H2O PARTNERS

2026

Crockett County

Hazard Mitigation Plan Update

Mitigating Risk for a Safe, Secure, Sustainable Future

For more information, visit our website at:

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Section 1
Introduction

SECTION 1: INTRODUCTION

BACKGROUND

Crockett County is located in Southwest Texas. The county seat, Ozona, is a census-designated place (CDP) located approximately 200 miles northwest of San Antonio. Crane County, Irion County, Reagan County, and Upton County are adjacent to the north, Schleicher County and Sutton County border the eastern portion of the County, Val Verde County and Terrell County are adjacent to the south, and Pecos County is to the west.

Texas is prone to extremely heavy rains and flooding, with half of the world record rainfall rates (48 hours or less).[1] While flooding is a well-known risk, Crockett County is susceptible to a wide range of natural hazards, including but not limited to tornadoes, extreme heat, wildfire, and drought. These life-threatening hazards can destroy property, disrupt the economy, and lower the overall quality of life for individuals.

While it is impossible to prevent an event from occurring, the impacts to people and property can be minimized through effective mitigation. The Federal Emergency Management Agency (FEMA) defines mitigation as *sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects.*[2] Communities participate in hazard mitigation by developing hazard mitigation plans. The Texas Division of Emergency Management (TDEM) is required to review the plan, and FEMA has the authority to review and approve hazard mitigation plans through the Disaster Mitigation Act of 2000.

The Disaster Mitigation Act requires that hazard mitigation plans be reviewed and revised every five years to maintain eligibility for Hazard Mitigation Assistance (HMA) grant funding. In 2012, Crockett County participated in the Concho Valley Council of Governments (CVCOG) Mitigation Action Plan (HMAP) which was specific to twelve participating counties.

FEMA approved the previous Concho Valley Council of Governments (CVCOG) Hazard Mitigation Plan Update in 2012, which then was set to expire in 2017. Therefore, the county began the process of developing their own Hazard Mitigation Plan Update in order to regain eligibility for grant funding. The HMAP Update planning process provided an opportunity for Crockett County to evaluate successful mitigation actions and explore opportunities to avoid future disaster loss.

Crockett County selected H2O Partners, Inc. to write and develop the 2026 HMAP Update, hereinafter titled: “Crockett County Hazard Mitigation Action Plan Update 2026: Maintaining a Safe, Secure, and Sustainable Community” (Plan or Plan Update). This is a single-jurisdiction plan; Crockett County is the only participant in the Plan Update.

[1] Source: http://www.floodsafety.com/texas/regional-info/san-antonio-flooding/
[2] Source: http://www.fema.gov/hazard-mitigation-planning-resources

SECTION 1: INTRODUCTION

Hazard mitigation activities are 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.

Crockett County understands the importance of building resiliency throughout the community and recognizes the cost savings realized from the successful implementation of sound mitigation projects. The county has been successfully implementing mitigation projects for decades, many of which are referenced throughout this Plan Update. Table 1-1 below identifies additional activities completed and/or underway within the planning area.

Table 1-1. Mitigation Success Examples

Mitigation Successes
• Crockett County continues to enhance infrastructure resiliency through improvements to its water system, including the completed water line replacement project from 1200 Avenue B to 1400 Avenue B, totaling $649,000. • Additional upgrades include the completed water line replacement along Avenue G, representing an investment of $744,999 to strengthen system reliability and service delivery. • The County is also planning for future improvements, with a water line replacement project from Owens to Sheffield Highway scheduled to begin in 2026, with an estimated cost of $765,000.

SCOPE

The focus of the Plan Update is to identify activities to mitigate hazards classified as "high" or "moderate" risk, as determined through a detailed hazard risk assessment conducted for Crockett County. The hazard classification enables the county to prioritize mitigation actions based on hazards that can present the greatest risk to lives and property in the geographic scope.

PURPOSE

The Plan Update was prepared by Crockett County and H2O Partners, Inc. The purpose of the Plan Update is to protect people and structures and to minimize the costs of disaster response and recovery. The goal of the Plan Update is to minimize or eliminate long-term risks to human life, property, operations, and the environment from known hazards by identifying risks and implementing cost-effective hazard mitigation actions. The planning process is an opportunity for Crockett County, stakeholders, and the general public to evaluate and develop successful hazard mitigation actions to reduce future risk of loss of life and damage to property resulting from a disaster in Crockett County.

The Mission Statement of the Plan Update is "*Maintaining a secure and sustainable future through the revision and development of targeted hazard mitigation actions to protect life and property.*"

Crockett County identified 13 natural hazards to be addressed by the Plan Update. The specific goals of the Plan Update are to:

- Provide a comprehensive update to the 2012 HMAP;

- Minimize disruption within Crockett County, following a disaster;
- Streamline disaster recovery by articulating actions to be taken before a disaster strikes to reduce or eliminate future damage;
- Demonstrate a firm local commitment to hazard mitigation principles;
- Serve as a basis for future funding that may become available through grants and technical assistance programs offered by the State or Federal government. The Plan will enable Crockett County to take advantage of rapidly developing mitigation grant opportunities as they arise; and
- Ensure that Crockett County maintains eligibility for the full range of future Federal disaster relief.

AUTHORITY

The Plan is tailored specifically for Crockett County and Plan participants, including Planning Team members, stakeholders, and the general public who participated in the Plan Update development process. The Plan complies with all requirements promulgated by the Texas Division of Emergency Management (TDEM) and all applicable provisions of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Section 104 of the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390), and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108–264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al). Additionally, the Plan complies with the Interim Final Rules for the Hazard Mitigation Planning and Hazard Mitigation Grant Program (44 CFR, Part 201), which specify the criteria for approval of mitigation plans required in Section 322 of the DMA 2000 and standards found in FEMA's "Local Mitigation Planning Policy Guide" (April 2025), and the "Local Mitigation Planning Handbook" (June 2025).

SUMMARY OF SECTIONS

Sections 1 and 2 of the Plan Update outline the Plan's purpose and development, including how Planning Team members, stakeholders, and members of the general public were involved in the planning process. Section 3 profiles Crockett County's population and economy.

Sections 4 through 17 present a hazard overview and information on individual natural hazards in the planning area. For each hazard, the Plan Update presents a description of the hazard, a list of historical hazard events, and the results of the vulnerability and risk assessment process.

Section 18 presents hazard mitigation goals and objectives. Section 19 gives an analysis of the previous actions, and Section 20 presents hazard mitigation actions for Crockett County. Section 21 identifies Plan maintenance mechanisms.

Human-caused hazards are included in Appendix A. The list of Planning Team members and stakeholders is located in Appendix B. Public survey results are presented in Appendix C. Appendix D contains a detailed list of critical facilities for the area. Appendix E contains information regarding dam locations within Crockett County. Appendix F contains information regarding workshops and meeting documentation. Capability Assessment results for Crockett

County are in Appendix G. Appendix H includes State and Federal Funding Opportunities. The resolution denoting adoption of the Plan Update is located at the end of this document.[3]

[3] Information contained in some of these appendices is exempt from public release under the Freedom of Information Act (FOIA).

Section 2
Planning Process

SECTION 2: PLANNING PROCESS

PLAN PREPARATION AND DEVELOPMENT

Hazard mitigation planning involves coordination with various constituents and stakeholders to develop a more disaster-resistant community. Section 2 provides an overview of the planning process, including the identification of key steps and a detailed description of how stakeholders and the public were involved.

OVERVIEW OF THE PLAN

Crockett County hired H2O Partners, Inc. (Consultant Team), to provide technical support and oversee the development of the Crockett County Hazard Mitigation Action Plan Update 2026. The Consultant Team used the FEMA “Local Mitigation Planning Policy Guide” (April 2025), and the “Local Mitigation Planning Handbook” (June 2025) to develop the Plan Update. The overall planning process is shown in Figure 2-1 below.

Figure 2-1. Mitigation Planning Process

SECTION 2: PLANNING PROCESS

PLANNING TEAM

Key members of H2O Partners, Inc. developed the Plan Update in conjunction with the Planning Team. The Planning Team was established using a direct representation model. Some of the responsibilities of the Planning Team included completing Capability Assessment surveys, providing input regarding the identification of hazards, identifying mitigation goals, and developing mitigation strategies. An Executive Planning Team consisting of key personnel involved in hazard mitigation activities from Crockett County, shown in Table 2-1, was formed to coordinate planning efforts and request input and participation in the planning process. Table 2-2 reflects the Advisory Planning Team, consisting of additional representatives from departments that participated throughout the planning process. All Executive and Advisory Planning Team members are involved in hazard mitigation activities; those with the authority to regulate development are identified within Appendix B.

Table 2-1. Executive Planning Team

Organization / Department	Title
Crockett County – Local Government	County Judge

Table 2-2. Advisory Planning Team

Organization / Department	Title
Crockett County – Administration	Treasurer
Crockett County – County Judge	Court Administrator
Crockett County – Emergency Management	Assistant Emergency Management Coordinator
Crockett County – Emergency Management	Emergency Management Coordinator
Crockett County – Local Government	Precinct 1, County Commissioner
Crockett County – Local Government	Precinct 2, County Commissioner
Crockett County – Local Government	Precinct 3, County Commissioner
Crockett County – Local Government	Precinct 4, County Commissioner
Crockett County – Local Government	District Clerk
Crockett County – Road & Bridge	Superintendent
Crockett County – Sheriff	Chief
Crockett County – Sheriff	Sheriff

SECTION 2: PLANNING PROCESS

PUBLIC AND STAKEHOLDER INVOLVEMENT

An important component of hazard mitigation planning is public participation and stakeholder involvement. Input from individual citizens and the community as a whole provides the Planning Team with a greater understanding of local concerns and increases the likelihood of successfully implementing hazard mitigation actions. When citizens and stakeholders, such as local businesses, nonprofits, hospitals, and schools are involved, they are more likely to gain a greater appreciation of the risks that hazards may present in their community and take steps to reduce or mitigate their impact.

Stakeholder involvement is essential because a diverse group of participants can provide insight from a wide range of perspectives and expertise. Throughout the planning process, members of community organizations, local businesses, schools, hospitals, and neighboring jurisdictions were invited to participate in the development of the Plan Update. The Stakeholder Group included representatives from both the public and private sectors and served as a key component of Crockett County's outreach efforts. Their input directly influenced the Plan Update; for example, concerns expressed at public meetings regarding potential flood incidents led the Planning Team to include mitigation actions to conduct numerous drainage system projects throughout the planning area.

A key goal of the Planning Team was to build equity into the planning process. Organizations that support underserved communities and socially vulnerable populations were intentionally invited to ensure equitable access to the planning process and meaningful participation by all residents. These organizations also helped ensure that the interests of vulnerable populations were accurately represented and served as valuable resources for sharing information with those communities. The Planning Team drew on longstanding partnerships and coordinated with new local agencies, organizations, and community leaders to support engagement efforts. These organizations were included in the planning process as stakeholders and were invited to participate in the planning process via email. These agencies were also encouraged to publicize and attend public meetings and solicit feedback through the public survey.

Overall, the public and stakeholders were involved in the development of the Crockett County Hazard Mitigation Action Plan Update 2026 at different stages prior to official Plan approval and adoption. Public input was gathered through three methods: (1) open public meetings; (2) survey instruments; and (3) making the draft Plan Update available for public review on the County's website.

The public and stakeholders were notified at the public meetings that the draft Plan Update would be available for review. The draft Plan Update was made available to the general public for review and comment on the County's website. While no feedback was received on the draft Plan Update itself, feedback provided through the public survey was incorporated into the Plan. Public input was used to identify hazards of greatest concern to residents and to help determine and prioritize mitigation actions.

Documentation of stakeholder meetings is included in Appendix F. A list of organizations invited to participate and those that engaged in the planning process is provided in Appendix B. Upon approval by FEMA, the final Plan Update will be posted on the County's website, and a copy will be maintained at the Crockett County Courthouse.

PUBLIC MEETINGS

Public meeting notices were posted on the County's website, social media platforms, and bulletin boards in public facilities to increase public participation in the Plan Update development process. A series of public meetings were held in the planning area to collect public and stakeholder input. Topics of discussion included the purpose of hazard mitigation, discussion of the planning process, and types of natural hazards. A sampling of these notices can be found in Appendix F, along with the documentation on the public meetings.

Public meetings were held on the following dates:

- October 28, 2025, at the Crockett County Annex in Ozona
- December 8, 2025, at the Crockett County Annex in Ozona
- February 9, 2026, at the Crockett County Annex in Ozona

PUBLIC PARTICIPATION SURVEY

In addition to public meetings, the Planning and Consultant Teams developed a public survey designed to solicit public input during the planning process from citizens and stakeholders to obtain data regarding the identification of any potential hazard mitigation actions or problem areas. The survey was promoted by local officials and a link to the survey was posted on the County's website. A total of 11 surveys were completed online. The survey results are presented in Appendix C. The Planning Team reviewed the input from the surveys and decided which information to incorporate into the Plan as hazard mitigation actions. For example, results indicate that drought and wildfire are the hazards of highest concern for the public. Constructing, maintaining and retrofitting infrastructure, as well as protecting and strengthening critical facilities were the two main actions identified in survey responses that the local government should take to mitigate risk to these hazards. As a result, the Planning Team has included mitigation actions to harden critical facilities to hazard-resistant levels, as well as to acquire and install generators with hard-wired quick connections at all critical facilities.

PLANNING PROCESS

The process used to prepare the Plan Update followed the four major steps included in Figure 2-1. After the Planning Team was organized, a capability assessment was developed and distributed at the Kickoff Workshop. A capability assessment is used to summarize and determine the extent of a jurisdiction's planning, regulatory, administrative, technical, fiscal, and political capacity.

Hazards identified by the Planning Team were assessed on the basis of historical occurrences and corresponding injuries, fatalities, and monetary damages. Results associated with each of the hazards were provided at the Risk Assessment Workshop. Based on Crockett County's identified social and structural vulnerabilities, specific mitigation strategies were discussed and developed at the Mitigation Strategy Workshop.

During the Plan Update development process described herein, the following factors were taken into consideration:

- The nature and magnitude of risks currently affecting the community;
- Current and anticipated conditions and financial resources;
- Feasibility issues that could affect implementation of the Plan Update;
- Anticipated outcomes; and

- How Crockett County, agencies, and partners will participate in implementing the Plan Update.

Finally, Plan maintenance and implementation procedures are included in Section 21. Participation of Planning Team members, stakeholders, and the public at each of the workshops is documented in Appendix F.

KICKOFF WORKSHOP

The Kickoff Workshop was held on October 28, 2025, at the Crockett County Annex in Ozona. The initial workshop informed participating officials and key department personnel about how the planning process pertained to their distinct roles and responsibilities and engaged stakeholder groups that focus on vulnerable populations and underserved communities including, but not limited to, public libraries and surrounding communities. In addition to the kickoff presentation, participants received the following:

- Project overview regarding the planning process;
- Public survey access information;
- Hazard Ranking form; and
- Capability Assessment survey for completion.

At the Kickoff Workshop, the Planning Team identified and considered a range of natural hazards that affect the communities. Each participant ranked hazards in terms of the frequency of occurrence and impact. The results of the ranking sheets reflect differing perceptions of risk across the planning area based on individual experience, professional roles, and familiarity with local conditions. The assessments were also used to set priorities for hazard mitigation actions based on potential loss of lives and dollar losses.

HAZARD IDENTIFICATION

At the Kickoff Workshop, and through email and phone correspondence, the Planning Team conducted preliminary hazard identification. The Planning Team, in coordination with the Consultant Team, reviewed and considered a full range of natural hazards. Once identified, the teams narrowed the list to significant hazards by reviewing hazards affecting the area, the 2023 State of Texas Hazard Mitigation Plan, and initial study results from reputable sources such as federal and state agencies. Based on this initial analysis, the teams identified a total of 13 natural hazards which pose a significant threat to the planning area.

RISK ASSESSMENT

An initial risk assessment for Crockett County was completed in November 2025 and results were presented to Planning Team members at the Risk Assessment Workshop held on December 8, 2025, at the Crockett County Annex in Ozona. At the workshop, the characteristics and consequences of each hazard were evaluated to determine the extent to which the planning area would be affected in terms of potential danger to citizens and property.

Property and crop damages were estimated by gathering data from the National Centers for Environmental Information (NCEI) and the National Oceanic and Atmospheric Administration (NOAA). The assessment also examined the impact of various hazards on the built environment, including general building stock, critical facilities, lifelines, and infrastructure. The resulting risk assessment profiled hazard events, provided information on previous occurrences, estimated probability of future events, and detailed the spatial extent and magnitude of impacts on people and property. Following the Risk Assessment Workshop, historical event data from the NCEI was

provided to the Planning Team for their review and assistance in identifying significant events. A hazard profile and vulnerability analysis for each of the hazards can be found in Sections 4 through 17.

MITIGATION STRATEGY DEVELOPMENT

Developing the mitigation strategy for the Plan Update involved identifying mitigation goals and new mitigation actions. A Mitigation Strategy Workshop was held on February 9, 2026, at the Crockett County Annex in Ozona. Regarding hazard mitigation action priorities, workshop participants emphasized the desire for flood projects. The Planning Team was proactive in identifying mitigation actions to lessen the risk of all the identified hazards included in the Plan Update.

The Consultant Team provided example hazard mitigation actions for profiled hazards to generate ideas about actions relevant to the Plan Update. Planning Team members then developed action plans identifying proposed actions, costs and benefits, the responsible organization(s), effects on new and existing buildings, implementation schedules, priorities, and potential funding sources. Each mitigation action in Section 20 identifies a lead agency, funding source, and implementation timeframe to ensure accountability and timely progress.

Specifically, the process involved:

- Listing optional hazard mitigation actions based on information collected from previous plan reviews, studies, and interviews with federal, state, and local officials. Workshop participants reviewed the optional mitigation actions and selected actions that were most applicable to their area of responsibility, cost-effective in reducing risk, easily implemented, and likely to receive institutional and community support.

- Workshop participants inventoried federal and state funding sources that could assist in implementing the proposed hazard mitigation actions. Information was collected, including the program name, authority, purpose of the program, types of assistance and eligible projects, conditions on funding, types of hazards covered, matching requirements, application deadlines, and a point of contact.

- Planning Team members considered the benefits that would result from implementing the hazard mitigation actions compared to the cost of those projects. Although detailed cost-benefit analyses were beyond the scope of the Plan Update, Planning Team members utilized economic evaluation as a determining factor between hazard mitigation actions.

- Planning Team members then selected and prioritized mitigation actions based on FEMA's STAPLEE criteria and included social, technical, administrative, political, legal, economic, and environmental considerations. The overall priority of each action is reflected in the hazard mitigation actions identified in Section 20.

Hazard mitigation actions identified in the process were made available to the Planning Team for review. The draft Plan Update was maintained on file by Crockett County and was made available to the general public for review.

REVIEW AND INCORPORATION OF EXISTING PLANS

REVIEW

Background information utilized during the planning process included various studies, plans, reports, and technical information from sources such as FEMA, the United States Army Corps of Engineers (USACE), the U.S. Fire Administration, the National Oceanic and Atmospheric Administration (NOAA), the Texas Water Development Board (TWDB), the Texas Commission on Environmental Quality (TCEQ), the Texas State Data Center, the Texas A&M Forest Service, the Texas Division of Emergency Management (TDEM), and local hazard assessments and plans. Section 4 and the hazard-specific sections of the Plan Update (Sections 5-17) summarize the relevant background information.

Specific background documents, including those from FEMA, provided information on hazard risk, hazard mitigation actions currently being implemented, and potential mitigation actions. Previous hazard events, occurrences, and descriptions were identified through NOAA's National Centers for Environmental Information (NCEI). Results of past hazard events were found through searching the NCEI Storm Events Database. The USACE studies were reviewed for their assessment of risk and potential projects in the region. Information from the State Demographer was reviewed for population and other projections and included in Section 3 of the Plan Update. Data from the Texas A&M Forest Service was used to appropriately rank the wildfire hazard, and to help identify potential grant opportunities. Materials from FEMA and TDEM were reviewed for guidance on Plan Update development requirements.

INCORPORATION OF EXISTING PLANS INTO THE HMAP PROCESS

A Capability Assessment was completed by key departments from Crockett County, which provided information pertaining to existing plans, policies, ordinances, and regulations to be integrated into the goals and objectives of the Plan Update. The relevant information was included in a master Capability Assessment, Appendix G.

Existing projects and studies were utilized as a starting point for discussing hazard mitigation actions among Planning and Consultant Team members. For example, Crockett County developed a Community Wildfire Protection Plan. Subsequently, in order to build upon these efforts to strengthen local plans and regulatory capacity, the Planning Team included a mitigation action to create an MOU with the local high school for the use of the gymnasium as a safe room or shelter.

For a comprehensive list of actions from the previous 2012 Concho Valley Council of Governments (CVCOG) Hazard Mitigation Plan, please refer to Section 19.

The Flood Insurance Study (FIS), as well as the current effective Flood Insurance Rate Map (FIRM) data, provided by FEMA, were used in the flood hazard risk assessment (Section 10). The FIRM data for Crockett County (map ID 480158C, panels 1-29) shows the areas throughout the planning area at greater risk of flooding, and the FIS report contains detailed flood elevation data in flood profiles and data tables and is utilized in determining extent.

Additionally, policies and ordinances were reviewed by Crockett County. Other plans were reviewed, such as the Capital Improvement Plan and Emergency Operations Plan to identify any additional mitigation actions. Furthermore, applicable information was included in the wildfire risk assessment from the Community Wildfire Protection Plan.

Finally, the 2023 State of Texas Hazard Mitigation Plan, developed by TDEM, was discussed in the initial planning meeting in order to develop a specific group of hazards to address in the planning effort. The 2023 State Plan was also used as a guidance document, along with FEMA materials, in the development of the Crockett County Hazard Mitigation Action Plan Update 2026.

INCORPORATION OF THE HMAP INTO OTHER PLANNING MECHANISMS

Planning Team members will integrate implementation of the Plan Update with other planning mechanisms for Crockett County, such as the Emergency Operations Plan, ordinances, and related efforts. The capability assessment provides an overview of the Planning Team members' existing planning and regulatory capabilities. These existing capabilities provide the mechanisms to implement the mitigation strategy objectives. For example, the adoption of building codes and implementation of land use regulations have been demonstrated to help communities avoid losses from natural hazard events. Currently, Crockett County does not have building codes or land use regulations in place; however, the development or adoption of such measures presents an opportunity to strengthen the County's mitigation capabilities. Please refer to Appendix G for a complete inventory of the County's capabilities.

Following adoption of the Plan Update, the Planning Team will coordinate periodic reviews of existing plans, planning mechanisms, and building codes to ensure hazard mitigation actions are integrated and implemented in accordance with the approved Plan. These reviews will evaluate the need for revisions or updates and ensure that future long-term planning efforts contribute to reducing risk to life and property from identified moderate- and high-risk hazards.

It should be noted that the Hazard Mitigation Plan Update has been used as a reference when reviewing and updating all plans and ordinances for the entire planning area. The Emergency Management Action Plan developed for Crockett County is updated every five years and incorporates goals, objectives and actions identified in the Plan Update.

OPPORTUNITIES FOR EXPANDING EXISTING CAPABILITIES

Based on the results of the completed Capability Assessments, Crockett County described methods for achieving future hazard mitigation measures by expanding existing capabilities. For example, the County has an opportunity to identify opportunities for cross-training or increasing the technical expertise of staff by attending free training available through FEMA and the Texas Division of Emergency Management (TDEM) by monitoring classes and availability through the TDEM Training Division Learning Management Site.[1] In addition, Crockett County can identify Planning Team members with the authority to monitor the Plan and identify grant funding opportunities for expanding staff. Other options for improving capabilities for the County are included in Table 2-3.

[1] Texas Division of Emergency Management: https://tdem.texas.gov/preparedness/training

Table 2-3. Opportunities for Improving and Expanding Existing Capabilities

Opportunities
• Integrate risk information from HMAP into future updates to **Capital Improvement Plan.** • Integrate risk information from HMAP into future updates to **Comprehensive Plan.** • Integrate risk information from HMAP into future updates to **Community Wildfire Protection Plan.** • Review current **floodplain ordinances** for opportunities to increase resiliency such as modifying permitting or building codes. • Develop **building and land use ordinances** that will require all new developments to conform to the highest mitigation standards.

PLAN REVIEW AND PLAN UPDATE

As with the development of the Plan Update, Crockett County will oversee the review and update process for relevance and if necessary, make adjustments. At the beginning of each fiscal year, Planning Team members will meet to evaluate the Plan and review other planning mechanisms to ensure consistency with long-range planning efforts. In addition, planning participants will also meet once a year, by conference call or presentation, to re-evaluate prioritization of the hazard mitigation actions. The Plan may be amended to include additional hazard mitigation actions as they are developed.

TIMELINE FOR IMPLEMENTING MITIGATION ACTIONS

Both the Executive Planning Team (Table 2-1) and the Advisory Planning Team (Table 2-2) will engage in discussions regarding a timeframe for how and when to implement each hazard mitigation action. Considerations include when the action will be started, how existing planning mechanisms' timelines affect implementation, and when the action should be fully implemented. Timeframes may be general, and there will be short-, medium-, and long-term goals for implementation based on prioritization of each action, as identified on the hazard mitigation action tables included in the Plan Update for Crockett County.

Both the Executive and Advisory Planning Team will evaluate and prioritize the most suitable hazard mitigation actions for the community to implement. The timeline for implementation of actions will partially be directed by Crockett County's comprehensive planning processes, budgetary constraints, and community needs. Crockett County are committed to addressing and implementing hazard mitigation actions that may be aligned with and integrated into the Plan Update.

Overall, the Planning Team is in agreement that goals and actions of the Plan Update shall be aligned with the timeframe for implementation of hazard mitigation actions with respect to annual review and updates of existing plans and policies.

Section 3
County Profile

SECTION 3: COUNTY PROFILE

OVERVIEW

Crockett County is located in southwestern Texas on the western edge of the Edwards Plateau. It is bounded on the west by the Pecos River, which separates it from Terrell and Pecos counties. Numerous draws, dry most of the year, drain the County during floods and empty into the Devils and Pecos rivers. Johnsons Run and Howard Draw bisect the central area before reaching the Devils and the Pecos, respectively, in Val Verde County. Live Oak Creek runs to the south from the northwest and enters the Pecos at Lancaster Hill. The dry bed of Spring Creek originates in the northeastern corner of the County and extends northeast to the Middle Concho River.

Early important sources of water for prehistoric people and early travelers were Live Oak Spring and Cedar Springs, which once provided strong flows in western Crockett County. Among the first people to take water from the springs were the early inhabitants of Gobbler Shelter, located on a small tributary canyon of Live Oak Creek. Prehistoric people lived over long periods of time in the shelter where they left artifacts. Spaniards first passed through the area of Crockett County in 1590, when Gaspar Castaño de Sosa brought the first Europeans through the isolated canyonland. Castaño led a mining expedition from Monclova, Chihuahua, to the northern New Mexico pueblo of Santo Domingo. On May 22, 1684, Juan Domínguez de Mendoza and his expedition crossed the Pecos River and camped at a site Domínguez called San Pantaleón, now in Crockett County. At that time, several indigenous tribes lived in the area, among them Lipan Apaches and Tonkawas. The Comanche people entered the area during the eighteenth century, displacing earlier inhabitants.

John Coffee Hays led an expedition through the County in 1849, charting waterholes for a freighting and stagecoach route from San Antonio to El Paso. It was determined that travelers along the route needed more military protection due to attacks from indigenous tribes. Fort Lancaster was founded on the east bank of Live Oak Creek on August 20, 1855. When Texas seceded from the Union less than six years later, the fort was abandoned, and after 1874 it fell into complete decay. Following the Civil War, settlers moved into the frontier region and took up the unoccupied lands, however conflicts with the indigenous tribes discouraged settlement until the United States sent troops to the frontier posts. The Texas legislature provided three battalions of rangers for the protection of the area in September 1866. Another sub-post, Camp Melvin, was established in 1868 at the river crossing where Domínguez de Mendoza had camped; the sub-post operated until 1871. Camp Melvin was important as a stage crossing and mail station, rather than a military installation.

SECTION 3: COUNTY PROFILE

On January 12, 1875, Crockett County, named for David Crockett of Alamo fame, was formed from Bexar County and attached to Kinney County for judicial purposes. It included the future Sutton and Schleicher counties and parts of the future Val Verde, Kinney, and Edwards counties. From the earliest settlement, the economy was dependent on sheep and cattle ranching. In 1880, Crockett County reported fifteen farms raising sheep, beef cattle, and hogs. By 1890, the County reported 23 farms in the area and a population of 194. Crockett County was organized on July 7, 1891, when an election was held at Couch Well, or Eureka, to choose the county seat from three contending communities. The election was inconclusive, but Ozona became the county seat by the end of the year as the other communities failed to develop. The new county seat grew slowly for the first decade. In 1891, it received a post office, a Sunday school, and the first school opened. A courthouse was built by the end of the year. A Baptist church was organized in 1892, and a Church of Christ in 1895. In 1899, a hotel opened, and by 1900, a stagecoach service had begun.

In 1900, Crockett County reported seven manufacturing establishments, which employed seven people and paid more than $3,700 in wages for the manufacture of $15,300 worth of products. By 1920, nine manufacturers employed 21 workers at a total wage of $42,500 and produced more than $93,600 in goods. Throughout the 1940s, only one manufacturer was in business. In 1900, the population had grown to 1,591, and there were 85 farms that comprised 1.7 million acres with 121,000 cattle and 91,000 sheep. By 1910, the number of farms had decreased to 79 with 110,000 sheep, 9,000 goats, and 45,000 cattle. The population had also decreased to 1,296. There continued to be a fluctuation in farms and population into the 1920's, with 1,500 people and sheep ranching leading the livestock industry.

In May 1925, oil was discovered on a ranch in north central Crockett County. There was no oil boom due to the lack of railroads and highways in the area. By 1930 and 1940, there was oil and gas production in several fields. The oil and gas production brought in more people, raising the population to 2,590 in 1930 and 2,809 in 1940. The population continued to grow throughout the 1960's, hitting a high of 4,209. Sheep have dominated the livestock market throughout the history of the County and continue to be the leading livestock population.[1]

Figure 3-1 shows the general location of Crockett County.

[1] Source: https://www.tshaonline.org/handbook/entries/crockett-county

Figure 3-1. Location of Crockett County

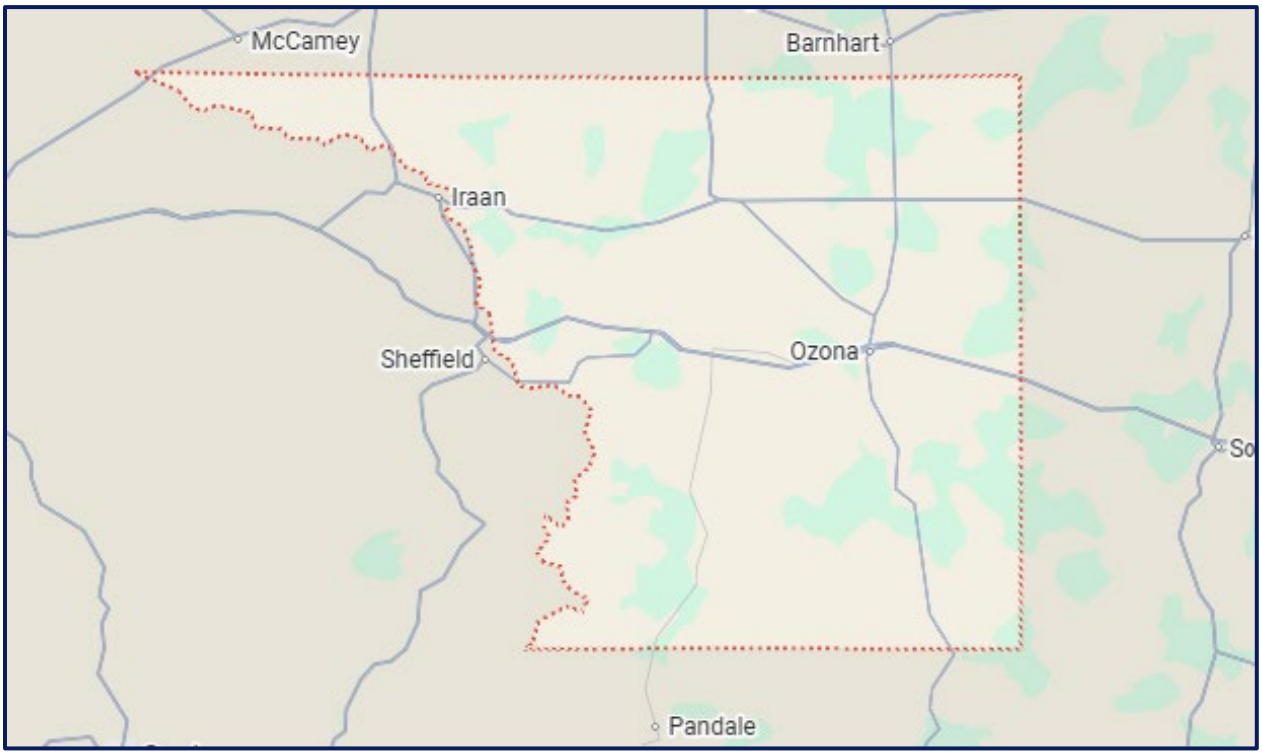
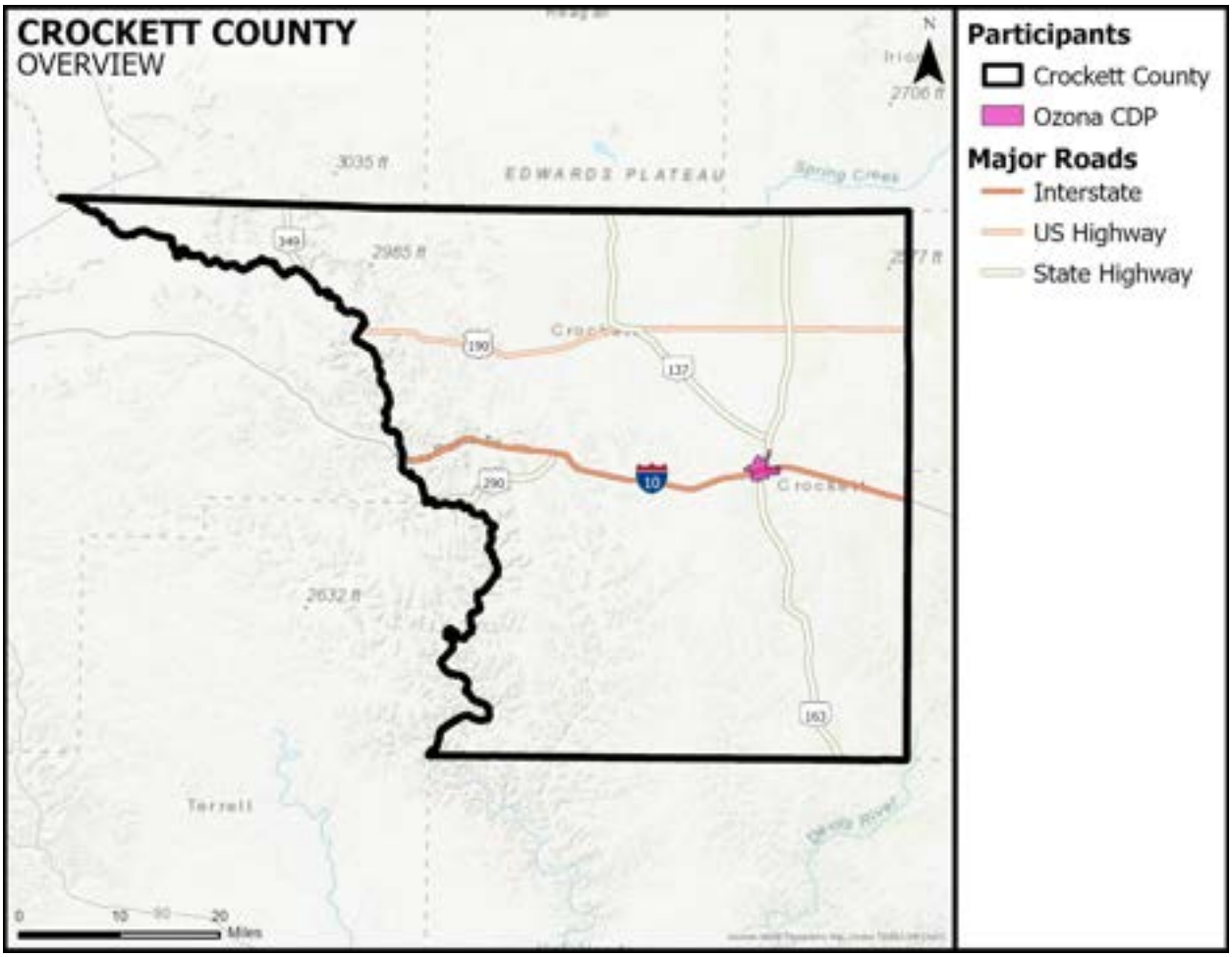


Figure 3-2 shows the limits of Crockett County, which makes up the planning area. All areas of the County are covered in the risk assessment analysis of the Plan Update.

Figure 3-2. Crockett County Planning Area



POPULATION AND DEMOGRAPHICS

Table 3-1 shows the population distribution in Crockett County in 2010, 2020, and 2024 (2024 American Community Survey (ACS) five-year estimates).[2] According to the 2020 Census, Crockett County has an official population of 3,098 residents, a 17 percent decrease since the 2010 census. Table 3-2 summarizes select characteristics of vulnerable or sensitive populations in Crockett County using data from the U.S. Census Bureau 2024 ACS five-year estimates.

Table 3-1. Population Distribution[3,4]

Jurisdiction	2010 (Census)	2020 (Census)	2024 (ACS Estimates)	Population Change			
				2010-2020	Percent	2010-2024	Percent
Crockett County	3,719	3,098	2,822	-621	-17%	-897	-24%

[2] ACS is simply an estimate, and many variables are involved in achieving an accurate estimation of the number of people living in a given area at a given time.
[3] U.S. Census Bureau: https://www.census.gov
[4] U.S. Census Bureau: 2024 American Community Survey 5-Year Estimates Data Profiles.

Table 3-2. Populations at Greater Risk[5]

Jurisdiction	Population				
	65 and Older	Under 5	With a Disability	Below Poverty Level	Limited English Speaking
Crockett County	537	36	491	262	295

ECONOMIC IMPACT

Hazard events have the potential to disrupt employment, reduce household income, and limit the ability of residents to recover from impacts. Households with lower incomes or limited financial resources may face greater challenges in preparing for, responding to, and recovering from hazard events. The community's economic character therefore provides important context for understanding the potential impacts and recovery capacity following hazard events.

Based on the American Community Survey 2024 estimates, 59 percent of the population 16 years and over (2,301) is employed in the labor force. The per capita income is $32,927 and the median household income countywide is $81,022. Families with incomes below the poverty level in 2024 made up 1.8 percent of all families. Of families that have children under 18 years old, 0 percent are below the poverty level.

Tables 3-3 and 3-4 show the various occupations and industries within Crockett County, according to the U.S. Census Bureau 2024 ACS five-year estimates.

Table 3-3. Occupations of Employed Population in Crockett County[6]

Occupation	Estimate	Percent
Civilian employed population 16 years and over	1,353	
Management, business, science, and arts occupations	538	39.8
Service occupations	374	27.6
Natural resources, construction, and maintenance occupations	193	14.3
Sales and office occupations	140	10.3
Production, transportation, and material moving occupations	108	8.0

Table 3-4. Industries of Employed Population in Crockett County[7]

Industry	Estimate	Percent
Civilian employed population 16 years and over	1,353	

[5] U.S. Census Bureau: 2024 American Community Survey 5-Year Estimates Data Profiles.
[6] U.S. Census Bureau: 2024 American Community Survey 5-Year Estimates Data Profiles.
[7] U.S. Census Bureau: 2024 American Community Survey 5-Year Estimates Data Profiles.

Industry	Estimate	Percent
Educational services, health care, and social assistance	461	34.1
Agriculture, forestry, fishing and hunting, and mining	320	23.7
Transportation and warehousing, and utilities	223	16.5
Construction	164	12.1
Other services, except public administration	78	5.8
Professional, scientific, management, administrative, and waste management services	66	4.9
Retail trade	21	1.6
Manufacturing	20	1.5
Arts, entertainment, recreation, accommodation, and food services	0	0.0
Finance and insurance, and real estate and rental and leasing	0	0.0
Public administration	0	0.0
Information	0	0.0
Wholesale trade	0	0.0

NATURAL, CULTURAL, AND HISTORIC RESOURCES

Crockett County covers approximately 2,807 square miles. The terrain is highly varied: the southern and western portions feature deep, narrow, steep-walled canyons and flat mesas, while the northern part consists of broad valleys and flat divides. A large, flat divide in the northeastern section separates the Colorado River and Rio Grande drainage basins.

The surface geology is predominantly Cretaceous. Soils across the County are mostly dark, calcareous, stony clays and clay loams. Vegetation varies by region; the western half of the county is characterized by desert shrub savanna, while the eastern half consists of juniper, oak, and mesquite savanna. Elevations range from about 1,500 feet above sea level in the southwest to 2,800 feet in the northwest. Temperatures range from an average low of 32°F in January to an average high of 96°F in July. The County receives an average of 18 inches of rainfall per year and has a growing season of 233 days.

The Escondido Draw Recreational Area (EDRA), which provides over 100 miles of trails for off-roading, dirt biking, and ATV riding, along with primitive camping and RV sites with hookups. Hunting is another major draw, with several private ranches offering hunting leases or guided packages, with opportunities for deer, quail, turkey, and javelina. Visitors can also enjoy hiking, birdwatching, and nature viewing along short interpretive trails at the Crockett County Interpretive Trail & Visitor Center Park in Ozona or explore the region’s diverse habitats for wildlife and

wildflowers. Stargazing is exceptional due to the dark skies, and scenic drives through the dramatic terrain are popular.

The County also has several notable historic locations that reflect its frontier past and early settlement days. Key sites include Fort Lancaster State Historic Site, located about 30 miles west of Ozona off U.S. 290, where visitors can explore the preserved stone ruins of a U.S. Army fort built in 1855 to protect travelers along the San Antonio–El Paso Road, complete with a visitor center and hiking trails. In Ozona, the limestone Crockett County Courthouse, completed in 1902 in American Gothic style and listed on the National Register of Historic Places, anchors the historic town square, which also features the Davy Crockett Monument and several historical markers. The Crockett County Museum, housed in a former 1926 church building, offers extensive exhibits on local history, including Paleo-Indian artifacts, pioneer life, and ranching heritage.

Crockett County's designated historic buildings and sites preserve its rich history. There are three buildings and sites on the National Register of Historic Places. Historic buildings are vulnerable to natural hazards as their construction pre-dates modern building codes. There are also historic preservation considerations and requirements for historic structures when they are included in mitigation or recovery projects.

Table 3-5. Historic Properties on the National Register[8]

Property Name	Location	Address
Ira and Wilma Carson House	Ozona CDP	1103 Avenue C
Crockett County Courthouse	Ozona CDP	907 Avenue D
Turkey Roost Petroglyph Site	Ozona CDP	Address Restricted

To further understand natural resources that may be vulnerable to a hazard event and those that need consideration when implementing mitigation activities, it is important to identify at-risk species (i.e., endangered species) in the planning area. According to the U.S. Fish and Wildlife Service, as of April 2026, there are six federally endangered, threatened, or candidate species in Crockett County, listed in Table 3-6. The report contains species that are known to or are believed to occur in this county, based on the species' current range, as defined by the USFWS. The definition of current range that the FWS uses is the general geographic area where we know or suspect that a species currently occurs.[9] Additionally, one species is listed as being in recovery (Black-Capped Vireo).

Table 3-6. Endangered Species in Crockett County[10]

Type	Common Name	Scientific Name	Species Status
Birds	Southwestern Willow Flycatcher	Empidonax traillii extimus	Endangered
Clams	Texas Hornshell	Popenaias popeii	Endangered

[8] National Register of Historic Places: https://npgallery.nps.gov/nrhp
[9] U.S. Fish and Wildlife Service: https://ecos.fws.gov/ecp/report/species-listings-by-current-range-county?fips=48105
[10] U.S. Fish and Wildlife Service: https://ecos.fws.gov/ecp/report/species-listings-by-current-range-county?fips=48105

Type	Common Name	Scientific Name	Species Status
Mammals	Tricolored Bat	Perimyotis subflavus	Proposed Endangered
Birds	Rufa Red Knot	Calidris canutus rufa	Threatened
Flowering Plants	Tobusch Fishhook Cactus	Sclerocactus brevihamatus ssp. tobuschii	Threatened
Insects	Monarch Butterfly	Danaus plexippus	Proposed Threatened

CHANGES IN VULNERABILITY

EXISTING LAND USE AND DEVELOPMENT TRENDS

A review of housing can also give a picture of the built environment and the changes in vulnerability to various hazards in a jurisdiction. Table 3-7 lists the total housing units for the County, where data was available, between 2020 and 2024, utilizing 2020 Decennial Census data U.S. Census Bureau 2024 ACS five-year estimates. Between official U.S. Census counts, the estimates use a formula based on the applicable Decennial Census housing units count, new residential construction, new mobile homes, and housing unit loss. The census data "residential construction" category calculates building permits issued utilizing permitted construction counts as well as permit completion rates. Estimates of decreasing housing units are computed by applying an annual loss rate to the housing stock. The rate is then added to an estimate of the number of units lost due to natural disasters. Housing loss rates are derived from prior American Housing Survey (AHS) estimates at the regional level. A unit is counted as lost if a survey was completed in the AHS, but it was listed as a non-response (Type C, 30 - Demolished) in the subsequent survey, indicating a permanent loss to the housing stock.[11] It is simply an estimate, and many variables are involved in achieving an accurate estimation of the number of housing units in a given area at a given time.

Table 3-7. Total Housing Units, 2020–2024[12]

Jurisdiction	Total Housing Units					Change 2020-2024	Percent of Change
	2020	2021	2022	2023	2024		
Crockett County	1,963	1,786	1,855	1,739	1,729	-234	-12

Certain types of housing found in the Crockett County planning area are more vulnerable than typical site-built, newly constructed residential structures. This includes mobile or manufactured homes, of which there are 226 (13 percent of total housing stock) in the planning area. Additionally, single-family residences (SFR) built before 1980 are typically built to lower or less stringent construction standards than newer construction, making these homes more susceptible to damage during hazard events. These older homes comprise approximately 55 percent (952

[11] U.S. Census Bureau: https://www.census.gov/programs-surveys/popest/technical-documentation/methodology.html
[12] U.S. Census Bureau: https://www.census.gov

structures) of housing stock in the planning area. Table 3-8 includes housing inventory data for the County per the 2024 American Community Survey five-year estimates.

Table 3-8. Housing Inventory and Vulnerable Structures[13]

Jurisdiction	Housing Units		
	Total	SFR Built Prior to 1980	Manufactured Homes
Crockett County	1,729	952	226

SUMMARY OF VULNERABILITY TRENDS

The Crockett County planning area experienced an overall population decrease of 17 percent between 2010 and 2020. The American Community Survey estimates the 2024 total housing units for the planning area to be 1,729, or a 12 percent decrease from 2020. The overall population decrease combined with the decrease in housing units, indicates no known increase in vulnerability to all hazards in terms of populations and the built environment (Table 3-9).

Table 3-9. Changes in Vulnerability

Jurisdiction	Population Trend	Housing Trend	Changes in Vulnerability
Crockett County	Decrease	Decrease	No Change

Changes in vulnerability are applicable to all natural hazards except when discussing dam failure, as vulnerability for this hazard is discussed in relation to changes in the estimated inundation areas for profiled dams. For the seven dams profiled in Section 5, there is no known increase in vulnerability in the estimated inundation areas. While flood and wildfire hazards feature geographical boundaries, increases in population and building inventory can increase overall vulnerability for these hazards even when the trends occur outside of the known hazard boundary. Development decreases permeable surface areas and increases runoff, increasing flood risk. As population density increases, the Wildland Urban Interface (WUI) typically increases. WUI growth often results in more wildfire ignitions, which puts more lives and houses at risk.

FUTURE GROWTH AND DEVELOPMENT

To better understand how future growth and development in Crockett County might affect hazard vulnerability, it is useful to consider population growth, occupied and vacant land, the potential for future development in hazard areas, and current planning and growth management efforts.

Population projections from 2020 to 2060 are listed in Table 3-10, provided by the Office of the State Demographer, Texas State Data Center, and the Institute for Demographic and Socioeconomic Research. Projections are based on a mid-migration scenario, which assumes that the U.S. and Texas migration patterns remain similar to the past two decades. The total population growth rate accounts for natural increase (births minus deaths) as well as net

[13] The Housing Inventory and Vulnerable Structures are based off the 2024 American Community Survey 5-Year Estimates Data Profiles.

migration. This information is only available at the county level; however, the projections reflect a decrease in population density, which would indicate no known increase in vulnerability for the County.

Table 3-10. Crockett County Population Projections[14]

Land Area (square miles)	Population									
	2020		2030		2040		2050		2060	
	Total	Density	Total	Density	Total	Density	Total	Density	Total	Density
2,807.32	3,098	1.10	2,534	0.90	2,095	0.75	1,758	0.63	1,565	0.56

Comprehensive Plans are guiding documents in a community that set forth a vision, goals, policies, and guidelines to direct future physical, social, and economic development within a jurisdiction. They are part of a continuous process to provide a sustainable environment for citizens and consider the general desire of the community to conserve, preserve, and protect the natural environment of their jurisdiction. These plans present a future vision, outlining recommendations on growth, community character, infrastructure, land use, economic development, zoning, mobility, and public facilities, while guiding staff, decision-makers, and citizens to weigh choice with an eye toward the future. Crockett County has a Comprehensive Plan in place. Refer to the Capability Assessment in Appendix G for a complete list of the plans, ordinances, and other resources for Crockett County.

[14] Texas Demographic Center: https://demographics.texas.gov/Projections/

Section 4
Risk Overview

SECTION 4: RISK OVERVIEW

HAZARD DESCRIPTION

Section 4 is the first phase of the Risk Assessment, providing background information for the hazard identification process and descriptions of the hazards identified. The Risk Assessment continues with Sections 5 through 17 and Appendix A, which include hazard descriptions and vulnerability assessments.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, Crockett County identified 13 natural hazards that are addressed in the Hazard Mitigation Action Plan Update 2026 and were identified as significant, as shown in Table 4-1. The hazards were identified through input from Planning Team members and a review of the current 2023 State of Texas Hazard Mitigation Plan (State Plan). Readily available online information from reputable sources such as federal and state agencies was also evaluated and utilized to supplement information as needed.

In general, there are five categories of hazards: atmospheric, hydrologic, geologic, technological, and human-caused. Atmospheric hazards are events or incidents associated with weather-generated phenomena. The following have been identified as significant for the planning area: extreme heat, hail, hurricane / tropical storm, lightning, thunderstorm wind, tornado, and winter storm (Table 4-1).

Geologic hazards are events or incidents associated with the earth's crust. The geologic hazards identified as significant for the planning area consist of earthquake and expansive soils.

Hydrologic hazards are events or incidents associated with water-related damage and account for over 75 percent of federal disaster declarations in the United States. Hydrologic hazards identified as significant for the planning area include flood and drought.

Technological hazards refer to the origins of incidents that can arise from human activities, such as the construction and maintenance of dams. They are distinct from natural hazards primarily because they originate from human activity. Human activity may increase or decrease the risks presented by natural hazards; however, they are not inherently human-induced. Therefore, dam failure is classified as a quasi-technological hazard and referred to as "technological" in Table 4-1 for purposes of description.

For the Risk Assessment, wildfire is considered "other" since this hazard is not considered atmospheric, geologic, hydrologic, or technological.

Human-caused hazards are events or incidents caused by human intent, human error, or failed systems. They can be caused or exacerbated by accidental or intentional human actions that

result in the loss of life or property. Appendix A includes the following human-caused hazards: cyber-attack, hazardous materials, pipeline failure, and terrorism.

Table 4-1. Hazard Descriptions

Hazard	Description
Atmospheric	
Extreme Heat	Extreme heat is the condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period of time.
Hail	Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and subsequent cooling of the air mass.
Hurricane / Tropical Storm	A hurricane is an intense tropical weather system of strong thunderstorms with a well-defined surface circulation and maximum sustained winds of 74 mph or higher.
Lightning	Lightning is a sudden electrostatic discharge that occurs during an electrical storm. This discharge occurs between electrically charged regions of a cloud, between two clouds, or between a cloud and the ground.
Thunderstorm Wind	Thunderstorm winds, often referred to as straight-line winds, are produced by severe thunderstorms and can reach speeds exceeding 100 mph. These winds are often caused by downbursts or microbursts, which are powerful columns of air that descend from a storm and spread outward upon hitting the ground. They can cause damage patterns similar to tornadoes but occur without rotation, spreading out in a straight path. Contrastingly, high wind events can occur in the absence of other definable hazard conditions, developing from strong pressure systems or terrain effects and causing similar impacts, especially in exposed or rural areas.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. The destruction caused by tornadoes ranges from light to catastrophic, depending on the location, intensity, size, and duration of the storm.
Winter Storm	Severe winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 mph, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads, and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.
Geologic	
Earthquake	An earthquake is the sudden, rapid shaking of the earth, caused by the breaking and shifting of subterranean rock as it releases strain that has accumulated over a long time. Initial mild shaking may strengthen and become extremely violent within seconds.

Hazard	Description
Expansive Soils	Expansive soils are soils and soft rocks that tend to swell or shrink due to changes in moisture content. Changes in soils volume present a hazard primarily to structures built on top of expansive soils.
Hydrologic	
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality.
Flood	The accumulation of water within a body of water, which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, and shallow flooding.
Other	
Wildfire	A wildfire is an uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase the risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors.
Technological	
Dam Failure	Dam failure is the collapse, breach, or other failure of a dam structure resulting in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream of the dam.

Hazards that were not considered significant and were not included in the Plan Update are located in Table 4-2, along with the evaluation process used for determining the significance of each of these hazards. Hazards not identified for inclusion at this time may be addressed during future evaluations and updates.

Table 4-2. Other Hazards Deferred

Hazard Considered	Reason For Determination
Coastal Erosion	The planning area is not located on the coast. Therefore, coastal erosion does not pose a risk.
Land Subsidence	The planning area has no historical land subsidence occurrences and is in an area where occurrences are considered rare. Land subsidence has not impacted critical structures, systems, populations, or other community assets or vital services in the past, and none is expected in the future.

DISASTER DECLARATION HISTORY

One method of understanding hazards that pose a risk to Crockett County is to identify past hazard events that triggered federal or state disaster declarations. Federal and state declarations may be granted when the severity and magnitude of an event surpass the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. Table 4-3 lists state and federal disaster declarations received by Crockett County. Many of the disaster events were regional or statewide.

Between 1953 and April 2026, Crockett County received 12 federal disaster declarations. Out of the 12 federally declared disasters, the largest share (5) was related to fire, followed by declarations for severe ice storms (2), biological (2), drought (1), hurricane (1),and severe storms (1).

