

EDWARDS COUNTY HAZARD MITIGATION ACTION PLAN UPDATE

2025 DRAFT

Mitigating Risk for a Safe, Secure, Sustainable Future



H2O
PARTNERS

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BACKGROUND

Edwards County is located in Southwest Texas. The largest town and county seat is Rocksprings. Sutton County borders the northern portion of the county, Kerr County is adjacent to the east, Kimble County is to the northeast, Kinney County is to the south, Real County and Uvalde County are to the southeast, and Val Verde 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, Edwards 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 from many hazards on people and property can be lessened through 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, Edwards County developed their previous Hazard Mitigation Action Plan (HMAP) to be specific to the County and the City of Rocksprings.

FEMA approved the previous Edwards County HMAP in 2012, which then was set to expire in 2017. Therefore, the County began the process of developing a Hazard Mitigation Plan Update in order to regain eligibility for grant funding. The HMAP Update planning process provided an opportunity for Edwards County to evaluate successful mitigation actions and explore opportunities to avoid future disaster loss.

The Middle Rio Grande Development Council (MRGDC) coordinated among Dimmit County, Edwards County, Kinney County, La Salle County, Maverick County, Real County, Uvalde County, Val Verde County, and Zavala County to update each of their HMAPs and selected H2O Partners, Inc. to write and develop the 2025 MRGDC Regional HMAP Developments and Updates, hereinafter titled: “Edwards County Hazard Mitigation Action Plan Update 2025: Maintaining a Safe, Secure, and Sustainable Community” (Plan or Plan Update). This is a multi-

¹ Source: <http://www.floodsafety.com/texas/regional-info/san-antonio-flooding/>

² Source: <http://www.fema.gov/hazard-mitigation-planning-resources>

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jurisdictional plan; the participating jurisdictions include Edwards County and the City of Rocksprings.

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. A comprehensive review of a hazard mitigation plan addresses vulnerabilities to hazards that exist today and in the foreseeable future. Therefore, it is essential that a plan identify projected patterns of how future development will increase or decrease a community's overall hazard vulnerability.

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 Edwards County and the City of Rocksprings. The hazard classification enables the participating jurisdictions to prioritize mitigation actions based on hazards which can present the greatest risk to lives and property in the geographic scope.

PURPOSE

The Plan Update was prepared by Edwards County, the City of Rocksprings, 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 Edwards County, the City of Rocksprings, 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 Edwards 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.*"

Edwards County, the City of Rocksprings, and planning participants identified 11 natural hazards and 4 human-caused 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 to Edwards County and the City of Rocksprings 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 Edwards County and the City of Rocksprings to take advantage of rapidly developing mitigation grant opportunities as they arise; and
- Ensure that Edwards County and the City of Rocksprings maintain eligibility for the full range of future Federal disaster relief.

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AUTHORITY



The Plan is tailored specifically for Edwards County, the City of Rocksprings, 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 2023), and the "Local Mitigation Planning Handbook" (May 2023).

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 Edwards County's population and economy.

Sections 4 through 19 present a hazard overview and information on individual natural and human-caused 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 20 presents hazard mitigation goals and objectives. Section 21 gives an analysis for the previous actions and Section 22 presents hazard mitigation actions for Edwards County and the City of Rocksprings. Section 23 identifies Plan maintenance mechanisms.

The list of Planning Team members and stakeholders is located in Appendix A. Public survey results are analyzed and presented in Appendix B. Appendix C contains a detailed list of critical facilities for the area. Appendix D contains information regarding workshops and meeting documentation. Capability Assessment results for Edwards County and the City of Rocksprings are in Appendix E. Appendix F includes State and Federal Funding Opportunities.³

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



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PLANNING PROCESS

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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

The Middle Rio Grande Development Council (MRGDC) hired H2O Partners, Inc. (Consultant Team), to provide technical support and oversee the development of the Edwards County Hazard Mitigation Action Plan Update 2025. The Consultant Team used the FEMA “Local Mitigation Planning Policy Guide” (April 2023), and the “Local Mitigation Planning Handbook” (May 2023) to develop the Plan Update. The overall planning process is shown in Figure 2-1 below.

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Figure 2-1. Mitigation Planning Process



Edwards County, the City of Rocksprings, and the Consultant Team met in April 2024 to begin organizing resources, identify Planning Team members, and conduct a Capability Assessment.

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 each of the participating jurisdictions within Edwards 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 area organizations and departments from the participating jurisdictions within Edwards County 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 with an asterisk next to their title.

Table 2-1. Executive Planning Team

ORGANIZATION / DEPARTMENT	TITLE
Middle Rio Grande Development Council	Planning / Operations Director
Edwards County – Emergency Management	Emergency Management Coordinator
City of Rocksprings – Emergency Management	Emergency Management Coordinator

Table 2-2. Advisory Planning Team

ORGANIZATION / DEPARTMENT	TITLE
Middle Rio Grande Development Council	Planning Assistant
Middle Rio Grande Development Council	Public Safety Director
Middle Rio Grande Development Council	911 Coordinator / Public Relations
Edwards County – Government	County Judge *

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ORGANIZATION / DEPARTMENT	TITLE
Edwards County – Fire	Fire Chief
City of Rocksprings – Administration	City Clerk / Secretary
City of Rocksprings – Government	Mayor *

Additionally, a Stakeholder Group was invited via email to participate in the planning process by attending meetings, commenting on draft versions of the plan, and/or by providing data to inform the planning process. The Consultant Team, Planning Teams, and Stakeholder Group coordinated to identify mitigation goals and develop mitigation strategies and actions for the Plan. Appendix A provides a complete listing of all participating Planning Team members and stakeholders from participating jurisdictions within Edwards County by organization, title, and stakeholder type. Stakeholder involvement is discussed further below.

Based on results of completed Capability Assessments, Edwards County and the City of Rocksprings described methods for achieving future hazard mitigation measures by expanding existing capabilities. For example, each jurisdiction 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 TDEM Training Division Learning Management Site (LMS) (<https://tdem.texas.gov/preparedness/training>). In addition, each jurisdiction 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 each jurisdiction include the following:

Table 2-3 Opportunities for Improving and Expanding Existing Capabilities by Jurisdiction

JURISDICTION	OPPORTUNITIES
Edwards County	<ul style="list-style-type: none"> ➤ Develop a Capital Improvement Plan based on information in the risk assessment and identified mitigation projects within the HMAP. ➤ Develop a Comprehensive Plan based on information in the risk assessment and identified mitigation projects within the HMAP. ➤ Develop a Community Wildfire Protection Plan based on information in the risk assessment and identified mitigation projects within the HMAP. ➤ Develop floodplain ordinances to increase resiliency such as modifying permitting or building codes. ➤ Develop land use and building ordinances that will require all new developments to conform to the highest mitigation standards.
City of Rocksprings	<ul style="list-style-type: none"> ➤ Develop a Capital Improvement Plan based on information in the risk assessment and identified mitigation projects within the HMAP. ➤ Develop a Comprehensive Plan based on information in the risk assessment and identified mitigation projects within the HMAP. ➤ Develop a Community Wildfire Protection Plan based on information in the risk assessment and identified mitigation projects within the HMAP.

