County.

Table 9-4: Eastland County Loss Summary

Time Period	Fatalities	Injuries	Property Damage	Crop Damage
Loss Summary - Eastland County				
25-year Total	0	0	$911,750	$5,000
Per Year	0	0	$36,470	$200
Per Capita Dollar Losses (2023 5-yr ACS Population)				
25-year Total	0	0	$51.09	$0.28
Per Year	0	0	$2.04	$0.01

SECTION 10: TORNADOES

Description

A tornado is a narrow, violently rotating column of air that extends from the base of a cumulonimbus cloud to the ground. Tornadoes, among the most violent storms on the planet, are capable of tremendous destruction with wind speeds that can reach as high as 250-300mph. Typically, the vortex of air will remain suspended in the atmosphere and be visible as a funnel cloud. If the lower tip of the vortex touches the ground, however, the path of the tornado will often leave destruction in its wake and can be more than one mile wide and 50 miles long. Supercell thunderstorms, created when horizontal wind shears (winds moving in different directions at different altitudes) begin to rotate the storm, can produce the most extreme and powerful tornadoes. The economic and financial impacts of a tornado event on a community can be devastating depending on the scale of the event and the population density of the area that is hit. The damage caused in the aftermath of a tornado event can be minimized with collaborative preparedness and pre-event planning by the government, businesses, and citizens.

Location

Tornadoes do not have any specific geographic boundary and can occur uniformly throughout the planning area. The majority of Eastland County is located in Wind Zone 4 along the Region (Figure 10- 1), where tornado winds can be as high as 250 mph, and part of the County is in Wind Zone 3, where wind speeds go up to 200 mph.

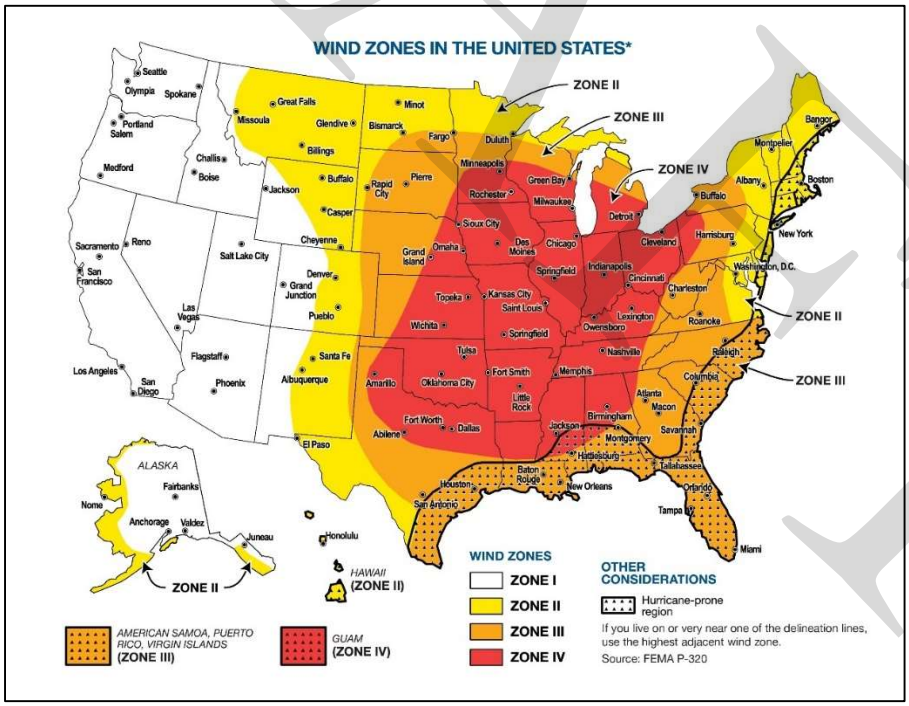


Figure 10-1: Wind Zones in the U.S. (Source: FEMA)

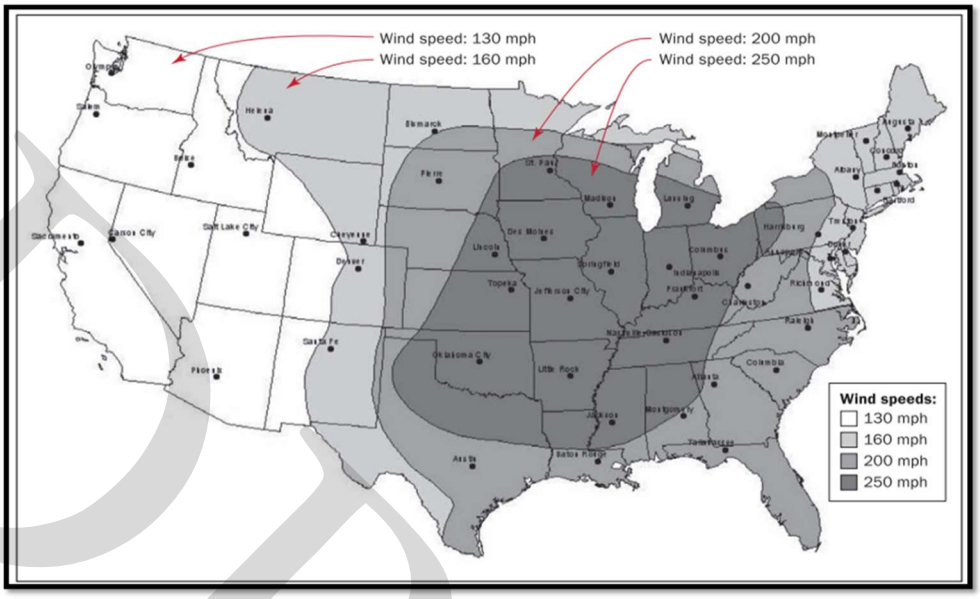


Figure 10-2: Wind Zones in the U.S. based on MPH. (Source: FEMA)

Tornado Alley refers to an area in the southern plains of the central United States that experiences a higher-than-normal frequency of tornadoes each year due to weather patterns and geography. This area extends from central Texas to northern Iowa, and from central Kansas and Nebraska east to Western Ohio (Figure 10-2). Tornadoes in this region typically occur in late spring and occasionally in the early fall. The County is located within the traditional area of Tornado Alley.

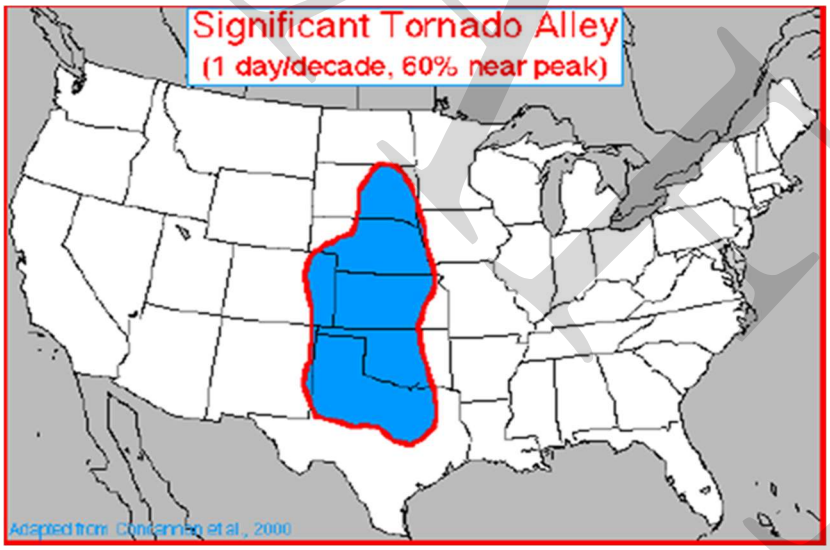


Figure 10-3: Map of Tornado Alley in the U.S.

Recent research indicates that with climate change, Tornado Alley is shifting away from the Midwestern United States, and moving towards the Southern and Central East Coast slightly. Climate change will likely also lead to a shift in when the peak of Tornado season occurs in North Texas. Tornadoes may be less likely to strike in the late Spring and Summer months, spanning from March

through August ('Tornado Alley' Has Shifted, Study Says, Weather.com).

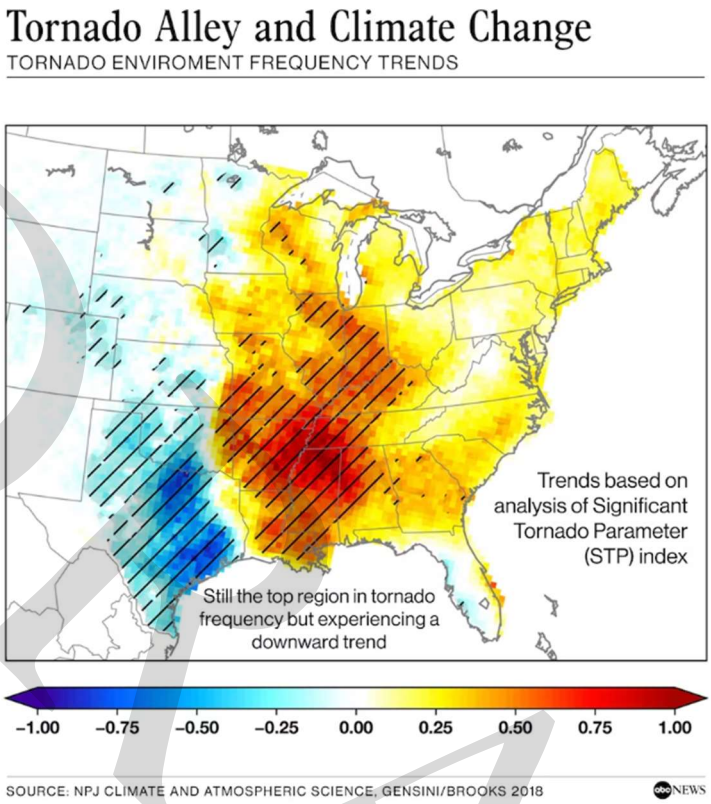


Figure 10-4: Updated Tornado Alley map (Source: NPJ Climate and Atmospheric Science)

Extent

Tornado events prior to 2007 follow the original Fujita scale, Table 11-1 on the following page. The current measure of the extent of tornado damage is the enhanced Fujita scale and it took effect on February 1st, 2007. The scale ranges from EF0, generally weak tornadoes with the ability to do minor damage, to EF5, tornadoes with winds in excess of 200 mph and the ability to do devastating damage to areas they come in contact with. Tornadoes can range from weak to violent and typically cause the greatest damage to structures of light construction, such as single-family, manufactured, and mobile homes.

Table 10-1 The Fujita Tornado Scale

Scale	Wind speed estimate (mph)	Potential damage	Example of damage
F0	40-72	Light damage.	Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.

F1	73-112	Moderate damage.	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving vehicles pushed off the roads; attached garages may be destroyed.
F2	113-157	Significant damage.	Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; high-rise windows broken and blown in; light-object missiles generated.
F3	158-206	Severe damage.	Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forests uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage.	Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown, and large missiles generated.
F5	261-318	Incredible damage.	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile-sized missiles fly through the air farther than 100 meters (110 yards); trees debarked; steel-reinforced concrete structures badly damaged and skyscrapers toppled.

Table 10-2: The Enhance Fujita Tornado Scale (Source: https://www.spc.noaa.gov/efscale/ef-scale.html)

Scale	Wind speed estimate (mph)	Potential damage	Example of damage
EF0	65–85	Minor damage.	Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.
EF1	86-110	Moderate damage.	Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111–135	Considerable damage.	Considerable damage. Roofs torn off from well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off the ground.
EF3	136–165	Severe damage.	Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations are badly damaged.
EF4	166–200	Devastating damage.	Well-constructed and whole-frame houses are completely leveled; cars and other large objects are thrown, and small missiles are generated.
EF5	>200	Incredible damage.	Strong-framed, well-built houses leveled off foundations are swept away; steel-reinforced concrete structures are critically damaged; tall buildings collapse or have severe structural deformations; some cars, trucks, and train cars can be thrown approximately 1 mile (1.6 km).

The Enhanced Fujita Scale has 28 Damage Indicators (DI), or types of structures and vegetation, each with a varying number of Degrees of Damage (DoD). Larger degrees of damage done to the damage indicators correspond to higher wind speeds. Each damage indicator has a unique Degree of Damage scale, summarized in Table 10-3. For example, in damage indicator two, One and Two-family Residences, Degree of Damage Scale is provided as Figure 10-3. For Degree of Damage Scales for the remaining Damage Indicators refer to the National Oceanic and Atmospheric Administration website.

Table 10-3: Degrees of Damage Scale

DI No.	Damage Indicator	Degree of Damage
1	Small barns, farm outbuildings	8
2	One- or two-family residences	10
3	Single-wide mobile home (MHSW)	9
4	Double-wide mobile home	12
5	Apt, condo, townhouse (3 stories or less)	6
6	Motel	10
7	Masonry apt. or motel	7
8	Small retail bldg. (fast food)	8
9	Small professional (doctor office, branch bank)	9
10	Strip mall	9
11	Large shopping mall	9
12	Large, isolated ("big box") retail bldg.	7
13	Automobile showroom	8
14	Automotive service building	8
15	School - 1-story elementary (interior or exterior halls)	10
16	School - jr. or sr. high school	11
17	Low-rise (1-4 story) bldg.	7
18	Mid-rise (5-20 story) bldg.	10
19	High-rise (over 20 stories)	10
20	Institutional bldg. (hospital, govt. or university)	11
21	Metal building system	8
22	Service station canopy	6
23	Warehouse (tilt-up walls or heavy timber)	7
24	Transmission line tower	6
25	Free-standing tower	3
26	Free-standing pole (light, flag, luminary)	3
27	Tree - hardwood	5
28	Tree - softwood	5

Typical Construction

- Asphalt shingles, tile, slate or metal roof covering
- Flat, gable, hip, mansard or mono-sloped roof or combinations thereof
- Plywood/OSB or wood plank roof deck
- Prefabricated wood trusses or wood joist and rafter construction
- Brick veneer, wood panels, stucco, EIFS, vinyl or metal siding
- Wood or metal stud walls, concrete blocks or insulating-concrete panels
- Attached single or double garage

DOD*	Damage description	Exp**	LB	UB
1	Threshold of visible damage	65	53	80
2	Loss of roof covering material (<20%), gutters and/or awning; loss of vinyl or metal siding	79	63	97
3	Broken glass in doors and windows	96	79	114
4	Uplift of roof deck and loss of significant roof covering material (>20%); collapse of chimney; garage doors collapse inward or outward; failure of porch or carport	97	81	116
5	Entire house shifts off foundation	121	103	141
6	Large sections of roof structure removed; most walls remain standing	122	104	142
7	Exterior walls collapsed	132	113	153
8	Most walls collapsed in bottom floor, except small interior rooms	152	127	178
9	All walls collapsed	170	142	198
10	Destruction of engineered and/or well constructed residence; slab swept clean	200	165	220

* DOD is degree of damage **Wind Speed values are in mph

Figure 10-5: One- and Two-Family residences damage indicators (Source: NOAA)

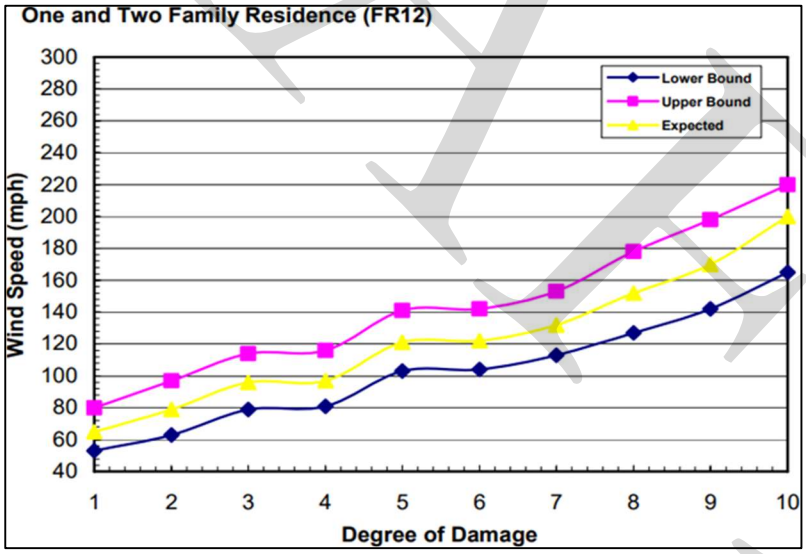


Figure 10-6: One- and Two-Family Residences visual chart (Source: NOAA)

LB and UB are the lower bound and upper bound for wind speeds. The graph above indicates the wind speeds of a tornado to the expected Degree of Damage.

The tornado events in the County planning area have been between F0 and F1 pre-2007 (9 events),

and between EF0 or EF3 post-2006 (Table 10-4). However, because County is in Wind Zone IV, the planning area could experience a tornado anywhere from an EF0 to an EF4. Therefore, the range of intensity that the planning area would be expected to mitigate is a tornado that could cause minor to devastating damage, an EF0 to EF4.

Historical Occurrences

Table 10-4 lists historical tornado events in the planning area from 1999-2024 that were reported to the NCEI or NOAA. The impact of each tornado event in Eastland County is listed by date with additional impact information related to the specific jurisdiction of touchdown, the magnitude of the event, total dollar losses related to crop and property damage, injuries, and fatalities. There have not been any events recorded past the listed dates.

Table 10-4: Historical Tornado Events by Jurisdiction, 1999 – 2024 (Source: NCEI NOAA)

Location	Date	Scale	Deaths	Injuries	Property Damage	Crop Damage
DESDEMONA	10/22/2000	F0	0	0	$25,000	$0
CARBON	4/22/2001	F0	0	0	$20,000	$0
CISCO	6/14/2001	F0	0	0	$0	$0
RISING STAR	3/30/2002	F1	0	0	$50,000	$0
RISING STAR	3/30/2002	F0	0	0	$0	$0
CISCO	5/7/2003	F0	0	0	$0	$0
CISCO	5/15/2003	F0	0	0	$5,000	$0
RANGER	5/15/2003	F0	0	0	$0	$0
CARBON	5/5/2006	F0	0	0	$0	$0
CARBON	3/30/2007	EF0	0	0	$0	$0
NIMROD	5/9/2015	EF3	1	2	$300,000	$100,000
STAFF	5/9/2015	EF0	0	0	$90,000	$0
STAFF	12/13/2022	EF2	0	0	$0	$0
PIONEER	5/25/2024	EF2	0	0	$100,000	$0

Table 10-5: Historical Tornado Events Magnitude Summary, 1999 - 2006

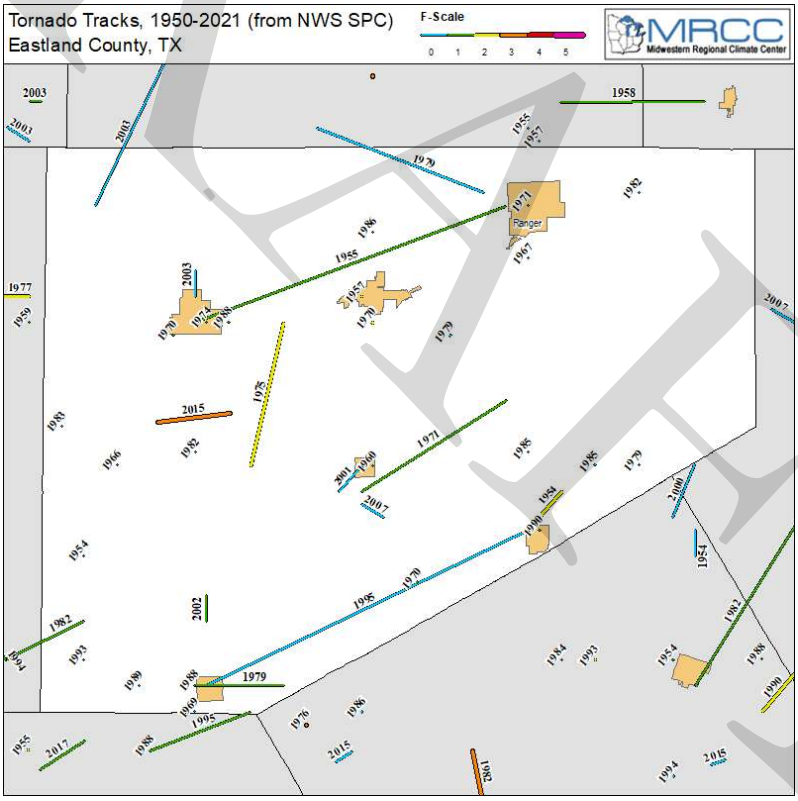
Number of Events	Magnitude (Fujita Scale)					
	F0	F1	F2	F3	F4	F5
1999-2006	8	1	0	0	0	0

Table 10-6: Historical Tornado Events Magnitude Summary, 2007-2024

Number of Events	Magnitude (Enhanced Fujita Scale)					
	EF0	EF1	EF2	EF3	EF4	EF5
2007-current	2	0	2	1	0	0

The locations of previous occurrences from 1950 through 2021 in the planning area are shown in Figure 10-4. This map displays historic tornado tracks, the distance traveled, and the direction they traveled. Only reported tornadoes were plotted and factored into the risk assessment, however, several occurrences have likely gone unreported over the past 67 years. Not all tornado paths were available in GIS form.

Figure 10-4: Historic Tornado Tracks 1950-2021, Distance Travelled, Magnitude, and Direction



Significant Events

F1 Tornado, 2002

Storm conditions coalesced to a tornado that touched down near Rising Star. Three barns were destroyed in the storm, causing $50,000 in property damages.

EF3 Tornado, 2015

Figure 10-5: Image of the EF3 tornado near Cisco on May 9th, 2015. (Source: FOX news)

Central parts of the United States started experiencing stormy conditions on May 5. These conditions continued until May 10 and caused multiple tornadoes across several states. On May 9th, a tornado touched down. Records show it reached EF3, causing winds up to 165 mph. The tornado destroyed a mobile home, and the elderly woman who lived inside was a casualty. Two more individuals were injured during the event. The storm and winds leveled homes, stripped and debarked trees, utility poles were broken, and vehicles were tossed around. This cost $300,000 in property damages, and $100,000 in crop damage.

EF2 Tornado, 2022

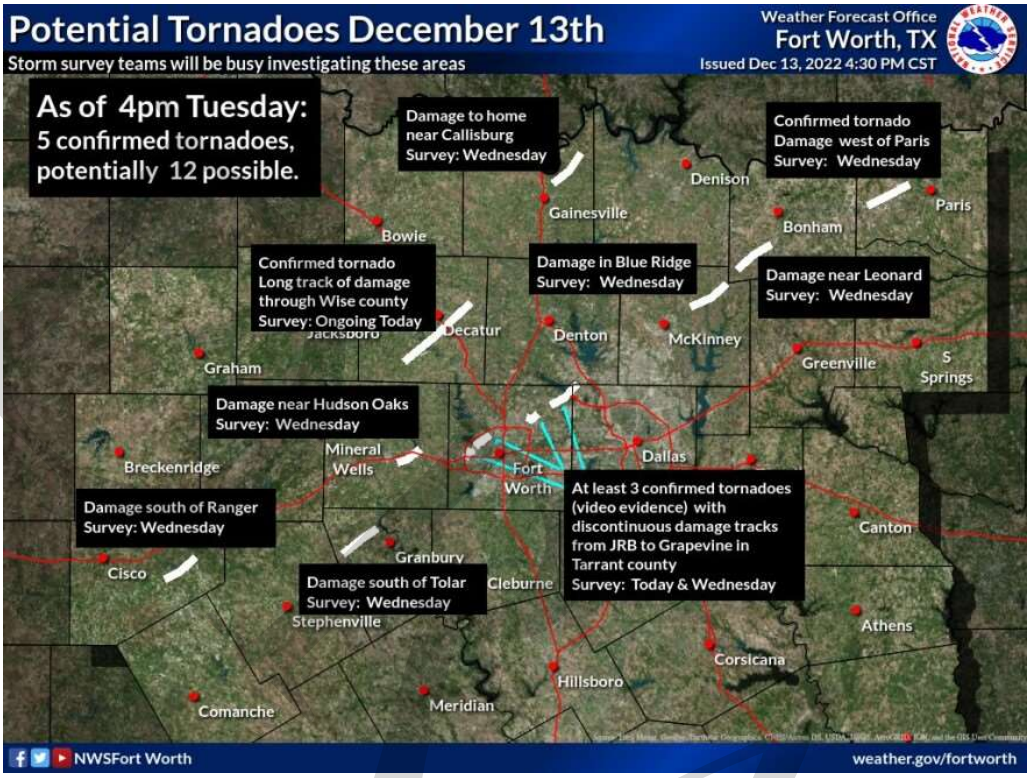


Figure 10-6: Image of reported tornadoes across Texas on December 13th. (Source: Weather.gov)

Stormy conditions were monitored between December 12 – 15th in South and Central states. The storms developed quickly, causing little time to react. An EF2 tornado touched down near Gorman, Texas on December 13th, 2022. As the tornado moved, it took up fences, trees, and roofs of houses. There was extensive damage to trees and many farm buildings throughout the storm. Winds were clocked at 135mph. No fatalities or injuries were reported.

EF2 Tornado, 2024

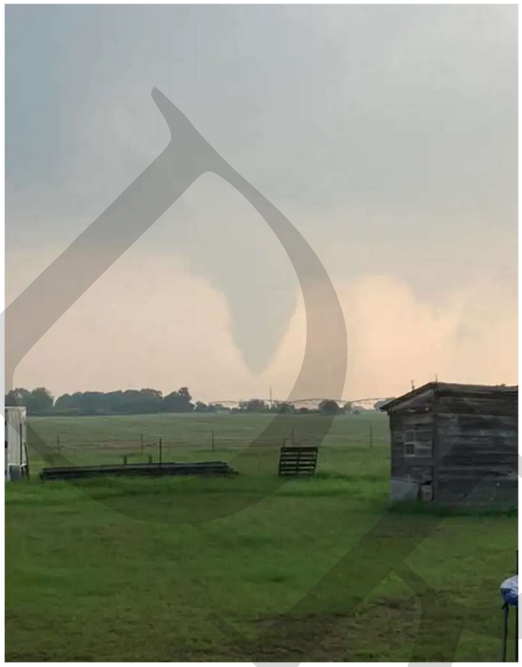


Figure 10-7: Tornado near Rising Star (Source: Big Country Homepage, c/o Kristin Wilson)

An EF-2 tornado developed in southwestern Eastland County and continued towards the east-northeast. As the storm grew in strength, trees were damaged and housing was impacted, including utility poles snapping and falling on the house. An RV trailer was completely destroyed, where a family of three survived when they left their RV trailer and sheltered behind a small building. Fortunately, no injuries were sustained. Farm buildings were destroyed as it tracked across ranch and farmland. Winds were estimated at 115mph. There was $100,000 in property damages reported.

Probability of Future Events

Tornado events can happen anywhere without much build-up. Eastland County has a high probability of experiencing a tornado due to the location, geography, wind zones, storm patterns, and has historically experienced significant collateral from tornado touchdowns. Currently, the majority of tornadoes are considered weak as seen in Table 10-7.

Table 10-7: Tornado Categories and Associated Impacts (average of all tornadoes)

Weak Tornadoes	Strong Tornadoes	Violent Tornadoes
63% of all tornadoes	35% of all tornadoes	**2% of all tornadoes**
Less than 5% of tornado deaths	Nearly 30% of all tornado deaths	**70% of all tornado deaths**
Lifetime 1-10+ minutes	May last 20 minutes or longer	**Lifetime can exceed one hour**

Winds less than 110 mph	Winds 110 – 205 mph	**Winds greater than 205 mph**

According to historical records, there were 14 events in a 25-year reporting period in the planning area. This provides a probability of occurrence of approximately once every two years for the planning area. This frequency supports a Likely probability of future events for the planning area, including all participating jurisdictions, meaning that an event is probable in the next three years.

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

Vulnerability and Impacts

All existing and future buildings, facilities, and populations in the Eastland County planning area are considered to be vulnerable to tornadoes and could potentially be impacted. High wind velocity, wind-blown debris, lightning, and large hail are typically the cause of damage done by a tornado. The high winds and flying debris can cause roofs to collapse, windows to shatter, and walls to crumble. Tornadoes can also cause significant damage to buildings, roads, bridges, and other infrastructure in cities. First responders and those needing to evacuate an area may encounter blocked roads as a result of the debris rendering some areas inaccessible or inescapable. Tornadoes can have a significant impact on the local economy as well, causing damage to businesses and homes, as well as disrupting transportation and causing productivity losses. The psychological trauma of experiencing a tornado, losing property or loved ones, or being displaced from one's home can have lasting effects on mental health.

Tornadoes pose a severe threat to communities as they often result in power outages, which could cause health and safety risks to vulnerable populations who rely on electricity for medical necessities, as well as patients in hospitals. Power outages can also disrupt electricity supply to neighborhoods and even entire cities, causing problems with heating, cooling, lighting, and communication. Anyone in the path of a tornado can incur serious injuries or even fatalities. Falling trees, branches, utility lines, poles, and flying debris pose safety risks, and people caught in the open or unable to take adequate cover are at the highest risk of injury or death. Certain buildings and structures are more prone to damage than others from the high wind velocity associated with tornado events. The three most susceptible types of structures to tornado damage are:

1. Manufactured Homes
2. Homes on crawlspaces (more susceptible to lift), and
3. Buildings with large spans, such as shopping malls, gymnasiums, and factories.

The Eastland County planning area features mobile and manufactured home parks. Because manufactured and temporary housing is located sporadically throughout rural portions of the planning area, they are not only vulnerable to tornado hazards but more prone to being isolated from essential needs and emergency services in the event of a disaster. Additionally, any structures built prior to 1980 are likely to have been built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant events.

Table 10-8: Structures at Greatest Risk by Jurisdiction (Source: 2023 ACS 5-year estimate)

Jurisdiction	Total Housing Units	Mobile Housing Units	Housing Built Before 1980
Eastland County	9,391	1,194	6,453
City of Eastland	1,901	110	1,510
City of Carbon	161	48	82
City of Cisco	1,589	72	1,238
City of Gorman	525	40	467
City of Ranger	1,343	247	998
City of Rising Star	473	71	374

*County totals include all jurisdictions, ISDs, and unincorporated areas.

Historic Tornado Impacts

The summary table, 10-9, shows the 25-year property and crop damage totals as well as the average annual (Per Year) losses summarizing historic tornado impacts. The bottom half of the table shows per capita dollar loss rates for the total and average annual losses. These rates are important measures for comparing losses between different hazards and areas. The average annual loss estimate of property and crops is $27,600 for the County.

Table 10-9: Eastland County Loss Summary for Tornadoes

Time Period	Fatalities	Injuries	Property Damage	Crop Damage
Loss Summary, Eastland County				
25-year Total	1	2	$590,000	$100,000
Per Year	N/A	N/A	$23,600	$4,000
Per Capita Dollar Losses				

25-year Total	$33.06	$5.06
Per Year	$1.32	$0.22

Since weather varies from year to year, forecasts of specific years are less likely to be true (less reliable) than these totals and averages for the period. The second summary table shows per capita dollar loss rates based on 2020 Census population counts. This is an important measure for comparing historical losses between different hazards and areas. Table 10-10 below displays the tornado losses by jurisdictions within the planning area.

Table 10-10: Tornado Losses by Jurisdiction 1999-2024

Jurisdiction	Est. Prop. Losses	Est. Crop Losses	Total Est. Losses
Desdemona	$25,000	$0	$25,000
Carbon	$20,000	$0	$20,000
Cisco	$5,000	$0	$5,000
Rising Star	$50,000	$0	$50,000
Ranger	$0	$0	$0
Nimrod	$300,000	$100,000	$400,000
Staff	$90,000	$0	$90,000
Pioneer	$100,000	$0	$100,000

SECTION 11: EXPANSIVE SOILS

Description

Expansive soils have high amounts of clay minerals alongside soil and soft rocks. The clay in the soil changes volume drastically when exposed to wet or dry conditions, swelling with water and shrinking with dryness. The change in moisture causes the soil to expand, shifting buildings, structures, and even large tree roots, causing damage. North central Texas is known for a high mix of soils, with loamy and clayey soils predominant in the area. Damage to buildings includes shifting foundations and cracks in walls and floors. Damage can range from minor to structurally unsafe in buildings. Roads may be affected by soil expansion, causing cracks and possibly even potholes.

Dry and drought conditions cause the shrinking of clay-heavy soil. The reduction in volume can affect support to buildings and other structures and also create fissures in the soil. Fissures in the soil cause a deep penetration of water when rain or extra moisture occurs. These fissures can further uneven soil expansion and shrinkage as the water and moisture allow for deeper penetration. Uneven expansion creates further instability in buildings and roads.

Location

The planning area is located in two major land resource areas: North Central Prairie and Western Cross Timber areas. Both areas have similar soil grades, with the majority being loamy with the second being clayey. North Central Prairie soil mixes have a slightly better drainage rate than the Wester Cross Timber area. According to the USDA's Soil Survey data, 51.2% of the area is sandy and loamy, and 20.9% is clayey soils. The soil provides a rich and fertile location for agriculture, such as peanuts which were a major economic driver for the County, and other areas served well for ranching and cattle. In addition, with two major rivers and several water sources, the selected areas can see extensive wet periods.

Figure 11-1 below shows a 1977 soil survey mapping the soil resources.

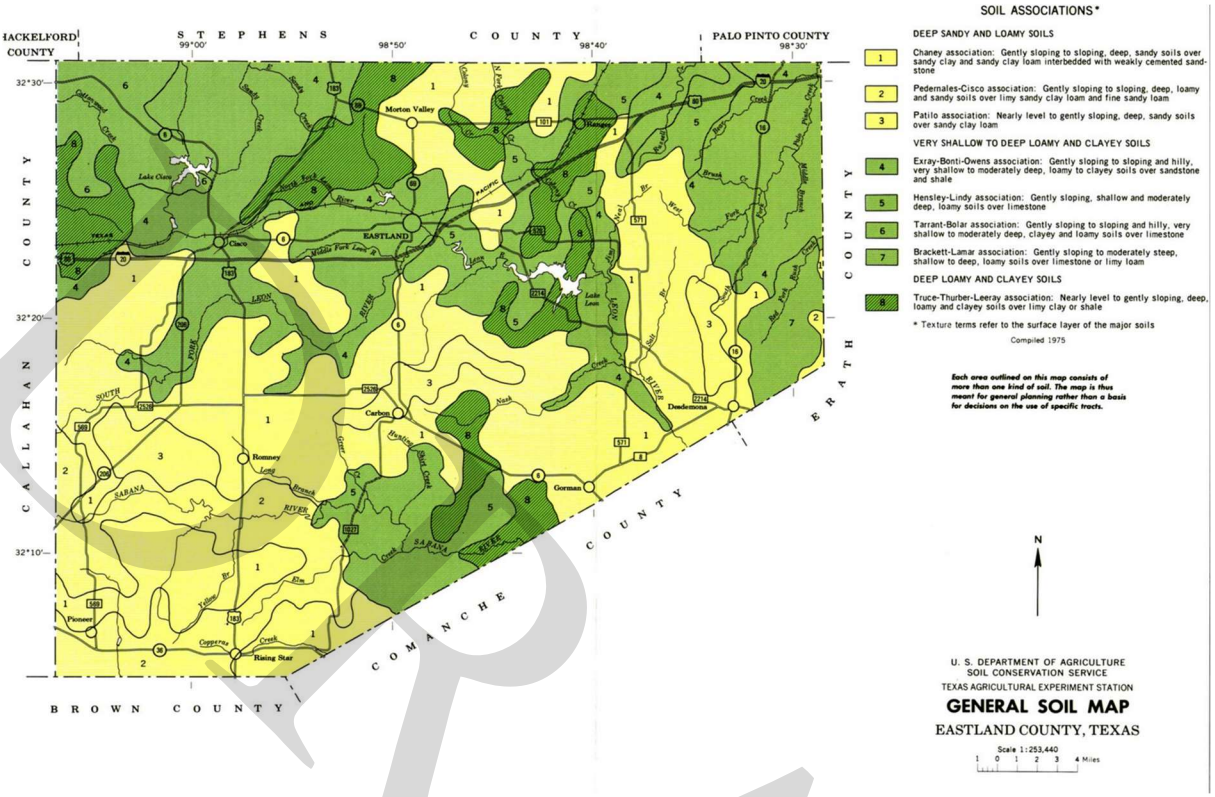


Figure 11-1: 1977 Soil Survey of Eastland County (Source: USDA)

Extent

Expansive soils can impact any building or road in an area with high amounts of clay. The US Department of Agriculture (USDA) measures the degree of risk as "Very limited", "Somewhat Limited", and "Not Limited" based on soil studies. These ratings are determined by the soil properties and how they affect the capacity to support a load without movement. This is vital data for the construction of buildings, as it helps understand the impacts of shrinking and expanding soils. These ratings are explained in Table 11-1 below.