Table 4-3. Disaster Declaration History of Crockett County, 1953 - April 2026[1]

Year	Declaration Title	Hazard	Declaration Type	Disaster No.
1993	Extreme Fire Danger	Drought	EM	3113
1998	Tropical Storm Charley	Severe Storm	DR	1239
1999	Extreme Fire Hazards	Fire	EM	3142
2005	Hurricane Katrina Evacuation	Hurricane	EM	3216
2006	Extreme Wildfire Threat	Fire	DR	1624
2008	Wildfires	Fire	EM	3284
2011	Wildfires	Fire	DR	1999
2011	Wildfires	Fire	DR	4029
2020	Covid-19	Biological	EM	3458
2020	Covid-19 Pandemic	Biological	DR	4485
2021	Severe Winter Storm	Severe Ice Storm	EM	3554
2021	Severe Winter Storms	Severe Ice Storm	DR	4586

In addition to the 12 federally declared disasters, there have been 42 U.S. Department of Agriculture (USDA) Secretarial disaster designations between 2012 and 2025. The Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans available to producers suffering losses in those counties and in counties that are contiguous to a designated county.[2] Many of the 42 USDA designations for Crocket County listed multiple factors that caused the disaster area designation. The leading cause was drought, which was included

[1] FEMA: https://www.fema.gov/openfema-data-page/disaster-declarations-summaries-v2

[2] United States Department of Agriculture: https://www.fsa.usda.gov/resources/disaster-assistance-program/disaster-designation-information

in 40 designations. Other factors listed include excessive heat (13 designations), high winds (12), fire/wildfire (12), insects (12), excessive rain (1), and flood (1).

NATURAL HAZARDS AND CLIMATE CHANGE

Climate change is defined as a long-term shift in temperature and weather patterns. These shifts can increase or decrease the risk of natural hazards. Global climate change is expected to exacerbate the risks of certain types of natural hazards impacted by rising sea levels, warmer ocean temperatures, higher humidity, the possibility of stronger storms, and an increase in wind and flood damage due to storm surges. Texas is considered one of the more vulnerable states in the U.S. to both abrupt climate changes and the impact of gradual climate changes on the natural and built environments.

Climate change is expected to lead to an increase in average temperatures as well as an increase in the frequency, duration, and intensity of extreme heat events. With no reductions in emissions worldwide, the state of Texas is projected to experience an additional 30 to 60 days per year above 100°F than what is experienced now.[3]

The State Climatologist's *Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036* identifies ongoing and likely future trends through 2036 based on analysis of historical observations of temperatures, precipitation, and extreme weather. Table 4-4 highlights future trends in extreme weather from the report.

Table 4-4. Future Trends in Extreme Weather in Texas[4]

Hazards	Expected Trends
Extreme Temperatures	• The average annual surface temperature in 2036 is expected to be 3.0°F warmer than the 1950-1999 average and 1.8°F warmer than the 1991-2020 average. • The number of 100°F days is projected to double by 2036, with urban areas experiencing a higher frequency due to the urban heat island effect. • Fewer cold extremes and warmer minimum temperatures are projected, suggesting a continued decrease in freezing conditions and frost days, as well as a warming trend for the coolest days of summer. • The number of heatwaves per year and number of days per year classified as heatwaves are expected to increase. • Data suggests a recent increase in both the severity and frequency of extreme heat, while extreme cold has decreased in both aspects.

[3] Kloesel, K., B. Bartush, J. Banner, D. Brown, J. Lemery, X. Lin, C. Loeffler, G. McManus, E. Mullens, J. Nielsen-Gammon, M. Shafer, C. Sorensen, S. Sperry, D. Wildcat, and J. Ziolkowska, 2018: Southern Great Plains. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 987–1035. doi: 10.7930/NCA4.2018.CH23. https://nca2018.globalchange.gov/chapter/23/

[4] Nielsen-Gammon, John, Holman, Sara, Buley, Austin and Jorgensen, Savannah. Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, 2021 Update. Texas A&M University Office of the Texas State Climatologist. October 7, 2021. https://climatexas.tamu.edu/files/ClimateReport-1900to2036-2021Update

Hazards	Expected Trends
Precipitation	• Precipitation has increased by 10 percent or more in eastern Texas, but no significant trends are evident in western Texas. • Natural variability will substantially influence precipitation trends through 2036. • Extreme precipitation has already intensified by about 7 percent from 1960 to 2020 and is projected to continue increasing statewide—by 6-10 percent in intensity relative to 1950–1999 (2-3 percent relative to 2001–2020), and by 30-50 percent in frequency compared to 1950–1999 (10-15 percent compared to 2001–2020).
Drought	• Projected increases in temperature, rainfall variability, and other factors—such as improved plant water use efficiency—collectively indicate a decrease in water availability; however, the extent of this impact varies significantly across regions and applications. • Sector-based variance in impact trends is expected, with agricultural areas potentially experiencing less impact than surface water supply.
Flood	• Observational data suggests no long-term trend in river flooding, and this remains consistent for current projections, barring areas with normally high rainfall or for the most extreme flood events. • Urban flooding is projected to increase due to both population growth and rising precipitation intensity, particularly in areas with fast-response drainage systems. • The climate-driven trend in urban flood frequency should be similar to the climate-driven trend in extreme precipitation frequency: 30-50 percent in 2036 relative to 1950-1999 and 10-15 percent relative to 2001-2020. • Areas already experiencing flooding are likely to see an increase in the frequency and magnitude of events.
Winter Weather	• As the climate warms, the likelihood of winter weather decreases. • Widespread snowfall events in Texas, such as the one in February 2021, remain extremely rare and have not shown an increase in frequency. However, with rising air temperatures, a decrease in both the frequency and intensity of such events is expected—reducing the overall snow hazard. • Extreme cold has become less frequent and less severe overall but is subject to more variation than other temperate extremes, thus, massively cold temperatures will continue to be possible.
Thunderstorms (Wind, Hail, Lightning)	• The evolution of reporting methods and magnitude scales, along with inconsistencies in observational data, has resulted in the absence of reliable, comprehensive records—limiting the ability to project trends and necessitating the use of indirect indicators. • Indirect evidence supports an increase in the number of days capable of producing severe thunderstorms and very large hail; however, a substantial basis to quantify these trends remains lacking.

Hazards	Expected Trends
Wildfire	• Reductions in precipitation, rising temperatures, increased surface dryness, stronger winds, lower humidity, and higher fuel loads are projected to vary in intensity across different regions of Texas, leading to non-uniform increases in wildfire risk. • The geographical boundaries of the area of the state commonly affected may expand.

OVERVIEW OF HAZARD ANALYSIS

The methodologies utilized to develop the Risk Assessment are a historical analysis and a statistical approach. Both methodologies provide an estimate of potential impact by using a common, systematic framework for evaluation.

Records for Crockett County were retrieved from the National Centers for Environmental Information (NCEI) and the National Oceanic and Atmospheric Administration (NOAA) databases. These records were analyzed to identify the occurrence of hazard events in the planning area and the maximum recorded magnitude of each event. Geographic information system (GIS) technology was also used to identify and assess risks and evaluate community assets and their spatial vulnerability to hazards.

The four general parameters that are described for each hazard in the Risk Assessment include frequency of return, approximate annualized losses, a description of general vulnerability, and a statement of the hazard's impact.

The frequency of return was calculated by dividing the number of events in the recorded time period for each hazard by the overall time period that the resource database was recording events. Frequency of return statements are defined in Table 4-5, and impact statements are defined in Table 4-6 below.

Table 4-5. Frequency of Return Statements

Probability	Description
Highly Likely	Event is probable in the next year.
Likely	Event is probable in the next three years.
Occasional	Event is probable in the next five years.
Unlikely	Event is probable in the next ten years.

Table 4-6. Impact Statements

Potential Severity	Description
Substantial	Multiple deaths. Complete shutdown of facilities for 30 days or more. More than 50 percent of property destroyed or with major damage.
Major	Injuries and illnesses resulting in permanent disability. Complete shutdown of critical facilities between one and four weeks. More than 25 percent of property destroyed or with major damage.

Potential Severity	Description
Minor	Injuries and illnesses do not result in permanent disability. Complete shutdown of critical facilities for up to one week. More than 10 percent of property destroyed or with major damage.
Limited	Injuries and illnesses are treatable with first aid. Shutdown of critical facilities and services for 24 hours or less. Less than 10 percent of property destroyed or with major damage.

Each of the hazard profiles includes a description of a general Vulnerability Assessment. Vulnerability refers to the total assets that are subject to damage from a hazard based on historic recorded damages. Assets in the region were inventoried and defined in hazard zones where appropriate. The total amount of damage, including property and crop damages, for each hazard is divided by the total number of assets (building value totals) in that community to determine the percentage of damage that each hazard can cause to the community. Risk and consequences will be addressed and covered within each hazard profile under the Vulnerability and Impact section as well as under the Assessment of Impact sections, where applicable.

To better understand how future growth and development in Crockett County might affect hazard vulnerability, it is useful to consider population growth, occupied and vacant land, the potential for future development in hazard areas, and current planning and growth management efforts. Hazard vulnerability for Crockett County was reviewed based on recent development changes that occurred throughout the planning area. The population of Crockett County has decreased by 17 percent between 2010 and 2020, according to the U.S. Census Bureau. Therefore, the vulnerability to the population, infrastructure, and buildings has no notable increase for hazards that do not have a geographical boundary.

Once loss estimates and vulnerability were known, an impact statement was applied to relate the potential impact of the hazard on the assets within the area of impact.

HAZARD RANKING

During the 2025 planning process, the Planning Team conducted a risk ranking exercise to get input from the Planning Team and stakeholders. Table 4-7 portrays the results of the risk assessment analysis, including the frequency of occurrence, potential severity, and the Planning Team's self-assessment for hazard ranking based on local knowledge of past events and impacts for each identified hazard. The definitions for frequency of occurrence and potential severity can be found in Table 4-5 and Table 4-6.

Table 4-7. Hazard Risk Ranking

Hazard	Frequency of Occurring	Potential Severity	Ranking
Drought	Highly Likely	Minor	High
Extreme Heat	Highly Likely	Limited	High
Lightning	Highly Likely	Limited	High
Thunderstorm Wind	Highly Likely	Limited	High

Hazard	Frequency of Occurring	Potential Severity	Ranking
Wildfire	Highly Likely	Limited	High
Winter Storm	Highly Likely	Substantial	High
Flood	Highly Likely	Limited	Moderate
Hail	Highly Likely	Limited	Moderate
Tornado	Occasional	Limited	Moderate
Earthquake	Unlikely	Limited	Low
Expansive Soils	Highly Likely	Limited	Low
Hurricane/ Tropical Storm	Unlikely	Limited	Low

RISK ASSESSMENT RESOURCES AND DATA LIMITATIONS

The risk and vulnerability assessment relies heavily on the content of the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) Storm Events Database. This database covers weather-related hazards that affect the planning area and that are profiled in this Plan Update including winter weather (extreme cold and winter storm), drought, hail, lightning, thunderstorm wind, flood, extreme heat, hurricane / tropical storm, and tornado. Other hazards were analyzed using databases containing more comprehensive historical data specific to Texas such as the Texas A&M Forest Service (TFS) for wildfires, the United States Geological Survey for earthquakes, and the Texas Geological Survey for expansive soil hazards. Historical dam incidents, including failures, were researched through the Association of State Dam Safety Officials database.

The NCEI Storm Events Database is a rich centralized repository of nationwide weather-related hazard events. Among other things, it is the source used by NOAA to populate its monthly storm data publication. The database contains recorded weather events of significance based on a range of potential criteria including intensity, duration, damages, injuries, or other noteworthy events. The history of data available in the NCEI database allows the study of impacts of individual hazards over an extended period of time. This data contributes to the framework for understanding relative risks over time.

While the NCEI is considered one of the most comprehensive national historical event databases, it is not without limitations. Records of historical occurrences in the state show significant variations in the number of events recorded from one county to the next. Further research shows that the variations are more attributable to under-reporting of events than variations in weather occurrences. Only the events that have been reported in the database are factored into the risk assessment when no other reliable resources are available. It is accurate to assume that additional natural hazard occurrences have gone unreported or have been underreported. The risk assessment in this Plan Update is considered the baseline for estimating potential future losses and frequency of events, which are assumed to be the minimum the planning area can

anticipate. Additionally, significant events may be reported by both the county and local jurisdictions. This is due to reports from various locations impacted by a given event.

Finally, damages are not reported for the majority of events recorded in the NCEI, as property damage estimates are not always available. Natural hazard event damages are often covered by private insurance, and statistical insurance data is not readily available in the public domain. The National Weather Service (NWS) regional forecast coordinators utilize the resources available to them to describe damages or impacts of events. However, local input is key to assigning damages to historical events.

ASSUMPTIONS

Event data is often reported at the county level only. This is primarily due to the nature of most natural hazards impacting areas larger than a single municipality. Winter storms or extreme heat, for example, impact large regions and are not confined to a single location. NWS regional coordinators typically gather event data from countywide or regional reporting and record it accordingly. Some exceptional events are captured by NWS regional coordinators when the impact of the event is severe or catastrophic. However, most events recorded at the municipality level are conveyed by local officials. Event data at the municipality level is often limited as a result. Due to the more robust reporting at the county level and limited reporting at the local level, summary vulnerability statements are formulated using both local and countywide event data. These vulnerability assessments assume that events impacting the county similarly impact the jurisdictions within that county. Therefore, the countywide assessment is considered similar for all participating jurisdictions unless stated otherwise. Future risk and vulnerability assessments at the local, county, and state levels will benefit significantly from increased, detailed event reporting.

Section 5
Dam Failure

SECTION 5: DAM FAILURE

Section 5 is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

Section 6
Drought

SECTION 6: DROUGHT

HAZARD DESCRIPTION

Drought is a period of unusually persistent dry weather that persists long enough to cause serious problems such as crop damage and/or water supply shortages. The severity of the drought depends upon the degree of moisture deficiency, the duration, and the size of the affected area. Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Droughts can be classified as meteorological, hydrologic, agricultural, and socioeconomic. Table 6-1 presents definitions for these different types of droughts.

Droughts are one of the most complex of all natural hazards as it is difficult to determine their precise beginning or end. In addition, droughts can create ideal conditions for other hazards such as extreme heat and wildfires. Their impact on wildlife and area farming is enormous, often killing crops, grazing land, edible plants, and even in severe cases, trees. A secondary hazard to drought is wildfire because dying vegetation serves as a prime ignition source. Therefore, a heat wave combined with a drought is a very dangerous situation.

Table 6-1. Drought Classification Definitions[1]

Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural Drought	Soil moisture deficiencies relative to water demands of plant life, usually crops.
Socioeconomic Drought	The effect of demands for water exceeding the supply as a result of a weather-related supply shortfall.

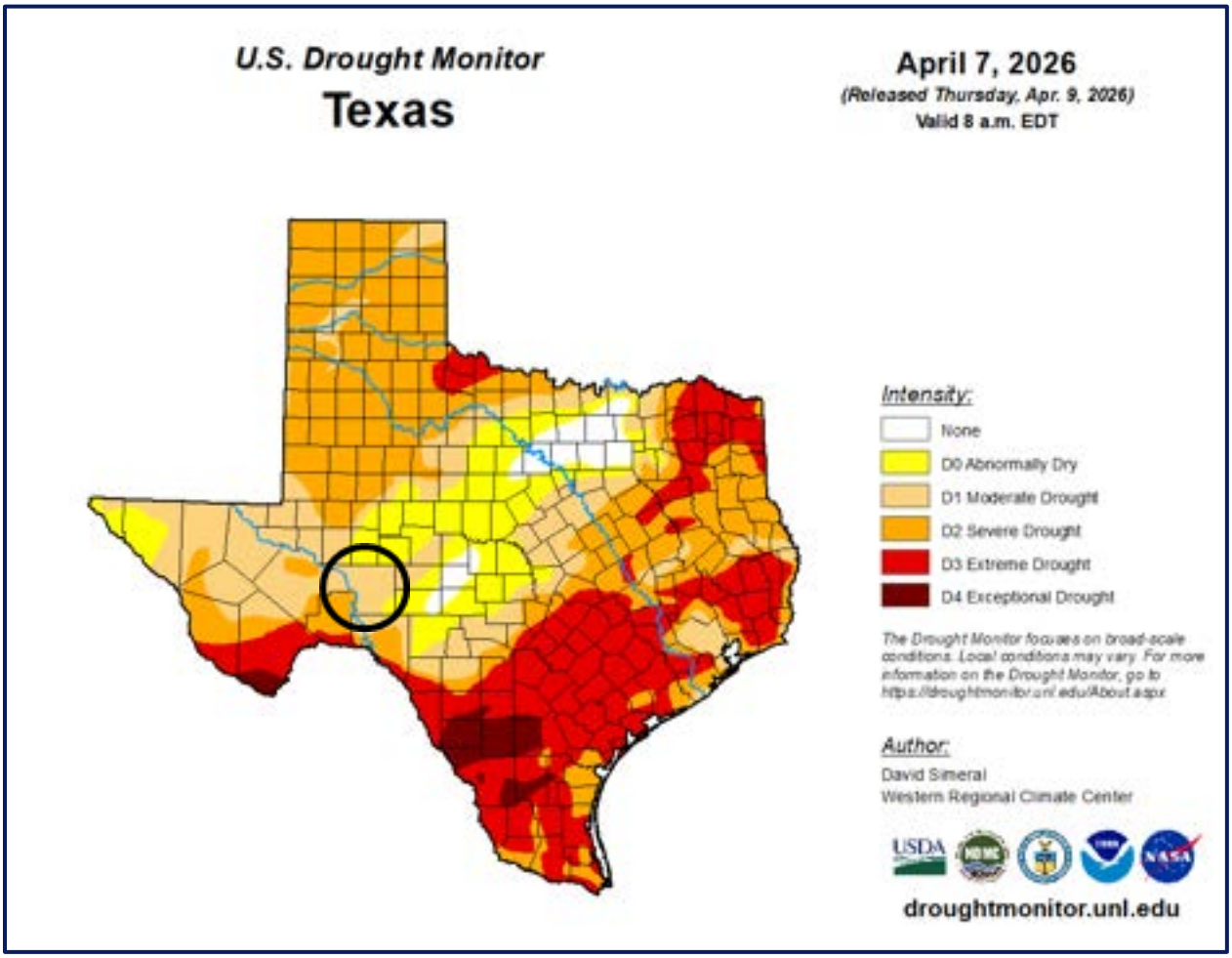
LOCATION

Droughts occur regularly throughout Texas, including the Crockett County planning area and are considered a normal condition. However, they can vary greatly in their intensity and duration. The U.S. Drought Monitor, produced through a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, U.S. Department of Agriculture and the National

[1] Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, FEMA

Oceanic and Atmospheric Administration, shows the planning area is currently experiencing abnormally dry to moderate drought conditions (Figure 6-1) but has experienced the full range of conditions from normal (none) to exceptional drought conditions over the last decade (Figure 6-2). There is no distinct geographic boundary to drought; therefore, it can occur anywhere throughout the Crockett County planning area.

Figure 6-1. U.S. Drought Monitor, April 2026



EXTENT

The Palmer Drought Index is used to measure the extent of drought by measuring the duration and intensity of long-term drought-inducing circulation patterns. Long-term drought is cumulative, with the intensity of drought during the current month dependent upon the current weather patterns plus the cumulative patterns of previous months. The hydrological impacts of drought (e.g., reservoir levels, groundwater levels, etc.) take longer to develop. Table 6-2 depicts magnitude of drought, while Table 6-3 describes the classification descriptions.

Table 6-2. Palmer Drought Index

Drought Index	Drought Condition Classifications						
	Extreme	Severe	Moderate	Normal	Moderately Moist	Very Moist	Extremely Moist
Z Index	-2.75 and below	-2.00 to -2.74	-1.25 to -1.99	-1.24 to +.99	+1.00 to +2.49	+2.50 to +3.49	N/A
Meteorological	-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above
Hydrological	-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above

Table 6-3. Palmer Drought Category Descriptions[2]

Category	Description	Possible Impacts	Palmer Drought Index
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures; fire risk above average. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.	-1.0 to -1.9
D1	Moderate Drought	Some damage to crops, pastures; fire risk high; streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested.	-2.0 to -2.9
D2	Severe Drought	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed.	-3.0 to -3.9
D3	Extreme Drought	Major crop/pasture losses; extreme fire danger; widespread water shortages or restrictions.	-4.0 to -4.9
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells, creating water emergencies.	-5.0 or less

[2] Source: National Drought Mitigation Center

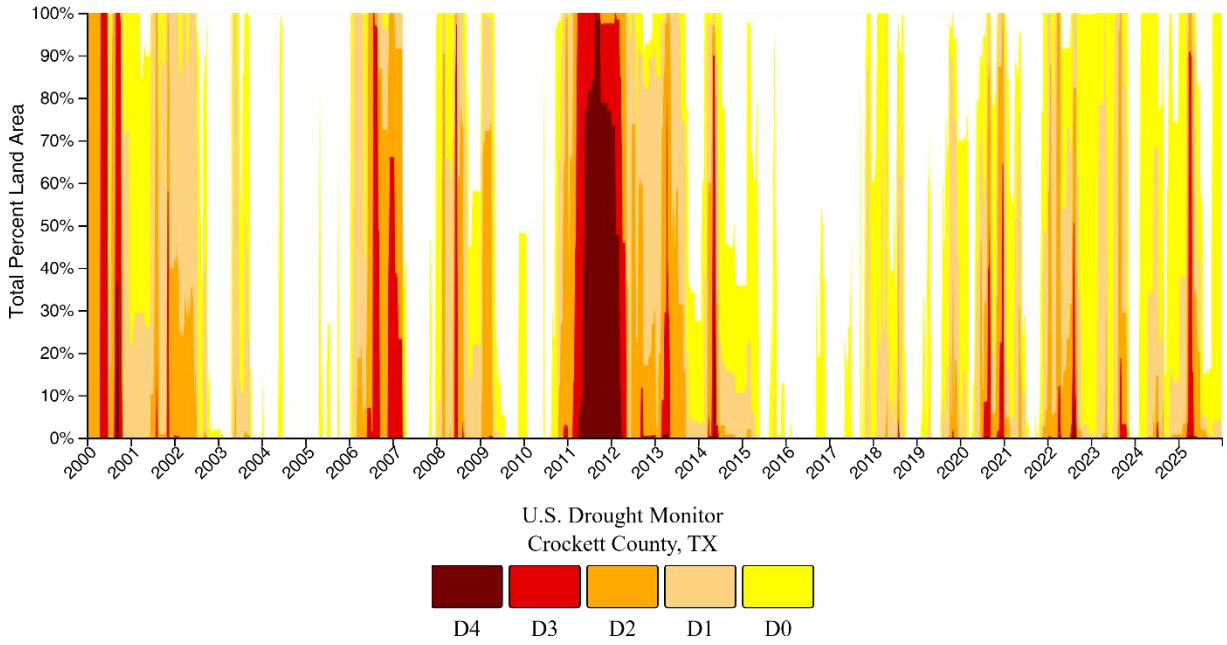
SECTION 6: DROUGHT

Drought is monitored nationwide by the National Drought Mitigation Center (NDMC). Indicators are used to describe broad scale drought conditions across the U.S. and correspond to the intensity of drought. Based on the historical occurrences for drought and the location of the Crockett County planning area, the area can anticipate the full range of drought from abnormally dry to exceptional drought, or D0 to D4, based on the Palmer Drought Category. Exceptional drought (D4) is the highest level of drought severity and the most extreme drought conditions the planning area can anticipate in the future.

HISTORICAL OCCURRENCES

The Crockett County planning area may experience an extreme drought in any given year. According to the U.S. Drought Monitor, between January 1996 and June 2025, the Crockett County planning area spent 1,049 weeks (78%) in some level of drought as defined as Abnormally Dry (D0) or worse conditions. The longest drought during this period lasted for just over 4 years and 8 months. Crockett County has received 40 USDA disaster designations for drought from 2012 through 2024.

Figure 6-2. Crockett County Drought Intensity, 2000–2025[3]



Historical damaging events in Crockett County have been documented using data from the National Centers for Environmental Information Storm Events Database (NCEI). From January 1996 through June 2025, Crockett County experienced 16 unique drought periods, in which 62 drought impacts were reported. Over this 29.5-year period, these historical drought impacts have resulted in $446,200 (2026 dollars) in crop damages for the Crockett County planning area.

[3] U.S. Drought Monitor

SECTION 6: DROUGHT

Historical drought information shows drought activity across a multi-county forecast area for each event, the appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event. Historical drought data is provided on a county-wide basis per the NCEI Storm Events database. A summary of historical drought events is provided in Table 6-4.

Table 6-4. Historical Drought Events Summary, January 1996–June 2025

Jurisdiction	Drought Impacts	Injuries	Deaths	Property Damage	Crop Damage
Crockett County	62	0	0	$0	$446,200

Based on historical drought events for the Crockett County planning area, 9 unique drought periods were reported since the 2012 plan.

SIGNIFICANT EVENTS

August 2010 – May 2015

As the Crockett County planning area began to receive less precipitation in Augst 2010, drought conditions weren't too far behind. By October, the planning area was fully experiencing abnormally dry (Stage D0) drought conditions. As the fall continued, so did these dry conditions. The fall of 2010 was a very dry fall with very little rainfall. Although the planning area received some small rainfall in December 2010, it wasn't really enough to help with drought conditions. By the end of December, the planning area was experiencing severe (D2) drought conditions. These same conditions continued throughout the rest of the winter. After receiving little to no rainfall during the first few months of 2011, the planning area saw the impacts as they began to experience extreme (D3) drought conditions by March. As the strong La Nina event continued, it caused these drought conditions to expand across West Central Texas. As spring continued, so did the La Nina pattern. As a result, the planning area started to see exceptional (D4) drought conditions by May. This drought period continued over the course of nearly 5 years for some Texas counties, which is the longest period the State of Texas has experienced. Crockett County's consecutive drought period was approximately 4 months less than the event of record. During this period, lots of crops and livestock were lost. This was also the worst drought period Texas had experienced.

PROBABILITY OF FUTURE EVENTS

According to the U.S. Drought Monitor, 16 unique drought periods (ranging from nine weeks to about 4 years and 8 months in duration) occurred over a 29.5-year reporting period, which provides a return interval of approximately one event every year. This frequency supports a "Highly Likely" probability of future events for the Crockett County planning area.

CLIMATE CHANGE CONSIDERATIONS

With the range of factors influencing drought conditions, it is impossible to make quantitative statewide projections of drought trends; however, many factors point toward increased drought severity. Drought will continue to be driven largely by precipitation variability over multiple decades, with long-term precipitation trends expected to be relatively small. Other factors

affecting drought impacts, such as increased temperatures and improved plant water use efficiency, can affect water availability. These impacts could cause drought impact trends to be highly sector-specific, with the impacts possibly smaller for agriculture than for surface water supply.[4]

It is projected that future changes to Crockett County will include increased temperatures, which according to the U.S. Climate Explorer, the planning area may experience a 6°F increase in average extreme heat temperatures. Historically, extreme temperatures averaged 100°F in Crockett County, but between 2035 and 2064 the average will be 106°F, increasing the severity and frequency of drought events. Some projections show an even higher increase; however, the severity will be dependent on overall future emissions and is subject to change.

VULNERABILITY AND IMPACT

Loss estimates were based on 29.5 years of statistical data from the NCEI and the U.S. Drought Monitor. A drought event frequency-impact was then developed to determine an impact profile on agriculture products and estimate potential losses due to drought in the area. All existing and future buildings, facilities, and populations are exposed to this hazard and could potentially be impacted. However, drought impacts are mostly experienced in water shortages, breaks in water lines, or crop and livestock losses on agricultural lands and typically have minimal impact on buildings.

The Crockett County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by drought events. For a comprehensive list, please see Appendix D.

Table 6-5. Critical Facilities Vulnerable to Drought Events

Critical Facilities	Potential Impacts
Emergency Response Services (EOC, Fire, Police, EMS, Hospitals)	• Increased law enforcement activities may be required to enforce water restrictions. • Firefighters may have limited water resources to aid in firefighting and suppression activities, increasing risk to lives and property. • Potential for increased number of emergency calls as drought events can lead to cascading hazard events such as wildfires and flash flooding.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters, Governmental Facilities	• Strain on staff as drought may cause health problems related to low water flows and poor water quality. • Water main breaks due to soil shrinking and swelling cycles could lead to facility closures. • Building foundations may crack due to soil shrinking and swelling cycles.

[4] Cleaveland, M. K., T. H. Votteler, D. K. Stahle, R. C. Casteel, and J. L. Banner, 2011: Extended Chronology of Drought in South Central, Southeastern and West Texas. Texas Water Journal, 2, 54-96, as cited in as cited in Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.

Critical Facilities	Potential Impacts
	• Operations dependent on water supply may be adversely impacted. • Economic disruptions due to cracked foundations and infrastructure damages as a result of soil shrinking and swelling cycles.
Commercial Suppliers (food, gas, etc.)	• Operations dependent on water supply may be adversely impacted. • Economic disruptions due to cracked foundations and infrastructure damages as a result of soil shrinking and swelling cycles.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Potential for increased number of emergency calls as drought events can lead to cascading hazard events such as wildfires and flash flooding. • Water main breaks due to soil shrinking and swelling cycles could lead to facility closures. • Operations dependent on water supply may be adversely impacted.

Even with the planning area relying on multiple water utility providers as well as local and private service, high demand can still deplete these resources during extreme drought conditions. As resources are depleted, potable water is in short supply and overall water quality can suffer, elevating health concerns for all residents but especially vulnerable populations – typically children, the elderly, and the ill. In addition, potable water is used for drinking, sanitation, patient care, sterilization, equipment, heating and cooling systems, and many other essential functions in medical facilities.

The average person will survive only a few days without potable water, and this timeframe can be drastically shortened for those people with more fragile health – typically children, the elderly, and people with disabilities. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

The population over 65 in the Crockett County planning area is estimated at 19 percent of the total population and children under the age of 5 are estimated at 1 percent. The population with a disability is estimated at 17 percent of the total population. An estimated 9 percent of the planning area population live below the poverty level and 10 percent of the populations speak English “less than very well” (Table 6-6).

Table 6-6. Populations at Greater Risk[5]

Jurisdiction	Population				
	65 and Older	Under 5	With a Disability	Below Poverty Level	Limited English Speaking
Crockett County	537	36	491	262	295
Ozona CDP	492	0	491	214	290

The planning area is also vulnerable to food shortages when drought conditions exist, and potable water is in short supply. Potable water is used for drinking, sanitation, patient care, sterilization, equipment, heating and cooling systems, and many other essential functions in medical facilities. All residents in the Crockett County planning area could be adversely affected by drought conditions, which could limit water supplies and present health threats.

The economic impact of droughts can be significant as they produce a complex web of impacts that spans many sectors of the economy and reach well beyond the area experiencing physical drought. This complexity exists because water is integral to our ability to produce goods and provide services. If droughts extend over several years, the direct and indirect economic impact can be significant.

Crockett County has a prominent agricultural sector and features 275 farms over 1,768,834 acres of land including sheep, goats, wool, mohair, milk, cattle and calves. Crockett County's annual market value of agricultural products sold is over $30,654,000. An estimated 91 percent of sales are from livestock and poultry products and an estimated 9 percent of sales are from crops. Most of the county's agriculture sales are grains, oilseeds, dry beans, and dry peas.[6] A lactating dairy cow will consume 30 to 50 gallons of water a day. The average adult beef cow requires approximately 12 gallons of water a day. Drought can negatively affect nutrition sources, milk production, and future yields. Dry pastures lead to lower quality hay and increased fire danger. Decreases in feed availability can lead to overgrazing. Heat stress can decrease milk production in dairy cattle. Prolonged drought periods could have devastating impacts on the agricultural industry across the planning area.

Impacts of past droughts experienced in the Crockett County planning area have resulted in no reported fatalities, injuries, or property damages. Historical crop losses due to drought are significant for the planning area over the 29.5-year reporting period, supporting a "Minor" severity of impact meaning crop losses between 10 and 25 percent of the annual yield during prolonged droughts. The annualized estimated losses due to drought over the 29.5-year reporting period in the Crockett County planning area is $15,100 (2026 dollars), though recorded damages are considered underreported. Table 6-7 shows annualized exposure.

[5] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.
[6] Census of Agriculture. Crockett County, Texas County Profile. 2022.

Table 6-7. Estimated Annualized Losses for Crockett County

Jurisdiction	Total Property & Crop Loss (2026 dollars)	Annual Loss Estimates (2026 dollars)
Crockett County	$446,200	$15,100

ASSESSMENT OF IMPACTS

The Drought Impact Reporter was developed in 2005 by the University of Nebraska-Lincoln to provide a national database of drought impacts. Droughts can have an impact on agriculture, business and industry; energy; fire; plants and wildlife; relief, response, and restrictions; society and public health; tourism and recreation; and water supply and quality. The reports are submitted from individuals to Federal, State, and local agencies, as well as the general public. Table 6-8 lists the drought impacts to Crockett County from January 2005 to June 2025 based on reports received by the Drought Impact Reporter.

Table 6-8. Drought Impacts, January 2005–June 2025

Drought Impacts	
Agriculture	117
Business & Industry	3
Energy	0
Fire	20
Plants & Wildlife	86
Relief, Response, & Restrictions	16
Society & Public Health	17
Tourism & Recreation	2
Water Supply & Quality	20

Drought has the potential to impact people in the Crockett County planning area. While it is rare that drought, in and of itself, leads to a direct risk to the health and safety of people in the U.S., severe water shortages could result in inadequate supply for human needs. Based on historical population trends, the Crockett County population is projected to decrease. Future growth can cause concern for the current water infrastructure and demand for the planning area. Severe drought conditions can be frequently associated with a variety of impacts, including:

- Dry clay soils can lead to water main lines shifting and breaking. Often repair to water lines includes shutting off water to multiple homes at one time.
- The number of health-related low-flow issues (e.g., diminished sewage flows, increased pollution concentrations, reduced firefighting capacity, and cross-connection contamination) will increase as the drought intensifies.
- Public safety from forest/range/wildfires will increase as water availability and/or pressure decreases.

- Respiratory ailments may increase as the air quality decreases.
- There may be an increase in disease due to wildlife concentrations (e.g., rabies, Rocky Mountain spotted fever, Lyme disease).
- Residents may disagree with the County over water use/water rights, creating conflict.
- Political conflicts may increase between municipalities, counties, states, and regions.
- Water management conflicts may arise between competing interests.
- Increased law enforcement activities may be required to enforce water restrictions.
- Severe water shortages could result in inadequate supply for human needs as well as lower quality of water for consumption.
- Firefighters may have limited water resources to aid in firefighting and suppression activities, increasing risk to lives and property.
- During drought there is an increased risk for wildfires and dust storms.
- The community may need increased operational costs to enforce water restriction or rationing.
- Prolonged drought can lead to increases in illness and disease related to drought.
- Utility providers can see decreases in revenue as water supplies diminish.
- Utilities providers may cut back energy generation and service to their customers to prioritize critical service needs.
- Hydroelectric power generation facilities and infrastructure would have significantly diminished generation capability. Dams simply cannot produce as much electricity from low water levels as they can from high water levels.
- Fish and wildlife food and habitat will be reduced or degraded over time during a drought and disease will increase, especially for aquatic life.
- Wildlife will move to more sustainable locations creating higher concentrations of wildlife in smaller areas, increasing vulnerability, and further depleting limited natural resources.
- There are 6 federally endangered, threatened or candidate species in Crockett County. Severe and prolonged drought can result in the reduction of a species or cause the extinction of a species altogether.
- Plant life will suffer from long-term drought. Wind and erosion will also pose a threat to plant life as soil quality will decline. The urban tree canopy, including county parks, are vulnerable to the impacts of prolonged drought.
- Dry and dead vegetation will increase the risk of wildfire.
- Drought poses a significant risk to annual and perennial crop production and overall crop quality leading to higher food costs.
- Drought-related declines in production may lead to an increase in unemployment.
- Drought may limit livestock grazing resulting in decreased livestock weight, potential increased livestock mortality, and increased cost for feed.
- Negatively impacted water suppliers may face increased costs resulting from the transport water or developing supplemental water resources.
- Long term drought may negatively impact future economic development.

The overall extent of damage caused by periods of drought is dependent on its extent and duration. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a drought event.

Section 7
Earthquake

SECTION 7: EARTHQUAKE

HAZARD DESCRIPTION

An earthquake is the sudden movement of the Earth's surface caused by the release of stress accumulated within or along the edge of the Earth's tectonic plates, volcanic eruption, or by a manmade explosion. The majority of earthquakes occur along faults; however, earthquakes can occur within plate interiors. Over geologic time, plates move and plate boundaries change, pushing weakened boundary regions to the interior part of the plates. These areas of weakness within the continents can cause earthquakes in response to stresses that originate at the edges of the plate or in the deeper crust.

Earthquake locations are described by the focal depth and geographic position of the epicenter. The focal depth of an earthquake is the depth from the Earth's surface to the region where an earthquake's energy originates (the focus or hypocenter). The epicenter is the point on the Earth's surface directly above the hypocenter. Earthquakes usually occur without warning, with their effects impacting great distances away from the epicenter.

According to the U.S. Geological Society (USGS) Earthquake Hazards Program, an earthquake hazard is anything associated with an earthquake that may influence an individual's normal activities. Table 7-1 describes definition of examples.

Table 7-1. Definitions of Earthquake Hazards[1]

Hazard	Description
Surface Faulting	Displacement that reaches the earth's surface during slip along a fault. Commonly occurs with shallow earthquakes, those with an epicenter less than 20 kilometers.
Ground Motion (shaking)	The movement of the earth's surface from earthquakes or explosions. Ground motion or shaking is produced by waves that are generated by sudden slip on a fault or sudden pressure at the explosive source and travel through the earth and along its surface.
Landslide	A movement of surface material down a slope.
Liquefaction	A process by which water-saturated sediment temporarily loses strength and acts as a fluid, like when you wiggle your toes in the wet sand near the water at the beach. This effect can be caused by earthquake shaking.
Tectonic Deformation	A change in the original shape of a material due to stress and strain.

[1] Source: USGS, 2012

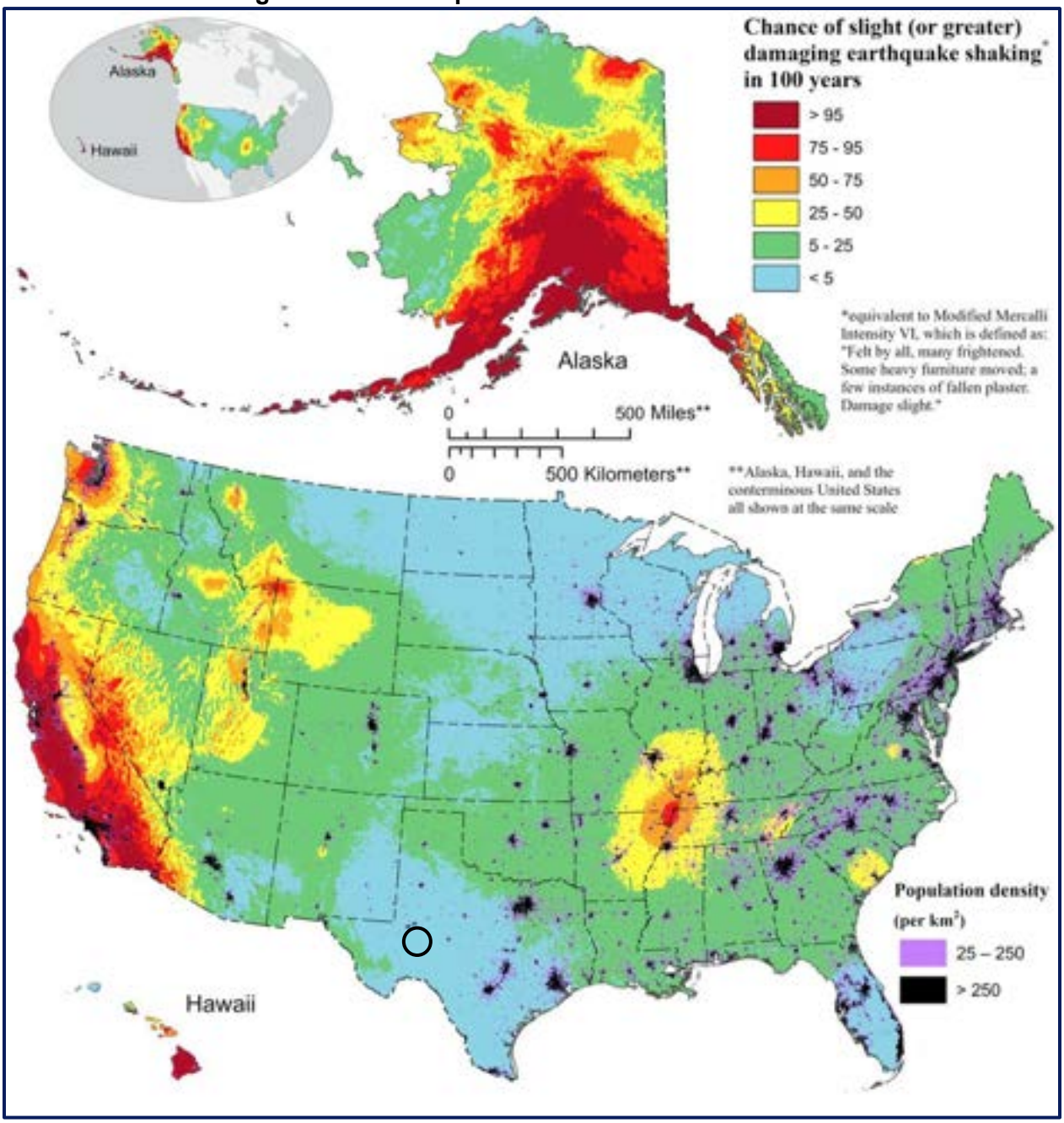
Hazard	Description
Tsunami	A sea wave of local or distant origin that results from large-scale seafloor displacements associated with large earthquakes, major submarine slides, or exploding volcanic islands.
Seiche	The sloshing of a closed body of water from earthquake shaking.

LOCATION

Earthquake hazard areas are mapped by the USGS's National Seismic Hazard Model (NSHM). Figure 7-1 shows the most recent 2023 iteration of this USGS model. The NSHM defines the potential for earthquake ground shaking for various probability levels across the United States. The 2023 NSHM is an update to the previous 2018 version, and compiles data and findings from a number of sources including earthquake catalogs, geodetic- and geologic-based fault and deformation models, and ground motion models (GMMs), among others.[2] The map shows the percent chance that a given area will experience a category VI (or stronger) earthquake in 100 years, as defined by the Modified Mercalli Intensity (MMI) Scale (Table 7-3). The likelihood of a significant earthquake event is signified by the color-coding on the map. Densely populated areas are also highlighted on the map (purple and black dotting) to indicate areas of elevated vulnerability in relation to higher seismic risk. The Crockett County planning area, as identified in Figure 7-1, is located in a low hazard area, with a less than five percent chance of experiencing a strong earthquake every 100 years.

[2] Note: A comprehensive overview of the modelling process can be found at the USGS website, https://www.usgs.gov/programs/earthquake-hazards/science/2023-50-state-long-term-national-seismic-hazard-model-0#overview

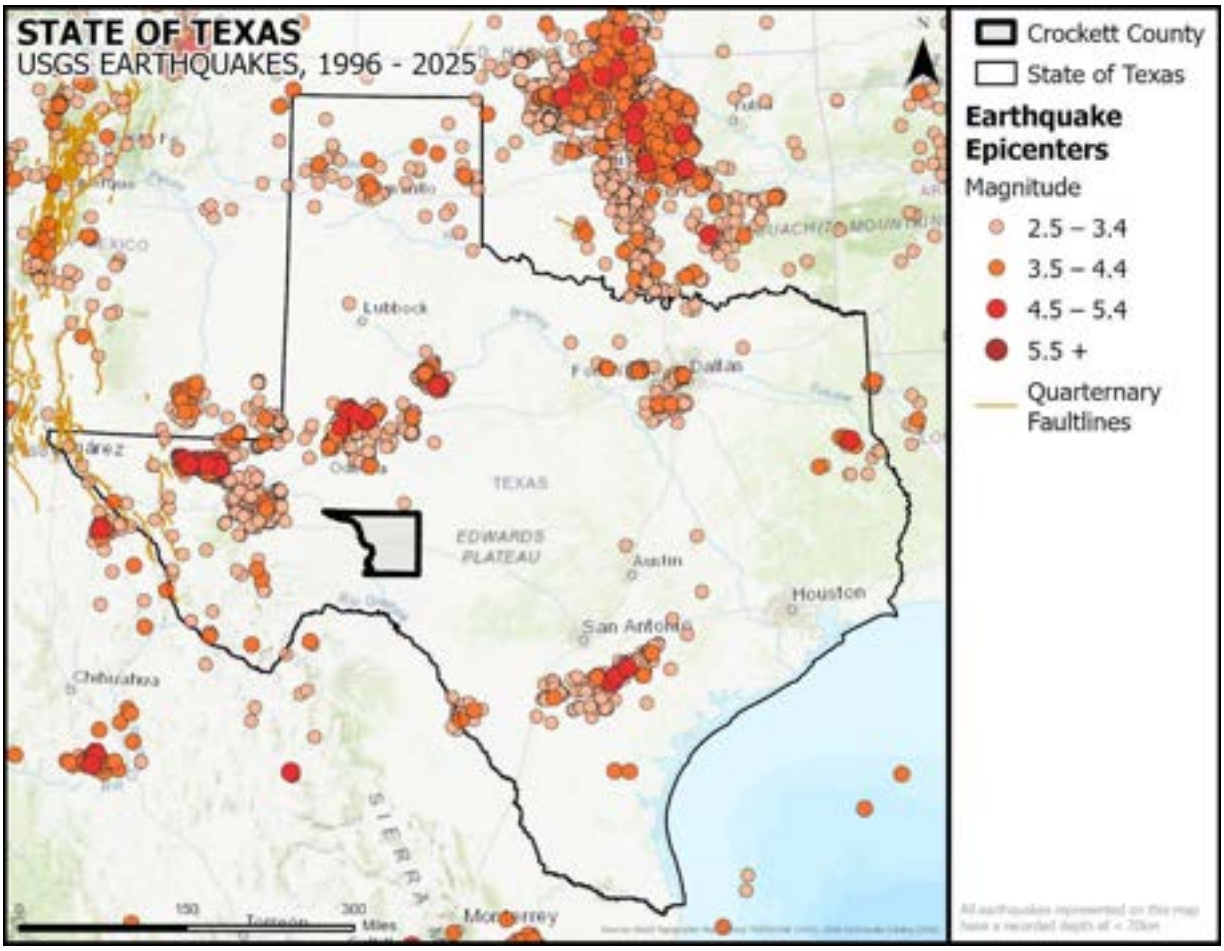
Figure 7-1. U.S. Map of Peak Ground Acceleration[3]



[3] Note: The Crockett County planning area is indicated by the black circle.

Figure 7-2 maps historic earthquake epicenters across Texas between 1996 and 2025.

Figure 7-2. Historic Earthquake Epicenters in Texas, 1996–2025[4]



EXTENT

Earthquakes are measured in terms of magnitude and intensity. The prevalent magnitude measurement in use today is based on the Moment Magnitude Scale (MMS). MMS measures the movement of rock along the fault. It accurately measures larger earthquakes, which can last for minutes, affect a much larger area, and cause more damage. Magnitudes are based on a logarithmic scale (base 10), meaning that for each whole number you go up on the magnitude scale, the amplitude of the ground motion recorded by a seismograph goes up ten times. Using this scale, a magnitude 5 earthquake would result in ten times the level of ground shaking as a magnitude 4 earthquake (and about 32 times as much energy would be released).[5] The USGS reports earthquake magnitudes above 4.0 as “moment magnitude,” often described in the press

[4] Note: Crockett County is indicated by the black polygon.

[5] Source: (n.d.). How Do We Measure Earthquake Magnitude? Michigan Tech. https://www.mtu.edu/geo/community/seismology/learn/earthquake-measure/#:~:text=The%20moment%20magnitude%20scale%20is,the%20earthquake%20at%20multiple%20stations

as "Richter" magnitude. Table 7-2 shows the magnitude levels for the current Richter / Moment Magnitude scale.

Table 7-2. Richter / Moment Magnitude Scale[6]

Magnitude	Category	Description of Effects	Events Per Year
< 3.0	Micro	Usually not felt but can be recorded by seismograph.	+100,000
3.0 – 3.9	Minor	Often felt but causes no damage.	12,000 - 100,000
4.0 – 4.9	Light	Felt by all, minor breakage of objects.	2,000 - 12,000
5.0 – 5.9	Moderate	Some damage to weak structures.	200 – 2,000
6.0 – 6.9	Strong	Moderate damage in populated areas.	20 – 200
7.0 – 7.9	Major	Serious damage over large areas with loss of life expected.	3 – 20
> 7.9	Great	Severe destruction and loss of life over large areas.	Less than 3

Earthquake intensity measurement is an on-the-ground description. The measurement qualitatively explains the severity of earthquake shaking and its effects on people and their environment. Intensity measurements will differ depending on each location's proximity to the epicenter or point on the surface of the earth directly above the focus where the earthquake started. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and total destruction. There can be multiple intensity measurements associated with an earthquake as opposed to one magnitude measurement.[7] The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the nonscientist than the magnitude because intensity refers to the effects actually experienced at a specific location. The scale provides the intensity of the earthquake in values ranging from I to X.

Table 7-3 describes the typical effects and intensities associated with earthquakes of various magnitudes. The intensity and effects depend on multiple factors (earthquake depth, epicenter location, site geology, population density, to name a few) and can vary widely.

[6] Source: (n.d.). Earthquakes. Britannica. https://www.britannica.com/science/earthquake-geology
[7] Source: Wood, H. O., and Neumann, Frank (1931). Modified Mercalli Intensity Scale of 1931: Seismological Society of America Bulletin, v. 21, no. 4, p. 277-283

Table 7-3. Magnitude and Modified Mercalli Intensity (MMI) Scale[8]

Intensity	Category	Description of Effects	Corresponding Richter Magnitude
I	Not Felt	Not felt except by a very few under especially favorable conditions.	< 2.0
I	Not Felt	Felt only by a few persons at rest, especially on upper floors of buildings.	2.0 – 2.9
II – III	Weak	Felt quite noticeably by persons indoors, with shaking of indoor objects. Rarely causes damages.	3.0 – 3.9
IV – V	Light to Moderate	Noticeable shaking of indoor objects and rattling noises. Felt by most people in the affected area. Generally, no to minimal damage.	4.0 – 4.9
VI – VII	Strong to Very Strong	Significant damages to poorly constructed buildings. Limited to moderate damages to well-built structures.	5.0 – 5.9
VIII – IX	Severe to Violent	Damage slight in specially designed structures; considerable damage in ordinary buildings with partial collapse. Damage great in poorly built structures.	6.0 – 6.9
VIII +	Severe to Extreme	Damage considerable in specially designed structures. Damage substantial to most buildings, with partial or complete collapse. Felt across great distances with major damage mostly limited to 250 km from Epicenter.	7.0 – 7.9
VIII – IX	Severe to Violent	Major damage to buildings, structures likely to be destroyed; will cause moderate to heavy damage to sturdy or earthquake-resistant buildings; damaging in large areas; felt in extremely large regions.	8.0 – 8.9
VIII +	Severe to Extreme	At or near total destruction. Severe damage or collapse to all buildings; heavy damage and shaking extends to distant locations and permanent changes in ground topography.	9.0+

[8] Source: USGS

Taking into consideration the possible extent of an earthquake for the area, by reviewing Tables 7-2 and 7-3 in conjunction with no significant previous occurrences, as depicted in Figure 7-2, the Crockett County planning area experiences on average less than 3.0 magnitude or Levels I (not felt) on the Modified Mercalli Intensity scale. This is the greatest extent the entire planning area can anticipate in the future, based on historic records.

HISTORICAL OCCURRENCES

According to USGS, and the National Geophysical Data Center (NGDC), there are no “significant” earthquakes on record for the State of Texas and the entire and Crockett County planning area from 2150 B.C. to present. A significant earthquake, as defined by NGDC, is one that has caused at least moderate damage (approximately $1 million or more), has resulted in 10 or more deaths, has registered as a magnitude 7.5 or greater, has registered as Modified Mercalli Intensity (MMI) Scale X or greater, or generated a tsunami. None of these criteria have been met by any seismic activity known to have impacted the planning area.

The USGS also has a database that tracks all earthquakes with a magnitude 2.5 or greater across the United States. According to the database, there were no earthquakes reported within the planning area between 1996 and 2025. During that same period, 67 earthquakes occurred within a 50-mile radius of the planning area and 793 earthquakes occurred within a 100-mile radius. Many of these occurred northwest of the Crockett County planning area. The maximum magnitude recorded for earthquakes within the 50-mile radius was magnitude 3.8, considered a Level III (weak) earthquake. In the 100-mile radius, the greatest recorded magnitude was 5.2, a Level VI-VII (strong to very strong) earthquake.

Another aspect of earthquakes tracked by the USGS is the depth at which they occur. Shallow earthquakes tend to be more damaging and cause more intense shaking than deeper earthquakes, however deep earthquakes are more likely to be felt over a wider area.

While it is possible for the planning area to feel stronger earthquakes that occur inside county boundaries, or within the 100-mile radius around the planning area, at this time, there are no known damages associated with these events for the Crockett County planning area. Table 7-4 summarizes historical earthquake events that have occurred in or near the planning area.