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JURISDICTION	OPPORTUNITIES
	<ul style="list-style-type: none">➤ Review current floodplain ordinances for opportunities to increase resiliency such as modifying permitting or building codes.➤ Review land use and building ordinances that will require all new developments to conform to the highest mitigation standards.

Sample hazard mitigation actions developed with similar hazard risks were shared at the meetings. These important discussions resulted in the development of multiple mitigation actions that are included in the Plan Update to further mitigate risk from natural hazards in the future.

The Planning Team developed hazard mitigation actions for mitigating risk from all of the hazards including potential tornado, flood, and wildfire events. These actions include but are not limited to the county and city hardening critical facilities to hazard-resistant levels, implementing drainage projects, and promoting the use of NOAA “All Hazards” radios for early warning and post-event information.

PLANNING PROCESS

The process used to prepare the Plan Update followed the four major steps included at Figure 2-1. After the Planning Team was organized, a capability assessment was developed and distributed at the Kickoff Workshop. Hazards were identified and assessed, and results associated with each of the hazards were provided at the Risk Assessment Workshop. Based on Edwards County’s identified vulnerabilities, specific mitigation strategies were discussed and developed at the Mitigation Strategy Workshop. Finally, Plan maintenance and implementation procedures were developed and are included in Section 23. Participation of Planning Team members, stakeholders, and the public at each of the workshops is documented in Appendix D.

At the Plan development workshops held throughout the planning process described herein, the following factors were taken into consideration:

- The nature and magnitude of risks currently affecting the community;
- Hazard mitigation goals to address current and expected conditions;
- Whether current resources will be sufficient for implementing the Plan Update;
- Implementation problems, such as technical, political, legal, and coordination issues that may hinder development;
- Anticipated outcomes; and
- How Edwards County, the City of Rocksprings, agencies, and partners will participate in implementing the Plan Update.

KICKOFF WORKSHOP

The Regional Kickoff Workshop was held on May 21, 2024, at the Workforce Center in the City of Uvalde. 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, economic development agencies, local colleges, and surrounding communities. In addition to the kickoff presentation, participants received the following information:

- Project overview regarding the planning process;
- Public survey access information;

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- Hazard Ranking form; and
- Capability Assessment survey for completion.

A risk ranking exercise was conducted at the Kickoff Workshop to get input from the Planning Team and stakeholders pertaining to various risks from a list of natural hazards affecting the planning area. Each participant at the Kickoff Workshop was provided a risk ranking sheet that asked participants to rank hazards in terms of the probability or frequency of occurrence, extent of spatial impact, and the magnitude of impact. The results of the ranking sheets identified unique perspectives on varied risks throughout the planning area. 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 e-mail 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 11 natural hazards and 4 human-caused hazards which pose a significant threat to the planning area.

RISK ASSESSMENT

An initial risk assessment for Edwards County and the City of Rocksprings was completed in July 2024 and results were presented to Planning Team members at the Risk Assessment Workshop held on August 14, 2024, at the Middle Rio Grande Development Council in the City of Carrizo Springs. 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 property and citizens.

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 impact on people and property. Following the risk assessment workshop past event data from NCEI is 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 19.

MITIGATION REVIEW AND DEVELOPMENT

Developing the Mitigation Strategy for the Plan involved identifying mitigation goals and new mitigation actions. A Mitigation Strategy Workshop was held on September 25, 2024, at the Camp Wood Senior Center in the City of Camp Wood. In addition to the Planning Team, stakeholder groups were invited to attend the workshop. Regarding hazard mitigation actions, workshop participants emphasized the desire for drought and extreme heat projects. Additionally, the participating jurisdictions were proactive in identifying mitigation actions to lessen the risk of all the identified hazards included in the Plan Update.

An inclusive and structured process was used to develop and prioritize new hazard mitigation actions for the Plan Update. The prioritization method was based on FEMA's STAPLEE criteria

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and included social, technical, administrative, political, legal, economic, and environmental considerations. As a result, each Planning Team Member assigned an overall priority to each hazard mitigation action. The overall priority of each action is reflected in the hazard mitigation actions found in Section 22.

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.

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.

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 Edwards County, the City of Rocksprings, and MRGDC, 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, National Oceanic and Atmospheric Administration (NOAA), the Texas Water Development Board (TWDB), the Texas Commission on Environmental Quality (TCEQ), the Texas State Data Center, 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 (Sections 5-19) 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 by searching the NCEI. 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

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projections and included in Section 3 of the Plan. 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 Edwards County and the City of Rocksprings 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 E.

Existing projects and studies were utilized as a starting point for discussing hazard mitigation actions among Planning and Consultant Team members. For a comprehensive list of actions from the previous 2012 Edwards County HMAP, please refer to Section 21.

Additionally, policies and ordinances were reviewed by the participating jurisdictions. Other plans were reviewed, such as Emergency Operations Plans, to identify any additional mitigation actions. 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 Edwards County Hazard Mitigation Action Plan Update 2025.

INCORPORATION OF THE HMAP INTO OTHER PLANNING MECHANISMS

Planning Team members will integrate the implementation of the Plan Update with other planning mechanisms for Edwards County, such as the Emergency Operations Plan. Existing plans for participating jurisdictions will be reviewed and incorporated into the Plan Update, as appropriate. This section discusses how the Plan will be implemented by Edwards County and the City of Rocksprings. It also addresses how the Plan will be evaluated and improved over time, and how the public will continue to be involved in the hazard mitigation planning process.

Edwards County and the City of Rocksprings will be responsible for implementing hazard mitigation actions contained in Section 22. Each hazard mitigation action has been assigned to a specific County or City department that is responsible for tracking and implementing the action.

A funding source has been listed for each identified hazard mitigation action and may be utilized to implement the action. An implementation time period has also been assigned to each hazard mitigation action as an incentive and to determine whether actions are implemented on a timely basis.