Table 11-1: USDA Soil Ratings for Construction of Dwellings on Concrete Slabs

Rating	Description
Not Limited	The soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected.
Somewhat Limited	The soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected.
Very Limited	The soil has one or more unfavorable features for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Eastland County is 72% "Somewhat Limited," and 22.6% of the area under "Very Limited". This totals 94.6% of the County at risk of expansive soils. The USDA rating map is visualized in Figure 11-2 below.

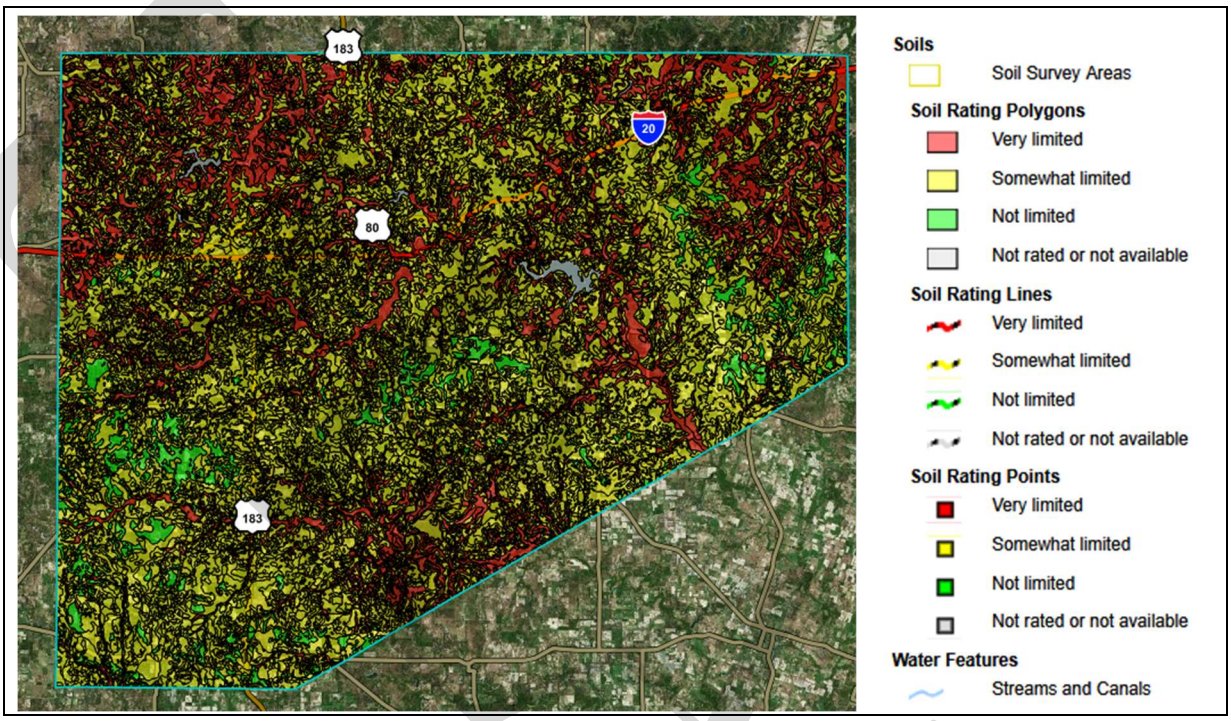


Figure 11-2: Map of Soil Ratings in Eastland County. (Source: USDA Web Soil Survey.)

Table 11-2 below further breaks down the percentage of soil ratings in each partnering jurisdiction. According to this data, all participating jurisdictions are at moderate risk with all localities having over 70% "Somewhat Limited" soil ratings. All the buildings built before 1960 or not built with specific construction designs and concrete slabs are at risk if expansive soil damage in Eastland County.

Table 11-2: USDA Soil Rating by Jurisdiction. (Source: USDA Soil Rating)

Rating	Percentage of area
City of Eastland	
Not Limited	0.2%
Somewhat Limited	74.3%
Very Limited	25.5%
City of Carbon	
Not Limited	7.4%
Somewhat Limited	79.5%
Very Limited	13.1%

City of Cisco	
Not Limited	0.0%
Somewhat Limited	94.2%
Very Limited	5.8%
City of Gorman	
Not Limited	5.6%
Somewhat Limited	94.4%
Very Limited	0.0%
City of Ranger	
Not Limited	0.6%
Somewhat Limited	76.7%
Very Limited	22.7%
City of Rising Star	
Not Limited	23.2%
Somewhat Limited	74.6%
Very Limited	2.2%

All critical facilities are vulnerable to expansive soils due to potential structural damages. These are listed below.

Table 11-3: List of Critical Facilities Vulnerable to Expansive Soils

Jurisdiction	Critical Facilities
Eastland County	3 government buildings, 1 County jail, 1 police station, 1 fire department, 1 emergency service facility.
City of Eastland	1 fire department; 1 police station; 2 emergency response facilities; 1 hospital; 2 schools; 1 airport; 3 vulnerable population serving faciltities; 7 key government buildings;
City of Carbon	1 Fire Department; 2 water facilities; 1 City Hall
City of Cisco	1 Fire Department; 3 government buildings; 4 schools; 1 critical utility
City of Gorman	1 Fire Department; 1 Police Station; 1 government building; 2 schools; 1 vulnerable population serving facility; 1 water facility
City of Ranger	1 City Hall; 1 Fire Department; 1 Police Station; 1 Public Works facility; 1 water facility; 1 wastewater treatment plant; 3 high-risk/vulnerable persons facilities (schools, nursing home)
City of Rising Star	1 Fire Department; 3 schools; 1 vulnerable population facility

Historical Occurrences

Eastland County and participating jurisdictions have no reported history of death, injury, or crop and property damages. However, the County and all participating jurisdictions are at risk of soil expansion. Soil expansion impacts buildings the most, so there may be unreported damages to houses or buildings. On personal property, recording this damage may be difficult. However, on public and government property these damages can be reported more easily. The County will work to document this damage as they arise.

Significant Events

There are no reported significant soil expansion events in the county and participating jurisdictions.

Probability of Future Events

Eastland County has no historical events of expansive soils; however, many of the impacts of expansive soils are subtle and over time. In addition, many homes may have experienced shifting or damaged foundations but these never were reported to FEMA or other sources. Residents of Eastland County and the jurisdictions have likely incurred expenses for house repairs due to expansive soils. Expansive soils may also cause damage to major infrastructure like thoroughfares, however normal wear and tear on roads often mask these concerns. Taking these into consideration, it is unlikely that a major event will happen in the next decade, but it should be cautioned the importance of planning for such situations for the safety of residents.

Frequency of Occurrence
Highly likely: Event probable in the next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in the next 10 years.

Vulnerability and Impact

As 94.6% of the County and participating jurisdictions are under somewhat or very limited soil ratings, many of the County's buildings are vulnerable to expansive soils. All residential buildings, critical facilities, and public buildings are at risk of damage from expansive soil, particularly buildings without a slab concrete foundation. Homes and buildings built before 1960 are more likely to be pier-and-beam construction. Pier-and-beam foundations are more likely to see the impact of expansive soils, as the walls start to crack and the floors become uneven.

Each jurisdiction has a significant number of homes built before 1960, increasing the probability of expansive soils causing property damage to residents. The City of Cisco has 63.2% of houses built before 1960, making them the leaders in possible housing and building damages from expansive soils. The Cities of Gorman and Rising Star also have over 60% of houses built before 1960's. Damaged houses can cause unnecessary financial strain on low-income households, and risk the safety of the residents if they are unable to repair the damages.

Table 11-4: Houses built before 1960 by Jurisdiction (Source: 2023 ACS data)

Jurisdiction	Total Housing Units	Housing built before 1960 (%)
Eastland County	9,391	4,532 (48.3%)
City of Eastland	1,901	925 (48.7%)
City of Carbon	161	60 (37.3%)
City of Cisco	1,589	1,004 (63.2%)
City of Gorman	525	324 (61.7%)
City of Ranger	1,343	701 (52.2%)
City of Rising Star	473	286 (60.5%)

Roadways and major arterial roads are unlikely to experience noticeable impacts from expansive soils, as many roads experience normal wear and tear and require regular maintenance. Expansive soils are a concern for economic stability. Wear and tear on homes, roadways, and public facilities cause excessive financial burden on residents on the County and the jurisdictions, and put additional stress with taxes to help pay for public improvements.

SECTION 12: SEVERE WINTER STORMS

Description

A severe winter storm event is when temperatures hover below freezing, and precipitation includes freezing ice, snow, and sleet. Strong winds often accompany severe winter storms and combine with freezing precipitation to produce a low wind chill. Severe winter storms may include snowstorms, blizzards, cold waves, and ice storms. Snowstorms include four or more inches of snow in a 12-hour period. Blizzards are characterized by low temperatures and strong winds in excess of 35 mph with large amounts of drifting snow. A cold wave is a winter cold front with a drastic drop in temperature. An ice storm occurs when rain falls out of the warm and moist upper layers of the atmosphere into a cold and dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces. If a half-inch of rain freezes on trees and utility wires, damage can occur, especially if accompanied by high winds. Half an inch is used as the criteria before an icing event is categorized as an "ice storm".

Location

Severe winter storm events are not confined to specific geographic boundaries and vary in intensity and duration. All existing and future buildings, facilities, and populations in the Eastland County planning area are considered to be uniformly exposed to a winter storm hazard and could potentially be impacted.

Table 12-1: List of winter weather advisory categories.

Winter weather advisory	This alert may be issued for a variety of severe conditions. Weather advisories may be announced for snow, blowing or drifting snow, freezing drizzle, freezing rain, or a combination of weather events.
Winter storm watch	Severe winter weather conditions may affect your area (freezing rain, sleet or heavy snow may occur separately or in combination).
Winter storm warning	Severe winter weather conditions are imminent.
Freezing rain or freezing drizzle	Rain or drizzle is likely to freeze upon impact, resulting in a coating of ice glaze on roads and all other exposed objects.
Sleet	Small particles of ice are usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.
Blizzard warning	Sustained wind speeds of at least 35 mph are accompanied by considerable falling or blowing snow. This alert is the most perilous winter storms with visibility dangerously restricted.
Frost/freeze warning	Below-freezing temperatures are expected and may cause significant damage to plants, crops, and fruit trees.

Wind chill	A strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower in a calm atmosphere. The combined cooling power of the wind and temperature on exposed flesh is called the wind−chill factor.

Extent

The extent or magnitude of a severe winter storm is measured on an intensity scale from "Mild" to "Severe" based on temperature ranges and snow accumulation levels. Table 12-2, Magnitude of Severe Winter Storms, is an index developed by the National Weather Service (NWS).

This table should be referenced with the wind chill factor image below, Figure 12-1, to better determine the intensity of a winter storm. Based on past events, the planning area can expect to experience severe winter storms with extreme intensity in the future.

Table 12-2: Magnitude/Intensity of Winter Storms (Source: NWS)

Intensity	**Temperature Range (Fahrenheit)**	**Extent Description**
Mild	40˚-50˚	Winds less than 10 mph and freezing rain or light snow falling for short durations with little or no accumulations
Moderate	30˚-40˚	Winds 10 – 15 mph and sleet and/or snow up to 4 inches
Significant	25˚-30˚	Intense snow showers accompanied by strong gusty winds, between 15 and 20 mph with significant accumulation
Extreme	20˚-25˚	Wind-driven snow that reduces visibility, heavy winds (between 20 to 30 mph), and sleet or ice up to 5 millimeters in diameter
Severe	Below 20˚	Winds of 35 mph or more and snow and sleet greater than 4 inches

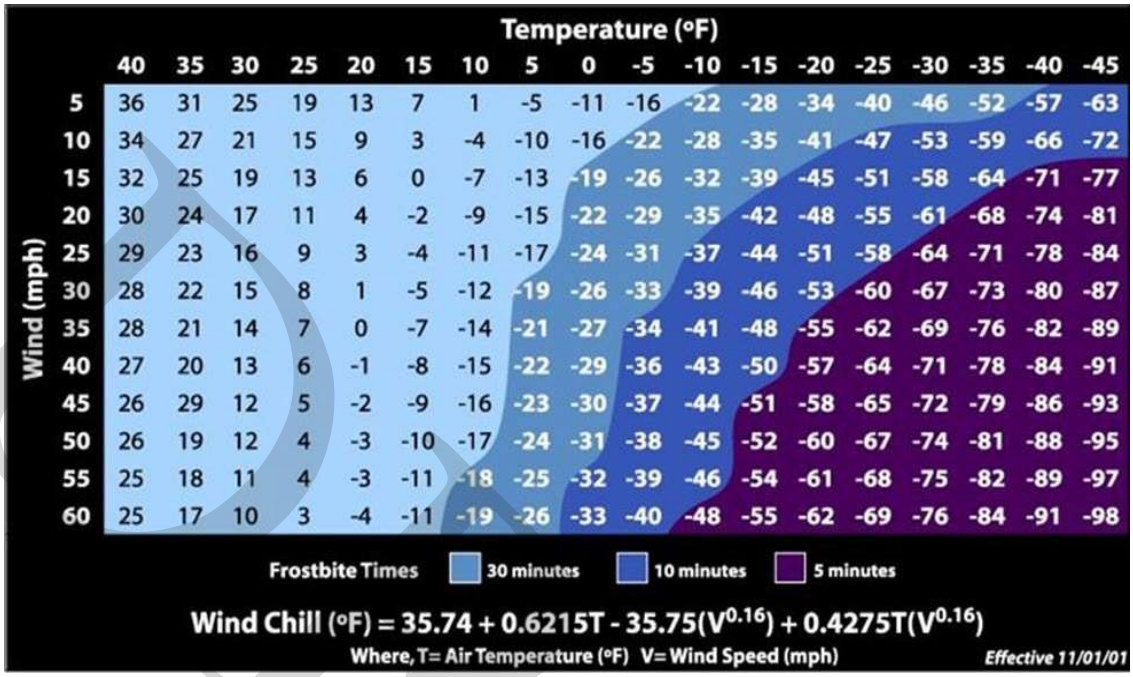


Figure 12-1: Wind Chill chart (Source: NWS)

Wind chill temperature is a measure of how cold the wind makes real air temperature feel to the human body. Since wind can dramatically accelerate heat loss from the body, a 30° day would feel just as cold as a calm day with 0° temperatures. Figure 12-1 is a chart for calculating wind chill using the wind speed and air temperature. Please note that it is not applicable in calm winds or when the temperature is over 50°F.

Historical Occurrences

The table below lists historical winter storm events from 1999 to 2024. This data comes from NOAA, and contains reported data from local or state data. Thirty events were recorded, with the average length of time of each event lasting approximately 2 days.

Table 12-3: Historical Winter Events in Eastland County (Source: NOAA NCEI)

Start Date	End Date	Fatalities	Injuries	Property damage	Crop damage
1/25/2000	1/28/2000	0	0	$0	$0
12/12/2000	12/13/2000	0	0	$0	$0
12/25/2000	12/27/2000	0	0	$0	$0
12/31/2000	12/31/2000	0	0	$0	$0
1/1/2001	1/5/2001	0	0	$0	$0
1/18/2001	1/18/2001	0	0	$0	$0
11/27/2001	11/29/2001	0	0	$0	$0
3/2/2002	3/2/2002	0	0	$0	$0
2/24/2003	2/27/2003	0	0	$0	$0
12/22/2004	12/22/2004	0	0	$0	$0

11/30/2006	11/30/2006	0	0	$0	$0
1/14/2007	1/17/2007	0	0	$25,000	$0
11/25/2007	11/25/2007	0	0	$0	$0
3/6/2008	3/6/2008	0	0	$0	$0
1/5/2009	1/5/2009	0	0	$25,000	$0
1/27/2009	1/28/2009	0	0	$10,000	$0
12/24/2009	12/24/2009	0	0	$150,000	$0
2/11/2010	2/11/2010	0	0	$75,000	$0
2/1/2011	2/1/2011	0	0	$200,000	$0
12/5/2013	12/6/2013	0	0	$0	$0
1/1/2015	1/2/2015	0	0	$10,000	$0
12/30/2017	12/31/2017	0	0	$0	$0
2/22/2018	2/22/2018	0	0	$0	$0
2/5/2020	2/5/2020	0	0	$0	$0
1/1/2021	1/1/2021	0	0	$0	$0
1/10/2021	1/10/2021	0	0	$0	$0
2/14/2021	2/19/2021	0	0	$3,800,000	$0
2/2/2022	2/3/2022	0	0	$0	$0
2/1/2023	2/2/2023	0	0	$0	$0
1/14/2024	1/15/2024	0	0	$0	$0

Significant Events

Based on NCEI data, from 1999 through March 2024, the County planning area experienced 30 severe winter events in the form of winter storms, winter weather, and heavy snow. No injuries or fatalities were reported for the following severe winter events. Overall, the storms cost $4,295,000 in property damages. Below are three significant winter storm events.

December 24, 2009

On Christmas eve, a powerful upper-level storm dropped temperatures and strong winds created a white Christmas in North Texas. With snowfall and high winds created blizzard like conditions in Eastland County. Roads were closed due to the icy conditions, and emergency services helped evacuate people from their cars or brought food and blankets. The storm brought in 3-6 inches of rain, and caused approximately $150,000 in property damages.

February 1, 2011

The storm in early 2011 initially heavy rain, but the temperatures dropped causing the rain to become sleet and water on surfaces iced over creating slippery surfaces. The County reported 3-6 inches of ice and snow, and dangerous roads were closed off. An accident was reported from the icy conditions on I20. In neighboring Erath County, one person passed from the cold. In Eastland County, the storm costed approximately $200,000 in property damages.

Winter Storm Uri (2021)

An arctic front brought Winter Storm Uri to Southeast Texas in mid-February, covering Eastland County in sleet, ice, and snow. Winter Storm Uri impacted most of Texas, and by the end of the event 246 individuals were reported as a fatality, direct or indirect, by the storm. The lowest reported temperature across the County was 8 degrees Fahrenheit, and wind chills dropped the feel to 0 degrees. Eastland had no reported deaths or injuries; however, the storm knocked out a lot of utilities, leaving over 6,500 residents without power. The storm lasted 5 days of sleet and snow, and some areas got up to 10 inches of snow. However, the impact on utility and infrastructure went beyond those 5 days as emergency responding utilities. The total cost for Eastland County residents was $3,800,000 in property damage, including damage to utilities, roofs, buildings, and public infrastructure.

Probability of Future Events

According to historical records, Eastland County and participating jurisdictions experience approximately one extreme winter weather event every year. The probability of a future winter storm event occurring in the planning area is Highly Likely, with a winter storm likely to occur within the next years.

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

Vulnerability and Impacts

All infrastructure, critical facilities, populations, and buildings in the Eastland County planning area are vulnerable to severe winter events. Winter weather such as ice hazards and extremely cold temperatures, as well as snow, present a risk to the planning area.

Populations of people and animals are subject to direct health risks from extended exposure to cold air and precipitation. Animals, such as pets and livestock, typically cannot survive the effects of direct exposure to severe winter weather and should be provided with shelter. In addition, House fires can occur more frequently during winter storm events due to increased and improper use of alternative heating sources which can cause injury or death. Moreover, house fires during winter storms present a greater danger because some areas may not be easily accessible due to icy roads, and water supplies may freeze and impede firefighting efforts. The people most at risk of the effects of severe winter storms are children younger than five and older adults over 65. Vulnerable populations are at greater risk of death from hypothermia during these events, especially in the rural areas of the county where populations are sparse, icy roads may impede travel, and there are fewer neighbors to check in on the elderly.

The planning area has a total population of 17,846 according to the 2023 ACS population estimate. Those over the age of 65 represent 5.6% (993) of the total population and children under the age of 5 represent 21.9% (3,910) of the total population. The total population of the county that is estimated to be below the poverty level is 14.8% (2,634). Table 12-4 presents the 2023 American Community Survey population and age cohort estimates below.

Table 12-4: Populations at Greater Risk by Jurisdiction (Source: 2023 ACS 5-year estimates)

Jurisdiction	Population 65 and Older	Population Under 5	Population below Poverty Level
Eastland County	993	3,910	2634
City of Eastland	252	845	698
City of Carbon	11	58	14
City of Gorman	28	188	490
City of Rising Star	47	169	169
City of Cisco	218	767	83
City of Ranger	232	404	544

Public and private infrastructure is also vulnerable to severe winter storms. These events can disrupt electric service for long periods of time. In addition, extended periods of freezing temperatures can cause water pipes to freeze and crack. The buildup of ice can cause power lines and tree limbs to break under the weight, potentially causing damage to property or the electric grid. During these times of ice and snow accumulation, response times will increase until public works road crews are able to clear roads of ice, snow, and other obstructions.

Historic Severe Winter Storm Impacts

A total of $4,295,000 of property damage was reported over the nearly 25-year period of analysis. Based on historical records, the injuries, fatalities and crop damages were negligible for sever winter weather. In Table 12-5 below, it shows the annual and per capita breakdown.

Table 12-5: Annual and per capita costs of Winter Storms in Eastland County

	Annual	Per Capita (pop. 17,846) 25-year period
Eastland County	$171,800	$241

SECTION 13: HAIL

Description

Hail is showery precipitation in the form of irregular pellets or balls of ice that typically measure 0.2 inches and six inches in diameter. It is a particularly damaging form of frozen precipitation resulting from thunderstorms, with the size of the hail being a direct result of the size and severity of the storms. Hail is produced when warm air rapidly rises into the upper atmosphere and the air mass is cooled. Frozen droplets within the cooled air mass accumulate to form ice crystals that then fall to the Earth as precipitation. The strength of the updraft is dependent on heating on the surface of the Earth with larger temperature gradients between the upper atmosphere and the surface responsible for increased suspension time and, therefore, increased hailstone size.

Location

Hailstorms are not confined to any specific geographic location and can vary greatly in size, location, intensity, and duration. As a result, all areas within the County planning area are equally at risk of hail.

Extent

The NCEI Intensity Scale, depicted in Table 13-1, shows how the intensity category of a hailstorm depends on hail size and the potential damage it could cause. The intensity scale ranges from H0 to H10, with increments of intensity or damage potential in relation to hail size (distribution and maximum), texture, fall speed, speed of storm translation, and strength of the accompanying wind. The National Weather Service (NWS) classifies a storm as "severe" if there is hail one inch in diameter (approximately the size of a quarter) or greater, based on radar intensity or as seen by observers. Based on historical data, hail of up to 4 inches can be expected in the planning area.

Table 13-1: Hail Intensity and Magnitude

Size Code	Intensity Category	Size (Dia. Inches)	Descriptive Term	Typical Damage
H0	Hard Hail	Up to 0.33	Pea	No damage
H1	Potentially Damaging	0.33 - 0.60	Marble	Slight damage to plants and crops
H2	Potentially Damaging	0.60 - 0.80	Dime	Significant damage to plants and crops
H3	Severe	0.80 - 1.2	Nickel	Severe damage to plants and crops
H4	Severe	1.2 - 1.6	Quarter	Widespread glass and auto damage
H5	Destructive	1.6 - 2.0	Half Dollar	Widespread destruction of glass, roofs, and risk of

				injuries
H6	Destructive	2.0 - 2.4	Ping Pong Ball	Aircraft bodywork dented and brick walls pitted
H7	Very Destructive	2.4 - 3.0	Golf Ball	Severe roof damage and risk of serious injuries
H8	Very Destructive	3.0 - 3.5	Hen Egg	Severe damage to all structures
H9	Super Hailstorms	3.5 - 4.0	Tennis Ball	Extensive structural damage could cause fatal injuries
H10	Super Hailstorms	4.0 +	Baseball	Extensive structural damage could cause fatal injuries

Eastland County may experience hailstorms ranging from an H1 to an H10 based on previous occurrences for the area discussed further below. The Core Team can plan to mitigate storms ranging from hard hail (low risk) to destructive hailstorms (high risk), the latter potentially leading to widespread destruction of glass, and roofs, and the potential risk of injuries. Given that climate change is likely going to make hailstorms more intense in the future, preparing for a minimum of an H9-magnitude hailstorm is recommended.

Historical Occurrences

Historical evidence for the County suggests that the entire planning area is vulnerable to hail events. Historical events with reported damage, injuries, or fatalities are shown in Table 8-2 below. A total of 140 reported historical hail events impacted Eastland County during the 25-year period from 1999 through 2024. These reported events may not represent all hail events to have occurred during this time since they were only the events reported to NCEI and NOAA databases. There have not been any events recorded past the listed dates.

Table 13-2: Historical Hail records (Source: NOAA NCEI)

Locality	Date	Size (in.)	Deaths	Injuries	Property Damage	Crop Damage
Gorman	4/26/1999	1	0	0	$0	$0
Olden	5/11/1999	1.75	0	0	$0	$0
Ranger	5/11/1999	1.75	0	0	$0	$0
Eastland	5/11/1999	1.75	0	0	$0	$0
Eastland	5/11/1999	1.5	0	0	$0	$0
Gorman	5/11/1999	1	0	0	$0	$0
Ranger	5/17/1999	0.75	0	0	$0	$0
Cisco	2/22/2000	0.88	0	0	$0	$0
Rising Star	4/11/2000	1	0	0	$0	$0

Eastland	4/30/2000	0.88	0	0	$0	$0
Eastland	4/30/2000	0.88	0	0	$0	$0
Ranger	4/30/2000	0.75	0	0	$0	$0
Rising Star	5/22/2000	1	0	0	$0	$0
Eastland	5/27/2000	1.75	0	0	$0	$0
Eastland	5/27/2000	0.88	0	0	$0	$0
Eastland	3/24/2001	0.88	0	0	$0	$0
Carbon	4/22/2001	1.25	0	0	$0	$0
Ranger	6/14/2001	1.75	0	0	$0	$0
Ranger	6/14/2001	1.75	0	0	$0	$0
Eastland	6/14/2001	1	0	0	$0	$0
Eastland	3/29/2002	2.75	0	0	$2,000,000	$0
Cisco	3/29/2002	1	0	0	$0	$0
Carbon	3/30/2002	1.75	0	0	$0	$0
Cisco	4/7/2002	0.88	0	0	$0	$0
Rising Star	5/3/2002	1.75	0	0	$0	$0
Eastland	5/5/2002	1	0	0	$0	$0
Eastland	5/8/2002	0.75	0	0	$0	$0
Carbon	5/25/2002	0.75	0	0	$0	$0
Rising Star	5/25/2002	0.75	0	0	$0	$0
Gorman	5/27/2002	2	0	0	$0	$0
Eastland	10/6/2002	1	0	0	$0	$0
Ranger	5/7/2003	0.88	0	0	$0	$0
Eastland	5/7/2003	0.75	0	0	$0	$0
Cisco	8/22/2003	0.88	0	0	$0	$0
Ranger	3/4/2004	0.88	0	0	$0	$0
Ranger	4/30/2004	1.75	0	0	$0	$0
Eastland	4/30/2004	1	0	0	$0	$0
Eastland	6/4/2004	0.88	0	0	$0	$0
Gorman	6/4/2004	0.88	0	0	$0	$0
Ranger	6/4/2004	0.75	0	0	$0	$0
Cisco	3/25/2005	0.88	0	0	$0	$0
Eastland	3/25/2005	0.75	0	0	$0	$0
Gorman	4/25/2006	0.75	0	0	$0	$0
Cisco	5/5/2006	1.75	0	0	$5,000	$0
Carbon	5/5/2006	1.75	0	0	$5,000	$0
Rising Star	5/5/2006	1.75	0	0	$50,000	$0
Eastland	5/5/2006	1	0	0	$0	$0
Cisco	11/29/2006	0.75	0	0	$0	$0
Ranger	3/30/2007	1	0	0	$0	$0
Cisco	4/24/2007	0.75	0	0	$0	$0

Cisco	5/30/2007	1	0	0	$0	$0
Cisco	4/8/2008	1	0	0	$0	$0
Cisco	4/23/2008	1.75	0	0	$5,000	$0
Lake Leon	4/23/2008	1.25	0	0	$0	$0
Desdemona	4/23/2008	1	0	0	$0	$0
Desdemona	4/23/2008	0.88	0	0	$0	$0
Eastland	4/26/2008	2.75	0	0	$10,000	$0
Cisco	4/26/2008	1.75	0	0	$5,000	$0
Eastland	4/26/2008	1.75	0	0	$5,000	$0
Gorman	4/26/2008	1.75	0	0	$5,000	$0
Eastland	4/26/2008	1.5	0	0	$0	$0
Eastland	4/26/2008	1	0	0	$0	$0
Rising Star	5/14/2008	0.88	0	0	$0	$0
Romney	11/11/2008	0.75	0	0	$0	$0
Rising star	3/25/2009	0.75	0	0	$0	$0
Gorman	3/25/2009	0.75	0	0	$1,000	$0
Tiffin	3/25/2009	0.75	0	0	$0	$0
Rising Star	5/8/2009	4	0	0	$50,000	$10,000
Cisco	5/8/2009	1.75	0	0	$6,000	$0
Rising Star	5/8/2009	1.75	0	0	$5,000	$0
Rising Star	5/8/2009	1	0	0	$0	$0
Morton	5/28/2009	1.25	0	0	$0	$0
Rising Star	6/2/2009	0.75	0	0	$0	$0
Cisco	6/11/2009	4.5	0	0	$15,000	$0
Eastland	6/11/2009	1.75	0	0	$5,000	$0
Cisco	6/11/2009	0.88	0	0	$0	$0
Cisco airport	7/28/2009	1.75	0	0	$1,000	$0
Cisco airport	7/28/2009	0.75	0	0	$0	$0
Pioneer	8/27/2009	0.88	0	0	$0	$0
Rising Star	9/4/2009	0.88	0	0	$0	$0
Tiffin	5/17/2010	1	0	0	$0	$0
Tiffin	5/17/2010	0.88	0	0	$0	$0
Ranger	6/15/2010	0.88	0	0	$0	$0
Pioneer	4/10/2011	1	0	0	$0	$0
Tiffin	4/23/2011	1	0	0	$0	$0
Ranger	4/24/2011	1.75	0	0	$5,000	$0
Tiffin	4/24/2011	1	0	0	$0	$0
Cisco	5/1/2011	1.75	0	0	$3,000	$0
Mangum	5/22/2011	1	0	0	$0	$0
Cisco	6/21/2011	1.75	0	0	$2,000	$0
Eastland	6/21/2011	1	0	0	$0	$0

Carbon	4/3/2012	1.75	0	0	$5,000	$0
Cisco	4/3/2012	1	0	0	$0	$0
Carbon	5/4/2012	1.75	0	0	$15,000	$0
Cisco	5/4/2012	1.25	0	0	$0	$0
Cisco airport	6/12/2012	1.75	0	0	$40,000	$0
Carbon	2/10/2013	1.75	0	0	$5,000	$0
Rising Star	2/10/2013	1	0	0	$0	$0
Gorman	4/1/2013	1	0	0	$0	$0
Desdemona	4/1/2013	1	0	0	$0	$0
Carbon	5/20/2013	1.75	0	0	$0	$5,000
Eastland	5/20/2013	0.75	0	0	$0	$0
Eastland	10/26/2013	2.25	0	0	$20,000	$0
Rising Star	10/26/2013	1.5	0	0	$5,000	$0
Eastland	10/26/2013	1	0	0	$0	$0
Gorman airport	4/13/2014	1.75	0	0	$10,000	$0
Rising Star	4/26/2015	2.75	0	0	$20,000	$0
Gorman	4/26/2015	1.75	0	0	$8,000	$0
Ranger	4/26/2015	0.88	0	0	$0	$0
Desdemona	5/7/2015	2.75	0	0	$5,000	$0
Eastland	5/9/2015	3.25	0	0	$10,000	$0
Cisco	5/9/2015	3	0	0	$10,000	$0
Cisco	5/9/2015	1.5	0	0	$0	$0
Morton	5/26/2015	1	0	0	$0	$0
Cisco	5/27/2015	0.75	0	0	$0	$0
Gorman	3/30/2016	1	0	0	$0	$0
Gorman airport	5/10/2016	1	0	0	$0	$0
Eastland	5/26/2016	1.75	0	0	$1,000	$0
Cisco	7/4/2016	1.5	0	0	$0	$0
Cisco	7/4/2016	1.5	0	0	$3,000	$0
Ranger	4/21/2017	1	0	0	$0	$0
Rising Star	5/18/2017	2.5	0	0	$10,000	$0
Rising Star	5/18/2017	1.75	0	0	$0	$0
Ranger	6/2/2018	1	0	0	$0	$0
Staff	6/2/2018	1	0	0	$0	$0
Cisco	3/9/2019	0.88	0	0	$0	$0
Eastland	4/28/2020	2	0	0	$10,000	$0
Ranger	4/13/2021	2.5	0	0	$1,000,000	$0
Desdemona	4/2/2023	1.5	0	0	$0	$0
Eastland	4/2/2023	1	0	0	$0	$0
Gorman	4/26/2023	3	0	0	$100,000	$0
Carbon	4/26/2023	2.5	0	0	$20,000	$0

Gorman	4/26/2023	2.5	0	0	$50,000	$0
Cisco	4/26/2023	1	0	0	$0	$0
Cisco	5/6/2023	1	0	0	$0	$0
Staff	5/11/2023	2.5	0	0	$20,000	$0
Cisco	4/1/2024	2	0	0	$7,000	$0
Mangum	4/1/2024	1.25	0	0	$0	$0
Carbon	4/1/2024	1	0	0	$0	$0
Rising Star	5/25/2024	2.5	0	0	$5,000	$0

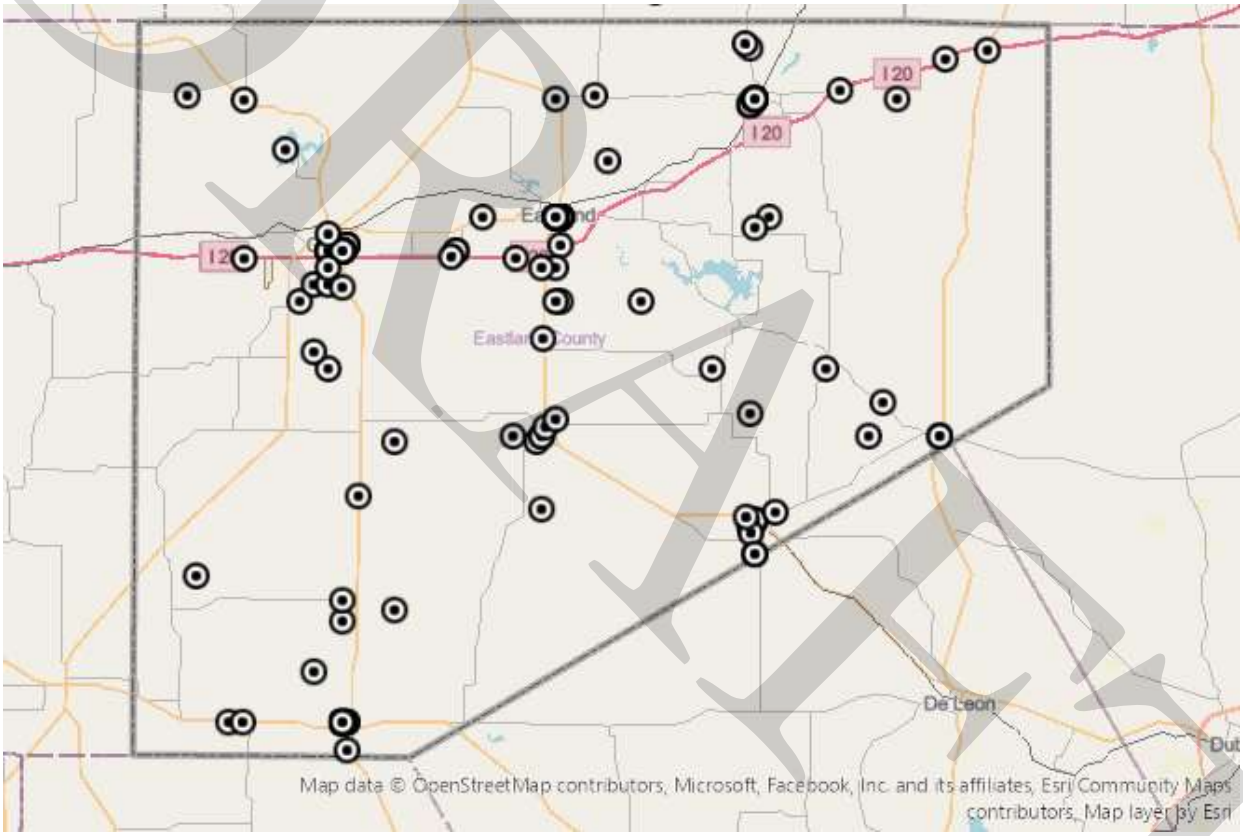


Figure 13-1: Eastland County Hail events (Source: NCEI NOAA data in ESRI)

The figure above plots this historical evidence by locating past hail events in the County's planning area where latitude and longitude were available.