Figure 7-3. Historic Earthquake Events in or Near Crockett County, 1996–2025

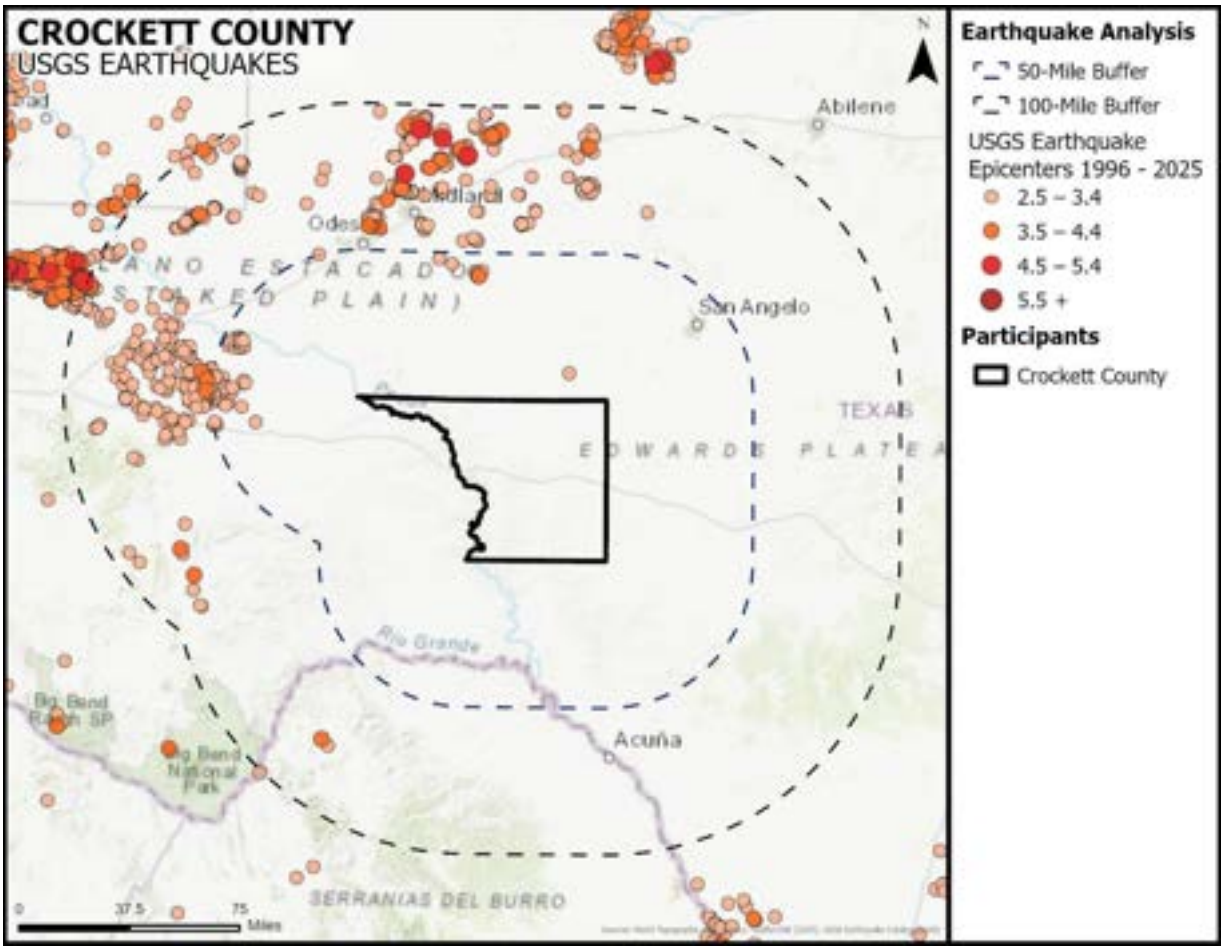


Table 7-4. Historical Earthquake Event Summary, 1996–2025[9]

Jurisdiction	Number of Events	Maximum Extent	Depth Range (km)	Injuries & Fatalities	Property & Crop Damage
Crockett County	0	0	0	0	$0
50-Mile Radius	67	3.8	1.37 - 22.30	0	$0
100-Mile Radius	793	5.2	0.02 - 22.30	0	$0

PROBABILITY OF FUTURE EVENTS

Earthquake Hazard Maps show the distribution of earthquake shaking levels that have a certain probability of occurring over a given period. According to the USGS, the entire Crockett County planning area has less than a five percent chance of a slightly damaging (or greater) earthquake

[9] Source: USGS

within 100 years. Based on historical records, the probability of a damaging earthquake affecting the planning area is “Unlikely,” meaning that an event is probable in the next 10 years.

CLIMATE CHANGE CONSIDERATIONS

Damaging earthquakes are rare within the State of Texas, including the Crockett County planning area. Changing conditions of weather patterns and climate change has not been established as having a direct impact on earthquake intensity or frequency.

According to the USGS, statistically there is an approximately equal distribution of earthquakes in all cold weather, hot weather, rainy weather, etc. Very large low-pressure changes associated with major storm systems, like typhoons and hurricanes, are known to trigger episodes of fault slip or slow earthquakes in the Earth’s crust and may also play a role in triggering some damaging earthquakes. However, the numbers are small and are not statistically significant.[10]

The Crockett County planning area is located outside of any known earthquake hazard areas. It sits in the Edwards Plateau, an area of relatively stable and flat terrain with no major tectonic faults. Climate change is assumed to have no impact on the probability or intensity of potential earthquakes in the planning area.

VULNERABILITY AND IMPACT

Little warning is usually associated with earthquakes and can impact areas a great distance away from the epicenter. The amount of damage depends on the density of population and buildings, and infrastructure construction in the affected area. Some places may be more vulnerable than others based on soil type, building age, and building codes in the Crockett County planning area.

Earthquakes often exhibit signs that when detected, allow forewarning. While all citizens are at risk of the impacts of an earthquake, forced relocation and disaster recovery disproportionately impacts low-income residents who lack the financial means to evacuate, afford a long-term stay away from home, and to rebuild or repair their homes. The elderly, children, and people with a disability may have trouble evacuating due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as warnings, evacuation routes and instructions regarding safety measures.

The population over 65 in the planning area is estimated at 19 percent of the total population and children under the age of 5 are estimated at 1 percent. The population with a disability is estimated at 17 percent of the total population. An estimated 9 percent of the planning area population live below the poverty level and 10 percent of the populations speak English “less than very well” (Table 7-5).

[10] Source: (n.d.). *Natural Hazards*. United Stated Geological Survey. https://www.usgs.gov/faqs/there-earthquake-weather

Table 7-5. Populations at Greater Risk[11]

Jurisdiction	Population				
	65 and Older	Under 5	With a Disability	Below Poverty Level	Limited English Speaking
Crockett County	537	36	491	262	295
Ozona CDP	492	0	491	214	290

The Crockett County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by earthquake events. For a comprehensive list, please see Appendix D.

Table 7-6. Critical Facilities Vulnerable to an Earthquake

Critical Facility Type	Potential Impacts
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to power outages, damaged facilities, fires and/or loss of communications. Impact can impede emergency response vehicle access to areas. • Power outages could disrupt communications, delaying emergency response times.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers and Shelters, Governmental Facilities, Residential/Assisted Living Facilities	• Power outages could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary due to extended power outages or other associated damages to facilities. • Economic disruption due to power outages negatively impact airport services as well as area businesses reliant on airport operations.
Commercial Supplier (food, fuel, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and critical services may be significantly impacted due to power outages, damaged facilities, and/or loss of communications. Impact can impede emergency service vehicle access to areas. • Power outages could disrupt communications, delaying emergency response times further straining the capacity and resources of emergency service personnel.

With no significant historical events recorded, neither annualized loss-estimates nor a breakdown of potential dollar losses of critical facilities and infrastructure from earthquakes are available. The

[11] US Census Bureau 2024 ACS data. Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.

potential severity of impact from an earthquake for the entire Crockett County planning area is classified as “Limited,” meaning that less than 10 percent of infrastructure would be damaged with critical facilities being shut down for less than 24 hours.

Section 8
Expansive Soils

SECTION 8: EXPANSIVE SOILS

HAZARD DESCRIPTION

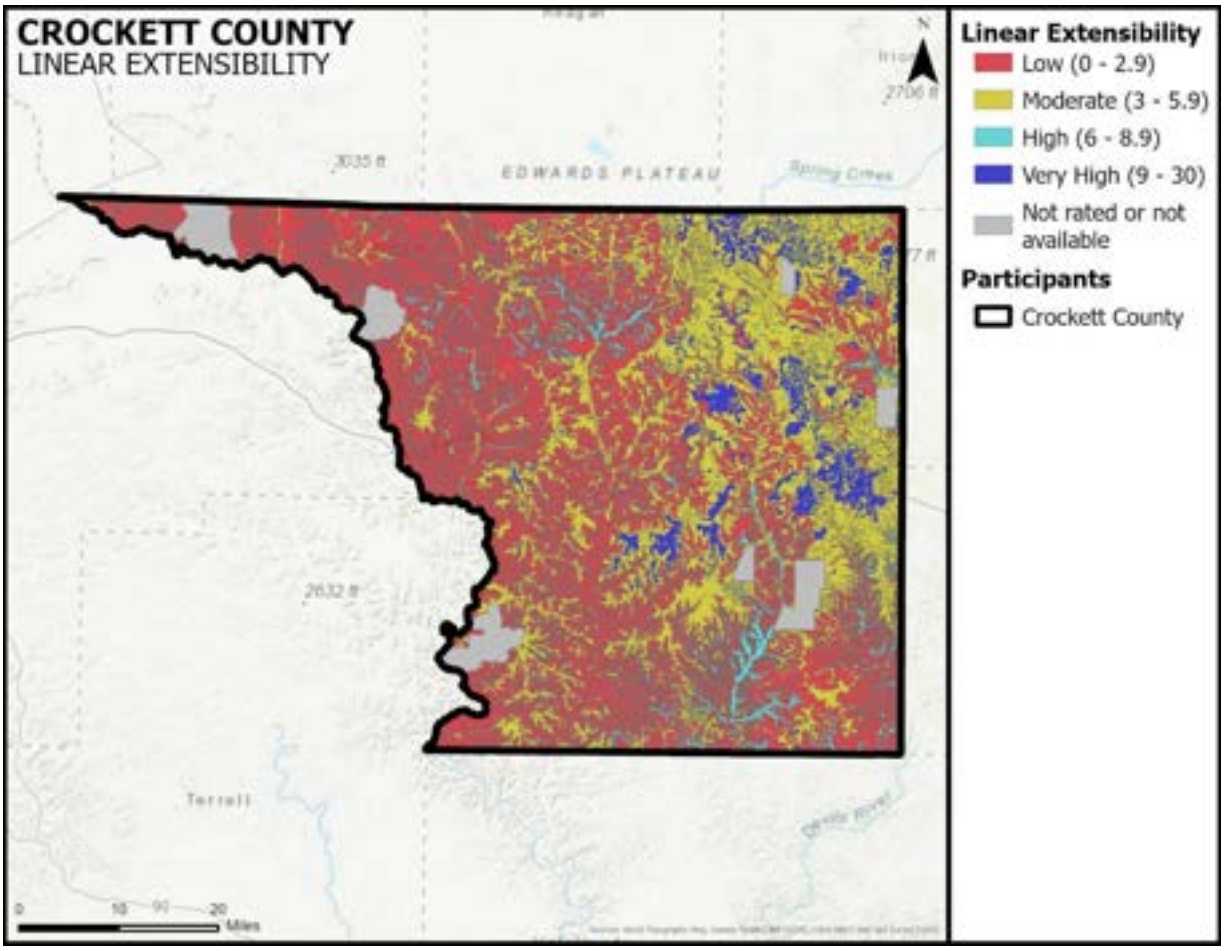
Expansive soils are soils and soft rocks with a relatively high percentage of clay minerals that are subject to changes in volume as they swell and shrink with changing moisture conditions. Expansive soils contain minerals such as smectite clays that are capable of absorbing water. When these clays absorb water, they increase in volume and expand. The change in soil volume and resulting expansion can exert enough force on a building or other structure to cause damage.

Expansive soils will also lose volume and shrink when they dry. Drought conditions can cause soils to contract in response to a loss of soil moisture. A reduction in soil volume can affect the support to buildings or other structures and result in damage. Fissures in the soil can also develop and facilitate the deep penetration of water when moist conditions or runoff occurs. This produces a cycle of shrinkage and swelling that place repetitive stress on structures. The effect of expansive soil is most prevalent in regions prone to prolonged periods of drought followed by periods of moderate to high precipitation.

LOCATION

Crockett County is primarily situated in the Edwards Plateau region. Expansive clay soils are primarily located in the lower-lying alluvial valleys along the western border of the county, adjacent to the Pecos River. Figure 8-1 shows the linear extensibility (shrink swell potential) category of expansive soils across Crockett County.

Figure 8-1. Crockett County Soil Linear Extensibility Map



EXTENT

Expansive soils risk is measured by the degree to which soils may shrink or swell. Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent, moderate if 3 to 6 percent, high if 6 to 9 percent, and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures.[1]

Table 8-1. NRCS Soil Linear Extensibility Risk Categories

Potential Category	Linear Extensibility %	Clay %
Low	< 3%	< 25%
Moderate	3% - 6%	25% - 35%
High	6% - 9%	35% - 45%
Very High	> 9%	> 45%

[1] (2009). *Soil Reports*. Natural Resources Conservation Service. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_016186.pdf

The Soil Survey was developed by the USDA Soils Conservation Service and contains information that can be applied in determining the suitability of soils in the planning area when selecting sites for roads, structures, and infrastructure. Based on Soil Survey data, roughly 56.4 percent of the Crockett County planning area is subject to the low (<3%) linear extensibility category (Table 8-1). The next most common linear extensibility category is moderate (3-6%) found in 22.8 percent of the planning area, followed by roughly 11.6 percent subject to high (6-9%) linear extensibility. Only 4.9 percent of the planning area falls within the very high (>9%) linear extensibility category. The remaining 4.2 percent of the planning area consists of water, quarries, or sand and gravel pits which do not receive a linear extensibility rating.[2] Figure 8-1 above illustrates the spatial distribution of linear extensibility across the Crockett County planning area, highlighting the areas where expansive soils are most likely to occur.

HISTORICAL OCCURRENCES

Expansive soil is a condition that is native to Texas soil characteristics and cannot be documented as a time-specific event, except when it leads to structural and infrastructure damage. Extreme conditions can damage roads, structures, and infrastructure, including projects still under construction. Damages from expansive soils are typically associated with droughts. Previous occurrences for expansive soils can be correlated with previous occurrences of drought, the impacts of which are typically negligible. The Crockett County planning area has no known recorded events of damaging expansive soils. Refer to the Drought profile (Section 6) of this plan for more information on the impacts of past drought events.

PROBABILITY OF FUTURE EVENTS

The Texas Department of Licensing and Regulation requires structures built after 2005 to include soil tests to be conducted for the likelihood of soil expansion, compression, or shifting. In such cases, top or subsoils are required to be removed and stabilize the remaining soils. Builders must ensure that water drains away from the structure on all sides and building owners notified of the potential for damage if changes in drainage flow occur. These measures significantly reduce the probability of expansive soil impacts on newer and future development.

As noted above and shown in Figure 8-1, the Crockett County planning area is subject to the full range of linear extensibility with the majority of the planning area falling into the low category (56.4%). With the state regulations in place, structures built since 2005 are generally protected from the impacts of expansive soils. It is considered “Unlikely” that the high-risk areas in the Crockett County planning area will experience expansive soil impacts such as problems with foundations, roadways, sidewalks and other structures and infrastructure in the future for newer development. However, structures pre-dating the state regulations are subject to the impacts of expansive soils in higher risk areas. Frequency of impacts to development prior to 2005 is considered “Highly Likely” with impacts probably every year depending, in part, on drought conditions that may exacerbate expansive soil conditions.

[2] Source: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

CLIMATE CHANGE CONSIDERATIONS

Expansive soils are directly connected to drought and flood conditions as they literally swell and shrink with changing moisture conditions. Impacts of climate change on drought and flood events indicate similar changes to expansive soil frequency and impacts. Refer to Probability of Future Events section in Section 6 (Drought) and Section 10 (Flood) for more information on those hazards.

VULNERABILITY AND IMPACT

The effects of expansive soils are most prevalent when periods of moderate to high precipitation are followed by drought and then again by periods of rainfall. Other cases of damage result from increases in moisture volume from such sources as broken or leaking water and sewer lines. Dry clays are capable of absorbing water and will increase in volume in an amount proportional to the amount of water absorbed. Soils capable of changes in volume present a hazard to structures built over them and to the pipelines buried in them. Houses and one-story commercial buildings are more apt to be damaged by the expansion of swelling clays than are multi-story buildings, which are usually heavy enough to counter swelling pressures. However, if constructed on wet clay, multi-story buildings may also be damaged by clay shrinkage when moisture levels are substantially reduced.

Cracked foundations and floors, jammed windows and doors, and ruptured pipelines are typical types of damage resulting from swelling soils. Damage to the upper floors of larger buildings can occur when motion in the structure is significant. While all infrastructure within the planning area is minimally vulnerable, slab on grade structures are more likely to suffer damages from expansive soils. In addition, older structures built to less stringent building codes may also be more susceptible to damage than new construction. While the number of slab on grade structures is not available, the U.S. Census data indicates approximately 1,327 of the housing units (77 percent of all housing units) in the planning area were built before 2000 and may be more susceptible to damages.

Table 8-2. Residential Structures at Greater Risk[3]

Jurisdiction	SFR Structures Built Before 2000
Crockett County	1,327
Ozona CDP	1,097

[3] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.

SECTION 8: EXPANSIVE SOILS

The Crockett County Planning Team identified the following critical facilities (Table 8-3) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by expansive soils. For a comprehensive list, please see Appendix D.

Table 8-3. Critical Facilities Vulnerable to Expansive Soils

Critical Facilities	Potential Impacts
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Uneven settling and shifting cause cracks in building foundations, impacting the integrity of critical facility structures and leading to doors being unable to open or close properly. • Damages and cracks in streets and highway infrastructure may lead to emergency vehicles being unable to access areas increasing the need for emergency operations. • Ruptured water pipes can lead to loss of function or water pressure impacting drinking water availability and firefighting capabilities.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Uneven settling and shifting cause cracks in building foundations, impacting the integrity of critical facility structures and leading to doors being unable to open or close properly. • Damages and cracks in streets and highway infrastructure may lead to emergency vehicles being unable to access areas increasing the need for emergency operations.
Commercial Supplier (food, fuel, etc.)	• Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Wastewater and drinking water facilities and infrastructure may be damaged or destroyed resulting in services disruption or outage for multiple days or weeks. • Disruptions and outrages impact public welfare as safe drinking water is critical. • A break in essential and effective wastewater collection and treatment is a health concern, potentially spreading disease. • Exposure to untreated wastewater is harmful to people and the environment.

ASSESSMENT OF IMPACTS

Expansive soils are generally influenced by how wet or dry reactive clay types of soils become. The climate of an area, and more specifically the seasonal precipitation-drought cycle associated with arid or semi-arid regions, influences the occurrence and severity of these hazards. Problems associated with expansive soils in Crockett County typically occur during extended periods of drought. Expansive soils present a hazard to lightweight buildings and other infrastructure. Uneven settling and shifting in such structures may occur, causing cracks in foundations, walls, streets, driveways, and sidewalks; ruptured pipes; and windows and doors that do not open and close properly. Special provisions are necessary in the construction of footings and slabs resting on expansive soils to minimize damages due to the expansiveness. Homeowners and public agencies that assume they cannot afford preventative measures such as more costly foundations and floor systems, often incur the largest percentage of damage and costly repairs from

expanding soil. No figures are available for the total damage to homes in the planning area from expansive clays. The greatest damage occurs when structures are constructed when clays are dry (such as during a drought) and then subsequent soaking rains swell the clay.

Infrastructure such as pipelines can be damaged, causing increased maintenance and repairs, replacement, or damage to the point of failure. Sewer and water lines are also affected by shrinking and swelling soils. The movement of the soil can snap water and sewer lines, producing a minimum of temporary discomfort, and a maximum of serious health and welfare risk. Field monitoring and testing should be conducted on a regular basis, especially during extended drought periods, to avoid loss of function or water pressure, which could impact drinking water and firefighting capabilities. In addition, highways and other critical egress routes (such as U.S Highway 190, State Highway 137, State Highway 163, State Highway 349, and Interstate 10) can be affected by expansive soils, causing possible closures during costly repair work.

Unlike many other environmental hazards, the effects of expansive soil are deceptive in that they are not revealed suddenly or caused by a single event but rather become increasingly evident and destructive over time. As such, the vast majority of expansive soil impacts are relatively benign in terms of emergency management and emergency response. Expansive soil can directly impact infrastructure and, as a result, indirectly create impacts on residents. The impact of climate change could produce more severe expansive soils events, exacerbating the current expansive soils impacts. The following are a summary of impacts frequently associated with expansive soils:

- Expansive soils are influenced by the seasonal precipitation-drought cycle. Most impacts on Crockett County typically occur during extended periods of drought.
- Impacts to lightweight buildings and other infrastructure are most likely to occur. Impacts include uneven settling and shifting in structures; cracks in foundations, walls, streets, driveways, and sidewalks; ruptured pipes; and windows and doors that do not open and close properly.
- An estimated 77 percent of homes in Crockett County were built before 2000 leading them to more susceptible to damages from expansive soils. There are 3 buildings and sites in Crockett County on the National Register of Historic Places, many of which pre-date modern building codes.
- Highways (such as Highway 190, State Highway 137, State Highway 163, State Highway 349, and Interstate 10) can be affected by expansive soils.
- Economic impacts are limited to uninsured damages.
- Impacts on people are indirect, with impacts related to disruption in county, city and town services such as water and sewer.
- As the population grows and development increases in the county the potential risk to expansive soils will also increase.
- Limited impact is anticipated to the natural environment other than changes in soil characteristics.

The impact of expansive soils experienced in Crockett County, including all participating jurisdictions has resulted in no injuries and fatalities, supporting a “Limited” severity of impact meaning injuries and illnesses are treatable with first aid, shutdown of critical facilities and services for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

Section 9
Extreme Heat

SECTION 9: EXTREME HEAT

HAZARD DESCRIPTION

Extreme heat is a prolonged period of excessively high temperatures and exceptionally humid conditions. Extreme heat during the summer months is a common occurrence throughout the State of Texas, and the Crockett County planning area is no exception. The County typically experiences extended heat waves or an extended period of extreme heat and is often accompanied by high humidity.

Although heat can damage buildings and facilities, it presents a more significant threat to the safety and welfare of citizens. The major human risks associated with extreme heat include heat cramps; sunburn; dehydration; fatigue; heat exhaustion; and even heat stroke. The most vulnerable population to heat casualties are children and the elderly or 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.

Critical infrastructure can also be damaged or impacted by extreme heat. High temperatures may cause a rise in electricity consumption as homes, schools, and businesses try to regulate the temperature. This may lead to energy shortages and possible blackouts.

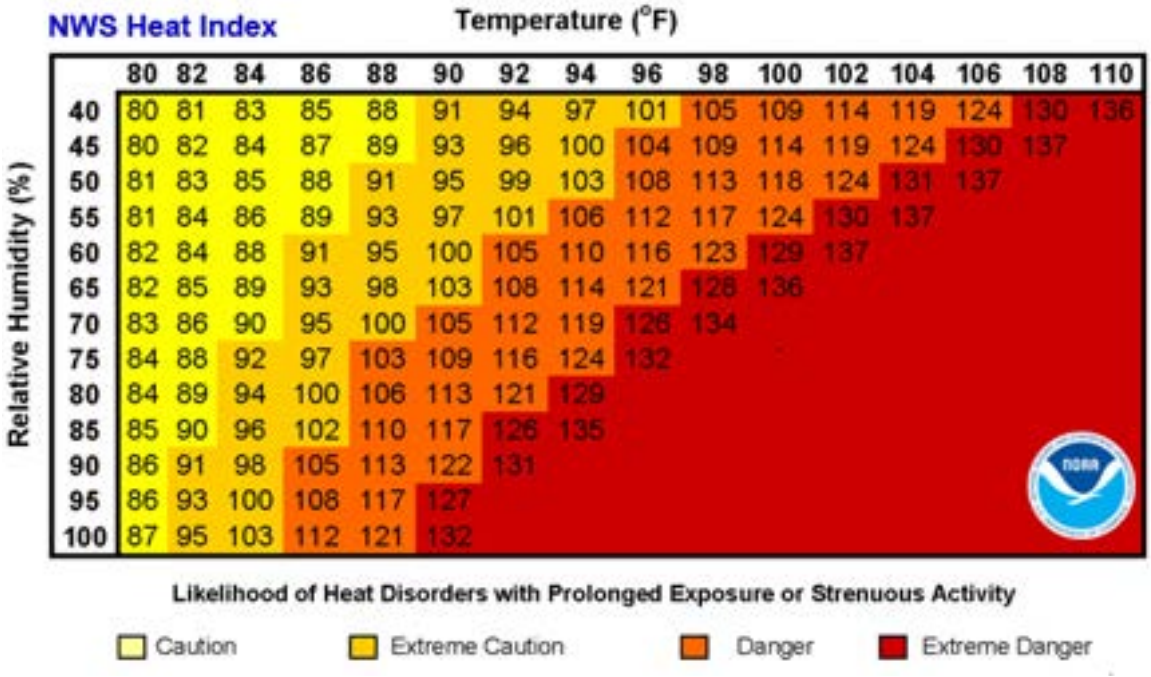
LOCATION

There is no specific geographic boundary to the extreme heat hazard. Extreme heat events can occur anywhere throughout the Crockett County planning area.

EXTENT

The magnitude or intensity of an extreme heat event is measured according to temperature in relation to the percentage of humidity. According to the National Oceanic Atmospheric Administration (NOAA), this relationship is referred to as the “Heat Index” and is depicted in Figure 9-1. This index measures how hot it feels outside when humidity is combined with high temperatures.

Figure 9-1. Extent Scale for Extreme Heat[1]



The index in Figure 9-1 displays varying categories of caution depending on the relative humidity combined with the temperature. For example, when the temperature is at 90 degrees Fahrenheit (°F) or lower, caution should be exercised if the humidity level is at or above 40 percent.

The shaded zones on the chart indicate varying symptoms or disorders that could occur depending on the magnitude or intensity of the event. The National Weather Service (NWS) initiates alerts based on the Heat Index as shown in Table 9-1.

Table 9-1. Heat Index and Warnings

Category	Heat Index	Possible Heat Disorders	Warning Type
Extreme Danger	125°F and higher	Heat stroke or sun stroke likely.	An Excessive Heat Warning is issued if the Heat Index rises above 105°F at least 3 hours during the day or above 80°F at night.
Danger	103 – 124°F	Sunstroke, muscle cramps, and/or heat exhaustion are likely. Heatstroke possible with prolonged exposure and/or physical activity.	An Excessive Heat Warning is issued if the Heat Index rises above 105°F at least 3 hours during the day or above 80°F at night.

[1] Source: NOAA

SECTION 9: EXTREME HEAT

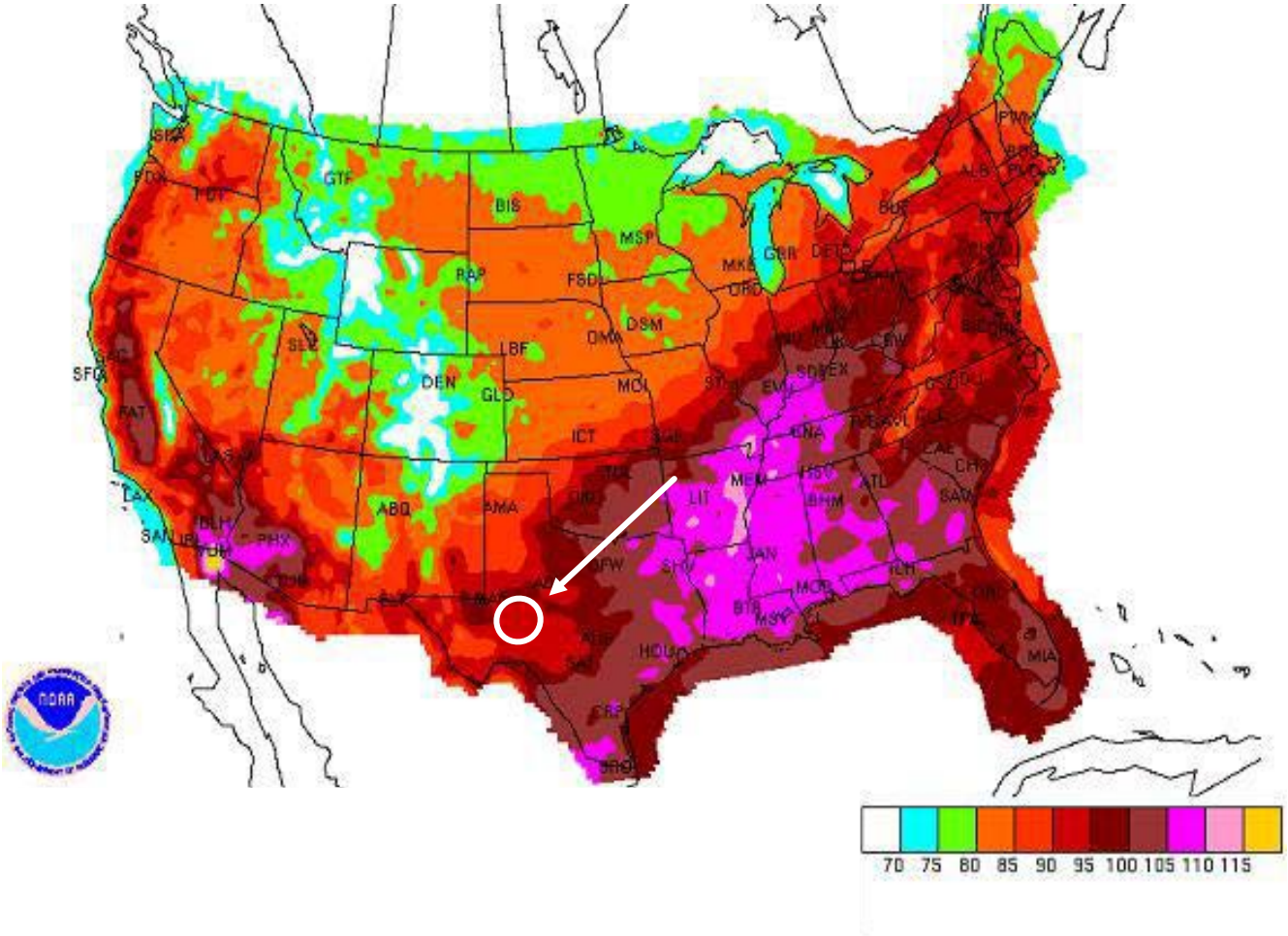
Category	Heat Index	Possible Heat Disorders	Warning Type
Extreme Caution	90 – 103°F	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.	A Heat Advisory will be issued to warn that the Heat Index may exceed 105°F.
Caution	80 – 90°F	Fatigue is possible with prolonged exposure and/or physical activity.	A Heat Advisory will be issued to warn that the Heat Index may exceed 105°F.

Crockett County sits on the western edge of the Edwards Plateau. The terrain is gently rolling plains and broad valleys in the north with deep, narrow, steep-walled canyons and flat mesas in the southern and western areas. It comprises 2,807 square miles in West Central Texas. The county has a 233-day growing season, an average temperature range of 33°F in January and 92°F in July, an average annual precipitation of 20 inches, and an elevation variation of 1,500 feet to 2,380 feet. The principal rivers in the county are the Pecos River and Devils River. The Pecos forms the western boundary of the county while the Devils River originates in the northeastern part of the county. The Devils River is known as the cleanest and most pristine rivers in Texas as it is fed by springs from the Edwards Aquifer.

Due to its geography and its semi-arid, hot, and subtropical climate, the Crockett County planning area can expect an extreme heat event each summer. Citizens, especially children and the elderly, should exercise caution by staying out of the heat for prolonged periods when a heat advisory or excessive heat warning is issued. In addition, those working or remaining outdoors for extended periods of time are at greater risk.

Figure 9-2 displays the daily maximum heat index as derived from NOAA based on data compiled from 1838 to 2015. The white circle shows the Crockett County planning area. The planning area is represented in a red color across the County. The red color indicates an average daily heat index of 90°F to 95°F. Therefore, Crockett County could experience dangerous heat from 90°F to 95°F and should anticipate the extent of “Extreme Caution” which can include sunstroke, muscle cramps, and heat exhaustion. The planning area’s record high temperature of 113°F was recorded in Ozona on August 3, 2015. This is the maximum temperature the planning area can anticipate based on historical events.

Figure 9-2. Average Daily Maximum Heat Index Days[2]



HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) Storm Events database is a national data source organized under the National Oceanic and Atmospheric Administration (NOAA). The NCEI is the largest archive available for historic storm events data. Previous occurrences for extreme heat are often derived from the NCEI database, which typically identifies extreme heat events at the county level for each event. However, due to the average high temperatures through the summer months across the planning area, most extreme heat events go unreported in the NCEI. Crockett County's rural location also contributes to underreporting of heat events. There have been no extreme heat events reported in the NCEI for the planning area (Table 9-2).

[2] NRDC and the white circle indicates the Crockett County planning area.

The National Weather Service heat forecast and average daily temperatures, planning team input and reported heat events have been factored into this Risk Assessment and were used to determine the probability of future events.

Table 9-2. Historical Extreme Heat Events Summary, 1996–2025

Jurisdiction	Number of Events	Deaths	Injuries	Property Damage	Crop Damage
Crockett County	0	0	0	$0	$0

Based on the list of historical extreme heat events for the Crockett County planning area, there have been no events recorded since the 2012 Plan.

PROBABILITY OF FUTURE EVENTS

According to historical records, the Crockett County planning area has experienced no events in a 29.5-year reporting period. While there is a lack of historical records, an analysis of maximum average temperatures provide a probability of at least one event every year. This frequency supports a “Highly Likely” probability of future events for the planning area.

CLIMATE CHANGE CONSIDERATIONS

Climate change is expected to lead to an increase in average temperatures as well as an increase in frequency, duration, and intensity of extreme heat events. With no reductions in emissions worldwide, the state of Texas is projected to experience an additional 30 to 60 days per year above 100°F than what is experienced now.[3]

In addition, it is projected that future changes to Crockett County will include increased temperatures, which according to the U.S. Climate Explorer, the planning area may experience a 6°F increase in the average extreme heat temperatures. Historically, extreme temperatures averaged 100°F in Crockett County, but between 2035 and 2064 the average will be 106°F, increasing the severity and frequency of extreme heat events. Some projections show an even higher increase; however, the severity will be dependent on overall future emissions and is subject to change.

VULNERABILITY AND IMPACT

While the Crockett County planning area is exposed to extreme temperatures, existing buildings, infrastructure, and critical facilities are not likely to sustain significant damage from extreme heat events. Therefore, any estimated property losses associated with the extreme heat hazard are anticipated to be minimal across the area.

Every summer, the hazard of heat-related illness becomes a significant public health issue throughout much of the United States. Mortality rates increase during heat waves, and excessive heat is an important contributing factor to deaths from other causes, particularly among the

[3] Nielsen-Gammon, John, Holman, Sara, Buley, Austin and Jorgensen, Savannah. Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, 2021 Update. Texas A&M University Office of the Texas State Climatologist. October 7, 2021. https://climatexas.tamu.edu/files/ClimateReport-1900to2036-2021Update

elderly. Extreme temperatures present a significant threat to life and safety for the population of the County as a whole. Heat casualties, for example, are typically caused by a lack of adequate air conditioning or heat exhaustion. The most vulnerable population to heat casualties are the elderly or infirmed who frequently live on 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. Children may also be more vulnerable if left unattended in vehicles. Populations living below the poverty level are often unable to run air conditioning on a regular basis and are limited in their ability to seek medical treatment.

Vulnerable and underserved populations are disproportionately impacted by extreme heat events as they may be more susceptible to health risks. Populations below the poverty level are less likely to be able to afford air conditioning during the hot summer months as well as less likely to have access to medical care. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

The population over 65 in the Crockett County planning area is estimated at 19 percent of the total population and children under the age of 5 are estimated at 1 percent. The population with a disability is estimated at 17 percent of the total population. An estimated 9 percent of the planning area population live below the poverty level and 10 percent of the populations speak English “less than very well” (Table 9-3).

Table 9-3. Populations at Greater Risk[4]

Jurisdiction	Population				
	65 and Older	Under 5	With a Disability	Below Poverty Level	Limited English Speaking
Crockett County	537	36	491	262	295
Ozona CDP	492	0	491	214	290

Extremely high temperatures can have significant secondary impacts, leading to droughts, water shortages, increased fire danger, and prompt excessive demands for energy. Typically, more than 12 hours of warning time would be given before the onset of an extreme heat event. In terms of vulnerability to structures, the impact from extreme heat is considered negligible. No historical agricultural losses were recorded over the reporting period. With no injuries, reported damages or fatalities, the potential impact of excessive summer heat is considered “Limited”, with any injuries being treatable with first aid, shutdown of critical facilities for 24 hours or less, and less than 10 percent of property being destroyed.

The Crockett County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by extreme heat events. The following critical facilities would be vulnerable to extreme

[4] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county’s population resides.

heat events in the Crockett County planning area. For a comprehensive list, please see Appendix D.

Table 9-4. Critical Facilities Vulnerable to Extreme Heat Events

Critical Facility Type	Potential Impacts
Emergency Response Services (EOC, Fire, Police, EMS, Hospitals)	• Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Exposure to heat can cause heat illnesses in first responders, especially for those in heavy equipment. • Roads may become impassable due to excessive heat causing asphalt roads to soften and concrete roads to shift or buckle impacting response times by emergency services.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters, Governmental Facilities	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Power outages due to increased usage could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary due to extended power outages, breaks in water main lines or other associated damage to facilities. • Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Economic disruption due to power outages negatively impact airport services as well as area businesses reliant on airport operations.
Commercial Suppliers (food, gas, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Roads may become impassable due to excessive heat causing asphalt roads to soften and concrete roads to shift or buckle impacting response times by emergency services. • Breaks in water main lines or other associated damage to facilities.

ASSESSMENT OF IMPACTS

The greatest risk from extreme heat is to public health and safety. Extreme heat conditions can be frequently associated with a variety of impacts, including:

- In Crockett County vulnerable populations, particularly the elderly (19 percent of total population), children under 5 (1 percent of total population), and those with a disability (17 percent of total population) can face serious or life-threatening health problems from exposure to extreme heat including hyperthermia, heat cramps, heat exhaustion, and heat stroke (or sunstroke).
- Response personnel, including utility workers, public works personnel, and any other professions where individuals are required to work outside, are more subject to extreme heat related illnesses since their exposure would typically be greater.
- High energy demand periods can outpace the supply of energy, potentially creating the need for rolling brownouts which would elevate the risk of illness to vulnerable residents.
- Highways and roads may be damaged by excessive heat causing asphalt roads to soften and concrete roads to shift or buckle.
- Vehicle engines and cooling systems typically run harder during extreme heat events resulting in increases in mechanical failures.
- Extreme heat events during times of drought can exacerbate the environmental impacts associated with drought, decreasing water and air quality and further degrading wildlife habitat.
- Extreme heat increases ground-level ozone (smog), increasing the risk of respiratory illnesses.
- Negatively impacted water suppliers may face increased costs resulting from the transport of water resources or development of supplemental water resources.
- Tourism and recreational activities at places may be negatively impacted during extreme heat events, reducing seasonal revenue.
- Outdoor activities may see an increase in school injury or illness during extreme heat events.

The economic and financial impacts of extreme heat on the community will depend on the duration of the event, demand for energy, drought associated with extreme heat, and many other factors. The level of preparedness and the amount of planning done by the community, local businesses, and citizens will impact the overall economic and financial conditions before, during, and after an extreme heat event.

Section 10
Flood

SECTION 10: FLOOD

HAZARD DESCRIPTION

Floods generally result from excessive precipitation. The severity of a flood event is determined by a combination of several major factors, including: stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and the degree of vegetative clearing and impervious surfaces. Typically, floods are long-term events that may last for several days.

The primary types of general flooding are inland and coastal flooding. Due to Crockett County's inland location, only inland flooding is profiled in this section. Inland or riverine flooding is a result of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Inland or riverine flooding is overbank flooding of rivers and streams, typically resulting from large-scale weather systems that generate prolonged rainfall over a wide geographic area. Therefore, it is a naturally occurring and inevitable event. Some river floods occur seasonally when winter or spring rainfalls fill river basins with too much water, too quickly. Torrential rains from decaying hurricanes or tropical systems can also produce river flooding.

The Crockett County planning area is subject to extreme rainfall events, often in short durations, leading to dangerous flash flooding events. Floods are a natural and recurrent event and take place every year, in all seasons.

LOCATION

The Flood Insurance Rate Maps (FIRMs) prepared by FEMA provide an overview of flood risk but can also be used to identify the areas of the County that are vulnerable to flooding. FIRMs are used to regulate new development and to control the substantial improvement and repair of substantially damaged buildings. Flood Insurance Studies (FIS) are often developed in conjunction with FIRMs.

The current effective Flood Insurance Rate Map or FIRM (map ID 480158C, panels 1-29, dated October 20,1981) data provided by FEMA for Crockett County shows the following flood hazard areas:

- Zone A: Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance requirements and floodplain management standards apply.

Locations of flood zones in Crockett County based on the Digital Flood Insurance Rate Map (DFIRM) from FEMA are illustrated in Figures 10-1 and 10-2.

Known localized flood risk areas are identified below. These descriptions were derived from the National Centers for Environmental Information (NCEI) event narrative from historical events as well as planning team members. General areas subject to flooding:

- Portions of U.S. Highway 190, U.S. Highway 137 (near the Howard Draw), and U.S. Highway 163
- Specifically, U.S. Highway 190 near the intersection of U.S. Highway 137 in the northwest portion of the county
- Low water crossings in and near the Census Designated Place (CDP) and unincorporated community of Ozona, particularly those near Johnson Draw
- The intersection of 12th and Jones in Ozona
- Low water crossings on Farm to Market (FM) Road 1973
- Portions of County Roads 2083, 1691, 405, and 406
- Flash flooding has been reported on Pandale Road and Howard Draw
- The bridge between Terrel and Crockett County in the southwest portion near the Pecos River

Figure 10-1. Estimated Flood Zones in Crockett County

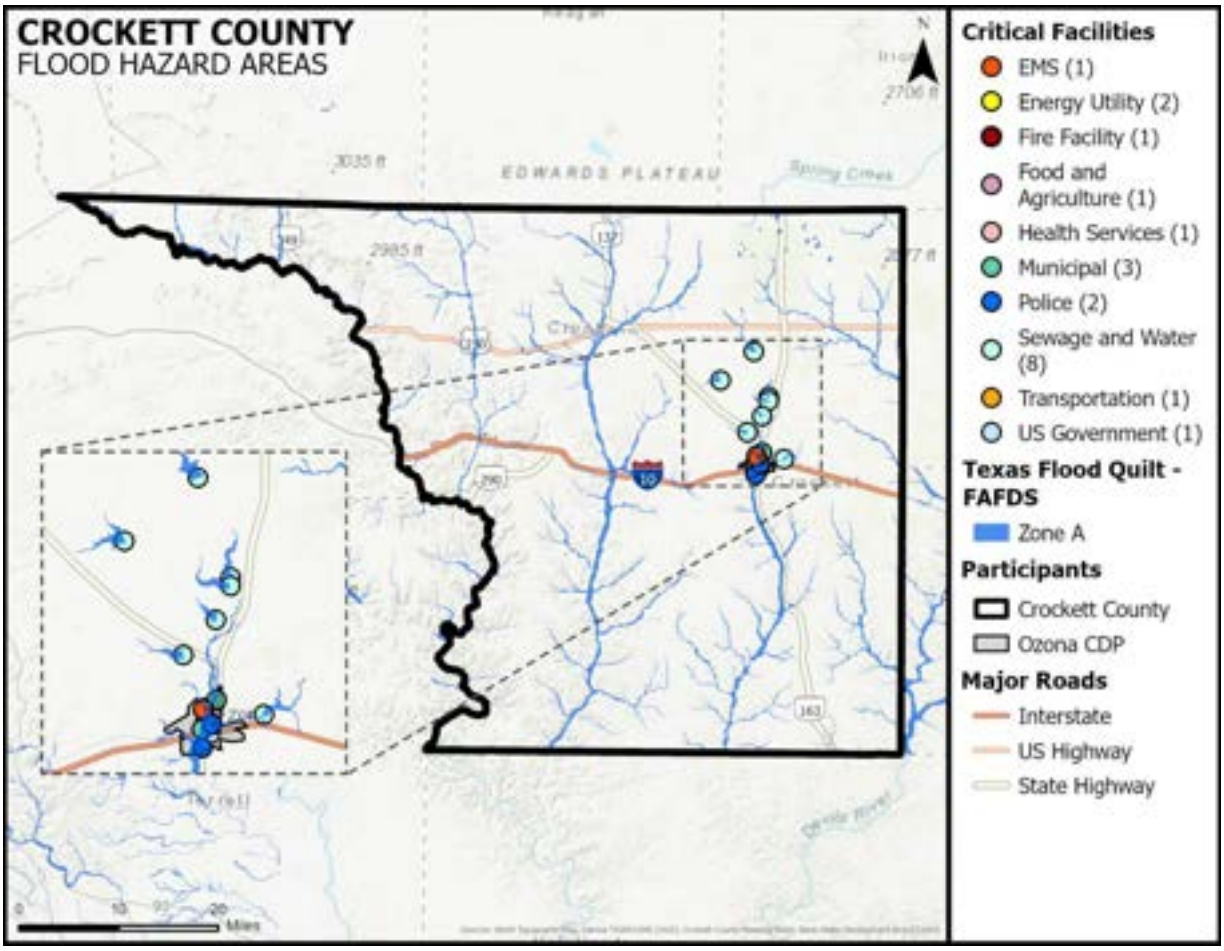
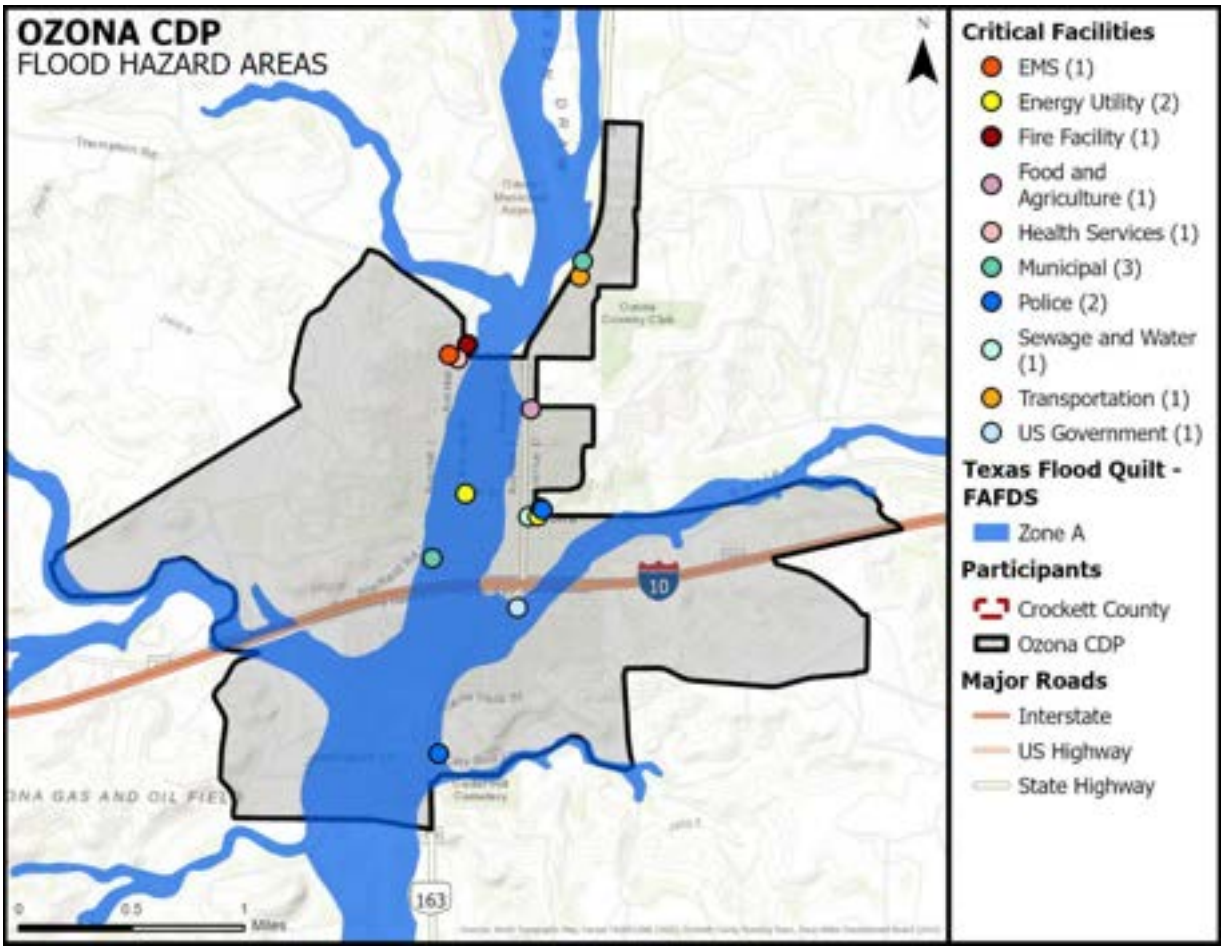


Figure 10-2. Estimated Flood Zones in Ozona[1]



EXTENT

The severity of a flood event is determined by a combination of several major factors, including stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and the degree of vegetative clearing and impervious surfaces. Typically, floods are long-term events that may last for several days.

Determining the intensity and magnitude of a flood event is dependent upon the flood zone and location of the flood hazard area in addition to the depths of floodwaters. The extent of flood damages can be expected to be more damaging in the areas that will convey a base flood. FEMA categorizes areas on the terrain according to how the area will convey floodwater. Flood zones are the categories that are mapped on FIRMs. Table 10-1 provides a description of FEMA flood zones and the flood impact in terms of severity or potential harm. Flood Zone A is the hazard area mapped in the region. Figures 10-1 and 10-2 should be read in conjunction with the extent for flooding in Table 10-1, and Figure 10-3 to determine the intensity of a potential flood event.

[1] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.

Table 10-1. Flood Zones

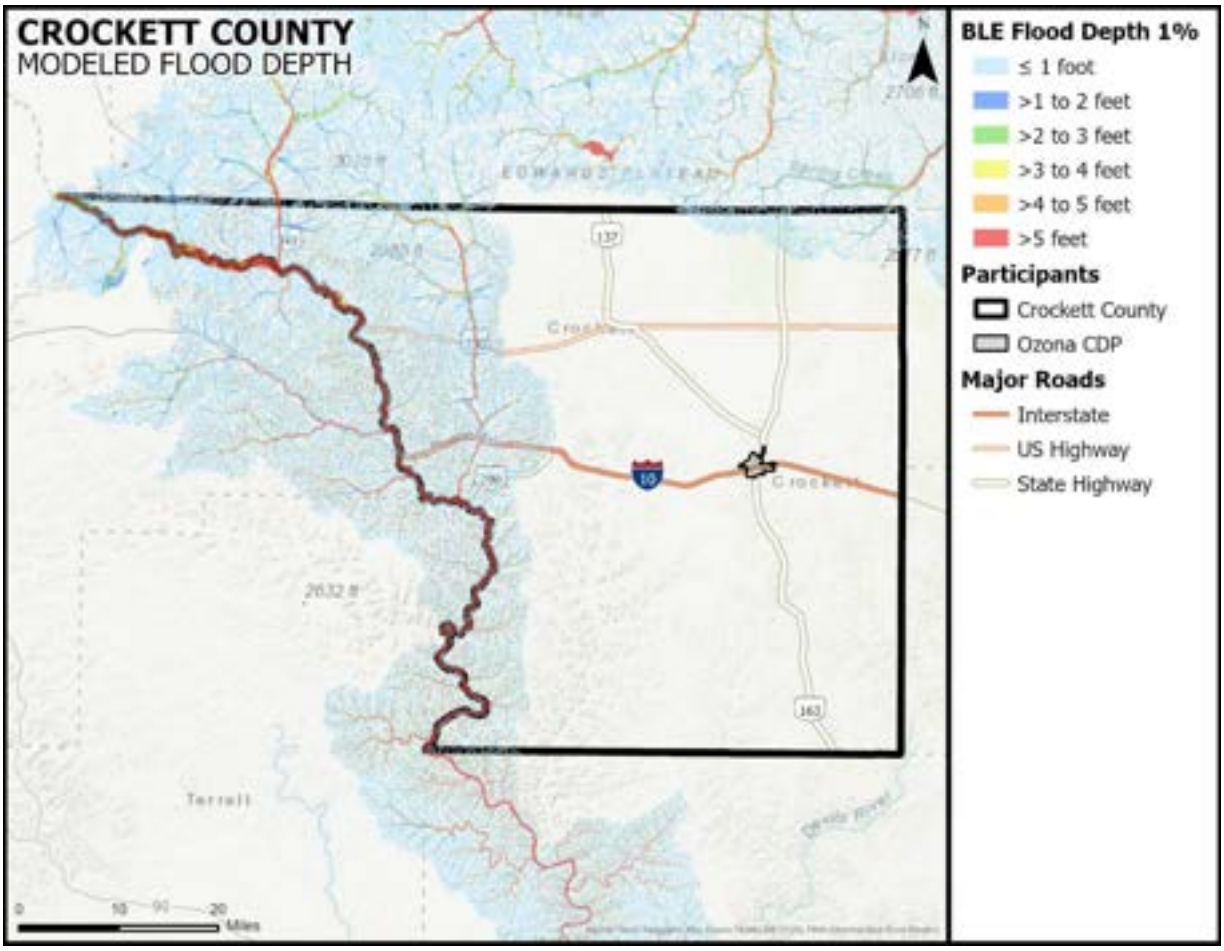
Intensity	Zone	Description
High	Zone A	Areas with a 1-percent-annual-chance of flooding and a 26 percent chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.
	Zone A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a Base Flood Elevation (BFE) (old format).
	Zone AE	The base floodplain where BFEs are provided. AE Zones are now used on the new format FIRMs instead of A1-A30 Zones.
	Zone AO	River or stream flood hazard areas and areas with a 1-percent-annual-chance or greater of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26 percent chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
	Zone AH	Areas with a 1-percent-annual-chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26 percent chance of flooding over the life of a 30-year mortgage. BFEs derived from detailed analyses are shown at selected intervals within these zones.
	Zone A99	Areas with a 1-percent-annual-chance of flooding that will be protected by a federal flood control system where construction has reached specified legal requirements. No depths or BFEs are shown within these zones.
	Zone AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
MODERATE To LOW	Zone X 500	An area inundated by 500-year flooding; an area inundated by 100-year flooding with average depths of less than 1 foot or with drainage areas less than 1 square mile; or an area protected by levees from 100-year flooding.

Zone A is interchangeably referred to as the 100-year flood, the 1-percent-annual-chance flood, the Special Flood Hazard Area (SFHA), or more commonly, the base flood. This is the area that will convey the base flood and constitutes a threat to the planning area. The impact from a flood event can be more damaging in areas that will convey a base flood.

Structures built in the SFHA are subject to damage by rising waters and floating debris. Moving floodwater exerts pressure on everything in its path and causes erosion of soil and solid objects. If not elevated above Base Flood Elevation, utility systems, such as heating, ventilation, air conditioning, fuel, electrical systems, sewage maintenance systems and water systems, may also be damaged.

The intensity and magnitude of a flood event is also determined by the depth of floodwater. According to FEMA's Region 6 Estimated Base Flood Elevation Viewer, the Crockett County planning area may experience flood depths of greater than 5 feet.[2] A map for the planning area with the Base Flood Elevation depth range is provided in Figure 10-3.

Figure 10-3. Estimated Base Flood Elevation Flood Depths in Crockett County[3]



[2] U.S. Geological Survey. Estimated Base Flood Elevation (BFE) Viewer. https://webapps.usgs.gov/infrm/estBFE/

[3] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides. BLE data in Ozona was "in progress" on the FEMA website at the time of plan development. Rely on the County BLE data where available.