Edwards County and the City of Rocksprings will integrate hazard mitigation actions contained in the Plan Update with existing planning mechanisms such as ordinances, Emergency Operations or Management Plans, and other local and area planning efforts. Edwards County will work closely with area organizations to coordinate implementation of hazard mitigation actions that benefit the planning area in terms of financial and economic impact.

Upon formal adoption of the Plan Update, Planning Team members will review existing plans along with building codes to guide development and ensure that hazard mitigation actions are implemented. Each of the jurisdictions will be responsible for coordinating periodic reviews of the Plan Update with members of the Advisory Planning Team to ensure the integration of hazard

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mitigation strategies into these planning mechanisms and codes. The Planning Team will also conduct periodic reviews of various existing planning mechanisms and analyze the need for any revisions or updates in light of the approved Plan Update. Edwards County and the City of Rocksprings will ensure that future long-term planning objectives will contribute to the goals of the Plan to reduce the long-term risk to life and property from moderate and high-risk hazards. Within one year of formal adoption of the Plan, existing planning mechanisms will be reviewed and analyzed as they pertain to the Plan Update.

Planning Team members will review and revise, as necessary, the long-range goals and objectives in its strategic plan and budgets to ensure that they are consistent with the Plan Update.

Furthermore, Edwards County will work with neighboring jurisdictions to advance the goals of the Plan Update as it applies to ongoing, long-range planning goals and actions for mitigating risk to natural hazards throughout the planning area.

Table 2-4 identifies types of planning mechanisms and examples of methods for incorporating the Plan into other planning efforts.

Table 2-4. Examples of Methods of Incorporation

Planning Mechanism	Incorporation of Plan
Annual Budget Review	Various departments and key personnel that participated in the planning process for Edwards County and the City of Rocksprings will review the Plan and mitigation actions therein when conducting their annual budget review. Allowances will be made in accordance with grant applications sought, and mitigation actions that will be undertaken, according to the implementation schedule of the specific action.
Floodplain Management Plans	Floodplain management plans include preventative and corrective actions to address the flood hazard. Therefore, the actions for flooding and information found in Section 8 of this Plan Update discussing the people and property at risk to flood will be reviewed and revised when the City updates their management plans.
Grant Applications	The HMAP will be evaluated by Edwards County and the City of Rocksprings 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	Edwards County and the City of Rocksprings have regulatory plans in place, such as Emergency Operations Plans. The Plan Update will be consulted when County and City departments review or revise their current regulatory planning mechanisms, or in the development of regulatory plans that are not currently in place.

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Appendix E Capability Assessment provides an overview of 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. At this time, neither Edwards County nor the City of Rocksprings have building codes in place. Please refer to Appendix E for a complete inventory of each participating jurisdiction's capabilities.

It should be noted for the purposes of the Plan Update that the HMAP has been used as a reference when reviewing and updating all plans and ordinances for the entire planning area, including all participating jurisdictions. The Emergency Management Action Plan developed for Edwards County is updated every 5 years and incorporates goals, objectives, and actions identified in the mitigation plan.

PLAN REVIEW AND PLAN UPDATE

As with the development of Plan Update, Edwards County and the City of Rocksprings 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 individual Hazard Mitigation Action tables included in the Plan Update for Edwards County and the City of Rocksprings.

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 participating jurisdictions' comprehensive planning process, budgetary constraints, and community needs. Edwards County and the City of Rocksprings 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 the 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.

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

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implementing hazard mitigation actions. If citizens and stakeholders, such as local businesses, non-profits, 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.

The public was involved in the development of the Edwards County Hazard Mitigation Action Plan Update 2025 at different stages prior to official Plan approval and adoption. Public input was sought using three methods: (1) open public meetings; (2) survey instruments; and (3) making the draft Plan Update available for public review on participating jurisdictions' websites.

The draft Plan Update was made available to the general public for review and comment on participating jurisdictions' websites. The public was notified at the public meetings that the draft Plan Update would be available for review. No feedback was received on the draft Plan Update, although it was given on the public survey, and all relevant information was incorporated into the Plan Update. Public input was utilized to assist in identifying hazards that were of most concern to the citizens of the County and what actions they felt should be included and prioritized.

The Plan Update will be advertised and posted on Edwards County and the City of Rocksprings' websites upon approval from FEMA, and a copy will be kept at the Edwards County Courthouse and MRGDC Facility.

UNDERSERVED COMMUNITIES / VULNERABLE POPULATIONS

A goal of the Planning Team was building equity into the planning process. Including organizations that aid underserved communities and socially vulnerable populations to participate in the plan helps ensure equitable access to the planning process and the meaningful participation of all residents. In addition, these groups can make sure that the interests of vulnerable populations are accurately represented and act as a valuable resource to share information with those vulnerable populations.

The Planning Team worked to identify local agencies, organizations, and community leaders that focus on reaching vulnerable populations and underserved communities. These organizations were included in the planning process as stakeholders and were invited to participate in the planning process via email. These agencies were encouraged to post public planning meetings as well as solicit feedback via the public survey.

The MRGDC Regional Hazard Mitigation Plan Update(s) and Development(s) encompasses a nine-county-wide area including the counties of Dimmit, Edwards, Kinney, La Salle, Maverick, Real, Uvalde, Val Verde, and Zavala. All stakeholders and planning team members were invited to participate in each of the nine county plans developed during this process, including all public meetings, and surveys. All stakeholders are listed in Table 2-5 below. Some stakeholders have been detailed below along with the agency's mission, including:

- American Red Cross – Prevents and alleviates human suffering in the face of emergencies by mobilizing the power of volunteers and the generosity of donors. The Red Cross shelters, feeds, and provides comfort to people affected by disasters; supplies about 40 percent of the nation's blood; teaches skills that save lives; distributes international humanitarian aid; and supports veterans, military members, and their families.
- Edwards Community Food Bank – Serves as an essential resource for families and individuals struggling with food insecurity and financial hardship by providing easily accessible groceries.

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- Edwards County Fair Association – Provides opportunities for community engagement through varied entertainment, educational, and agricultural activities such as shearing demonstrations, goat roping, dances under the stars, various tournaments and challenges, cook-offs, and parades.

In addition, public notices were posted on public bulletin boards throughout the planning area as well as posted on the participating jurisdictions' websites and social media platforms. For a sample of these postings, please see Appendix D. 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 and to obtain input and feedback on the mitigation plan. For each form of engagement, all efforts were made to reach Edwards County's underserved communities and vulnerable populations throughout the planning process. Additional survey information is provided at the end of this section.