Significant Events

While there have been no documented deaths or injuries related to hailstorms in Eastland County, hailstorms over the past 25 years have caused over $3,562,000 in property damages and $15,000 in crop damages. Given that is just damage reported, the true financial impact of hailstorms is likely

greater. The majority of hailstorms have been reported at H8 intensity, with a few going up to H9 and H10.

Probability of Future Events

Based on available records of historic events there were 140 events in a 25-year reporting period for the Eastland County planning area. This provides a probability of on average 5.6 storms per year. This frequency supports a Highly Likely probability of future events meaning that an event is probable somewhere in the planning area in the next year.

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

Vulnerability and Impacts

Hail can cause significant injury to humans and has been fatal in some circumstances. People could be struck by hail, falling trees, and branches. Also, hail could cause power outages, which could cause health and safety risks to more vulnerable populations in the planning area. The most common impacts of hailstorms are on crops, trees, and landscaping since even small hail can tear plants apart in a short amount of time. Vehicles, roofs of buildings, and homes are also commonly damaged by hail. Older structures not built to current codes may be more susceptible to hail damage than newer structures. HVAC and electrical service systems, particularly those on roofs, at schools, and critical facilities would be vulnerable and could also be damaged.

The Eastland County planning area features mobile and manufactured home parks which are more vulnerable to hailstorms than site-built structures. In addition, manufactured and temporary housing is located sporadically throughout rural portions of the planning area which are also vulnerable to the hailstorm hazard and more prone to being isolated from essential needs and emergency services in the event of a disaster. Also, structures built prior to 1980 are likely to have been built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant events.

Table 13-3: Structures at Greater Risk by Jurisdiction (Source: 2023 5-year ACS estimates)

Jurisdiction	Total Housing Units	Mobile Housing Units	Housing Built Before 1980
Eastland County	9,391	1,194 (12.7%)	6,453 (68.7%)

City of Eastland	1,901	110 (5.8%)	1,510 (79.4%)
City of Carbon	161	48 (29.8%)	82 (50.9%)
City of Cisco	1,589	72 (4.5%)	1,238 (77.9%)
City of Gorman	525	40 (7.6%)	467 (89%)
City of Ranger	1,343	247 (18.4%)	998 (74.3%)
City of Rising Star	473	71 (15%)	374 (79.1%)

Based on the ACS 2023 data, all cities in this plan are relatively equally vulnerable when it comes to the proportion of housing built before 1980, with all localities having over 50% of housing made before 1980. Cisco, Ranger, and the County have a relatively higher percent of mobile housing units compared to the remaining localities with more than 10% of their housing units classified as mobile homes. To mitigate the risks associated with the impacts of hailstorms, it is important to have early warning systems in place, build structures that can withstand high-velocity impacts from hail, and establish emergency response plans to quickly respond to disasters.

Historic Hailstorm Impacts

The summary table below, 13-4, shows the 25-year property and crop damage totals as well as the average annual (Per Year) losses summarizing historic hailstorm impacts. The bottom half of the table shows per capita dollar loss rates for the total and average annual losses. These rates are important measures for comparing losses between different hazards and areas. The average annual loss estimate of property and crops is $143,080.

Table 13-4, Eastland County Loss Summary (Source: 2023 ACS data)

Time Period	Fatalities	Injuries	Property Damage	Crop Damage
Loss Summary, Eastland County				
25-year Total	0	0	$3,562,000	$15,000
Per Year	0	0	$142,480	$600
Per Capita Dollar Losses				
25-year Total	0	0	$199.60	$0.84
Per Year	0	0	$7.98	$0.03

Since weather varies from year to year, forecasts of specific years are less likely to be true (less reliable) than these totals and averages for the period. The second summary table shows per capita dollar loss

rates based on 2020 Census population counts. This is an important measure for comparing historical losses between different hazards and areas. Table 13-5 below displays the hailstorm losses by jurisdictions within the planning area that had recorded financial or health losses. Some jurisdictions listed in earlier table of historical instances are not listed here due to no financial or health loss.

Table 13-5: Hailstorm Losses by Jurisdiction 1999-2024 (Source: NOAA NCEI)

Jurisdiction	Total Storms	Est. Prop Loss	Est Crop Loss	Total Loss
Carbon	10	$50,000	$5,000	$55,000
Cisco	31	$102,000	$0	$102,000
Desdemona	5	$5,000	$0	$5,000
Eastland	30	$2,061,000	$0	$2,061,000
Gorman	14	$174,000	$0	$174,000
Ranger	16	$1,005,000	$0	$1,005,000
Rising Star	18	$145,000	$10,000	$155,000
Staff	2	$20,000	$0	$20,000

SECTION 14: EXTREME HEAT

Description

Extreme heat is a condition where temperatures exceed local average high temperatures by ten degrees or more for an extended period of time and is also characterized by high humidity levels. Extreme heat is a common occurrence in Texas during the summer months. Extended periods of extreme heat are called heat waves and can lead to illness and death, particularly among vulnerable populations. In fact, heat waves have been the top cause of U.S. weather fatalities, on average, over the past 30 years. Texas had a particularly deadly year in 2011 when 203 heat-related deaths were reported. The major human risks associated with severe summer heat include heat cramps, sunburn, dehydration, fatigue, heat exhaustion, and heat stroke. Extreme heat can lead to power outages as heavy demands for air conditioning strain the power grid and prolonged exposure to excessive temperatures can damage crops and injure or kill livestock. As the Earth's climate warms overall heat waves are expected to become more frequent, longer, and more intense.

Location

Extreme heat is not confined to any specific geographic area and can occur anywhere within the planning area. City residents can face a heightened risk of extreme heat because of warmer temperatures in cities from the urban heat island effect. The urban heat island effect is caused by large amounts of paved surfaces that absorb and re-radiate heat. The lack of green spaces and tree cover in these areas adds to the issue. Since Eastland County does not have any large major metropolitan areas, the urban heat island effect is not as pronounced. This results in a negligible variance in extreme temperatures from heat waves in the unincorporated areas of the counties versus the incorporated areas

Extent

The "Heat Index" is the relationship between temperature and relative humidity established by the National Oceanic Atmospheric Administration (NOAA) to measure the magnitude or intensity of an extreme heat event. This index combines the effect of high temperatures with high humidity to determine how hot it feels outside. Figure 14-1 below describes the heat index as it relates to the likelihood of heat disorders due to prolonged exposure or strenuous activity. As an example, if the air temperature is 98°F and the relative humidity is 65%, the heat index, or how hot it feels, is 128°F. The red area indicates extreme danger, and the example below would fall into this category. Also, exposure to full sunshine can increase heat index values by up to 15°F since the heat index values in the chart below were devised for shady light wind conditions.

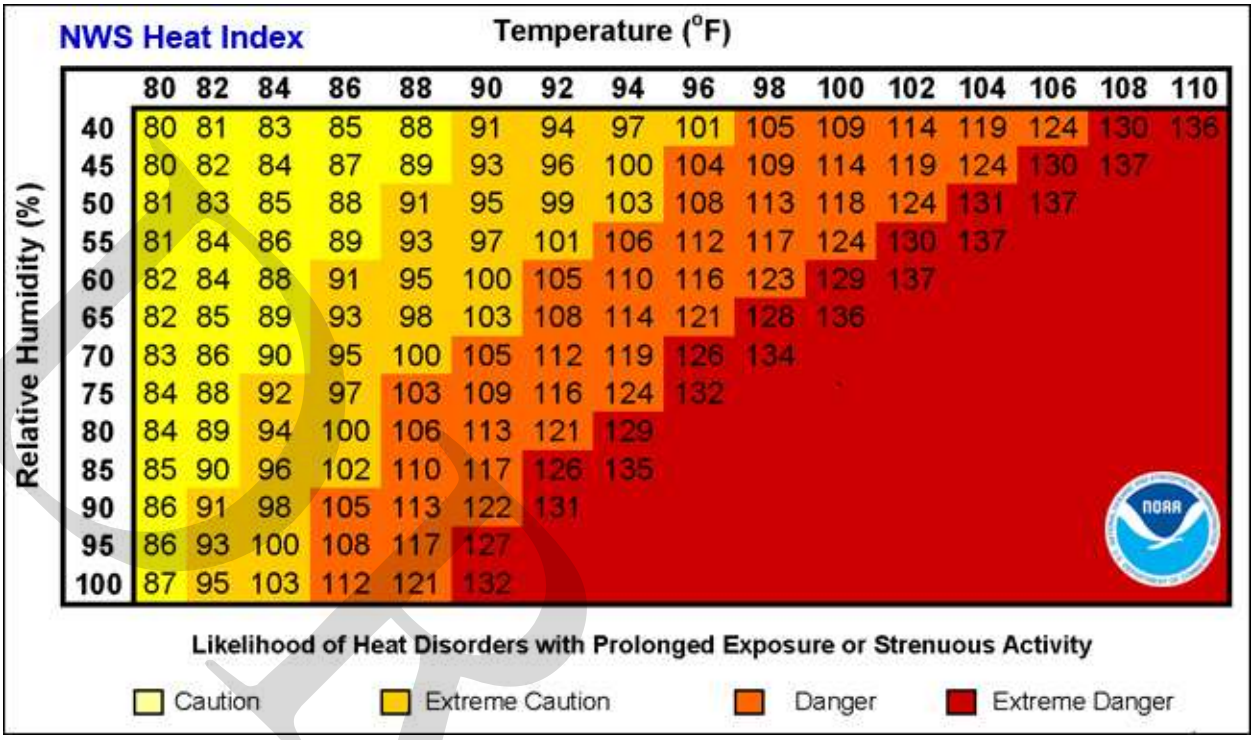


Figure 14-1: National Weather Service Heat Index

The likelihood of health disorders associated with ranges of heat index values are displayed below. The classifications of "Caution," "Extreme Caution," "Danger," and "Extreme Danger" are associated with increasingly harmful effects on the body. Effects on the body depend on the magnitude or intensity of the event with the shaded rows in the table below (Figure 14-2) corresponding to the colors in the chart above (Figure 14-1). The National Weather Service will initiate alert procedures when the Heat Index is expected to exceed 105°-110°F, depending on local climate, for at least two consecutive days.

Figure 14-2: Heat Index and Warnings (Source: NOAA)

Classification	Heat Index	Effect on the body
Caution	80°F - 89°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 102°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

The hottest months of the year for the Eastland County planning area are typically July and August. In August 2024, Eastland County reported 23 days of over 100°F temperatures, with the highest real-feel temperature recorded at 111°F. Residents in Eastland County are considered in the Danger

Classification with the heat index.

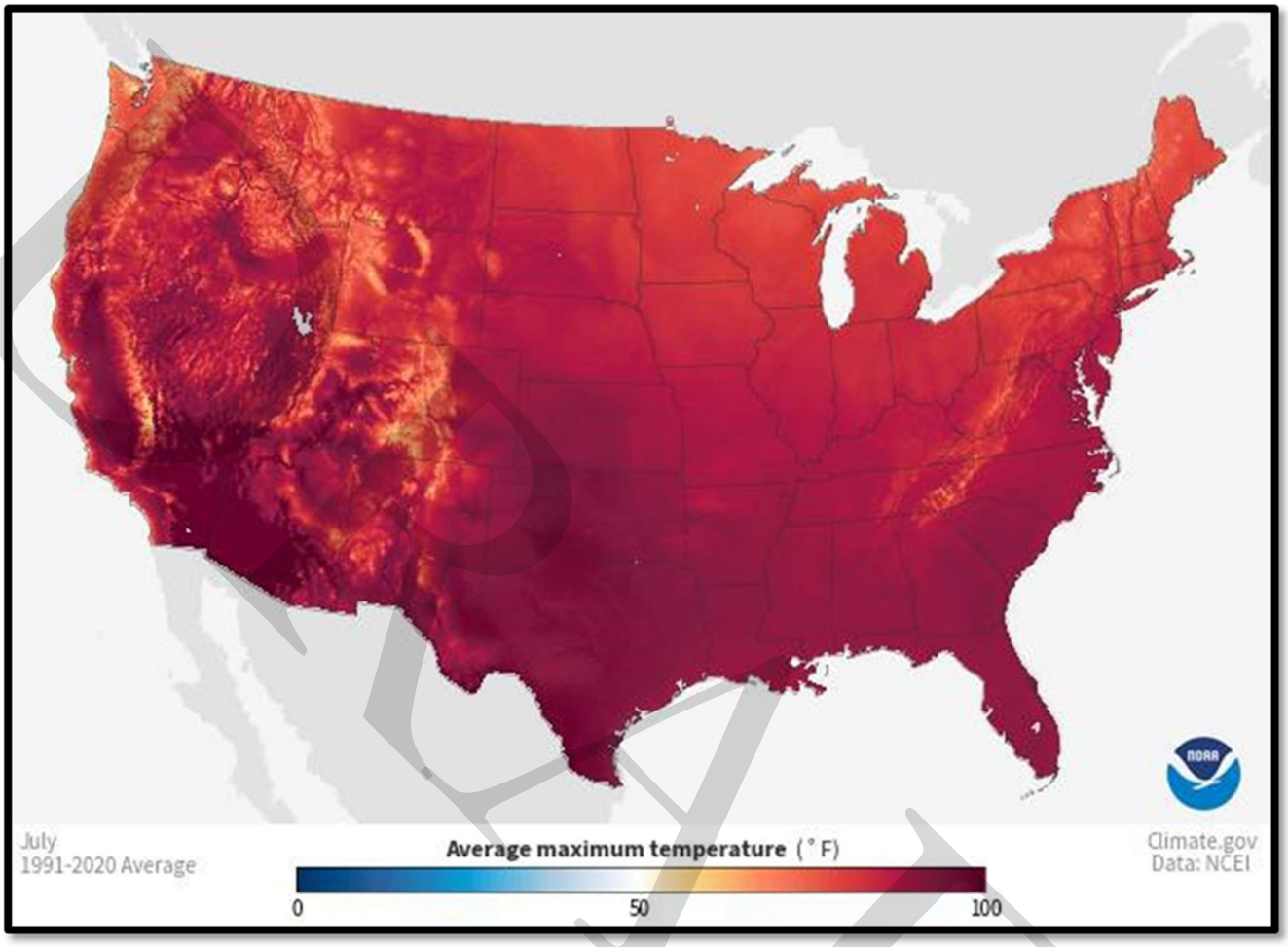


Figure 14-3: Average Maximum Temperature, Contiguous United States, August 1981-2010

Based on the average maximum temperature (90-100°F) and the average relative humidity of 53% from May through September in Eastland County, extreme heat events to the extent of "Danger" and "Extreme Danger" should be mitigated to reduce threats to humans, livestock, and pets. When the heat index reaches a "Danger" classification, effects can include sunstroke, muscle cramps, heat exhaustion, and prolonged exposure can bring on heatstroke. When the heat index reaches an "Extreme Danger" classification, effects on the body can include all the above in addition to increasing the risk of heat stroke and even death.

Historical Occurrences

Table 14-1: Eastland County extreme heat events from 1999-2024 (Source: NOAA NCEI)

Date	Deaths	Injuries	Property Damage	Crop Damage
8/1/1999	0	0	$0	$0
7/1/2000	0	0	$0	$0

8/1/2000	0	0	$0	$0
9/1/2000	0	0	$0	$0
6/19/2019	0	0	$0	$0
7/8/2019	0	0	$0	$0
8/7/2019	0	0	$0	$0
8/17/2019	0	0	$0	$0
8/26/2019	0	0	$0	$0
7/1/2020	0	0	$0	$0
7/9/2020	0	0	$0	$0
8/12/2020	0	0	$0	$0
8/13/2020	0	0	$0	$0
8/28/2020	0	0	$0	$0
6/11/2022	0	0	$0	$0
6/12/2022	0	0	$0	$0
7/6/2022	0	0	$0	$0
7/10/2022	0	0	$0	$0
7/17/2022	0	0	$0	$0
8/3/2022	0	0	$0	$0
6/19/2023	0	0	$0	$0
6/22/2023	0	0	$0	$0
6/26/2023	0	0	$0	$0
7/10/2023	0	0	$0	$0
7/12/2023	0	0	$0	$0
7/17/2023	0	0	$0	$0
8/1/2023	0	0	$0	$0
8/1/2023	0	0	$0	$0
8/17/2023	0	0	$0	$0
8/17/2023	0	0	$0	$0
9/5/2023	0	0	$0	$0
9/7/2023	0	0	$0	$0
9/23/2023	0	0	$0	$0
6/25/2024	0	0	$0	$0
8/7/2024	0	0	$0	$0
8/13/2024	0	0	$0	$0
8/20/2024	0	0	$0	$0

Eastland County and participating jurisdictions frequently experience excessive heat events in the Summer months. No recorded events have associated deaths, injuries or costs to property or crops in Eastland County. However, many heat-related health injuries may go unreported if no hospitalization is required. Vulnerable residents, such as youth under 5, adults over 65 and low-income or people experiencing homelessness may be at higher risk to the effects of extreme heat.

Table 14-2: Eastland County and jurisdiction's vulnerable populations (Source: 2023 ACS Census data)

Jurisdiction	Population 65 and Older	Population Under 5	Population below Poverty Level
Eastland County	993	3,910	2634
City of Eastland	252	845	698
City of Carbon	11	58	14
City of Gorman	28	188	490
City of Rising Star	47	169	169
City of Cisco	218	767	83
City of Ranger	232	404	544

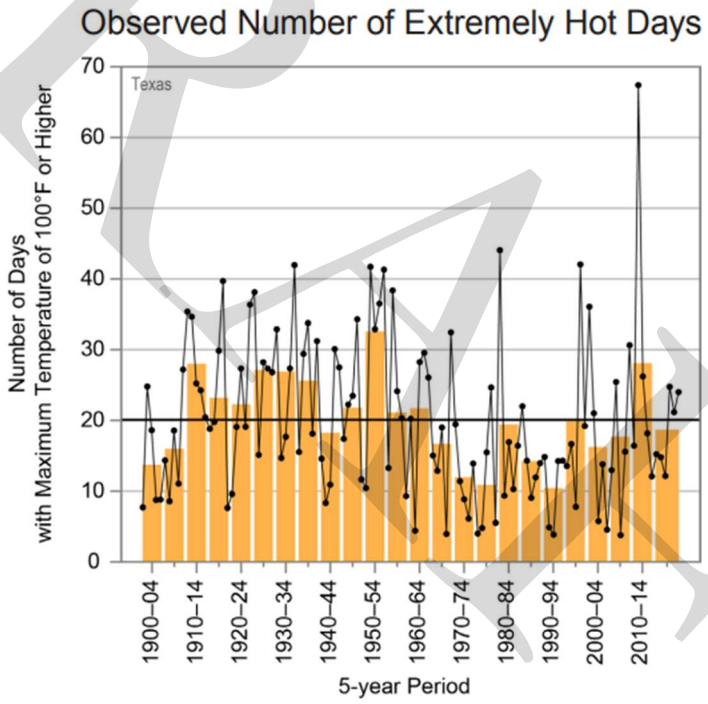


Figure 14-4: Extreme heat days since 1990. (Source: Texas - State Climate Summaries 2022)

Based on historical monitoring data from 1900-2014, the average number of days with extreme heat for the State of Texas is 20, with yearly spikes reaching as high as 68 days. While monitoring inadequacies mean an exact average number of days cannot be quantified for Eastland County, all surrounding counties without such inadequacies experienced over 14 days of extreme heat per summer from 2007 to 2016.

Data from CDC can also help tell a story of how the number of extreme heat days to be expected each summer is increasing. The two maps below depict an average number of extreme heat days over the 29-year period from 1981 - 2010 and below it the average for the 10 years from 2000-2010. The

Eastland County planning area is depicted within the black circle in North-central Texas on the maps below.

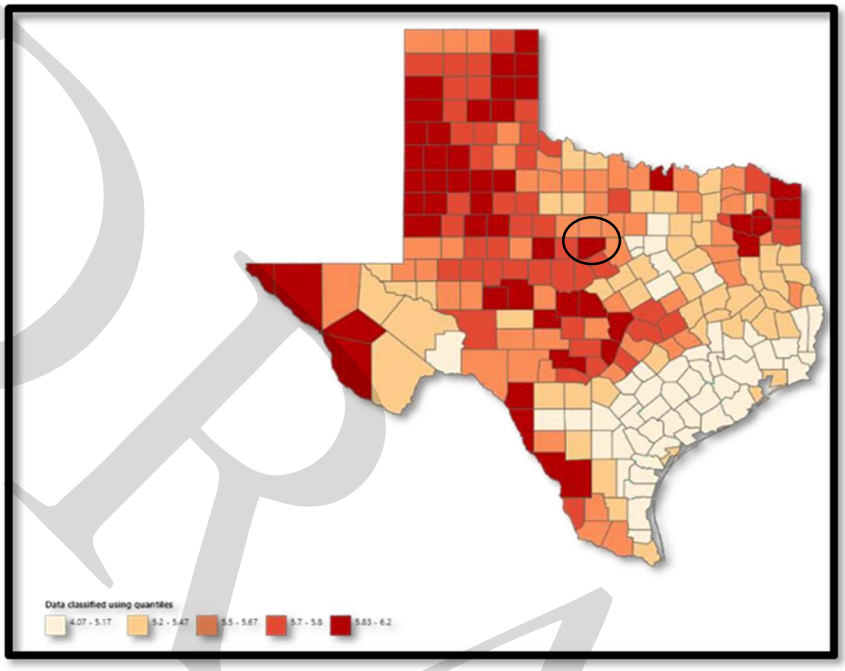


Figure 14-5: Average number of extreme heat days from 1981-2010 (Source: CDC)

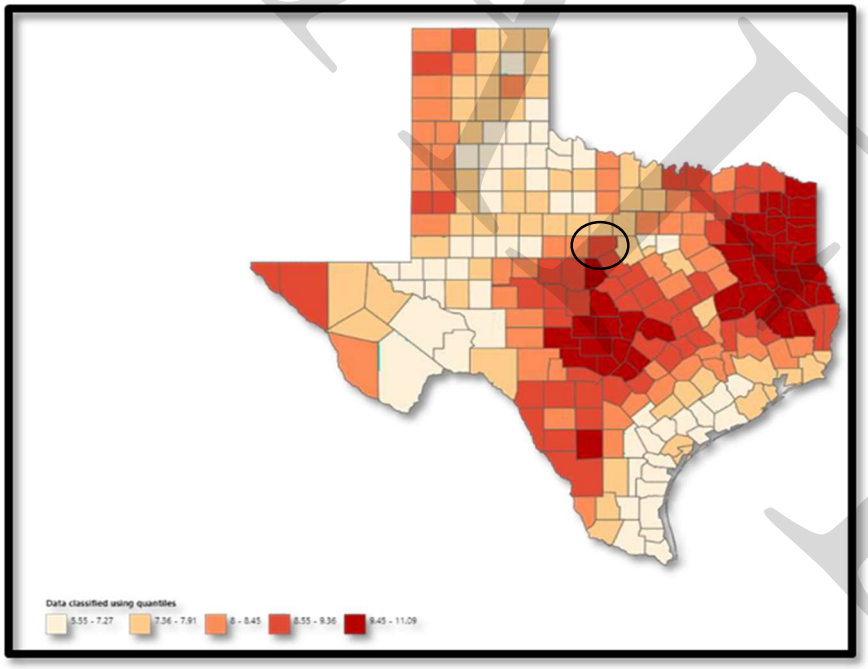


Figure 14-6: Average number of extreme heat days from 2000-2010. (Source: CDC)

The Extreme Heat Events data available on the CDC WONDER website are county-level measures

of the number of heat wave days in the months of May through September spanning the years 1981-2010. The CDC defines heat wave days as those that are 95th percentile of the daily maximum Heat Index. The number of heat wave days is computed at the county level and the choropleth map and associated legends show the average number of heat wave days occurring based on the selected time period and location. The average for Eastland County shifts from between 6-7 days over the long term but increases to an average of 9-10 extreme heat days from 2000 to 2010.

Significant Events

August 2024

The summer of 2024 had a long dry and hot spell. By the beginning of August, the heat started to get into triple digits. By August 13th, temperatures throughout North-Central Texas were reaching 105°F, and by the 20th, exceeding 105°F. Eastland County did not experience any injuries or deaths; however, other areas did, and the summer heat wave of 2024 caused 4 fatalities.

June 2023

High temperatures hit Eastland County in early summer in 2024. Early June already had excessive temperatures, and the heat index value reached up to 110 to 115°F. These temperatures continued throughout June, with a small reprieve where the head index hit 105°F, but by the end of June the heat index was back to 110-115°F

July 2022

In 2022, the summer temperatures reached triple digits by July. Many areas of the County saw temperatures at or over 105°F for nearly 2 weeks, then a period of over 110°F by the end of July.

Probability of Future Events

Eastland County has seen 37 extreme heat events in the past 25 years. The planning area can expect between 8-10 extreme heat days and at least one extreme heat event, or heat wave, each summer due to the warm, sunny, and humid climate in the Eastland County planning area. The probability of the area experiencing at least one extreme heat event in the next year is Highly Likely**.**

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

The probability that the number of extreme heat days will continue to increase in the future is also highly likely. According to NOAA, the top ten warmest years on record (1880-2022) across the globe have all occurred within the past 12 years. The table below ranks the warmest years on record with

land and ocean annually averaged measurements compiled from 1880-2017.

Table 14-3: Top ten warmest years, globally (Source: Global Climate Report – Annual 2022, NOAA, 1880-2022)

Rank: 1 = Warmest Period of Record: 1850–2023	Year	Anomaly °C	Anomaly °F
1	2023	1.18	2.12
2	2016	1.03	1.85
3	2020	1.01	1.82
4	2019	0.98	1.76
5	2017	0.95	1.71
6	2015	0.92	1.66
7	2022	0.91	1.64
8 (tied)	2018	0.86	1.55
8 (tied)	2021	0.86	1.55
10	2014	0.77	1.39

The average maximum temperature maps in Figure 14-7 are produced by the U.S. National Climatic Data Center and depict trends for the most recent complete 30-year period as well as the trend when looking at all recorded temperatures since 1896. The maps show average maximum temperature trends across the United States during the summer periods from 1991-2020 and 1896-2020 which show how trends from which forecasts are made can change drastically when looking at different periods of time. The planning area is in an area that can expect an increase of 0.5-1°F in average maximum summer temperatures over the next century.

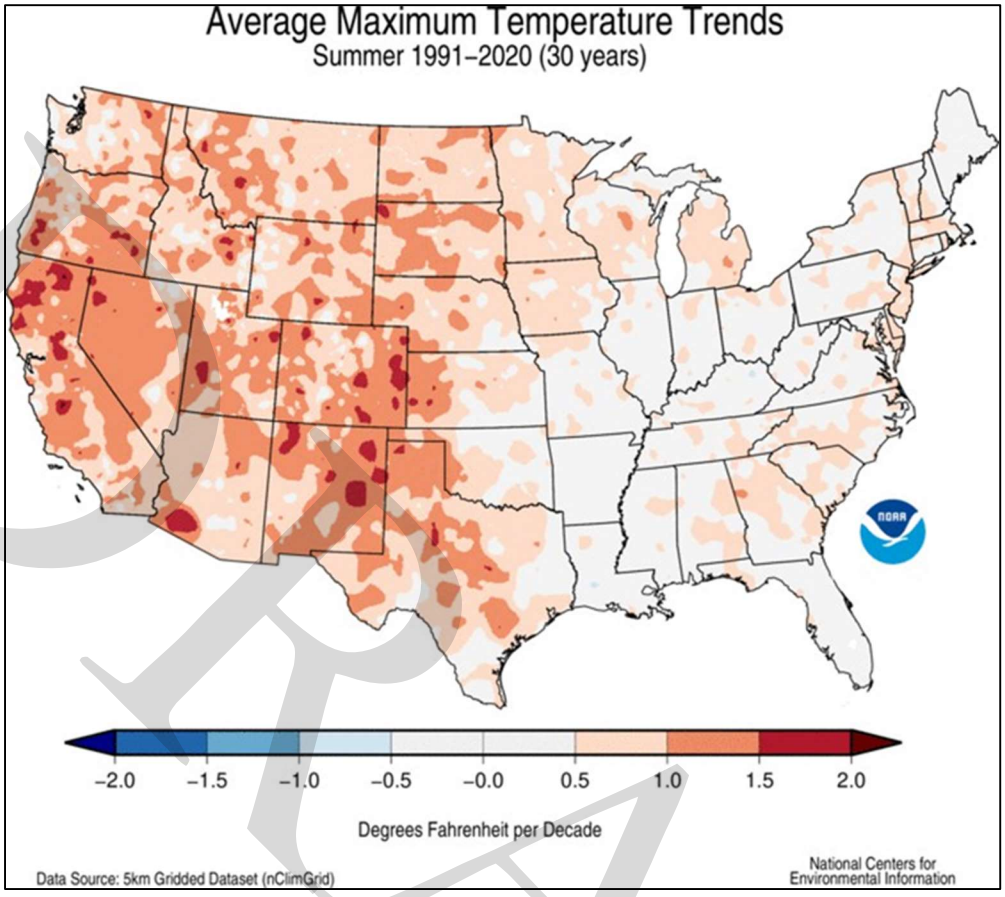


Figure 14-7: Average Temperature Trends in the U.S. (Source: https://www.ncdc.noaa.gov/temp-and-precip/us-trends/)

Vulnerability and Impacts

Residents of the area, especially vulnerable populations such as children under five and those over 65, should exercise caution by staying out of the heat for prolonged periods when a heat advisory or excessive heat warning is in effect. In addition to children and the elderly, the most vulnerable population to heat illnesses and casualties are the infirmed, who frequently live on low fixed incomes and cannot afford to run air conditioning on a regular basis. This population is sometimes isolated, with no immediate family or friends to look out for their well-being so it is important for communities to get to know which immediate neighbors may be at the highest risk to health impacts from heat. Those working or remaining outdoors for extended periods of time and overweight individuals are also at higher risk. It is never safe to leave a baby, child, disabled person, or pet in a locked car. Cars heat up quickly in the sun. This is true even in the winter, in fact, the first toddler death due to being left in a locked car in the U.S. in 2018 occurred in February. The graphic in Figure 14-8 below is produced by NOAA with tips on how to practice heat safety in different situations.

Figure 14-8: Heat Safety tips (Source: NOAA weather.gov)

Higher heat index values (which combine temperature and humidity to describe perceived temperature) are expected to increase discomfort and aggravate health issues. Conversely, cold spells are expected to decrease. In most locations, scientists expect daily minimum temperatures—which typically occur at night—to become warmer at a faster rate than daily maximum temperatures. This change will provide less opportunity to cool off and recover from daytime heat.

As the region continues to warm overall, it will be important to educate the public about strategies to stay cool during extreme heat events and how to recognize and respond to heat-related illnesses.

SECTION 15: DAM FAILURE

Description

Lake Cisco Dam – unsure about opening – can look at previous HMGP for inundation data and other facts.

Dams are water storage, control, or diversion structures that impound water upstream in reservoirs. Benefits provided by dams include water supplies for drinking, irrigation, and industrial uses. Dams also provide flood control, hydroelectric power, recreation, and navigation. At the same time, dams also represent a risk to public safety. Dams require ongoing maintenance, monitoring, safety inspections, and sometimes even rehabilitation to continue safe service.

Dam failure can take several forms, including a collapse of or breach in the structure. Hundreds of dam failures have occurred throughout U.S. history. These failures have caused immense property and environmental damage and have taken thousands of lives. As the nation's dams age and population increase, the potential for deadly dam failures grows. No one knows precisely how many dam failures have occurred in the U.S., but they have been documented in every state. Data from the Association of State Dam Officials states that from January 2005 through June 2013, state dam safety programs reported 173 dam failures and 587 "incidents" - episodes that, without intervention, would likely have resulted in dam failure. The graphic below depicts the history of dam failures throughout the US.

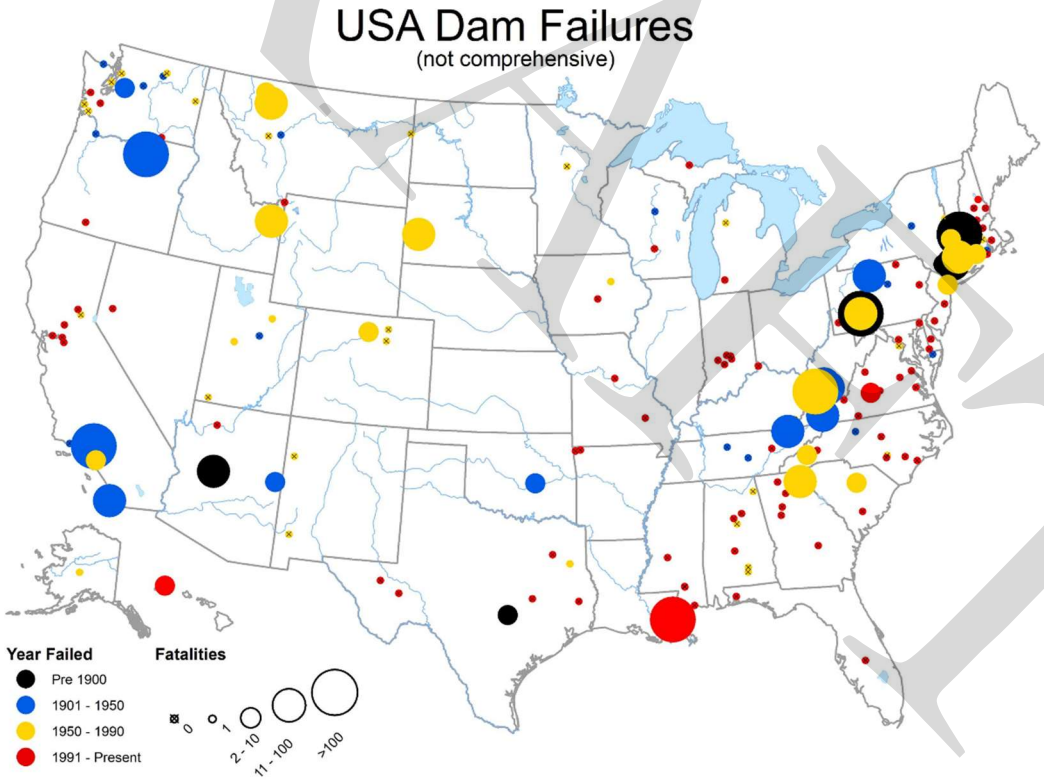


Figure 15-1: Extent and time of dam failures in the U.S. (Source: NOAA)

In the event of a dam failure, the energy of the water stored behind the dam can cause rapid and unexpected flooding downstream, resulting in loss of life and substantial property damage. A devastating effect on water supply and power generation could be expected as well. The causes of dam failures are many but they are most likely to happen for one of five reasons.