The range of flood intensity that the planning area can experience is high, or Zone A. Based on historical occurrences, the planning area could expect to experience an average of 1 inch of rain within a 2-hour period, resulting in flash flooding. The data described in Table 10-1, together with Figures 10-1 through 10-3 and historical occurrences for the area, provides an estimated potential magnitude and severity for the Crockett County planning area.

HISTORICAL OCCURRENCES

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 flood events that have been reported 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 10-2 identifies historical flood events that resulted in damages, injuries, or fatalities within the Crockett County planning area. Table 10-3 provides the historical flood event summary. Historical data is provided by the Storm Prediction Center (NOAA), National Centers for Environmental Information (NCEI) database for Crockett County. There have been 36 recorded flood events in Crockett County. Historical flood data events for the Census Designated Place (CDP) of Ozona are provided in the NCEI database under the county events.

Table 10-2. Historical Flood Events, January 1996–June 2025[4]

Jurisdiction	Date	Deaths	Injuries	Property Damage	Crop Damage
Crockett County	6/22/1999	0	0	$1,000	$0
Crockett County	6/18/2000	0	0	$18,800	$0
Crockett County	10/8/2002	0	0	$1,787,000	$0
Crockett County	10/24/2002	0	0	$17,900	$0
Crockett County	5/9/2007	0	0	$15,600	$0
Totals		**0**	**0**	**$1,840,300**	**$0**

Table 10-3. Summary of Historical Flood Events, January 1996–June 2025

Jurisdiction	Number of Events	Deaths	Injuries	Property Damage	Crop Damage
Crockett County	36	0	0	$1,840,300	$0

Based on the list of historical flood events for the Crockett County planning area, 9 events have occurred since the 2012 Plan.

[4] Table only includes historical flood events that resulted in damages, injuries, or fatalities between January 1996 and June 2025 in the NCEI database. Values are in 2026 dollars.

SECTION 10: FLOOD

SIGNIFICANT EVENTS

October 8, 2002

During the early morning hours of October 8th, one to three inches of rain fell across Crockett County. This rainfall, combined with heavy precipitation that had occurred over the preceding days, led to significant flooding and washouts along several farm roads and highways in the southeastern portion of the county. The event was caused by a stalled frontal boundary over South Texas interacting with an upper-level storm system positioned over the southwestern United States, resulting in prolonged periods of heavy rainfall. Numerous roads were closed for several days due to extensive washout damage and unsafe traveling conditions. This is the costliest reported flood event for the planning area, with an estimated $1,787,000 (2026 dollars) in damages.

October 16, 2022 – Flash Flood

Thunderstorms produced localized flash flooding across portions of Crockett County. Law enforcement officials reported water depths of up to three feet on at least one roadway, causing two passenger vehicles to stall. In addition, a semi-trailer truck was reported to have water reaching the radiator level.

PROBABILITY OF FUTURE EVENTS

Based on 36 recorded historical occurrences within a 29.5-year reporting period within the Crockett County planning area, flooding is considered “Highly Likely,” meaning an event is probable within the next year.

CLIMATE CHANGE CONSIDERATIONS

River flooding in Texas is projected to have no substantial change through 2036. This is in large part due to the construction of dams and reservoirs for flood management in the 20th century. There is a mixture of historical trends categorized by season, with no one clear trend to project. In addition, meteorological drivers of river flooding (increased rainfall intensity, decreased soil moisture) are projected to have competing influences. On balance, if an increasing trend is present in river flooding, it will be at the most extreme flood events or in the wettest parts of the state where there is so much rainfall that a decrease in soil moisture would have little mitigating impact.[5]

According to the Climate Risk and Resilience Portal (ClimRR), the historical annual total precipitation for Crockett County is 23.76 inches and the current ClimRR climate change projections estimate the annual minimum precipitation at mid-century to be 23.09 inches, which represents a slight decrease from current averages. End of century projections are higher with a new annual minimum precipitation at 25.86 inches. An increase in precipitation and precipitation events could increase flood risk, however, projections are variable and subject to change over time.

[5] Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.

VULNERABILITY AND IMPACT

A property's vulnerability to a flood depends on its location and proximity to the floodplain. Structures that lie along banks of a waterway are the most vulnerable and are often repetitive loss structures. Crockett County promotes development outside of the floodplain. The potential severity of impact for flood events is considered "Limited", with the complete shutdown of critical facilities for 24-hours or less and less than 10 percent of property destroyed or with major damage.

Table 10-4 includes the comprehensive critical facilities identified in Appendix D that were considered the most important to the planning area that are subject to a range of impacts due to flood and are located in the regulatory floodplain. For a comprehensive list of identified critical facilities, please see Appendix D.

Table 10-4. Critical Facilities in the Floodplain

Critical Facility Types	Critical Facilities at Risk	Potential Impacts
Emergency Response Departments (EOC, Fire, Police, EMS), Hospitals	Crockett County: 1 EMS Facility, 1 Fire Facility, 1 Health Service Facility, 2 Police Facilities	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by rising floodwaters. • Flood-related rescues may be necessary at swift and low water crossings or in flooded neighborhoods where roads have become impassable, placing first responders in harm's way. • Evacuations may be required for entire neighborhoods because of rising floodwaters, further taxing limited response capabilities and increasing sheltering needs for displaced residents. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Washed out roads and bridges can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • First responders are exposed to downed power lines, contaminated and unusual debris, hazardous materials, and generally unsafe conditions.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters,	Crockett County: 3 Municipal Facilities, 1 U.S. Government Facility, 1 Transportation Facility	• Structures can be damaged by rising floodwaters. • Power outages could disrupt critical care. • Backup power sources could be damaged, inundated or otherwise inoperable. • Critical staff may be impacted and unable to report for duty, limiting response capabilities. • Evacuations may be necessary due to extended power outages, gas line ruptures, or inundation of facilities.

Critical Facility Types	Critical Facilities at Risk	Potential Impacts
Governmental Facilities		• Additional emergency responders and critical aid workers may not be able to reach the area for days. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. • Temporary break in operations may significantly inhibit post event evacuations. • Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Suppliers (food, gas, etc.)	Crockett County: 1 Food Facility	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	Crockett County: 2 Energy Utility Facilities, 8 Sewage and Water Facilities	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency service vehicles can be damaged by rising floodwaters. • Flood-related rescues may be necessary at swift and low water crossings or in flooded neighborhoods where roads have become impassable, placing emergency service workers in harm's way. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • Service responders are exposed to downed power lines, contaminated and unusual debris, hazardous materials, and generally unsafe conditions.

Historic loss estimates due to flood are presented in Table 10-5 below. Considering 36 flood events over a 29.5-year period, the frequency is approximately one event every year.

Table 10-5. Average Annualized Losses, January 1996–June 2025

Jurisdiction	Total Property & Crop Loss	Average Annual Loss Estimates
Crockett County	$1,840,300	$62,400

While all citizens are at risk of the impacts of a flood, forced relocation and disaster recovery disproportionately impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. In addition, due to factors like limited mobility, communication difficulties, medical needs, reliance on support services, transportation challenges, housing accessibility issues, and possible shortages in emergency shelter accommodations, the elderly, children, and people with disabilities are also disproportionately affected by flooding events. People who speak a language other than English

may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

The population over 65 in the Crockett County planning area is estimated at 19 percent of the total population and children under the age of 5 are estimated at 1 percent. The population with a disability is estimated at 17 percent of the total population. An estimated 9 percent of the planning area population live below the poverty level and 10 percent of the populations speak English "less than very well."

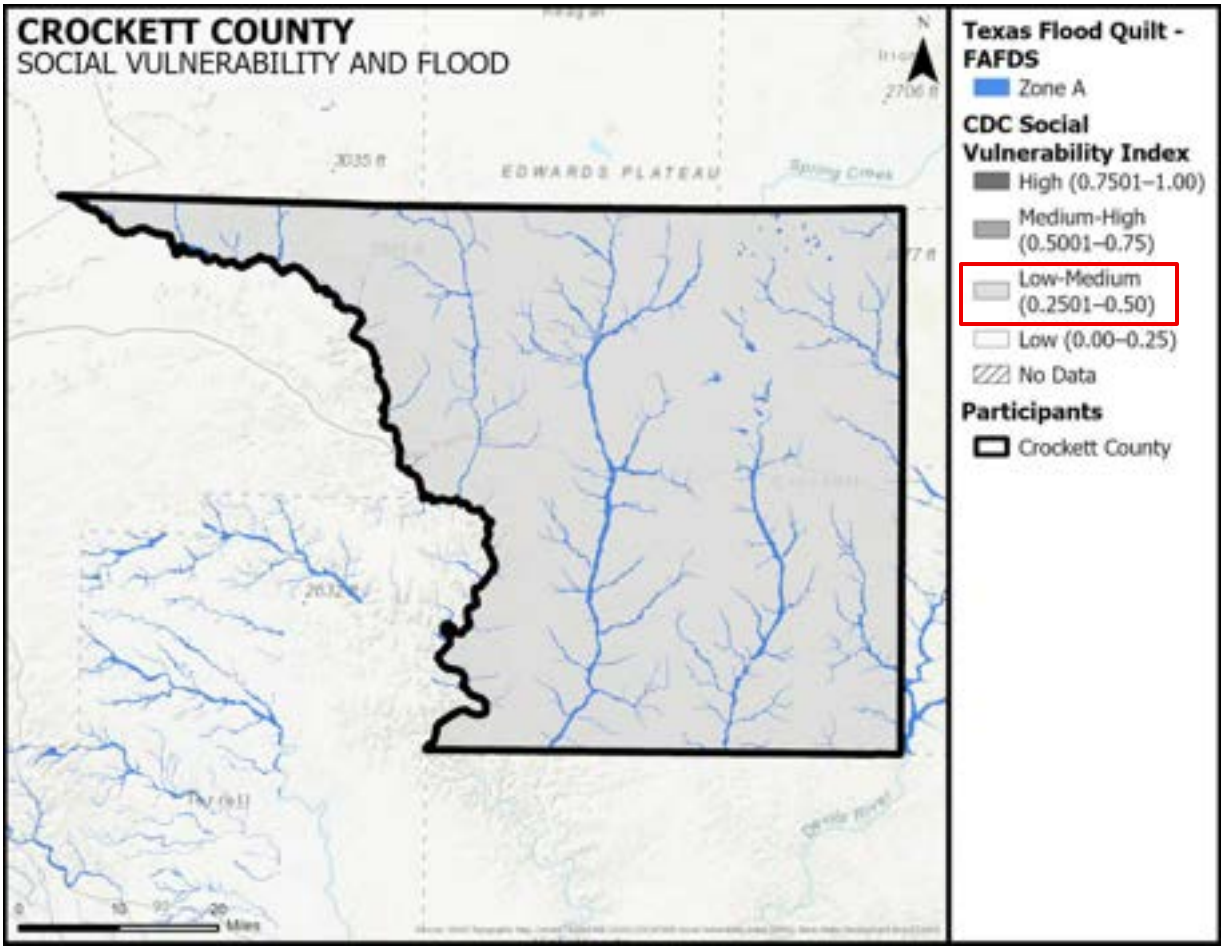
Table 10-6. Populations at Greater Risk[6]

Jurisdiction	Population				
	65 and Older	Under 5	With a Disability	Below Poverty Level	Limited English Speaking
Crockett County	537	36	491	262	295
CDP of Ozona	492	0	491	214	290

The Center for Disease Control (CDC) created a Social Vulnerability Index (SVI) which includes a database and mapping application that identifies and quantifies communities experiencing social vulnerability. The current CDC SVI uses 16 U.S. census variables from the 5-year American Community Survey (ACS) to identify communities that may need support before, during, or after disasters. All 16 variables fall under four broad categories including socioeconomic status (population in poverty, unemployment, etc.), household characteristics (age, disability status, etc.), racial and ethnic minority status, and housing type and transportation (mobile homes, no vehicles, etc.). Populations experiencing social vulnerability may be adversely impacted by natural hazards, disasters, and other community-level stressors. Figure 10-4 identifies areas of social vulnerability using the CDC's SVI and where these areas overlap with the Crockett County flood hazard areas.

[6] U.S. Census Bureau Five-Year estimates. Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.

Figure 10-4. Crockett County Social Vulnerability and Flood Hazard Areas



ASSESSMENT OF IMPACTS

Flooding is the deadliest natural disaster that occurs in the U.S. each year, and it poses a constant and significant threat to the health and safety of the people in the Crockett County planning area. Impacts to the planning area can include:

- Flood-related rescues may be necessary at swift water and low water crossings or in flooded neighborhoods where roads have become impassable, placing first responders in harm's way.
- Evacuations may be required for entire neighborhoods because of rising floodwaters, further taxing limited response capabilities and increasing sheltering needs for displaced residents.
- Health risks and threats to residents are elevated after the floodwaters have receded due to contaminated floodwaters (untreated sewage and hazardous chemicals) and mold growth typical in flooded buildings and homes.
- Significant flood events often result in widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.

- Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- Floods can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.
- First responders are exposed to downed power lines, contaminated and potentially unstable debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Emergency operations and services may be significantly impacted due to damaged facilities.
- Significant flooding can result in the inability of emergency response vehicles to access areas of the community.
- Critical staff may suffer personal losses or otherwise be impacted by a flood event and be unable to report for duty, limiting response capabilities.
- County departments may be flooded, delaying response and recovery efforts for the entire community.
- Private sector entities that the planning area and its residents rely on, such as utility providers, financial institutions, and medical care providers, may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- Some businesses not directly damaged by the flood may be negatively impacted while utilities are being restored or water recedes, further slowing economic recovery.
- When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Residential structures substantially damaged by a flood may not be rebuilt for years and uninsured or underinsured residential structures may never be rebuilt, reducing the tax base for the community.
- Large floods may result in dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- Recreation activities may be unavailable, and tourism can be unappealing for years following a large flood event, devastating directly related local businesses and negatively impacting economic recovery.
- Flooding may cause significant disruptions of clean water and sewer services, elevating health risks and delaying recovery efforts.

- The psychosocial effects on flood victims and their families can traumatize them for long periods of time, creating long term increases in medical treatment and services.
- Extensive or repetitive flooding can lead to decreases in property value for the affected community.
- Flood poses a potential catastrophic risk to annual and perennial crop production and overall crop quality, leading to higher food costs.
- Flood related declines in production may lead to an increase in unemployment.
- Large floods may result in loss of livestock, increased livestock mortality due to stress and waterborne disease, and increased cost for feed.

The overall extent of damage caused by floods is dependent on the extent, depth, and duration of flooding, in addition to the velocities of flows in the flooded areas. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a flood event.

NATIONAL FLOOD INSURANCE PROGRAM (NFIP) PARTICIPATION

Flood insurance offered through the National Flood Insurance Program (NFIP) is the best way for home and business owners to protect themselves financially against the flood hazard. Crockett County participates in the NFIP and is in good standing. Currently, the Census Designated Place (CDP) of Ozona itself is not an eligible entity to participate independently in the NFIP.

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, Crockett County does not participate in the CRS. Crockett County may evaluate their capacity for CRS participation in the next planning cycle. Crockett County currently has in place minimum NFIP standards for new construction and substantial improvements of structures. The County is considering adopting additional higher regulatory NFIP standards to limit floodplain development.

The flood hazard areas throughout Crockett County are subject to periodic inundation, which may adversely affect public safety, resulting in loss of life and property, health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief. Flood losses are created by the cumulative effect of obstructions in floodplains which cause an increase in flood heights and velocities. In addition, occupancy in flood hazard areas creates an increase in vulnerabilities to flood hazards as they typically are inadequately elevated, flood-proofed, or otherwise protected from flood damage. Mitigation actions are included to address flood maintenance issues as well, including routinely clearing debris from roadside ditches and bridges, and expanding drainage culverts and storm water structures to convey floodwater more adequately.

It is the purpose of Crockett County to continue to promote public health, safety, and general welfare by minimizing public and private losses due to flood conditions in specific areas. The County is guided by their local Flood Damage Prevention Ordinance. The County will continue to comply with NFIP requirements through their local permitting, inspection, and record-keeping

requirements for new and substantially developed construction. Further, the NFIP program promotes sound development in floodplain areas and includes provisions designed to:

- Protect human life and health;
- Minimize expenditure of public money for costly flood control projects;
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- Minimize prolonged business interruptions;
- Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in floodplains;
- Help maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to minimize future flood blight areas; and
- Ensure that potential buyers are notified that property is in a flood area.

In order to accomplish these tasks, Crockett County seeks to observe the following guidelines in order to achieve flood mitigation:

- Restrict or prohibit uses that are dangerous to health, safety, or property in times of flood, such as filling or dumping, that may cause excessive increases in flood heights or velocities;
- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction, as a method of reducing flood losses;
- Control the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters;
- Control filling, grading, dredging, and other development, which may increase flood damage; and
- Prevent or regulate the construction of flood barriers which will unnaturally divert floodwaters, or which may increase flood hazards to other lands.

NFIP COMPLIANCE AND MAINTENANCE

The County has developed mitigation actions that relate to either NFIP maintenance or compliance. Compliance and maintenance actions can be found in Section 20. Flooding was identified as a significant risk hazard during hazard ranking activities at the Risk Assessment Workshop by the majority of the planning team. As such, many of the mitigation actions were developed with flood mitigation in mind. A majority of these flood actions address compliance with the NFIP and implementing flood awareness programs. The County recognizes the need and is working towards adopting higher NFIP regulatory standards to further minimize flood risk. In addition, the County focuses on public flood awareness activities. This includes promoting the availability of flood insurance.

The County has a designated floodplain administrator. All floodplain administrators in the planning area will continue to maintain compliance with the NFIP, including continued floodplain administration, zoning ordinances, and development regulation. The floodplain ordinance outlines the minimum requirements for development in Special Flood Hazard Areas.

The County has a permitting process in place, and the local floodplain administrator is responsible for coordinating inspections of damaged homes located in the floodplain. Following a flood event, local officials inspect damaged homes to make a substantial damage determination. Substantially damaged homes must be brought into compliance. Similarly, proposed improvements to homes located in the floodplain are reviewed by local building officials to determine if a substantial improvement is proposed. The floodplain administrator oversees permitted repairs and improvements to ensure compliance during the rebuilding or improvement process.

REPETITIVE LOSS

The Flood Mitigation Assistance (FMA) Grant Program under FEMA provides federal funding to assist states and communities in implementing mitigation measures to reduce or eliminate the long-term risk of flood damage to buildings that are insured under the National Flood Insurance Program. The Texas Water Development Board (TWDB) administers the FMA grant program for the State of Texas. One of the goals of the FMA program is to reduce the burden of repetitive loss and severe repetitive loss properties on the NFIP through mitigation activities that significantly reduce or eliminate the threat of future flood damages.

Repetitive Loss properties are defined as structures that are:

- Any insurable building for which 2 or more claims of more than $1,000 each, paid by the National Flood Insurance Program (NFIP) within any 10-year period, since 1978;
- May or may not be currently insured under the NFIP.

Severe Repetitive Loss properties are defined as structures that are:

- Covered under the NFIP and have at least 4 flood related damage claim payments (building and contents) over $5,000.00 each, and the cumulative amount of such claims payments exceed $20,000; or
- At least 2 separate claim payments (building payments only) have been made, with the cumulative amount of the building portion of such claims exceeding the market value of the building.

In either scenario, at least 2 of the referenced claims must have occurred within any 10-year period and must be greater than 10 days apart.[7]

Crockett County currently has no repetitive loss or severe repetitive loss properties.

[7] Source: Texas Water Development Board

Section 11
Hail

SECTION 11: HAIL

HAZARD DESCRIPTION

Hailstorm events are a potentially damaging outgrowth of severe thunderstorms. During the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere, and the subsequent cooling of the air mass. Frozen droplets gradually accumulate into ice crystals until they fall as precipitation that is round or irregularly shaped masses of ice typically greater than 0.75 inches in diameter. The size of hailstones is a direct result of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a by-product of heating on the Earth's surface. Higher temperature gradients above Earth's surface result in increased suspension time and hailstone size.

According to the National Insurance Crime Bureau (NICB), between 2018 and 2020 the State of Texas had the greatest number of hail loss claims in the U.S. with 605,866 loss claims (23 percent of total hail claims in the U.S.) due to hail events. In this two-year period Texas experienced a total of 584 severe hail days. Five of the top ten cities for hail loss claims between 2017 and 2019 were in Texas, three of which were in the Dallas-Fort Worth metropolitan area.[1]

In 2021, 6.8 million properties in the U.S. experienced one or more damaging hail events, resulting in a total of $16.5 billion in insured losses. Texas had the highest number of properties affected by hail with over 1.5 million properties or 17 percent of total properties in the state affected; an increase of 80,000 properties affected between 2020 and 2021. Texas hailstorms accounted for almost a quarter of total U.S. properties affected by hail in 2021.

LOCATION

Hailstorms are an extension of severe thunderstorms that could potentially cause severe damage. As a result, they are not confined to any specific geographic location and can vary greatly in size, location, intensity, and duration. Therefore, the entire Crockett County planning area is equally at

[1] Manasek, Thomas, "2018-2020 United States Hail Loss Claims and Questionable Claims" (National Insurance Crime Bureau, March 15, 2021). http://www.rmiia.org/downloads/PUBLIC%202018%20-%202020%20Hail%20foreCAST-%20TJM.pdf

risk to the hazard of hail. Refer to Figure 11-1 for the location of past hail events in the planning area.

EXTENT

The National Weather Service (NWS) classifies a storm as "severe" if there is hail three-quarters of an inch in diameter (approximately the size of a penny) or greater, based on radar intensity or as seen by observers. The intensity category of a hailstorm depends on hail size and the potential damage it could cause, as depicted in the National Centers for Environmental Information (NCEI) Intensity Scale in Table 11-1.

Table 11-1. Hail Intensity and Magnitude[2]

Size	Intensity Category	Size (Diameter 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 – 1.20	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

The intensity scale in Table 11-1 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. Based on the best available data regarding the previous occurrences for the area, the Crockett County planning area may experience hailstorms ranging from an H0 (pea size) to an H8 (hen egg size). The largest size hail to be reported since 1996 was 3.0 inches in diameter, or an H8, which is considered a very destructive

[2] NCEI Intensity Scale, based on the TORRO Hailstorm Intensity Scale.

hailstorm that can cause severe structural damage and potentially serious injuries. An event of this magnitude occurred in the planning area on April 30, 2019. This is likely the greatest extent the planning area can anticipate in the future, based on historical events.

HISTORICAL OCCURRENCES

Historical evidence shown in Figure 11-1 demonstrates that the planning area is vulnerable to hail events overall. Historical hail events in the Crockett County planning area resulting in damages, injuries, or fatalities are shown in Table 11-2. A total of 100 reported historical hail events impacted the planning area between January 1996 and June 2025; these events were reported to NCEI and NOAA databases and may not represent all hail events to have occurred during the past 29.5 years. Only those events for the Crockett County planning area with latitude and longitude available were plotted (Figure 11-1).

Figure 11-1. Spatial Historical Hail Events, January 1996–June 2025

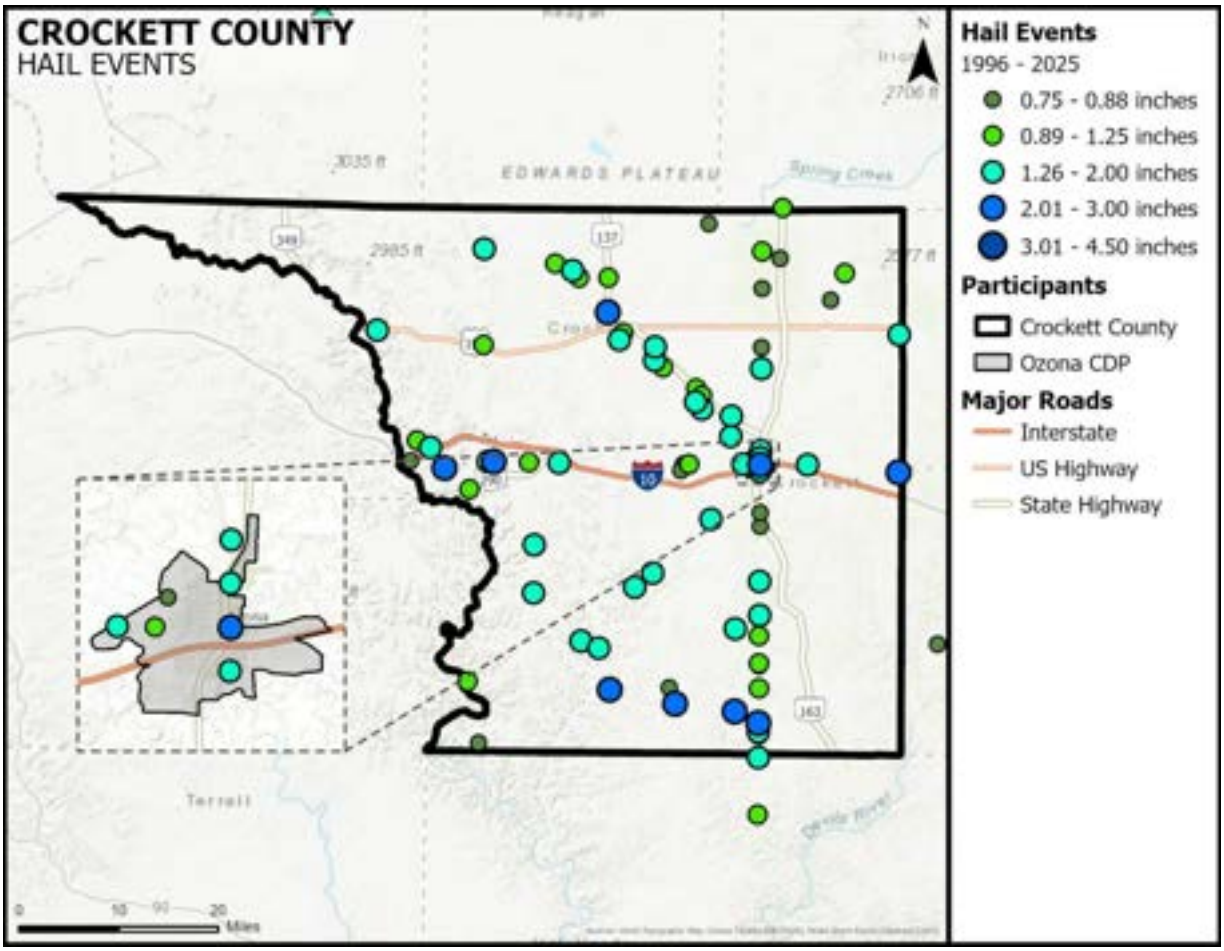


Table 11-2. Damaging Historical Hail Events, January 1996–June 2025[3]

Jurisdiction	Date	Magnitude (Inches)	Deaths	Injuries	Property Damage	Crop Damage
Crockett County	4/7/2002	2.5	0	0	$45,100	$0
Crockett County	3/30/2007	1.75	0	0	$3,200	$0
CDP of Ozona	3/15/2005	1.75	0	0	$1,700	$0
Crockett County	4/13/2019	1.75	0	0	$700	$0
Totals			**0**	**0**	**$50,700**	**$0**

Table 11-3. Historical Hail Events Summary, January 1996–June 2025

Jurisdiction	Number of Events	Max Magnitude (Inches)	Deaths	Injuries	Property Damage	Crop Damage
Crockett County	82	2.75	0	0	$49,000	$0
CPD of Ozona	18	3	0	0	$1,700	$0
Totals	**100**	**3**	**0**	**0**	**$50,700**	**$0**

Based on the list of historical hail events for Crockett County planning area, 44 events were reported to the NCEI since the 2012 Plan.

SIGNIFICANT EVENTS

April 7, 2002

During a severe thunderstorm outbreak in West Central Texas, afternoon hail up to the size of baseballs fell over eastern Crockett County. At least one home suffered extensive damage, including many broken windows and its roof destroyed. Additionally, several automobiles suffered shattered windshields and extensive dent damage. Total damages were estimated at $45,100 (2026 dollars).

April 13, 2019

An isolated supercell thunderstorm developed over Crockett County, producing large hail over portions of the county. In Twistflower Ranch off County Road 208, golf ball size hail shattered the windshield of an automobile. Total damages were estimated at $700 (2026 dollars).

PROBABILITY OF FUTURE EVENTS

Based on available records of historic events, 100 events in a 29.5-year reporting period for the Crockett County planning area provides an average annual occurrence of approximately three to

[3] Monetary damages have been inflated to their 2025 value. No reports of injuries or fatalities were recorded in the NCEI database between 1996 and 2025. Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.

four events per year. This frequency supports a “Highly Likely” probability of future events for the planning area, with an event probable within the next year.

CLIMATE CHANGE CONSIDERATIONS

Although the impact of climate change on the frequency and severity of hail events is uncertain, some climate studies attempt to give insight into the future conditions of hailstorms. As ocean temperatures rise due to climate change, more moisture is evaporating into the atmosphere. The warm and moist air masses that fuel severe weather may become more unstable on average, which could favor the increased development of thunderstorms and hail. However, it is also suggested that in a warming climate, the average melting level will rise in thunderstorms, meaning small hailstones will have more of a chance to melt as they fall to the ground. Therefore, hail may become less frequent, but large hail can be expected when it does occur, leading to the possibility of increased damages.[4]

VULNERABILITY AND IMPACT

Crops are typically the most vulnerable to the impacts of hail. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are most damaged by hail. Utility systems on roofs of buildings and critical facilities would be vulnerable and could be damaged. Hail could cause a significant threat to people, as they could be struck by hail and falling trees and branches. Outdoor activities and events may elevate the risk to residents and visitors when a hailstorm strikes with little warning. Portable buildings typically utilized by schools and commercial sites such as construction areas would be more vulnerable to hail events than the typical site-built structures.

The Crockett County planning area features mobile or manufactured homes throughout the planning area. These structures are typically more vulnerable to hail events than typical site-built structures. The U.S. Census data indicates a total of 226 (13 percent of total housing stock) manufactured homes located in the planning area. In addition, 55 percent (952 structures) of the housing structures in the Crockett County planning area were built before 1980. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during hail events.

Table 11-4. Structures at Greater Risk to Hail[5]

Jurisdiction	Structures	
	SFR Built Before 1980	Manufactured Homes
Crockett County	952	226
CDP of Ozona	767	163

While all citizens are at risk of the impacts of hail, forced relocation and disaster recovery disproportionately impacts low-income residents who lack the financial means to travel, afford a

[4] Yale Climate Connections, Hailstorms and Climate Change, March 17, 2022.
[5] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county’s population resides.

long-term stay away from home, and to rebuild or repair their homes. An estimated 9 percent of the planning area population live below the poverty level (Table 11-5). While warning times for this type of hazard events should be substantial enough for these individuals to seek shelter, the elderly, children, and people with a disability may have trouble taking shelter due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

Table 11-5. Populations at Greater Risk by Jurisdiction[6]

Jurisdiction	Population				
	65 and Older	Under 5	With a Disability	Below Poverty Level	Limited English Speaking
Crockett County	537	36	491	262	295
CDP of Ozona	492	0	491	214	290

The Crockett County Planning Team identified the following critical facilities (Table 11-6) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by hail events. For a comprehensive list, please see Appendix D.

Table 11-6. Critical Facilities Vulnerable to Hail

Critical Facility Type	Potential Impacts
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by hailstones. • Power outages could disrupt communications, delaying emergency response times. • Accumulated hail on the streets may impede emergency response vehicle access to areas.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Structures can be damaged by hailstones. • Power outages could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary due to extended power outages, gas line ruptures, or structural damage to facilities. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations.

[6] US Census Bureau 2024 ACS data. Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.

Critical Facility Type	Potential Impacts
	• Temporary break in operations may significantly inhibit post event evacuations. • Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Supplier (Food, fuel, etc.)	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Power outages could disrupt communications, delaying emergency response times. • Accumulated hail on the streets may impede service response vehicle access to areas.

Historically, no injuries have been reported due to hail within the Crockett County. The total loss estimate of property and crops in the planning area is $50,700 (2026 dollars) with an average annualized loss of $1,700. Based on historic loss and damages, the impact of hail on the Crockett County planning area is considered “Limited” severity of impact, meaning minor quality of life lost, critical facilities and services shut down for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

Table 11-7. Estimated Annualized Losses[7]

Jurisdiction	Total Property & Crop Loss	Average Annual Loss Estimates
Crockett County	$49,000	$1,600
CDP of Ozona	$1,700	$100
Planning Area	**$50,700**	**$1,700**

ASSESSMENT OF IMPACTS

Hail events have the potential to pose a significant risk to people and can create dangerous situations. Hail conditions can be frequently associated with a variety of impacts, including:

- Hail may create hazardous road conditions during and immediately following an event, potentially delaying critical staff from reporting for duty as well as delaying first responders from providing for or preserving public health and safety.
- Individuals and first responders who are exposed to the storm may be struck by hail, falling branches, or downed trees resulting in injuries or possible fatalities.

[7] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county’s population resides.

- Large hail events will likely cause extensive roof damage to residential structures along with siding damage and broken windows, creating a spike in insurance claims and a rise in premiums, and potentially result in physical harm to occupants.
- Automobile damage may be extensive depending on the size of the hail and length of the storm.
- Hail events can result in power outages over widespread areas increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- First responders are exposed to downed power lines, damaged structures, hazardous spills, and debris that often accompany hail events, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Some businesses not directly damaged by the hail event may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damage without a backup power source.
- Depending on the severity and scale of damage caused by large hail events, damage to power transmission and distribution infrastructure can require days or weeks to repair.
- A significant hail event could significantly damage agricultural crops, resulting in extensive economic losses for the community and surrounding area.
- Hail events may injure or kill livestock and wildlife or destroy wildlife habitat.
- A large hail event could impact the accessibility of recreational areas and parks due to extended power outages or debris clogged access roads.
- Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There are three historical sites listed on the National Register of Historic Places in Crockett County.

The economic and financial impacts of hail will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning conducted by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of any hail event.

Section 12

Hurricane / Tropical Storm

SECTION 12: HURRICANE / TROPICAL STORM

HAZARD DESCRIPTION

According to the National Oceanic and Atmospheric Administration (NOAA), a hurricane is an intense tropical weather system of strong thunderstorms with well-defined surface circulation and maximum sustained winds of 74 mph or higher. In the Northern Hemisphere, circulation of winds near the Earth's surface is counterclockwise.

Hurricanes often begin as tropical depressions that intensify into tropical storms when maximum sustained winds increase to between 35–64 knots (39–73 mph). At these wind speeds, the storm becomes more organized and circular in shape and begins to resemble a hurricane. Tropical storms can be equally problematic without ever becoming a hurricane. Tropical storms resulting in high winds and heavy rainfall can be dangerous to people and property, as Tropical Storm Frances was for southeast Texas in September 1998. Once sustained winds reach or exceed 74 mph, the storm becomes a hurricane. The intensity of a landfalling hurricane is expressed in categories relating wind speeds to potential damage. Tropical storm-force winds are strong enough to be dangerous to those caught in them. For this reason, emergency managers plan to have evacuations completed and personnel sheltered before winds of tropical storm-force arrive, which precedes the arrival of hurricane-force winds.

LOCATION

The location of the Crockett County planning area is approximately 170 miles from the coast, making the planning area vulnerable primarily to threats indirectly related to a hurricane event, such as excessive precipitation and flooding. There is a low risk of hurricanes and tropical storms with wind speeds up to 200 miles per hour impacting Crockett County, typically during the official Atlantic U.S. hurricane season (June to November).

EXTENT

As a hurricane develops, the barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can

intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour, the storm is deemed a hurricane.

Hurricanes are categorized according to the strength and intensity of their winds using the Saffir-Simpson Hurricane Scale (Table 12-1). A Category 1 storm has the lowest wind speeds, while a Category 5 hurricane has the highest. However, a lower category storm can inflict potentially greater damage than higher category storms depending on where they strike, the amount of storm surge, weather they interact with, and the speed at which they move.

Table 12-1. Extent Scale for Tropical Cyclones[1]

Classification	Maximum Sustained Wind Speed (mph)	Minimum Surface Pressure (Millibars)	Storm Surge (Feet)
Tropical Depression	< 39	Greater than 1000	1 - 3
Tropical Storm	39 - 73	Greater than 1000	1 - 3
Category 1	74 – 95	970 - 980	3 – 5
Category 2	96 – 110	979 – 965	6 – 8
Category 3	111 – 130	964 – 945	9 – 12
Category 4	131 – 155	944 – 920	13 – 18
Category 5	155+	Less than 920	19+

Based on historical storm tracks and the location of Crockett County outside of the hurricane wind hazard area, the maximum extent to anticipate in the future is a tropical storm.

HISTORICAL OCCURRENCES

Typical hurricanes are about 300 miles wide although they can vary considerably in size. Hurricane-force winds can extend outward to about 25 miles in a small hurricane and to more than 150 miles for a large one. Tropical storm-force winds can stretch out as far as 300 miles from center of a large hurricane.[2] According to the historical hurricane tracks from NOAA's National Hurricane Center, there have been 13 storms known to have come within 300 miles of the Cameron County planning area from January 1996 through June 2025. However, only one of these events impacted the planning area. The last known system to track across Cameron County was Tropical Storm Erin in 2007.

[1] Source: National Hurricane Center, https://www.nhc.noaa.gov/HAW2/english/basics/saffir_simpson.shtml
[2] Source: NOAA, https://www.weather.gov/source/zhu/ZHU_Training_Page/tropical_stuff/hurricane_anatomy/hurricane_anatomy.html.

SECTION 12: HURRICANE / TROPICAL STORM

Crockett County is located inland and is not directly along the coastline. As tropical cyclones typically form over the ocean and affect coastal areas, the Crockett County planning area is less prone to direct impacts from hurricanes. Hurricanes typically downgrade to tropical storms or tropical depressions as they move away from the coast. However, it is important to note that the remnants of tropical systems, including hurricanes, can still bring heavy rainfall and potential flooding to inland areas.

The last known system to track across Crockett County was Hurricane Erin in 2007. Historical systems that have impacted the planning area, bringing storm systems, excessive precipitation and potentially damaging wind to the Crockett County planning area are presented in Table 12-2 below.

Table 12-2. Historical Hurricane / Tropical Storm Events, January 1996–June 2025[3]

Date	Storm Name	Category (Max)
08/15/2007 – 08/19/2007	Erin	Tropical Storm

According to the historical hurricane tracks from NOAA's National Hurricane Center and data from the National Center for Environmental Information (NCEI), there has been 1 storm known to have impacted the Crockett County planning area from January 1996 through June 2025. Table 12-3 lists the NCEI reports associated with these storms. Not all events reported by the NOAA National Hurricane Center are reported by the NCEI, so some damages and events may be unreported or underreported. Historical hurricane data is provided on a countywide basis per the NCEI and NOAA databases.

Table 12-3. Historical Hurricane Events, January 1996–June 2025[4]

Jurisdiction	Date	Storm Name	Category (Max)	Deaths	Injuries	Property and Crop Damage
Crockett County	8/16/2007	Erin	Tropical Storm	0	0	$0
Totals				**0**	**0**	**$0**

Based on the list of historical hurricane events for the Crockett County planning area, no events have occurred since the 2012 Plan.

SIGNIFICANT EVENTS

There has been 1 emergency declaration that included Crockett County between January 1996 and June 2025 (Table 12-4) related to hurricane or tropical storm events. This declaration was issued for all 254 counties in Texas to assist with mass evacuations and sheltering following Hurricane Katrina.

[3] Source: NOAA Historical Hurricane Tracks, https://coast.noaa.gov/hurricanes/#map=4/32/-80
[4] Values are in 2026 dollars.

Table 12-4. Disaster Declarations for Hurricane / Tropical Storm, January 1996–June 2025[5]

Year	Declaration Title	Declaration Type	Disaster No.
2005	Hurricane Katrina Evacuation	EM	3216

Tropical Storm Erin on August 15 – August 19, 2017
On August 16, 2007, Tropical Storm Erin made landfall just north of Corpus Christi. Erin then weakened into a tropical depression while moving inward over West Texas over the next few days. As Erin started to track across the Crockett County planning area, over 9 inches of rain fell, and wind gusts were up to around 48 mph. Because of the amount of rain, flash flooding caused several roads to close.

PROBABILITY OF FUTURE EVENTS

Based on historical occurrences of hurricane events, the probability of future events is “Unlikely”, with an event probable in the next ten years for the Crockett County planning area.

CLIMATE CHANGE CONSIDERATIONS

Hurricane and tropical storm events have the potential to pose a significant risk to people and property. Such events can create dangerous situations for public health and safety officials and cause catastrophic damages. The impact of climate change could produce larger, more severe hurricane events, exacerbating the current hurricane impacts. The economic and financial impacts of hurricanes and tropical storms will depend entirely on the scale of the events, what is damaged, and how quickly repairs to critical components of the economy can be implemented.

The current climate assessment report for Texas indicates an expected increase in the intensity of very strong hurricanes, despite an expected lack of increase, or even a decrease, in hurricane frequency overall. Different research studies have produced some conflicting results. While some recent research has pointed to an apparent trend for U.S. tropical cyclones to move more slowly at landfall, much like Hurricane Harvey, other research suggests that Texas may be spared from such a slowdown. At this point, the enhanced risk is difficult to quantify, but substantial scientific progress on this topic is likely as climate models become better able to simulate the observed spatial distribution, frequency, and intensity of hurricanes.[6]

VULNERABILITY AND IMPACT

Hurricane and tropical storm events can cause major damage to large areas; hence, all existing buildings, facilities, and populations are equally exposed and vulnerable to this hazard and could potentially be impacted. The Crockett County planning area features manufactured homes throughout the planning area. These homes are typically more vulnerable to hurricane events

[5] Emergency declarations for Hurricane Katrina included the Crockett County planning area in order to allow pre-deployment of resources as regional evacuee hub, not as a result of damages associated with the storms.
[6] Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.

than typical site-built structures. The U.S. Census data indicates a total of 226 (13 percent of total housing stock) manufactured homes located in the Crockett County planning area. In addition, 55 percent of the single family residential (SFR) structures in Crockett County were built before 1980. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant events. Table 12-5 shows the more vulnerable structures identified in the county.

Table 12-5. Structures at Greater Risk[7]

Jurisdiction	Structures	
	SFR Built Before 1980	Manufactured Homes
Crockett County	952	226
Ozona CDP	767	163

The planning team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by hurricane and tropical storm events. For a comprehensive list, please see Appendix D.

Table 12-6. Critical Facilities Vulnerable to Hurricane and Tropical Storm Events

Critical Facilities	Potential Impacts
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling trees or flying debris. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Debris/downed trees can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.

[7] U.S. Census Bureau American Community Survey Five-Year Estimates 2020-2024 data for Crockett County. Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.

Critical Facilities	Potential Impacts
Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Structures can be damaged by falling trees or flying debris. • Power outages could disrupt critical care. • Backup power sources could be damaged. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Evacuations may be necessary due to extended power outages, gas line ruptures, or structural damages to facilities.
Commercial Supplier (food, fuel, etc.)	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed. • Additional emergency responders and critical aid workers may not be able to reach the area for days.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling trees or flying debris. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Debris/downed trees can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.

Table 12-7 shows impact or loss estimation for storms impacting Crockett County. Damages in the NCEI database are reported on a countywide basis. Annual loss estimates were based on the 29.5-year reporting period. The average annual loss estimate for the Crockett County planning area is considered negligible.

Table 12-7. Summary of Annualized Losses, January 1996–June 2025

Jurisdiction	Total Property & Crop Loss	Average Annual Loss Estimates
Crockett County	$0	$0

With limited reported damages and no reported injuries or fatalities, the potential severity of impact from a hurricane event for the Crockett County planning area is considered to be “Limited”,

meaning injuries and illnesses are treatable with first aid, shutdown of critical facilities and services for 24-hours or less, and less than ten percent of property destroyed or with major damage.

ASSESSMENT OF IMPACTS

Hurricane and tropical storm events have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. The impact of climate change could produce larger, more severe hurricane events, exacerbating the current hurricane impacts. Impacts to the planning area can include:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Driving conditions in the planning area may be dangerous during a hurricane event, especially over elevated bridges, elevating the risk of injury and accidents during evacuations if not timed properly.
- Emergency evacuations may be necessary prior to a hurricane landfall, requiring emergency responders, evacuation routing, and temporary shelters.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- During hurricane landfall, first responders may be prevented from responding to calls as the winds may reach a speed in which their vehicles and equipment are unsafe to operate.
- Hurricane events often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage often results in an increase in structure fires and carbon monoxide poisoning as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- Extended power outages can also be deadly for individuals reliant on electricity to live independently in their homes.
- Extreme hurricane events may rupture gas lines and down trees and power lines, increasing the risk of structure fires during and after a storm event.
- Extreme hurricane events may lead to prolonged evacuations during search and rescue, and immediate recovery efforts requiring additional emergency personnel and resources to prevent entry, protect residents, and protect property.
- First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications.
- Critical staff may be unable to report for duty, limiting response capabilities.
- County departments may be damaged, delaying response and recovery efforts for the entire community.

- Private sector entities that the County and residents rely on, such as utility providers, financial institutions, and medical care providers, may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- Some businesses not directly damaged by the hurricane may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to hurricane damage. In Crockett County, 55 percent of homes were built before 1980, and 3 buildings and sites in the County are on the National Register of Historic Places, many of which pre-date modern building codes.
- Vegetation in urban parks may become flattened or oversaturated from high winds and heavy rains.
- Large scale hurricanes can have significant economic impact on the affected area, as it must now fund expenses such as infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damage without a backup power source.
- While the Crockett County planning area continues to see a decrease in population, structure and infrastructure exposure remains constant. Continued public education on the planning area's risks to hurricane and tropical storm events will continue to be key to the Planning Teams overall mitigation strategy.

The economic and financial impacts of hurricane events on the area will depend on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any hurricane event.

Section 13
Lightning

SECTION 13: LIGHTNING

HAZARD DESCRIPTION

Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes thunder which often accompanies lightning strikes. While most often affiliated with severe thunderstorms, lightning often strikes outside of heavy rain and might occur as far as 10 miles away from any rainfall.

According to the National Weather Service (NWS), the 10-year (2012–2021) average for fatalities is 23 people with an average of 300 injuries in the United States each year by lightning. Lightning can occur as cloud to ground flashes or as intra-cloud lightning flashes. Direct lightning strikes can cause significant damage to buildings, critical facilities, infrastructure, and communication equipment affecting emergency response. Lightning is also responsible for igniting destructive wildfires.

LOCATION

Lightning can strike in any geographic location and is considered a common occurrence in Texas. The Crockett County planning area is in a region of the country that is moderately susceptible to lightning strikes, with the area uniformly exposed to the unmitigated threat of lightning.

EXTENT

According to the 2025 Annual Lightning Report by Vaisala, the State of Texas ranks sixth in the U.S. for lightning strike density with an average of 176.4 flashes per square mile.[1] Vaisala's U.S. National Lightning Detection Network lightning flash density map shows an average of 73 lightning events per square mile per year for the Crockett County planning area. This rate equates to approximately 57,300 flashes per year for the entire planning area, or one to two flashes per 15-minute interval during storm events.

[1] Source: https://www.xweather.com/annual-lightning-report

SECTION 13: LIGHTNING

HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) database indicates no recorded lightning events for the Crockett County planning area. It is highly likely multiple lightning occurrences have gone unreported before and during the recording period. The NCEI is a national data source organized under the National Oceanic and Atmospheric Administration and considered a reliable resource for hazards. However, the flash density for the planning area along with input from local team members indicates regular lightning occurrences that simply have not been reported.

PROBABILITY OF FUTURE EVENTS

Based on historical records and input from the County, the probability of occurrence for future lightning events in the Crockett County planning area is considered “Highly Likely”, or an event probable in the next year. The county confirmed that lightning occurs regularly in the area. According to the 2025 Annual Lightning Report by Vaisala, the Crockett County planning area is located in an area of the country that experiences approximately 73 lightning flashes per square mile per year (approximately 57,300 flashes per year). Given this estimated return interval, it can be expected that future lightning events will continue to threaten life and cause property damage throughout the planning area.

CLIMATE CHANGE CONSIDERATIONS

As CO_2 increases and the land surface warms, stronger updrafts are more likely to produce lightning. In a climate with double the amount of CO_2, we may see fewer lightning storms overall, but 25 percent stronger storms, with a 5 percent increase in lightning. Lightning damage is also likely to increase because of its role in igniting forest fires, where dry vegetation, also caused by rising temperatures, creates more ‘fuel’ for fires, so even a small climate change may have huge consequences. While the impact climate change will have on our weather still remains uncertain, researchers agree that implementing simple measures like lightning detection systems and installing grounding systems in buildings could go a long way in avoiding deaths and injuries.[2]

Lightning events have the potential to pose a significant risk to people and property throughout the Crockett County planning area. The economic and financial impacts of lightning on the area will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. While no increase in the number of hazard events is anticipated, the impact of the hazard may see an increase in losses. As populations grow and urban development continues to rise, the overall vulnerability and impact are expected to increase in the next five years.

VULNERABILITY AND IMPACT

Vulnerability is difficult to evaluate since lightning events can occur at different strength levels, in random locations, and can create a broad range of damage depending on the strike location. Due to the randomness of these events, all existing and future structures and facilities in the Crockett

[2] Environmental Journal, Nathan Neal, January 11, 2021.

SECTION 13: LIGHTNING

County planning area could potentially be impacted and remain vulnerable to possible injury and property loss from lightning strikes.

The direct and indirect losses associated with these events include injury and loss of life, damage to structures and infrastructure, agricultural losses, utility failure (power outages), and stress on community resources. The entire population of the Crockett County planning area are considered exposed to the lightning hazard. The peak lightning season in the State of Texas is from June to August; however, the most fatalities occur in July. Fatalities occur most often when people are outdoors and/or participating in some form of recreation. The population located outdoors during a lightning event is considered at risk and more vulnerable to a lightning strike compared to those inside a structure. Moving to a lower risk location will decrease a person's vulnerability.

The entire general building stock and all infrastructure of the Crockett County planning area are considered exposed to the lightning hazard. Lightning can be responsible for damages to buildings, cause electrical, forest and/or wildfires, and damage infrastructure such as power transmission lines and communication towers.

While all citizens are at risk to the impacts of lightning, forced relocation and disaster recovery disproportionately impacts low-income residents who lack the financial means to repair their homes. An estimated 9 percent of the planning area population live below the poverty level. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures. Table 13-1 lists these vulnerable populations and several others for Crockett County.

Table 13-1. Populations at Greater Risk[3]

Jurisdiction	Population				
	65 and Older	Under 5	With a Disability	Below Poverty Level	Limited English Speaking
Crockett County	537	36	491	262	295
Ozona CDP	492	0	491	214	290

Crockett County identified the following critical facilities (Table 13-2) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by lightning events. For a comprehensive list, please see Appendix D.

[3] US Census Bureau, American Community Survey Five-Year Estimates, 2024. Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the County's population resides.

Table 13-2. Critical Facilities Vulnerable to Lightning Events

Critical Facilities	Potential Impacts
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to power outages, damaged facilities, fires and/or loss of communications as a result of lightning strikes. • Emergency vehicles, including critical equipment, can be damaged by lightning strikes or by falling trees damaged by lightning. • Power outages could disrupt communications, delaying emergency response times. • Downed trees due to lightning strikes can impede emergency response vehicle access to areas. • Lightning strikes can be associated with structure fires and wildfires, further straining the capacity and resources of emergency personnel.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Structures can be damaged by falling trees damaged by lightning. • Power outages could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary due to extended power outages, fires, or other associated damages to facilities.
Commercial Supplier (food, fuel, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed. • Economic disruption due to power outages and fires negatively impact airport services as well as area businesses reliant on airport operations.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and critical services may be significantly impacted due to power outages, damaged facilities, fires and/or loss of communications as a result of lightning strikes. • Emergency vehicles, including critical equipment, can be damaged by lightning strikes or by falling trees damaged by lightning. • Power outages could disrupt communications, delaying emergency response times. • Downed trees due to lightning strikes can impede emergency response vehicle access to areas. • Lightning strikes can be associated with structure fires and wildfires, further straining the capacity and resources of emergency personnel.

There are no recorded fatalities or injuries within the Crockett County planning area. Additionally, there are no reports of lightning damage to property in the planning area according to NCEI data. These limited historical losses and damages as a result of lightning events, indicate a “Limited” impact, with minimal quality of life lost, critical facilities and services shut down for 24 hours or

less, and less than 10 percent of property destroyed. Overall, the total loss estimate for the planning area is considered negligible.

Table 13-3. Estimated Annualized Losses[4]

Jurisdiction	Total Property & Crop Loss	Average Annual Loss Estimates
Crockett County	$0	$0
Ozona CDP	$0	$0
Totals	**$0**	**$0**

ASSESSMENT OF IMPACTS

Lightning events have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. Additional impacts to the planning area can include:

- The Crockett County planning area features developed parks and green spaces. Lightning events could impact recreational activities, placing residents and visitors in imminent danger, potentially requiring emergency services or park evacuation.
- Older structures built to less stringent building codes may suffer greater damage from a lightning strike as they are typically built with less fire-resistant materials and often lack any fire mitigation measures such as sprinkler systems. 55 percent of homes in Crockett County were built before 1980. Similarly, historic buildings may lack fire mitigation materials or measures due to their historic status. Three historic sites in Crockett County are listed on the National Register of Historic Places.
- Vegetation in urban parks may be destroyed by lightning caused brush fires and result in poor air quality impacting public health.
- Individuals exposed to the storm can be directly struck, posing significant health risks and potential death.
- Structures can be damaged or crushed by falling trees damaged by lightning, which can result in physical harm to the occupants.
- Lightning strikes can result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage often results in an increase in structure fires and carbon monoxide poisoning as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- Lightning strikes can be associated with structure fires and wildfires, creating additional risk to residents and first responders.
- Emergency operations and services may be significantly impacted due to power outages and/or loss of communications.
- County departments may be damaged, delaying response and recovery efforts for the entire community.

[4] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the County's population resides.

- Economic disruption due to power outages and fires negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- Some businesses not directly damaged by lightning events may be negatively impacted while utilities are being restored, further slowing economic recovery.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damage without a backup power source.

The economic and financial impacts of lightning on the area will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any significant lightning event.

Section 14
Thunderstorm Wind

SECTION 14: THUNDERSTORM WIND

HAZARD DESCRIPTION

Thunderstorms create extreme wind events which includes straight-line winds. Wind is the horizontal motion of the air past a given point, beginning with differences in air pressures. Pressure that is higher at one place than another sets up a force pushing from high toward low pressure; the greater the difference in pressures, the stronger the force. The distance between the area of high pressure and the area of low pressure also determines how fast the moving air accelerates.

Thunderstorms are created when heat and moisture near the Earth's surface are transported to the upper levels of the atmosphere. By-products of this process are the clouds, precipitation, and wind that become the thunderstorm.

According to the National Weather Service (NWS), a thunderstorm occurs when thunder accompanies rainfall. Radar observers use the intensity of radar echoes to distinguish between rain showers and thunderstorms.

Straight-line winds 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

Thunderstorm wind events can develop in any geographic location and are considered a common occurrence in Texas. Therefore, a thunderstorm wind event could occur at any location within the Crockett County planning area. These storms develop randomly and are not confined to any geographic area within the planning area. It is assumed that the entire Crockett County planning area is uniformly exposed to the threat of thunderstorm winds.