STAKEHOLDER INVOLVEMENT

Stakeholder involvement is essential to hazard mitigation planning since a wide range of stakeholders can provide input on specific topics and from various points of view. Throughout the planning process, members of community groups, local businesses, and neighboring jurisdictions were invited to participate in the development of the Plan Update. The Stakeholder Group (Table 2-5) included a broad range of representatives from both the public and private sectors and served as a key component in MRGDC's outreach efforts for the development of the Edwards County Plan Update. Documentation of stakeholder meetings is found in Appendix D. A list of organizations invited to attend via email is found in Table 2-5. Those who participated in the public meetings are identified with a plus symbol (+) next to their stakeholder type.

Table 2-5. Stakeholder Working Group

AGENCY	TITLE	STAKEHOLDER TYPE
211 Texas	General Representative	Regional Agency
Alexander Memorial Library	Librarian	Community Organization
American Red Cross	Disaster Program Manager	Community Organization +
American Red Cross	Regional Communications Director	Community Organization
Asherton VFD	Fire Chief	Community Organization
The ARC	Development and Events Manager	Community Organization
Bandera County	Emergency Management Coordinator	Neighboring Community
Batesville VFD	Fire Chief	Community Organization
Bethel Center	Food Bank Representative	Community Organization
Brush Country Chamber of Commerce	General Representative	Community Organization

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AGENCY	TITLE	STAKEHOLDER TYPE
Camino Real Community Services	Executive Director	Community Organization
Camp Wood Library	Director	Community Organization
Catholic Charities	Administrator	Community Organization
Catholic Charities	Executive Director	Community Organization
Carrizo Springs, City of	Streets Department Representative	City Department
Carrizo Springs, City of	Public Works Director	City Department +
Carrizo Springs, City of	Wastewater Superintendent	City Department +
Carrizo Springs ISD	Superintendent	Academia
Carrizo Springs Javelin	General Representative	Community Organization
Carrizo Springs VFD	Fire Chief	Community Organization
Community Service Agency	General Representative	Community Organization
Comstock ISD	Superintendent	Academia
Concan VFD	Fire Chief	Community Organization
Cotulla, City of	City Administrator	Neighboring Community
Cotulla ISD	Superintendent	Academia
Cotulla VFD	Fire Chief	Community Organization
Crockett County	County Judge	Neighboring Community
Crystal City, City of	Chief of Police	City Department
Crystal City, City of	Mayor	Local Government
Crystal City ISD	Director of Federal Programs	Academia
Crystal City ISD	Superintendent	Academia
Crystal City VFD	Fire Chief	Community Organization
Del Rio, City of	Administrative Captain - Police	City Department
Del Rio, City of	Community Services Director	City Department
Del Rio, City of	Economic Development Director	City Department
Del Rio, City of	International Bridge Superintendent	City Department

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AGENCY	TITLE	STAKEHOLDER TYPE
Del Rio, City of	Mayor	Local Government
Del Rio, City of	Neighborhood Services Administrative Assistant	City Department
Del Rio, City of	Nutrition & Social Services Center Director	City Department
Del Rio, City of	Parks and Recreation Superintendent	City Department
Del Rio, City of	Planning and Zoning Director	City Department
Del Rio, City of	Public Works Director / City Engineer	City Department
Del Rio, City of	Streets and Drainage Superintendent	City Department
Del Rio, City of	Transportation Director	City Department
Del Rio Economic Development Council	Council Representative	Community Organization
Del Rio Fire Department	Fire Chief	Community Organization
Dimmit County	County Judge	Local Government +
Dimmit County	Precinct 1 Commissioner	Local Government +
Dimmit County	Precinct 2 Commissioner	Local Government
Dimmit County	Precinct 3 & 6 Commissioner	Local Government
Dimmit County	Precinct 4, 5, & 7 Commissioner	Local Government
Dimmit County	Sanitation Secretary	Utility Provider
Dimmit County	Utility Department Administrative Assistant	Utility Provider
Dimmit County Chambers of Commerce	General Representative	Community Organization
Dimmit County Fire Department	Fire Chief	Community Organization
Dimmit County Food Pantry	Food Services Coordinator	Community Organization
Dimmit County ISD	Director of Federal Programs	Academia
Dimmit County ISD	Superintendent	Academia
Dimmit County Public Library	Librarian	Community Organization
Dimmit County Sheriff's Office	County Sheriff	Community Organization

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AGENCY	TITLE	STAKEHOLDER TYPE
Dimmit Regional Hospital	Chief Executive Officer	Healthcare Agency
Duval County	Emergency Management Coordinator	Neighboring Community
Eagle Pass, City of	City Engineer	City Department
Eagle Pass, City of	Economic Development Director	City Department
Eagle Pass, City of	Water Works System Representative	City Department
Eagle Pass Chamber of Commerce	General Representative	Community Organization
Eagle Pass ISD	Deputy Superintendent for District Operations	Academia
Eagle Pass Library	Librarian	Community Organization
Eagle Pass – Maverick County (EPMC) Economic Development Alliance	General Representative	Community Organization
Eagle Pass VFD	Fire Chief	Community Organization
Edwards Community Food Bank	General Representative	Community Organization
Edwards County	Precinct 1 Commissioner	Local Government
Edwards County	Precinct 2 Commissioner	Local Government
Edwards County	Precinct 3 Commissioner	Local Government
Edwards County	Precinct 4 Commissioner	Local Government
Edwards County	Road and Bridges Superintendent	County Department
Edwards County Chamber of Commerce	President	Community Organization
Edwards County Fair Association	General Representative	Community Organization
Edwards County Sheriff's Office	County Sheriff	Community Organization
El Progreso Memorial Library	Librarian	Community Organization
Encinal Water Supply Corporation (WSC)	General Representative	Utility Provider
Environmental Protection Agency (EPA), Region 6	Director of Superfund and Emergency Management Division	Federal Agency