1. **Overtopping is** caused by water spilling over the top of a dam. Overtopping of a dam is often a precursor of dam failure. National statistics show that overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest accounts for approximately 34% of all U.S. dam failures. Overtopping can happen after periods of prolonged rainfall and flooding for which the dam was not designed or failure of upstream dams in the same drainage basin.
2. **Foundation Defects**, including settlement and slope instability, cause about 30% of all dam failures.
3. **Cracking is** caused by movements like the natural settling of a dam.
4. **Inadequate maintenance** and upkeep.
5. **Piping** is when seepage through a dam is not properly filtered and soil particles continue to progress and form sinkholes in the dam. [See an animation of a piping failure.] Another 20% of U.S. dam failures have been caused by piping. Seepage often occurs around hydraulic structures, such as pipes and spillways; through animal burrows; around roots of woody vegetation; and through cracks in dams, dam appurtenances, and dam foundations.

Location

Figures 15-2 and 15-3, provide a summary and illustrate general locations for each dam in the planning area. Currently, there are forty-four (44) dams located in Eastland County, of which 4 are public dams, and 40 are private dams. For the purposes of the 2025 Eastland County Hazard Mitigation Plan, the main focus and analysis will be on public dams; however, data will be presented on private dams to the extent that it is available. The four public dams are all classified as "High" hazard potential. Of the forty private dams, 2 are considered "high" hazard potential, 2 are "Significant" and 36 are considered "Low".

Table 15-1: Data on Eastland County public dams (Source: National Inventory of Dams, USACE)

Dam Name	NID ID	Owner Names	Latitude	Longitude	City
Lake Eastland Dam	TX01411	CITY OF EASTLAND	32.41641	-98.83259	Eastland
Lake Leon Dam	TX01417	EASTLAND COUNTY WSD	32.36272	-98.67562	
Ringling Lake Dam	TX01410	CITY OF EASTLAND	32.42416	-98.82908	Eastland
Williamson Dam	TX01409	CITY OF CISCO	32.43944	-98.98444	

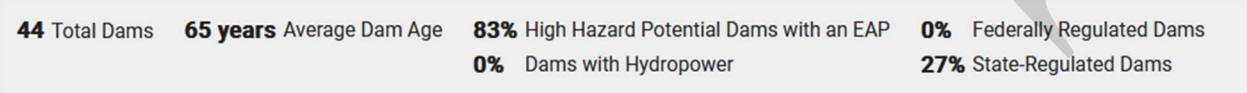


Figure 15-2: Eastland dam average data

Table 15-2: Eastland Dams detailed information

Dam Name	NID ID	State Regulated Dam	Federally Regulated Dam	Dam Height (Ft)	Year	Normal Storage (Acre-Ft)	Hazard Potential Class.	EAP Prepared
Lake Eastland Dam	TX01411	Yes	No	33	1922	1740	High	Yes
Lake Leon Dam	TX01417	Yes	No	88	1954	28042	High	Yes
Ringling Lake Dam	TX01410	Yes	No	18	1922	144	High	Yes
Williamson Dam	TX01409	Yes	No	96	1923	26000	High	Yes
Buster Hanson Lake Dam	TX05036	Yes	No	29	1977	370	Low	Not Required
Love and Rodgers Dam No 1	TX04352	Yes	No	21	1970	170	Low	Not Required
Perrin Lake Dam	TX01413	Yes	No	29	1972	350	High	Yes
Dickey Lake Dam	TX05031	Yes	No	35	1980	300	Low	Not Required
Lakewood Reservoir Dam	TX01399	Yes	No	23	1925	150	High	No
Lake Olden Dam	TX01407	Yes	No	45	1920	1607	Low	Not Required
Hagaman Lake Dam	TX01418	Yes	No	43	1913	1158	Significant	Yes
Dothan Water Station Levee	TX01419	No	No	22	1914	67	Low	Not Required
Warren Dam No 2	TX01415	No	No	21	1967	244	Low	Not Required
Hanson Dam	TX01406	No	No	8	1969	60	Low	Not Required
Love and Rodgers Dam No 3	TX04351	No	No	18	1969	40	Low	Not Required
Parker Dam	TX06496	No	No	18	1947	6	Low	Not Required
Griffin Lake Dam	TX05035	No	No	20	1970	90	Low	Not Required
Fambro Lake Dam	TX05033	No	No	15	1965	40	Low	Not Required
Truett Spruill Dam	TX01403	No	No	18	1969	138	Low	Not Required
Crawford Lake Dam	TX05034	No	No	27	1950	57	Low	Not Required
Little Lake Dam	TX05796	No	No	29	1966	100	Low	Not Required
Borrow Pit Reservoir Dam	TX04348	No	No	8	1975	60	Low	Not Required
Kendall Lake Dam	TX05032	No	No	20	1965	48	Low	Not Required
Warren Dam No 1	TX01402	No	No	15	1968	48	Low	Not Required
Grimshaw Lake Dam	TX05038	No	No	18	1972	40	Low	Not Required

Howard Wade Lake Dam	TX04350	No	No	29	1967	32	Low	Not Required
Love and Rodgers Dam No 2	TX01416	No	No	14	1969	15	Low	Not Required
Peterson Dam	TX01401	No	No	19	1965	100	Low	Not Required
Maynord Lake Dam	TX05039	No	No	19	1977	100	Low	Not Required
West King Dam	TX04837	No	No	14	1965	50	Low	Not Required
Reeves Dam	TX09067	No	No	13		26	Low	Not Required
Carlton Dam	TX04300	No	No	13	1970	60	Low	Not Required
Cooper Lake Dam	TX05030	No	No	13	1925	40	Low	Not Required
Jg Bishop Dam	TX06272	No	No	30	1981	23	Low	Not Required
Bryant Dam	TX01405	No	No	24	1969	70	Low	Not Required
Whiteside Estate Lake Dam	TX04347	No	No	29	1969	76	Low	Not Required
Rodgers Dam	TX01414	No	No	42	1970	50	Low	Not Required
Birdsong Dam	TX01400	No	No	25	1966	90	Low	Not Required
Hodges Dam	TX04222	No	No	31	1971	188	Low	Not Required
Twin Lake Dam	TX01408	No	No	16	1966	64	Low	Not Required
East King Dam	TX04838	No	No	15	1965	36	Low	Not Required
Old City Lake Dam	TX04349	No	No	26	1966	75	Low	Not Required
Hamner Dam	TX01404	No	No	24	1967	96	Low	Not Required

All census blocks within five miles of a dam with a maximum storage capacity of 100,000 acre-feet or more are considered at risk of potential dam failure hazards. For dams with a maximum storage capacity between 10,000 and 100,000 acre-feet, all census blocks within three miles are deemed to be at risk of potential dam failure hazards. For dams with a maximum storage capacity of less than 10,000 acre-feet, all census blocks within one mile are considered to be at risk from potential dam failure hazards.

In Eastland County, no dams have a maximum storage capacity above 100,000. Lake Leon Dam and Williamson Dam have the largest storage capacity at 70,630 and 32,800 respectively. These two dams are a potential risk for all census tracts within 3 miles. In table 15-3 and 15-4 below, each dam is categorized by size and associated with the census block groups within the risk zone. For more

information regarding the inundation area of dam failure, contact the Eastland County Office of Emergency Management.

Table 15-3: Dams with 10,000-100,000 max capacity and associated CT/BG information

Dam Name	Latitude	Longitude	CT/BG within 3 miles
Lake Leon Dam	32.362719	-98.675622	9502.02 BG 5, 9501.00 BG 2
Williamson Dam	32.439444	-98.984444	9503.02 BG 1

Table 15-4: Dams with less than 10,000 max capacity and associate CT/BG information

Dam Name	Latitude	Longitude	CT/BG within 1 miles
Lake Eastland Dam	32.416413	-98.832585	9502.01 BG 1, 9502.02 BG 4, 9502.02 BG 1
Ringling Lake Dam	32.424157	-98.829076	9502.01 BG 1
Buster Hanson Lake Dam	32.28136	-98.78448	9505.00 BG 1 & 2
Love and Rodgers Dam No 1	32.33565	-98.60819	9501.00 BG 2, 9505.00 BG 2
Perrin Lake Dam	32.34676	-98.60310	9501.00 BG 2
Dickey Lake Dam	32.39646	-98.57415	9501.00 BG 2
Lakewood Reservoir Dam	32.10101	-99.06245	9504.00 BG 1
Lake Olden Dam	32.37137	-98.76927	9502.02 BG 5
Hagaman Lake Dam	32.49687	-98.65176	9501.00 BG 2
Dothan Water Station Levee	32.38853	-99.09181	9503.02 BG 1, BG 2
Warren Dam No 2	32.28326	-98.66298	9505.00 BG 2
Hanson Dam	32.28858	-98.81622	9505.00 BG 1
Love and Rodgers Dam No 3	32.33983	-98.61120	9501.00 BG 2, 9505.00 BG 2
Parker Dam	32.09427	-98.90252	9504.00 BG 1, 9502.00 BG 1
Griffin Lake Dam	32.28804	-98.87752	9505.00 BG 1
Fambro Lake Dam	32.49339	-98.52694	9501.00 BG 2
Truett Spruill Dam	32.24099	-98.81956	9505.00 BG 1
Crawford Lake Dam	32.41214	-98.52991	9501.00 BG 2
Little Lake Dam	32.27292	-98.75550	9505.00 BG 1 & 2
Borrow Pit Reservoir Dam	32.40167	-98.76376	9502.01 BG 1, 9502.02 BG 5
Kendall Lake Dam	32.38561	-99.02371	9503.02 BG 1
Warren Dam No 1	32.23613	-98.66683	9505.00 BG 2
Grimshaw Lake Dam	32.31777	-98.60484	9505.00 BG 2, 9501.00 BG 2
Howard Wade Lake Dam	32.35339	-98.54141	9501.00 BG 2

Love and Rodgers Dam No 2	32.33846	-98.61273	9501.00 BG 2, 9505.00 BG 2
Peterson Dam	32.23630	-98.63715	9505.00 BG 2
Maynord Lake Dam	32.23654	-98.93665	9504.00 BG 1, 9505.00 BG 1
West King Dam	32.41071	-98.87226	9502.02 BG 3, 9502.01 BG 1
Reeves Dam	32.24333	-98.63000	9505.00 BG2
Carlton Dam	32.28023	-98.76192	9505.00 BG 1 & 2
Cooper Lake Dam	32.49146	-99.03729	9503.02 BG 1
Jg Bishop Dam	32.315	-98.65500	9505.00 BG 2, 9502.02 BG 5, 9501.00 BG 2
Bryant Dam	32.26121	-98.79453	9505.00 BG 1
Whiteside Estate Lake Dam	32.14174	-98.80300	9505.00 BG 1, 9501.02 BG 2
Rodgers Dam	32.28379	-98.64684	9505.00 BG 2
Birdsong Dam	32.21609	-98.71162	9505.00 BG 1 & 2
Hodges Dam	32.45870	-98.62938	9501.00 BG 1 & 2
Twin Lake Dam	32.40307	-98.99228	9503.01 BG 1 & BG 4, 9502.01 BG 1
East King Dam	32.40660	-98.85674	9502.02 BG 3 & 4, 9502.01 BG 1
Old City Lake Dam	32.40131	-98.78501	9502.01 BG 1, 9502.02 BG 2 & 5
Hamner Dam	32.23337	-98.85517	9505.00 BG 1

The number of census blocks at risk as they relate to dam size is to be used only as a rough guide. Inundation maps based on hydraulic and hydrologic modeling can be used to provide precise risk from dam failure. Five of the six owners of the high-hazard dams in the County all have the mandated Emergency Action Plans prepared.

Extent

The extent or magnitude of a dam failure event is described in terms of the classification of damages that could result from a dam's failure, not the probability of failure. The National Interagency Committee on Dam Safety defines high-hazard dams as those where failure or mis-operation would cause loss of human life. Low-hazard potential dams are those at which failure or misoperation probably would not result in loss of human life but would cause limited economic and/or environmental losses. Losses would be limited mainly to the owner's property.

Classifications for dam failure extent are found in Table 15-5 below.

Table 15-5: Dam Hazard Classification Criteria Source: Federal Guidelines for Dam Safety

Hazard Potential Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low	None expected	Low and generally limited to owner
Significant	None expected	Yes
High	Probable. One or more expected	Yes (but not necessary for this classification)

Table 15-3: Eastland County and jurisdiction Dam classifications

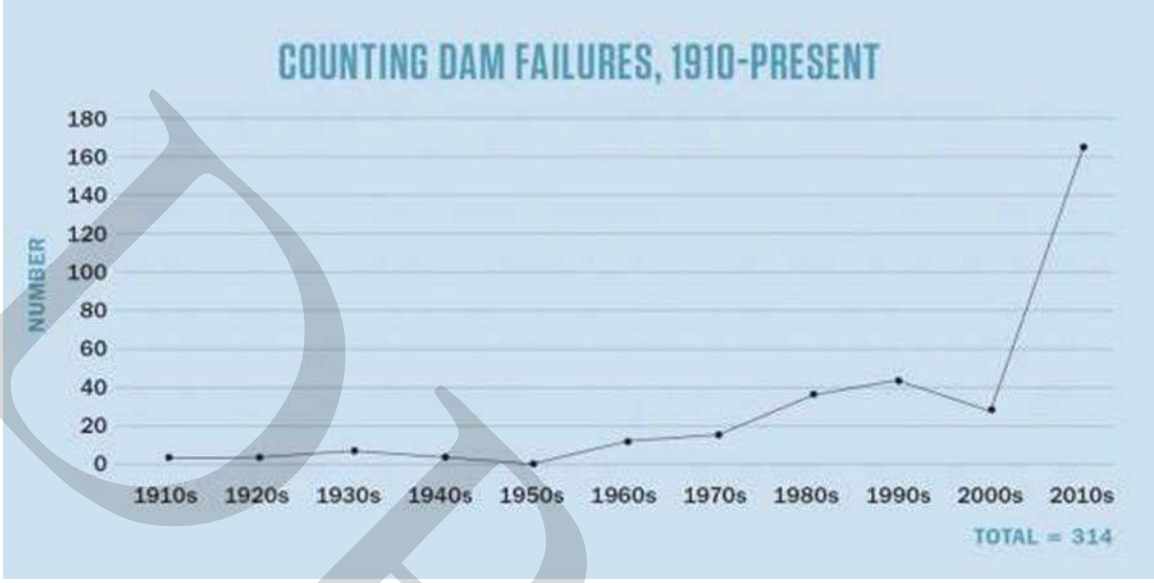
Extent	Number	Level of Intensity to mitigate
Eastland County - 40 total		
High Hazard	6	The County has 3 High Hazard Dams: 1) Lake Leon Dam Lake Leon Dam is a state-regulated dam owned by Eastland County WSD for water supply purposes. It sits on Leon River and is an earthen dam. Built in 1954, it reaches 99 feet in height, has a max storage of 70,630 acre per foot, and has a drainage area of 252 square miles. The dam's condition is satisfactory; however, residents downstream of the dam and near Lake Leon are at risk of dam failure. 2) Perrin Lake Dam Perrin Lake Dam is a private dam along Perrin Lake and Salt Branch River. The dam has a drainage age of 3.8 square miles, but not enough data on it to determine the extent, flow, and the drainage flow in the event of a failure. 3) Lakewood Reservoir Dam Lakewood Reservoir Dam is a privately owned dam, built in 1925 for irrigation and recreation. The max height is 23 feet and has a drainage area of 7.92 square miles. There is not enough data on this private dam to determine the extent, flow and drainage in the event of failure.
Significant Hazard	1	The County has 1 Significant Hazard Dam: 1) Hagaman Dam Hagaman Dam is a privately owned dam built in 1913 for irrigation purposes. The height of the dam is 43 feet, with a drainage area of 13.8 square miles. This puts City of Ranger and Tiffin at risk of flooding in the event of failure. There is limited data on this dam to present drainage flow; however, the dam does have an Emergency Action Plan.
Low Hazard	36	The County has 36 low-hazard dams, many of which are private dams and have a low level of intensity to mitigate.

City of Eastland - 2 total		
High Hazard	2	1) Lake Eastland Dam Lake Eastland Dam is a state-regulated dam owned by the City of Eastland. It is made of earthen mixture, reaching 33 feet in height. It was built in 1922 and has a drainage area of 33.8 square miles. In the event of failure, the City of Eastland residents are most at risk, although many unincorporated areas of the dam downstream would also be severely impacted. 2) Ringling Dam Ringling Dam is owned by the City of Eastland, located north and slightly east of Lake Eastland Dam. It reaches 18 feet in height, was completed in 1922, and has a drainage area of 3.5 square miles. In the event of failure, the City of Eastland residents are at the most risk.
Significant Hazard	0	N/A
Low Hazard	0	N/A
City of Cisco - total 1		
High Hazard	1	1) Williamson Dam Williamson Dam is publicly owned by the City of Cisco and completed in 1923. The main purpose of the dam is for water supply and recreation. The height of the dam is 96 feet, with 32,800 acre/feet max storage. The drainage area of the dam is 26 square miles. In the event of failure, the City of Cisco's residents are at a high risk of impact.
Significant Hazard	0	N/A
Low Hazard	0	N/A
City of Rising Star - 1 total		
High Hazard	0	N/A
Significant Hazard	0	N/A
Low Hazard	1	1) Parker Dam Parker Dam is a low hazard dam, privately owned, that was completed in 1947. The height is 18 feet, but there is little additional data to help determine drainage area, flow and impact.

Historical Occurrences

Texas dams earn a "D" grade from the American Society of Civil Engineers. Of the approximately 300 dam failures in Texas since 1910, half have occurred in the last nine years.

Figure 15-4: Texas Dam Failures, 1910-2019 (Source: Texas Observer)



Many of the dams in the planning area are classified as small dams and their failure has the capacity to cause physical and economic harm. A federal study found that from 1960- 1998 dam failures accounted for 300 fatalities that occurred nationally and more than 85 percent were caused by dams less than 50 feet in height. In Texas, almost half of all dams are considered too small to regulate, and they are exempt from inspections and oversight. Based on an investigation by the Texas Observer, "This investigation found that the vast majority of failures in Texas involve dams that impound less than 1,000 acre-feet. Despite their size, many small dams are ticking time bombs, according to safety experts. Big dams are usually owned by government agencies such as river authorities, which have money for upgrades and are regulated by TCEQ. Small dams are typically owned by individuals, homeowners' associations and cash-strapped counties that can't afford expensive improvements."

Significant Events

There have been no documented significant dam failure events in Eastland County and participating jurisdictions.

Probability of Future Events

According to historical records, from 1999-2024 the planning area has experienced zero (0) dam failures. The probability of a dam failure event occurring in the planning area is Unlikely, with a dam failure event probable in the next 10 years.

Frequency of Occurrence

Highly likely: Event probable in next year.
Likely: Event probable in next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

Vulnerability and Impact

All areas that are directly downstream of one of the dams in Eastland County are vulnerable to dam failure, overflow, and spillage. The average lifespan of dams is approximately 50 years. The average age of all Eastland Dams at 66 years, which may be a concern for future dam failure. The two largest dams were built in 1954 (Lake Leon Dam) and 1923 (Williamson Dam), making them 71 and 102 years old respectively. In Table 15-6 below, the High and Significant Hazard Potential Classifications are listed with their most recent inspection date, and if they have an EAP.

Table 15-6: List of High/Significant hazard dams with inspection and condition data

Dam Name	Owner Type	Hazard Potential Classification	Last Inspection Date	Condition Assessment	Condition Assessment Date	EAP Prepared
Lake Eastland Dam	Public	High	2/28/2023	Fair	4/27/2023	Yes
Lake Leon Dam	Public	High	5/30/2023	Satisfactory	10/9/2023	Yes
Ringling Lake Dam	Public	High	2/28/2023	Unsatisfactory	5/23/2022	Yes
Williamson Dam	Public	High	1/12/2024	Unsatisfactory	5/23/2022	Yes
Perrin Lake Dam	Private	High	3/1/2023	Fair	4/27/2023	Yes
Lakewood Reservoir Dam	Private	High	1/12/2024	Poor	1/26/2021	No
Hagaman Lake Dam	Private	Significant	3/1/2023	Fair	5/17/2023	Yes

Dam failure is categorized from lesser degree to catastrophic failure. Catastrophic type of failure is characterized by the sudden, rapid, and uncontrolled release of impounded water or the likelihood of such an uncontrolled release. Lesser degrees of failure include any malfunction or abnormality outside the design assumptions and parameters that adversely affect a dam's primary function of impounding water. These lesser degrees of failure can often lead to an increased risk of catastrophic failure; however, lesser degrees are easier to remedy to prevent further complications. If a dam failure is extensive, a large amount of water would enter the downstream waterways forcing them out of their banks. There may be significant environmental effects, resulting in flooding that could disperse debris and hazardous materials downstream that can damage local ecosystems. If the event is severe, debris carried downstream can block traffic flow, cause power outages, disrupt local utilities, such as water and wastewater, and could result in school closures.

Populated centers around Ringling Lake Dam and Williamson Dam are at moderate risk, considering age and condition of the dams. This puts the City of Eastland at risk due to the proximity of Ringling Dam. Areas directly downstream and within the City of Eastland's city limits would need to be immediately evacuated in the event of a dam failure. The City of Cisco would be at risk with Williamson dam, and areas downstream and within the city limits would need to be evacuated. There are many other unincorporated communities that would need to be evacuated in the event of a dam failure of one of the remaining 5 high-or-significant-hazard dams in Eastland County. Vulnerable populations such as children and those above 65 years of age are at further risk as they may not be able to evacuate in a timely fashion in the event of failure.

The majority of Census Tracts and Block Groups in the county have or are adjacent to a dam, with several larger dams nearby populated centers like the City of Eastland, as seen in Table 15-3 and 15-4. The Cities of Eastland and Cisco receive a High impact rating for dam failure due to the severity, size, and hazard potential of nearby dams. The cities of Gorman and Carbon, as well as unincorporated County, have a Moderate impact rating, due to the number of dams yet the relatively smaller sizes and condition of the dams. Finally, Rising Star and Ranger have Low impact ratings due to the lack of nearby dams to their city limits.

Figures 15-5 to 15-9 below show the location of dams in relation to flood zone data. Due to no digital data for a large portion of the County, the maps for Ringling Dam, Lake Eastland Dam, Lake Leon Dam, Williamson Dam, and Lakewood Reservoir Dam are plotted on traditional FEMA FIRMettes. Perrin Lake Dam and Hagaman Lake Dam are presented with digital data.

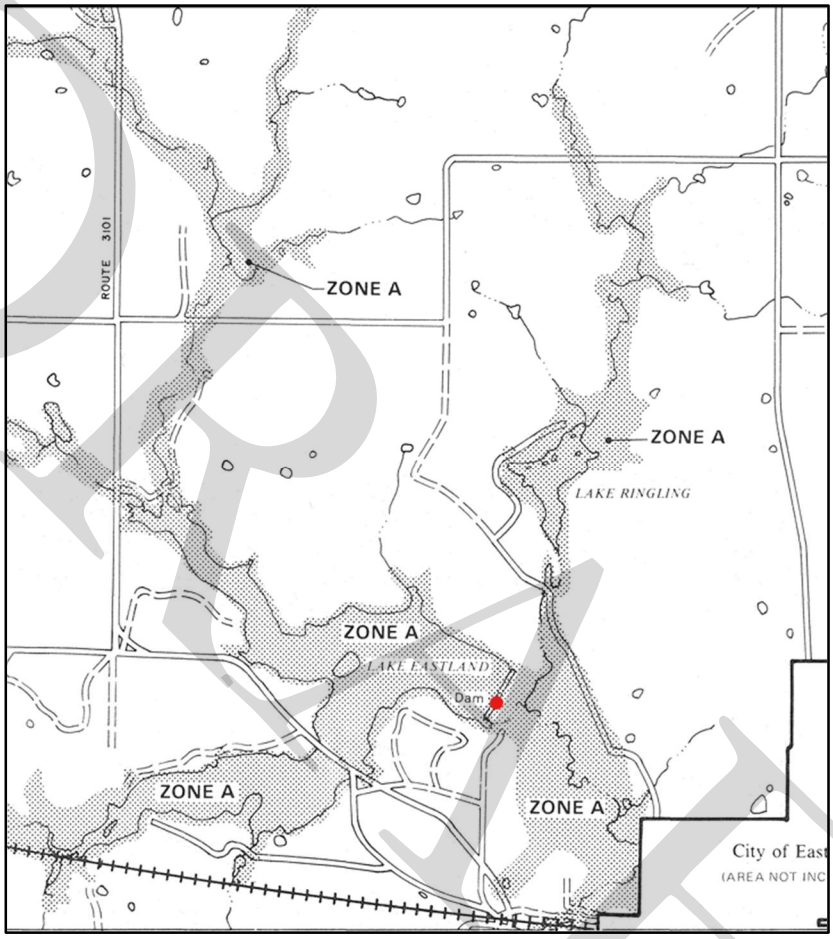


Figure 15-5: FEMA FIRMette of Lake Eastland Dam. (Source: FEMA)

Lake Eastland Dam is in close proximity to the City of Eastland, and a High Hazard classification. Many residential buildings and businesses are at risk of dam failure.

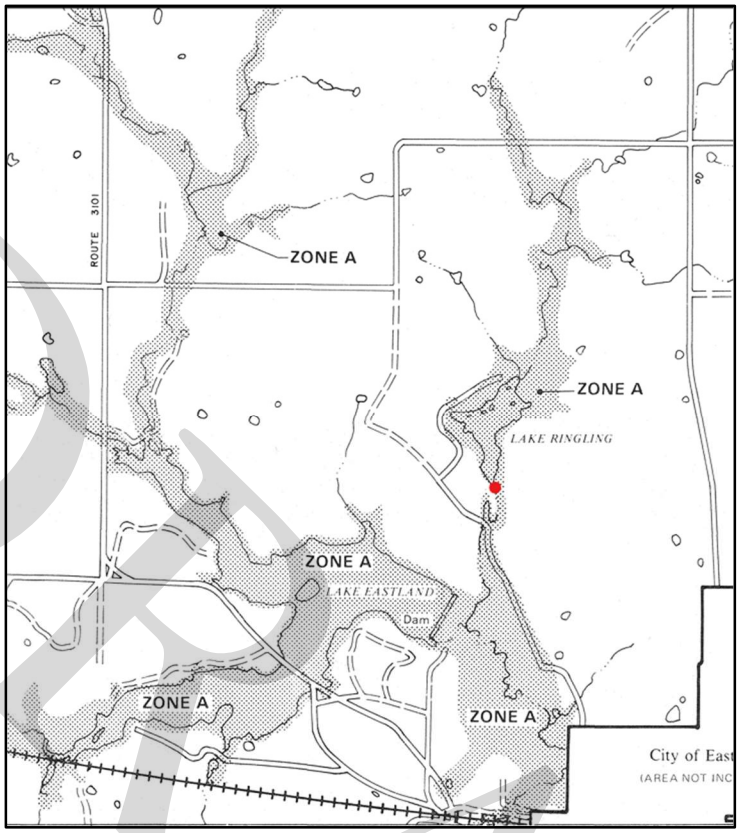


Figure 15-6: FEMA FIRMette of Lake Ringling Dam (Source: FEMA)

Similar to Lake Eastland Dam, Lake Ringling Dam is in close proximity to the City of Eastland and many residential buildings and businesses are at risk of the impacts of dam failure.

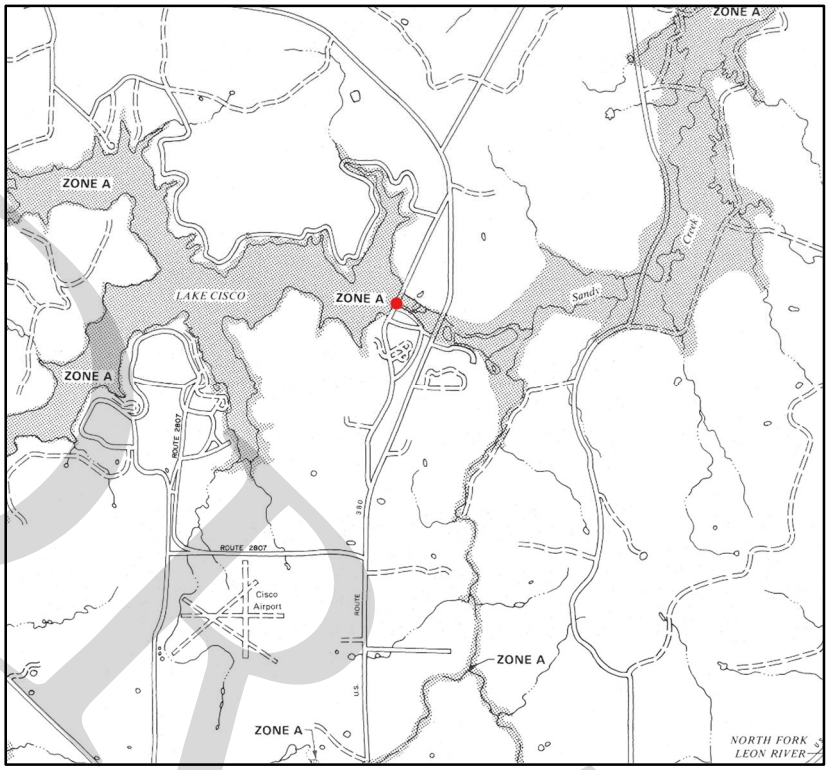


Figure 15-7: FEMA FIRMette showing Williamson Dam (Source: FEMA)

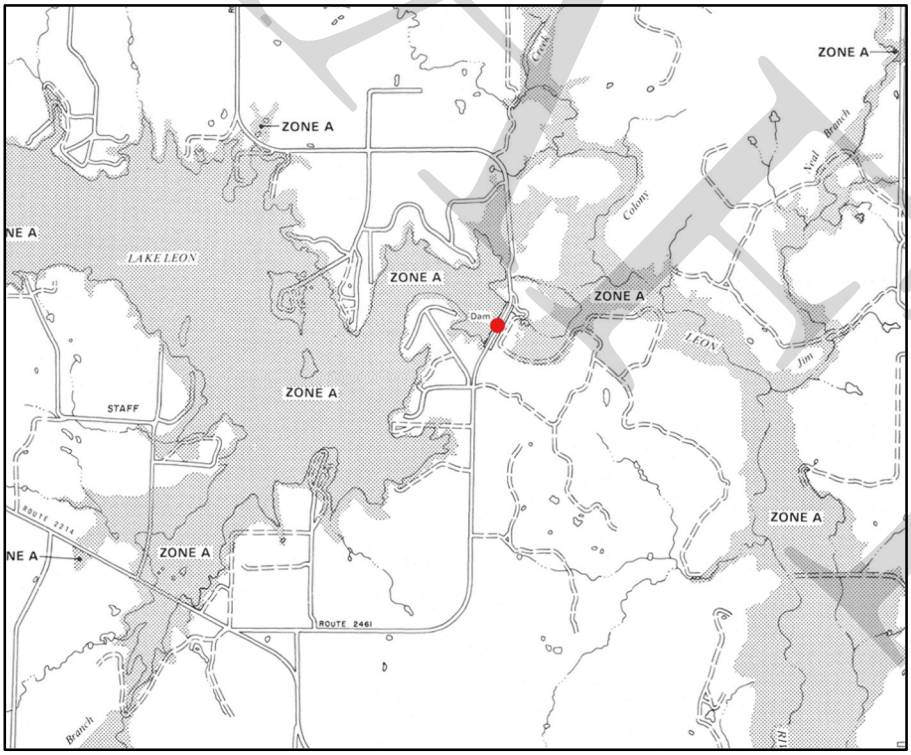


Figure 15-8: FEMA FIRMette showing Lake Leon Dam (Source: FEMA)

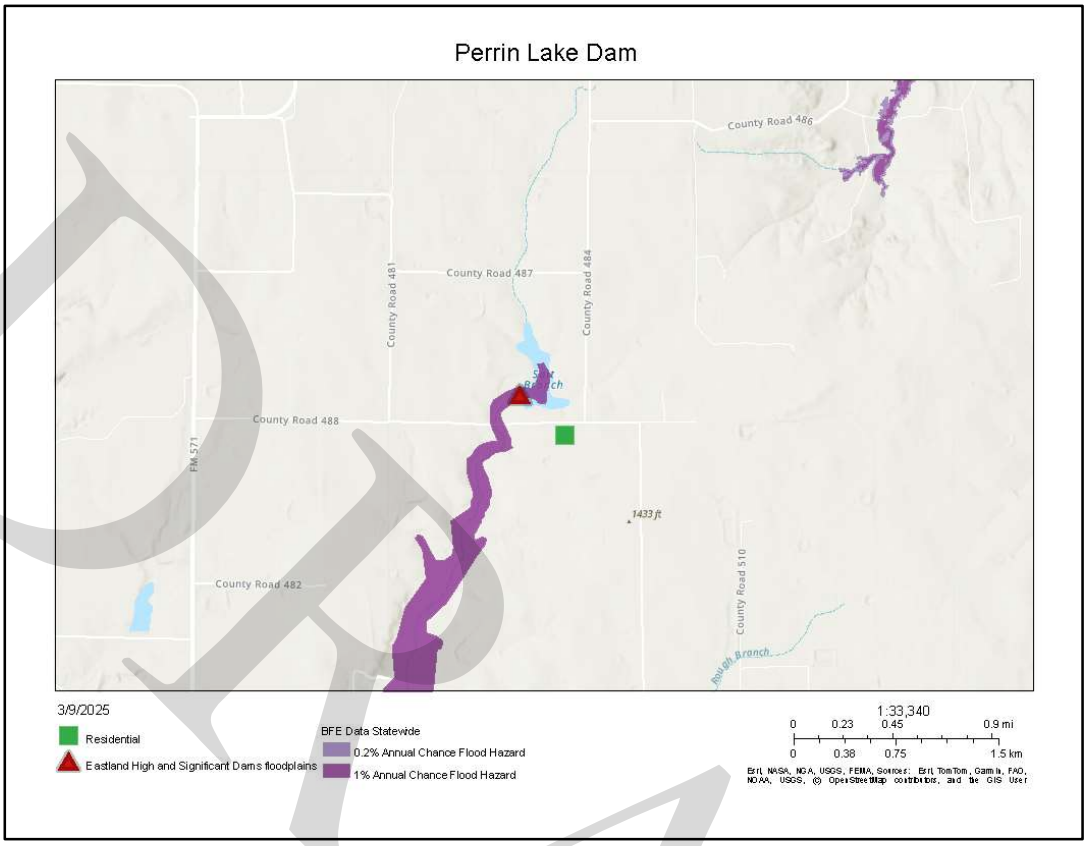


Figure 15-9: Floodplain data of Perrin Lake Dam with buildings within 1 mile (Source: FEMA)

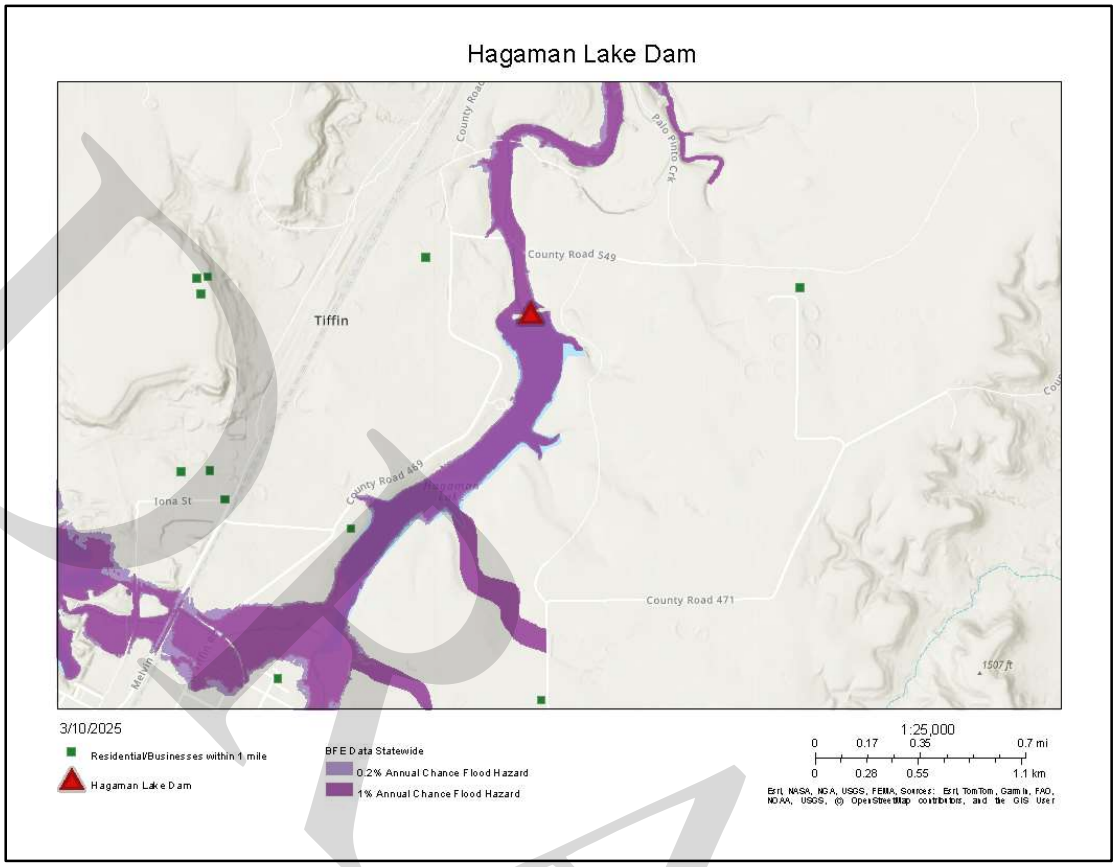


Figure 15-9: Floodplain data of Hagaman Lake Dam with buildings within 1 mile (Source: FEMA)

Annualized loss estimates for dam failure are not available nor is there a breakdown of potential dollar losses for critical facilities, infrastructure and lifelines, or hazardous materials facilities. For the dams that are regulated, the State of Texas assigns a rating based on the condition of the dam during the last inspection.