EXTENT

The extent or magnitude of a thunderstorm wind event is measured by the Beaufort Wind Scale. Table 14-1 describes the different intensities of wind in terms of speed and effects, from calm to violent and destructive.

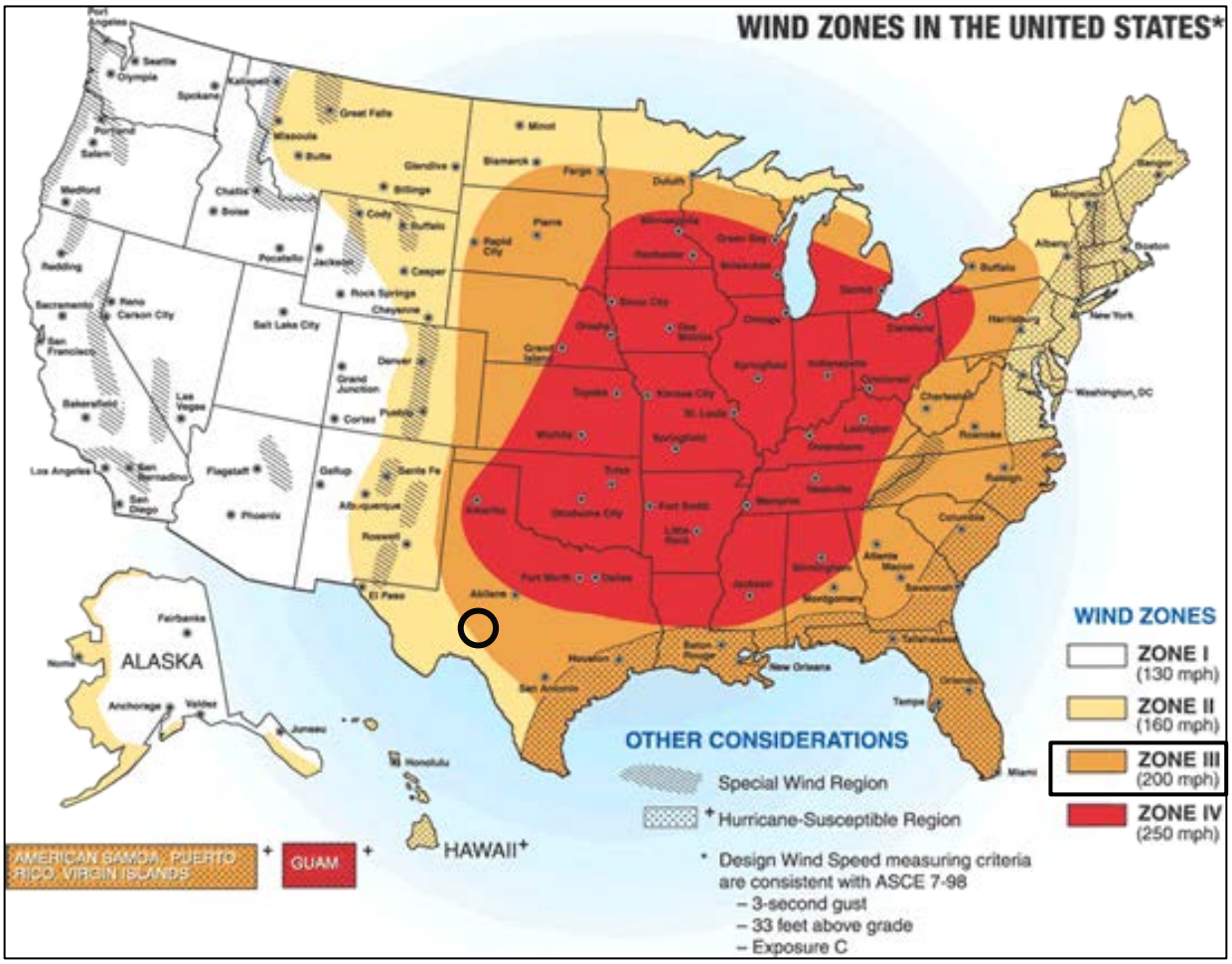
Table 14-1. Beaufort Wind Scale[1]

Force	Wind		WMO Classification	Appearance of Wind Effects
	(mph)	(knots)		
0	Less than 1	Less than 1	Calm	Calm, smoke rises vertically
1	1-3	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4-7	4-6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	7-10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	13-18	11-16	Moderate Breeze	Dust, leaves and loose paper lifted, small tree branches move
5	19-24	17-21	Fresh Breeze	Small trees in leaf begin to sway
6	25-31	22-27	Strong Breeze	Larger tree branches moving, whistling in wires
7	32-38	28-33	Near Gale	Whole trees moving, resistance felt walking against wind
8	39-46	34-40	Gale	Whole trees in motion, resistance felt walking against wind
9	47-54	41-47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	55-63	48-55	Storm	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	64-72	56-63	Violent Storm	If experienced on land, widespread damage
12	72-83	64-71	Hurricane	Violence and destruction

Figure 14-1 displays the wind zones as derived from NOAA.

[1] Source: World Meteorological Organization

Figure 14-1. Wind Zones in the United States[2]



On average, the planning area experiences approximately one to two thunderstorm wind events each year. The Crockett County planning area is located within Wind Zone III, meaning the planning area can experience maximum windspeeds up to 200 mph. The planning area has experienced a significant wind event, or an event with winds in the range of "Force 12" on the Beaufort Wind Scale with winds above 72 mph. The highest magnitude event occurred on June 23, 2017, with winds recorded at 74 knots, or approximately 85 mph. This is the worst to be anticipated for the entire planning area based on historic events.

HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) Storm Events database is a national data source organized under the National Oceanic and Atmospheric Administration (NOAA). The NCEI is the largest archive available for historic storm events data; however, it is important to note that only incidents recorded in the NCEI have been factored into this risk assessment unless otherwise noted. It is likely that a high number of occurrences have gone unreported over the past

[2] The Crockett County planning area is indicated by the black circle.

29.5 years. Tables 14-2, 14-3, and 14-4 depict historical occurrences of thunderstorm wind events for the Crockett County planning area according to the NCEI database.

Since 1996, 37 thunderstorm wind events are known to have occurred in the Crockett County planning area. Table 14-3 presents information on known historical events in the planning area which resulted in monetary damages, injuries, or fatalities.

It is important to note that high wind events associated with other hazards, such as tornadoes, are not accounted for in this section. Property damage estimates are not always available. Where an estimate has been provided in a table for losses, the dollar amounts have been modified for inflation to indicate the damage in 2026 dollars.

Table 14-2. Historical Thunderstorm Wind Speeds, January 1996–June 2025

Maximum Wind Speed Recorded (Knots)	Number of Reported Events
0-30	0
31-40	1
41-50	2
51-60	22
61-70	6
71-80	1
81-90	0
91-100+	0
Unknown	5

Table 14-3. Damaging Historical Thunderstorm Wind Events, January 1996–June 2025[3]

Jurisdiction	Date	Magnitude (Knots)	Deaths	Injuries	Property Damage	Crop Damage
Crockett County	5/26/1998	-	0	0	$6,000	$0
Crockett County	5/26/1998	-	0	0	$4,000	$0
Crockett County	10/31/1998	-	0	0	$1,000	$0
Crockett County	4/26/1999	-	0	0	$9,800	$0
Crockett County	5/27/2000	-	0	0	$18,900	$0
Crockett County	5/25/2003	70	0	0	$3,600	$0

[3] Magnitude is listed when available. Damage values are in 2026 dollars. No fatalities, injuries, or crop damages were reported in the NCEI database from January 1996 to June 2025.

Jurisdiction	Date	Magnitude (Knots)	Deaths	Injuries	Property Damage	Crop Damage
Crockett County	3/4/2004	61	0	0	$15,600	$0
Crockett County	6/17/2006	61	0	0	$40,000	$0
Crockett County	2/24/2007	39	0	0	$3,200	$0
Crockett County	5/6/2007	61	0	0	$14,100	$0
Totals			**0**	**0**	**$116,200**	**$0**

Table 14-4. Summary of Historical Events, January 1996–June 2025

Jurisdiction	Number of Events	Magnitude (Knots)	Deaths	Injuries	Property Damage	Crop Damage
Crockett County	37	74	0	0	$116,200	$0

Based on the list of historical thunderstorm wind events for the Crockett County planning area, 22 events were reported to the NCEI since the 2012 Plan.

SIGNIFICANT EVENTS

May 27, 2000

Severe thunderstorms moved across the Concho Valley and Northwest Hill Country during the evening, bringing winds exceeding 60 mph to Crockett County. During the storm, a retail store in southern Ozona lost part of its roof due to the high winds, resulting in an estimated $18,900 (2026 dollars) in property damage.

June 23, 2017

A line of damaging thunderstorms formed northwest of Grape Creek, then moving south and resulting in wind damage across Grape Creek, San Angelo, Eldorado, and Ozona. In Ozona, the wind reportedly downed 20 power poles as well as uprooting numerous large trees. Multiple homes also received minor roof damage. Monetary damage estimates were not available for this event.

August 4, 2025

Isolated severe thunderstorms developed over the region, producing damaging winds and large hail across several counties. In Crockett County, a utility company reported that winds exceeding 80 mph had blown down 13 electrical power poles. Monetary damage estimates were not available for this event.

PROBABILITY OF FUTURE EVENTS

Most thunderstorm winds occur during the spring and fall seasons and during the months of March, April, May, and September. Based on available records of historic events, there have been a total of 37 events in a 29.5-year reporting period, which provides an estimated frequency of one to two events each year. Even though the intensity of thunderstorm wind events is not always damaging for the Crockett County planning area, the frequency of occurrence for a thunderstorm

wind event is “Highly Likely.” This means that an event is probable within the next year for the planning area.

CLIMATE CHANGE CONSIDERATIONS

The impacts on the frequency and severity of severe thunderstorm wind events due to climate change are unclear. According to the Texas A&M 2021 Climate Report Update, changes in severe thunderstorm reports over time have been more closely linked to changes in population than changes in the hazard event. Currently there is low confidence of an ongoing trend in the overall frequency and severity of thunderstorm events, due to the lack of climate data records for severe thunderstorms. Based on climate models that are available, the environmental conditions needed for severe thunderstorms are estimated to become more likely, resulting in an overall increase in the number of days capable of producing a severe thunderstorm event.[4]

VULNERABILITY AND IMPACT

Vulnerability is difficult to evaluate since thunderstorm wind events can occur at different strength levels, in random locations, and can create relatively narrow paths of destruction. Due to the randomness of these events, all existing and future structures, and facilities within the Crockett County planning area, could potentially be impacted and remain vulnerable to possible injury and property loss from strong winds.

Trees, power lines and poles, signage, manufactured housing, radio towers, concrete block walls, storage barns, windows, garbage recepticles, brick facades, and vehicles, unless reinforced, are vulnerable to thunderstorm wind events. More severe damage involves windborne debris; in some instances, patio furniture and other lawn items have been reported to have been blown around by wind and, very commonly, debris from damaged structures in turn have caused damage to other buildings not directly impacted by the event. In more severe instances, roofs have been reported as having been torn off of buildings. The portable buildings typically used at schools and construction sites would be more vulnerable to thunderstorm wind events than typical site-built structures and could potentially pose a greater risk for wind-blown debris.

According to the American Community Survey (ACS) five-year estimates for 2024, a total of 226 manufactured homes are located in the planning area (13 percent of total housing stock). In addition, 55 percent (952 structures) of the housing units were built before 1980. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant wind events.

Table 14-5. Structures at Greater Risk[5]

Jurisdiction	Structures	
	SFR Built Before 1980	Manufactured Homes
Crockett County	952	226

[4] Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 Update.

[5] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county’s population resides.

Jurisdiction	Structures	
	SFR Built Before 1980	Manufactured Homes
CDP of Ozona	767	163

While all citizens are vulnerable to the impacts of thunderstorm wind, forced relocation and disaster recovery disproportionately impacts low-income residents who lack the financial means to repair their homes. An estimated 9 percent of the planning areas population live below the poverty level (Table 14-6). While warning times for these types of hazard events should be substantial enough for these individuals to seek shelter, the elderly, children, and people with a disability may have trouble taking shelter due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

Table 14-6. Populations at Greater Risk[6]

Jurisdiction	Population				
	65 and Older	Under 5	With a Disability	Below Poverty Level	Limited English Speaking
Crockett County	537	36	491	262	295
CDP of Ozona	492	0	491	214	290

The Crockett County Planning Team identified the following critical facilities (Table 14-7) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by thunderstorm wind events. The critical infrastructure with the greatest vulnerability to thunderstorms are power and communications facilities. Failures of these facilities can result in a loss of service and cascading impacts such as posing enormous risk to individuals dependent on electricity as a medical necessity. For a comprehensive list, please see Appendix D.

Table 14-7. Critical Facilities Vulnerable to Thunderstorm Wind Event

Critical Facility Type	Potential Impacts
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling trees or flying debris. • Power outages could disrupt communications, delaying emergency response times.

[6] US Census Bureau 2024 ACS data. Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.

Critical Facility Type	Potential Impacts
	• Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Debris/downed trees can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Structures can be damaged by falling trees or flying debris. • Power outages could disrupt critical care. • Backup power sources could be damaged. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Evacuations may be necessary due to extended power outages, gas line ruptures, or structural damage to facilities. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. • Temporary break in operations may significantly inhibit post event evacuations. • Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Supplier (food, fuel, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed. • Economic disruption due to power outages and fires negatively impact airport services as well as area businesses reliant on airport operations.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling trees or flying debris. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Debris/downed trees can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel.

SECTION 14: THUNDERSTORM WIND

Thunderstorm winds experienced in Crockett County have not resulted in any reported injuries or fatalities since 1996. Overall, in the past 29.5 years there has been an estimated total of $116,200 in damages (2026 dollars) in the Crockett County planning area due to thunderstorm wind events. The estimated average annual loss from thunderstorm wind events is $3,900. Based on historic loss and property damages, the potential severity of impact of thunderstorm wind on the Crockett County planning area is "Limited," meaning minimal quality of life lost, critical facilities and services shut down for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

Table 14-8. Estimated Annualized Losses

Jurisdiction	Total Property & Crop Loss	Average Annual Loss Estimates
Crockett County	$116,200	$3,900

ASSESSMENT OF IMPACTS

Thunderstorm wind events have the potential to pose a significant risk to people and can create dangerous and difficult situations for public health and safety officials. Thunderstorm wind conditions can be frequently associated with a variety of impacts, including:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- Thunderstorm wind events often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage often results in an increase in structure fires and carbon monoxide poisoning, as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- Critical staff may be unable to report for duty, limiting response capabilities.
- Private sector entities that residents rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- Some businesses not directly damaged by thunderstorm wind events may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.

- Older structures, specifically those built before 1980 (55 percent of the planning area), were built to less stringent building codes may suffer greater damage as they are typically more vulnerable to thunderstorm winds.
- Recreational areas such as community parks and green spaces may be damaged or inaccessible due to downed trees or debris, causing temporary impacts to associated businesses in the area.
- Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There are three historical sites listed on the National Register of Historic Places in Crockett County.

The economic and financial impacts of thunderstorm winds on the area will depend entirely on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any thunderstorm wind event.

Section 15
Tornado

SECTION 15: TORNADO

HAZARD DESCRIPTION

Tornadoes are among the most violent storms on the planet. A tornado is a rapidly rotating column of air extending between, and in contact with, a cloud and the surface of the earth. The most violent tornadoes are capable of tremendous destruction and have wind speeds of 250 miles per hour (mph) or more. In extreme cases, winds may approach 300 mph. Damage paths can be in excess of one mile wide and 50 miles long.

The most powerful tornadoes are produced by "Supercell Thunderstorms." These thunderstorms are created when horizontal wind shears (winds moving in different directions at different altitudes) begin to rotate the storm. This horizontal rotation can be tilted vertically by violent updrafts, and the rotation radius can shrink, forming a vertical column of very quickly swirling air. This rotating air can eventually reach the ground, forming a tornado.

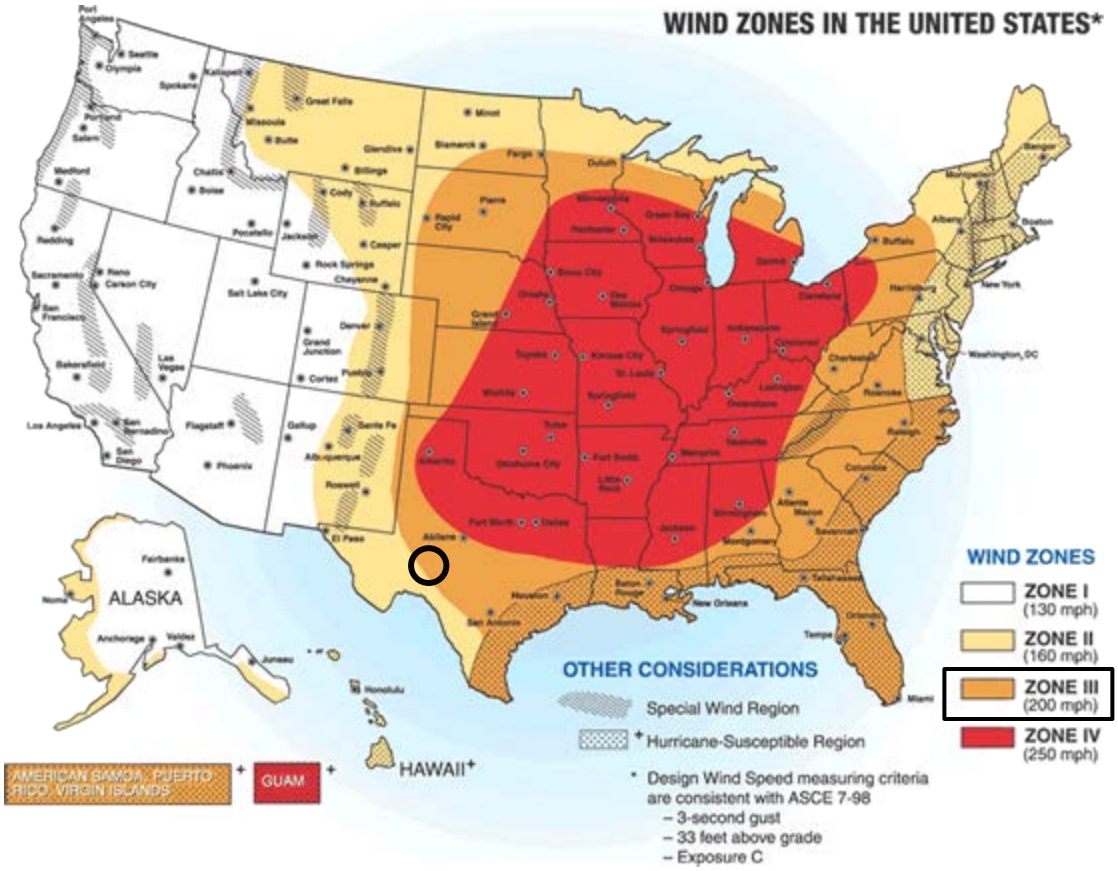
Table 15-1. Variations among Tornadoes

Weak Tornadoes	Strong Tornadoes	Violent Tornadoes
• 69% of all tornadoes • Less than 5% of tornado deaths • Lifetime 1-10+ minutes • Winds less than 110 mph	• 29% of all tornadoes • Nearly 30% of all tornado deaths • May last 20 minutes or longer • Winds 110–205 mph	• 2% of all tornadoes • 70% of all tornado deaths • Lifetime can exceed one hour • Winds greater than 205 mph

LOCATION

Tornadoes do not have any specific geographic boundary and can occur throughout the county uniformly. It is assumed that the entire Crockett County planning area is uniformly exposed to tornado activity. The planning area is in Wind Zone III, meaning tornado winds can be as high as 200 mph within the planning area.

Figure 15-1. FEMA Wind Zones in the United States[1]



EXTENT

The destruction caused by tornadoes ranges from light to inconceivable, depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, such as residential homes (particularly mobile homes).

Tornado magnitudes prior to 2007 were determined using the traditional version of the Fujita Scale, which estimated tornado wind speeds based on the damage caused by an event. Since February 2007, the Enhanced Fujita Scale has been utilized to classify tornadoes, which included improvements to the original scale. The original Fujita scale had limitations, such as a lack of damage indicators, no account for construction quality and variability, and no definitive correlation between damage and wind speed. These limitations led to some tornadoes being rated in an inconsistent manner and, in some cases, an overestimate of tornado wind speeds. The Enhanced Fujita scale retains the same basic design and six strength categories as the previous scale. The newer scale reflects more refined assessments of tornado damage surveys, standardization, and damage consideration to a wider range of structures. Table 15-2 includes both scales for reference when analyzing historical tornadoes, since tornado events prior to 2007 will follow the original Fujita Scale.

[1] The Crockett County planning area is indicated by the circle.

Table 15-2. The Fujita and Enhanced Fujita Tornado Scale[2]

Enhanced Fujita Scale				Fujita Scale			
Category	**Wind Speed**	**Damage Level**	**Damage**	**Category**	**Wind Speed**	**Intensity**	**Damage**
EF0	65-85 MPH	Gale	The environment sustained minor damage: tree branches are broken, some shallow-rooted trees are uprooted, and some chimneys are damaged.	**F0**	45-78 MPH	Gale	Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
EF1	86-110 MPH	Weak	The environment sustained moderate damage: mobile homes are tipped over, windows are broken, roof tiles may be blown off, and some tree trunks have snapped.	**F1**	79-117 MPH	Moderate	Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
EF2	111-135 MPH	Strong	The environment sustained considerable damage: mobile homes are destroyed, roofs are damaged, debris flies in the air, and large trees are snapped or uprooted.	**F2**	118-161 MPH	Significant	Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165 MPH	Severe	The environment sustained severe damage: roofs and walls are ripped off buildings, small buildings are destroyed, and most trees are uprooted.	**F3**	162-209 MPH	Severe	Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
EF4	166-200 MPH	Devastating	The environment sustained devastating damage: well-built homes are destroyed, buildings are lifted off their foundations, cars are blown away, and large debris flies in the air.	**F4**	210-261 MPH	Devastating	Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown, and large missiles generated.
EF5	200+ MPH	Incredible	The environment sustained incredible damage: well-built homes are lifted from their foundations, reinforced concrete buildings are damaged, the bark is stripped from trees, and car-sized debris flies through the air.	**F5**	262-317 MPH	Incredible	Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

[2] Source: http://www.tornadoproject.com/fscale/fscale.htm

Both the Fujita Scale and Enhanced Fujita Scale should be referenced in reviewing previous occurrences since tornado events that occurred before 2007 will follow the original Fujita Scale. The greatest magnitude reported within the planning area is F2 (an EF2 or EF3 when converted to the Enhanced Fujita Scale, depending on exact wind speed), a significant tornado capable of removing roofs from homes, demolishing mobile homes, lifting cars, and uprooting or snapping large trees. Based on the planning area's location in Wind Zone III, the planning area has the potential to experience anywhere from an EF0 to an EF5 depending on the wind speed. Previous tornado events in the Crockett County planning area (converted from the Fujita Scale) have ranged between EF0 and EF3 magnitudes (Figure 15-2). This is the worst the planning area can anticipate based on historical events.

HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) Storm Events database is a national data source organized under the National Oceanic and Atmospheric Administration (NOAA). The NCEI is the largest archive available for historic storm events data; however, it is important to note that only incidents recorded in the NCEI have been factored into this risk assessment unless otherwise noted. It is likely that a number of occurrences have gone unreported over time.

Figure 15-2 identifies the locations of previous occurrences in the Crockett County planning area from January 1955 through June 2025. A total of 13 events have been recorded by NOAA's Storm Prediction Center and the NCEI Storm Events databases for the planning area. The strongest magnitude reported in the planning area was an F2 tornado which occurred on June 16, 1955 (Table 15-3).

Figure 15-2. Spatial Historical Tornado Events, January 1955–June 2025[3]

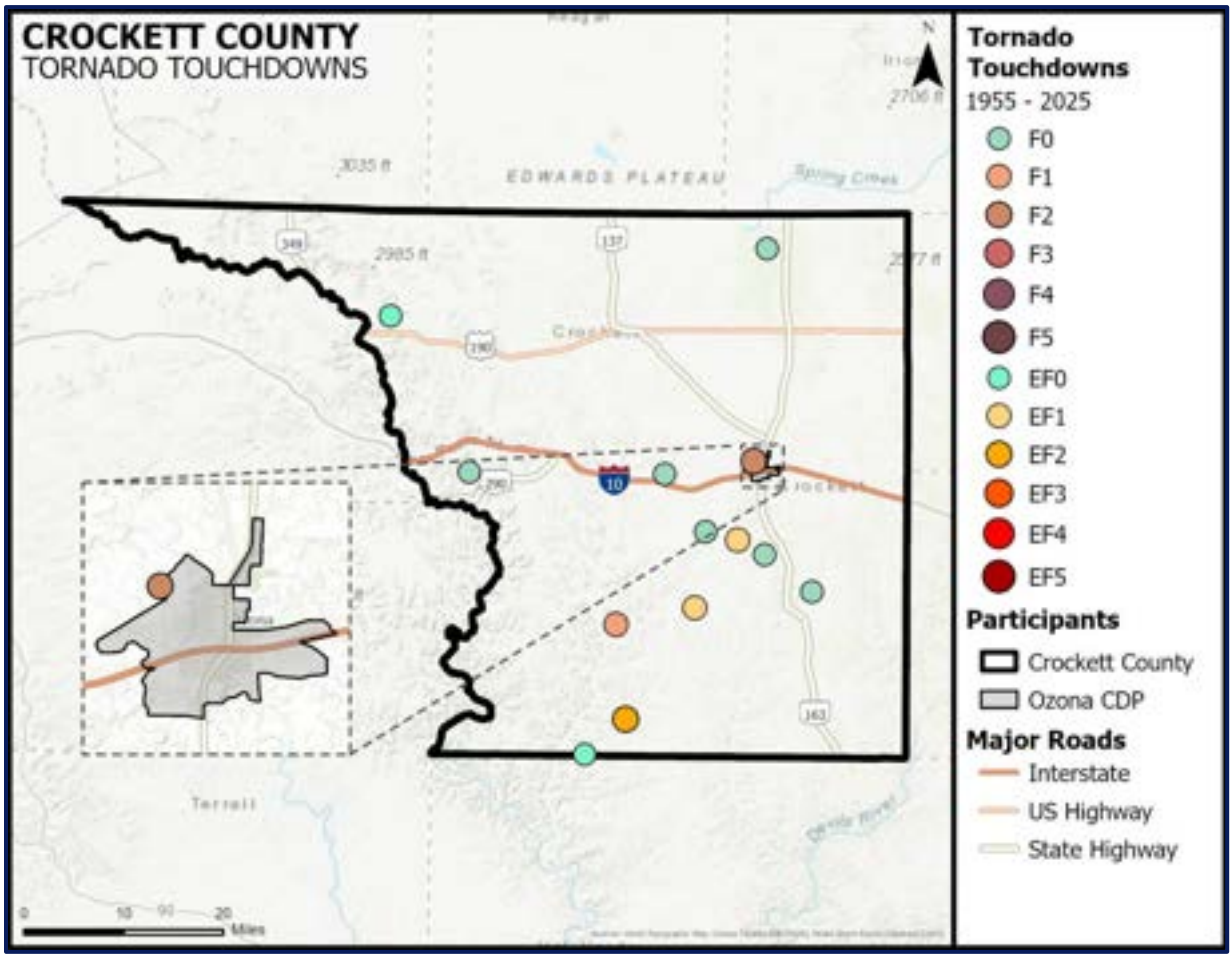


Table 15-3. Historical Tornado Events, January 1955–June 2025[4]

Jurisdiction	Date	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Crockett County	6/16/1955	F2	0	0	$0	$0
Crockett County	3/2/1979	F0	0	0	$1,200	$0
Crockett County	6/19/1982	F1	0	0	$83,500	$0
Crockett County	5/19/1997	F0	0	0	$0	$0
Crockett County	5/21/1997	F0	0	0	$0	$0
Crockett County	10/5/1998	F0	0	0	$14,900	$0
Crockett County	4/7/2002	F0	0	0	$0	$0

[3] Source: NOAA Storm Prediction Center
[4] Damage values are in 2026 dollars. Magnitude is listed when available.

Jurisdiction	Date	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Crockett County	4/7/2002	F0	0	0	$0	$0
Crockett County	6/15/2007	EF1	0	0	$108,900	$0
Crockett County	5/24/2014	EF0	0	0	$0	$0
Crockett County	5/2/2018	EF0	0	0	$0	$0
Crockett County	4/12/2020	EF1	0	0	$0	$0
Crockett County	5/4/2024	EF2	0	0	$0	$0
Totals			**0**	**0**	**$208,500**	**$0**

Table 15-4. Summary of Historical Tornado Events, January 1955–June 2025

Jurisdiction	Number of Events	Max Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Crockett County	13	F2	0	0	$208,500	$0

Based on the list of historical tornado events for the Crockett County planning area, four events were reported to the NCEI since the 2012 Plan.

SIGNIFICANT EVENTS

June 15, 2007

A moist unstable airmass combined with a weak shortwave, causing severe thunderstorms in the evening. Amidst this severe weather which affected much of West Texas, an EF1 tornado touched down in Crockett County south of the community of Ozona. Along the tornado's approximately three-mile-long path, it uprooted trees and damaged several outbuildings and mobile homes. Total property damage was estimated at $108,900 (2026 dollars).

April 12, 2020

Unstable conditions led to multiple supercell thunderstorms in West Texas, one of which resulted in an EF1 tornado touching down in Crockett County. The tornado touched down south of Ozona and tracked mostly over ranch land for over five miles before dissipating. Along this path, the tornado downed a large utility pole and electrical lines, destroyed a deer blind and nearby fencing, and damaged the awning of a mobile home and an outdoor A/C unit. Monetary damage estimates were not available for this event.

May 4, 2024

In the evening, a supercell thunderstorm produced an EF2 tornado approximately 26 miles south-southwest of Ozona. The tornado, with peak winds estimated at 115 mph, uplifted and destroyed the roof of a barn, as well as lifting a heavy metal bulk feeder at least 5 feet in the air and tossing it 150 feet from its original location. Additionally, the tornado snapped a 150-year-old cottonwood tree. Monetary damage estimates were not available for this event.

PROBABILITY OF FUTURE EVENTS

Tornadoes can occur at any time of year and at any time of day, but they are typically more common in the spring months during the late afternoon and evening hours. A smaller, high frequency period can emerge in the fall during the brief transition between the warm and cold seasons. With 13 historical events over a 70.5-year reporting period, the Crockett County planning area can anticipate a tornado touchdown approximately every five years. This frequency supports a "Occasional" probability of future events for Crockett County planning area, meaning an event is probable within the next five years.

CLIMATE CHANGE CONSIDERATIONS

The impacts on the frequency and severity of tornado events due to climate change are unclear. According to the Texas A&M 2021 Climate Report Update, the most robust trend in tornado activity in Texas is a likelihood for a greater number of tornadoes in large outbreaks, although the factors contributing to this trend are not expected to continue. Tornadoes spawn from less than 10 percent of thunderstorms, usually supercell thunderstorms that are in a wind shear environment that promotes rotation.[5] Based on climate models that are available, the environmental conditions needed for severe thunderstorm events are estimated to become more likely, resulting in an overall increase in the number of days capable of producing a severe thunderstorm event and potential tornadoes to develop from these storms.[6]

VULNERABILITY AND IMPACT

Because tornadoes often cross jurisdictional boundaries, all existing and future buildings, facilities, and populations in the entire Crockett County planning area is considered to be exposed to this hazard and could potentially be impacted. The damage caused by a tornado is typically a result of high wind velocity, wind-blown debris, lightning, and large hail.

The average tornado moves from southwest to northeast, but tornadoes have been known to move in any direction. Consequently, vulnerability of humans and property is difficult to evaluate since tornadoes form at different strengths, in random locations, and create relatively narrow paths of destruction. Although tornadoes strike at random, making all buildings vulnerable, three types of structures are more likely to suffer damage:

- Manufactured Homes;
- Homes built of peer and beam construction (more susceptible to lift); and
- Buildings with large spans, such as shopping malls, gymnasiums, and factories.

Tornadoes can cause a significant threat to people as they could be struck by flying debris, falling trees or branches, utility lines, and poles. Blocked roads could prevent first responders from responding to calls. Tornadoes commonly cause power outages which could cause health and safety risks to residents and visitors, as well as to patients in hospitals.

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[5] Treisman, Rachel. *The exact link between tornadoes and climate change is hard to draw. Here's why*. NPR. December 13, 2021. https://www.npr.org/2021/12/13/1063676832/the-exact-link-between-tornadoes-and-climate-change-is-hard-to-draw-heres-why

[6] Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.

The Crockett County planning area features mobile or manufactured homes throughout the planning area. These structures are typically more vulnerable to tornado events than typical site-built structures. The U.S. Census data indicates a total of 226 (13 percent of total housing stock) manufactured homes located in the planning area. In addition, 55 percent (952 structures) of the housing structures in the planning area were built before 1980. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant tornado events (Table 15-5).

Table 15-5. Structures at Greater Risk[7]

Jurisdiction	Structures	
	SFR Built Before 1980	Manufactured Homes
Crockett County	952	226
CDP of Ozona	767	163

While all citizens are at risk to the impacts of a tornado, forced relocation and disaster recovery disproportionately impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. The elderly, children, and people with a disability may have trouble taking shelter due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures. The population over 65 in the planning area is estimated at 19 percent of the total population and children under the age of 5 are estimated at 1 percent. The population with a disability is estimated at 17 percent of the total population. An estimated 9 percent of the planning area population live below the poverty level and 10 percent of the populations speak English “less than very well” (Table 15-6).

Table 15-6. Populations at Greater Risk[8]

Jurisdiction	Population				
	65 and Older	Under 5	With a Disability	Below Poverty Level	Limited English Speaking
Crockett County	537	36	491	262	295
CDP of Ozona	492	0	491	214	290

The Crockett County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by tornado events (Table 15-7). The critical infrastructure with the greatest vulnerability

[7] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county’s population resides.

[8] US Census Bureau 2024 ACS data. Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county’s population resides.

to tornadoes are power and communications facilities. Failures of these facilities can result in a loss of service and cascading impacts such as posing enormous risk to individuals dependent on electricity as a medical necessity. For a comprehensive list, please see Appendix D.

Table 15-7. Critical Facilities Vulnerable to Tornado Event

Critical Facility Type	Potential Impacts
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling trees or flying debris. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Debris/downed trees can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Structures can be damaged by falling trees damaged by tornadoes. • Power outages could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary due to extended power outages, fires, or other associated damage to facilities. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. • Temporary break in operations may significantly inhibit post event evacuations. • Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Supplier (food, fuel, etc.)	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed. • Additional emergency responders and critical aid workers may not be able to reach the area for days.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling trees or flying debris.

Critical Facility Type	Potential Impacts
	• Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Debris/downed trees can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.

The total loss estimate due to tornado events in the Crockett County planning area is $208,500 (2026 dollars), having an approximate average annual loss estimate of $3,000. Historically, tornadoes have not resulted in any reported injuries or fatalities within the planning area. Based on historic loss and damages, the impact of tornado events on the Crockett County planning area is considered “Limited” severity of impact, meaning minor quality of life lost, critical facilities and services shut down for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

Table 15-8. Estimated Average Annual Losses by Jurisdiction

Jurisdiction	Total Property & Crop Loss	Average Annual Loss Estimates
Crockett County	$208,500	$3,000

ASSESSMENT OF IMPACTS

Tornadoes have the potential to pose a significant risk to the population and can create dangerous situations. Often, providing and preserving public health and safety is difficult. The impact of climate change could produce larger, more severe tornado events, exacerbating the current tornado impacts. More destructive tornado conditions can be frequently associated with a variety of impacts, including:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Manufactured homes (13 percent of total housing stock) may suffer substantial damage as they would be more vulnerable than typical site-built structures.
- Portable classrooms may also suffer substantial damage as they would be more vulnerable than other classroom structures.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.

- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- Tornadoes often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- Tornadoes can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.
- First responders must enter the damage area shortly after the tornado passes to begin rescue operations and to organize cleanup and assessments efforts, therefore they are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Emergency operations and services may be significantly impacted due to damaged facilities, loss of communications, and damaged emergency vehicles and equipment.
- Private sector entities such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue, especially if damage is sustained to major employers within the planning area.
- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, and normal day-to-day operating expenses.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Residential structures destroyed by a tornado may not be rebuilt for years, reducing the tax base for the community.
- Large or intense tornadoes may result in dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- Recreation activities may be unavailable, and tourism can be unappealing for years following a large tornado, devastating directly related local businesses.
- Tornadoes may destroy or degrade endangered species habitat; currently, there are six federally endangered, threatened, or candidate species in the planning area.
- Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There are three historical sites listed on the National Register of Historic Places in Crockett County.

SECTION 15: TORNADO

The economic and financial impacts of a tornado event on the community will depend on the scale of the event, what is damaged, costs of repair or replacement, lost business days in impacted areas, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a tornado event.

Section 16
Wildfire

SECTION 16: WILDFIRE

HAZARD DESCRIPTION

Wildfire is an unplanned fire burning in natural or wildland areas such as forests, shrub lands, grasslands, or prairies.[1] Texas is one of the fastest growing states in the nation, with much of this growth occurring adjacent to metropolitan areas. This increase in population across the state will impact counties and communities that are located within the Wildland Urban Interface (WUI). The WUI is described as the area where structures and other human improvements meet and intermingle with undeveloped wildland or vegetative fuels. Population growth within the WUI substantially increases the risk of wildfire. In Texas nearly 85 percent of wildfires occur within two miles of a community.

Wildfires have the potential to spread quickly given the right environmental conditions, particularly within the wildland urban interface and intermix. Most ignition sources for wildfires are a result of human activities, such as an electrical line sparking dry grasses, an improperly discarded cigarette, burning debris, or arson.

Development has increased in west Texas over the past few decades, resulting in more populated areas within the wildland interface / intermix, though stagnant development in recent years is trending for the planning area. The Crockett County population is expected to decrease over time following population trends over the last decade. Declining populations do not change the footprint of infrastructure at risk in a community. Reduced populations decrease the tax base, reducing the revenue available for recovery. In addition, vulnerability is increasing across the planning area due to climate change impacts. The increase in frequency and severity of events currently outpaces the reduced exposure caused by declining populations.

While the planning area is continually at some risk for wildfires, that risk is elevated during two periods each year: the winter wildfire season (February through April) and the summer wildfire season (August through October).[2] Wildfires spread based on the type and quantity of fuel that surrounds it. Fuel can include everything from trees, underbrush and dry grassy fields to homes. The amount of flammable material that surrounds a fire is referred to as the fuel load. Conditions in the weather and environment, such as drought, winds and extreme heat, can cause a fire to

[1] FEMA: https://hazards.fema.gov/nri/wildfire
[2] Austin American Statesman, “Winter wildfire risk is rising in Central Texas. Here’s what you should know.” January 2023: https://www.statesman.com/story/news/environment/2023/01/30/wildfire-risk-is-rising-in-central-texas-what-you-should-know/69845234007/

spread more quickly.[3] A wildfire event often begins unnoticed and spreads quickly, lighting brush, trees, and homes on fire. For example, a wildfire may be started by a campfire that was not doused properly, a tossed cigarette, burning debris, or arson. Additionally, the Crockett County planning team reports that wildfires are often caused by lightning and thunderstorm wind events.

Texas has seen a significant increase in the number of wildfires in the past 30 years, including wildland, urban interface, or intermix fires. Wildland fires are fueled almost exclusively by natural vegetation, while interface or intermix fires are urban / wildland fires in which vegetation and the built environment provide the fuel.

LOCATION

A wildfire incident can have devastating consequences due to human activities, drought conditions, lightning, or wind events, if the conditions allow. Wildfires can vary greatly in terms of size, location, intensity, and duration. While wildfires are not confined to any specific geographic location, they are most likely to occur in open grasslands.

The Texas A&M Forest Service Wildfire Risk Assessment Portal (TxWRAP) provides historical wildfire data for Texas counties along with mapping resources that include data layers on the WUI, ignition density, and fire damage potential for communities throughout the Crockett County planning area, along with multiple tips, recommendations and mitigation solutions for communities and residents. The TxWRAP portal was utilized to produce the maps found in this profile.

The threat to people and property from a wildfire event is greater in the fringe areas where developed areas meet open grass lands, such as the Functional Wildland Urban Interface (WUI) (Figures 16-1 and 16-2). The Functional WUI is based on a comprehensive building footprint dataset, fire intensity modeling, and a simulation of ember production and transport. The Zones used in the Functional WUI are described below. Critical facilities are only mapped within the Direct Exposure Zone of the WUI, as these structures face the greatest risk from wildfire due to their proximity to flammable vegetation and potential fire pathways.

The **Direct Exposure Zone** is burnable land cover within 75 meters 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.

The **Indirect Exposure Zone** is non-burnable land cover within 1,500 meters of burnable land cover that is within 75 meters 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.

The **Critical Fireshed** is the unpopulated land within about 2.4 kilometers 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.

The **Sources of Ember Load to Buildings (SELB) Zone** is a critical area or burnable land cover that produces embers capable of reaching nearby buildings. Ember production is a function of fire

[3] NOAA Weather Forecasting: https://scijinks.gov/wildfires/

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.

The **Little-to-No Exposure Zone** is non-burnable land that is within 75 meters of a structure but greater than 1,500 meters from a large 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. However, smoke and evacuations could still impact this area. Support should be given to those most vulnerable in the community. The need for a wildfire evacuation in this zone is unlikely.

Figure 16-1. Wildland Urban Interface Map in Crockett County

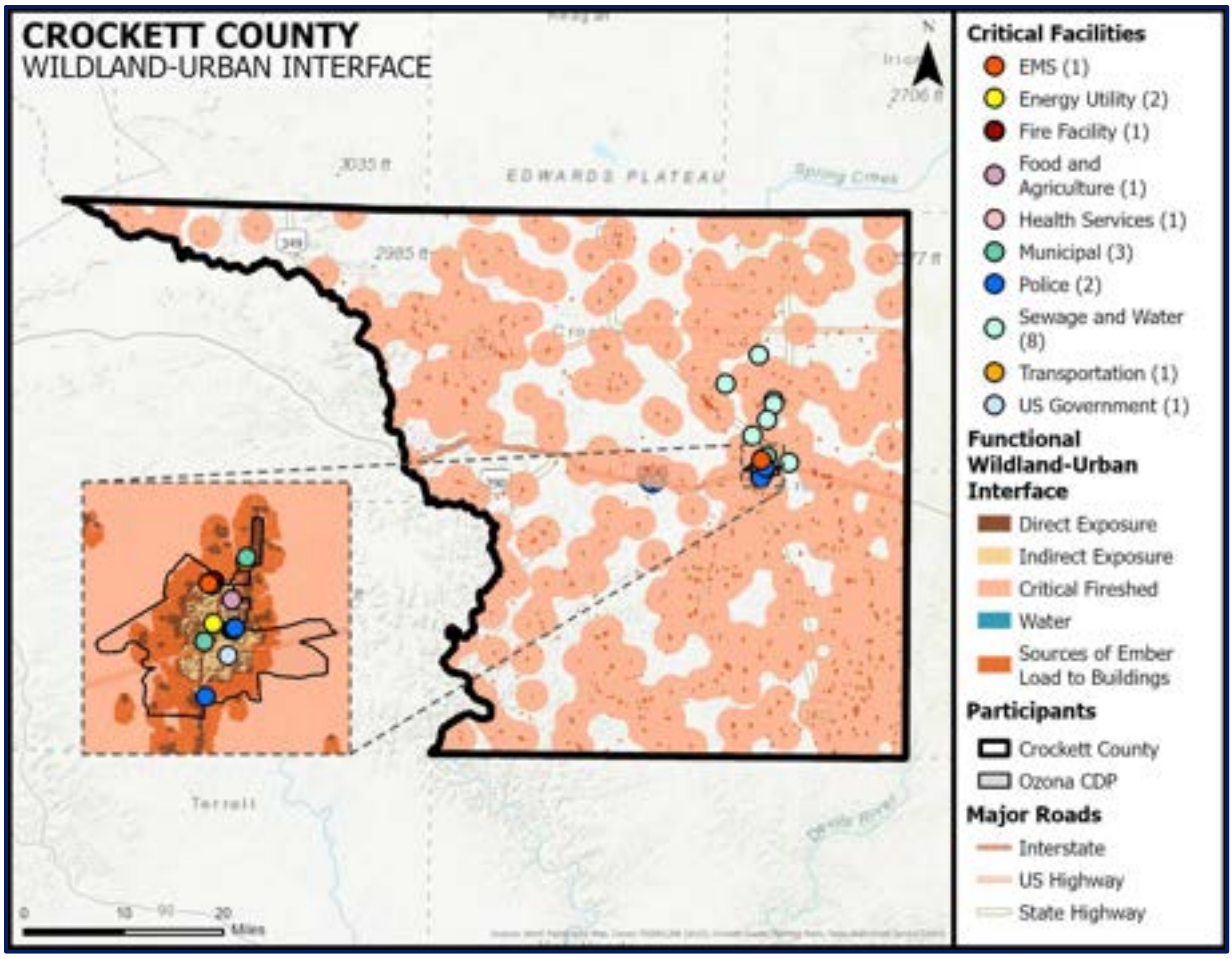
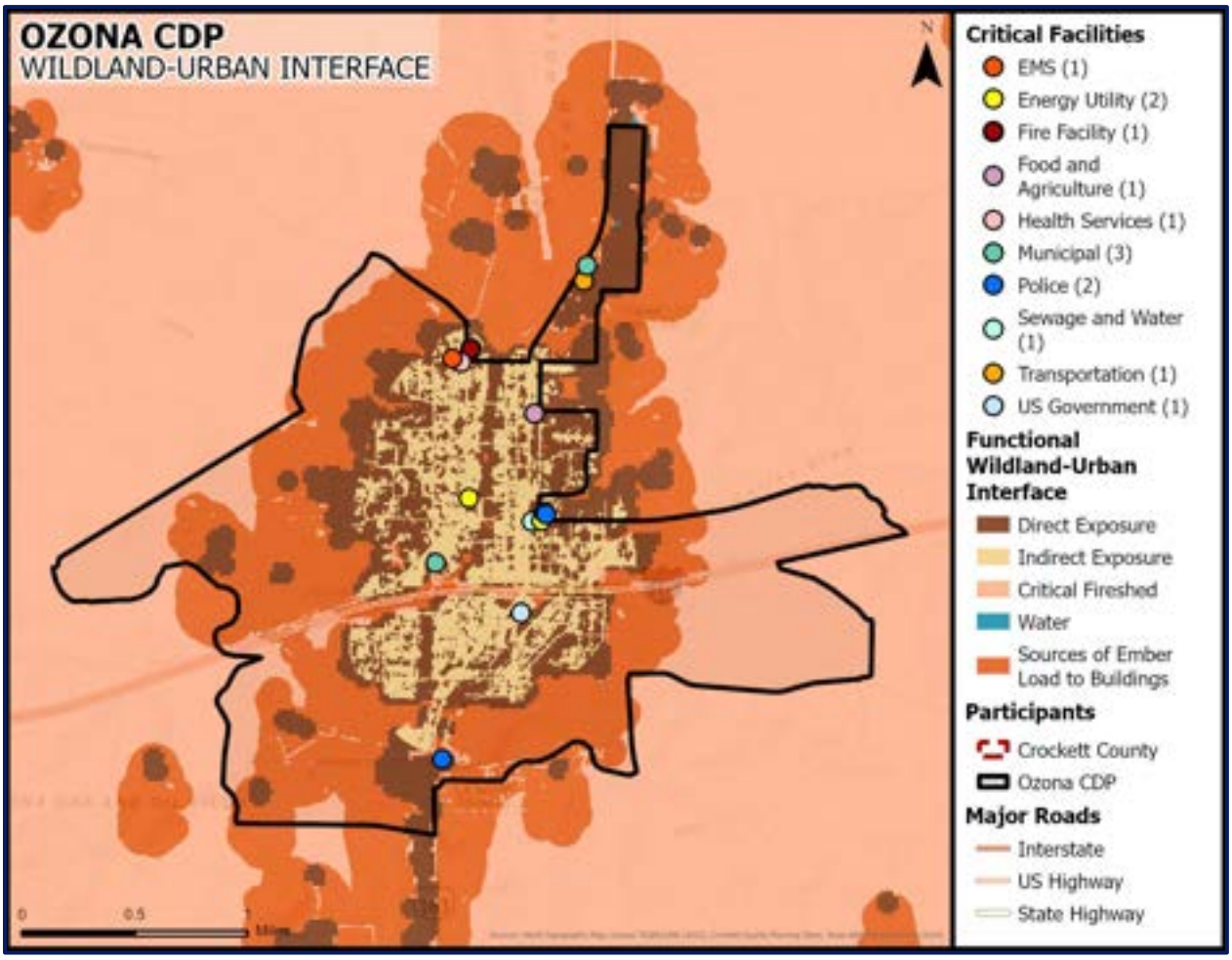


Figure 16-2. Wildland Urban Interface Map in Ozona[4]



EXTENT

The Texas Forest Service's Fire Intensity Scale (FIS) identifies areas with high fuel hazards and dangerous fire behavior potential. This scale considers fuel conditions along with a range of wind and weather scenarios. These estimates include the contribution of crown fuel and crowning fire intensity. Crown fuels (the branches, leaves, and needles of tall trees) are the primary fuel layer in crown fires, and the intensity of a crown fire is determined by factors like fuel load, moisture content, and wind conditions, leading to rapid fire spread and high temperatures.

The FIS provides a standard scale to measure potential wildfire intensity. The FIS consists of 5 classes where the order of magnitude between classes is ten-fold. The minimum class, Class 1,

[4] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.

represents very low wildfire intensities and the maximum class, Class 5, represents very high wildfire intensities. Refer to descriptions below.

Table 16-1. Characteristic Fire Intensity Scale (FIS)

FIS Class	Class Description
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 non-specialized equipment.
Class 2 (Low)	Small flames, usually less than 2 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 9 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
Class 4 (High)	Large Flames, up to 40 feet in length; short-range spotting common; medium range spotting possible. 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)	Flames exceed 200 feet in length; expect extreme fire behavior.

The Crockett County planning area is susceptible to wildfires of varying intensities. Figures 16-3 and 16-4 identify the wildfire intensity for the planning area.

Figure 16-3. Fire Intensity Scale Map in Crockett County

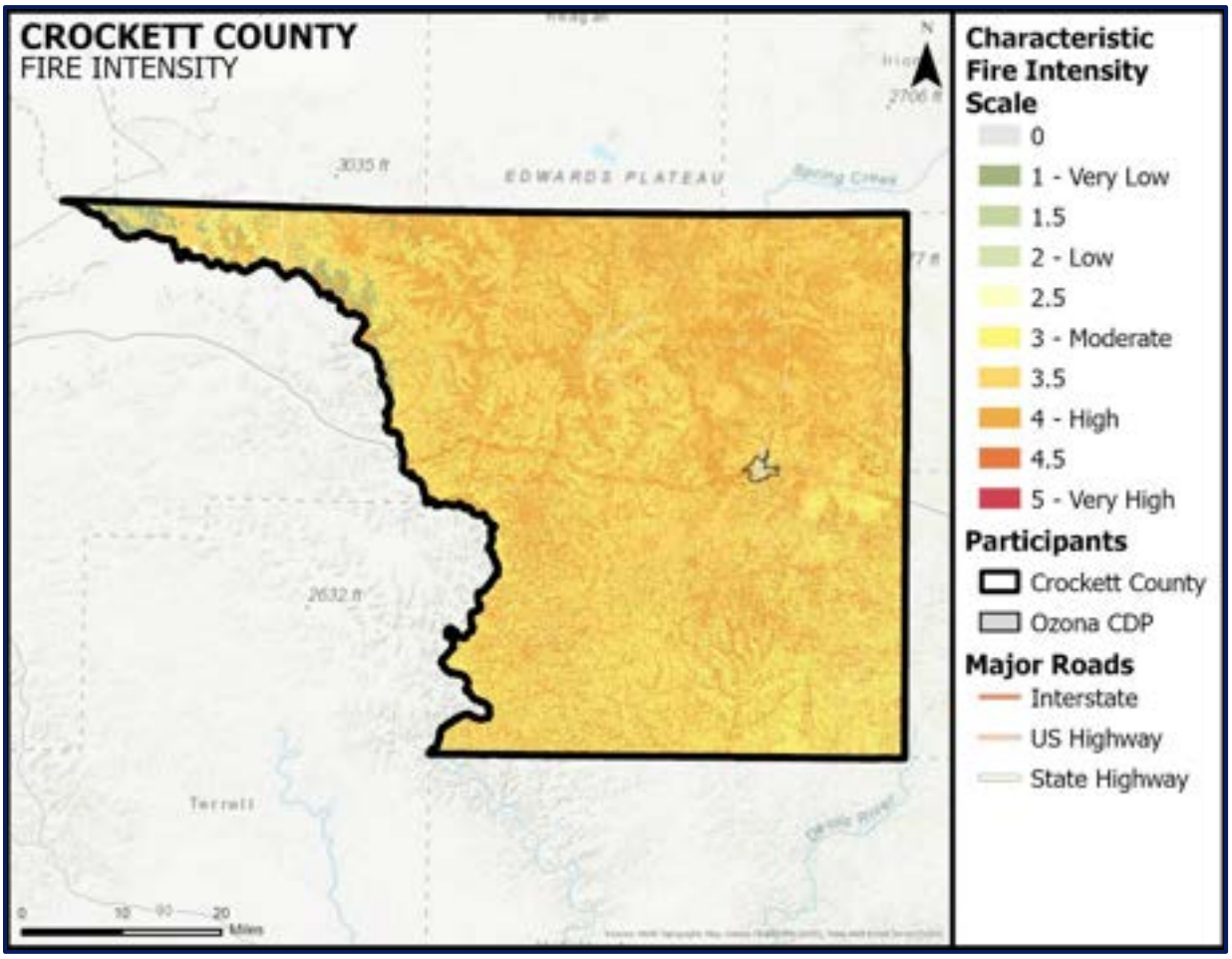
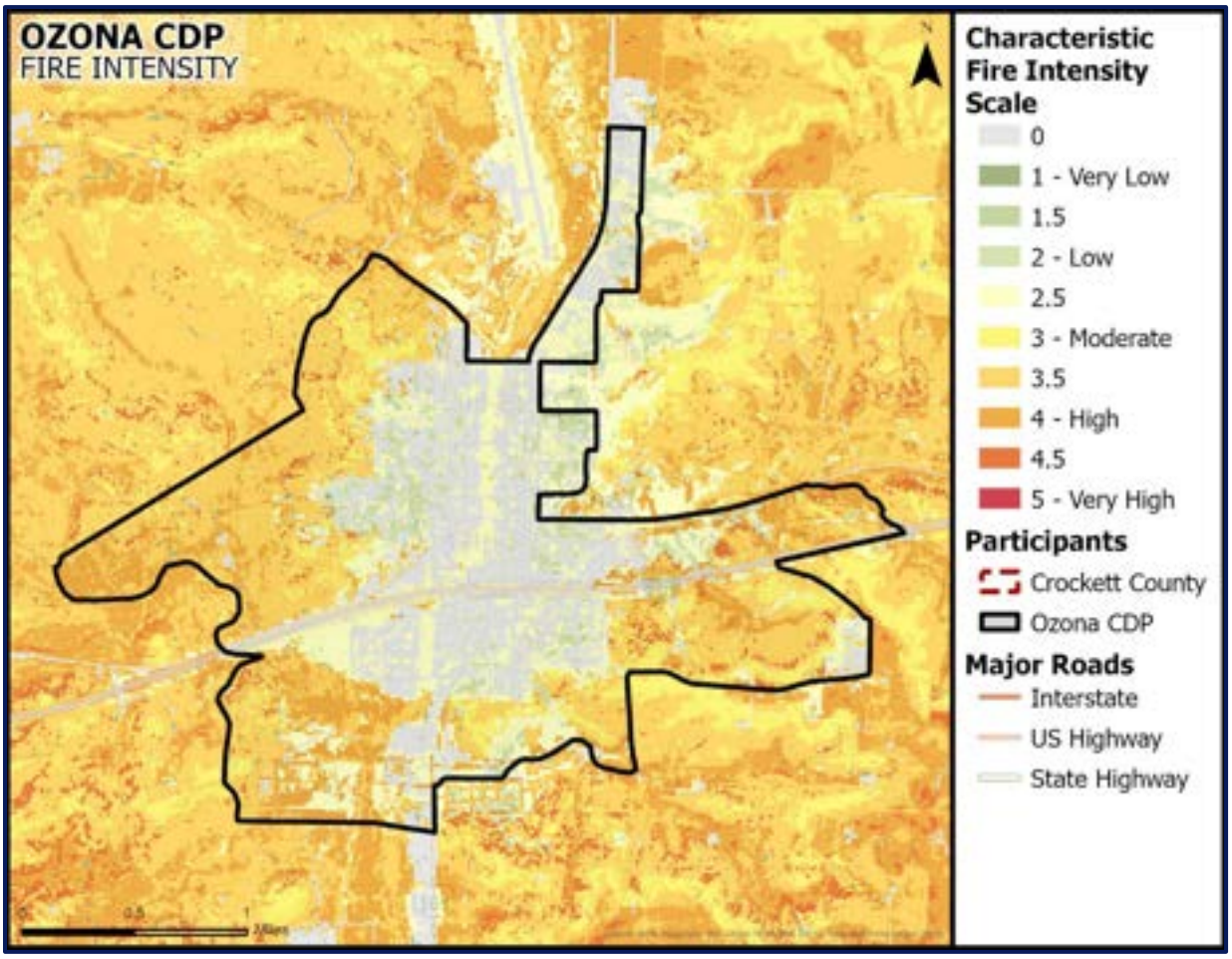


Figure 16-4. Fire Intensity Scale Map in Ozona[5]



HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) Storm Events Database includes 15 recorded wildfire events over the 20-year reporting period. It is assumed that all of these events are accounted for in the TxWRAP data. There are four reported injuries and no fatalities for the events reported in the NCEI. There were no reported damages for any of the reported events. Damages are typically not available for the majority of wildfires in the planning area.