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AGENCY	TITLE	STAKEHOLDER TYPE
Fort Duncan Regional Medical Center	Assistant to Safety Officer / Operations Director	Healthcare Agency
Fort Duncan Regional Medical Center	Safety Officer / Operations Director	Healthcare Agency
Frio Canyon Chamber of Commerce	General Representative	Community Organization
Frio County	Emergency Management Coordinator	Neighboring Community
Gilmer Memorial Library	Director	Community Organization
Grace Community College	General Representative	Academia
Habitat for Humanity	General Representative	Community Organization
H.E. Butt Foundation	General Representative	Community Organization
Helping Hands Fund Program	General Representative	Community Organization
Hill Country Post	Editor	Community Organization
Keep It REAL Beautiful	General Representative	Community Organization
Kerr County	Emergency Management Coordinator	Neighboring Community
Kickapoo Tribe	Tribal Representative	Tribal Community
Kimble County	County Judge	Neighboring Community
Kinney County	Precinct 1 Commissioner	Local Government
Kinney County	Precinct 2 Commissioner	Local Government
Kinney County	Precinct 3 Commissioner	Local Government
Kinney County	Precinct 4 Commissioner	Local Government
Knippa VFD	Fire Chief	Community Organization
KSAT	General Manager	Community Organization
La Pryor ISD	Director of Federal Programs	Academia
La Pryor ISD	Superintendent	Academia
La Pryor VFD	Fire Chief	Community Organization
La Salle County	County Judge	Local Government +
La Salle County	Justice of the Peace Precinct 1, 5, and 6	Local Government +

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AGENCY	TITLE	STAKEHOLDER TYPE
La Salle County	Precinct 1 Commissioner	Local Government
La Salle County	Precinct 2 Commissioner	Local Government
La Salle County	Precinct 3 Commissioner	Local Government +
La Salle County	Precinct 4 Commissioner	Local Government
La Salle Community Outreach	Community Coordinator	Community Organization
La Salle County Sheriff's Office	County Sheriff	Community Organization
Leaky ISD	Superintendent	Academia
The Leaky Star	Editor	Community Organization
Leaky VFD	Fire Chief	Community Organization
Maverick County	Precinct 1 Commissioner	Local Government
Maverick County	Precinct 2 Commissioner	Local Government
Maverick County	Precinct 3 Commissioner	Local Government
Maverick County	Precinct 4 Commissioner	Local Government
Maverick County Development Corporation	General Representative	Community Organization
Maverick County Food Pantry	Director	Community Organization +
Maverick County Hospital District	Building Maintenance	Healthcare Agency
Maverick County Sheriff's Office	County Sheriff	Community Organization
Maverick County Times	Editor	Community Organization
Maverick County WCID 1	General Manager	Utility Provider
McMullen County	Emergency Management Coordinator	Neighboring Community
Medina County	Emergency Management Coordinator	Neighboring Community
Mi Familia Adult Day Care Center	General Representative	Community Organization
Middle Rio Grande Development Council	Area Agency on Aging Coordinator	Regional Agency
Nueces Canyon Chamber of Commerce	General Representative	Community Organization

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AGENCY	TITLE	STAKEHOLDER TYPE
Nueces Canyon Consolidated ISD	Superintendent	Academia
Nueces Canyon VFD	Fire Chief	Community Organization
NWS	Corpus Christi Representative	Federal Agency
NWS	Austin/San Antonio Representative	Federal Agency
Reagan Wells VFD	Fire Chief	Community Organization
Real County Library	Director	Community Organization
Rise Recovery	Chief of Operations	Community Organization
Rocksprings - Edwards County VFD	Fire Chief	Community Organization
Rock Springs ISD	Superintendent	Academia
Sabinal, City of	Chief of Police	City Department
Sabinal, City of	Director of Public Works	City Department
Sabinal, City of	Utilities Clerk	City Department
Sabinal EMS	Administrator	Community Organization
Sabinal VFD	Fire Chief	Community Organization
San Antonio Area – Uvalde Strong	General Representative	Community Organization
San Antonio River Authority	Regional Representative	Utility Provider
San Felipe-Del Rio CISD	Administration	Academia
San Lucas Lutheran Church	Pastor	Community Organization
Southwest Texas Junior College	Chief of Police	Academia
St. Joseph's Catholic Church	Food Bank Representative	Community Organization
Sul Ross University Center	Director of University Department of Public Safety	Academia
Sutton County	County Judge	Neighboring Community
SWCD #320	District Secretary	Utility Provider
Terrell County	County Clerk	Neighboring Community
Texas A&M AgriLife Extension	Dimmit County Extension Agent	State Agency

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AGENCY	TITLE	STAKEHOLDER TYPE
Texas A&M AgriLife Extension	District 10 - Disaster Assessment and Recover (DAR) Agent	State Agency +
Texas A&M AgriLife Extension	Edward County Extension Agent	State Agency
Texas A&M AgriLife Extension	Kinney County Extension Agent	State Agency
Texas A&M AgriLife Extension	La Salle County Extension Agent	State Agency +
Texas A&M AgriLife Extension	Maverick County Extension Agent	State Agency +
Texas A&M AgriLife Extension	Real County Extension Agent	State Agency +
Texas A&M AgriLife Extension	Uvalde County Extension Agent	State Agency
Texas A&M AgriLife Extension	Val Verde County Extension Agent	State Agency
Texas A&M AgriLife Extension	Zavala County Extension Agent	State Agency
Texas A&M Forest Service	Area Operations Chief	State Agency
Texas A&M Forest Service	Central Texas Operations Department Head	State Agency
Texas A&M Forest Service	Regional District Coordinator	State Agency +
Texas A&M Forest Service	Staff Forester III	State Agency +
Texas A&M Forest Service	Staff Forester III ¹	State Agency
Texas Commission on Environmental Quality (TCEQ), Region 13	Regional Director	State Agency
Texas Commission on Environmental Quality (TCEQ), Region 16	Regional Director	State Agency
Texas Commission on Fire Protection	County Representative	State Agency
Texas Department of Health Services (TDHS), Region 7	Regional Director	State Agency
Texas Department of Housing and Community Affairs (TDHCA)	Director of Single-Family and Homeless Program	State Agency

¹ Please note this is not a duplicate entry.

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AGENCY	TITLE	STAKEHOLDER TYPE
Texas Department of Housing and Community Affairs (TDHCA)	Manager of Single-Family Program	State Agency
Texas Department of Transportation (TXDOT)	Laredo District Engineer	State Agency
Texas Department of Transportation (TXDOT)	San Angelo District Engineer	State Agency
Texas Division of Emergency Management (TDEM), Region 6	District 24 Chief	State Agency +
Texas Division of Emergency Management (TDEM), Region 6	Gillespie CLO	State Agency +
Texas Division of Emergency Management (TDEM), Region 6	Maverick CLO	State Agency +
Texas Division of Emergency Management (TDEM), Region 6	Regional Mitigation Coordinator	State Agency
Texas Division of Emergency Management (TDEM), Region 6	Recovery & Mitigation Section Chief	State Agency
Texas Floodplain Management Association, Region 3	Director	State Agency
Texas Floodplain Management Association, Region 6	Director	State Agency
Texas Land Conservation Assistance Network	Development Assistant and Grant Administrator	Private Organization
Texas Parks and Wildlife Department, Region 8	District Leader	State Agency
Texas Parks and Wildlife Department	District Leader for Edwards County	State Agency
Texas Soil and Water Conservation Districts	Field Representative	Utility Provider
Texas State Legislature	House District 31 Representative	State Agency
Texas State Legislature	House District 53 Representative	State Agency
Texas State Legislature	House District 74 Representative	State Agency