Any individual dam has a very specific area that will be impacted by a catastrophic failure. The 44 dams identified can directly threaten the lives of people and animals in the inundation zone below the dam. The impact from any catastrophic failure would be like that of a flash flood with loss of life possible and injuries from debris carried by the flood. As the size of the dam increases and the proximity to the public and/or critical infrastructure increases, the probability of damage to the economy increases as well. For these reasons, creating mitigation actions to remove or protect people and structures from the path of destruction is necessary in order to minimize impact from dam failure.

The following is an excerpt from the American Society of Civil Engineers' 2017 Infrastructure Report Card detailing the importance of public safety and proper maintenance:

"In order to improve public safety and resilience, the risk and consequences of dam failure must be lowered. Progress requires better planning for mitigating the effects of failures; increased regulatory oversight of the safety of dams; improving coordination and communication across governing agencies; and the development of tools, training, and technology. Dam failures not only risk public

safety, they also can cost our economy millions of dollars in damages. Failure is not just limited to damage to the dam itself. It can result in the impairment of many other infrastructure systems, such as roads, bridges, and water systems. When a dam fails, resources must be devoted to the prevention and treatment of public health risks as well as the resulting structural consequences."

Dam safety inspections fall to the Dam Safety Program managed by the Texas Commission on Environmental Quality (TCEQ). The Commission currently focuses its inspection program of existing dams primarily on high and significant hazard dams as required by rule in 30 TAC §299.42(a)(2). According to the rule, high and significant hazard dams and large, low hazard dams are scheduled to be inspected every five years, while small and intermediate dams, and low hazard dams, are only to be inspected at the request of an owner, as a result of a complaint, at the request of someone other than the owner, following an emergency such as a flooding event, or, for determining the hazard classification.

SECTION 16: MITIGATION STRATEGY

Eastland County's overall strategy for future disasters is to reduce and eliminate the risk of loss of life, safety, and property damage from the disasters that may affect the planning area. The County leaders and planners support efforts that reduce negative impacts on residents' daily life, their well-being, and safety. The success of this strategy relies on creating mitigation goals and actions and creating an action plan for implementation. These build the framework to identify, prioritize, and implement key actions that reduce risk to hazards.

Goals should describe the long-term outcomes that the communities want to achieve. The objectives may be broad but more measurable and connect the goals to clear actions.

Actions are specific activities or improvements that the local communities and government will take to reduce the disaster risks. These items are described in more detail, and prioritized before they are implemented. This provides a roadmap for localities to follow through on the highest risks in the community, and help prioritize funds to complete critical activities.

These are all compiled and listed in the action plan, which clearly outlines the priority projects, and activities necessary to reduce risk of life, safety or property damage. An action plan provides an overall reference guide for the next 5 years, or when the next Hazard Mitigation Plan update will occur. Regular reviews of the plan are vital to staying on track.

The Texas State Hazard Mitigation Plan (SHMP) provides the State's overall strategy for disaster mitigation, risk reduction, and resource allocation. The SHMP was updated in 2023 to account for changes in FEMA's Hazard Mitigation Plans and the growing impact of disasters in Texas. The Core Team decided to align with the SHMP's goals, vision, and objectives to support disaster mitigation statewide.

The efficacy of a State Hazard Mitigation Plan relies on coordinating many organizations and all levels of government, public, and private sectors. Full mitigation starts with data collection, identifying and defining hazards that may affect an area at the city, county, and state level. This data then assists the individual, who is responsible for making risk-making decisions regarding their personal safety and the safety of their family and home. Local governments can support individuals by improving communication systems and infrastructure so that individuals have access to necessary utilities or evacuation routes as necessary. The work completed locally informs citizens and officials on appropriate strategies and policies to reduce risk in their communities. The state must also work to identify hazards and understand the collective vulnerability and risk these hazards present to Texas communities in order to craft effective strategies, public policy, and programs that support local government in risk management. Ultimately, the state's success at implementing an effective hazard mitigation program that reduces the long-term risk for natural hazards in Texas depends on the success of local government, as this is where the impacts of hazards are most acutely experienced. Therefore, helping local governments achieve success with their mitigation strategies is the primary focus of the Texas Hazard Mitigation Program.

The State Hazard Mitigation Plan of 2023 identifies the following goals for the plan:

- Minimize the suffering, including loss of life and injuries, and damages to property, environment, economy, and infrastructure which result from natural hazard events.
- Create a stable environment for business and investment in Texas through proactive and integrated hazard mitigation.
- Support Texas communities in making themselves safer from hazards.
- Maximize grant and technical assistance by ensuring aid is provided to communities who need it most.

Under each goal, the plan defines these further with concrete objectives on how to achieve the goals. For further details, please check pages 306 to 309 in the plan for all objectives. Eastland County aligns with these objectives and has prioritized activities that reduce adverse impacts from hazards, reduce the interruption of critical services and activities following a disaster, and enhance coordination between agencies. With this strategy in mind, the Core Team and localities developed a set of actions that will best suit the goals and objectives outlined in the Texas Hazard Mitigation Plan and this Hazard Mitigation Plan.

SECTION 17: MITIGATION ACTIONS

The mitigation actions developed by the Core Team, Jurisdictional sub-teams, and community stakeholders are presented in this section for Eastland County and all participating jurisdictions. Core Team members and Jurisdictional sub-team members met for two mitigation workshops in July 2024 and August 2024 to develop mitigation actions for each of the natural hazards described in the Plan, Sections 5-15.

This began with a review of mitigation actions from the prior Eastland County Hazard Mitigation Plan to assess whether they had been completed and, if not, whether they were still relevant. The Action items with an "Ongoing" label in the New Action column are those that have been carried over from the previous plan. New actions were developed with unique insight from planning team members, community and regional plans, capital improvement plans, and mitigation ideas developed by FEMA and the Texas Department of Emergency Management (TDEM).

Based on the input, the following action items from the previous Plan were completed or are being updated to better fit the County or jurisdiction needs. Action items previously listed but are still ongoing are included in the current mitigation actions in table 17-2 to 17-8.

Table 17-1: List of completed or removed Action Plan items.

Eastland County		
Mitigation Action	**Hazard(s) Addressed**	**New or Ongoing**
Implement CodeRED and Reverse 911 throughout the county.	Tornado, Wind Storm, Severe Winter Weather, Wildfire, Dam Failure, Flood	Completed
Provide public education about NWS and USDA data via email, social media, and county website. This includes programs such as StormReady, FireWise, and includes soil information.	All Hazards	Completed
City of Eastland		
Study the feasibility of developing treated effluent to school facilities as an alternative irrigation supply and reduce reliance on potable supply during drought.	Drought, Wildfire, Expansive Soils	Irrelevant
City of Carbon		

Implement CodeRED to other areas of the County	Tornado; Wind Storm; Winter Weather; Wildfire; Dam Failure; Flood	Completed
City of Cisco		
Create and Implement a Hazard Educational Enhancement Program in which faculty/students can collaborate in understanding and communicating hazards of concern, such as a poster contest, essay contest, or field work that teaches practical understanding of local concerns.	ALL	ISD's and schools will coordinate efforts
Implement CodeRed and Reverse 911 throughout the County.	All	Completed
City of Gorman		
Create and Implement a Hazard Educational Enhancement Program in which faculty/students can collaborate in understanding and communicating hazards of concern, such as a poster contest, essay contest, or field work that teaches practical understanding of local concerns.	All Hazards	ISD's and schools will coordinate efforts
Locate an appropriate site and construct a community safe room, posisbly combined with a communications center in the City of Gorman.	All Hazards	Completed
Purchase bunker geat to assist Gorman's fire department	Wildfire	Completed
Implement CodeRed and Reverse 911 throughout the County	All Hazards	Completed
Provide a tank coating to enhance resistance to hail and other debris at all tank sites	Hail, Winds, tornado	Completed

Provide metal roofs at all pump stations	Hail, Winds, tornado	Completed for water pumps, not feasible for sewer
City of Ranger		
Implement CodeRED to other areas of the County	Tornado; Wind Storm; Winter Weather; Wildfire; Dam Failure; Flood	Completed
Create and Implement a Hazard Educational Enhancement Program in which faculty/students can collaborate in understanding and communicating hazards of concern, such as a poster contest, essay contest, or field work that teaches practical understanding of local concerns.	All Hazards	ISD's and schools will coordinate efforts

The Core Planning team reviewed the remaining actions, presenting them to their respective departments and stakeholders to get feedback and develop them further. The goals listed in the Hazard Mitigation Plan in Section 16 were used as guidance while considering factors such as existing and future growth, hazard risk assessments, individual community priorities, critical facilities, and unique community vulnerabilities.

Each Action item is associated with a type in the following tables, with the symbols listed below.

Educational Outreach	Structural Projects	Natural System Enhancements	Local Plans and Regulations
			

Mitigation action types include Local plans and regulations, Structural projects, Natural systems protection, and Education programs. Additional information provided for each mitigation action includes the jurisdictional department responsible for implementation, estimated cost, potential funding sources, timeline for implementation, and benefit to the community based on the cost and resources to implement the action.

An action that is ranked as "High" indicates that it will be implemented as soon as funding is made available from both local budgets and through grants. A "Medium" action is one that may not be implemented right away depending on the cost and how well or how many community members are

served. A "Low" action is one whose benefit is hard to quantify in relation to the cost but is still considered of value to the community and is to be implemented when funds and resources are available.

Mitigation Action Plan

The Mitigation Action Plan is a method to prioritize mitigation actions and assign departmental responsibility, ensuring a higher rate of successful action implementation and administration. Each jurisdiction has multiple authorities to implement the mitigation strategy including, but also limited to, local planning and zoning, public works efforts, emergency management, tax authority, building codes and ordinances, and legislative and managerial departments.

All of the new and old mitigation actions in this section were prioritized primarily based on FEMA's Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLE-E) criteria. These criteria are considered necessary for each action's successful and enduring implementation. Each participating jurisdiction in the Plan had an opportunity to discuss and consider each of the criteria as they related to each individual action and rate them from 1 to 5. The total scores from the STAPLE-E exercises were then used to assign an overall priority to each mitigation action for each of the participating jurisdictions. In addition to the STAPLE-E exercise, jurisdictions analyzed each action in terms of which department or agency will be responsible for the administration of the action, action timeline, potential funding sources, and the overall costs, measuring whether the potential benefit to be gained from the action outweighed the costs associated with it.

Eastland County Mitigation Actions

Table 17-2: Mitigation Actions for Eastland County

Action Number	Mitigation Action	Hazard(s) Addressed	Associated Goal	Action Type	Lead Agency/Responsible Department	Potential Funding	Timeline (Months)	Priority (L, M, H)	STAPLE-E Rating
1	Develop and implement a multi-hazard public awareness program. Educate homeowner on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.	All			County Judge	County Budget, HMGP	24 months	H	Pending
2	Purchase suppression equipment to aid smaller VFD's	Wildfire			Eastland County Judge	AFG, HSGA, JAG	36 months	H	Pending
3	Purchase compressed foam for brush trucks.	Wildfire			Eastland County Judge, VFDs	Local, AFG, HSGA	36 months	H	Pending
4	Prepare improved flood maps through engineering analysis to more accurately reflect flood hazard risk, especially in unincorporated areas.	Flood			Eastland County Judge	Local, HMGP	48 months	M	Pending
5	Conduct "tabletop exercises" with emergency response personnel from multiple agencies, to determine further mitigation opportunities and response vulnerabilities.	Hail, Wind Storm, Tornado, Wildfire, Winter Weather			Eastland County Judge	Local, HGSA	Continual	H	Pending
6	Develop wildfire outreach, education, and inspection programs to accompany fuel mitigation programs, and target wildland-urban interface areas with critical facilities.	Wildfire, Drought			Eastland County Judge, County EMC	CWDG	36 months	H	Pending
7	Coordinate a plan with all participating jurisdictions and fire departments to create defensible space around properties and wildfire-urban interface areas	Wildfire			Eastland County Judge, County EMC	Local, CWDG	Continual	H	Pending
8	Assess all critical facilities, harden for hazards as needed. Including installing back-up generators, installing metal roofs, elevating electricals, and updating associated equipment for all hazards.	All hazards			Eastland County Judge	Local, HMGP	48 months	M	Pending
9	Complete a geotechnical study of soils in Eastland County for possible project implementation against Expansive Soils.	Expansive Soils			Eastland County Judge	Local, HMGP, BRIC	60 months	L	Pending
10	Purchase NOAA Weather Radios for all Facilities	All Hazards			Eastland County Judge	Local, HMGP	48 months	M	Pending
11	Construct retention basins, berms/levees, flood walls or any associated construction tha reduces flooding in populated areas.	Floods			Eastland County Judge	Local, HMGP, CDBG	60 months	M	Pending
12	Update building codes to promote energy-efficient building designs	Extreme Heat, Severe Winter Storms			Eastland County Judge	Local	24 months	M	Pending

13	Update County buildings for energy-efficiency	Extreme Heat, Severe Winter Storms			Eastland County Judge	Local	24 months	L	Pending
14	Install backup generators to County critical facilities, and any County-owned utilities	All Hazards			Eastland County Judge	Local, HMGP, BRIC	36 months	H	Pending
15	Update County property with permeable pavement parking lots	Droughts, Floods			Eastland County Judge	Local, DR, HMGP	48 months	L	Pending
16	Update and harden County shelters and EOC with special barriers over windows, doors and vulnerable areas.	Floods, thunderstorms winds, tornadoes			Eastland County Judge, County EMC	Local, DR, HMGP	48 months	H	Pending
17	Enforce/update building codes to withstand seismic activity	Earthquakes			Eastland County Judge	Local	24 months	M	Pending

City of Eastland Mitigation Actions

Table 17-3: Mitigation Actions for City of Eastland

Action Number	Mitigation Action	Hazard(s) Addressed	Associated Goal	Action Type	Lead Agency/Responsible Department	Potential Funding	Timeline (Months)	Priority (L,M,H)	STAPLE-E Rating
1	Install backup generators at key facilities after investigating available equipment, as well as types and sizes of systems required to ensure continuity of water and sewer service, as well as availability to shelter facilities.	Tornados, Windstorms, Flood, Dam Failure, Winter Storms, Wildfires, HAZMAT Events			City of Eastland - City Manager	HMGP, CDBG-GLO, Local	36 months	H	Pending
2	Restore and widen the Leon River Channel to increase flood conveyance.	Flood			City of Eastland - City Manager,	HMGP, FMA, USACE, CDBG-GLO	48 months	H	Pending
3	Phase I: Study the feasibility of detention on the North Fork of the Leon River to reduce flood risk.	Flood			City of Eastland - City Manager, USACE, BRA,	HMGP, FMA, USACE, CDBG-GLO, Local	15 months	M	Pending
4	Phase II: Construct the recommendations of the engineering study.	Flood			City of Eastland - City Manager,	HMGP, FMA, USACE, CDBG-GLO, Local	36 months	H	Pending
5	Form an Emergency Interconnect Planning Group to study and develop a backup water source with regional partners, then study the feasibility of an Emergency Interconnect project.	Drought, Wildfire, Dam Safety			City of Eastland - City Manager	HMGP, FMA, USACE, CDBG-GLO, Local. TWDB	24 months	M	Pending
6	Rehabilitate the Lake Eastland Dam.	Dam Safety, Flood, Drought, Wildfire			City of Eastland - City Manager	HMGP, FMA, CDBG-GLO, Local, TWDB, BRA	60 months	H	Pending
7	Rehabilitate the Lake Ringling Dam.	Dam Safety, Flood, Drought, Wildfire			City of Eastland - City Manager	HMGP, FMA, CDBG-GLO, Local, TWDB, BRA	60 months	H	Pending
8	Provide public education about NWS and USDA data via email, social media, and website. This includes such programs as StormReady and FireWise, and includes soil information.	All Hazards			City of Eastland - City Manager	Local, HMGP	12 months	H	Pending
9	Develop and implement a multi-hazard public awareness program. Educate homeowners on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.	All Hazards			City of Eastland - City Manager	Local, HMGP	12 months	H	Pending
10	Purchase P-Compliant equipment for all emergency response entities in the County.	All Hazards			City of Eastland - City Manager	Local, AFG, JAG, HSGA	36 months	M	Pending
11	Install foam/membrane hail-resistant roofs for historic and public buildings and school facilities.	Hail, Windstorm			City of Eastland - City Manager	Local, HMGP	48 months	L	Pending
12	Construct a detailed hydrologic and hydraulic study, and from the results, develop a flood protection plan for the North and South Forks of the Leon River, including Weaver Creek.	Flood			City of Eastland - City Manager	Local, TWDB, FPP, USACE	48 months	H	Pending
13	Assess all critical facilities for lightning protection and install as necessary.	Lightning			City of Eastland - City Manager	Local, HMGP	36 months	L	Pending
14	Provide a tank coating to enhance resistance to hail and other debris at all tank sites.	Hail, Windstorm, Tornado			City of Eastland - City Manager	Local, HMGP	36 months	M	Pending
15	Assess water and sewer facilities, update and harden with generators, metal roofs, or elevating electricals above flood level, as needed.	Hail, Windstorm, Tornado			City of Eastland - City Manager	Local, HMGP	48 months	H	Pending
16	Conduct "tabletop exercises" with emergency response personnel from multiple agencies, to determine further mitigation opportunities and response vulnerabilities.	Hail, Wind Storm, Tornado, Wildfire, Winter Weather			City of Eastland - City Manager	Local, HSGA	12 months	H	Pending

17	Purchase NOAA Weather Radios for all facilities.	All Hazards			City of Eastland - City Manager	Local, HMGP	36 months	M	Pending
18	Update and incorporate inundation mapping information into the existing EAPs.	Dam Failure			City of Eastland - City Manager	Local	36 months	M	Pending
19	Coordinate with County to complete a fire hazard plan, and create defensible space around wildfire-urban interfaces	Wildfire, Drought			City of Eastland - City Manager	CWDG	36 months	H	Pending
20	Develop wildfire outreach, education, and inspection programs to accompany fuel mitigation programs, and target wildland-urban interface areas with critical facilities.	Wildfire, Drought			City of Eastland - City Manager	CWDG	Continuous	H	Pending
21	Improve stormwater drainage system throughout the City	Floods			City of Eastland - City Manager	Local, HMGP, CDBG	48 months	H	Pending
22	Update City buildings for energy-efficiency	Extreme Heat, Severe Winter Weather			City of Eastland - City Manager	Local, HMGP	48 months	L	Pending
23	Develop urban cooling strategies, and implement actions such as planting trees in building/pavement dense areas.	Droughts, Extreme Heat			City of Eastland - City Manager	Local, HMGP	36 months	M	Pending
24	Install backup generators to City critical facilities, and any City-owned utilities	All Hazards			City of Eastland - City Manager	Local, HMGP, DR, CDBG	36 months	H	Pending
25	Implementing controlled burns to reduce fuel loads	Wildfires			City of Eastland - City Manager, Eastland Fire Chief	CWDG	36 months	M	Pending
26	Update and harden the City shelter and EOC with special barriers over windows, doors and vulnerable areas.	Floods, thunderstorm winds, tornadoes			City of Eastland - City Manager	Local, HMGP	48 months	M	Pending
27	Purchase and install an indoor weather station that requires no Wi-Fi and has an independent energy source	All hazards			City of Eastland - City Manager	Local, HMGP	48 months	M	Pending
28	Establish cooling and heating centers for vulnerable populations	Extreme Heat, Severe Winter Weather			City of Eastland - City Manager	Local	36 months	H	Pending

City of Carbon Mitigation Actions

Table 17-4: Mitigation Actions for City of Carbon

Action Number	Mitigation Action	Hazard(s) Addressed	Associated Goal	Action Type	Lead Agency/Responsible Department	Potential Funding	Timeline (Months)	Priority (L, M, H)	STAPLE-E Rating
1	Install Backup Generators at water, sewer, EOC, fire department and shelter facilities after investigating available equipment to ensure continuity.	Tornados, Windstorm, Flood, Dam Failure, Winter Storms, Wildfire			City of Carbon - City Secretary	HMGP; CDBG; Local	48 months	M	Pending
2	Form an Emergency Interconnect Planning Group to study and develop a backup water source with regional partners, then study the feasibility of an Emergency Interconnect project.	Drought; Wildfire; Dam Safety			City of Carbon - City Secretary	HMGP; FMA; CDBG; Local; TWDB; BRA	24 months	M	Pending
3	Provide public education about NWS and USDA data via e-mail, social media, website. This includes such programs as StormReady and FireWise, and includes soil information.	All Hazards			City of Carbon - City Secretary	Local, HMGP	Continuous	M	Pending
4	Develop and implement a multi-hazard public awareness program. Educate homeowners on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.	All Hazards			City of Carbon - City Secretary	Local, HMGP	Continuous	H	Pending
5	Provide public education about flood hazards, and floodplain insurance programs.	Floods			City of Carbon - City Secretary	Local, HMGP	24 months	H	Pending
6	Purchase compressed foam for brush trucks	Wildfire			City of Carbon - City Secretary	Local, AFG, HSGA, JAG	36 months	H	Pending
7	Install foam/membrane hail resistant roofs for historic and public buildings and school facilities.	Hail, Wind Storm			City of Carbon - City Secretary	Local, HMGP	36 months	H	Pending
8	Assess all critical facilities for lightning protection and install as necessary.	Lightning			City of Carbon - City Secretary	Local, HMGP	32 months	M	Pending
9	Provide a tank coating to enhance resistance to hail and other debris at all tank sites.	Hail, Wind Storm, Tornado			City of Carbon - City Secretary	Local, HMGP, BRIC	32 months	M	Pending
10	Assess City water and sewer facilities and provide necessary updates, such as metal roofs, back-up generators, or elevated electricals.	Hail, Wind Storm, Tornado, Floods			City of Carbon - City Secretary	Local, HMGP, BRIC	48 months	H	Pending
11	Conduct "tabletop exercises" with emergency response personnel from multiple agencies, to determine further mitigation opportunities and response vulnerabilities.	Hail; Wind Storm; Tornado; Wildfire; Winter Weather			City of Carbon - City Secretary	Local, HGSA	Continuous	M	Pending
12	Construct an additional emergency warning system near Cannel St.	All Hazards			City of Carbon - City Secretary	Local, HMGP, BRIC	36 months	H	Pending

13	Construct drainage improvements in accordance with an engineering analysis and design at the Brush St./Short St. outfall.	Flood			City of Carbon - City Secretary	Local, HMGP, BRIC	36 months	H	Pending
14	Construct drainage improvements in accordance with an engineering analysis and design for the conveyance area near Coal St./Advanced Drilling, generally the watershed between Avenue A and Main St	Flood			City of Carbon - City Secretary	Local, HMGP, BRIC	48 months	H	Pending
15	Design and construct a centralized sewer plant to reduce health exposure during frequent flooding events.	Flood			City of Carbon - City Secretary	Local, TWDB, CDBG, USDA	60 Months	H	Pending
16	Install hail-resistant membrane roofs at the water department facility on Collins St., and at Water Treatment Plant No. 1 near SH 6.	Hail, Windstorm, Tornado			City of Carbon - City Secretary	Local, HMGP, BRIC	24 months	M	Pending
17	Improve stormwater drainage systems throughout the city	Flood			City of Carbon - City Secretary	Local, HMGP	36 months	M	Pending
18	Purchase NOAA Weather Radios for all facilities.	All Hazards			City of Carbon - City Secretary	Local, HMGP	36 months	M	Pending
19	Plant drought tolerant landscaping around public buildings.	Drought			City of Carbon - City Secretary	Local	36 months	L	Pending
20	Coordinate with County to complete fire hazard plans and create defensible space around wildfire-urban interfaces	Wildfire, Drought			City of Carbon - City Secretary	CWDG	36 months	H	Pending
21	Develop wildfire outreach, education, and inspection program to accompany fuels mitigation program, and target wildland urban interface areas with critical facilities.	Wildfire, Drought			City of Carbon - City Secretary	CWDG	Continuous	H	Pending
22	Update City buildings for energy-efficiency	Extreme Heat, Severe Winter Storms			City of Carbon - City Secretary	Local	48 Months	M	Pending
23	Implementing controlled burns to reduce fuel loads	Wildfires			City of Carbon - City Secretary	Local, CWDG	Continuous	M	Pending
24	Update and harden the City shelter and EOC with special barriers over windows, doors and vulnerable areas.	Floods, thunderstorm winds, tornadoes			City of Carbon - City Secretary	DR, CDBG, HMGP	36 months	M	Pending
25	Establishing cooling and heating centers for vulnerable populations	Extreme Heat, Severe Winter Storms			City of Carbon - City Secretary	Local	36 months	M	Pending
26	Purchase and install an indoor weather station that requires no Wi-Fi and has an independent energy source	All hazards			City of Carbon - City Secretary	Local, HMGP, BRIC	24 months	M	Pending

City of Cisco Mitigation Actions

Table 17-5: Mitigation Actions for City of Cisco

Action Number	Mitigation Action	Hazard(s) Addressed	Associated Goal	Action Type	Lead Agency/Responsible Department	Potential Funding	Timeline (Months)	Priority (L, M, H)	STAPLE-E Rating
1	Form an Emergency Interconnect Planning Group to study and develop a backup water source with regional partners.	Drought; Wildfire; Dam Safety			City of Cisco - City Manager	HMGP, FMA, CDBG-GLO, Local, TWDB, BRA	24 months	M	Pending
2	Study the feasibility of an Emergency Interconnect project with regional partners, and following the engineering feasibility analysis, design and construct an interconnect.	Drought, Dam Safety			City of Cisco - City Manager	HMGP, FMA, CDBG-GLO, Local, TWDB, BRA	24 months	M	Pending
3	Rehabilitate the Williamson Dam on Lake Cisco.	Dam Safety, Flood, Drought			City of Cisco - City Manager	HMGP, FMA, CDBG-GLO, Local, TWDB, BRA	60 months	H	Pending
4	Evaluate the feasibility of transmitting treated effluent to Lake Bernie, and construct the project in accordance with engineering design.	Drought, Wildfire			City of Cisco - City Manager	HMGP, FMA, CDBG-GLO, Local, TWDB	60 months	H	Pending
5	Provide public education about NWS and USDA data via email, social media, website. This includes such programs as StormReady and FireWise, and includes soil information.	All hazards			City of Cisco - City Manager	Local, HMGP	12 months	M	Pending
6	Develop and implement a multi-hazard public awareness program. Educate homeowners on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.	All hazards			City of Cisco - City Manager	Local, HMGP	18 months	H	Pending
7	Provide public education about hazards that may affect the Dam and Dam Safety through websites and printed brochures.	Flood, Dam/Levee Failure, Expansive Soil			City of Cisco - City Manager	Local, HMGP	18 months	H	Pending
8	Locate an appropriate site and construct a community safe room in the City of Cisco.	Tornado, Wildfire, Windstorm, Winter Weather			City of Cisco - City Manager	Local, HMGP	48 months	M	Pending
9	Purchase portable tankers and wildland gear for Cisco firefighters.	Wildfire			City of Cisco - City Manager, Fire Chief	Local, HMGP	36 months	H	Pending
10	Assess public buildings, public utilities and critical facilities roofs, and install foam/membrane hail-resistant roofs as needed.	Hail, Windstorm			City of Cisco - City Manager	Local, HMGP	36 months	M	Pending
11	Prepare improved flood maps through engineering analysis to more accurately reflect flood hazard risk, especially in unincorporated areas.	Flood			City of Cisco - City Manager	Local, HMGP	48 months	H	Pending
12	Assess all critical facilities for lightning protection and install as necessary.	Lightning			City of Cisco - City Manager	Local, HMGP	48 months	M	Pending
13	Provide a tank coating to enhance resistance to hail and other debris at all tank sites.	Hail, Wind Storm, Tornado			City of Cisco - City Manager	Local, HMGP	36 months	M	Pending
14	Provide metal roofs at all pump stations.	Hail, Wind Storm, Tornado			City of Cisco - City Manager	Local, HMGP	36 months	L	Pending
15	Purchase NOAA Weather Radios for all Facilities	ALL			City of Cisco - City Manager	Local, HMGP, BRIC	36 months	M	Pending
16	Adopt newer flood damage prevention ordinance to reflect updated DFIRM products.	Flood			City of Cisco - City Manager	Local, HMGP	12 months	M	Pending
17	Update and Incorporate inundation mapping information into the existing EAPs.	Dam Failure			City of Cisco - City Manager	Local, HMGP	24 months	H	Pending

18	Coordinate with County to complete fire hazard plans and create defensible space around wildfire-urban interfaces	Wildfire, Drought			City of Cisco - City Manager	CWDG	36 months	H	Pending
19	Develop wildfire outreach, education, and inspection program to accompany fuels mitigation program, and target WUI areas with critical facilities.	Wildfire, Drought			City of Cisco - City Manager	CWDG	36 months	H	Pending
20	Improve stormwater drainage system throughout the City	Floods			City of Cisco - City Manager	Local, HMGP, CDBG	48 months	H	Pending
21	Update City buildings for energy-efficiency	Extreme Heat, Severe Winter Weather			City of Cisco - City Manager	Local	36 months	L	Pending
22	Develop urban cooling strategies, and implement actions such as planting trees in building/pavement dense areas.	Droughts, Extreme Heat			City of Cisco - City Manager	Local	36 months	M	Pending
23	Install backup generators to City critical facilities, and any City-owned utilities	All Hazards			City of Cisco - City Manager	Local, HMGP, BRIC, CDBG	48 months	M	Pending
24	Implementing controlled burns to reduce fuel loads	Wildfires			City of Cisco - City Manager	CWDG	36 months	H	Pending
25	Update and harden the City shelter and EOC with special barriers over windows, doors and vulnerable areas.	Floods, thunderstorm winds, tornadoes			City of Cisco - City Manager	Local, DR, HMGP	60 months	L	Pending
26	Purchase and install an indoor weather station that requires no Wi-Fi and has an independent energy source	All hazards			City of Cisco - City Manager	HMGP, BRIC	24 months	M	Pending

City of Gorman Mitigation Actions

Table 17-6: Mitigation Actions for City of Gorman

Action Number	Mitigation Action	Hazard(s) Addressed	Associated Goal	Action Type	Lead Agency/Responsible Department	Potential Funding	Timeline (Months)	Priority (L, M, H)	STAPLE-E Rating
1	Provide public education about NWS and USDA data via e-mail, social media, website. This includes such programs as StormReady and FireWise, and includes soil information.	All Hazards			City of Gorman - City Secretary	Local, HMGP	12 months	M	Pending
2	Develop and implement a multi-hazard public awareness program. Educate homeowners on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.	All Hazards			City of Gorman - City Secretary	Local, HMGP	18 months	H	Pending
3	Prepare improved flood maps through engineering analysis to more accurately reflect flood hazard risk.	Floods			City of Gorman - City Secretary	Local, HMGP	18 months	H	Pending
4	Complete street drainage improvements in accordance with the City's street Capital Improvements Plan.	Floods			City of Gorman - City Secretary	Local, HMGP, BRIC	48 months	M	Pending
5	Conduct "tabletop exercises" with emergency response personnel from multiple agencies, to determine further mitigation opportunities and response vulnerabilities.	Hail; Wind Storm; Tornado; Wildfire; Winter Weather			City of Gorman - City Secretary	Local, HSGA	12 months	H	Pending
6	Adopt newer flood damage prevention ordinance to reflect updated DFIRM products.	Floods			City of Gorman - City Secretary	Local, TWDB	18 months	M	Pending
7	Plant drought tolerant landscaping around public buildings	Drought			City of Gorman - City Secretary	Local	48 months	L	Pending
8	Coordinate with County to complete fire hazard plans and create defensible space around wildfire-urban interfaces	Wildfire, Drought			City of Gorman - City Secretary	CWDG	36 months	H	Pending
9	Develop wildfire outreach, education, and inspection program to accompany fuels mitigation program, and target wildland urban interface areas with critical facilities.	Wildfire, Drought			City of Gorman - City Secretary	CWDG	36 months	H	Pending
10	Improve stormwater drainage system throughout the City	Floods			City of Gorman - City Secretary	Local, HMGP, CDBG	48 months	H	Pending
11	Update City buildings for energy-efficiency	Extreme Heat, Severe Winter Weather			City of Gorman - City Secretary	Local	36 months	L	Pending
12	Develop urban cooling strategies, and implement actions such as planting drought-resistant trees and plants in building/pavement-dense areas.	Droughts, Extreme Heat, Severe Winter Weather			City of Gorman - City Secretary	Local	36 months	M	Pending
13	Install backup generators to City critical facilities, and any City-owned utilities	All hazards			City of Gorman - City Secretary	Local, HMGP, BRIC, CDBG	48 months	M	Pending
14	Implementing controlled burns to reduce fuel loads	Wildfires			City of Gorman - City Secretary	CWDG	36 months	H	Pending

15	Update and harden the City shelter and EOC with special barriers over windows, doors and vulnerable areas.	Floods, thunderstorm winds, tornadoes			City of Gorman - City Secretary	Local, DR, HMGP	60 months	L	Pending
16	Establishing cooling and heating centers for vulnerable populations	Extreme Heat, Severe Winter Weather			City of Gorman - City Secretary	Local	24 months	M	Pending
17	Assess city-owned utility infrastructure for hazard resistance, and harden/improve equipment as necessary. Improvements may include elevating electricals above flood levels, installing metal roofs, and replacing aged equipment/electronics.	All Hazards			City of Gorman - City Secretary	Local, DR, HMGP, BRIC	48 months	H	Pending