The Texas A&M Forest Service (TFS) reported 393 wildfire events for the Crockett County planning area between 2005 and 2024. The TFS started collecting wildfire reported by volunteer fire departments in 2005. Due to a lack of recorded data for wildfire events prior to 2005 and after 2024, frequency calculations are based on a 20-year reporting period, using only data from recorded years. Tables 16-2 and 16-4 identify the number of wildfires and total acreage burned each year within the county boundaries.

[5] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.

Table 16-2. Historical Wildfire Events Summary, 2005–2024[6]

Jurisdiction	Number of Events	Acres Burned
Crockett County	393	274,950

Table 16-3. Historical Wildfire Events by Year

Year	Crockett County
2005	0
2006	15
2007	1
2008	27
2009	53
2010	53
2011	96
2012	9
2013	19
2014	43
2015	16
2016	0
2017	3
2018	12
2019	26
2020	16
2021	2
2022	1
2023	1
2024	0
Totals	**393**

[6] Source: Texas A&M Forest Service

SECTION 16: WILDFIRE

Based on the list of historical wildfire events for the Crockett County planning area (Table 16-2), 148 events have occurred since the 2012 plan.

Table 16-4. Acreage of Suppressed Wildfire by Year

Year	Crockett County
2005	0
2006	848
2007	3,555
2008	131,625
2009	526
2010	1,950
2011	69,639
2012	22
2013	314
2014	1,904
2015	10,732
2016	0
2017	494
2018	8,580
2019	12,768
2020	28,788
2021	5
2022	434
2023	2,766
2024	0
Totals	**274,950**

SIGNIFICANT EVENTS

There have been five declared disasters related to wildfire in Crockett County between 1996 and 2026 (Table 16-5). Additional details on certain wildfire events are described below.

Table 16-5. Disaster Declarations for Wildfire, 1996–2026

Year	Declaration Title	Declaration Type	Disaster No.
1999	Extreme Fire Hazards	EM	EM-3142
2006	Extreme Wildfire Threat	DR	DR-1624
2008	Wildfires	EM	EM-3284
2011	Wildfires	DR	DR-4029
2011	Wildfires	DR	DR-1999

February 25, 2008
An 8,900-acre wildfire started near the intersection of FM 137 and CR 204, then moved toward Ozona. However, the fire was contained before reaching Ozona. State Highway 163 and U.S. 90 were closed at the intersections of FM 137 for traffic control.

April 29, 2011
The Worthington Fire started about 7.2 miles west of Highway 163 in Crockett County and the fire burned about 900 acres. It was 100 percent contained.

June 16, 2011
The Faulkner Wildfire was along the Crockett and Reagan County Line along Highway 137. The fire burned grass, mesquite, juniper, numerous oil field platforms and power lines throughout the area.

June 20, 2011
The Mitchell Ranch 2 Wildfire was located about 33 miles southwest of Ozona. The fire burned approximately 3,212 acres. Gas plants were threatened and saved.

September 26, 2011
The lightning induced Mitchell 3 Fire was located in the extreme part of southwest Crockett County. Several oil field structures were threatened, and fire crews were working in rough terrain.

PROBABILITY OF FUTURE EVENTS

Wildfires can occur at any time of the year. As Crockett County communities move into wildland, the potential area of occurrence of wildfire increases. With 393 events in a 20-year period, an event within the Crockett County planning area is “Highly Likely”, meaning an event is probable within the next year.

CLIMATE CHANGE CONSIDERATIONS

Wildfires require the alignment of a number of factors, including temperature, humidity, and the lack of moisture in fuels, such as trees, shrubs, grasses, and forest debris. All these factors have strong direct or indirect ties to climate variability and climate change. Research shows that changes in climate create warmer, drier conditions, leading to longer and more active fire

seasons. Increases in temperatures and the thirst of the atmosphere due to human-caused climate change have increased aridity of forest fuels during the fire season.[7]

Vapor pressure deficit, an indicator of the ability of moisture to evaporate, is projected to increase as temperatures rise and carbon dioxide fertilization reduces transpiration, leading to both lower humidity and increased surface dryness. Overall, increased dryness should extend the wildfire season in places where the fire season is presently constrained by low levels of aridity, such as eastern Texas.[8]

Additionally, it is projected that future changes to the Crockett County will include increased temperatures, which according to the U.S. Climate Explorer, the planning area may experience a 6°F increase in the average extreme heat temperatures. Historically, extreme temperatures averaged 100°F in Crockett County, but between 2035 and 2064 the average will be 106°F, increasing the severity and frequency of extreme heat events, contributing to favorable wildfire conditions.

Extreme heat and extended periods of drought contribute to wildfire risk in the planning area. Extreme temperatures and periods of drought destroy vegetation in the area, contributing to available fuels that spread wildfires. Additional climate change impacts from drought and extreme heat are discussed in Sections 6 and 9 of this Plan. The projected rise of severity in drought and extreme heat events suggest a growing likelihood of conditions that favor wildfires. Additional information and studies are needed to determine the degree and rate of any increased wildfire risk.

VULNERABILITY AND IMPACT

Periods of drought, dry conditions, high temperatures, and low humidity are factors that contribute to the occurrence of a wildfire event. Less developed areas, such as along interstates or in more remote areas where fuels are more prevalent have an increased risk of being affected by wildfire. The more heavily populated areas of the planning area are not highly likely to experience large, sweeping fires. Unoccupied buildings and open spaces that have not been maintained have the greatest vulnerability to wildfire. The overall level of concern for wildfires is located across the county where wildland and urban areas interface. Figures 16-5 and 16-6[9] illustrate the areas that are the most vulnerable to wildfire throughout the Crockett County planning area.

The Crockett County Planning Team identified the following critical facilities (Table 16-6) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by wildfire events. Critical facilities within the Direct Exposure Zone of the WUI are at the greatest risk from wildfire. For a comprehensive list of critical facilities, please see Appendix D.

[7] NOAA Wildfire Climate Connection, August 2022: wildfire-climate-connection.
[8] Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.
[9] TxWRAP portal at the following site: https://texaswildfirerisk.com/

Table 16-6. Critical Facilities and Critical Services Vulnerable to Wildfire Events

Critical Facility Type	Critical Facilities at Risk	Potential Impacts
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	Crockett County: 1 Health Service Facility, 2 Police Facilities	• Emergency services may be disrupted during a wildfire if facilities are impacted, roadways are inaccessible, or personnel are unable to report for duty. • First responders are at greater risk of injury when in close proximity to the hazard while extinguishing flames, protecting property, or evacuating residents in the area. • Critical departments may not be able to function and provide necessary services depending on the location of the fire and the structures or personnel impacted. • Roadways in or near the WUI could be damaged or closed due to smoke and limited visibility, slowing or preventing access for emergency response vehicles. • Fire suppression costs can be substantial, exhausting the financial resources of the community. • First responders can experience heart disease, respiratory problems, and other long-term related illnesses from prolonged exposure to smoke, chemicals, and heat. • Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Power outages could disrupt communications, delaying emergency response times. • Structures can be damaged or destroyed in the path of the wildfire. • Power outages could disrupt critical care. • Backup power sources could be damaged or destroyed. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	Crockett County: 3 Municipal Facilities, 1 U.S. Government Facility	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed. • Additional emergency responders and critical aid workers may not be able to reach the area for days. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations.

Critical Facility Type	Critical Facilities at Risk	Potential Impacts
Commercial Supplier (food, fuel, etc.)	Crockett County: 1 Food Facility	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed. • Economic disruption due to power outages and fires negatively impact services as well as area businesses reliant on commercial suppliers.
Utility Services and Infrastructure (electric, water, wastewater, communications)	Crockett County: 1 Energy Utility Facility, 1 Sewage and Water Facility	• Wastewater and drinking water facilities and infrastructure may be damaged or destroyed resulting in service disruption or outage for multiple days or weeks. • Disruptions and outages impact public welfare as safe drinking water is critical. • A break in essential and effective wastewater collection and treatment is a health concern, potentially spreading disease. • Exposure to untreated wastewater is harmful to people and the environment. • Any service disruptions can negatively impact or delay emergency management operations.

Older structures face significantly higher wildfire risks due to combustible building materials (wood shakes, siding), lack of modern fire-rated, non-combustible construction materials, and features that trap embers like open eaves. Older structures often lack automatic sprinkler systems and modern ignition-resistant designs, leading to faster flame spread and higher destruction rates in suburban and historical areas. Manufactured homes are significantly more vulnerable to wildfire due to lighter construction materials and often closer placement of units within communities.

The Crockett County planning area features mobile or manufactured homes throughout the planning area. The U.S. Census data indicates a total of 226 (13 percent of total housing stock) manufactured homes located in the planning area. In addition, 55 percent (952 structures) of the housing structures in the planning area were built before 1980 (Table 16-7).

Table 16-7. Structures at Greater Risk[10]

Jurisdiction	Structures	
	SFR Built Before 1980	Manufactured Homes
Crockett County	952	226
Ozona CDP	767	163

[10] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.

Within the Crockett County planning area, a total of 393 fire events were reported from 2005 through 2024 by Texas A&M Forest Service. All events were suspected wildfires. Historic loss and annualized estimates of acres burned due to wildfires are presented in Table 16-8 below. The average frequency is approximately 20 events every year.

Table 16-8. Average Annualized Acreage Losses[11]

Jurisdiction	Total Acres Burned	Average Annual Acre Losses
Crockett County	274,950	14,471

Damage Potential provides an index of potential damage to homes from wildfire. It considers factors like flame length and embers lofted from nearby fuel. Damage Potential is a relative index (from low to high), that provides a broad measure of the possible damage from wildfire, based generally on the landscape, rather than specific characteristics of a home or parcel. For planning uses and broad applications, the index is calculated for all areas regardless of whether a structure currently exists at that location. This index does not incorporate a measure of wildfire likelihood.[12] Figures 16-5 and 16-6 show the level of potential damage from wildfires in the Crockett County planning area.

[11] Events divided by 20 years of data.
[12] TxWRAP portal at the following site: https://texaswildfirerisk.com/

Figure 16-5. Damage Potential in Crockett County

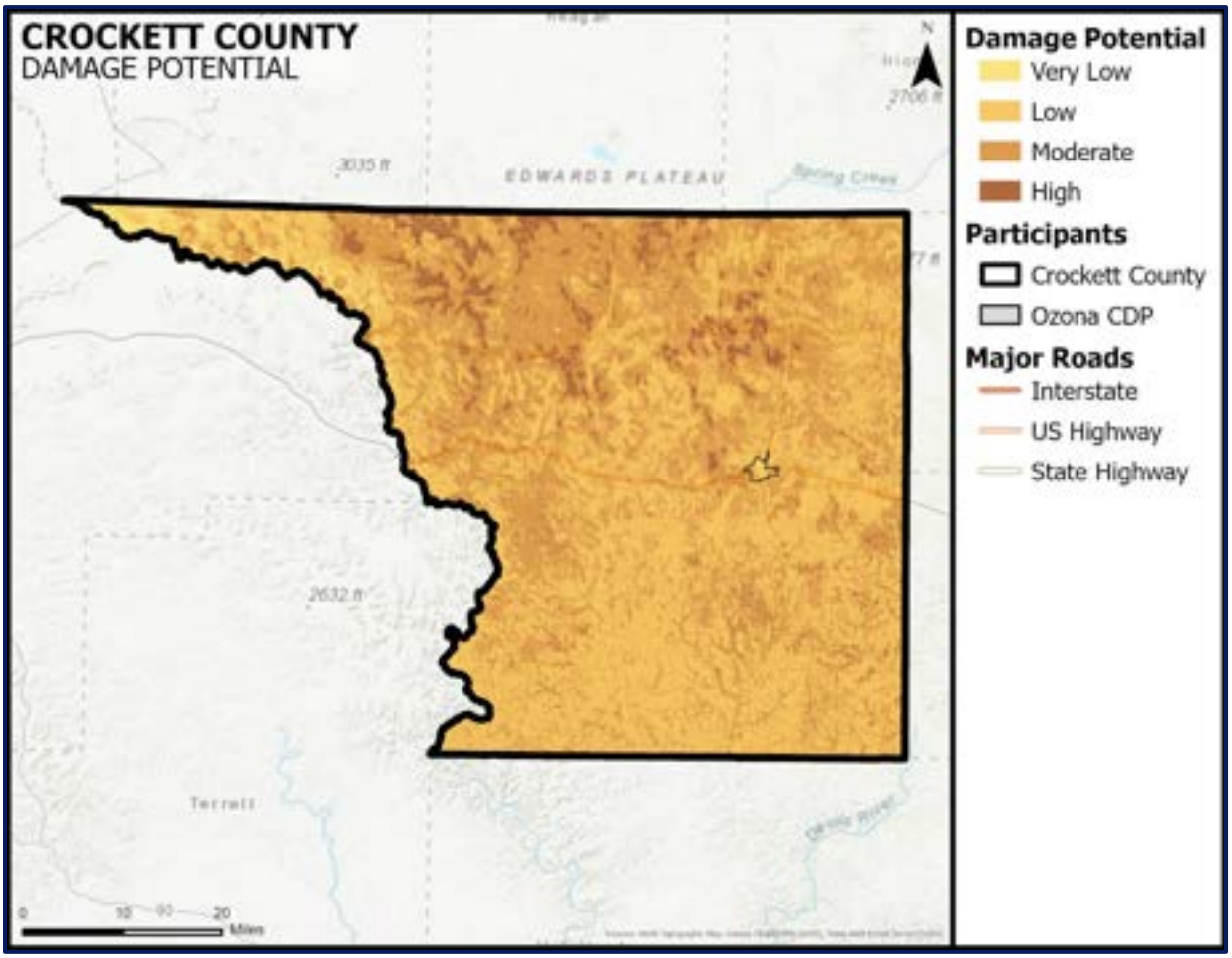
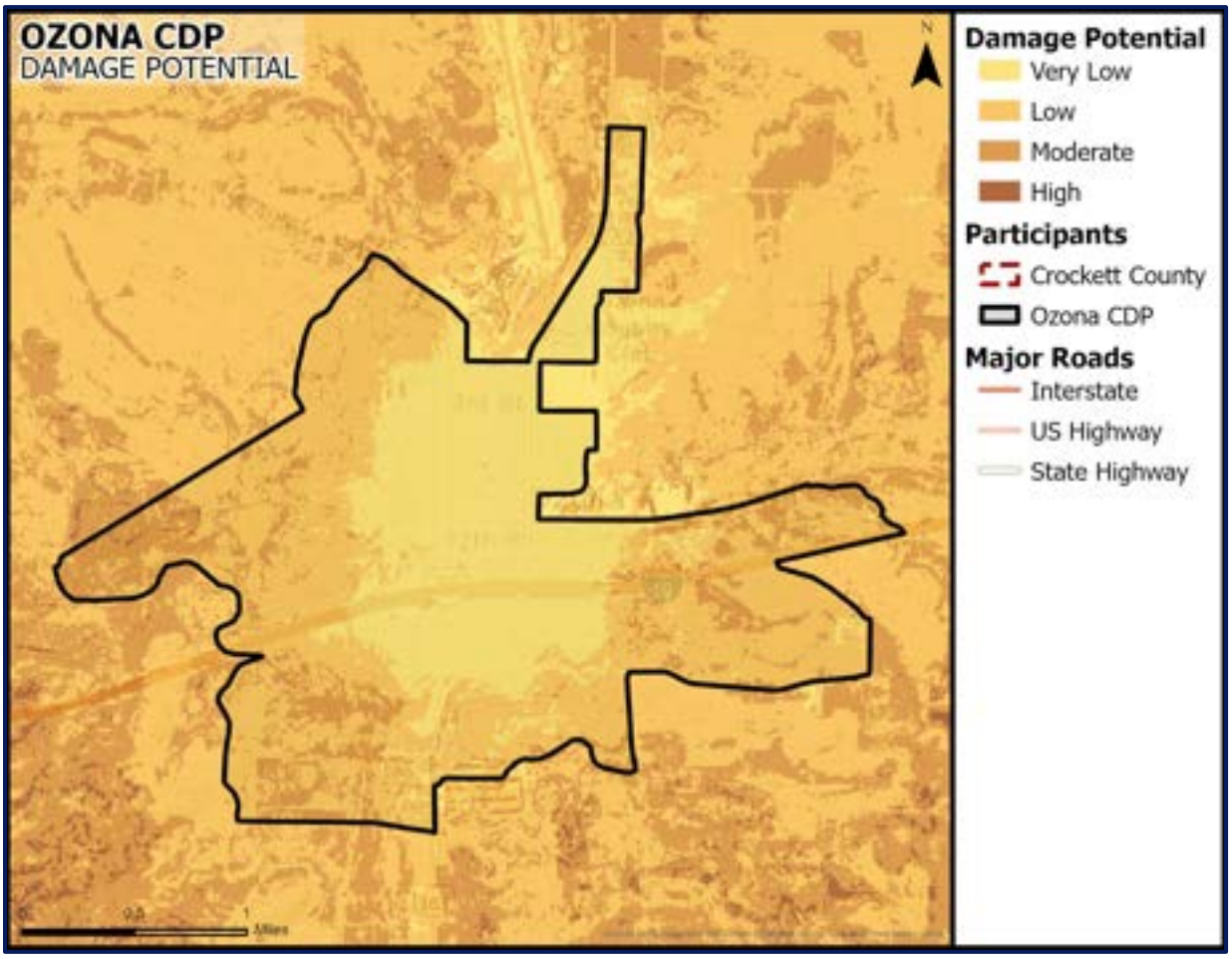


Figure 16-6. Damage Potential in Ozona[13]



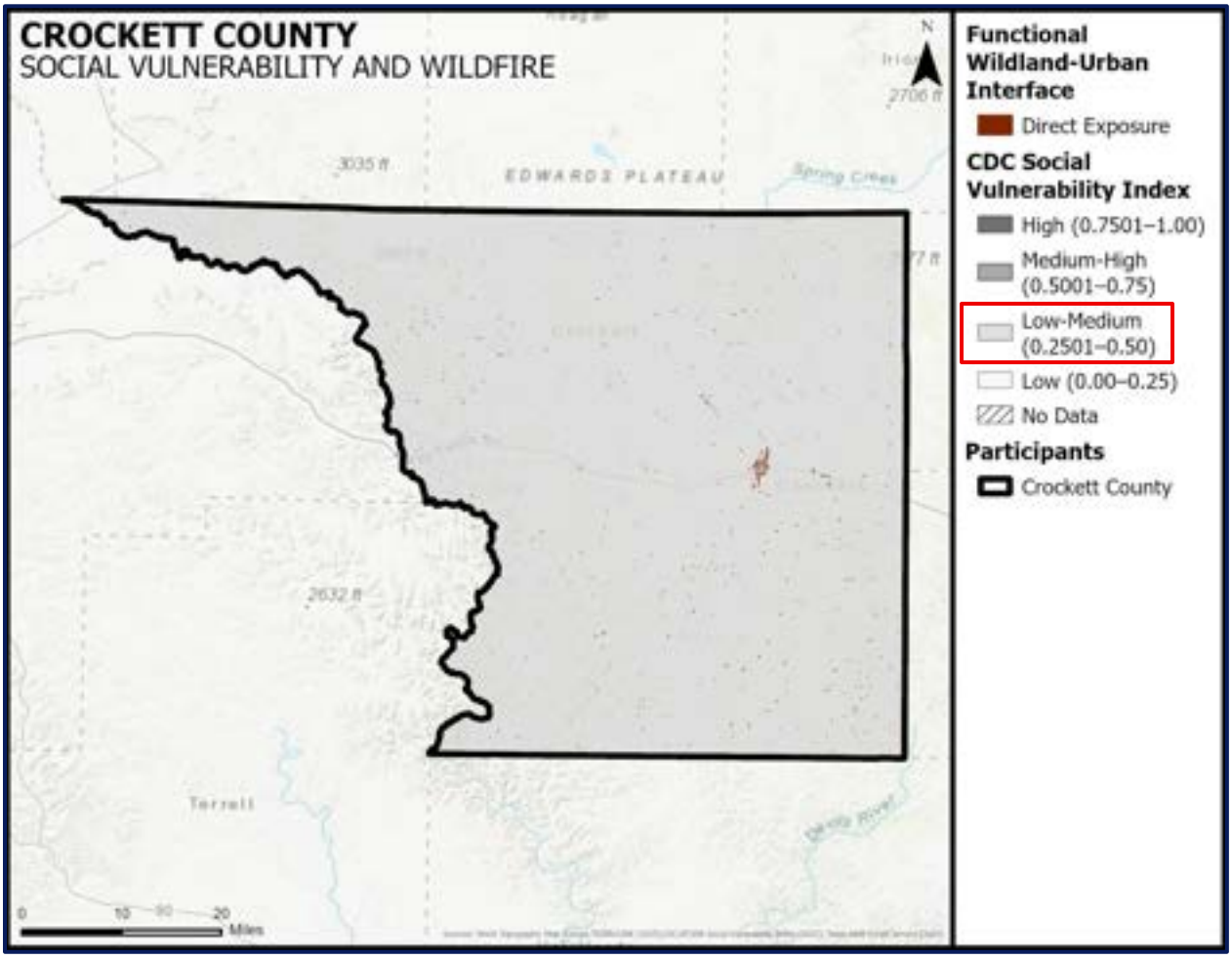
Diminished air quality is an environmental impact that can result from a wildfire event and pose a potential health risk. Wildfire smoke plumes may contain carcinogenic particles that can be inhaled. Fine particles of invisible soot and ash that are too small for the respiratory system to filter can cause immediate and possibly long-term health effects. The elderly or those individuals with compromised respiratory systems may be more vulnerable to the effects of diminished air quality after a wildfire event.

The Center for Disease Control (CDC) created a Social Vulnerability Index (SVI) which includes a database and mapping application that identifies and quantifies communities experiencing social vulnerability. The current CDC SVI uses 16 U.S. census variables from the 5-year American Community Survey (ACS) to identify communities that may need support before, during, or after disasters. All 16 variables fall under four broad categories including socioeconomic status (population in poverty, unemployment, etc.), household characteristics (age, disability status, etc.), racial and ethnic minority status, and housing type and transportation (mobile homes, no vehicles, etc.). Populations experiencing social vulnerability may be adversely impacted by natural hazards, disasters, and other community-level stressors. Figure 16-7 identifies areas of

[13] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.

social vulnerability using CDC's SVI and where these areas overlap with the Crockett County WUI areas, where wildfire risk is considered the highest.

Figure 16-7. Crockett County County's Social Vulnerability and WUI



Climatic conditions such as severe freezes and drought can significantly increase the intensity of wildfires since these conditions kill vegetation, creating a prime fuel source for wildfires. The intensity and rate at which wildfires spread are directly related to wind speed, temperature, and relative humidity.

The impact of a wildfire event for the Crockett County planning area is considered "Limited," meaning injuries and/or illnesses are typically treatable with first-aid, complete shutdown of facilities and services for 24 hours or less and less than 10 percent of property is destroyed or with major damage. The severity of impact is gauged by acreage burned, homes and structures lost, injuries, and fatalities.

Table 16-9. Impact for Crockett County[14]

Jurisdiction	Impact	Description
Crockett County	Limited	A majority of the County (50 percent) is in the "low" damage potential category. In addition, 1 percent is in the "very low" category, 44 percent is in the "moderate" category, 5 percent is in the "high" category, and 0 percent in the "little to none" category. County residents may suffer injuries that are treatable with first aid. Critical facilities could be shut down for 24 hours, and less than 10 percent of total property could be damaged.
Ozona CDP	Limited	A majority of the community (50 percent) is in the "low" damage potential category. In addition, 36 percent is in the "very low" category, 14 percent is in the "moderate" category, 0 percent is in the "high" category, and 0 percent in the "little to none" category. Community residents may suffer injuries that are treatable with first aid. Critical facilities could be shut down for 24 hours, and less than 10 percent of total property could be damaged.

ASSESSMENT OF IMPACTS

A wildfire event poses a potentially significant risk to public health and safety, particularly if the wildfire is initially unnoticed and spreads quickly. The impacts associated with wildfire are not limited to direct damage. Significant wildfire events can be frequently associated with a variety of impacts, including:

- The Crockett County planning area contains numerous open space areas. Wildfire may adversely affect or destroy endangered species' habitat, reduce air quality, increase erosion and risk of flash flooding, contribute to increased local temperatures, and disrupt other ecological functions.
- Recreation activities throughout the county parks may be unavailable and tourism can be unappealing for years following a large wildfire event, devastating directly related local businesses and negatively impacting economic recovery.
- Persons, pets, and wildlife in the area at the time of the fire are at risk for injury or death from burns and/or smoke inhalation. First responders are at greater risk of physical injury when in close proximity to the hazard while extinguishing flames, protecting property, or evacuating residents in the area.
- First responders can experience heart disease, respiratory problems, and other long-term related illnesses from prolonged exposure to smoke, chemicals, and heat.
- Emergency services may be disrupted during a wildfire if facilities are impacted, roadways are inaccessible, or personnel are unable to report for duty.
- Critical county departments may not be able to function and provide necessary services depending on the location of the fire and the structures or personnel impacted.
- Non-critical businesses may be directly damaged, suffer loss of utility services, or be otherwise inaccessible, delaying normal operations and slowing the recovery process.

[14] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county's population resides.

- Displaced residents may not be able to immediately return to work, slowing economic recovery.
- Roadways in or near the WUI could be damaged or closed due to smoke and limited visibility.
- Some high-density neighborhoods feature small lots with structures close together, increasing the potential for fire to spread rapidly.
- Air pollution from smoke may exacerbate respiratory problems of vulnerable residents.
- Charred ground after a wildfire cannot easily absorb rainwater, increasing the risk of flooding and potential mudflows.
- Wildlife may be displaced or destroyed.
- Historical or cultural resources may be damaged or destroyed.
- Tourism can be significantly disrupted, further delaying economic recovery for the area.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- Fire suppression costs can be substantial, exhausting the financial resources of the community.
- Residential structures lost in wildfire may not be rebuilt for years, reducing the tax base for the community.
- Direct impacts to municipal water supply may occur through contamination of ash and debris during the fire, destruction of aboveground delivery lines, and soil erosion or debris deposits into waterways after the fire.

The economic and financial impacts of a wildfire event on local government will depend on the scale of the event, what is damaged, costs of repair or replacement, lost business days in impacted areas, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community, local businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a wildfire event.

Section 17
Winter Storm

SECTION 17: WINTER STORM

HAZARD DESCRIPTION

A severe winter storm event is identified as a storm with snow, ice, or freezing rain, typically combined with strong winds and cold temperatures. Wind chill, a function of temperature and wind, is the "feels like" temperature, representing the rate of heat loss from exposed skin due to combined cold and wind, rather than just the actual temperature alone. It serves as a vital indicator of health risks, as higher wind speeds accelerate body heat loss, significantly increasing the danger of frostbite and hypothermia.

Winter storms can cause significant problems including widespread power outages, hazardous travel conditions, and damage from falling trees or limbs. Winter weather that threatens the Crockett County planning area usually begins as powerful cold fronts that push south from central Canada. This can cause a rapid temperature drop, occasionally plunging temperatures below freezing. This transition is frequently accompanied by cold, heavy rain that can occasionally be followed by risks like freezing rain, sleet, and ice accumulation.

Crockett County is located in an area that experiences 65 or fewer days of below freezing temperatures per year. The planning area is subject to a variety of winter weather including wind chill, frost, below freezing temperatures, freezing rain, sleet, and snow. Winters are generally short, mild to cool, dry, windy, and temperate, with average highs in the low-to-mid 60s°F and lows in the 30s°F. Rain is common, while freezing temperatures and snow are less common.

As indicated in Figure 17-1, the Crockett County planning area is located in USDA Hardiness Zone 8a, indicating annual minimum temperatures between 10°F and 15°F. During times of ice and snow accumulation, response times will increase until public works road crews are able to make major roads passable. Table 17-1 describes the types of winter weather possible to occur in the Crockett County planning area.

Figure 17-1. Annual Minimum Temperature[1]

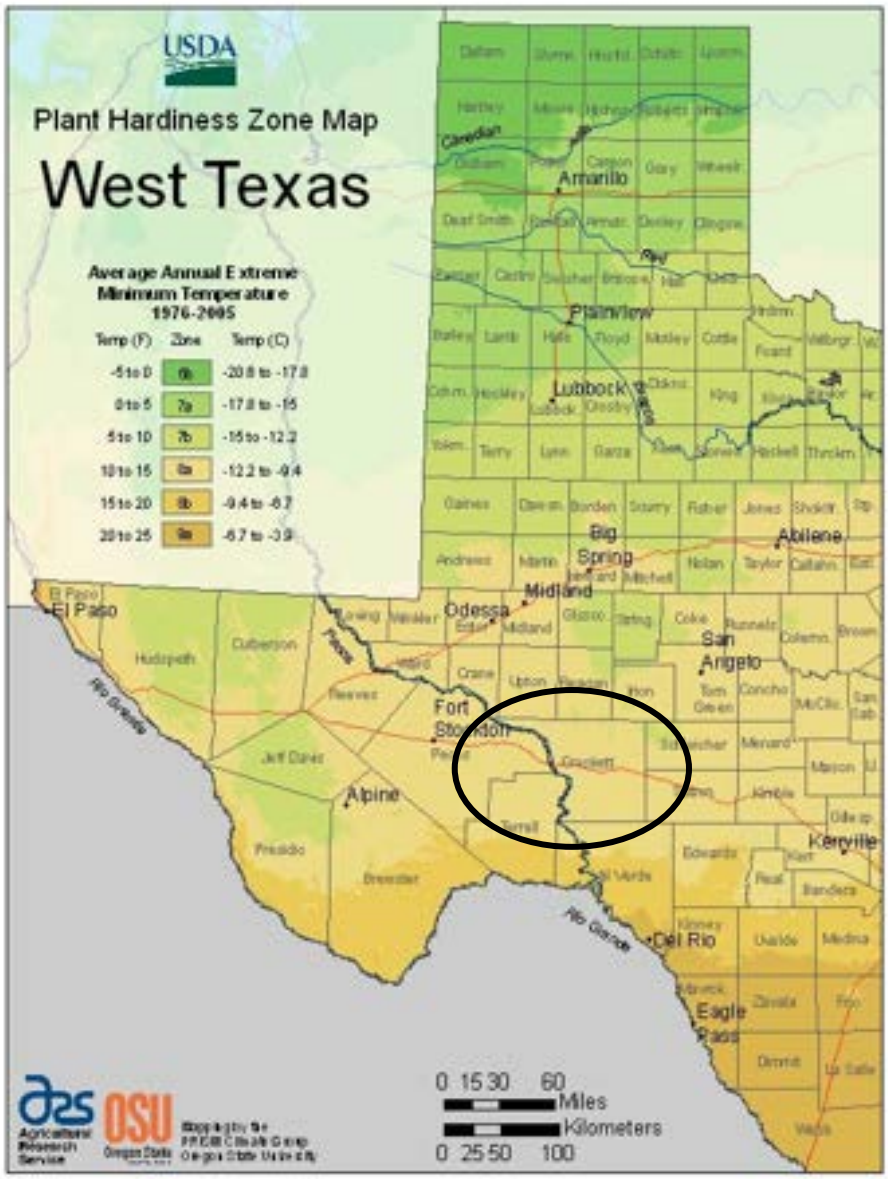


Table 17-1. Types of Winter Weather

Type of Winter Weather	Description
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 usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.

[1] Source: USDA

Type of Winter Weather	Description
Blizzard	Sustained wind speeds of at least 35 mph are accompanied by considerable falling or blowing snow. This alert is the most perilous winter storm with visibility dangerously restricted.
Frost / Freeze	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.

Crockett County coordinates and promotes warming centers during winter storm events. The primary facility is Crockett County Fair Park Convention Center or coordinated with local agencies. Shelter activation is on a case-by-case basis due to the rural location of the county and traffic on I-10.

LOCATION

Winter storm events are not confined to specific geographic boundaries. Therefore, all existing and future buildings, facilities, and populations in the Crockett County planning area are vulnerable to winter weather hazards and could potentially be impacted.

EXTENT

The extent or magnitude of a severe winter storm is measured in intensity based on the temperature and level of accumulations as shown in Table 17-2.

Table 17-2. Magnitude of Severe Winter Storms

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 with 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

The Crockett County planning area has experienced all categories of winter storm intensity. Typical winter storm conditions in the planning area involve short term events with freezing rain,

sleet, and sometimes light snow, with temperatures dropping into the 20s or low 30s°F. The greatest single day snowfall on record in Crockett County was 14.0 inches, which occurred on January 21, 1946.[2] The coldest temperature on record for the county was on February 2, 1951, when Ozona reported a temperature of -8°F.

HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) is a national data source organized under the National Oceanic and Atmospheric Administration and considered a reliable resource for historical event data. Winter storm data is provided at the county level only. According to historical NCEI records and information from the planning team, there have been 29 winter weather events in the Crockett County planning area since 1996 (Table 17-3).

Table 17-3. Historical Winter Storm Events, 1996–2025[3]

Jurisdiction	Date	Deaths	Injuries	Property Damage	Crop Damage
Crockett County	1/14/2007	0	0	$1,700	$0
Crockett County	1/16/2007	0	0	$16,100	$0
Crockett County	4/7/2007	0	0	$15,700	$0
Crockett County	1/10/2015	2	0	$0	$0
Crockett County	2/22/2018	0	2	$0	$0
Totals		**2**	**2**	**$33,500**	

Table 17-4. Historical Winter Storm Events Summary, 1996–2025

Jurisdiction	Number of Events	Deaths	Injuries	Property Damage	Crop Damage
Crockett County	29	2	2	$33,500	$0

Based on the list of historical winter storm events for the Crockett County planning area, 17 events have occurred since the 2012 Plan.

SIGNIFICANT EVENTS

January 14-16, 2007

An arctic cold front moved through West Central Texas. Behind the front, temperatures quickly fell below freezing, and light freezing rain and drizzle developed. The freezing rain gradually spread southward, spreading over much of West Central Texas by January 14th. Ice accumulations reached up to two inches along and north of Interstate 20. Between Highway 87 and I-20, including the Heartland and northern Concho Valley, accumulations ranged from one-

[2] NCEI. https://www.ncei.noaa.gov/access/monitoring/snowfall-extremes/TX

[3] Note: Monetary damages have been inflated to their 2026 value. Only events with injuries, fatalities, and/or damages have been included in the table.

quarter to one-half inch. Farther south, between the I-10 corridor and Highway 87, about one-quarter inch of ice was reported.

The storm led to numerous traffic accidents across the region and caused a few power outages, primarily in the western Big Country. As the ice storm began to wind down Sunday evening, the weight of the accumulated ice caused an Abilene television transmitter tower to collapse. The falling tower also destroyed a National Weather Service (NWS) weather radio antenna mounted on it. Right on the heels of the ice storm that affected the region just days earlier, another surge of arctic air moved into West Central Texas on Monday, January 15th. With an active subtropical jet overhead and several disturbances moving through it, snow began to fall Tuesday morning, January 16th, across the northern Edwards Plateau and along the I-10 corridor.

The heaviest snowfall occurred along and south of Interstate 10, where 4 to 8 inches were reported. Between the I-10 and I-20 corridors, accumulations ranged from 1 to 3 inches, while areas along and north of I-20 saw only a trace to around 1 inch. This heavy snow led to the closure of Interstate 10 for two days between Junction and Ozona. Many roads farther north were snow- and ice-covered, prompting numerous school districts to delay or cancel classes on Wednesday, January 17th. Ozona Emergency Management opened a shelter at the Ozona Convention Center for stranded motorists. The wintry mix also caused scattered power outages in the Sweetwater area.

April 7, 2007
A significant and highly unusual winter weather event brought unseasonably cold temperatures to West Central Texas over Easter Weekend. Winter weather is rare in this region during April. An unseasonably cold air mass developed across the northern Plains, Midwest, and Great Lakes on April 5th and 6th. A strong high-pressure system then dropped south from Canada, pushing the frigid air southward across the Plains and into Texas. By early Saturday morning, April 7th, temperatures across West Central Texas had fallen into the 30 to 35°F range. Temperatures held steady or slowly dropped a few more degrees during the day Saturday and remained in the upper 20s to lower 30s Saturday night.

To make matters worse, an upper-level disturbance approached from southern New Mexico and interacted with the cold, moist air already in place. This triggered several rounds of mixed winter precipitation across the area. Precipitation fell mostly as snow across the Big Country. Farther south, a wintry mix of sleet, snow, and freezing rain occurred. The precipitation was heavy at times, especially when accompanied by scattered thunderstorms moving eastward across the region. Thunder sleet was reported in San Angelo on Saturday, along with a heavy burst of sleet and snow. Crockett County saw ½ inch to 1 inch of sleet during this event.

January 10, 2015
Temperatures in the upper 20s, combined with sleet and freezing rain, created hazardous icy conditions on bridges and overpasses along the Interstate 10 corridor, particularly in the Ozona, Sonora, and Junction areas. The frozen precipitation was responsible for two traffic fatalities.

February 22, 2018
A winter storm impacted the Big Country during the morning and early afternoon of February 21. With surface temperatures in the mid to upper 20s, heavy sleet mixed with freezing rain fell across the region. The freezing precipitation led to numerous school closures and multiple traffic accidents.

As the heavy precipitation tapered off by early afternoon on February 21st, light freezing drizzle continued through the night and into the early afternoon of February 22nd across much of West Central Texas south of Interstate 20. The additional ice accumulation caused some downed tree branches and further icing on roads, bridges, elevated surfaces, and trees. These hazardous conditions contributed to a multiple-vehicle pileup on Interstate 10 near Sonora. Many school districts across West Central Texas started classes about two hours late on February 22nd.

February 10-14, 2021 – Winter Storm Uri (DR-4586)
Winter Storm Uri was one of the most impactful winter events in the state's history. The winter storm event lasted a week and brought snow, sleet, and freezing rain to much of the State of Texas. The presence of the storm began on February 10, 2021, when a cold front brought a surge of cold air to the Area. On February 13th, the winter storm hit the region, including Crockett County, and many areas were placed under a Winter Storm Warning.

Fatalities across the state were attributed to hypothermia, vehicle accidents, carbon monoxide poisoning, and chronic medical conditions complicated by a lack of electricity over several days. Statewide, more than 69 percent of households lost power at some point during the event, with average disruptions lasting 42 hours. Water service was also disrupted, with 49 percent of households losing running water with an average disruption of 52 hours.[4]

Crockett County saw power outages due to the statewide grid strain; however, the outages were generally shorter and less widespread than in eastern parts of the state. The county reported 2 inches of snow.

PROBABILITY OF FUTURE EVENTS

According to historical records, the Crockett County planning area has experienced 29 winter weather events over a 29.5-year reporting period. The probability of a future winter weather event affecting the Crockett County planning area is considered "Highly Likely," with a winter storm event probable within the next year.

CLIMATE CHANGE CONSIDERATIONS

Climate change is expected to reduce the number of extreme cold events statewide but increase in the variability of events.[5] Extreme cold events will continue to be possible but overall winters are becoming milder, and the frequency of extreme winter weather events are decreasing due to the warming of the Arctic and less extreme cold air coming from that region.[6] A trend that is expected to continue with winter extremes estimated to be milder by 2036 compared to extremes in the historic record.[7]

[4] Source: Donald, Jess. "Winter Storm Uri. The Economic Impact of the Storm." October 2021. Fiscal Notes. Texas Comptroller of Public Accounts. https://comptroller.texas.gov/economy/fiscal-notes/2021/oct/winter-storm-impact.php
[5] Fourth National Climate Assessment. Chapter 23 Southern Great Plans. U.S. Global Change Program. 2018.
[6] Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.
[7] Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.

VULNERABILITY AND IMPACT

Severe winter weather is relatively rare for Crockett County. Aging infrastructure in the planning area was not designed for freezing temperatures. Older buildings, homes and pipes often lack insulation leading to damaged pipes and water damages. Freezing rain and ice accumulation can damage trees and, subsequently, power lines, leading to prolonged power outages. Elevated roads, bridges, and interchanges, particularly on I-10, are prone to icing, causing a shutdown of critical transit systems.

Crockett County, as well as surrounding areas in Texas have faced significant power grid strain and outages during severe winter weather events like Winter Storm Uri, which prompted emergency measures. The regional grid operator, Electric Reliability Council of Texas (ERCOT) directed local suppliers to implement "load shedding" or rolling blackouts to prevent more extensive, prolonged grid failure during the extreme demand of Winter Storm Uri. ERCOT is an independent system operator and reliability coordinator for about 90 percent of Texas. They monitor the grid in real time and when reserves critically low they can declare emergencies to shed a specific amount of load.

Due to the relative infrequency of winter storms, local authorities have limited specialized equipment for clearing ice from roads, causing access and mobility issues. The Crockett County planning area relies on a response strategy coordinated with local and county capabilities, state resources, and inter-agency coordination and pre-positioned agreements to prepare and respond to winter storm conditions.

Additional economic impacts may occur during extreme winter weather due to increased consumption of heating fuel, which can lead to a spike in billing and a strain on residents. House fires and resulting deaths tend to occur more frequently from increased and improper use of alternate heating sources. Fires during winter weather events also present a greater danger because water supplies may freeze or water pressure may drop and impede firefighting efforts.

The Crockett County Planning Team identified the following critical facilities (Table 17-5) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by winter weather events. For a comprehensive list of critical facilities, please see Appendix D.

Table 17-5. Critical Facilities Vulnerable to Winter Storm Events

Critical Facility Type	Potential Impacts
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Roads may become impassable due to snow and/or ice impacting response times by emergency services
Airport, Academic Institutions, Animal Shelter, Evacuation Centers and Shelters, Governmental Facilities, Residential/	• Power outages could disrupt critical care. • Water pipes can freeze and burst leading to flooding within facilities. • Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable.

Critical Facility Type	Potential Impacts
Assisted Living Facilities	• Economic disruption due to power outages negatively impacts airport services as well as area businesses reliant on airport operations. • Increased exposure risks for outdoor workers.
Commercial Supplier (food, fuel, etc.)	• Facilities, infrastructure, or critical equipment, including communications may be damaged, destroyed, or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Utility operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Roads may become impassable due to snow and/or ice impacting response times by emergency services. • Power outages could disrupt critical care. • Water pipes can freeze and burst leading to flooding within facilities.

Vulnerable populations are subject to health risks from extended exposure to cold air (Table 17-6). Elderly people are at greater risk of death from hypothermia, especially in neighborhoods with older housing stock. Disabled populations may face challenges due to factors like limited mobility, medical needs, or transportation challenges and may not be able to access appropriate sheltering to meet their functional needs. Inclusive measures are crucial to address these vulnerabilities and ensure their safety during severe weather events.

Substandard housing and older infrastructure make low-income residents more susceptible to winter storm impacts. Poor insulation is a significant contributor to the Crockett County planning area having a high energy burden. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

The population over 65 in the Crockett County planning area is estimated at 19 percent of the total population and children under the age of 5 are estimated at 1 percent. The population with a disability is estimated at 17 percent of the total population. An estimated 9 percent of the planning area population live below the poverty level and 10 percent of the populations speak English “less than very well” (Table 17-6).

Table 17-6. Populations at Greater Risk of Winter Storm Events[8]

Jurisdiction	Population				
	65 and Older	Under 5	With a Disability	Below Poverty Level	Limited English Speaking
Crockett County	537	36	491	262	295

[8] Source: U.S. Census Bureau 2024 data for Crockett County. Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county’s population resides.

Jurisdiction	Population				
	65 and Older	Under 5	With a Disability	Below Poverty Level	Limited English Speaking
Ozona CDP	492	0	491	214	290

Older homes tend to be more vulnerable to the impacts of winter weather events. Homes built before 1980 are generally more vulnerable to winter storm damage because they were constructed before modern energy codes, insulation standards, and wind-resistance requirements became mandatory. These older homes frequently lack sufficient insulation, feature single-pane windows, and have outdated plumbing and electrical systems that cannot handle the stress of extreme cold or power outages. Approximately 55 percent (952 structures) of the housing units in the planning area were built before 1980 (Table 17-7).

Table 17-7. Structures at Greater Risk of Winter Storm Events[9]

Jurisdiction	Structures
	SFR Built Before 1980
Crockett County	952
Ozona CDP	767

Winter weather has been known to cause injury to humans and occasionally has been fatal; two injuries and two fatalities have resulted from winter weather in the Crockett County historically. Overall, the total loss estimate of property and crops in the planning area is $33,500 (in 2026 dollars) with an average annualized loss of $1,100. Based on historic loss and damages to the built environment, the impact of winter weather events on the Crockett County planning area would be considered limited, meaning critical facilities and services shut down for 24 hours or less, and less than 10 percent of property destroyed or with major damage. However, with multiple historical injuries and two fatalities, the winter storm severity of impact for the Crockett County planning area is considered “Substantial,” meaning multiple fatalities are possible depending on the extent and duration of the event.

Table 17-8. Winter Storm Event Damage Totals, 1996–2025

Jurisdiction	Total Property & Crop Loss	Average Annual Loss Estimates
Crockett County	$33,500	$1,100

ASSESSMENT OF IMPACTS

The greatest risk associated with a winter storm is the potential impact on public health and safety. The impact of climate change could produce longer, more intense winter storm events,

[9] Ozona is a Census Designated Place (CDP) in Crockett County and is where approximately 90 percent of the county’s population resides.

exacerbating the current winter storm impacts. Worsening winter storm conditions can be frequently associated with a variety of impacts, including:

- In Crockett County vulnerable populations, particularly the elderly (19 percent of total population), children under 5 (1 percent of total population), and those with a disability (17 percent of total population) can face serious or life-threatening health problems from exposure to extreme cold including hypothermia and frostbite.
- Loss of electric power or other heat source can result in increased potential for fire injuries or hazardous gas inhalation because residents burn candles for light or use fires or generators to stay warm.
- Response personnel, including utility workers, public works personnel, debris removal staff, tow truck operators, and other first responders, are subject to injury or illness resulting from exposure to extreme cold temperatures.
- Response personnel would be required to travel in potentially hazardous conditions, elevating the life safety risk due to accidents and potential contact with downed power lines.
- Operations or service delivery may experience impacts from electricity blackouts due to winter storms.
- Power outages are possible throughout the planning area due to downed trees and power lines and/or rolling blackouts.
- Critical facilities without emergency backup power may not be operational during power outages.
- Emergency response and service operations may be impacted by limitations on access and mobility if roadways are closed, unsafe, or obstructed.
- Hazardous road conditions will likely lead to increases in automobile accidents, further straining emergency response capabilities.
- Depending on the severity and scale of damage caused by ice and snow events, damage to power transmission and distribution infrastructure can require days or weeks to repair.
- Winter storms can reduce the efficacy of shaded fuel breaks for wildfire mitigation as treated areas were more likely to have downed trees and limbs than untreated areas.
- Winter storms can result in damage to endangered species habitat and increased fuel loads within forested habitats.
- Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to impacts of winter storm events. Approximately 55 percent of homes in the County were built before 1980. Similarly, historic buildings and sites are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There are three historical buildings and sites listed on the National Register of Historic Places for Crockett County.
- Schools may be forced to shut early due to treacherous driving conditions.
- Exposed water pipes may be damaged by severe or late season winter storms at both residential and commercial structures, causing significant damages.

The economic and financial impacts of winter weather on the community will depend on the scale of the event, what is damaged, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by the community,

local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of a winter storm event.

Section 18
Mitigation Strategy

SECTION 18: MITIGATION STRATEGY

MITIGATION GOALS

Based on the results of the risk and capability assessments, the Planning Team developed and prioritized the mitigation strategy. This involved utilizing the results of both assessments and reviewing the goals and objectives that were included in the previous 2012 Plan. At the Mitigation Strategy Workshop in February 2026, Planning Team members reviewed the mitigation strategy from the previous Plan. The consensus among all members present was that the strategy developed for the 2012 Plan remains relevant and will continue to serve as the foundation for development and implementation of hazard mitigation initiatives in the Plan Update, with additional elements incorporated to further support overall resilience objectives.

GOAL 1

Protect public health and safety.

OBJECTIVE 1.1

Advise the public about health and safety precautions to guard against injury and loss of life from hazards.

OBJECTIVE 1.2

Maximize utilization of the latest technology to provide adequate warning, communication, and mitigation of hazard events.

OBJECTIVE 1.3

Reduce the danger to and enhance protection of high-risk areas during hazard events.

OBJECTIVE 1.4

Protect critical facilities and services.

GOAL 2

Build and support local capacity and commitment to continuously become less vulnerable to hazards.

OBJECTIVE 2.1

Foster ongoing local partnerships and collaborations to improve long-term vulnerability to hazards.

OBJECTIVE 2.2

Establish a cadre of committed volunteers to safeguard the community before, during, and after a disaster.

OBJECTIVE 2.3
Incorporate hazard mitigation concerns into County planning and budgeting processes.

GOAL 3
Increase public understanding, support, and demand for hazard mitigation.

OBJECTIVE 3.1
Heighten public awareness regarding the full range of natural hazards the public may face.

OBJECTIVE 3.2
Educate the public on actions they can take to prevent or reduce the loss of life or property from all hazards and increase individual efforts to respond to potential hazards.

OBJECTIVE 3.3
Publicize and encourage the adoption of appropriate hazard mitigation measures.

GOAL 4
Protect new and existing properties.

OBJECTIVE 4.1
Reduce National Flood Insurance Program (NFIP) repetitive loss occurrences through increased mitigative intervention to structures that have been identified to have sustained repeated damage from hazards.

OBJECTIVE 4.2
Use the most cost-effective approach to protect existing buildings and public infrastructure from hazards.

OBJECTIVE 4.3
Enact and enforce regulatory measures to ensure that future development will not endanger or increase threats to people and existing properties.

GOAL 5
Maximize the resources for investment in hazard mitigation.

OBJECTIVE 5.1
Maximize the use of outside sources of funding.

OBJECTIVE 5.2
Maximize participation of property owners in protecting their properties.

OBJECTIVE 5.3
Maximize insurance coverage to provide financial protection against hazard events.

OBJECTIVE 5.4
Prioritize mitigation projects, based on cost-effectiveness and sites facing the greatest threat to life, health, and property.

GOAL 6
Promote growth in a sustainable manner.

OBJECTIVE 6.1
Incorporate hazard mitigation activities into long-range planning and development activities.

OBJECTIVE 6.2
Promote beneficial uses of hazardous areas while expanding open space and recreational opportunities.

OBJECTIVE 6.3
Utilize regulatory approaches to prevent the creation of future hazards to life and property.

GOAL 7
Promote equity and protect vulnerable populations and underserved communities through hazard mitigation activities.

OBJECTIVE 7.1
Allocate resources and funding to implement hazard mitigation activities that directly benefit vulnerable and underserved communities.

OBJECTIVE 7.2
Build and support local partnerships to leverage resources and expertise in addressing hazard-related equity concerns.

OBJECTIVE 7.3
Establish internal decision-making processes that integrate equity into project selection.

OBJECTIVE 7.4
Monitor and evaluate the effectiveness of mitigation activities to ensure equitable outcomes and protection of vulnerable populations.

Section 19
Previous Actions

SECTION 19: PREVIOUS ACTIONS

SUMMARY

This section includes analysis from the 2012 Concho Valley Council of Government (CVCOG) Hazard Mitigation Plan, which was specific to twelve participating counties, including Crockett County. Planning Team members were given copies of their previous mitigation actions submitted in the 2012 Concho Valley Council of Government (CVCOG) Hazard Mitigation Plan at the Mitigation Strategy Workshop. Crockett County reviewed their previous actions and provided an analysis as to whether the action had been completed, should be carried over as for future implementation, or be deleted from the Plan Update. The actions from the 2012 Plans are included in this section as they were written in 2012, except for the “2026 Analysis” section. Any action in the analysis the team selected for future implementation (carried over) is considered a current action for potential implementation over the life cycle of this updated plan. Additional new actions developed for this plan are detailed in Section 20.