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AGENCY	TITLE	STAKEHOLDER TYPE
Texas State Legislature	House District 80 Representative	State Agency
Texas State Senate	District 19	State Agency
Texas State Senate	District 21	State Agency
Texas Water Development Board (TWDB)	General Representative	State Agency
Texas Windstorm Insurance Associations (TWIA)	General Representative	State Agency
U.S. Army Corps of Engineers	Fort Worth / Galveston Representative	Federal Agency
U.S. Fish and Wildlife	Southwest Regional Representative	Federal Agency
U.S. International Boundary and Water Commission	Area Operations Manager	Federal Agency +
U.S. International Boundary and Water Commission	Patrol	Federal Agency +
Utopia Volunteer Fire Rescue	Fire Chief	Community Organization
Uvalde, City of	Chief of Police	City Department
Uvalde, City of	Director of Planning	City Department
Uvalde, City of	Director of Public Works	City Department
Uvalde, City of	District 1 Commissioner	Local Government
Uvalde, City of	District 2 Commissioner	Local Government
Uvalde, City of	District 3 Commissioner	Local Government
Uvalde, City of	District 4 Commissioner	Local Government
Uvalde, City of	District 5 Commissioner	Local Government
Uvalde Consolidated ISD	Executive Director of Student Services	Academia +
Uvalde Consolidated ISD	Superintendent	Academia
Uvalde County	County Judge	Local Government
Uvalde County	Precinct 1 Commissioner	Local Government
Uvalde County	Precinct 2 Commissioner	Local Government
Uvalde County	Precinct 3 Commissioner	Local Government
Uvalde County	Precinct 4 Commissioner	Local Government

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AGENCY	TITLE	STAKEHOLDER TYPE
Uvalde County Sheriff's Office	County Sheriff	County Department
Uvalde Fire Department	Fire Chief	Community Organization
Uvalde Hesperian	Editor	Community Organization +
Uvalde Leader News	Editor	Community Organization
Uvalde Leader News	Writer	Community Organization +
Uvalde Memorial Hospital	Emergency Management Coordinator	Healthcare Agency +
Uvalde Memorial Hospital	Public Information Official	Healthcare Agency
Val Verde Community Center – Precinct 2	Food Bank Representative	Community Organization
Val Verde Community Center – Precinct 4	Food Bank Representative	Community Organization
Val Verde County	Commissioner's Office Manager	Local Government
Val Verde County	Commissioner's Secretary	Local Government
Val Verde County	Health Department / Risk Management Engineer	Local Government
Val Verde County	County Judge	Local Government
Val Verde County Fire Department	Fire Chief	Community Organization
Val Verde County Library	Librarian	Community Organization
Val Verde County WCID – Comstock	General Representative	Utility Provider
Val Verde Loaves and Fishes	Food Bank Representative	Community Organization
Val Verde International	Airport Advisory Board	Community Organization
Val Verde Regional Medical Center	Director of Public Relations, Marketing, and Communication	Healthcare Agency
Veterans Service Officer	Dimmit County	Community Organization
Webb County	Emergency Management Coordinator	Neighboring Community
Wintergarden Groundwater Conservation District	Director	Utility Provider
Wintergarden Groundwater Conservation District	General Manager	Utility Provider +

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AGENCY	TITLE	STAKEHOLDER TYPE
Zavala County	County Judge	Local Government
Zavala County	Utility Manager	County Department
Zavala County Sheriff's Office	County Sheriff	County Department
Zavala County WCID #1	General Representative	Utility Provider

Stakeholders and participants from neighboring communities that attended the Planning Team and public meetings played a key role in the planning process. For example, communication and hazard preparedness were two of the biggest concerns to stakeholders, so Edwards County included an action to develop a coordinated evacuation plan among other Middle Rio Grande border region counties as well an action to identify and map low water crossing and roadways prone to flooding to serve as a basis for evacuation planning.

PUBLIC MEETINGS

A series of public meetings were held throughout the nine-county MRGDC 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. Edwards County and the City of Rocksprings released information regarding the public meetings in their area to increase public participation in the Plan Update development process, through posting on their website, on social media sources including Facebook, Instagram, and X (formerly known as Twitter), and/or posting the information on bulletin boards in public facilities. A sampling of these notices can be found in Appendix D, along with the documentation on the public meetings.

Public meetings were held on the following dates:

- May 21, 2024, at the Workforce Center in the City of Uvalde (Uvalde County)
- August 14, 2024, at the MRGDC Facility in the City of Carrizo Springs (Dimmit / Zavala County) *
- August 15, 2024, at the International Center for Trade in the City of Eagle Pass (Maverick County)
- September 25, 2024, at the Camp Wood Senior Center in the City of Camp Wood (Real / Edwards County) *
- September 26, 2024, at the Val Verde Library in the City of Del Rio (Val Verde County) *
- October 9, 2024, at the La Salle County Emergency Operations Center in the City of Cotulla (La Salle County) *

**Denotes virtual option available*

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 participating jurisdictions' websites. A total of 139 surveys were completed online by members of the public in all nine counties participating in the MRGDC Regional Hazard Mitigation Plan Updates and Developments. The survey results are analyzed in Appendix B. Edwards County

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and the City of Rocksprings reviewed the input from the surveys and decided which information to incorporate into the Plan as hazard mitigation actions. For example, results indicate that extreme heat and drought are the hazards of highest concern for the public. Strengthening critical facilities and constructing infrastructure to reduce hazard impact were the two main actions indicated that the local government should take to mitigate risk to these hazards. As a result, the Planning Team has included mitigation actions to equip critical facilities with back-up generators to provide auxiliary power and to install surge protectors on critical electronic equipment at all critical facilities.



SECTION 3

COUNTY PROFILE

SECTION 3: COUNTY PROFILE

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OVERVIEW

Edwards County is located in Southwest Texas and encompasses 2,120 square miles of the Edwards Plateau region. The elevation varies from 1,500 to 2,410 feet. The region that became Edwards County was home to Lipan Apache Indians. Spain established the mission of San Lorenzo de la Santa Cruz in 1762 but was otherwise unable to settle the area. European settlement in the region did not begin until the mid-1800s. In 1858, the county was formed from Bexar County; the first land was sold in 1876.