City of Ranger Mitigation Actions

Table 17-7: Mitigation Actions for City of Ranger

Action Number	Mitigation Action	Hazard(s) Addressed	Associated Goal	Action Type	Lead Agency/Responsible Department	Potential Funding	Timeline (Months)	Priority (L, M, H)	STAPLE-E Rating
1	Provide public education about NWS and USDA data via e-mail, social media, website. This includes such programs as StormReady and FireWise, and includes soil information.	All Hazards			City of Ranger City Manager	Local, HMGP	12 months	H	Pending
2	Develop and implement a multi-hazard public awareness program. Educate homeowners on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.	All Hazards			City of Ranger City Manager	Local, HMGP	18 months	H	Pending
3	Locate appropriate sites in city and near Ranger College and install a warning siren	Tornado, Dam Failure			City of Ranger City Manager	Local, HMGP	24 months	M	Pending
4	Install foam/membrane hail resistant roofs for historic and public buildings and school facilities.	Hail, Windstorm			City of Ranger City Manager	Local, HMGP	36 months	M	Pending
5	Construct a covered equipment shelter at fleet locations in the City of Ranger.	Hail, Windstorm			City of Ranger City Manager	Local, HMGP	24 months	M	Pending
6	Prepare improved flood maps through engineering analysis to more accurately reflect flood hazard risk, especially in unincorporated areas.	Floods			City of Ranger City Manager	Local, HMGP, FMA	36 months	H	Pending
7	Conduct a feasibility study of using the Gholson Hotel as a public shelter. Discussions to include right of use, need for hardening, signage, accessibility, etc..	Tornado; Wind Storm; Lightning; Severe Winter Weather			City of Ranger City Manager	Local, HMGP, BRIC	48 months	M	Pending
8	Complete street drainage improvements in accordance with the City's street Capital Improvements Plan.	Floods			City of Ranger City Manager	Local, HMGP	48 months	H	Pending
9	Conduct a feasibility study of using the "old gym" downtown as a shelter, and implement the hardening recommendations of a structural engineering report	All Hazards			City of Ranger City Manager	Local, HMGP	48 months	M	Pending
10	Assess all critical facilities for lightning protection and install as necessary	Lightning			City of Ranger City Manager	Local, HMGP	48 months	M	Pending
11	Provide a tank coating to enhance resistance to hail and other debris at all tank sites	Hail, Windstorm, Tornado			City of Ranger City Manager	Local, HMGP, BRIC	48 months	H	Pending
12	Provide metal roofs at all pump stations	Hail, Windstorm, Tornado			City of Ranger City Manager	Local, HMGP, BRIC	60 months	L	Pending
13	Conduct "tabletop exercises" with emergency response personnel from multiple agencies, to determine further mitigation opportunities and response vulnerabilities.	Hail; Wind Storm; Tornado; Wildfire; Winter Weather			City of Ranger City Manager	Local, HSGA	12 months	H	Pending
14	Phase I: Conduct a Master Drainage Study to evaluate alternatives for improving flood conveyance	Floods			City of Ranger City Manager	Local, HMGP	18 months	H	Pending
15	Phase II: Construct/implement the recommended improvements from the Master Drainage Study	Floods			City of Ranger City Manager	Local, HMGP	36 months	H	Pending

16	Make repairs and increase bedding as necessary at the main water supply line along the railroad	Expansive Soils			City of Ranger City Manager	Local, HMGP	48 months	M	Pending
17	Purchase NOAA Weather Radios for all facilities	All Hazards			City of Ranger City Manager	Local, HMGP	36 months	M	Pending
18	Coordinate with County to complete fire hazard plans and create defensible space around wildfire-urban interfaces	Wildfire			City of Ranger City Manager	CWDG	36 months	H	Pending
19	Develop wildfire outreach, education, and inspection program to accompany fuels mitigation program, and target wildland urban interface areas with critical facilities.	Wildfire			City of Ranger City Manager	CWDG	36 months	H	Pending
20	Improve stormwater drainage system throughout the City.	Floods			City of Ranger City Manager	Local, HMGP, CDBG	48 months	H	Pending
21	Update City buildings for energy-efficiency	Extreme Heat, Severe Winter Weather			City of Ranger City Manager	Local	36 months	L	Pending
22	Develop urban cooling strategies, and implement actions such as planting drought-resistant trees and plants in building/pavement-dense areas.	Droughts, Extreme Heat, Severe Winter Weather			City of Ranger City Manager	Local	36 months	M	Pending
23	Install backup generators to City critical facilities, and any City-owned utilities	All hazards			City of Ranger City Manager	Local, HMGP, BRIC, CDBG	48 months	M	Pending
24	Implementing controlled burns to reduce fuel loads	Wildfires			City of Ranger City Manager	CWDG	36 months	H	Pending
25	Update and harden the City shelter and EOC with special barriers over windows, doors and vulnerable areas.	Floods, thunderstorm winds, tornadoes			City of Ranger City Manager	Local, DR, HMGP	60 months	L	Pending
26	Establishing cooling and heating centers for vulnerable populations	Extreme Heat, Severe Winter Weather			City of Ranger City Manager	Local	24 months	M	Pending
27	Assess and improve City utilities to protect from multiple hazards, including elevating electricals, installing generators, installing metal roofs, and updating equipment as needed	All Hazards			City of Ranger City Manager	Local, DR, HMGP, BRIC	48 months	H	Pending

City of Rising Star Mitigation Actions

Table 17-8: Mitigation Actions for City of Rising Star

Action Number	Mitigation Action	Hazard(s) Addressed	Associated Goal	Action Type	Lead Agency/Responsible Department	Potential Funding	Timeline (Months)	Priority (L, M, H)	STAPLE-E Rating
1	Develop and implement a multi-hazard public awareness program. Educate homeowners on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.	All hazards			Rising Star City Manager/Administrator	Local, HMGP	18 months	L	Pending
2	Prepare improved flood maps through engineering analysis to more accurately reflect flood hazard risk, especially in unincorporated areas.	Flood			City of Rising Star Administrator	Local, HMGP	36 months	L	Pending
3	Assess all critical facilities for lightning protection and install as necessary.	Lightning			City of Rising Star Administrator	Local, HMGP,	48 months	M	Pending
4	Install warning systems/sirens at locations as recommended in an engineering feasibility report.	All hazards			City of Rising Star Administrator	Local, HMGP	36 months	L	Pending
5	Conduct a feasibility study using the Methodist church basement or the Baptists church gymnasium or the Higginbotham Building, or the Rising Star ISD gymnasium as a shelter and implement the hardening recommendations of a structural engineering report. Discussions to include right of use, need for hardening, signage, accessibility, etc.	All hazards			City of Rising Star Administrator	Local, HMGP	60 months	M	Pending
6	Construct the Mayfield St. Drainage Improvements	Flood			City of Rising Star Administrator	Local, HMGP	48 months	M	Pending
7	Purchase NOAA Weather Radios for all facilities.	All hazards			City of Rising Star Administrator	Local, HMGP	36 months	M	Pending
8	Conduct tabletop exercises with emergency response personnel from multiple agencies, to determine further mitigation opportunities and response vulnerabilities.	All hazards			City of Rising Star City Administrator	Local, HSGA	12 months	L	Pending
9	Improve stormwater drainage systems throughout the City.	Floods			City of Rising Star City Administrator	Local, HMGP, CDBG	48 months	H	Pending
10	Develop drought and cooling strategies, and implement actions such as planting drought-resistant trees and plants in building/pavement dense areas.	Extreme Heat / Severe Winter weather, drought			City of Rising Star City Administrator	Local	36 months	L	Pending
11	Implementing controlled burns to reduce fuel loads.	All hazards			City of Rising Star City Administrator	CWDG	36 months	H	Pending
12	Update and harden the City shelter and EOC with special barriers over windows, doors and vulnerable areas.	Floods, thunderstorm winds, tornadoes			City of Rising Star City Administrator	Local, DR, HMGP	60 months	L	Pending
13	Purchase and install indoor weather station that requires no Wi-Fi and has an independent energy source	All hazards			City of Rising Star City Administrator	HMGP, BRIC	24 months	M	Pending
14	Establish cooling and heating centers for vulnerable populations	Extreme Heat / Severe Winter weather			City of Rising Star City Administrator	Local	24 months	M	Pending
15	Assess and improve City utilities to protect from multiple hazards, including elevating electricals systems, installing generators, installing metal roofs, additional coatings, and updating equipment as needed	All hazards			City of Rising Star City Administrator	Local, DR, HMGP, BRIC	48 months	M	Pending
16	Coordinate with County to complete fire hazard plans and create defensible space around wildfire-urban interfaces	Wildfires			City of Rising Star City Administrator	CWDG	36 months	H	Pending

SECTION 18: PLAN MAINTENANCE

This section describes how Eastland County, including participating jurisdictions, will implement the Plan and continue to evaluate and enhance it over time. As indicated in the previous section, each action has been assigned to a specific department within the jurisdiction. To ensure that the Plan remains current and relevant, the following Plan maintenance procedures will be addressed:

1. Ensure the mitigation strategy remains current and that actions are implemented according to the timeline.
2. Develop an ongoing mitigation program throughout the community for each participating jurisdiction and work together at the county level to update and review the Plan.
3. Integrate short and long-term mitigation objectives into community officials' daily roles and responsibilities.
4. Continue public involvement and maintain momentum with education programs and materials, routine publication of accomplishments, and briefings to decision-makers of the Plan's progress.

Table 18-1: Team Members responsible for Plan maintenance.

Jurisdiction/Entity	Title
Eastland County	County Judge & Emergency Management Coordinator
City of Eastland	Mayor & City Manager
City of Carbon	Mayor & City Secretary
City of Cisco	Mayor & City Manager
City of Gorman	Mayor & City Manager
City of Ranger	Mayor & City Manager
City of Rising Star	Mayor & City Administrator

Incorporation

Following approval and adoption of the Plan, Eastland County and participating jurisdictions will implement actions they have developed and prioritized in the Plan based on funding availability and continuing public input. A timeline is provided with each action and is used to assess whether actions are being completed on time based on the date of Plan adoption. Potential funding sources are also listed for each action below in this Section. Additional funding sources can include federal disaster declarations and other non-federal grant sources.

Local funding: This is funding that the community can allocate in the budget process and with other local funding mechanisms such as impact fees and drainage utility fees. This funding can be used entirely for specific hazard mitigation activities and projects or can be used as a match to leverage federal and state funding.

BRIC: The Building Resilient Infrastructure and Communities (BRIC) grant program supports states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. The program's guiding principles are supporting communities through capability-and-capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large infrastructure projects; maintaining flexibility; and providing consistency.

CWDG: The Community Wildfire Defense Grant Program, or CWDG, is intended to help at-risk local communities and tribes plan for and reduce the risk of wildfire. This program, which the Bipartisan Infrastructure Law authorized, prioritizes at-risk communities in an area identified as having high or very high wildfire hazard potential, are low-income, or have been impacted by a severe disaster that affects the risk of wildfire. More details on these three priorities are in the Notices of Funding Opportunity (NOFOs) below. The program provides funding for communities for two primary purposes:

- Develop and revise Community Wildfire Protection Plans (CWPP).
- Implement projects described in a Community Wildfire Protection Plan less than ten years old.

The CWDG Grant Program also helps communities in the wildland-urban interface (WUI) implement the three goals of the National Cohesive Wildland Fire Management Strategy.

HMGP: The purpose of Hazard Mitigation Grant Programs is to help communities implement hazard mitigation measures following a Presidential Major Disaster Declaration in the areas of the state, tribe, or territory requested by the Governor or Tribal Executive. The key purpose of this grant program is to enact mitigation measures that reduce the risk of loss of life and property from future disasters.

CDBG: The Community Development Block Grant (CDBG) focuses on developing livable communities by providing affordable housing and suitable living environments for principally low-to-moderate income residents. The program helps communities fund infrastructure projects that help with water, sewer, generators, or key road improvements. These funds may supplement utility development that helps mitigate hazards.

Methods of Incorporating the Plan

The Core Team members will conduct a review of the plans and policies in place at least annually. The review and analysis will guide any updates and incorporate new actions into the plan as appropriate. The plans and policies that require review include emergency operations or management plans, capital improvement plans, comprehensive land use and future growth plans, transportation plans, annual budgeting, and any building codes that guide and control development in a way that will contribute to the goals of this Plan to reduce long- term risk to life and property from all hazards.

A list of regulatory and planning capabilities currently available to the jurisdictions can be found in Appendix A. In the process of integrating the mitigation actions into new and existing planning mechanisms, the participating jurisdictions will do the following:

Grant Applications	Hazard mitigation grant funding will be sought to fund eligible action items as the funding is awarded. If a need for additional action items is presented, an amendment will be necessary to include the action in the plan.
Annual Budget Review	The Plan and mitigation actions will be reviewed annually to determine any funding needs to be included during the budget process and will involve various departments and team members that participated in the planning process. Local funds match requirements for grants will be considered by the appropriate departments such as engineering, planning, code enforcement, and others to achieve the mitigation action based on the timeline.
Floodplain Management Plans and Watershed Studies	These types of plans include preventative and corrective actions to address the flood hazard.
Regulatory Plans and Future Growth Plans	Eastland County and jurisdictions have additional studies and regulatory plans in place that require occasional updating. This Plan will be consulted when County and City departments review or revise their current regulatory planning mechanisms and growth plans such as land development and building codes, comprehensive plans, and capital improvement plans.

Periodic annual tracking of the Plan is required to ensure that the mitigation actions are implemented over the 5-year cycle and that the Plan is kept current based on the latest information about hazards and their impacts. The team members designated by department and jurisdiction in Table 18-1 are responsible for monitoring, evaluating, and updating the Plan for their participating jurisdiction. The Core Team will meet on an annual basis or when other plans are being developed, reviewed, or updated. In addition to annual monitoring, the Plan will be similarly reviewed immediately after extreme weather events, including, but not limited to, state and federally declared disasters.

Monitoring

The Plan will be monitored in its entirety, using multiple methods including but not limited to:

- Public participation
- Plan evaluation methods
- Update methods
- Action prioritization
- Administration of identified mitigation actions
- Risk assessment
- Incorporating planning mechanisms

The parties responsible for the monitoring vary based on the city and County departments involved.

This ensures that all identified new changes are integrated into the updated Plan, existing policies and procedures, and that mitigation actions funded by City Councils/Commissioners Court are implemented in the projected timeline.

All planning team meetings for monitoring the Plan will include a sign-in sheet to record attendance and a brief report that identifies policies and actions in the Plan that have been successfully implemented since its adoption. The report will also document the steps to be followed to develop action items into a policy or project that has not yet been completed and how the Plan has been incorporated into other planning mechanisms.

Evaluation

As part of the annual tracking of the Plan, Core Planning Team members will evaluate changes in risk and hazard data associated with the planning area to determine if there are any needed changes to mitigation action timelines, prioritization, or if any action needs to be amended, added, or deleted. This is an opportunity to detect if there are any new obstacles to the implementation of actions such as funding, political, legal, or coordination within departments such as changes in departmental programs and goals that may affect mitigation priorities.

The Plan evaluation is also an opportunity to review the effectiveness of public participation and outreach efforts and to update or expand upon those efforts. The effectiveness of public participation can be measured by surveys, number of website hits, number of people in attendance, and number of materials printed. The annual evaluation process is necessary to make any necessary amendments to the Plan to keep the Plan relevant and most effective in mitigating the identified hazards in the Plan. Team meetings for evaluating the Plan will include a sign-in sheet to record attendance and a brief report that identifies any changes to the Plan or to the local jurisdiction's implementation process needed for continued success.

Updating

The designated Core Planning Team members from each community evaluating the Plan will prepare annual reports that will be used to keep the Plan updated and keep them on file. Major changes to mitigation actions, the overall direction of the Plan, or the policies contained within the Plan are subject to formal adoption by each city, and the amendment will be submitted to TDEM. To determine whether to recommend approval or denial of a Plan amendment request, each County, City, or Special District will consider the following factors:

- Changes in information, data, or assumptions from those on which the Plan was based.
- New issues or needs that were not adequately addressed in the Plan.
- Errors or omissions made in the identification of issues or needs during the preparation of the Plan.

This annual Plan Maintenance process enables Eastland County and participating jurisdictions to keep its Hazard Mitigation Plan relevant based on the latest information, capabilities, needs, and community input. The process also provides an opportunity to ensure that mitigation actions meet the goals in this Plan and that they are implemented in the manner they were intended. This is a valuable

opportunity to identify mitigation actions in the annual report that were not successful and to recommend the removal of those that are no longer needed.

Five-year Review and Update

The Plan will be thoroughly reviewed by Planning Team members at the end of three years from the approval date to determine whether there have been any significant changes in the County that may require updating, amending, or deleting parts of the Plan. It is wise to begin considering Plan updates in advance of the five-year deadline due to the timelines for grant funding, Plan reviews, and to ensure eligibility. Oftentimes, the timelines for grant and planning cycles can take more than a year to apply and receive funding.

The 5-year Plan review allows for evaluating successful and unsuccessful mitigation actions, documenting avoided losses, and considering factors affecting the Plan. Necessary revisions will be summarized and integrated into the existing Plan or reserved for the 5-year Plan update. The revised or new Plan will be submitted to TDEM and FEMA for final review and approval.

Continued Public Involvement

Input from the stakeholders and public was an integral part of the preparation of this Plan and will remain integral while the Plan is reviewed, revised, and updated. This Plan will be posted on the County and city's websites, and/or made available at key locations where the public will be invited to review and provide feedback via e-mail. All public participation will be available for a minimum of two weeks, or as outlined by FEMA requirements. Core Planning Team members are tasked with notifying stakeholders and community members when the annual review of the Plan is undertaken.

The Core Team may also develop a voluntary citizen/stakeholder advisory group comprised of members from throughout the planning area to provide feedback on an annual basis. The public and stakeholders must maintain a vested interest in the Plan to keep the Plan relevant as it relates to the broader community's sustained health, safety, and welfare. Media such as websites, social media, local newspapers, and radio stations will be used to notify the public of any maintenance or periodic review activities taking place.

Public participation is critical to creating a Plan that is enduring and one that has meaning to the community. The direct involvement of local officials and the public has been and will continue to be sought during the development, implementation, and maintenance phases of this Eastland County Hazard Mitigation Plan Update

APPENDICES

APPENDIX A

Capabilities Assessment Forms

Planning and regulatory capabilities are identified as the most impactful in determining how a municipality or utility can plan and develop in a disaster-resilient manner. As is typical of smaller communities, many critical municipal functions and roles are carried out by people who are required to wear "many hats" as part of their job description. This strategy can be cost-effective for cash-strapped municipalities, but it often leads to roles being carried out by those who may be experts in one area or field, rather than in the secondary and tertiary roles they are needed for. This also leads to the requirement to contract with outside consultants, who may be experts in specific areas but often lack the local knowledge and background that can be critical to success.

This would require local focus on these items, such as hiring Planners, Geographic Information Systems, and building official personnel, or developing these capabilities with grants and other means. There are existing grants to develop comprehensive plans that have been discussed with all jurisdictions that do not have recent up-to-date land use plans, to encourage regulatory management of development. Studies also need to be conducted to thoroughly identify gaps in capabilities and make comparisons with communities of similar size and economic status. The communities throughout the planning area currently utilize engineering and grant writing consultants who are meeting these capability needs. Fiscal mechanisms to fund growth also need to be explored throughout the planning area, such as stormwater utility fees and impact fees. Lastly, educational programs and literature related to hazard mitigation should be strengthened within all municipalities, including close coordination with local school districts. The jurisdictions in the plan could initiate participation in Firewise from the National Fire Protection Agency and Storm Ready community programs from the National Weather Service to ensure local preparedness for wildfires and hurricanes.

Eastland County Multi-Hazard Mitigation Action Plan Update
Community Capabilities Table

	Capabilities	Eastland County		City of Eastland	City of Cisco	City of Ranger	City of Rising Star	City of Carbon	City of Gorman	
Planning and Regulatory	Comprehensive Plan									The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan									
	Transportation Plans									
	Emergency Operation Plans	✓								
	Continuity of Operations Plan	✓								
	Stormwater Management Plan									
	Zoning ordinances									
	Building Codes (follow fire codes)									
	Subdivision Ordinance (Court Order)									
	Floodplain Ordinance (Court Order)	✓								
Administrative and Technical	Engineers									This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners									
	GIS Analysts									
	Building inspectors									
	Emergency managers									
	Grant writers									
	Chief Building Official									
	Floodplain Administrator									
Financial	CDBG	✓								The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program									
	Stormwater utility fees									
	Development impact fees									
Education and Outreach	School programs									The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities									
	Storm Ready communities									
	Hazard awareness campaigns									
	Public Information Officer									
	Community newsletter									

Eastland County Multi-Hazard Mitigation Action Plan Update
Community Capabilities Table

	Capabilities	Eastland County		City of Eastland	City of Cisco	City of Ranger	City of Rising Star	City of Carbon	City of Gorman	
Planning and Regulatory	Comprehensive Plan			✓						The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan			✓						
	Transportation Plans									
	Emergency Operation Plans			✓						
	Continuity of Operations Plan									
	Stormwater Management Plan									
	Zoning ordinances			✓						
	Building Codes (follow fire codes)			✓						
	Subdivision Ordinance (Court Order)			✓						
	Floodplain Ordinance (Court Order)			✓						
Administrative and Technical	Engineers			✓						This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners									
	GIS Analysts			✓						
	Building inspectors			✓						
	Emergency managers			✓						
	Grant writers			✓						
	Chief Building Official									
	Floodplain Administrator			✓						
Financial	CDBG			✓						The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program									
	Stormwater utility fees									
	Development impact fees									
Education and Outreach	School programs									The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities									
	Storm Ready communities									
	Hazard awareness campaigns									
	Public Information Officer			✓						
	Community newsletter									

Eastland County Multi-Hazard Mitigation Action Plan Update
Community Capabilities Table

	Capabilities	Eastland County		City of Eastland	City of Cisco	City of Ranger	City of Rising Star	City of Carbon	City of Gorman	
Planning and Regulatory	Comprehensive Plan									The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan									
	Transportation Plans									
	Emergency Operation Plans									
	Continuity of Operations Plan									
	Stormwater Management Plan									
	Zoning ordinances									
	Building Codes (follow fire codes)									
	Subdivision Ordinance (Court Order)									
	Floodplain Ordinance (Court Order)									
Administrative and Technical	Engineers									This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners									
	GIS Analysts									
	Building inspectors									
	Emergency managers									
	Grant writers									
	Chief Building Official									
	Floodplain Administrator									
Financial	CDBG									The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program									
	Stormwater utility fees									
	Development impact fees									
Education and Outreach	School programs									The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities									
	Storm Ready communities									
	Hazard awareness campaigns									
	Public Information Officer									
	Community newsletter									

Eastland County Multi-Hazard Mitigation Action Plan Update
Community Capabilities Table

	Capabilities	Eastland County		City of Eastland	City of Cisco	City of Ranger	City of Rising Star	City of Carbon	City of Gorman	
Planning and Regulatory	Comprehensive Plan				✓					The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan									
	Transportation Plans				✓					
	Emergency Operation Plans				✓					
	Continuity of Operations Plan				✓					
	Stormwater Management Plan				✓					
	Zoning ordinances				✓					
	Building Codes (follow fire codes)				✓					
	Subdivision Ordinance (Court Order)				✓					
	Floodplain Ordinance (Court Order)				✓					
Administrative and Technical	Engineers				✓					This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners									
	GIS Analysts				✓					
	Building inspectors				✓					
	Emergency managers				✓					
	Grant writers				✓					
	Chief Building Official				✓					
	Floodplain Administrator				✓					
Financial	CDBG				✓					The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program				✓					
	Stormwater utility fees									
	Development impact fees				✓					
Education and Outreach	School programs				✓					The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities									
	Storm Ready communities									
	Hazard awareness campaigns									
	Public Information Officer				✓					
	Community newsletter									

	Capabilities	Eastland County		City of Eastland	City of Cisco	City of Ranger	City of Rising Star	City of Carbon	City of Gorman	
Planning and Regulatory	Comprehensive Plan									The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan									
	Transportation Plans									
	Emergency Operation Plans								X	
	Continuity of Operations Plan									
	Stormwater Management Plan									
	Zoning ordinances									
	Building Codes (follow fire codes)									
	Subdivision Ordinance (Court Order)									
	Floodplain Ordinance (Court Order)								X	
Administrative and Technical	Engineers								X	This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners									
	GIS Analysts									
	Building inspectors									
	Emergency managers								X	
	Grant writers								X	
	Chief Building Official									
	Floodplain Administrator									
Financial	CDBG								X	The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program									
	Stormwater utility fees									
	Development impact fees									
Education and Outreach	School programs									The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities									
	Storm Ready communities									
	Hazard awareness campaigns								X	
	Public Information Officer									
	Community newsletter									

	Capabilities	Eastland County		City of Eastland	City of Cisco	City of Ranger	City of Rising Star	City of Carbon	City of Gorman	
Planning and Regulatory	Comprehensive Plan									The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan									
	Transportation Plans									
	Emergency Operation Plans									
	Continuity of Operations Plan									
	Stormwater Management Plan					X				
	Zoning ordinances									
	Building Codes (follow fire codes)									
	Subdivision Ordinance (Court Order)									
	Floodplain Ordinance (Court Order)									
Administrative and Technical	Engineers									This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners									
	GIS Analysts									
	Building inspectors									
	Emergency managers									
	Grant writers					X				
	Chief Building Official									
	Floodplain Administrator									
Financial	CDBG					X				The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program					X				
	Stormwater utility fees									
	Development impact fees									
Education and Outreach	School programs									The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities									
	Storm Ready communities									
	Hazard awareness campaigns									
	Public Information Officer									
	Community newsletter									

Eastland County Multi-Hazard Mitigation Action Plan Update
Community Capabilities Table

	Capabilities	Eastland County		City of Eastland	City of Cisco	City of Ranger	City of Rising Star	City of Carbon	City of Gorman	
Planning and Regulatory	Comprehensive Plan						X			The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan									
	Transportation Plans									
	Emergency Operation Plans						X			
	Continuity of Operations Plan						X			
	Stormwater Management Plan									
	Zoning ordinances									
	Building Codes (follow fire codes)									
	Subdivision Ordinance (Court Order)									
	Floodplain Ordinance (Court Order)									
Administrative and Technical	Engineers									This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners									
	GIS Analysts									
	Building inspectors									
	Emergency managers						X			
	Grant writers									
	Chief Building Official									
	Floodplain Administrator									
Financial	CDBG									The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program									
	Stormwater utility fees									
	Development impact fees									
Education and Outreach	School programs									The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities									
	Storm Ready communities									
	Hazard awareness campaigns									
	Public Information Officer									
	Community newsletter									

APPENDIX B

Priority Ranking Index (PRI) Forms

LANGFORD COMMUNITY MANAGEMENT SERVICES EST. 1983

Hazard Mitigation Plan Action Prioritization exercise

STAPLEE Ranking: Eastland County

The project was evaluated based on STAPLEE criteria on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration.

(1 = Does not satisfy, 3 = Moderately satisfies, 5 = Strongly satisfies)

Timeframe Values: Within next 2 years = Immediate (I)
2-3 years = Near (N)
3-5 years = Short (S)
More than 5 years = Long (L)

Action Number	*Mitigation Action*	*Socially Acceptable*	*Technically Feasible*	*Administratively Possible*	*Politically Acceptable*	*Legal*	*Economically Sound*	*Environmentally Sound*	*BONUS: Addresses Multiple Hazards (5pts)*	*BONUS: Complements another entity's efforts (5pts)*	Total Score	Time Frame
1	Develop and implement a multi-hazard public awareness program. Educate homeowners on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.											
2	Purchase suppression equipment to aid smaller VFD's											
3	Purchase compressed foam for brush trucks.											
4	Prepare improved flood maps through engineering analysis to more accurately reflect flood hazard risk, especially in unincorporated areas.											
5	Conduct "tabletop exercises" with emergency response personnel from multiple agencies, to determine further mitigation opportunities and response vulnerabilities.											
6	Develop wildfire outreach, education, and inspection programs to accompany fuel mitigation programs, and target wildland-urban interface areas with critical facilities.											

7	Coordinate a plan with all participating jurisdictions and fire departments to create defensible space around properties and wildfire-urban interface areas											
8	Assess all critical facilities, harden for hazards as needed. Including installing back-up generators, installing metal roofs, elevating electricals, and updating associated equipment for all hazards.											
9	Complete a geotechnical study of soils in Eastland County for possible project implementation against Expansive Soils.											
10	Purchase NOAA Weather Radios for all Facilities											
11	Construct retention basins, berms/levees, flood walls or any associated construction that reduces flooding in populated areas.											
12	Update building codes to promote energy-efficient building designs											
13	Update County buildings for energy-efficiency											
14	Install backup generators to County critical facilities, and any County-owned utilities											
15	Update County property with permeable pavement parking lots											
16	Update and harden County shelters and EOC with special barriers over windows, doors and vulnerable areas.											
17	Enforce/update building codes to withstand seismic activity											

LANGFORD COMMUNITY MANAGEMENT SERVICES EST. 1983

Hazard Mitigation Plan Action Prioritization exercise

STAPLEE Ranking: City of Eastland

The project was evaluated based on STAPLEE criteria on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration.

(1 = Does not satisfy, 3 = Moderately satisfies, 5 = Strongly satisfies)

Timeframe Values: Within next 2 years = Immediate (I)
2-3 years = Near (N)
3-5 years = Short (S)
More than 5 years = Long (L)

Action Number	*Mitigation Action*	*Socially Acceptable*	*Technically Feasible*	*Administratively Possible*	*Politically Acceptable*	*Legal*	*Economically Sound*	*Environmentally Sound*	*BONUS: Addresses Multiple Hazards (5pts)*	*BONUS: Complements another entity's efforts (5pts)*	Total Score	Time Frame
1	Install backup generators at key facilities after investigating available equipment, as well as types and sizes of systems required to ensure continuity of water and sewer service, as well as availability to shelter facilities.											
2	Restore and widen the Leon River Channel to increase flood conveyance.											
3	Phase I: Study the feasibility of detention on the North Fork of the Leon River to reduce flood risk.											
4	Phase II: Construct the recommendations of the engineering study.											
5	Form an Emergency Interconnect Planning Group to study and develop a backup water source with regional partners, then study the feasibility of an Emergency Interconnect project.											
6	Rehabilitate the Lake Eastland Dam.											
7	Rehabilitate the Lake Ringling Dam.											
8	Provide public education about NWS and USDA data via email, social media, and website. This includes such programs as StormReady and FireWise, and includes soil information.											

9	Develop and implement a multi-hazard public awareness program. Educate homeowners on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.											
10	Purchase P-Compliant equipment for all emergency response entities in the County.											
11	Install foam/membrane hail-resistant roofs for historic and public buildings and school facilities.											
12	Construct a detailed hydrologic and hydraulic study, and from the results, develop a flood protection plan for the North and South Forks of the Leon River, including Weaver Creek.											
13	Assess all critical facilities for lightning protection and install as necessary.											
14	Provide a tank coating to enhance resistance to hail and other debris at all tank sites.											
15	Assess water and sewer facilities, update and harden with generators, metal roofs, or elevating electricals above flood level, as needed.											
16	Conduct "tabletop exercises" with emergency response personnel from multiple agencies, to determine further mitigation opportunities and response vulnerabilities.											
17	Purchase NOAA Weather Radios for all facilities.											
18	Update and incorporate inundation mapping information into the existing EAPs.											
19	Coordinate with County to complete a fire hazard plan, and create defensible space around wildfire-urban interfaces											
20	Develop wildfire outreach, education, and inspection programs to accompany fuel mitigation programs, and target wildland-urban interface areas with critical facilities.											
21	Improve stormwater drainage system throughout the City											
22	Update City buildings for energy-efficiency											
23	Develop urban cooling strategies, and implement actions such as planting trees in building/pavement dense areas.											
24	Install backup generators to City critical facilities, and any City-owned utilities											

25	Implementing controlled burns to reduce fuel loads											
26	Update and harden the City shelter and EOC with special barriers over windows, doors and vulnerable areas.											
27	Purchase and install an indoor weather station that requires no Wi-Fi and has an independent energy source											
28	Establish cooling and heating centers for vulnerable populations											

LANGFORD COMMUNITY MANAGEMENT SERVICES EST. 1983

Hazard Mitigation Plan Action Prioritization exercise

STAPLEE Ranking: City of Carbon

The project was evaluated based on STAPLEE criteria on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration.

(1 = Does not satisfy, 3 = Moderately satisfies, 5 = Strongly satisfies)

Timeframe Values: Within next 2 years = Immediate (I)
2-3 years = Near (N)
3-5 years = Short (S)
More than 5 years = Long (L)

Action Number	*Mitigation Action*	*Socially Acceptable*	*Technically Feasible*	*Administratively Possible*	*Politically Acceptable*	*Legal*	*Economically Sound*	*Environmentally Sound*	*BONUS: Addresses Multiple Hazards (5pts)*	*BONUS: Complements another entity's efforts (5pts)*	Total Score	Time Frame
1	Install Backup Generators at water, sewer, EOC, fire department and shelter facilities after investigating available equipment to ensure continuity.											
2	Form an Emergency Interconnect Planning Group to study and develop a backup water source with regional partners, then study the feasibility of an Emergency Interconnect project.											
3	Provide public education about NWS and USDA data via e-mail, social media, website. This includes such programs as StormReady and FireWise, and includes soil information.											
4	Develop and implement a multi-hazard public awareness program. Educate homeowners on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.											
5	Provide public education about flood hazards, and floodplain insurance programs.											
6	Purchase compressed foam for brush trucks											
7	Install foam/membrane hail resistant roofs for historic and public buildings and school facilities.											

8	Assess all critical facilities for lightning protection and install as necessary.											
9	Provide a tank coating to enhance resistance to hail and other debris at all tank sites.											
10	Assess City water and sewer facilities and provide necessary updates, such as metal roofs, back-up generators, or elevated electricals.											
11	Conduct "tabletop exercises" with emergency response personnel from multiple agencies, to determine further mitigation opportunities and response vulnerabilities.											
12	Construct an additional emergency warning system near Cannel St.											
13	Construct drainage improvements in accordance with an engineering analysis and design at the Brush St./Short St. outfall.											
14	Construct drainage improvements in accordance with an engineering analysis and design for the conveyance area near Coal St./Advanced Drilling, generally the watershed between Avenue A and Main St											
15	Design and construct a centralized sewer plant to reduce health exposure during frequent flooding events.											
16	Install hail-resistant membrane roofs at the water department facility on Collins St., and at Water Treatment Plant No. 1 near SH 6.											
17	Improve stormwater drainage systems throughout the city											
18	Purchase NOAA Weather Radios for all facilities.											
19	Plant drought tolerant landscaping around public buildings.											
20	Coordinate with County to complete fire hazard plans and create defensible space around wildfire-urban interfaces											
21	Develop wildfire outreach, education, and inspection program to accompany fuels mitigation program, and target wildland urban interface areas with critical facilities.											
22	Update City buildings for energy-efficiency											
23	Implementing controlled burns to reduce fuel loads											

24	Update and harden the City shelter and EOC with special barriers over windows, doors and vulnerable areas.											
25	Establishing cooling and heating centers for vulnerable populations											
26	Purchase and install an indoor weather station that requires no Wi-Fi and has an independent energy source											

LANGFORD COMMUNITY MANAGEMENT SERVICES EST. 1983

Hazard Mitigation Plan Action Prioritization exercise

STAPLEE Ranking: City of Cisco

The project was evaluated based on STAPLEE criteria on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration.

(1 = Does not satisfy, 3 = Moderately satisfies, 5 = Strongly satisfies)

Timeframe Values: Within next 2 years = Immediate (I)
2-3 years = Near (N)
3-5 years = Short (S)
More than 5 years = Long (L)

Action Number	*Mitigation Action*	*Socially Acceptable*	*Technically Feasible*	*Administratively Possible*	*Politically Acceptable*	*Legal*	*Economically Sound*	*Environmentally Sound*	*BONUS: Addresses Multiple Hazards (5pts)*	*BONUS: Complements another entity's efforts (5pts)*	Total Score	Time Frame
1	Form an Emergency Interconnect Planning Group to study and develop a backup water source with regional partners.											
2	Study the feasibility of an Emergency Interconnect project with regional partners, and following the engineering feasibility analysis, design and construct an interconnect.											
3	Rehabilitate the Williamson Dam on Lake Cisco.											
4	Evaluate the feasibility of transmitting treated effluent to Lake Bernie, and construct the project in accordance with engineering design.											
5	Provide public education about NWS and USDA data via email, social media, website. This includes such programs as StormReady and FireWise, and includes soil information.											
6	Develop and implement a multi-hazard public awareness program. Educate homeowners on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.											
7	Provide public education about hazards that may affect the Dam and Dam Safety through websites and printed brochures.											