SECTION 19: PREVIOUS ACTIONS

CROCKETT COUNTY

	Crockett County – Previous Action #1
Proposed Action:	Conduct a public education program on fire risks and wildfire mitigation, with the assistance of the Texas Forest Service.
BACKGROUND INFORMATION	
Site and Location:	Crockett County
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Public Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New / Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$8,000
Potential Funding Sources:	Grants
Lead Agency / Department Responsible:	Crockett County
Implementation Schedule:	2012

2026 ANALYSIS:
Complete.

SECTION 19: PREVIOUS ACTIONS

		Crockett County – Previous Action #2
	Proposed Action:	Develop a Wildfire Recovery Plan, including soil erosion control and vegetative recovery.
	BACKGROUND INFORMATION	
	Site and Location:	Crockett County
	Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Prevention, Property Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New / Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	To be determined
Potential Funding Sources:	Grants
Lead Agency / Department Responsible:	Crockett County
Implementation Schedule:	Upon funding

2026 ANALYSIS:
Complete.

SECTION 19: PREVIOUS ACTIONS

	Crockett County – Previous Action #3
Proposed Action:	Develop a Community Wildfire Protection Plan.
BACKGROUND INFORMATION	
Site and Location:	Crockett County
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Public Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New / Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$8,000
Potential Funding Sources:	Grants
Lead Agency / Department Responsible:	Crockett County
Implementation Schedule:	2012

2026 ANALYSIS:
Complete.

SECTION 19: PREVIOUS ACTIONS

	Crockett County – Previous Action #4
Proposed Action:	Repairing spillways and concrete dams.
BACKGROUND INFORMATION	
Site and Location:	Crockett County – Sides #2, 7, Johnson Draw WCD
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Property Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Dam Failure
Effect on New / Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$120,000
Potential Funding Sources:	Grants
Lead Agency / Department Responsible:	County Judge
Implementation Schedule:	2012

2026 ANALYSIS:
Complete.

SECTION 19: PREVIOUS ACTIONS

	Crockett County – Previous Action #5
Proposed Action:	Establish public awareness program regarding availability of flood insurance by disseminating brochures in public places, such as City Hall.
BACKGROUND INFORMATION	
Site and Location:	Crockett County
Type of Action: *(Local Plans and Regulations, Structure and Infrastructure Projects, Natural Systems Protection, or Education and Awareness)*	Property Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New / Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	To be determined
Potential Funding Sources:	Local revenues
Lead Agency / Department Responsible:	Public works
Implementation Schedule:	2012

2026 ANALYSIS:
Complete.

Section 20
Mitigation Actions

SECTION 20: MITIGATION ACTIONS

SUMMARY

The 44 CFR § 201.6(c)(3)(ii) states that the plan must include "A section that *identifies* and *analyzes* a comprehensive range of specific mitigation actions and projects *being considered* to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure." The mitigation planning process is designed to help communities identify feasible and cost-effective mitigation strategies, but implementation of actions is dependent on factors such as funding, staff time, and evolving community priorities, and there is no penalty for jurisdictions unable to implement projects throughout the plan's life.[1]

As discussed in Section 2, at the Mitigation Strategy Workshop, the Planning Team and stakeholders met to develop mitigation actions for each of the natural hazards included in the Plan Update. Each of the actions in this section were prioritized based on FEMA's Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) criteria necessary for the implementation of each action.

As part of the economic evaluation of the STAPLEE analysis, the County analyzed each action in terms of the overall costs, measuring whether the potential benefit to be gained from the action outweighed the costs associated with it. As a result of this exercise, priority was assigned to each mitigation action by marking them as High (H), Moderate (M), or Low (L). An action that is ranked as "High" indicates that the action will be implemented as soon as funding is received. A "Moderate" action is one that may not be implemented right away, depending on the cost and number of citizens served by the action. Actions ranked as "Low" indicate that they will not be implemented without first seeking grant funding, and after "High" and "Moderate" actions have been completed.

Within each mitigation action, the Planning Team considered all potential funding sources that could be utilized to implement the proposed project. To ensure all potential funding resources are considered and are not limited to those sources identified within the action, please see Appendix H for a list of all available State and Federal grant programs as of 2026. The Planning Team will continue to seek out other available funding sources during the 5-year cycle as notices of funding opportunity (NOFO) are released.

All mitigation actions created by Planning Team members are presented in this section in the form of a Mitigation Action Table. More than one hazard is sometimes listed for an action, if appropriate. Actions presented in this section represent a comprehensive range of mitigation actions per current State and FEMA Guidelines, including one action per hazard, and at least two different types for each participating jurisdiction. Section 19 includes an analysis of the actions identified in the previous 2012 Concho Valley Council of Government (CVCOG), which included Crockett County. All precious actions were completed.

Crockett County is a participant in the National Flood Insurance Program (NFIP). Flooding was identified as a significant risk for the community; therefore, many of the mitigation actions were

[1] Cost, funding sources, and implementation schedules are subject to change upon full scoping of project and grant availability.

developed with flood mitigation in mind. Actions related to NFIP compliance include additional narrative when deemed appropriate.

SECTION 20: MITIGATION ACTIONS

Table 20-1. Crockett County Mitigation Action Matrix

Type of Action	
Action #1 – Plans/Regulations (Blue)	**Action #4 – Structural (Orange)**
Action #2 – Education/Awareness (Red)	**Action #5 – Preparedness/Response (Black)**
Action #3 – Natural Systems Protections (Green)	

Jurisdiction	Dam Failure	Drought	Earthquake	Expansive Soils	Extreme Heat	Flood	Hail	Hurricane / Tropical Storm	Lightning	Thunderstorm Wind	Tornado	Wildfire	Winter Storm	Cyber Attack	Hazardous Materials	Pipeline Failure	Terrorism
Crockett County	●●●●	●●	●●●●	●	●	●●●●	●●	●●●●	●●●●	●●●●	●●●●	●●●●●	●●●●	●	●●●●	●●●	●●

CROCKETT COUNTY

Crockett County Mitigation Actions														
***Reduces risk to new and / or existing buildings and infrastructure**														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority** (High, Mod., Low)	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
1	Assess and implement mitigation projects at the Civic Center or local High School Gym for use as a shelter.	Ozona CDP	Reduce risk to citizens by providing shelter in high-risk areas during extreme weather events.	Structure and Infrastructure	Earthquake, Hurricane / Tropical Storm, Thunderstorm Wind, Tornado, Wildfire, Winter Storm, Hazardous Materials, Pipeline Failure, Terrorism	Safety/Security	H	H	$500,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Crockett County EMC	36 Months	Emergency Management Action Plan	Promotes public safety.
2	Create MOU with Civic Center and/or local High School to utilize their gym during hazard events as a safe room or shelter location.	Ozona CDP	Reduce risk of injuries or fatalities to vulnerable populations.	Local Plans and Regulations	Earthquake, Hurricane/Tropical Storm, Thunderstorm Wind, Tornado, Wildfire, Winter Storm, Hazardous Materials, Pipeline Failure, Terrorism	Communication	N/A	H	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Crockett County Administration	24 Months	Emergency Management Action Plan	Promotes public safety.

Crockett County Mitigation Actions														
*Reduces risk to new and / or existing buildings and infrastructure														
Action #	Proposed Action	Site	Benefit	Action Type	Hazards	Community Lifeline	Infra.*	Priority (High, Mod., Low)	Cost	Potential Funding Sources	Lead Agency	Timeline	Existing Plans	NFIP
3	Acquire and install generators with hard wired quick connections at all critical facilities. The priority location is the Annex building.	County-wide critical facilities, including but not limited to County Annex Building	Provide power for critical facilities during power outages and ensure continuity of critical services.	Structure and Infrastructure	Dam Failure, Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm, Hazardous Materials, Pipeline Failure, Terrorism	Energy (Power/Fuel)	Y	H	$500,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Crockett County EMC	36 Months	Emergency Management Action Plan	Helps ensure critical facilities continue to provide services during a power outage caused by unforeseen events.
4	Enhance animal health preparedness by leveraging technology to improve tracking, reporting, and response capabilities.	County-wide	Reduce loss of livestock and economic impact during hazard events.	Local Plans and Regulations	Dam Failure, Earthquake, Flood, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm	Communication	N/A	H	$100,000	Local Budget; State Grants (Star Fund, AgLine); Federal Grants (USDA)	Crockett County EMC	24 Months	N/A	Promotes public safety.
	This shall include the adoption of modern animal and asset tracking technologies, along with the integration of Geographic Information System (GIS) platforms to map disease incidents, analyze spatial patterns of outbreaks, monitor livestock movements in real time, and facilitate more effective coordination and decision-making among stakeholders during emergencies.													

Crockett County Mitigation Actions														
*Reduces risk to new and / or existing buildings and infrastructure														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority** (High, Mod., Low)	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
5	Establish and sustain a multidisciplinary Animal and Agricultural Issues Committee to lead and coordinate planning, preparedness, training, and response efforts for animal health emergencies, livestock facility issues, and broader agricultural risks in the jurisdiction.	County-wide	Reduce loss of livestock and economic impact during hazard events.	Preparedness / Response	Dam Failure, Earthquake, Flood, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm	Communication	N/A	H	$100,000	Local Budget; State Grants (Star Fund, AgLine); Federal Grants (USDA)	Crockett County EMC	24 Months	N/A	Promotes public safety.
	The committee will bring together local stakeholders, emergency management officials, veterinarians, producers, youth organizations, and key state agencies such as the Texas Animal Health Commission (TAHC), Texas A&M AgriLife Extension Service, Texas Department of Agriculture (TDA), and Texas Division of Emergency Management (TDEM) to ensure integrated strategies and effective collaboration.													
6	Assess and install lightning rods on critical facilities.	County-wide critical facilities	Reduce risk to structures and infrastructure.	Structure and Infrastructure	Lightning	Safety/Security	Y	H	$100,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Crockett County EMC	36 Months	Capital Improvement Plan	N/A

Crockett County Mitigation Actions														
*Reduces risk to new and / or existing buildings and infrastructure														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority** (High, Mod., Low)	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
7	Harden/retrofit critical facilities to hazard-resistant levels. Harden internal systems to prevent phishing and other attacks. Install greywater reclamation system for outdoor irrigation at critical public facilities to reduce water consumption and prevent foundation shifts through proper irrigation.	County-wide critical facilities	Reduce damages at critical facilities; Ensure continuity of critical services during and after event;	Structure and Infrastructure	Dam Failure, Drought, Earthquake, Expansive Soils, Extreme Heat, Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm, Cyber Attack, Hazardous Materials, Pipeline Failure, Terrorism	Safety/Security	Y	H	$500,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Crockett County EMC	36-48 Months	Emergency Management Action Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
8	Create MOU with battery farm for mitigation projects.	County-wide	Reduce risk of damages to structures; Reduce risk of injuries to critical service employees.	Preparedness / Response	Dam Failure, Drought, Earthquake, Flood, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm	Communication	N/A	H	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Crockett County Administration	24 Months	N/A	Promotes public safety.

SECTION 20: MITIGATION ACTIONS

Crockett County Mitigation Actions														
**Reduces risk to new and / or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority** (High, Mod., Low)	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
9	In conjunction with the Crockett County LEPC pursue the commodity flow study to gain insight into hazmat transportation that passes through the area.	County-wide	Reduce loss of life and property from impacts of hazardous materials on the roadways.	Preparedness /Response	Hazardous Materials	Safety/Security	N/A	H	$5,000	HMEP	Crockett County Administration	24 Months	N/A	N/A
10	Implement an education and awareness program on the benefits of residential and commercial storm ditch clearing to maintain the capacity of the planning area's drainage system.	County-wide	Reduce flood risk by maintaining channels and ditches. Reduce volume of wildfire fuels near development	Education and Awareness	Dam Failure, Flood, Wildfire	Safety / Security	N/A	High	$5,000	Local Budget (Staff Time)	Crockett County Commissioner's Court	24 Months	N/A	Promotes public safety.

Crockett County Mitigation Actions														
*Reduces risk to new and / or existing buildings and infrastructure														
Action #	Proposed Action	Site	Benefit	Action Type	Hazards	Community Lifeline	Infra.*	Priority (High, Mod., Low)	Cost	Potential Funding Sources	Lead Agency	Timeline	Existing Plans	NFIP
11	Adopt and implement a program for clearing debris from bridges, drains and culverts.	County-wide	Reduce damages to infrastructure; Ensure continuity of services during and after event; Reduce damages associated with power outages.	Local Plans and Regulations Structure and Infrastructure	Flood, Hail, Hurricane / Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm	Safety/Security	N/A	M	$100,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Crockett County EMC	36-48 Months	Emergency Management Action Plan	Promotes public safety.
12	Work with state and local agencies to determine locations to reduce fuel on public and private lands. Implement fuels reduction program.	County-wide	Reduce risk of wildfire and the spread of wildfire through targeted fuels reduction programs.	Natural Systems Protection	Wildfire	Safety/Security	Y	M	$500,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Crockett County EMC	24 Months	N/A	N/A

Crockett County Mitigation Actions														
*Reduces risk to new and / or existing buildings and infrastructure														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority** (High, Mod., Low)	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
13	Integrate a county-wide warning notification system.	County-wide	Reduce risk to citizens through improved communication and early warning.	Education and Awareness	Dam Failure, Earthquake, Flood, Hurricane / Tropical Storm, Thunderstorm Wind, Tornado, Wildfire, Winter Storm, Hazardous Materials, Pipeline Failure	Communication	N/A	High	$50,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Crockett County EMC	36-48 Months	Emergency Management Action Plan	Promotes public safety.
14	Mitigate low water crossings south of the City of Ozona.	Ozona CDP (30°42’ 20.4”N 101°12’ 15.3”W)	Improve risk assessment; Reduce risk of damages or injuries through drainage improvements; Reduce risk of damages and injuries.	Local Plans / Regulations Structure and Infrastructure	Flood	Safety/Security	Yes	High	$188,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Crockett County Commissioner’s Court	36-48 Months	Emergency Management Action Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
	A Flood Management Evaluation (FME) and preliminary analysis of Ozona Low Water Crossings have been completed. Several low-water crossings were identified south of the City of Ozona. Low water crossings pose a significant risk to area residents and visitors as rapid flash flooding is common in the area. Flas flooding also contributes to significant erosion at crossings, requiring costly repairs.													

Section 21
Plan Maintenance

SECTION 21: PLAN MAINTENANCE

PLAN MAINTENANCE PROCEDURES

The following is an explanation of how Crockett County and the general public will be involved in implementing, evaluating, and enhancing the Plan over time. When the Plan is discussed in all maintenance procedures, it includes mitigation actions and hazard assessments. The sustained hazard mitigation planning process consists of four main parts:

- Incorporation
- Monitoring and Evaluating
- Updating
- Continued Public Involvement

INCORPORATION

Crockett County will be responsible for further development and implementation of mitigation actions. Each action has been assigned to a specific department within the County. The following describes the process by which the County will incorporate elements of the Plan Update into other planning mechanisms.

PROCESS OF INCORPORATION

Upon formal adoption of the Plan Update, Crockett County will implement actions based on priority and the availability of funding. The County is committed to implementing their mitigation actions and will adjust long-term plans and budgets to stay aligned with the updated Hazard Mitigation Plan. The potential funding sources noted for each action can guide participants when seeking support and include a timeline to promote timely completion and measure progress.

Crockett County will work to align their mitigation actions with existing plans and policies, such as construction standards and Emergency Management Plans, and ensure these actions appear in related planning efforts. Integrating these plans will help maximize funding, enable cost-sharing, and reduce risks to people and property.

The Planning Team members will work to integrate hazard mitigation strategies into other plans and codes as they are developed. Participating team members will conduct periodic reviews of relevant plans and policies at least annually and ensure that future capital improvement planning aligns with the goals of this Hazard Mitigation Plan Update to reduce long-term risk to life and property from all hazards. To guide and manage development, the Planning Team will review the Comprehensive Land Use Plan, Capital Improvement Plan, Emergency Operations or Management Plan, and Transportation Plan, as applicable.

SECTION 21: PLAN MAINTENANCE

Table 21-1 identifies types of planning mechanisms and examples of methods for incorporating the Plan Update into other planning efforts. The team members, listed in Table 21-2 below, will be responsible for the review of these planning mechanisms and their incorporation of the Plan Update, with the exception of the Floodplain Management Plan; the Floodplain Administrator on staff will be responsible for incorporating the Plan when the Floodplain Management Plan is updated, or a new plan is developed.

Table 21-1. Methods of Incorporation of the Plan

Planning Mechanism	Department / Title Responsible	Incorporation of Plan
Annual Budget Reviews	Local Government – County Judge	Various departments and key personnel that participated in the planning process will review the Plan and mitigation actions therein when conducting their annual budget review.
Capital Improvement Plan	Local Government – County Judge	Crockett County has a Capital Improvement Plan (CIP) under development. Prior to any revisions to the CIP, County departments will review the risk assessment and mitigation strategy sections of the HMAP, as limiting public spending in hazardous zones is one of the most effective long-term mitigation actions available to local governments.
Comprehensive Plan	Local Government – County Judge	Crockett County has a Comprehensive Land Use Plan in place. Since Comprehensive Plans involve developing a unified vision for a community, the mitigation vision and goals of the Plan will be reviewed in the development or revision of a Comprehensive Plan.
Community Wildfire Protection Plan	Local Government – County Judge	A Community Wildfire Protection Plan (CWPP) includes preventative and corrective actions to address a community's risk of damage from wildfire. Information found in Section 16 of this Plan Update discussing the people and property at risk to wildfire will be reviewed and revised when Crockett County updates their CWPP.
Floodplain Management Plan	Floodplain Administrator	A Floodplain Management Plan includes preventative and corrective actions to address the flood hazard. Therefore, the actions for flooding and information found in Section 10 of this Plan Update discussing the people and property at risk to flood will be reviewed and revised when the County updates their Floodplain Management Plan or develops a new plan.
Grant Applications	Local Government – County Judge	The HMAP will be evaluated by Crockett County when grant funding is sought for mitigation projects. If a project is not in the Plan Update, a Plan Revision may be necessary to include the action in the Plan.
Regulatory Plans	Local Government – County Judge	Currently, Crockett County has regulatory plans in place, such as an Emergency Operations Plan, Land Use Plan, and Evacuation Plan. The Plan Update will be consulted when County departments review or revise their current regulatory planning mechanisms, or in the development of regulatory plans that are not currently in place.

MONITORING, EVALUATING, AND UPDATING

This section outlines the procedures for monitoring and evaluating the Plan Update and for completing required reviews, revisions, and updates. Table 21-2 identifies the departments and titles responsible for these activities.

Table 21-2. Team Members Responsible for Monitoring, Evaluating, and Updating the Plan

Organization / Department	Title
Crockett County – Local Government	County Judge

MONITORING

The Planning Team will be responsible for monitoring implementation of the mitigation strategy and coordinating regular updates to the Plan to ensure it remains an effective tool. The lead agency responsible for implementing each mitigation action in this Plan Update will submit annual progress reports to Crockett County.

The Planning Team will continue to facilitate meetings with the individuals holding the titles listed in Table 21-2 on an annual basis and will produce an annual report that includes updates on the implementation status of the Plan Update, updates to the risk assessment and capability assessment to incorporate new data and developments, and new mitigation action items. In addition to the annual monitoring, the Plan will be similarly reviewed immediately after major weather events, including state or federal disaster declarations.

EVALUATING

As part of the evaluation process, the Planning Team members identified in Table 21-2 will assess changes in risk; determine whether the implementation of mitigation actions is on schedule; determine whether there are any implementation problems, such as technical, political, legal, or coordination issues; and identify changes in land development or programs that affect mitigation priorities for each respective department or organization. When needed, the goals, objectives, mitigation actions, and priorities will be changed to reflect the changing needs of the community.

The Planning Team will meet on an annual basis to evaluate the Plan, including the risk and capability assessments, to identify any changes needed, and assess the effectiveness of the Plan in achieving its stated purpose and goals. The team will evaluate the number of mitigation actions implemented, changes in vulnerability due to the completion of mitigation projects, and the loss reduction associated with each action. In addition, the Plan will be similarly evaluated immediately after extreme weather events, including but not limited to state and federally declared disasters.

UPDATING

The full Executive and Advisory Planning Teams (Appendix B, Tables B-1 and B-2) will meet to review the Plan three years from the FEMA approval date for the development of a five-year update. Additionally, following a disaster, including state or federal disaster declarations, the Plan will be updated to reflect changes in the community's vulnerabilities or mitigation priorities according to the process outlined above, as necessary.

Factors that may affect the content of the revised Plan include new development in identified hazard areas, increased exposure to hazards, disaster declarations, increase or decrease in capability to address hazards, and changes to federal or state legislation. The Plan update process also provides the Planning Team an opportunity to evaluate mitigation actions that have been successful, identify losses avoided due to the implementation of specific mitigation measures, and address mitigation actions that may not have been successfully implemented as assigned.

Upon completion of the review, revision, and update planning process, the revised Plan will be submitted to TDEM and FEMA for final review and approval in coordination with FEMA within the five-year cycle.

It is important to note that grant and planning cycles may extend beyond one year. Given the five-year lifespan of an approved plan, early consideration of update timelines is relevant to ensure continuity and avoid a lapse in plan status.

CONTINUED PUBLIC INVOLVEMENT

Public input was an integral part of the preparation of this Plan and will continue to be essential for Plan updates. The public will be directly involved in the annual evaluation, monitoring, reviews, and cyclical updates. Changes or suggestions to improve or update the Plan will provide opportunities for additional public input.

The public can review the Plan Update on the County’s website, where officials and the public are invited to provide ongoing feedback, via email.

The Planning Team may also designate voluntary citizens from the planning area or willing stakeholder members from the private sector businesses that were involved in the Plan's development to provide feedback on an annual basis. It is important that stakeholders and the immediate community maintain a vested interest in preserving the functionality of the planning area as it pertains to the overall goals of the mitigation plan. The Planning Team is responsible for notifying stakeholders and community members on an annual basis and maintaining the Plan.

Media, including local newspapers and radio stations, will be used to notify the public of any maintenance or periodic review activities during the implementation, monitoring, and evaluation phases. Additionally, local news media will be contacted to cover information regarding Plan updates, the status of grant applications, and project implementation. Local and social media outlets will keep the public and stakeholders apprised of potential opportunities to fund and implement mitigation projects identified in the Plan.

Appendix A
Human-Caused Hazards

APPENDIX A: HUMAN-CAUSED HAZARDS

Appendix A is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

Appendix B
Planning Team

APPENDIX B: PLANNING TEAM

PLANNING TEAM MEMBERS

The Crockett County Hazard Mitigation Action Plan Update 2026 was organized using a direct representative model. An Executive Planning Team from the County, shown in Table B-1, was formed to coordinate planning efforts and request input and participation in the planning process. Table B-2 reflects the Advisory Planning Team, consisting of additional departments that participated throughout the planning process. All Executive and Advisory Planning Team members are involved in hazard mitigation activities; those with the authority to regulate development are identified within Tables B-1 and B-2 with an (R) after their title. Table B-3 is comprised of stakeholders who were invited to provide Plan Update input. Public outreach efforts and meeting documentation are provided in Appendix F.

Table B-1. Executive Planning Team

Organization / Department	Title
Crockett County – Local Government	County Judge (R)

Table B-2. Advisory Planning Team

Organization / Department	Title
Crockett County – Administration	Treasurer (R)
Crockett County – County Judge	Court Administrator
Crockett County – Emergency Management	Assistant Emergency Management Coordinator
Crockett County – Emergency Management	Emergency Management Coordinator
Crockett County – Local Government	Precinct 1, County Commissioner (R)
Crockett County – Local Government	Precinct 2, County Commissioner (R)
Crockett County – Local Government	Precinct 3, County Commissioner (R)
Crockett County – Local Government	Precinct 4, County Commissioner (R)
Crockett County – Local Government	District Clerk (R)
Crockett County – Road & Bridge	Superintendent
Crockett County – Sheriff	Chief
Crockett County – Sheriff	Sheriff (R)

APPENDIX B: PLANNING TEAM

STAKEHOLDERS

The following groups listed in Table B-3 represent a list of organizations invited to stakeholder meetings, public meetings, and workshops throughout the planning process and include members of community groups, non-profit organizations, private businesses, utility providers, neighboring counties, schools, and state and federal agencies. Those that participated in the public meetings are identified with a plus symbol (+) next to their stakeholder type. The public was also invited to participate via e-mail throughout the planning process. Many of the invited organizations and stakeholders participated and were integral to providing comments and data for the Plan Update. For a list of meeting attendees, please see Appendix F.[1]

Table B-3. Stakeholders

Agency	Title	Stakeholder Type
American Red Cross	Disaster Program Manager	Nonprofit Organization / Regional Agency (+)
Concho Valley Council of Governments	Director	Regional Agency
Concho Valley Council of Governments	Homeland Security Planner	Regional Agency
Concho Valley KLST-TV | KSAN-TV	General Manager	Media
Crane County	Emergency Management Coordinator	Neighboring Jurisdiction
Crockett County Library	Library Director	Community Organization (+)
Environmental Protection Agency	Acting Director of Superfund and Emergency Management Division	Federal Agency
Environmental Protection Agency	Regional Administrator	Federal Agency
Habitat for Humanity	General Representative	Nonprofit Organization / Regional Agency
Irion County	Judge	Neighboring Jurisdiction
National Weather Service	Warning Coordination Meteorologist	Federal Agency (+)
Pecos County	Emergency Management Coordinator	Neighboring Jurisdiction
Reagan County	Judge	Neighboring Jurisdiction
Sutton County	Judge	Neighboring Jurisdiction
Texas A&M AgriLife Extension	County Extension Agent	State Agency

[1] Information contained in Appendix F is exempt from public release under the Freedom of Information Act (FOIA).

APPENDIX B: PLANNING TEAM

Agency	Title	Stakeholder Type
Texas A&M Forest Service	District Forester	State Agency
Texas A&M Forest Service	Resource Specialist	State Agency
Texas A&M Forest Service	Resource Specialist	State Agency
Texas A&M Forest Service	Resource Specialist	State Agency
Texas A&M Forest Service	Resource Specialist	State Agency
Texas Commission on Environmental Quality, Region 8	Executive Assistant	State Agency
Texas Commission on Environmental Quality, Region 8	Regional Director	State Agency
Texas Department of Health and Human Services, Region 9	Regional Director	State Agency
Texas Department of Homeland Security	Media Representative	State Agency
Texas Department of Housing and Community Affair	Director of Single-Family and Homeless Program	State Agency
Texas Department of Housing and Community Affair	Manager of Single-Family Program	State Agency
Texas Department of Transportation	Area Engineer	State Agency
Texas Department of Transportation	Assistant Supervisor	State Agency (+)
Texas Department of Transportation	District Engineer	State Agency
Texas Department of Transportation	Maintenance Supervisor	State Agency (+)
Texas Department of Transportation	Officer Manager	State Agency (+)
Texas Division of Emergency Management (TDEM), Region 7	County Liaison Officer	State Agency
Texas Division of Emergency Management (TDEM), Region 7	District Chief	State Agency
Texas Division of Emergency Management (TDEM), Region 7	Recovery & Mitigation Section Chief	State Agency
Texas Division of Emergency Management (TDEM), Region 7	Regional Mitigation Coordinator	State Agency (+)
Texas State Representative	House District 53	State Legislature
Texas State Senate	Senate District 19	State Senate

APPENDIX B: PLANNING TEAM

Agency	Title	Stakeholder Type
Texas State Soil & Water Conservation Board	Administrative Assistant	State Agency
Texas State Soil & Water Conservation Board	Field Representative	State Agency
Texas State Soil & Water Conservation Board	Government Relations Specialist	State Agency
Texas Water Development Board, Region F	General Representative	State Agency
Texas Water Development Board, Region F	Regional Water Project Development Team Manager	State Agency
Texas Windstorm Associations	Public Information Officer	State Agency
United States Army Corps of Engineers	Fort Worth & Galveston District	Federal Agency
United States Fish & Wildlife	Southwest Regional Representative	Federal Agency
United Way of Concho Valley	Director of Community Impact & Engagement	Nonprofit Organization / Regional Agency
Upton County	Emergency Management Coordinator	Neighboring Jurisdiction
Val Verde County	Emergency Management Coordinator	Neighboring Jurisdiction

Appendix C
Public Survey Results

APPENDIX C: PUBLIC SURVEY RESULTS

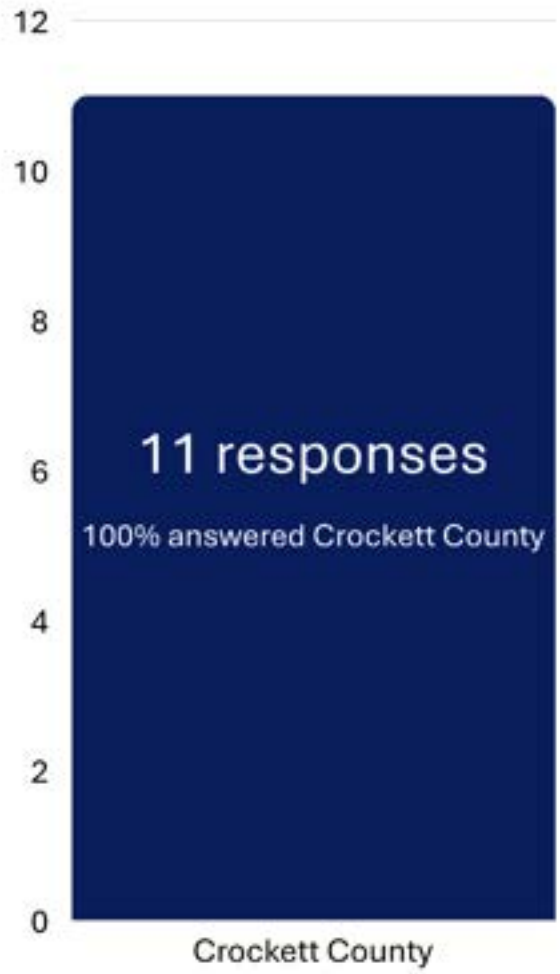
OVERVIEW

Crockett County prepared a public survey that requested public opinion on a wide range of questions relating to natural hazards. The survey was made available via the County's website. The survey link was also distributed at public meetings and stakeholder events throughout the planning process.

A total of 11 surveys were collected, and the results are presented in this appendix. The purpose of the survey was twofold: 1) to solicit public input during the planning process, and 2) to help the County identify any potential mitigation actions or problem areas.

All public survey results were discussed and shared with the Planning Team during the Mitigation Strategy Workshop. These results are also provided below. The survey results provide information regarding the public's experience with natural hazards, their perceived hazards of concern, recommended mitigation actions, and additional valuable insights. Overall, the survey enhances the mitigation planning process by ensuring the Plan Update properly represents the community, is informed through local knowledge, and promotes equity.

PUBLIC SURVEY RESULTS



Have you ever experienced or been impacted by a disaster?

27% Responded 'Yes'

Personal experiences shared in survey responses included:

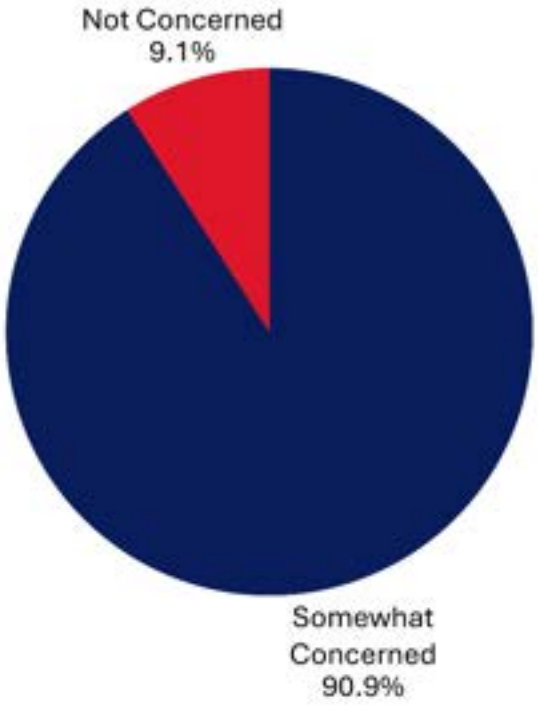
"Flooding, straight line winds."

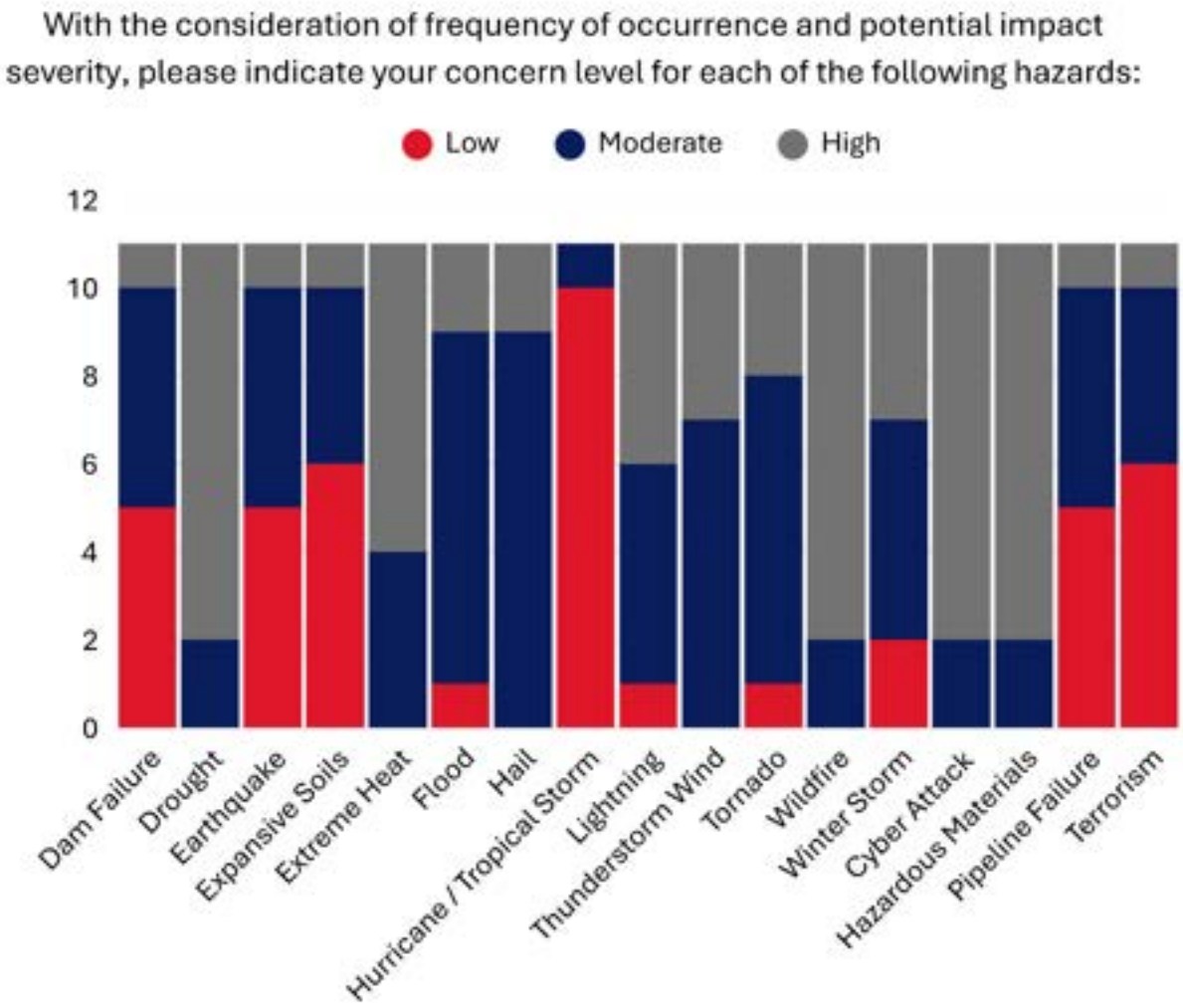
"Flooding."

"Ice storm in Crockett County in 2012 No electricity for 8 days and temperatures in the teens."

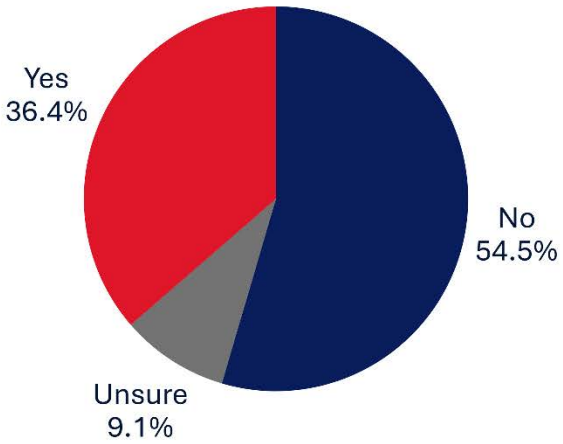
67% of those who have been impacted by a disaster mentioned flooding in their explanations.

Concern level for the possibility of their community being impacted by a disaster.

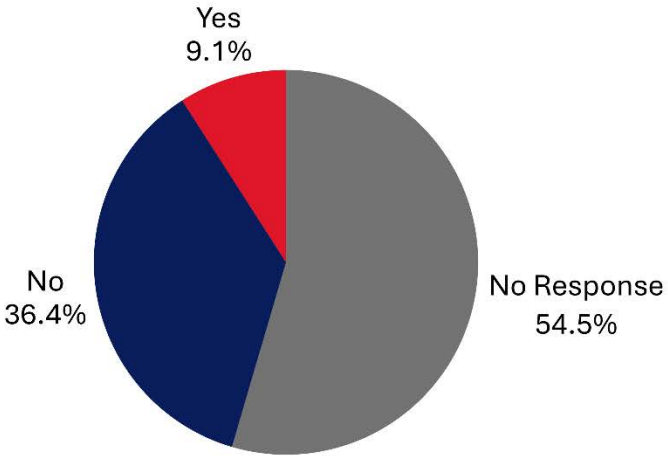


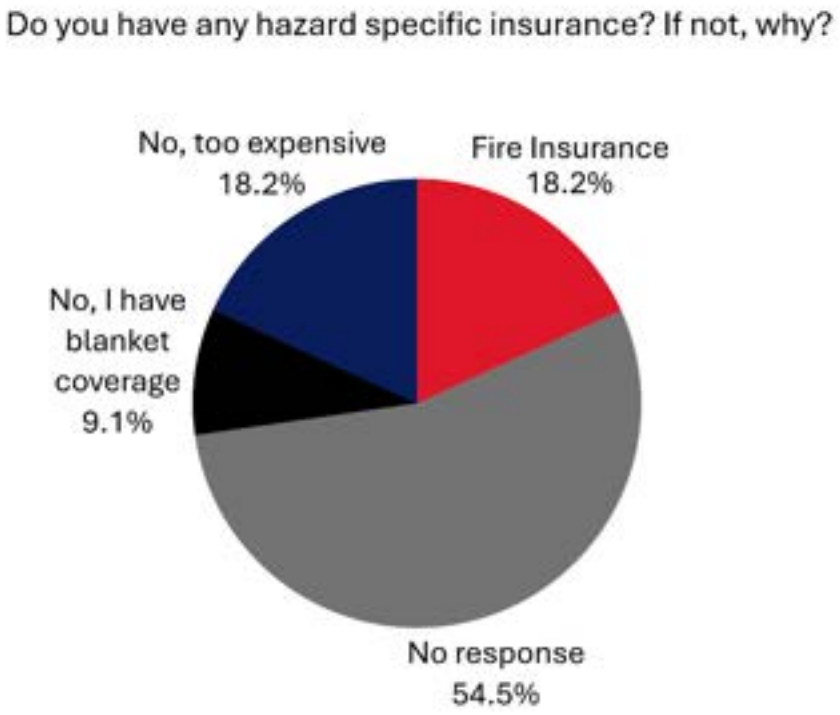

With the consideration of frequency of occurrence and potential impact severity, please indicate your concern level for each of the following hazards:
Low
Moderate
High
12
10
8
6
4
2
0
Dam Failure
Drought
Earthquake
Expansive Soils
Extreme Heat
Flood
Hail
Hurricane / Tropical Storm
Lightning
Thunderstorm Wind
Tornado
Wildfire
Winter Storm
Cyber Attack
Hazardous Materials
Pipeline Failure
Terrorism

To your knowledge, is your home located in any high hazard risk zones?



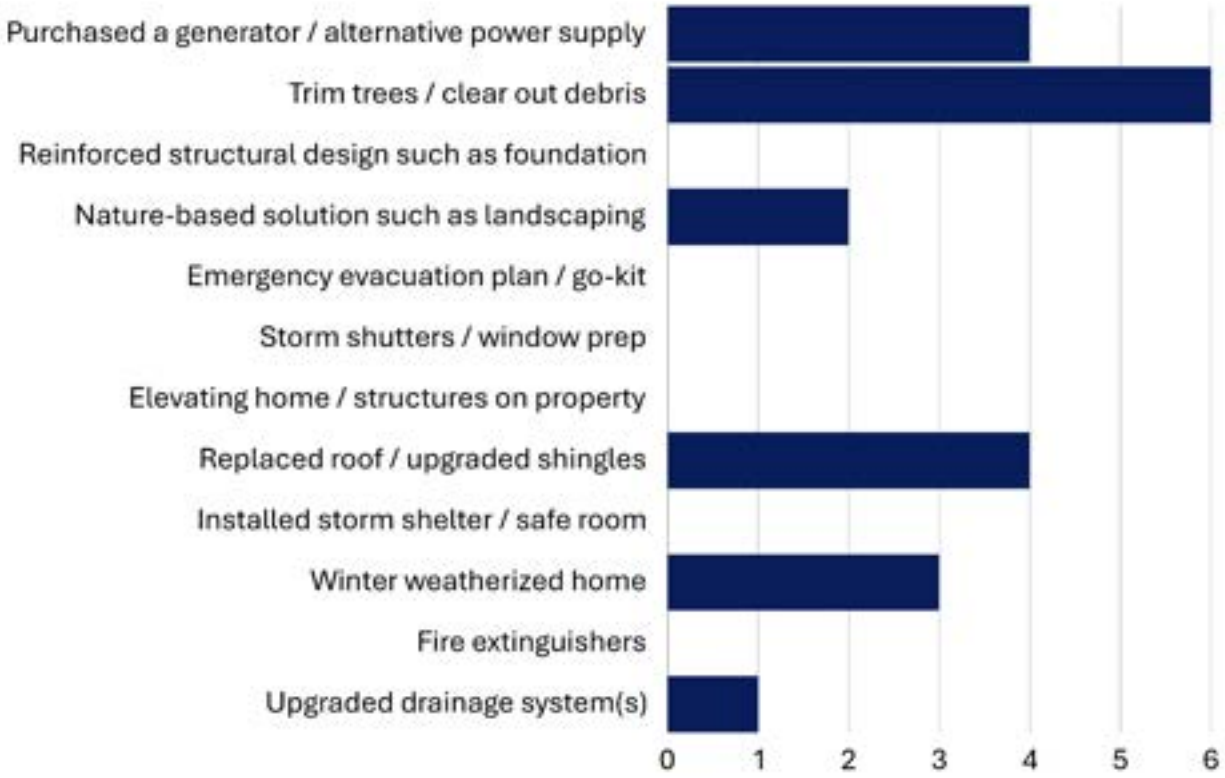
Have you had any issues getting homeowners or renters insurance due to risks of hazardous events?




Do you have any hazard specific insurance? If not, why?
No, too expensive
18.2%
Fire Insurance
18.2%
No, I have
blanket
coverage
9.1%
No response
54.5%

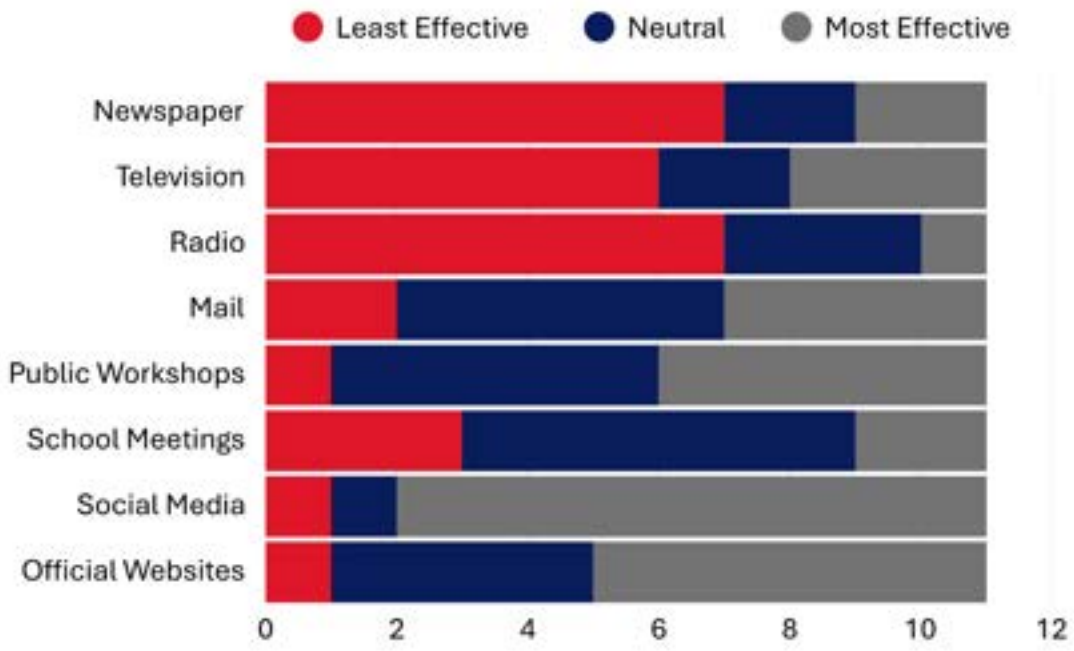
Have you taken any actions to make your home or neighborhood more resistant to hazards?

55% Responded 'Yes'

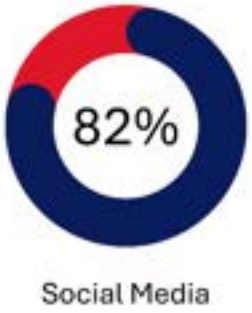


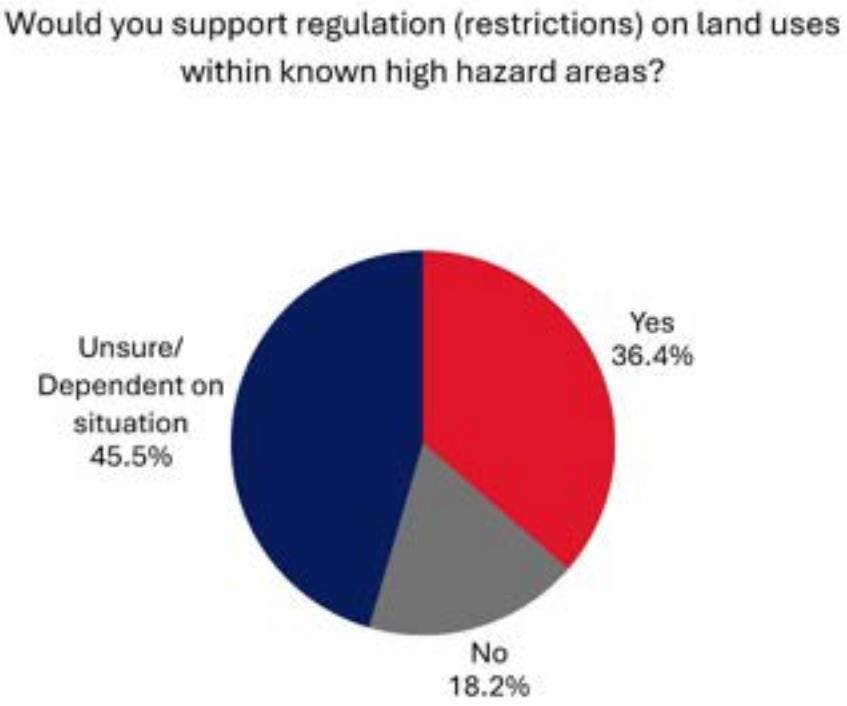
82% of survey responders are interested in making their homes or neighborhoods more resistant to hazards.

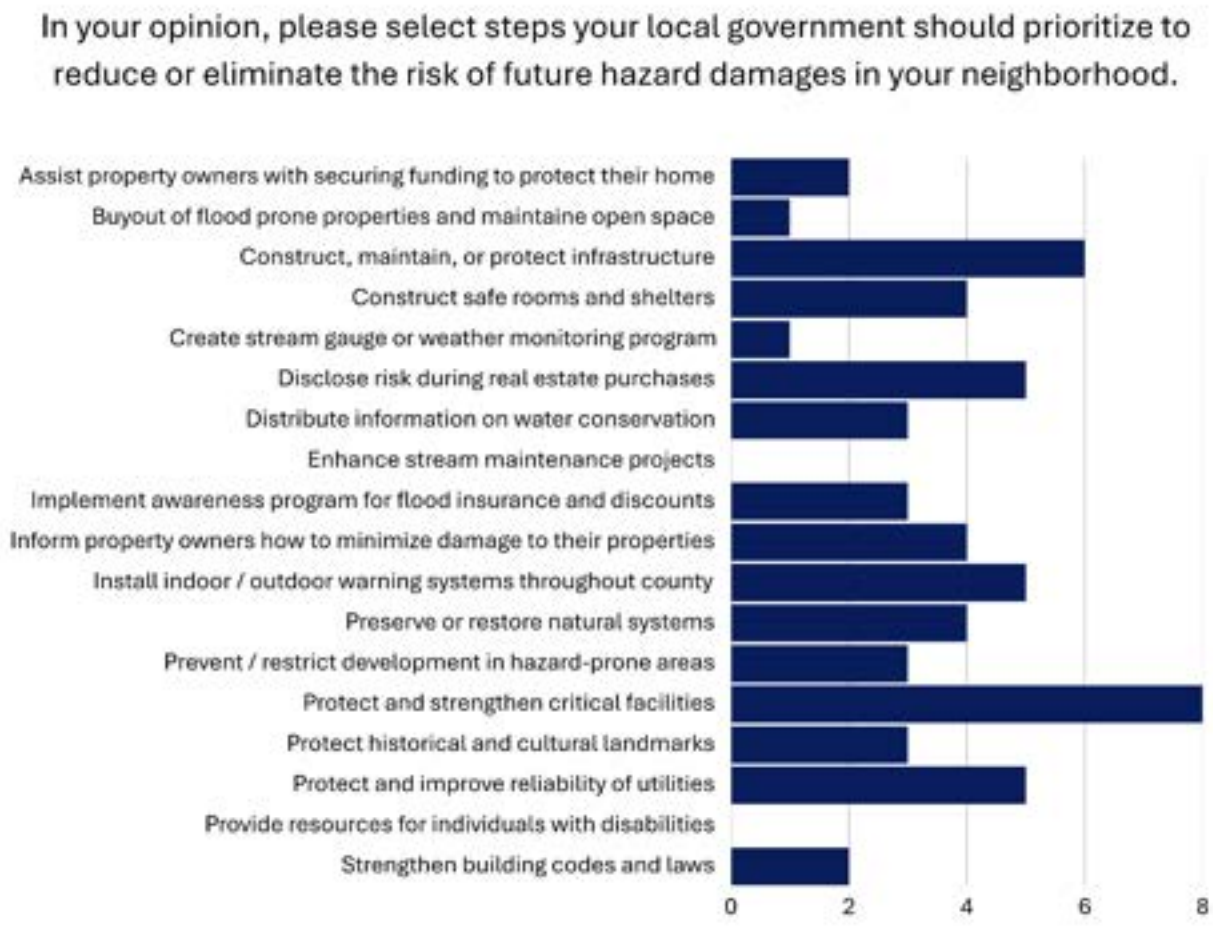
What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?



Most effective form of communication method for receiving information




Would you support regulation (restrictions) on land uses within known high hazard areas?
Yes
36.4%
No
18.2%
Unsure/
Dependent on
situation
45.5%


In your opinion, please select steps your local government should prioritize to reduce or eliminate the risk of future hazard damages in your neighborhood.
Assist property owners with securing funding to protect their home
Buyout of flood prone properties and maintaine open space
Construct, maintain, or protect infrastructure
Construct safe rooms and shelters
Create stream gauge or weather monitoring program
Disclose risk during real estate purchases
Distribute information on water conservation
Enhance stream maintenance projects
Implement awareness program for flood insurance and discounts
Inform property owners how to minimize damage to their properties
Install indoor / outdoor warning systems throughout county
Preserve or restore natural systems
Prevent / restrict development in hazard-prone areas
Protect and strengthen critical facilities
Protect historical and cultural landmarks
Protect and improve reliability of utilities
Provide resources for individuals with disabilities
Strengthen building codes and laws
0
2
4
6
8

A number of community-wide activities can reduce our risk from hazards. In general, these activities fall into one of the following six broad categories.

Emergency Services - Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical facilities or systems.

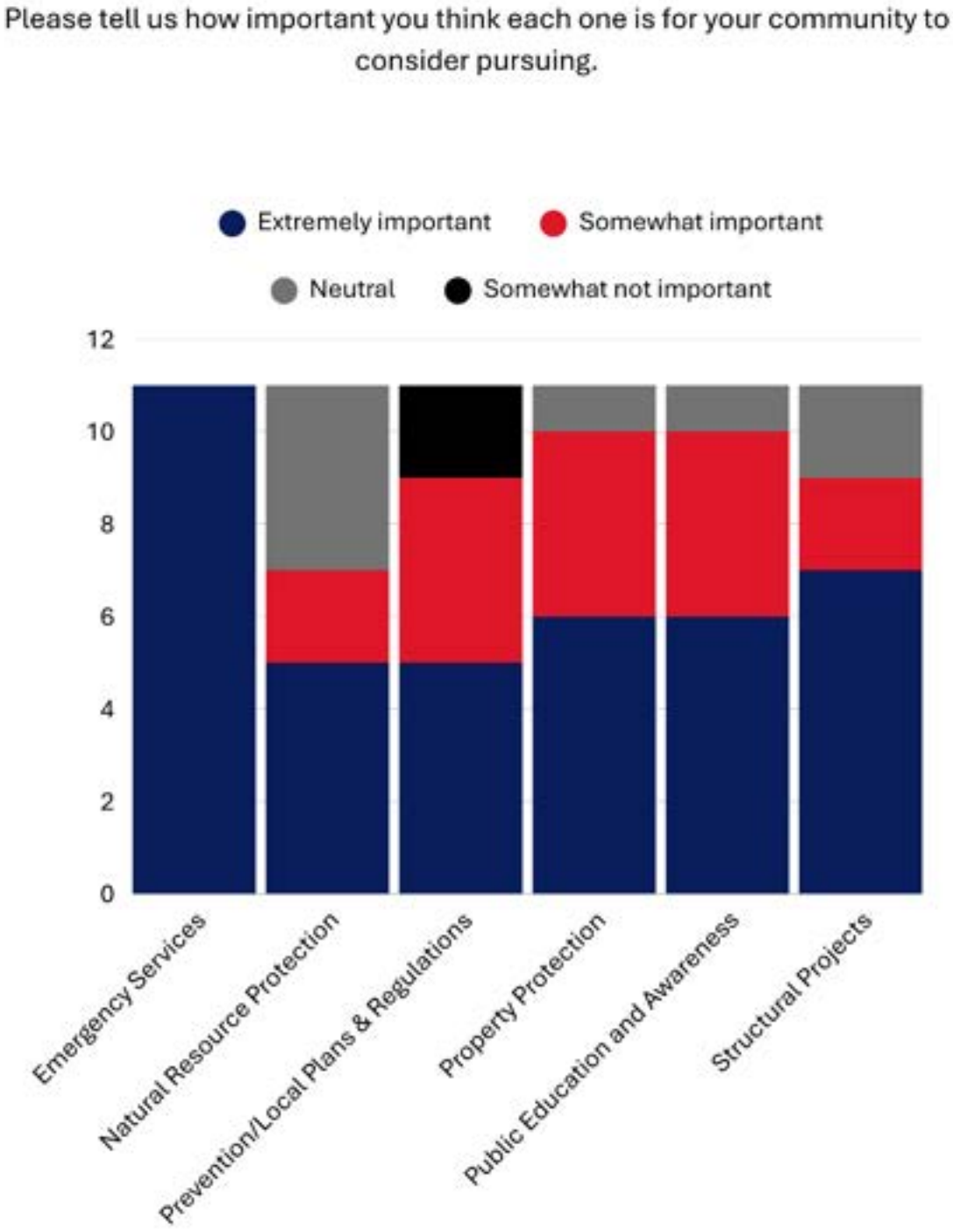
Natural Resource Protection - Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.