Edwards County was not officially organized until 1883. It was named for Hayden Edwards, one of the first American settlers of Nacogdoches. The county seat was originally Bullhead, which later changed its name to Vance. Rock Springs (now Rocksprings) became the county seat in 1891. In 1913, Real County was taken from the eastern section of Edwards County, thus decreasing Edwards County to its present size.

The early settlers of this region soon realized that the area was not suitable for farming, but that it did supply ample natural food for sheep and angora goats. Ranching began to dominate the economy as the demand for wool and mohair increased in the early twentieth century. The production of wool and mohair reached its apex in 1940, with 331,970 sheep and 376,322 angora goats being counted in the county, after which Rocksprings called itself the "Top-o-the-World" in mohair production. The number of animals declined to 43,293 sheep and 154,144 angora goats in 1987. Ranching continues to control the economy of the county, with most available land still used for raising sheep and goats. Less than 5 percent of the county is under cultivation.

Very little growth has taken place in the towns of this ranching county. Rocksprings, the largest population center, had 1,339 residents in 1990. Such transportation services as railroads have not entered the county. The closest railroad for transporting goods, the Southern Pacific, is twenty-five miles south of the county. The only reliable transportation came in the 1930s with the construction of the state and federal highway systems; State Highway 55 and U.S. 377 intersect in Rocksprings. The new roads enabled the county to expand the production of wool and mohair by giving ranchers greater access to markets. Oil was discovered in this region in 1946, and production increased from 1,066 barrels in 1958 to 8,254 barrels in 1978. Production had slowed to 4,371 barrels a year by 1990.

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The population of Edwards County increased from 266 in 1880 to 3,768 in 1910. The county saw a steady decline in population since that time, to 2,933 in 1940 and 2,033 in 1980. Between 1980 and 1990 the trend reversed toward moderate growth, with the 1990 population being 2,266.¹

Figure 3-1 shows the general location of Edwards County and the cities within the county.

Figure 3-1. Location of Edwards County

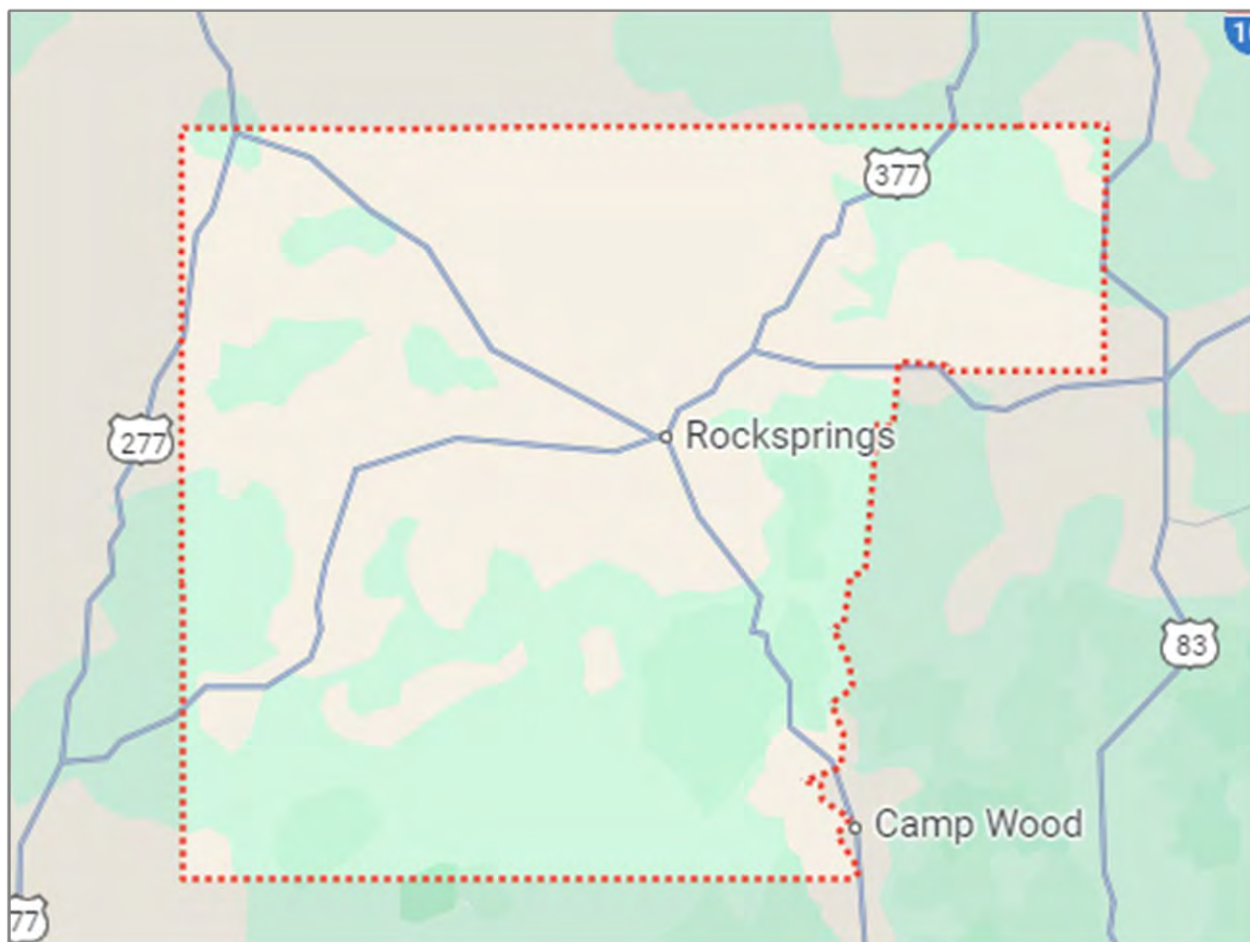


Figure 3-2 shows Edwards County and the City of Rocksprings that are covered in the risk assessment analysis of the Plan Update.