8	Locate an appropriate site and construct a community safe room in the City of Cisco.											
9	Purchase portable tankers and wildland gear for Cisco firefighters.											
10	Assess public buildings, public utilities and critical facilities roofs, and install foam/membrane hail-resistant roofs as needed.											
11	Prepare improved flood maps through engineering analysis to more accurately reflect flood hazard risk, especially in unincorporated areas.											
12	Assess all critical facilities for lightning protection and install as necessary.											
13	Provide a tank coating to enhance resistance to hail and other debris at all tank sites.											
14	Provide metal roofs at all pump stations.											
15	Purchase NOAA Weather Radios for all Facilities											
16	Adopt newer flood damage prevention ordinance to reflect updated DFIRM products.											
17	Update and Incorporate inundation mapping information into the existing EAPs.											
18	Coordinate with County to complete fire hazard plans and create defensible space around wildfire-urban interfaces											
19	Develop wildfire outreach, education, and inspection program to accompany fuels mitigation program, and target WUI areas with critical facilities.											
20	Improve stormwater drainage system throughout the City											
21	Update City buildings for energy-efficiency											
22	Develop urban cooling strategies, and implement actions such as planting trees in building/pavement dense areas.											
23	Install backup generators to City critical facilities, and any City-owned utilities											
24	Implementing controlled burns to reduce fuel loads											
25	Update and harden the City shelter and EOC with special barriers over windows, doors and vulnerable areas.											

26	Purchase and install an indoor weather station that requires no Wi-Fi and has an independent energy source											

LANGFORD COMMUNITY MANAGEMENT SERVICES EST. 1983

Hazard Mitigation Plan Action Prioritization exercise

STAPLEE Ranking: City of Gorman

The project was evaluated based on STAPLEE criteria on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration.

(1 = Does not satisfy, 3 = Moderately satisfies, 5 = Strongly satisfies)

Timeframe Values: Within next 2 years = Immediate (I)
2-3 years = Near (N)
3-5 years = Short (S)
More than 5 years = Long (L)

Action Number	*Mitigation Action*	*Socially Acceptable*	*Technically Feasible*	*Administratively Possible*	*Politically Acceptable*	*Legal*	*Economically Sound*	*Environmentally Sound*	*BONUS: Addresses Multiple Hazards (5pts)*	*BONUS: Complements another entity's efforts (5pts)*	Total Score	Time Frame
1	Provide public education about NWS and USDA data via e-mail, social media, website. This includes such programs as StormReady and FireWise, and includes soil information.											
2	Develop and implement a multi-hazard public awareness program. Educate homeowners on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.											
3	Prepare improved flood maps through engineering analysis to more accurately reflect flood hazard risk.											
4	Complete street drainage improvements in accordance with the City's street Capital Improvements Plan.											
5	Conduct "tabletop exercises" with emergency response personnel from multiple agencies, to determine further mitigation opportunities and response vulnerabilities.											
6	Adopt newer flood damage prevention ordinance to reflect updated DFIRM products.											
7	Plant drought tolerant landscaping around public buildings											

8	Coordinate with County to complete fire hazard plans and create defensible space around wildfire-urban interfaces											
9	Develop wildfire outreach, education, and inspection program to accompany fuels mitigation program, and target wildland urban interface areas with critical facilities.											
10	Improve stormwater drainage system throughout the City											
11	Update City buildings for energy-efficiency											
12	Develop urban cooling strategies, and implement actions such as planting drought-resistant trees and plants in building/pavement-dense areas.											
13	Install backup generators to City critical facilities, and any City-owned utilities											
14	Implementing controlled burns to reduce fuel loads											
15	Update and harden the City shelter and EOC with special barriers over windows, doors and vulnerable areas.											
16	Establishing cooling and heating centers for vulnerable populations											
17	Assess city-owned utility infrastructure for hazard resistance, and harden/improve equipment as necessary. Improvements may include elevating electricals above flood levels, installing metal roofs, and replacing aged equipment/electronics.											

LANGFORD COMMUNITY MANAGEMENT SERVICES EST. 1983

Hazard Mitigation Plan Action Prioritization exercise

STAPLEE Ranking: City of Ranger

The project was evaluated based on STAPLEE criteria on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration.

(1 = Does not satisfy, 3 = Moderately satisfies, 5 = Strongly satisfies)

Timeframe Values: Within next 2 years = Immediate (I)
2-3 years = Near (N)
3-5 years = Short (S)
More than 5 years = Long (L)

Action Number	*Mitigation Action*	*Socially Acceptable*	*Technically Feasible*	*Administratively Possible*	*Politically Acceptable*	*Legal*	*Economically Sound*	*Environmentally Sound*	*BONUS: Addresses Multiple Hazards (5pts)*	*BONUS: Complements another entity's efforts (5pts)*	Total Score	Time Frame
1	Provide public education about NWS and USDA data via e-mail, social media, website. This includes such programs as StormReady and FireWise, and includes soil information.											
2	Develop and implement a multi-hazard public awareness program. Educate homeowners on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.											
3	Locate appropriate sites in city and near Ranger College and install a warning siren											
4	Install foam/membrane hail resistant roofs for historic and public buildings and school facilities.											
5	Construct a covered equipment shelter at fleet locations in the City of Ranger.											
6	Prepare improved flood maps through engineering analysis to more accurately reflect flood hazard risk, especially in unincorporated areas.											

7	Conduct a feasibility study of using the Gholson Hotel as a public shelter. Discussions to include right of use, need for hardening, signage, accessibility, etc..											
8	Complete street drainage improvements in accordance with the City's street Capital Improvements Plan.											
9	Conduct a feasibility study of using the "old gym" downtown as a shelter, and implement the hardening recommendations of a structural engineering report											
10	Assess all critical facilities for lightning protection and install as necessary											
11	Provide a tank coating to enhance resistance to hail and other debris at all tank sites											
12	Provide metal roofs at all pump stations											
13	Conduct "tabletop exercises" with emergency response personnel from multiple agencies, to determine further mitigation opportunities and response vulnerabilities.											
14	Phase I: Conduct a Master Drainage Study to evaluate alternatives for improving flood conveyance											
15	Phase II: Construct/implement the recommended improvements from the Master Drainage Study											
16	Make repairs and increase bedding as necessary at the main water supply line along the railroad											
17	Purchase NOAA Weather Radios for all facilities											
18	Coordinate with County to complete fire hazard plans and create defensible space around wildfire-urban interfaces											
19	Develop wildfire outreach, education, and inspection program to accompany fuels mitigation program, and target wildland urban interface areas with critical facilities.											
20	Improve stormwater drainage system throughout the City.											
21	Update City buildings for energy-efficiency											

22	Develop urban cooling strategies, and implement actions such as planting drought-resistant trees and plants in building/pavement-dense areas.											
23	Install backup generators to City critical facilities, and any City-owned utilities											
24	Implementing controlled burns to reduce fuel loads											
25	Update and harden the City shelter and EOC with special barriers over windows, doors and vulnerable areas.											
26	Establishing cooling and heating centers for vulnerable populations											
27	Assess and improve City utilities to protect from multiple hazards, including elevating electricals, installing generators, installing metal roofs, and updating equipment as needed											

LANGFORD COMMUNITY MANAGEMENT SERVICES EST. 1983

Hazard Mitigation Plan Action Prioritization exercise

STAPLEE Ranking: City of Rising Star

The project was evaluated based on STAPLEE criteria on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration.

(1 = Does not satisfy, 3 = Moderately satisfies, 5 = Strongly satisfies)

Timeframe Values: Within next 2 years = Immediate (I)
2-3 years = Near (N)
3-5 years = Short (S)
More than 5 years = Long (L)

Action Number	*Mitigation Action*	*Socially Acceptable*	*Technically Feasible*	*Administratively Possible*	*Politically Acceptable*	*Legal*	*Economically Sound*	*Environmentally Sound*	*BONUS: Addresses Multiple Hazards (5pts)*	*BONUS: Complements another entity's efforts (5pts)*	Total Score	Time Frame
1	Develop and implement a multi-hazard public awareness program. Educate homeowners on how to mitigate their homes from all hazards through the distribution of pamphlets, flyers, and social media.											
2	Prepare improved flood maps through engineering analysis to more accurately reflect flood hazard risk, especially in unincorporated areas.											
3	Assess all critical facilities for lightning protection and install as necessary.											
4	Install warning systems/sirens at locations as recommended in an engineering feasibility report.											
5	Conduct a feasibility study using the Methodist church basement or the Baptists church gymnasium or the Higginbotham Building, or the Rising Star ISD gymnasium as a shelter and implement the hardening recommendations of a structural engineering report. Discussions to include right of use, need for hardening, signage, accessibility, etc.											

6	Construct the Mayfield St. Drainage Improvements											
7	Purchase NOAA Weather Radios for all facilities.											
8	Conduct tabletop exercises with emergency response personnel from multiple agencies, to determine further mitigation opportunities and response vulnerabilities.											
9	Improve stormwater drainage systems throughout the City.											
10	Develop drought and cooling strategies, and implement actions such as planting drought-resistant trees and plants in building/pavement dense areas.											
11	Implementing controlled burns to reduce fuel loads.											
12	Update and harden the City shelter and EOC with special barriers over windows, doors and vulnerable areas.											
13	Purchase and install indoor weather station that requires no Wi-Fi and has an independent energy source											
14	Establish cooling and heating centers for vulnerable populations											
15	Assess and improve City utilities to protect from multiple hazards, including elevating electricals systems, installing generators, installing metal roofs, additional coatings, and updating equipment as needed											
16	Coordinate with County to complete fire hazard plans and create defensible space around wildfire-urban interfaces											

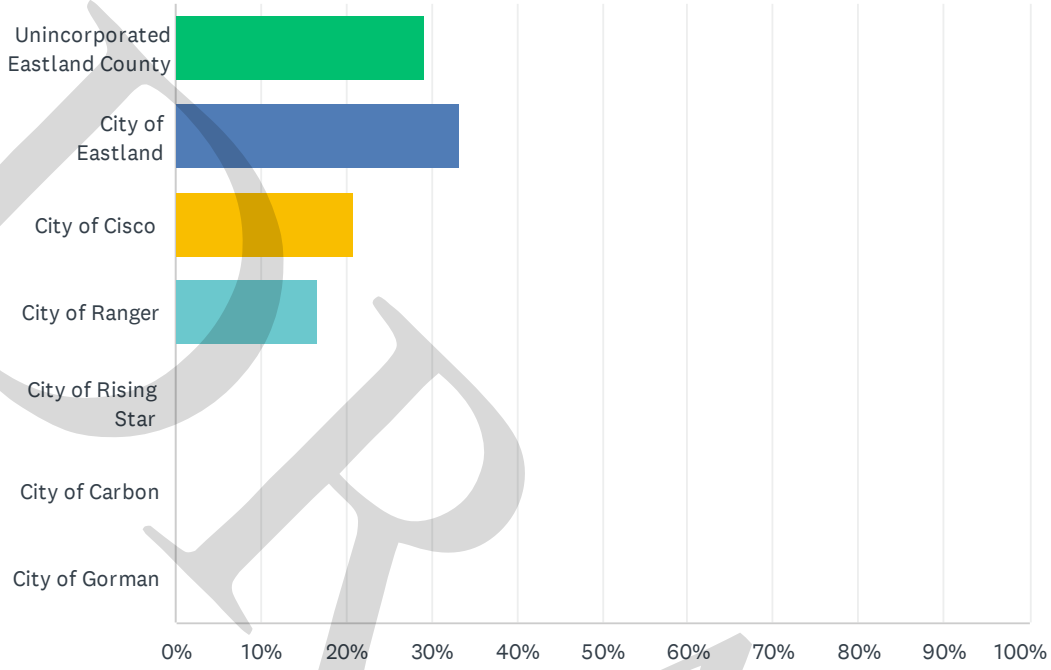
APPENDIX C

Public Engagement Survey Results

Survey was made available online and through public meetings, and filled out through Survey Monkey.

Q1 Please tell us where you live

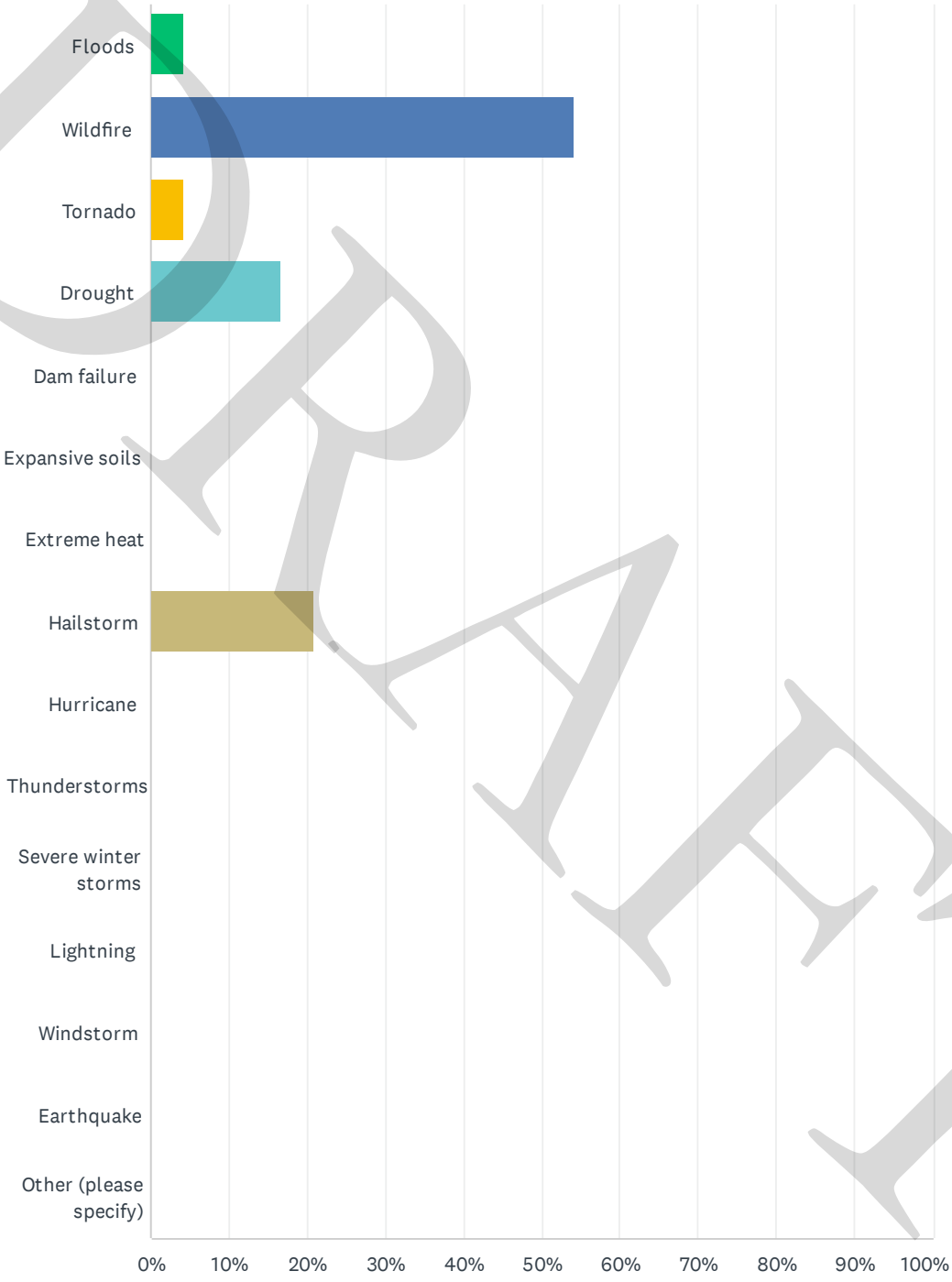
Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
Unincorporated Eastland County	29.17%	7
City of Eastland	33.33%	8
City of Cisco	20.83%	5
City of Ranger	16.67%	4
City of Rising Star	0.00%	0
City of Carbon	0.00%	0
City of Gorman	0.00%	0
TOTAL		24

Q2 Please select the hazard you think is the highest threat to you, your business and/or your community. (Please check only one)

Answered: 24 Skipped: 0

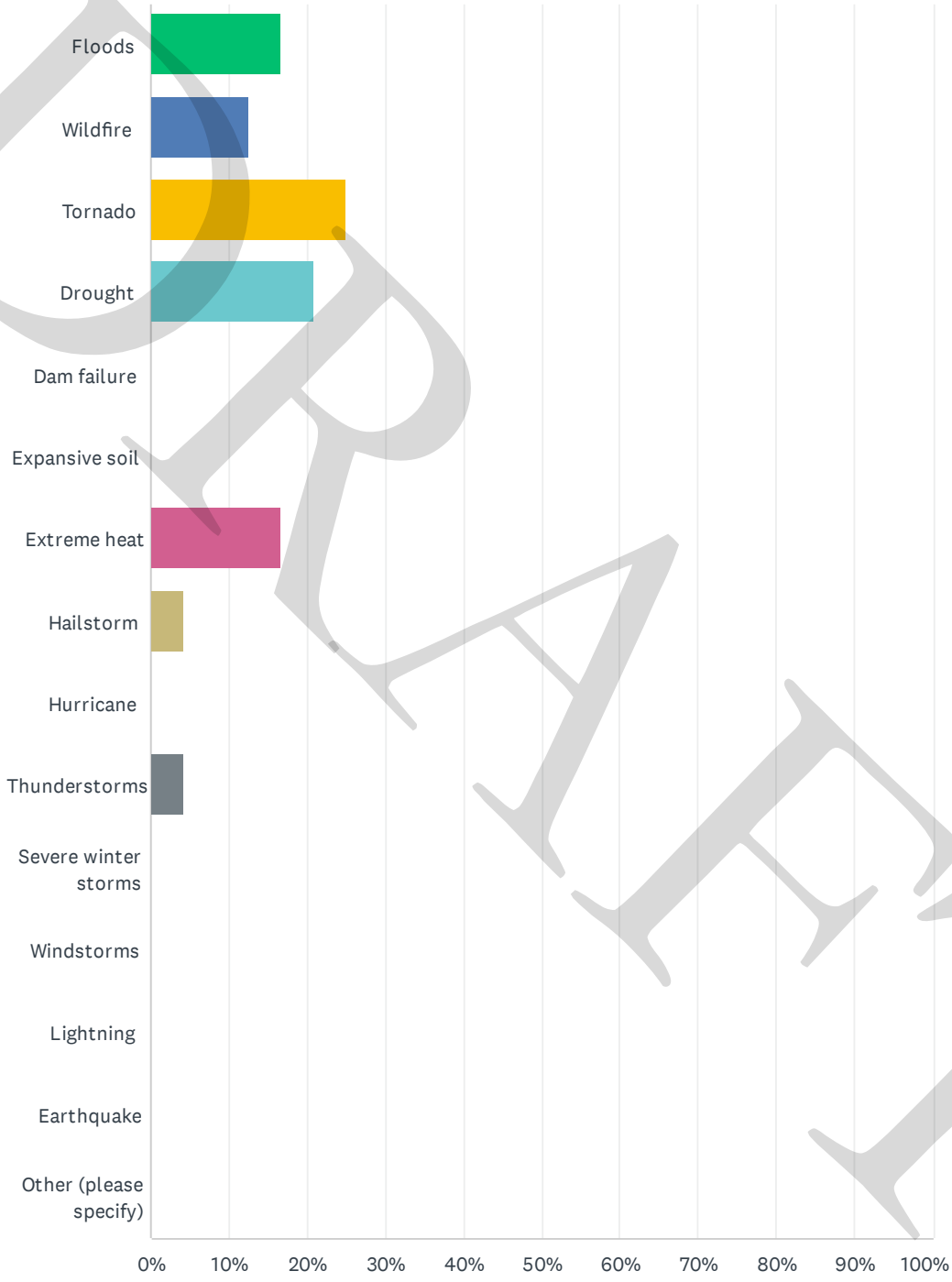


213

ANSWER CHOICES	RESPONSES	
Floods	4.17%	1
Wildfire	54.17%	13
Tornado	4.17%	1
Drought	16.67%	4
Dam failure	0.00%	0
Expansive soils	0.00%	0
Extreme heat	0.00%	0
Hailstorm	20.83%	5
Hurricane	0.00%	0
Thunderstorms	0.00%	0
Severe winter storms	0.00%	0
Lightning	0.00%	0
Windstorm	0.00%	0
Earthquake	0.00%	0
Other (please specify)	0.00%	0
TOTAL		24

Q3 Please select the hazard you think is the second highest threat to you, your business and/or your community. (Please check only one)

Answered: 24 Skipped: 0

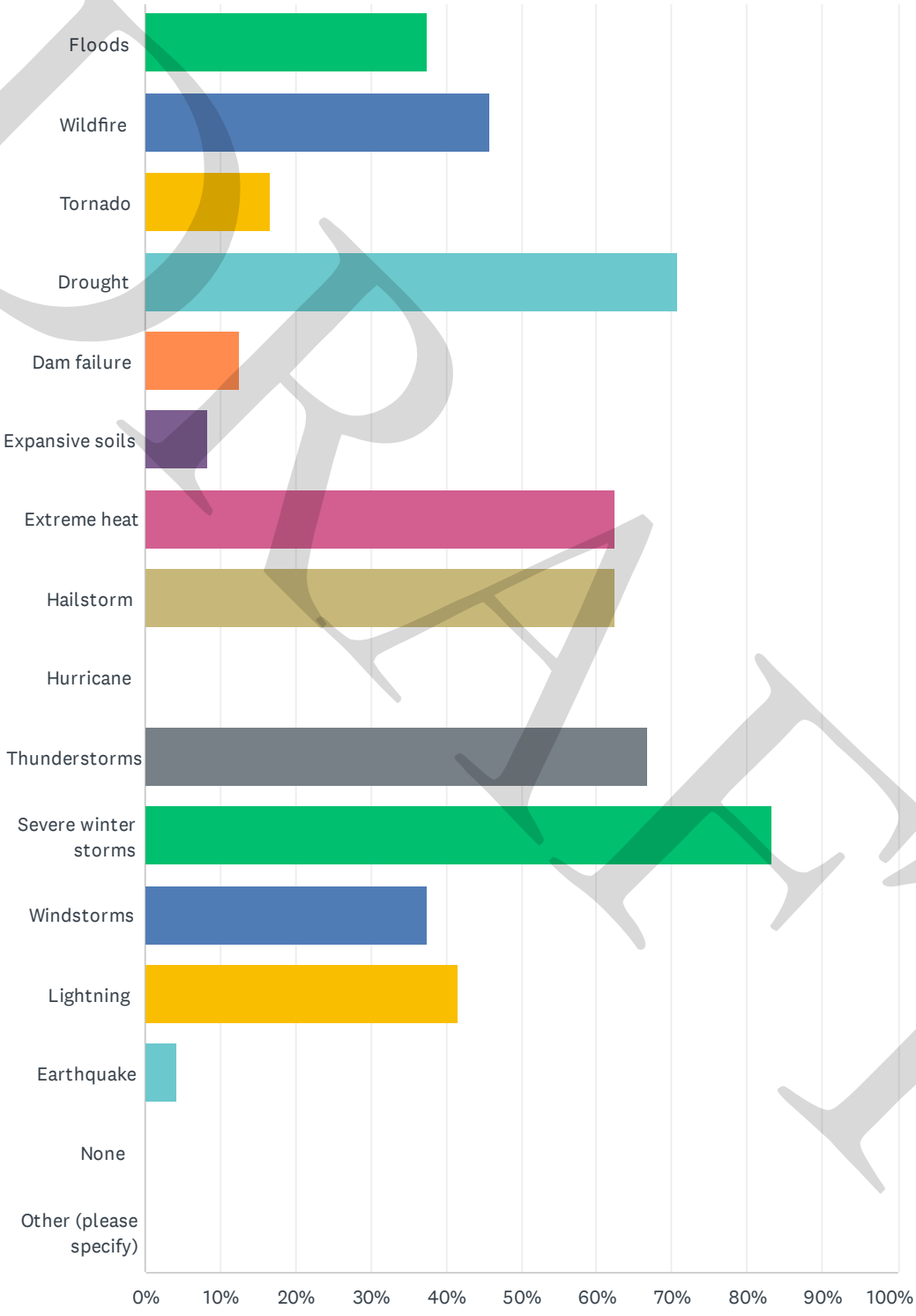


215

ANSWER CHOICES	RESPONSES	
Floods	16.67%	4
Wildfire	12.50%	3
Tornado	25.00%	6
Drought	20.83%	5
Dam failure	0.00%	0
Expansive soil	0.00%	0
Extreme heat	16.67%	4
Hailstorm	4.17%	1
Hurricane	0.00%	0
Thunderstorms	4.17%	1
Severe winter storms	0.00%	0
Windstorms	0.00%	0
Lightning	0.00%	0
Earthquake	0.00%	0
Other (please specify)	0.00%	0
TOTAL		24

Q4 While living here in Eastland County, have you experienced a disaster? (please check all that apply)

Answered: 24 Skipped: 0

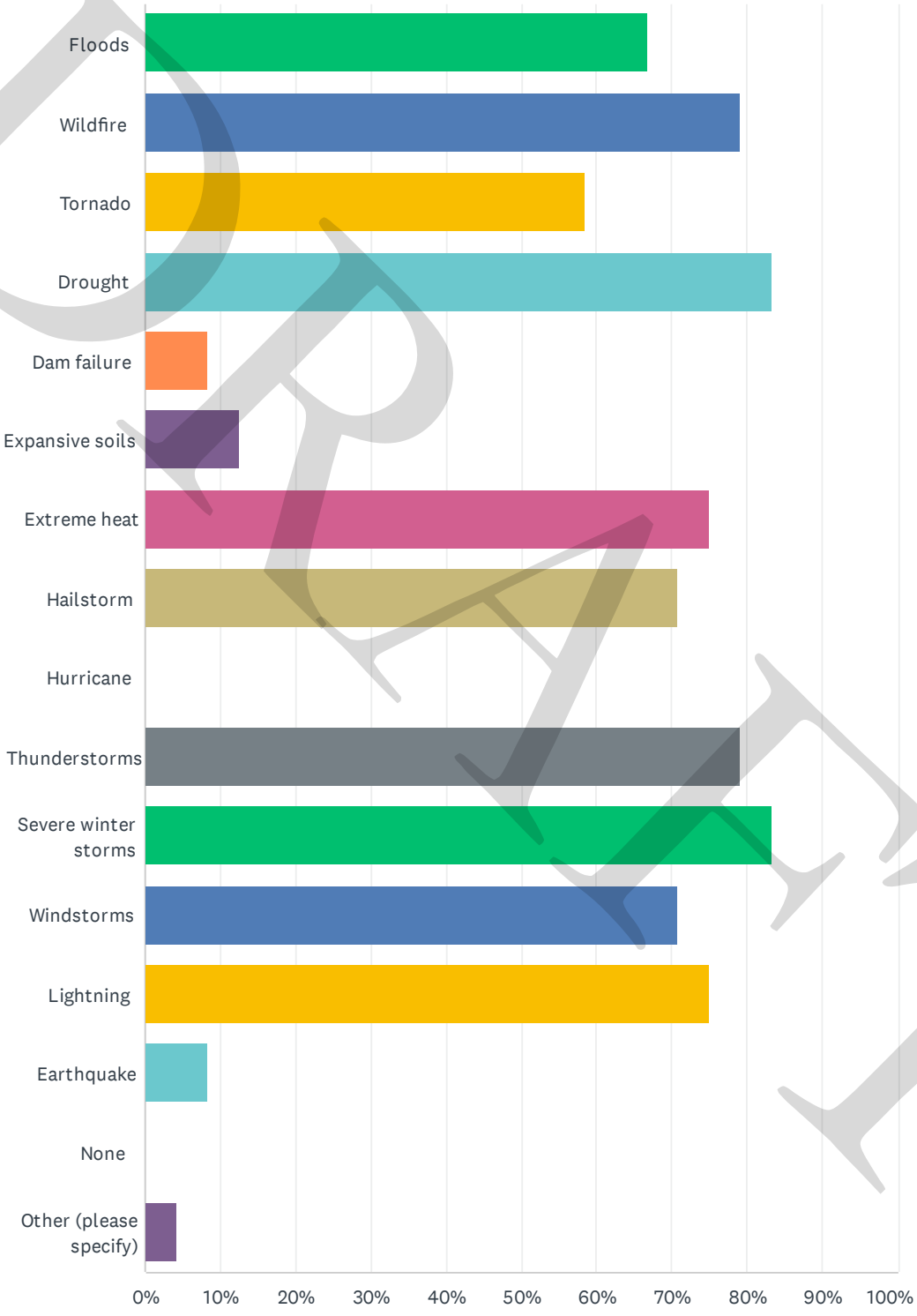


217

ANSWER CHOICES	RESPONSES	
Floods	37.50%	9
Wildfire	45.83%	11
Tornado	16.67%	4
Drought	70.83%	17
Dam failure	12.50%	3
Expansive soils	8.33%	2
Extreme heat	62.50%	15
Hailstorm	62.50%	15
Hurricane	0.00%	0
Thunderstorms	66.67%	16
Severe winter storms	83.33%	20
Windstorms	37.50%	9
Lightning	41.67%	10
Earthquake	4.17%	1
None	0.00%	0
Other (please specify)	0.00%	0
Total Respondents: 24		

Q5 Which of the following are likely to occur in your area at least once in your lifetime? (please check all that apply)

Answered: 24 Skipped: 0

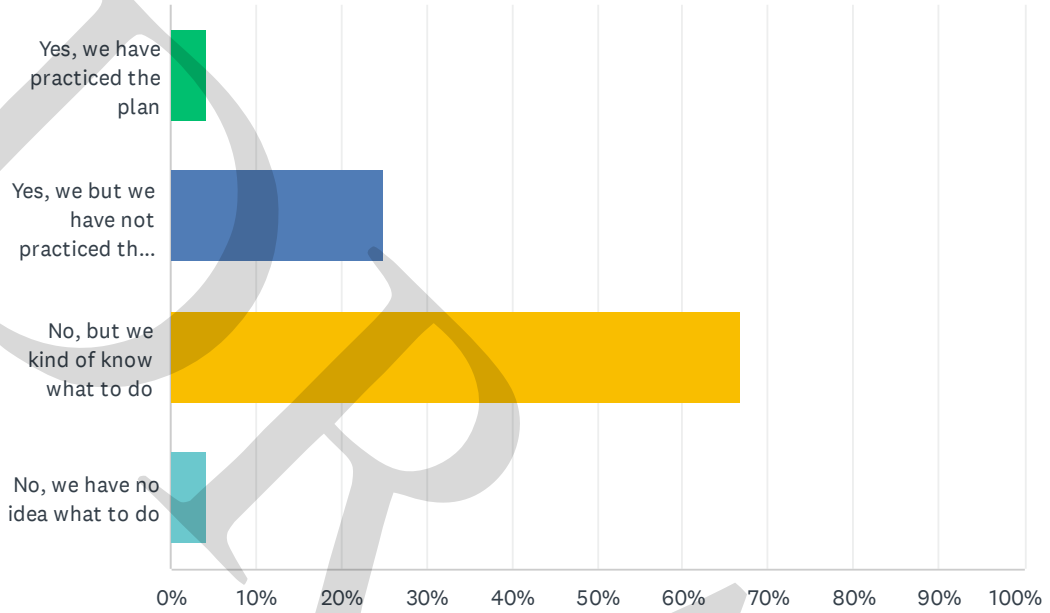


219

ANSWER CHOICES	RESPONSES	
Floods	66.67%	16
Wildfire	79.17%	19
Tornado	58.33%	14
Drought	83.33%	20
Dam failure	8.33%	2
Expansive soils	12.50%	3
Extreme heat	75.00%	18
Hailstorm	70.83%	17
Hurricane	0.00%	0
Thunderstorms	79.17%	19
Severe winter storms	83.33%	20
Windstorms	70.83%	17
Lightning	75.00%	18
Earthquake	8.33%	2
None	0.00%	0
Other (please specify)	4.17%	1
Total Respondents: 24		

Q6 My household has a plan in the event of a disaster such as a flood, tornado, etc.

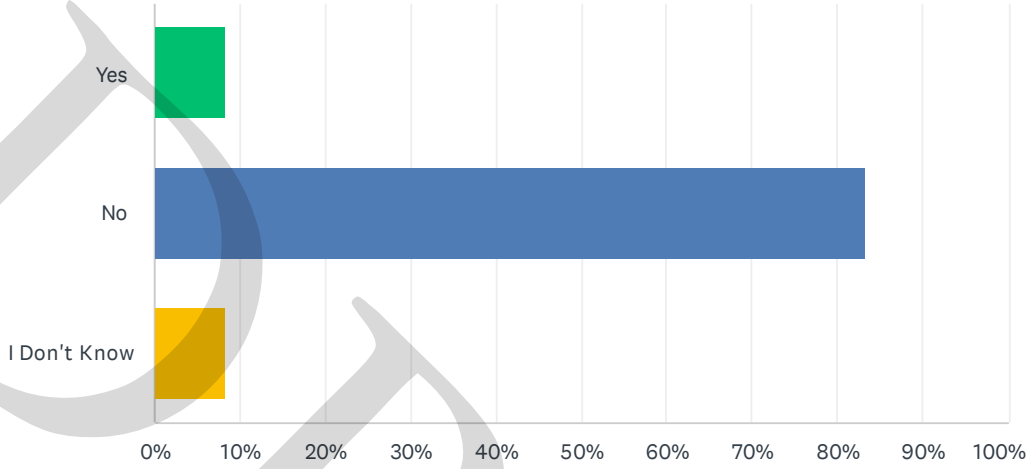
Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes, we have practiced the plan	4.17%	1
Yes, we but we have not practiced the plan	25.00%	6
No, but we kind of know what to do	66.67%	16
No, we have no idea what to do	4.17%	1
TOTAL		24

Q7 Is your home located in a floodplain?

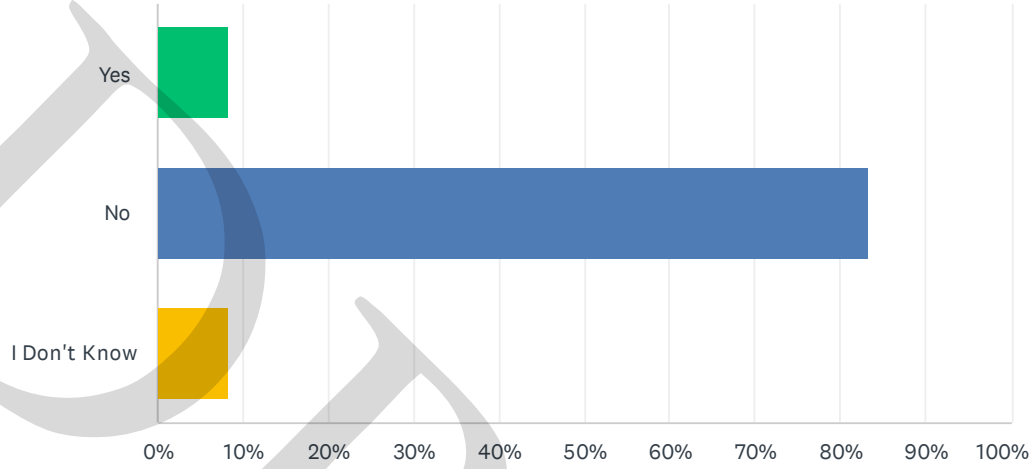
Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	8.33%	2
No	83.33%	20
I Don't Know	8.33%	2
TOTAL		24

Q8 Do you have flood insurance?

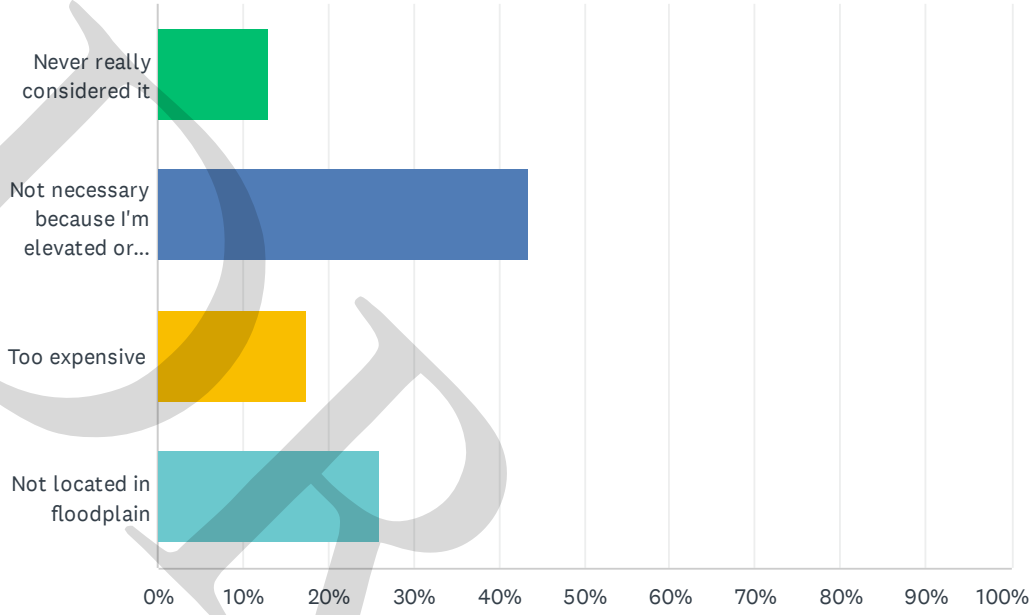
Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	8.33%	2
No	83.33%	20
I Don't Know	8.33%	2
TOTAL		24

Q9 If you do not have flood insurance, why not?