Prevention / Local Plans & Regulations - Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.

Property Protection - Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.

Public Education and Awareness - Actions to inform citizens about hazards and techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials, and demonstration events.

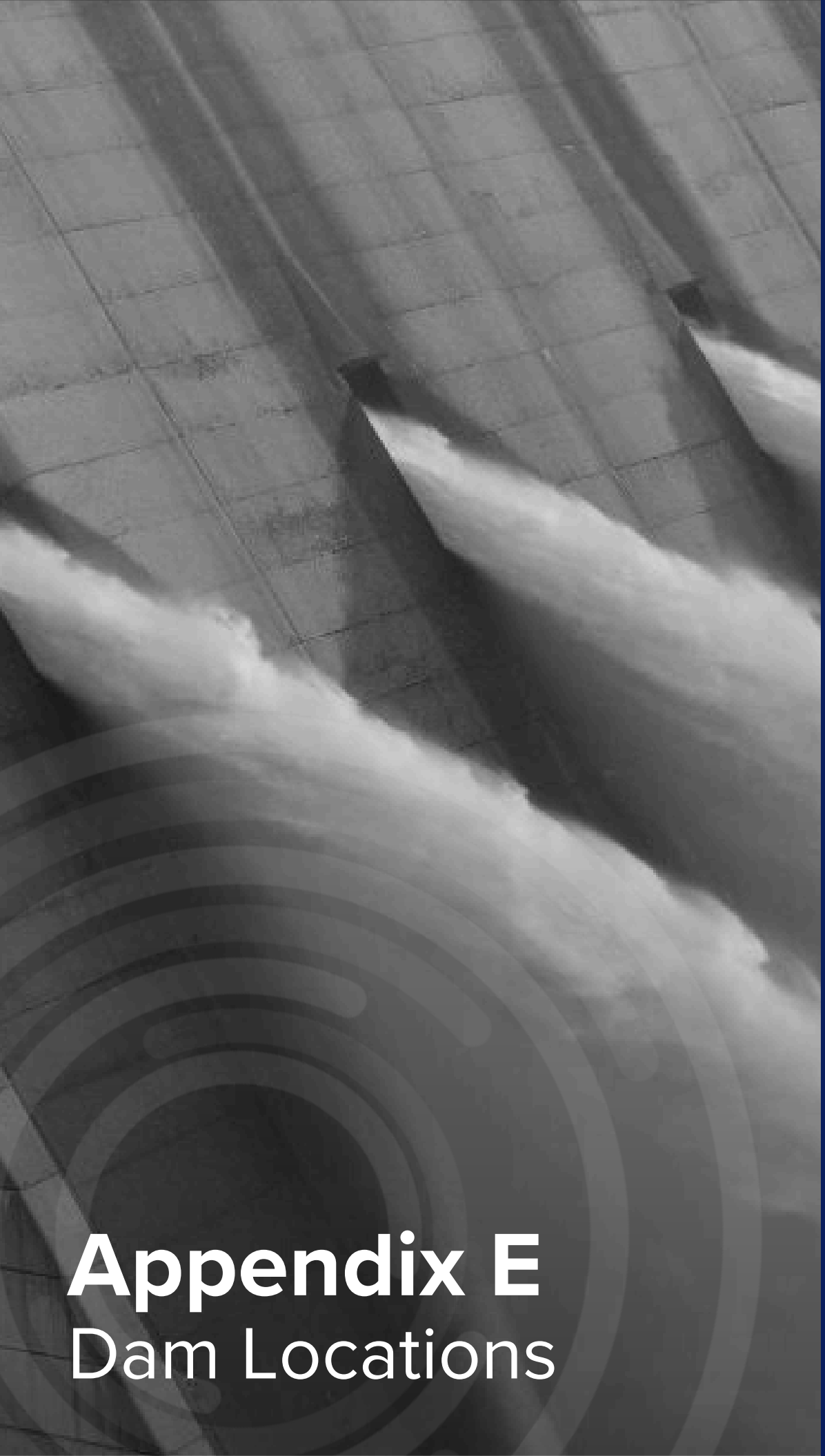
Structural Projects - Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, seawalls detention / retention basins, channel modification, retaining walls, and storm sewers.


Please tell us how important you think each one is for your community to consider pursuing.
Extremely important
Somewhat important
Neutral
Somewhat not important
12
10
8
6
4
2
0
Emergency Services
Natural Resource Protection
Prevention/Local Plans & Regulations
Property Protection
Public Education and Awareness
Structural Projects

Appendix D
Critical Facilities

APPENDIX D: CRITICAL FACILITIES

Appendix D is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).



Appendix E
Dam Locations

APPENDIX E: DAM LOCATIONS

Appendix E is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

Appendix F
Meeting Documentation

APPENDIX F: MEETING DOCUMENTATION

Appendix F is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

Appendix G
Capability Assessment

APPENDIX G: CAPABILITY ASSESSMENT

Appendix G is **For Official Use Only (FOUO)** and may be exempt from public release under the Freedom of Information Act (FOIA).

Appendix H
State and Federal Funding Opportunities

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

OVERVIEW

Texas utilizes state funds to improve statewide hazard mitigation capabilities and advance their hazard mitigation goals to help identify, understand, and manage various risks associated with natural hazards. State funds also provide funding for state facilities and infrastructure upgrades, hazard mapping, mitigation planning, and other mitigation programmatic activities. Table H-1 describes a variety of loan and grant programs offered by state agencies for which mitigation activities may be eligible.

Table H-1. Summary of State Funded Mitigation Programs

Agency	Funding Program
Texas A&M Forest Service (TAMFS)	• Community Fire Protection Program • Community Wildfire Defense Grant • Fire-Adapted Communities Program (FAC) • Firewise USA Program • Forest Land Enhancement Program • Forest Legacy Program • Mitigation Project Support Fund Prescribed Fire Grants • Resilient Landscapes Program • Rural Fire Assistance Grant • State Fire Assistance for Mitigation (SFAM) - Mechanical Fuels Grants • State Fire Assistance for Mitigation (SFAM) - Vegetative Fuel Break Grant • Texas Longleaf Conservation Assistance Program • Urban Tree Canopy Project (UTC)
Texas Commission on Environmental Quality (TCEQ)	• Clean Water Act Section 319 Grants • High Hazard Potential Dam Program (HHPD) • Nonpoint Source Grant Program • U.S.-Mexico Border Water Infrastructure Program
Texas Department of Agriculture (TDA)	• Agricultural Management Assistance (AMA) • Agricultural Water Enhancement Program (AWEP) • Community Development Block Grant • Community Development Block Grant for Rural Texas • Conservation Innovation Grants (CIG) • Environmental Quality Incentives Program (EQUIP)
Texas Department of Housing and Community Affairs (TDHCA)	• Texas HOME Disaster Relief

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

Agency	Funding Program
Texas Department of State Health Services (TXDSHS)	• Hospital Preparedness Program (HPP) Cooperative Agreement • Public Health Emergency Preparedness (PHEP) Cooperative Agreement
Texas Department of Transportation (TXDOT)	• Bridge Preventative Maintenance Program • Emergency Relief (ER) Program • Highway Bridge Replacement and Rehabilitation Program • Safe Rest Stops Program • Transportation Enhancement Program
Texas Division of Emergency Management (TDEM)	• Emergency Management Performance Grant (EMPG) • Fire Management Assistance Grants (FMAG) • Hazard Mitigation Planning Grants Program (HMGP) • Homeland Security Grant Program (HSGP) • Individual Assistance (IA) • National Earthquake Hazard Reduction Program (NEHRP) • Public Assistance (PA) Section 406 Funds
Texas Economic Development & Tourism (EDT)	• Economic Development Administration Grants and Investments
Texas General Land Office (TXGLO)	• Beach Act Grants • Beach Maintenance Reimbursement Fund • Coastal Erosion Planning and Response Act (CEPRA) • Coastal and Estuarine Land Conservation Program (CELCP) • Coastal Management Program (CMP) • Community Development Block Grant – Disaster Recovery (CDBG-DR) • Community Development Block Grant – Mitigation (CDBG-MIT) • Gulf of Mexico Energy Security Act (GOMESA) • Hazard Mitigation Grant Program Supplemental – LHMPP
Texas Parks and Wildlife Department (TPWD)	• Nation Resources Damage Assessment (NRDA) • National Wildlife Wetland Refuge System • North American Wetland Conservation Fund • Partners for Fish and Wildlife • Texas Farm and Ranch Lands Conservation Program (TFRLCP) • Wildlife Habitat Incentive Program (WHIP)
Texas State Soil and Water Conservation Board (TSSWCB)	• Clean Water Act Section 319 Grants • Nonpoint Source Grant Program

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

Agency	Funding Program
Texas Water Development Board (TWDB)	• Agricultural Water Conservation Grants • Agricultural Water Conservation Loans • Clean Water State Revolving Fund (CWSRF) • Community Assistance Program (CAP) • Drinking Water State Revolving Fund (DWSRF) • Economically Distressed Areas Program • Emergency Community Water Assistance Grants • Flood Infrastructure Fund (FIF) • Flood Mitigation Assistance (FMA) Program • Flood Protection Planning Program • Groundwater Conservation District Loan Program • Planning Assistance to States • Regional Facility Planning Grant Program • Regional Water Planning Group Grants • Research and Planning Fund and Fund Development Program • Risk MAP Program • Rural Development Grants • Rural Water Assistance Fund (RWAF) • Silver Jackets • Small Flood Control Projects (USACE Section 205) • State Participation Program – Regional Water and Wastewater Facilities • State Water Implementation Fund for Texas (SWIFT) • State Water Resources Research Act Program • Texas Infrastructure Resiliency Fund (TIRF) • Texas Water Development Fund (DFund) • Water Research Grant Program • WaterSMART - Drought Response Program

In addition to state-funded programs, many local jurisdictions benefit from federal mitigation funding opportunities. FEMA's Hazard Mitigation Assistance is a primary source for the implementation of mitigation projects throughout the nation. Table H-2 describes additional federal, state, local, and nonprofit mitigation funding sources specifically within the State of Texas.

Table H-2. Federal, State, Local and Non-Profit Mitigation Funding Sources in Texas

Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Agricultural Conservation Easement Program (ACEP)	Federal	NRCS		Provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits.
Agricultural and Food Research Initiative (AFRI)	Federal	USDA	NIFA	Provides $100,000 in funding to support research in two key areas: (1) understanding fundamental watershed processes; and (2) developing technologies and management practices that enhance the efficient use of water, both consumptive and non-consumptive, while protecting or improving water quality for agricultural and forestry production.
Agricultural Management Assistance (AMA)	Federal	USDA, NRCS	TDA	Provides financial and technical assistance to agricultural producers to voluntarily address issues such as water management, water quality, and erosion control by incorporating conservation methods into their farming operations.
Agricultural Water Enhancement Program (AWEP)	Federal	USDA, NRCS	TDA	Voluntary conservation initiative that provides financial and technical assistance to agricultural producers to implement water enhancement activities on agricultural land to conserve surface and ground water and improve water quality.
Agricultural Water Conservation Grants	State	TWDB	TWDB	Funding is available to state agencies and political subdivisions for projects that advance the implementation of conservation or water management strategies identified in state and regional water plans. Applications are accepted annually, with up to $1.2 million in total funding available each year. Grant categories are subject to change annually.
Agricultural Water Conservation Loans	State	TWDB	TWDB	Agricultural water conservation loans to use either for facility improvements or as loans to individuals. Low-interest, fixed rates. Up to 10-year repayment terms. U.S. Iron and Steel requirements apply to certain projects. Eligible loan applicants include political subdivisions.
AmeriCorps - Corporation for National & Community Service (CNCS)	Federal	AmeriCorps	N/A	Provides funding for volunteers to serve communities, including disaster prevention. AmeriCorps/Vista has assisted local communities with wildfire mitigation projects.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

Name	Level	Source Agency	Managing State Agency	Purpose of Funding
American Recovery and Reinvestment Act (ARRA)	Federal	EPA		Provides significant funding for states to finance high priority water infrastructure projects through a $2 billion appropriation to the Drinking Water State Revolving Fund (DWSRF) program and a $4 billion appropriation to the Clean Water State Revolving Fund (CWSRF) program.
American Recovery and Reinvestment Act (ARRA)	Federal	DOT Federal Transit Administration	TDA	The American Recovery and Reinvestment Act (ARRA), commonly referred to as the Recovery Act, is a stimulus package enacted by the 111th U.S. Congress and signed into law by President Barack Obama in February 2009. Designed in response to the Great Recession, the primary goal of the Act was to preserve existing jobs and generate new employment opportunities as quickly as possible. Additional objectives include providing temporary relief to individuals most affected by the recession and investing in infrastructure, education, healthcare, and renewable energy.
Aquatic Ecosystem Restoration	Federal	DOD-USACE		Direct support for carrying out aquatic ecosystem restoration projects that will improve the equality of the environment.
Assistance to Firefighters program - Fire Prevention & Safety (FP&S) **Grants**	Federal	FEMA, AFG		Fire Prevention & Safety (FP&S) Grants support projects that enhance the safety of the public and firefighters from fire and related hazards.
BEACH Act Grants	Federal	EPA	TXGLO	EPA awards grants under the authority of the BEACH Act to eligible states, territories, and tribes with beaches on oceans and the Great Lakes coasts to develop and implement programs to monitor their beaches and notify the public when it is not safe to swim.
Beach Maintenance Reimbursement Fund	State	GLO	TXGLO	Allocates approximately $750,000 per year to help communities maintain their beaches. Applications are distributed to eligible participants in early fall and are due within a specified amount of time, no less than 30 days. Contracts are renewable annually.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Bridge Preventative Maintenance Program	State	TXDOT	TXDOT	A planned, cost-effective treatment that preserves, improves, or delays future deterioration of the condition of a bridge. To be eligible, a bridge must have a condition rating of 5 or 6 for at least one of the following: deck, superstructure, substructure, culvert, or channel. Safety and improvements to the physical condition of the State's on-system bridges are TxDOT's main goals in the prioritization of the bridges using BMIP funds. Each FY, the Bridge Division develops and distributes an initial list of eligible bridges in each district for the annual program call.
Carbon Reduction Program (CRP)	Federal	USDOT	TXDOT, TCEQ	Provides funds for projects that are designed to reduce transportation emissions (CO2). This program can fund a wide range of projects designed to reduce carbon dioxide emissions from on-road highway sources.
Center for Integration of Natural Disaster Information	Federal	DOI/USGS, The Center for Integration of Natural Hazards Research	Texas A&M	Technical Assistance: Develops and evaluates technology for information integration and dissemination.
Clean School Bus Program	Federal	EPA	TCEQ	Provides assistance in replacing existing school buses with zero-emission and low-emission models.
Clean Water Act Section 319 Grants	Federal	EPA	TCEQ and TSSWCB	Provides grants for a wide variety of activities related to non-point source pollution runoff mitigation.
Clean Water State Revolving Fund (CWSRF)	Federal	EPA	TWDB	Provides low-cost financing for a wide range of wastewater, stormwater, reuse, and other pollution control projects.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Climate Pollution Reduction Grant (CPRG)	Federal	EPA	TCEQ	Supports the state in creating two climate action plans (i.e., one priority plan and one comprehensive plan) for implementing effective greenhouse gas reduction strategies while ensuring the benefits of these actions are delivered to Texans, especially Low Income or Disadvantaged communities (LIDAC) as defined by US EPA. This grant will give Texas communities the opportunity to collaborate with the state to build projects and programs that provide high-quality jobs, improve health, and keep families safe where they live.
Coastal Erosion Planning and Response Act (CEPRA)	State	GLO	TXGLO	Since its inception in 2000, the Texas General Land Office's Coastal Erosion Planning and Response Program has secured over $62 million in state funding, complemented by an additional $62 million in matching funds. This program has facilitated the completion of more than 200 coastal erosion projects and studies. The application process for non-emergency project funding opens every even-numbered year in February and closes in early June of the same year.
Coastal and Estuarine Land Conservation Program (CELCP)	Federal	NOAA	TXGLO	When the National Oceanic and Atmospheric Administration (NOAA) provides funding for CELCP, the General Land Office (GLO) offers coastal communities the opportunity to submit up to three project applications per year. Federal grant awards for individual projects may not exceed $3 million.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Coastal Management Program (CMP)	Federal	NOAA	TXGLO	Texas receives approximately $2 million annually in grants from NOAA and 90 percent of the funds are passed through to local governments and entities to address environmental needs and promote sustainable economic development along the coast. Projects must improve the management of the state's coastal resources and ensure long-term ecological and economic productivity. Section 306 administrative funds can be used for non- construction, coastal planning and education, and research. Section 306A improvement funds can be utilized for construction and land acquisition projects, preservation, and restoration. CMP funding categories include Coastal Natural Hazards Response, Critical Areas Enhancement, Public Access, Water/Sediment Quantity and Quality Improvements, Waterfront Revitalization and Ecotourism Development, Permit Streamlining/ Assistance, Governmental Coordination and Local Government Planning Assistance.
Community Assistance Program (CAP)	Federal	FEMA, NFIP	TWDB	Product-oriented financial assistance program directly related to the flood loss reduction objectives of the National Flood Insurance Program (NFIP).
Community Development Block Grant (CDBG)	Federal	HUD	TDA	The primary objective is to develop viable communities by providing decent housing and suitable living environments and expanding economic opportunities principally for persons of low- to moderate- income. Eligible applicants are non-entitlement cities under 50,000 in population and non-entitlement counties that have a non-metropolitan population under 200,000 and that are not eligible for direct CDBG funding from HUD may apply for funding through any of the Texas CDBG programs.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Community Development Block Grant for Rural Texas	State	TDA	TDA	TDA administers the Community Development Block Grant for Rural Texas. The primary objective of the CDBG is to develop viable communities by providing decent housing and suitable living environments and expanding economic opportunities principally for persons of low- to moderate-income. Eligible applicants are non-entitlement cities under 50,000 in population and non-entitlement counties that have a non-metropolitan population under 200,000 and that are not eligible for direct CDBG funding from HUD may apply for funding through any of the Texas CDBG programs.
Community Development Block Grant – Disaster Recovery (CDBG-DR)	Federal	HUD	TXGLO	Often following a disaster, the state may receive a CDBG-DR Supplement intended for mitigation and disaster recovery projects in the affected areas. Funding can be used to acquire properties in hazard prone areas. Since CDBG funds lose their federal identify they can also be used to supplement state or local match requirements on other funds such as FEMA HMA grants. Funding also supports public facilities including water and wastewater.
Community Development Block Grant – Mitigation (CDBG-MIT)	Federal	HUD	TXGLO	Eligible grantees can use this assistance in areas impacted by recent disasters to carry out strategic and high-impact activities to mitigate disaster risks and reduce future losses. In February of 2018, Congress appropriated $12 billion dollars in Community Development Block Grant (CDBG) funds specifically for mitigation activities for qualifying disasters in 2015, 2016, and 2017. HUD was able to allocate an additional $3.9 billion, bringing the amount available for mitigation to nearly $16 billion.
Community Fire Protection Program	Federal	USDA	TAMFS	Mitigation is delivered via the USDA Forest Service and Private Forestry Coop Fire Program.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Community Rating System (CRS)	Federal	FEMA		A voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. CRS not only assists communities in reducing flood risks, but also enhances public safety, reduces damage to property and public infrastructure, avoids economic disruption and losses, reduces human suffering, and protects the environment. Technical assistance in designing and implementing some activities is available at no charge. Participating in the CRS provides an incentive to maintain and improve a community's floodplain management program over the years. Implementing some CRS activities can help the project qualify for certain other Federal assistance funds.
Community Wildfire Defense Grant	Federal	USFS	TAMFS	Offers financial assistance to at-risk local communities with planning for and against the risk of catastrophic wildfire. This program is authorized in Public Law 117-58, the Infrastructure Investment and Jobs Act. Two primary objectives: The development and revision of Community Wildfire Protection Plans (CWPP), and the implementation of projects described in a CWPP that is less than ten years old. Prioritizes at-risk communities that are in an area identified as having high or very high wildfire hazard potential, are low-income, and/or have been impacted by a severe disaster with no minimum federal funding limit for projects.
Conservation Contracts	Federal	USDA-FSA		Debt reduction for delinquent and non-delinquent borrowers in exchange for conservation contracts placed on environmentally sensitive real property that secures FSA loans.
Conservation Innovation Grants (CIG)	Federal	USDA, NRCS	TDA	A voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging federal investment in environmental enhancement and protection, in conjunction with agricultural production.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Conservation Technical Assistance (CTA) **Program**	Federal	USDA-NRCS		Technical assistance for run-off retardation and soil erosion prevention to reduce hazards to life and property.
Decision, Risk, and Management Science Program	Federal	NSF		Funding is provided for research and related educational activities focused on risk, perception, communication, and management, with an emphasis on technological hazards.
Disaster Mitigation Planning and Technical Assistance	Federal	DOC, EDA		Technical and planning assistance grants for capability building and mitigation project activities focusing on creating disaster resistant jobs and workplaces.
Division of Homeland Security Financial Assistance	Federal	US Department of Homeland Security	OOG	Supports a wide variety of funding and financial assistance programs that promote preparedness, resilience, and post-disaster relief.
Drinking Water State Revolving Fund (DWSRF)	Federal	EPA	TWDB	Provides funding for infrastructure improvements to drinking water systems. The program also emphasizes providing funds to small and disadvantaged communities and for programs that encourage pollution prevention as a tool for ensuring safe drinking water.
Economic Development Administration Grants and Investments	Federal	U.S. DOC, EDA	EDT	Provides grants and investments for community construction projects, including mitigation activities.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Economically Distressed Areas Program	State	TWDB	TWDB	Provides financial assistance for projects serving economically distressed areas where water or sewer services do not exist, or systems do not meet minimum state standards. Eligible EDAP applicants include cities, counties, water districts, nonprofit water supply corporations, and all other political subdivisions. The city or county where the project is located must adopt and enforce Model Subdivision Rules for the regulation of subdivisions prior to application for financial assistance. Projects must also be in an economically distressed area where the median household income is not greater than 75 percent of the median state household income.
Economic Injury Disaster Loan	Federal	SBA		The COVID EIDL program ceased accepting applications on December 31, 2021, however, the disaster EIDL program continues to be available to businesses impacted by other publicly declared disasters.
Emergency Community Water Assistance Grants	Federal	USDA	TWDB	$150,000 to $500,000 available to rural communities with populations over 10,000 people with a median household income of less than $65,900. Aids communities that have experienced a decline in quantity or quality of drinking water as a result of an emergency, including drought.
Emergency Management / Mitigation Training	Federal	FEMA		Training in disaster mitigation, preparedness, and planning.
Emergency Management Institute	Federal	FEMA		Education training programs to prepare emergency management professionals to prepare for, respond to, and recover from disasters and emergencies.
Emergency Management Performance Grant (EMPG)	Federal	FEMA	TDEM	Provides a yearly allocation of funding to support state and local emergency management programs. This has included providing funding for local mitigation plans, mitigation-oriented studies, and related activities.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Emergency Relief (ER) **Program**	Federal	US DOT - FHWA	TXDOT	Provides funding for the repair or reconstruction of roads and bridges on Federal-aid highways that have sustained damage as a direct result of a natural disaster or a catastrophic failure due to an external cause.
Emergency Watershed Protection (EWP)	Federal	USDA, NRCS	TWDB	Provides funding and technical assistance for emergency measures, including floodplain easements in impaired watersheds. Funding is available through Simplified Acquisition Procedures (SAP), typically ranging from $25,000 to $100,000. Support is provided through contracts between project sponsors and the Natural Resources Conservation Service (NRCS); grants are not offered under this program. The NRCS covers up to 75 percent of total project costs.
Environmental Justice Government-to-Government Program (EJG2G)	Federal	EPA		Provides funding to support government activities that lead to measurable environmental or public health impacts in communities disproportionately burdened by environmental harms.
Environmental Justice Collaborative Problem Solving Program	Federal	EPA		Provides funding directly to community-based organizations to address environmental injustices.
Environmental Quality Incentives Program (EQUIP)	Federal	USDA, NRCS	TDA	Provides funding and technical assistance to farmers and ranchers to promote agricultural production and environmental quality as compatible goals.
Farm Ownership Loans	Federal	USDA-FSA		Direct loans, guaranteed / insured loans, and technical assistance to farmers so that they may develop, construct, improve, or repair farm homes, farms, and service buildings, and to make other necessary improvements.
Federal Land Transfer / Federal Land to Parks Program	Federal	DOI-NPS		Identifies, assesses, and transfers available federal real property for acquisition for use in state and local parks and recreation, such as open space.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Fire-Adapted Communities Program (FAC)	Federal	FEMA, USFA	TAMFS	Collaborates to identify wildfire risk and take actionable steps to reduce risk of loss by protecting property and enhancing the safety of firefighters and residents.
Fire Management Assistance Grants (FMAG)	Federal	FEMA	TDEM	Provides fire suppression support to states when loss of life and property is imminent. Wildfire mitigation is also eligible under emergency protection if life is in imminent danger.
Fire Prevention and Safety Grant Program	Federal	US Fire Administration		Provides funding for projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations and reduce injury and prevent death.
Firewise USA Program	Federal	USDA, DOI, NASFF, NFPA	TAMFS	Provides a collaborative framework to help neighbors in a geographic area organize and enhance ignition resistance of their homes and community to reduce wildfire risks at the local level.
Flood Infrastructure Fund (FIF)	State	TWDB	TWDB	Provides financial assistance in the form of loans and grants for flood control, flood mitigation, and drainage projects. The Flood Intended Use Plan (Flood IUP) details the structure of each funding cycle and the SWIFT Advisory Committee serves as the oversight entity.
Flood Mitigation Assistance Program (FMA)	Federal	FEMA	TWDB	Repetitive flood loss property reduction and projects that mitigate losses to NFIP-insured properties.
Floodplain Management Services	Federal	DOD-USACE		Provides technical and planning assistance at the local, regional, or national level needed to support effective floodplain management.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Flood Protection Planning Program	State	TWDB	TWDB	Grant funding available to political subdivisions of the State of Texas for the evaluation of structural and nonstructural solutions to flooding problems. Upstream and/or downstream effects of proposed solutions must be considered in the planning and must be regional in nature by considering the flood protection needs of the entire watershed. Eligible planning activities include, but are not limited to, determining and describing flooding-related problems; conducting hydrologic and hydraulic studies; identifying potential solutions; estimating the benefits and costs of potential solutions, including structural and nonstructural measures; determining the views and needs of the affected public regarding flooding problems; recommending feasible flood protection solutions; evaluating environmental, social, and cultural factors; and ensuring proposed solutions are consistent with regional or statewide plans as well as relevant laws and regulations.
Forest Land Enhancement Program	Federal	USDA, NRCS	TAMFS	Provides educational, technical, and financial assistance to help landowners implement sustainable forestry management objectives.
Forest Legacy Program	Federal	USFS	TAMFS	Provides funding to protect private forest lands that are environmentally, economically, and socially critical, thereby reducing development in the wildland-urban interface.
Greenhouse Gas Reduction Fund (GGRF)	Federal	EPA		The program is designed to combat the climate crisis by mobilizing financing and private capital for greenhouse gas- and air pollution-reducing projects in communities across the country.
Grid Resilience Program (GRIP)	Federal	DOE		Enhance grid flexibility and improve the resilience of the nation's power grid against threats of extreme weather and climate change.
Hazard Mitigation Grant Program (HMGP)	Federal	FEMA	TDEM	Post-disaster multi-hazard mitigation funding for federally declared disasters. HMGP Post Fire funds are available for FMAG declarations.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Hazard Mitigation Grant Program Supplemental – Local Hazard Mitigation Plan Program (LHMPP)	Federal	FEMA	TXGLO	The Local Hazard Mitigation Plan Program (LHMPP) assists eligible entities by providing grants to develop or update local hazard mitigation plans, or to provide cost share for hazard mitigation planning activities funded through other federal sources. Grant awards range from $20,000 to $100,000.
Hazardous Materials Emergency Preparedness (HMEP) **Grant Program**	Federal	DOT	TDEM	Funding is available to help facilitate preparedness in transporting hazardous materials. The program recognizes Local Emergency Planning Committees (LEPCs) as applicants to maximize funding impact through regional partnerships.
Healthy Forests Reserve Program (HFRP)	Federal	NRCS		Assist landowners, on a voluntary basis, in restoring, enhancing and protecting forestland resources on private lands through various means, including conservation easements and cost-sharing agreements.
High Hazard Potential Dam Program (HHPD)	Federal	FEMA	TCEQ	Provides assistance for technical, planning, and design activities related to the repair, removal, and/or structural or nonstructural rehabilitation of eligible non-federal high hazard dams classified as high hazard potential by the state/territory dam safety agency, with an approved Emergency Action Plan (EAP) and rated in poor condition, through a pre-disaster or annual cycle.
Highway Bridge Replacement and Rehabilitation Program	Federal	FHWA	TXDOT	Provides funding to enable states to improve the condition of highway bridges through replacement, rehabilitation, and systematic preventive maintenance. Also includes the National Historic Covered Bridge Preservation Program.
Homeland Security Grant Program (HSGP)	Federal	DHS	TDEM	Funding supports homeland security activities identified in state and local strategic plans, including threat and hazard risk identification for natural, technological, and human-caused hazards.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Hospital Preparedness Program (HPP) **Cooperative Agreement**	Federal	HHS	TXDSHS	The HPP is the primary source of federal funding for health care system preparedness and response. In collaboration with public health, it prepares health-care delivery systems to save lives through the development of health care coalitions (HCCs). Under the direction of the HPP providers, the HCCs develop plans, provide training, and coordinate regional exercises.
Hydrologic Research Grants	Federal	NOAA		Offers up to $125,000 to conduct joint research and development on pressing surface water hydrology issues common to national, regional, and local operational offices. Eligible applicants include federally recognized agencies of state or local governments, quasi-public institutions such as water supply or power companies, hydrologic consultants and companies involved in using and developing hydrologic forecasts.
Groundwater Conservation District Loan Program	State	TWDB	TWDB	Provides short-term loans to finance the start-up costs of Groundwater Conservation Districts. Funding is available for any Groundwater District or Authority with the ability to regulate water well spacing and/or production. The program is authorized under Texas Water Code Chap. 36, Subchapter. L, and governed by TWDB rules in 31 Tex. Admin. Code Chap. 363, Subchapter. H.
Gulf of Mexico Energy Security Act (GOMESA)	Federal	DOI	TXGLO	GOMESA significantly enhances oil and gas leasing activities and creates revenue sharing provisions for the oil- and gas-producing states of Alabama, Louisiana, Mississippi, Texas, and their coastal political subdivisions (CPSs). The funds are used for coastal conservation, restoration, and hurricane protection. The second phase of GOMESA revenue sharing, which began in Fiscal Year 2017, expands the definition of qualified Outer Continental Shelf revenues to include receipts from Gulf of Mexico leases that are subject to withdrawal or moratoria restrictions. A revenue-sharing cap of $500 million per year for the four Gulf-producing states, their CPSs and the Land and Water Conservation Fund, effective from fiscal years 2016 through 2055.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Indian Housing Assistance - Housing Improvement Program (HIP)	Federal	DOI-BIA		The Housing Improvement Program (HIP) is a home repair, renovation, replacement and new housing grant program administered by the Bureau of Indian Affairs (BIA) and federally recognized Indian tribes. It is designed to assist American Indian and Alaska Native (AI/AN) individuals and families who lack immediate standard housing resources.
Individual Assistance (IA)	Federal	FEMA	TDEM	Following a disaster, funds can be used to mitigate hazards when repairing individual and family homes.
In-Lieu Fee Program Mitigation Projects	Federal	USACE	Community Applicants	Supports the restoration, establishment, enhancement, and/or preservation of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation requirements for Department of the Army permits.
Land Acquisition	Federal	DOI-FWS		Acquires high-quality lands and waters, or easements thereon, for inclusion in the National Wildlife Refuge System.
Landowner Incentive Program	Federal	USFWS	EMNRD	Collaborates with the Forestry Division and private landowners to protect the habitats of at-risk species on private lands. Landowner involvement is voluntary.
Mapping Standards Support	Federal	DOI/USGS		Provides mapping and digital data standards expertise in support the National Flood Insurance Program (NFIP).
Mitigation Banks	Federal	USACE	Community Applicants	Mitigation Banks are Corps-approved sites that sell compensatory mitigation credits for projects that cause unavoidable impacts to waters of the U.S. When a permit requires compensatory mitigation, it specifies the number of credits to be purchased from an approved mitigation bank.
National Dam Safety Program	Federal	FEMA		Provides technical assistance, training, and grants to enhance state dam safety programs.
National Digital Orthophoto Program	Federal	DOI-USGS		Develops topographic quadrangles for use in flood mapping and other hazards.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
National Earthquake Hazards Reduction Program (NEHRP)	Federal	FEMA	TDEM	Provides funding to support enhanced earthquake risk assessments in local hazard mitigation plans, as well as other earthquake hazard mitigation and preparedness activities.
National Earthquake Hazard Reduction Program (NEHRP) **in Earth Sciences**	Federal	NSF		Conducts research on basic and applied earth and building sciences.
National Earthquake Hazard Reduction Program	Federal	DOI-USGS		NEHRP's work encompasses research, development, and implementation activities. Research helps to advance our understanding of why and how earthquakes occur and impact the natural and built environments. The program develops strategies, tools, techniques, and other measures that can reduce the adverse effects of earthquakes and facilitates and promotes implementation of these measures, thereby strengthening earthquake resilience among at-risk communities.
Natural Resources Damage Assessment (NRDA)	Federal	EPA	TPWD	Evaluates the likelihood of adverse ecological effects that are occurring or may occur as a result of exposure to physical (e.g., cleanup) or chemical (e.g., hazardous release) stressors at a site.
National Flood Insurance Program (NFIP)	Federal	FEMA	TWDB	Provides affordable insurance to property owners and encourages communities to adopt and enforce floodplain management regulations.
National Flood Insurance Program: Technical Mapping Advisory Council	Federal	DOI-USGS		Provides technical guidance and advice to coordinate FEMA's map modernization efforts for the National Flood Insurance Program (NFIP).

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
National Training and Education (NTE)	Federal	FEMA		Offers educational and training programs through online course catalog, which provides searchable, integrated information on courses provided or managed by FEMA's Center for Domestic Preparedness (CDP), Emergency Management Institute (EMI), and National Training and Education Division (NTED).
National Weather Service (NWS)	Federal	NOAA - NWS		The National Weather Service (NWS) offers storm spotter training as well as weather and flood safety guides. It may also provide funding to support severe weather signage in parks and other public areas.
National Wildlife Wetland Refuge System	Federal	USFWS	TPWD	Provides funding for the acquisition of land for inclusion in the National Federal Wildlife Refuge System.
Nonpoint Source Grant Program	Federal	EPA	TCEQ, TSSWCB	The Clean Water Act (CWA) requires states to develop programs to protect the water quality from the adverse effects of nonpoint source (NPS) water pollution. The Texas Commission on Environmental Quality (TCEQ) and the Texas State Soil and Water Conservation Board (TSSWCB) administer federal grants for activities that prevent or reduce NPS pollution.
Non-Structural Alternatives to Structural Rehabilitation of Damaged Flood Control Works	Federal	DOD-USACT		Provides planning and construction grants for non-structural alternatives to the rehabilitation of flood control works damaged by floods or coastal storms.
North American Wetland Conservation Fund	Federal	USFWS	TPWD	Provides funding for wetland conservation projects.
NRCS Conservation Programs	Federal	USDA, NRCS	Community Applicants	Provides funding through various programs for the conservation of natural resources.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Office of Disaster Assistance	Federal	SBA		Provides financial assistance through low interest disaster loans to businesses of all sizes, private non-profit organizations, homeowners, and renters to repair or replace real estate, personal property, machinery and equipment, inventory and business assets that have been damaged or destroyed in a declared disaster.
Partners for Fish and Wildlife	Federal	USFWS	TPWD	Provides financial and technical assistance to landowners for wetland restoration projects in "focus areas" of the state.
Planning Assistance to States	Federal	USACE	TWDB	Aids states in planning for development, utilization, and conservation of water and related land resources.
Pollution Prevention Grant: Environmental Justice in Communities	Federal	EPA		Provides technical assistance to businesses aiming to improve human health and the environment in disadvantaged communities.
Pollution Prevention Grant: Environmental Justice Through Safer and More Sustainable Products	Federal	EPA		Provides technical assistance to businesses to increase the supply, demand, and use of safer, more sustainable products.
Post-Disaster Economic Recovery Grants and Assistance	Federal	DOC-EDA		Provides funding to assist with the long-term economic recovery of communities, industries, and firms adversely impacted by disasters.
Pre-Disaster Mitigation Loan Program	Federal	SBA		Provides low-interest loans to small businesses for mitigation projects.
Pre-Disaster Mitigation (PDM)	Federal	FEMA		Congressional funding for local governments, tribes, and states to plan and implement sustainable, cost-effective measures designed to reduce risk to individuals and property from future natural hazards.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Preparedness (Non-Disaster) Grants	Federal	FEMA		Provides financial assistance to state and local governments for preparedness programs. Funding is allocated to enhance the capacity of emergency responders to prevent, respond to, and recover from terrorism incidents involving weapons of mass destruction—chemical, biological, radiological, nuclear, and explosive devices – as well as cyber-attacks.
Prescribed Fire Grants	State	TAMFS	TAMFS	The Texas A&M Forest Service's Mitigation & Prevention Department annually implements four prescribed fire grants to protect communities and restore ecosystems. (1) SFAM Plains Prescribed Fire Grant – Supports prescribed burns to reduce hazardous fuels near Texas communities at high risk for wildfires – specifically those threatened by Southern Plains Wildfire Outbreaks. Treatment areas are located adjacent to identified priority communities. (2) The Community Protection Program Grant – Funds prescribed burns on private lands within 10 miles of a National Forest boundary to reduce high-risk fuels. The goal is to protect nearby communities and forest resources by lowering the risk of catastrophic wildfire across public and private lands. (3) The State Fire Assistance for Mitigation Central & East Texas Grant – Provides funding for prescribed burns on private lands in 43 Central and East Texas counties that have approved Community Wildfire Protection Plans (CWPPs). The goal is to protect high-risk communities and restore ecosystems by reducing hazardous vegetation. Priority is given to sites that are within a CWPP, near Firewise communities or residential areas (as identified by the Texas Wildfire Risk Assessment Portal), and support ecosystems that benefit from prescribed fire. (4) Neches River and Cypress Basin Watershed Restoration Program – Assists landowners with prescribed burns to improve ecological health in the Neches River and Cypress Basin watersheds. The program benefits water quality and quantity, controls invasive species, and enhances wildlife habitat. Priority is given to treatment areas on private land that promote native ecosystem restoration, fall within priority watershed protection zones, and are located near public lands.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Project Modifications for Improvement of the Environment	Federal	DOD-USACE		Provides funds for ecosystem restoration by modifying structures and/or operations of water resources projects constructed by the U.S. Army Corps of Engineers (USACE), or by restoring areas where a USACE project contributed to environmental degradation.
Protection of Essential Highways, Highway Bridge Approaches, and Public Works	Federal	USACE		Provides technical assistance to ensure bank protection for highways, highway bridges, essential public works, churches, hospitals, schools, and other nonprofit public services endangered by flood-caused erosion.
Public Assistance	Federal	FEMA	DHSEM	Funds are allocated to states and communities to repair damaged infrastructure and public facilities, and to help restore government or government-related services.
Public Assistance (PA) **Section 406 Funds**	Federal	FEMA	TDEM	Following a disaster, funds can be used to mitigate hazards while repairing damages to public structures or infrastructure. Wildfire mitigation is also eligible under emergency protection if lives are in imminent danger.
Public Health Emergency Preparedness (PHEP) **Cooperative Agreement**	Federal	CDC	TXDSHS	Aids health departments in building and strengthening their ability to effectively respond to a range of public health threats, including infectious diseases, natural disasters, and biological, chemical, nuclear, and radiological events. Preparedness activities funded by the PHEP Cooperative Agreement specifically target the development of emergency-ready public health departments that are both flexible and adaptable.
Public Housing Capital Fund	Federal	HUD		Funding available towards public housing agencies for modernization needs resulting from natural disasters including elevation, flood proofing, and retrofitting.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Regional Facility Planning Grant Program	State	TWDB	TWDB	Provides funds to political subdivisions in Texas for studies and analyses to evaluate and determine the most feasible alternatives to meet regional water supply and wastewater facility needs, estimate the costs associated with implementing these alternatives, and identify institutional arrangements for providing regional water supply and wastewater services.
Regional Water Planning Group Grants	State	TWDB	TWDB	Developed to guide and support the planning of the State's water resources, this program administers and assists in the development of regional and state water plans. It aims to improve the planning process by providing clear guidance for stakeholders and utilizing the best available data, methodologies, and technical innovations for each funding cycle.
Repetitive Flood Claims Program	Federal	FEMA	DHSEM	Provides funds to assist states and communities reduce flood damages to insured properties that have had one or more claims under the National Flood Insurance Program (NFIP).
Research and Planning Fund and Fund Development Program	State	TWDB	TWDB	Provides funds to eligible applicants for the development or revision of regional water plans. Eligible activities include the development, revision, or improvement of regional water plans including public meetings, hearings, and special studies. Plans must comply with Texas Water Code, §16.053 and Chapter 357, or other special studies approved by the Texas Water Development Board (TWDB) that enhance water planning efforts in the region.
Resilient Landscapes Program	Federal	USDA, USFS	TAMFS	Provides coordination to restore healthy, resilient, fire-adapted ecosystems. Restoration efforts include thinning crowded forests and using prescribed fire on two to three million acres annually, which helps prevent the buildup of flammable vegetation that feeds extreme wildfires.
Risk MAP Program	Federal	FEMA, NFIP	TWDB	Establishes or updates floodplain mapping and multi-hazard risk products.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Rural Development Grants	Federal	USDA-Rural Development	TWDB	Provides grants and loans for the development and enhancement of infrastructure and public safety in rural areas, offering up to $100,000 or 75 percent of the total project cost, whichever is less.
Rural Fire Assistance Grant	Federal	NIFC	TAMFS	Funds fire mitigation activities in rural communities.
Rural Utilities Service (RUS)	Federal	USDA-Rural Development		Programs designed to provide needed infrastructure or infrastructure improvements to rural communities, including water and wastewater treatment, electric power, and telecommunications services.
Rural Water Assistance Fund (RWAF)	State	TWDB	TWDB	Provides low-cost financing to assist small rural utilities with water and wastewater projects. The Rural Water Assistance Fund (RWAF) offers tax-exempt equivalent interest rate loans and long-term financing options.
Safe Rest Stops Program	State	TXDOT	TXDOT	Texas has 21 major highways that function as long-distance travel corridors. Along these routes, rest areas serve as critical safety features designed to reduce accidents caused by driver fatigue. These facilities provide travelers with an opportunity to pause, rest, and return to the road more alert and refreshed.
Section 108 Loan Guarantee Program	Federal	HUD		Provides loans to public entities for community and economic development projects, including mitigation measures.
Section 502 Loan Guaranteed Loan Program	Federal	USDA-RHS		Provides loans, loan guarantees, and technical assistance to very low- and low-income applicants seeking to purchase, build, or rehabilitate homes in rural areas.
Section 504 Loans for Housing	Federal	USDA-RHS		Provides repair loans, grants, and technical assistance to low-income senior homeowners in rural areas to address home repairs and eliminate health and safety hazards.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Societal Dimensions of Engineering, Science, and Technology Program	Federal	NSF		Provides funding for research and educational activities on topics such as ethics, values, risk assessment, communication, risk management, and risk perception.
Soil Survey	Federal	USDA-NRCS		Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation or related purposes.
State Fire Assistance for Mitigation (SFAM) **– Mechanical Fuels Grants**	State	TAMFS	TAMFS	Provides financial assistance for hazardous fuel reduction on private lands to decrease wildfire risk. The grant targets high-risk communities within 32 counties in Central Texas, as identified by the Texas A&M Forest Service Mitigation and Prevention Department. Priority is given to landowners who reside in one of the 32 high-risk counties, are located within a city or county with an active Community Wildfire Protection Plan (CWPP) or live in a recognized Firewise USA site.
State Fire Assistance for Mitigation (SFAM) **– Vegetative Fuel Break Grant**	State	TAMFS	TAMFS	Provides financial assistance for the creation of vegetative fuel breaks on private lands in Texas. Vegetative fuel breaks are trees and shrubs systematically planted adjacent to fields, homesteads, or feedlots to reduce or redirect wind. The goal of the grant is to protect high-risk communities by reducing the risk of catastrophic wildfires on private and public lands. Grant recipients will be reimbursed up to $2,500 for actual costs associated with creating a green, vegetative fuel break, consisting of a minimum of three rows of trees and 400 feet in length. Eligible projects must be located within the Texas High Plains.
Silver Jackets	Federal	USACE	TWDB	Provides funding for flood-related studies, public awareness efforts, risk analysis, flood response plans, and the construction of small flood control projects.
Small Flood Control Projects (USACE Section 205)	Federal	USACE	TWDB	Authorizes the U.S. Army Corps of Engineers (USACE) to conduct feasibility studies and construct small flood control projects.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
State Participation Program – Regional Water and Wastewater Facilities	State	TWDB	TWDB	Provides funding and assumes a temporary ownership interest in regional water, wastewater, or flood control projects when local sponsors are unable to assume debt for an optimally sized facility. The program is intended to encourage the optimum regional development of projects by funding excess capacity for future use, where benefits can be documented and such development is otherwise unaffordable without state participation. The goal is to enable the rightsizing of projects by accounting for future demand.
State Water Implementation Fund for Texas (SWIFT)	State	TWDB	TWDB	The SWIFT program helps communities develop and optimize water supplies at cost-effective rates. It offers low-interest loans, extended repayment terms, deferred loan repayments, and incremental repurchase terms for projects with state ownership aspects.
State Water Resources Research Act Program	Federal	USGS	TWDB	The U.S. Geological Survey (USGS), in cooperation with the National Institutes for Water Resources (NIWR), issues an annual call for proposals that address water challenges and concerns of regional or interstate significance, or that relate to a specific program priority identified by the Secretary of the Interior and the Institutes.
Stream Gauging and Flood Monitoring Network	Federal	DOE-USGS		Operation of a network of over 7,000 stream gauging stations that provide data on river flooding characteristics.
Surface Transportation Program	Federal	USDOT/ FHWA		Provides funding for activities such as safety-related construction and transportation enhancements. These enhancements include a broad range of initiatives, from safety education to environmentally and historically focused activities.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Texas Farm and Ranch Lands Conservation Program (TFRLCP)	State	TPWD	TPWD	Maintains and enhances the ecological and agricultural productivity of lands through Agricultural Conservation Easements. The TFRLCP supports responsible stewardship and conservation of working lands, water, fish and wildlife, and agricultural production through: • Generating interest and awareness in easement programs and other options for conserving working lands. • Leveraging available monies to fund as many high-quality projects as possible. • Highlighting the ecological and economic value of working lands and the long-term opportunities for their conservation.
Texas HOME Disaster Relief	Federal	TDHCA	TDHCA	The Texas HOME Disaster Relief Program is a long-term housing initiative designed to help eligible organizations assist income-qualified households affected by disasters. Funds are available for federal or state-declared disasters, as well as other natural or man-made events. It is the Department's practice to maintain a HOME Disaster Relief Fund balance of $1 million whenever possible. These funds may be used to support affected households located outside communities that receive HOME funds directly from the U.S. Department of Housing and Urban Development (HUD).
Texas Longleaf Conservation Assistance Program	Federal	National Fish and Wildlife Foundation (NFWF)	TAMFS	Provides eligible landowners with financial and technical assistance for establishing, enhancing, and managing longleaf pine. Landowners with property within 11 East Texas counties— including Angelina, Hardin, Jasper, Nacogdoches, Newton, Polk, San Augustine, Sabine, San Jacinto, Trinity, and Tyler— are eligible to apply. Approved participants may receive up to 50 percent payment not to exceed a standard cap rate, for implementing approved conservation practices. Approved conservation practices include prescribed burning, reforestation, site preparation, and forest stand improvement.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Texas Infrastructure Resiliency Fund (TIRF)	State	TWDB	TWDB	The purpose of this program is to provide loans, grants, and matching funds for flood projects through four separate accounts. It was enacted through Senate Bill 7 to address needs identified following the flood disasters of 2015, 2016, and 2017. Senate Bill 500 appropriated $685 million to support the program. Each account serves a distinct purpose. The oversight entity is the Texas Infrastructure Resiliency Fund (TIRF) Advisory Board, with the SWIFT Advisory Committee and the Texas Division of Emergency Management (TDEM) Director as non-voting members.
Texas Water Development Fund (DFund)	State	TWDB	TWDB	Provides financing for various types of eligible infrastructure projects, including planning, design, acquisition, and construction of projects for: water supply (such as reservoirs and well fields), conservation, water quality enhancement, flood control, and wastewater. This program enables the Texas Water Development Board (TWDB) to fund multi-purpose projects (e.g., water and wastewater) through a single commitment. Eligible applicants include political subdivisions and nonprofit water supply corporations.
Transfers of Inventory Farm Properties to Federal and State Agencies for Conservation Purposes	Federal	USDA-FSA		Transfers the titles of certain inventory farm properties owned by the FSA to federal and state agencies for conservation purposes, including the restoration of wetlands and floodplain areas to reduce future flood potential.
Transportation Enhancement Program	Federal	FHWA	TXDOT	This program supports non-traditional transportation-related activities that extend beyond standard infrastructure initiatives. Eligible projects must demonstrate thoughtful integration with the surrounding environment, contributing meaningfully to community vitality, environmental quality, and the visual character of transportation corridors. Reimbursement of up to 80 percent of allowable costs is available for qualifying enhancement activities.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
United States Geological Survey (USGS)	Federal	USGS		The U.S. Geological Survey (USGS) issues competitive grants and cooperative agreements to support research in earthquake hazards, the physics of earthquakes, earthquake occurrence, and earthquake safety policy.
Urban Tree Canopy Project (UTC)	Federal	USDA, USFS	TAMFS	The urban tree canopy (UTC) refers to the layer of leaves, branches, and stems of trees that cover the ground when viewed from above. In urban environments, the UTC plays a crucial role in stormwater management by intercepting rainfall that would otherwise run off paved surfaces and enter local waterways through storm drainage systems, carrying pollutants along the way. Additionally, the UTC mitigates the urban heat island effect, reduces heating and cooling costs, lowers air temperatures, improves air quality, increases property values, provides wildlife habitat, and offers aesthetic and community benefits, including an enhanced quality of life.
Urban Waters Small Grants	Federal	EPA		Funding is allocated to improve urban water quality through activities that also support community revitalization and other local priorities, which may include the implementation of green infrastructure.
USDA Conservation Programs	Federal	USDA/FSA		These programs[1] work to address a large number of farming and ranching related conservation issues including drinking water protection, soil erosion reduction, wildlife habitat preservation, the preservation and restoration of forests and wetlands, and aiding farmers whose farms have been damaged by natural disasters.
U.S.- Mexico Border Water Infrastructure Program	Federal	EPA	TCEQ	Provides grant assistance to U.S. and Mexican communities located within 60 miles of the border for the development and construction of high-priority drinking water and wastewater facilities. The program furthers EPA's mission to protect human health and the environment by providing critical resources for what is often an area's first drinking water and basic sanitation services.

[1] Note: Programs include Conservation Reserve Program, Conservation Reserve Enhancement Program, Emergency Conservation Program, Emergency Forest Restoration Program, Farmable Wetlands Program, Grassland Reserve Program, Source Water Protection Program.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Water Research Grant Program	State	TWDB	TWDB	The Texas Water Development Board (TWDB) funds a variety of water planning and research studies and projects designed to support regional water planning efforts and address region-specific water resource questions.
Water Conservation Field Services Program	Federal	HUD	Texas A&M AgriLife	Encourage beneficiaries of federal water projects to conserve water and assists agricultural and urban water districts in developing and implementing water conservation plans in accordance with the Reclamation Reform Act (RRA) of 1982. Through the WCFSP, cost-shared financial assistance is available for developing water conservation plans, identification of water management improvements through System Optimization Reviews (SORs), design of water management improvements, and promotion of water conservation techniques through demonstration activities. WaterSMART also supports Reclamation's priorities to increase water reliability and resilience, advance racial and economic equity, and enhance water conservation, ecosystem health, and climate resilience.
Watershed Processes and Water Resources	Federal	Bureau of Reclamation	TWDB	Promotes up to $250,000 for projects that can be completed within 24 months and that reduce conflicts through water conservation, efficiency, and markets.
WaterSMART – Drought Response Program	Federal	USDA	TWDB	Provides $500,000 to support innovative research focused on: (1) understanding the fundamental processes that influence the quality and quantity of water resources across diverse spatial and temporal scales; (2) improving water resource management in agricultural, forested, and rangeland watersheds; and (3) developing appropriate technologies to achieve these objectives.
Wetlands Protection – Development Grants	Federal	EPA		Provides funding to support the development and enhancement of state and tribal wetlands protection programs.

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Name	Level	Source Agency	Managing State Agency	Purpose of Funding
Wetlands Reserve Program	Federal	USDA, NRCS		Provides financial and technical assistance to protect and restore wetlands through the use of easements and restoration agreements.
Wildlife Habitat Incentive Program (WHIP)	Federal	USDA, NRCS	TPWD	A voluntary program for conservation-minded landowners seeking to develop and improve wildlife habitat on agricultural land, nonindustrial private forest lands, and tribal lands.

Adoption Resolution