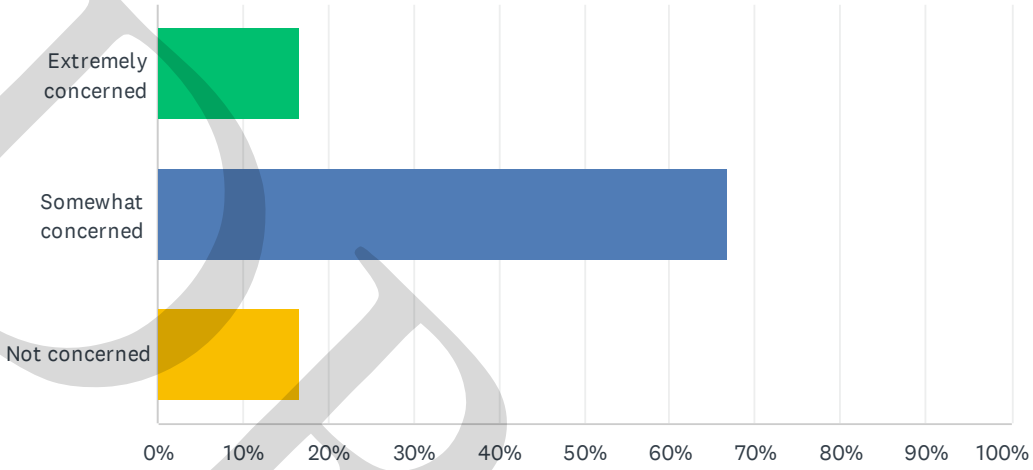
Answered: 23 Skipped: 1



ANSWER CHOICES	RESPONSES	
Never really considered it	13.04%	3
Not necessary because I'm elevated or otherwise protected	43.48%	10
Too expensive	17.39%	4
Not located in floodplain	26.09%	6
TOTAL		23

Q10 How concerned are you about the possibility of you or your community being impacted by a disaster?

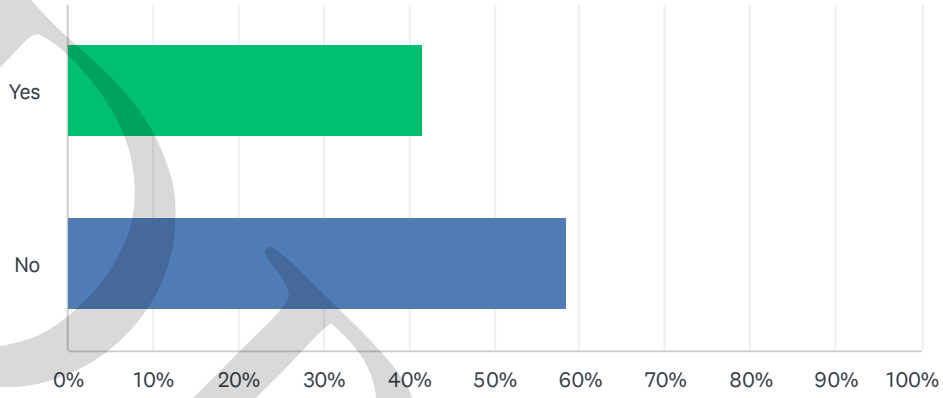
Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
Extremely concerned	16.67%	4
Somewhat concerned	66.67%	16
Not concerned	16.67%	4
TOTAL		24

Q11 Have you taken any actions to make your home, business and/or community more resistant to hazards?

Answered: 24 Skipped: 0



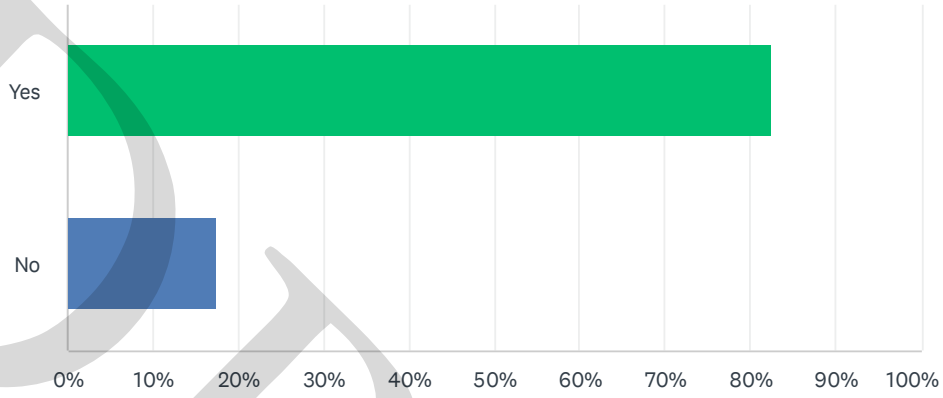
ANSWER CHOICES	RESPONSES	
Yes	41.67%	10
No	58.33%	14
TOTAL		24

Q12 If "Yes", please described the action you have taken:

Answered: 12 Skipped: 12

Q13 Are you interested in making your home, business and/or community more resistant to hazards?

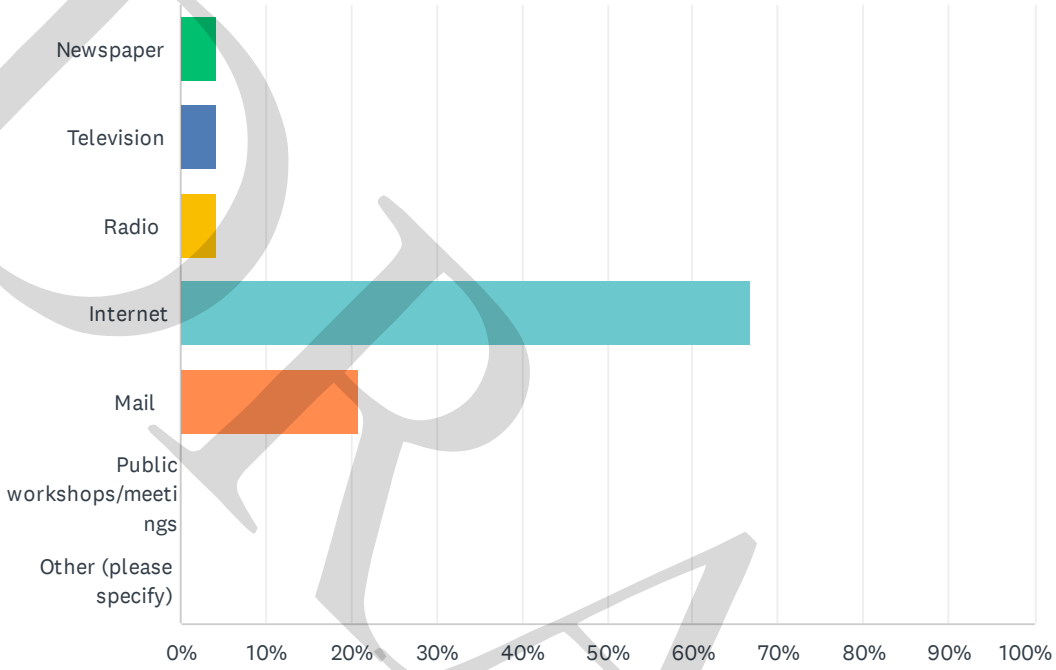
Answered: 23 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	82.61%	19
No	17.39%	4
TOTAL		23

Q14 What is the most effective way for you to receive information about how to make your home, business and/or community more resistant to hazards?

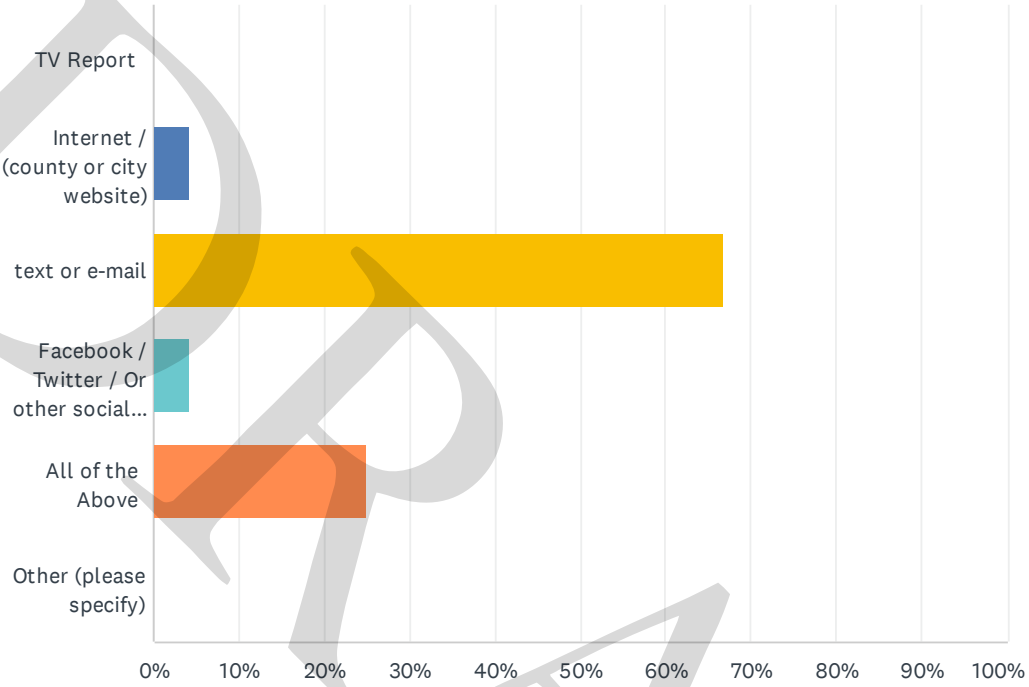
Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
Newspaper	4.17%	1
Television	4.17%	1
Radio	4.17%	1
Internet	66.67%	16
Mail	20.83%	5
Public workshops/meetings	0.00%	0
Other (please specify)	0.00%	0
TOTAL		24

Q15 Which of the following would be the best way to alert you and your household to an imminent disaster?

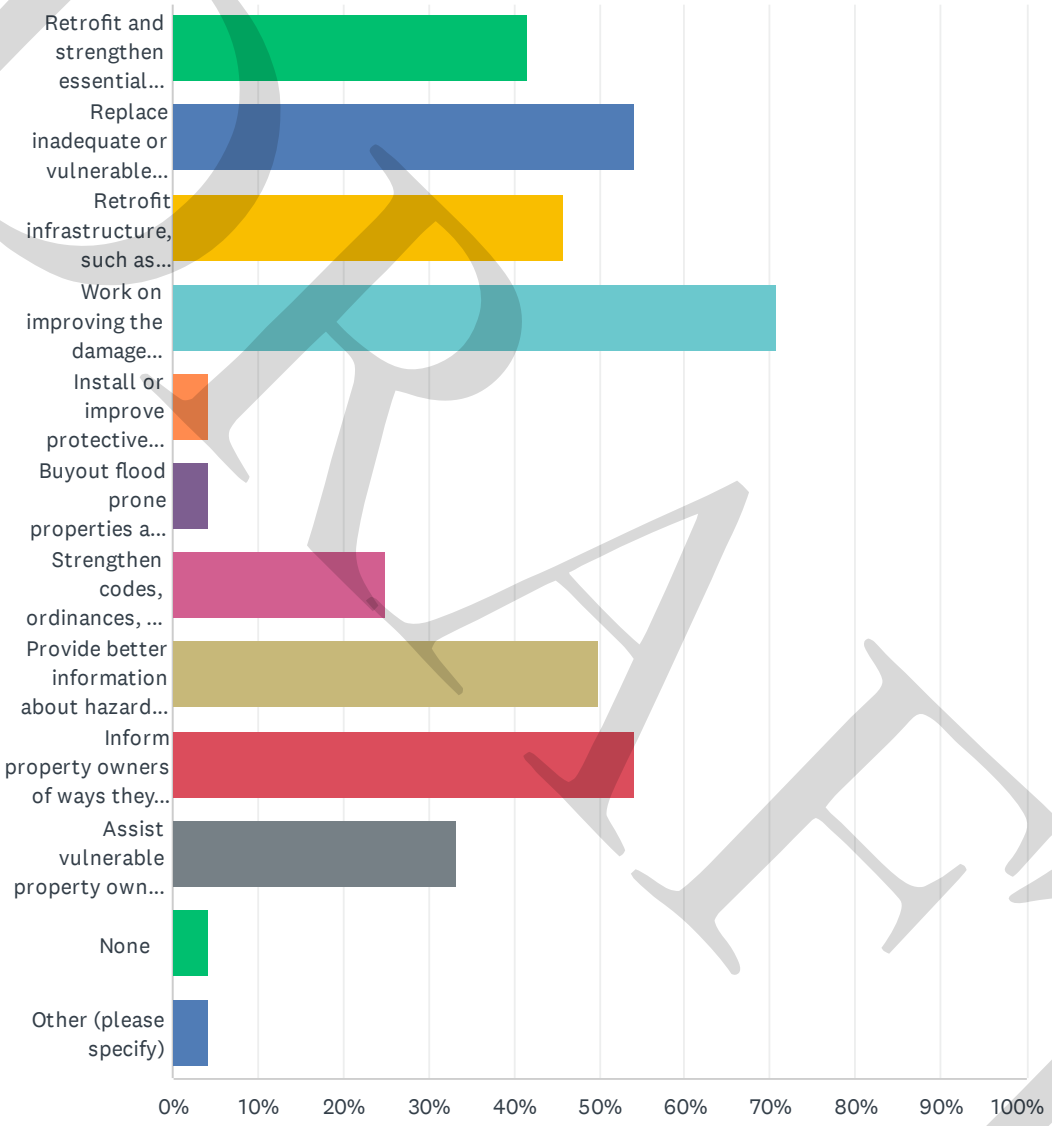
Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
TV Report	0.00%	0
Internet / (county or city website)	4.17%	1
text or e-mail	66.67%	16
Facebook / Twitter / Or other social media	4.17%	1
All of the Above	25.00%	6
Other (please specify)	0.00%	0
TOTAL		24

Q16 Which of the following mitigation activities do you believe your local government should employ to reduce or eliminate the risk of future hazard damages in your neighborhood and/or community. (Please check all that apply)

Answered: 24 Skipped: 0



231

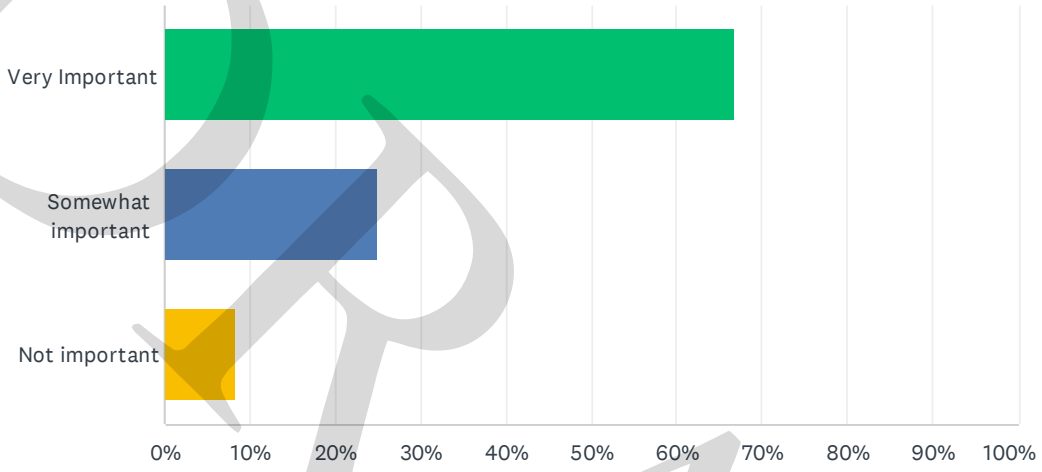
ANSWER CHOICES	RESPONSES	
Retrofit and strengthen essential facilities such as police, fire, emergency medical services, hospitals, schools, etc.	41.67%	10
Replace inadequate or vulnerable bridges and roads.	54.17%	13
Retrofit infrastructure, such as elevating roadways and improving drainage systems.	45.83%	11
Work on improving the damage resistance of utilities (electricity, communications, water / wastewater facilities, etc.).	70.83%	17
Install or improve protective structures, such as floodwalls and levees or individual/community saferooms.	4.17%	1
Buyout flood prone properties and maintain as open-space.	4.17%	1
Strengthen codes, ordinances, and plans to require higher hazard risk management standards.	25.00%	6
Provide better information about hazard risk and high-hazard areas.	50.00%	12
Inform property owners of ways they can mitigate damage to their properties.	54.17%	13
Assist vulnerable property owners with securing funding to mitigate impacts to their property(s).	33.33%	8
None	4.17%	1
Other (please specify)	4.17%	1
Total Respondents: 24		

Q17 Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?

Answered: 9 Skipped: 15

Q18 Prevention of Hazards is any administrative or regulatory action that influences the way land is developed and buildings are built. Some examples include planning and zoning, building codes, open space prevention, and flood plain regulation. Please rank how important you believe it is for your community to pursue the prevention of hazards .

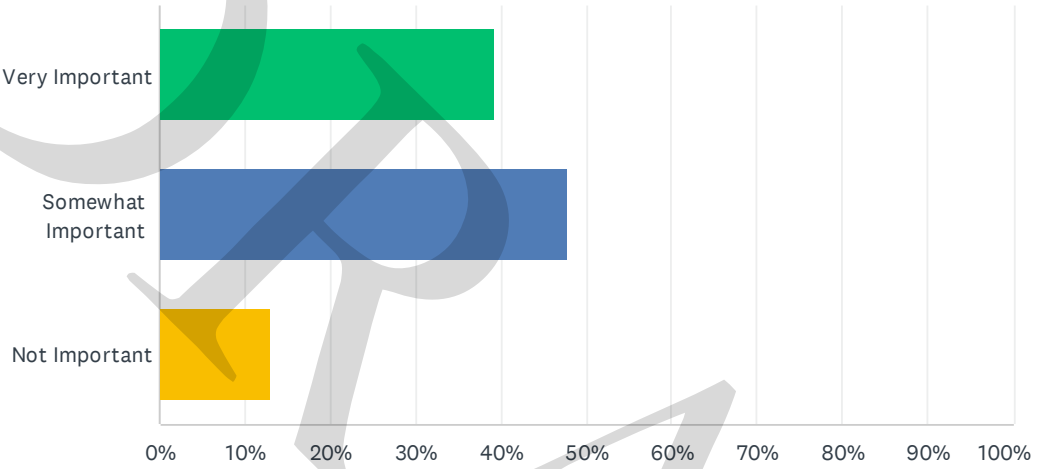
Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
Very Important	66.67%	16
Somewhat important	25.00%	6
Not important	8.33%	2
TOTAL		24

Q19 Reducing community risks from hazards can also include property protection. This involves actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevations, structural retrofits and storm shutters. How important is it to you that your community should pursue property protection?

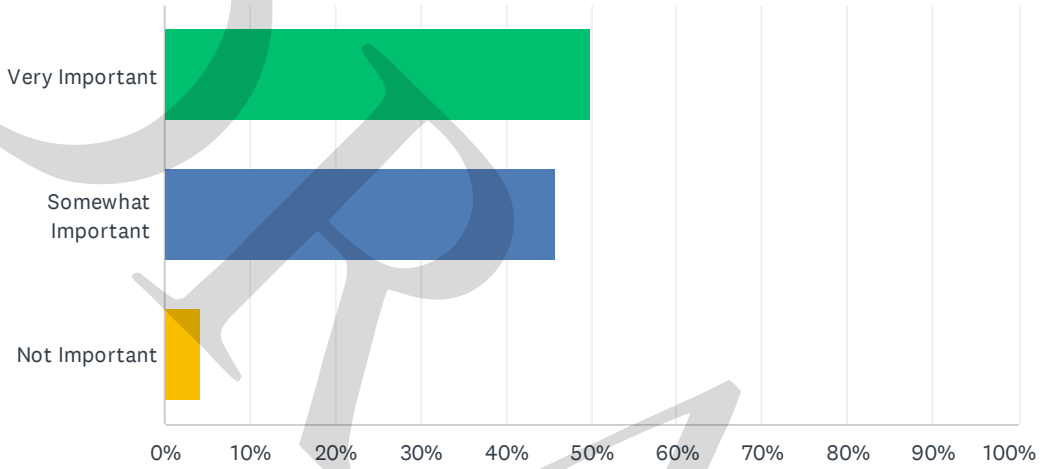
Answered: 23 Skipped: 1



ANSWER CHOICES	RESPONSES	
Very Important	39.13%	9
Somewhat Important	47.83%	11
Not Important	13.04%	3
TOTAL		23

Q20 Reducing community risks from hazards can also include natural resource protection. This kind of protection is in addition to minimizing hazard losses, preserve or restoring the functions of natural systems. Some examples include flood plain protection, habitat preservation, slope stabilization, riparian buffers and forest management. Do you believe this is important for your community to pursue? Please rank below.

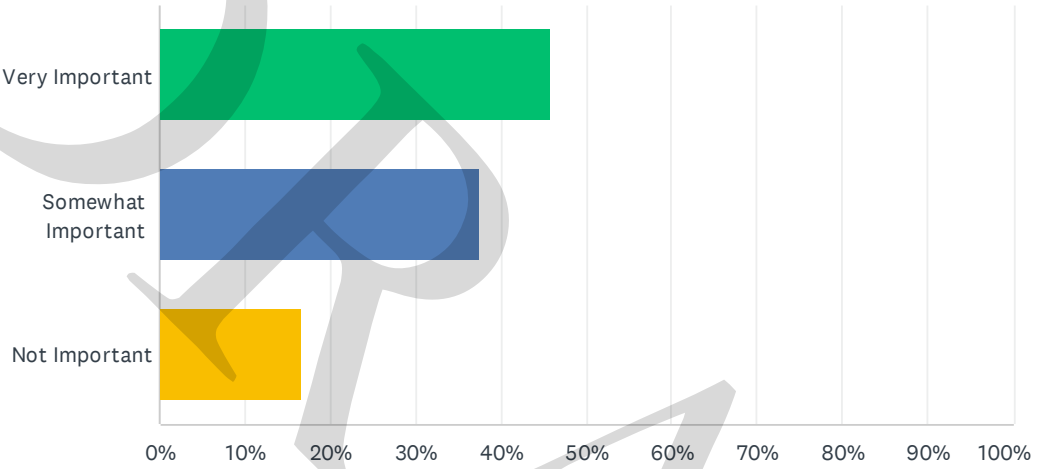
Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
Very Important	50.00%	12
Somewhat Important	45.83%	11
Not Important	4.17%	1
TOTAL		24

Q21 Structural Projects can also help to reduce hazards.These actions are intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, seawalls, detention/retention basins, channel modifications, retaining walls and storm sewers. Do you believe this is important for your community to pursue? Please rank below.

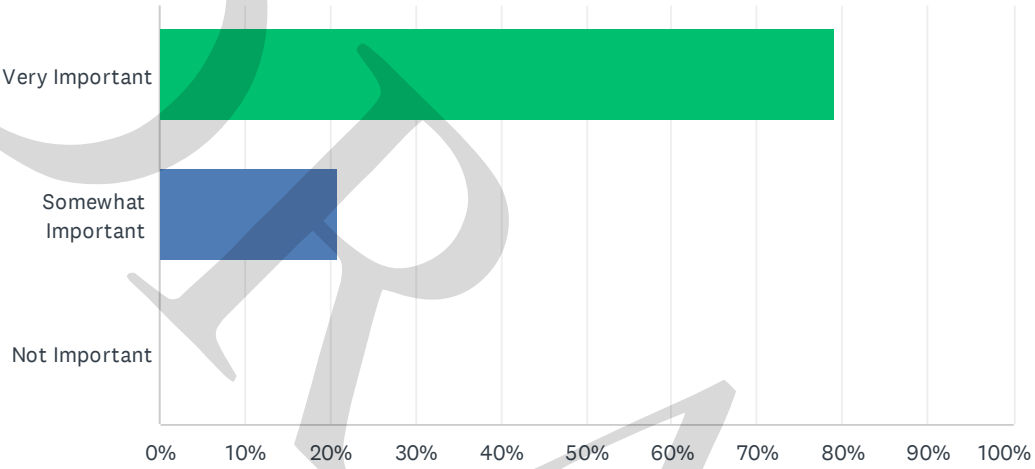
Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
Very Important	45.83%	11
Somewhat Important	37.50%	9
Not Important	16.67%	4
TOTAL		24

Q22 Emergency Services are actions that protect people and property during and immediately after a hazard event . Some examples include warning systems, evacuation planning, emergency planning, emergency response training and protection of critical emergency facilities/system. Do you believe this is important for your community to pursue? Please rank below.

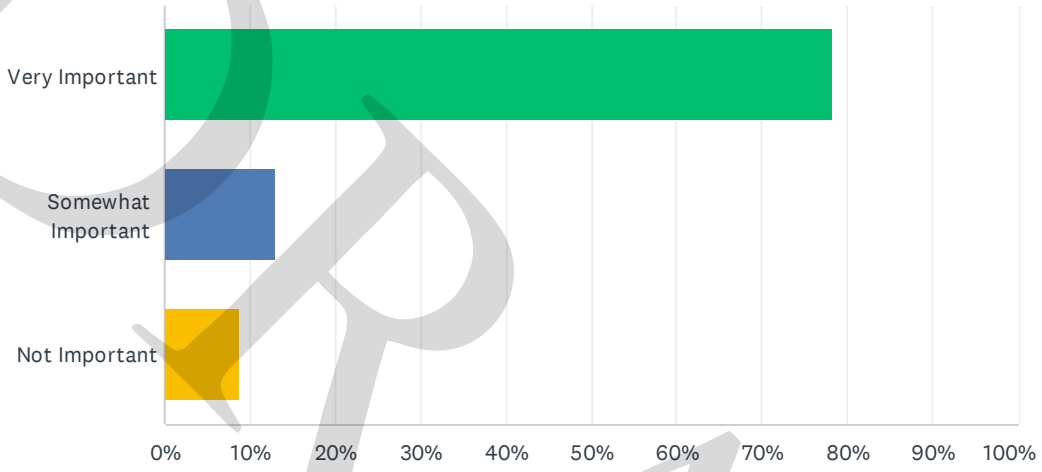
Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
Very Important	79.17%	19
Somewhat Important	20.83%	5
Not Important	0.00%	0
TOTAL		24

Q23 Public Education and Awareness are actions to inform citizens about hazards and the techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials and demonstration events. Do you believe this is important for your community to pursue? Please rank below.

Answered: 23 Skipped: 1



ANSWER CHOICES	RESPONSES	
Very Important	78.26%	18
Somewhat Important	13.04%	3
Not Important	8.70%	2
TOTAL		23

Q24 If you would like to be notified of upcoming public meetings for the Eastland County Hazard Mitigation Plan Update, please leave your name and email below. Thank you for your time!Name:

Answered: 5 Skipped: 19

Q25 e-mail:

Answered: 5 Skipped: 19

APPENDIX D

Critical Facilities Listing for each jurisdiction

The list and location of critical and vulnerable facilities will be kept and maintained by the Emergency Management Coordinator for Eastland County. This list is provided in the form of an ArcGIS geodatabase and a Microsoft Excel spreadsheet, which include the location and contact information. The table below provides a summary of critical facilities that are vulnerable to hazards based on location and hazard magnitude.

Eastland County

Three government/EOC facilities, two police and correctional facilities, one fire department, 1 emergency services facility.

City of Eastland

Seven government/EOC facilities, one airport facility, one hospital, one fire department, one police/correctional facility, two schools, and three facilities serving vulnerable populations

City of Carbon

One governmental/EOC facility, one fire department, two water facilities

City of Cisco

Three governmental/EOC buildings, four schools, one fire department, and one utility facility

City of Gorman

One governmental/EOC facility, one fire department, one police facility, three utility facilities, and three facilities serving vulnerable populations.

City of Ranger

Two governmental/EOC facilities, one fire department, one police facility, two utility facilities, and three facilities serving vulnerable populations.

City of Rising Star

One governmental/EOC facility, one fire department, three schools, and one facility serving vulnerable populations

APPENDIX E

Meeting Documentation

Legal Notice

NOTICE BY PUBLICATION
STATE OF TEXAS

TO: To All Persons Interested in the Property, located in Eastland County, more particularly described as:
76.10 acres of land, more or less, in the J.U. Shugart Survey, Abstract 695, Eastland County, Texas, said 76.10 acres being the remainder portion of a called 154.5 acre tract conveyed to John U. Shugart by a deed recorded in Volume N, Page 526 of the Deed Records of Eastland County, Texas.
On this the 11th day of October, 2024, KAREN DASHA GALLOWAY, DAVID LYNN SHUGART and MERRI LEE ANN SHUGART, filed in the Official Public Records of Eastland County, an AFFIDAVIT OF USE AND ADVERSE POSSESSION and an AFFIDAVIT OF HEIRSHIP, recorded as Document Number 2024-002987 PURSUANT TO SECTION 16.0265 OF THE TEXAS CIVIL PRACTICE AND REMEDIES CODE.
All persons interested in the aforesaid PROPERTY are cited to appear by filing a written contest to or answer to said AFFIDAVIT OF USE AND ADVERSE POSSESSION and an AFFIDAVIT OF HEIRSHIP under Section 16.0265(E) OF THE TEXAS CIVIL PRACTICE AND REMEDIES CODE, should they desire to oppose or contest it. Your rights to the title to the property may be affected by the AFFIDAVIT OF USE AND ADVERSE POSSESSION and an AFFIDAVIT OF HEIRSHIP. To ensure its consideration, you or your attorney must file any objection, intervention, or response in writing with the County Clerk of Eastland County, Texas on or before the noted date and time.
Said written contest or answer shall be filed in the office of the County Clerk of Eastland County in Eastland, Texas no later than the fifth anniversary of the date the right of adverse possession was asserted by the Affiants, KAREN DASHA GALLOWAY, DAVID LYNN SHUGART and MERRI LEE ANN SHUGART.
This citation shall, in compliance with the law, be published four times in a newspaper of general circulation in this, the county in which such action is pending. The date of publication said newspaper bears shall be the date of service.

Matthew D. Crum
Attorney for Karen Dasha Galloway, David Lynn Shugart and Merri Lee Ann Shugart
State Bar No.: 24055365
115 East Main Street
Eastland, Texas 76448
Telephone: (254) 264-4005

(10-17, 10-24, 10-31, 11-7-2024)

Public Notices

County of Eastland

Request For Proposal and Statement of Qualifications for Architecture/Engineering Services

The County of Eastland is requesting proposals and statements of qualifications from interested state registered Architecture/Engineering firms for the following project:

Expansion of the Justice Center.

County plans to select the most qualified contractor for architecture/engineering services based on the criteria listed in Section III of the Request for Proposals.

The objective in issuing this Request for Proposals and Statement of Qualifications is to solicit proposals of qualifications from companies that have the experience and capability to provide architecture/engineering services for the above-named project. The selected firm will provide a comprehensive plan to expand the existing Justice Center.

All qualified firms interested in providing the specified architecture/engineering services should respond with a written proposal to the County. Final selection will be made in accordance with the policies and administrative directives of the County and other statutory provisions. Three copies of proposals must be received by 4:00 p.m., November 19, 2024, at Eastland County Auditor's Office after which time and date they will no longer be accepted. Late responses will be returned and will not be considered. Responses may be mailed or delivered to:

Eastland County Auditor's Office
100 W. Main St.
Suite 205
Eastland, Texas 76448

* * * * * * (10-31, 11-7-2024)

Eastland County Water Supply District is accepting sealed bids on one lot of two (2) used John Deere Zero Turn Lawnmowers Model Z910A. Inspection can be made by contacting Carrie Goodman at the district office at office@ecwsd.org or telephone 254-647-1320 or 802 Hwy 2461 Ranger Texas during the hours of 9am to 3pm M-F. Deadline for the sealed bids is Friday, November 15th at 3PM.

(10-31, 11-7-2024)

PUBLIC INPUT REQUEST

Eastland County and the Cities of Carbon, Cisco, Eastland, Gorman, Ranger, Rising Star, School Districts, and Eastland County WSD seek public input as they review and update the Hazard Mitigation Plan. Public input will help the local planning teams prioritize potential natural hazards that may affect residents and identify key facilities that need to be protected. A Community Open House will be held on **Thursday, November 21,** from 5:30 pm to 7:30 pm at the Eastland County Courthouse, 100 W. Main, Ste. 203, Eastland, TX 76448. Professional consultants will be present to facilitate the meeting and answer questions.

Under the Disaster Mitigation Act of 2000, the Federal Emergency Management Agency (FEMA) requires communities to develop a mitigation plan to minimize or eliminate the long-term risk to human life and property from known hazards. Communities with a FEMA-approved plan are eligible for specific grant funding under the Hazard Mitigation Assistance (HMA) Program. Your feedback will help ensure that the plan will prepare the area and its residents for future hazards

Please complete the online survey available to the public at https://www.surveymonkey.com/r/C78BTWF
or use the QR code provided below to access the survey.

(11-7, 11-14-2024)

Thursday, November 14, 2024/B3

PUBLIC INPUT REQUEST

Eastland County and the Cities of Carbon, Cisco, Eastland, Gorman, Ranger, Rising Star, School Districts, and Eastland County WSD seek public input as they review and update the Hazard Mitigation Plan. Public input will help the local planning teams prioritize potential natural hazards that may affect residents and identify key facilities that need to be protected. A Community Open House will be held on **Thursday, November 21,** from 5:30 pm to 7:30 pm at the Eastland County Courthouse, 100 W. Main, Ste. 203, Eastland, TX 76448. Professional consultants will be present to facilitate the meeting and answer questions.

Under the Disaster Mitigation Act of 2000, the Federal Emergency Management Agency (FEMA) requires communities to develop a mitigation plan to minimize or eliminate the long-term risk to human life and property from known hazards. Communities with a FEMA-approved plan are eligible for specific grant funding under the Hazard Mitigation Assistance (HMA) Program. Your feedback will help ensure that the plan will prepare the area and its residents for future hazards

Please complete the online survey available to the public at https://www.surveymonkey.com/r/C78BTWF
or use the QR code provided below to access the survey.

(11-7, 11-14-2024)

EASTLAND COUNTY

HAZARD MITIGATION PLAN UPDATE

PUBLIC INPUT NEEDED! WE WANT TO HEAR FROM YOU!

EASTLAND COUNTY IS UPDATING THE HAZARD MITIGATION PLAN (HMP). THE PLAN INCLUDES THE CITIES OF EASTLAND, CISCO, RANGER, RISING STAR, CARBON, GORMAN & THE ECWSD.

YOUR PARTICIPATION IS VITAL!

Scan the QR Code to complete the survey.

Paper copies available at the Judge's Office, at the City Halls or online at the following URL: https://www.surveymonkey.com/r/C78BTWF

WE CANNOT STOP NATURAL DISASTERS BUT WE CAN ARM OURSELVES WITH KNOWLEDGE. INCREASING DISASTER RESILIENCE IS AN IMPERATIVE THAT REQUIRES THE COLLECTIVE WILL OF THE NATION AND ITS COMMUNITIES.

For more information, contact Judge David Hullum at 254/629-1263 or ecjudge@eastlandcountytexas.com

APPENDIX F

Plan Adoption Documents and FEMA Approval Letter

Pending completion of plan.

- Eastland County
- City of Eastland
- City of Carbon
- City of Cisco
- City of Gorman
- City of Ranger
- City of Rising Star