¹ Source: <https://www.tshaonline.org/handbook/entries/edwards-county>

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Figure 3-2. Edwards County Planning Area

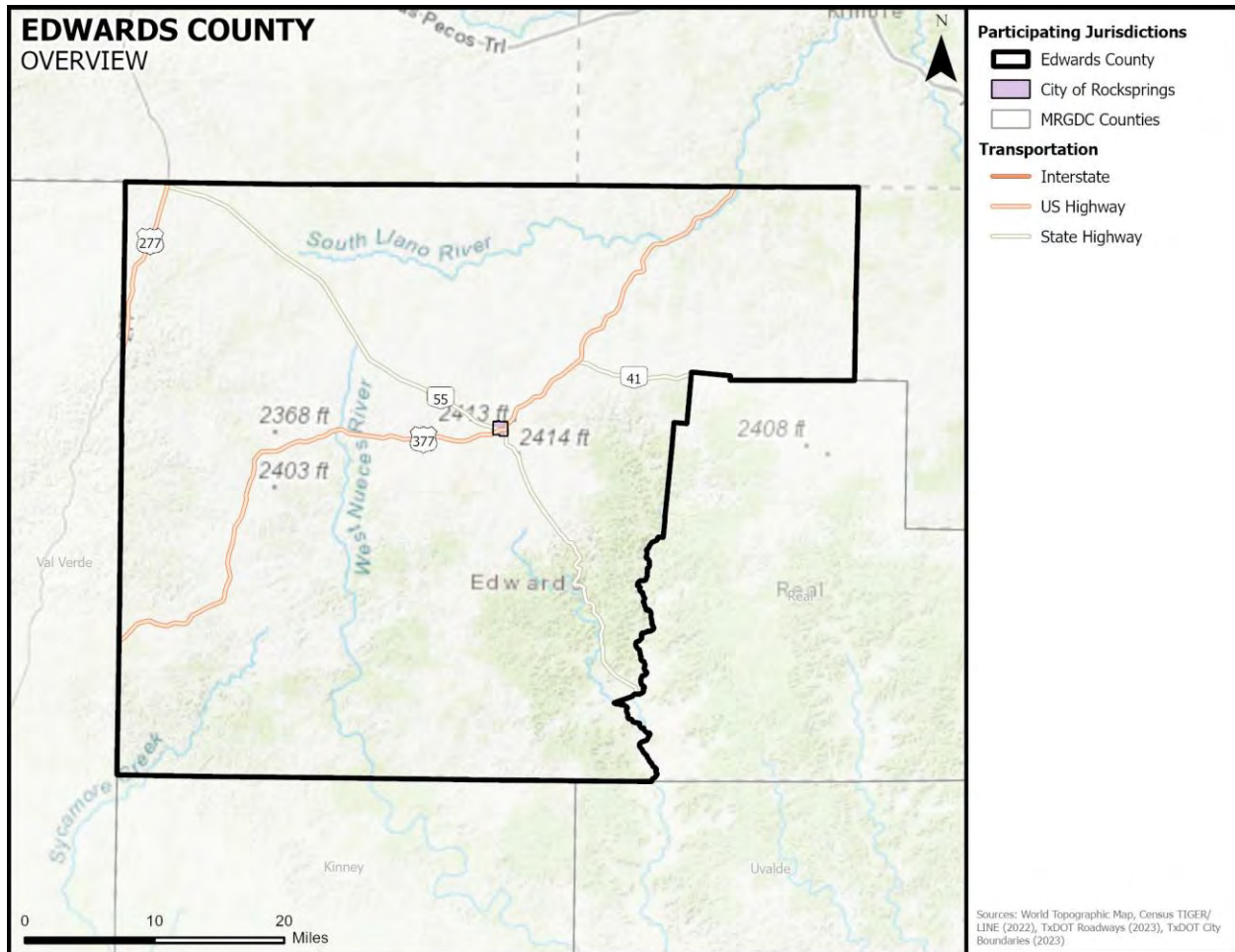


Table 3-1 below lists the jurisdictions in Edwards County that participated in the Edwards County Hazard Mitigation Action Plan Update 2025.

Table 3-1. Participating Jurisdictions

PARTICIPATING JURISDICTIONS	
Edwards County	
City of Rocksprings	

POPULATION AND DEMOGRAPHICS

According to the 2020 Census, Edwards County has an official population of 1,422 residents, a 29 percent decrease since the 2010 census. Table 3-2 shows the population distribution in Edwards County and the City of Rocksprings in 2010, 2020 (Census population county), and 2023 (2023 American Community Survey (ACS) five-year estimates). Note that in some cases, the

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2023 ACS estimates may differ from the 2020 census counts: the ACS estimates are used throughout this section for consistency.²

Table 3-2. Population Distribution by Jurisdiction

JURISDICTION	TOTAL 2010 POPULATION	TOTAL 2020 POPULATION (Census)	PERCENT CHANGE 2010- 2020	TOTAL 2023 POPULATION (ACS Estimates)	PERCENT CHANGE 2010- 2023
Edwards County ³	2,002	1,422	-29%	1,392	-30%
City of Rocksprings	1,182	874	-26%	721	-39%

Table 3-3 summarizes select characteristics of vulnerable or sensitive populations in Edwards County and the City of Rocksprings using data from the U.S. Census Bureau 2023 American Community Survey (ACS) five-year estimates.

Between official U.S. Census population counts, the estimate uses a formula based on new residential building permits and household size. It 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.

Table 3-3. Populations at Greatest Risk by Jurisdiction

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Edwards County ⁴	315	21	240	352	117
Town of Rocksprings	206	21	149	167	101

POPULATION GROWTH

The official 2020 Edwards County population is 1,422. Overall, Edwards County experienced a population decrease of 37 percent between 1990 and 2020, or a decrease of 844 residents. The City of Rocksprings also experienced a population decrease during this time. Between 2010 and 2020, both Edwards County (-29%) and the City of Rocksprings (-26%) experienced a population decline. Table 3-4 provides historical growth rates in Edwards County.

² Source: <https://demographics.texas.gov/Data/Decennial/2010/>, <https://www.census.gov/en.html> and <https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2023/>

³ County totals include the entire population within the county lines, including unincorporated areas and non-participating jurisdictions within the County.

⁴ County totals include the entire population within the county lines, including unincorporated areas and non-participating jurisdictions within the County.

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Table 3-4. Population Growth by Jurisdictions 1990-2020⁵

JURISDICTIONS	1990	2000	2010	2020	POP CHANGE 1990- 2020	PERCENT OF CHANGE	POP CHANGE 2010- 2020	PERCENT OF CHANGE
Edwards County ⁶	2,266	2,162	2,002	1,422	-844	-37%	-580	-29%
City of Rocksprings	1,339	1,285	1,182	874	-465	-35%	-308	-26%

ECONOMIC IMPACT

Building and maintaining infrastructure depends on the economy, and therefore, protecting infrastructure from risk due to natural hazards in the planning area is important to Edwards County and the City of Rocksprings. Whether it's expanding culverts under a road that washes out during flash flooding, shuttering a fire station, or flood-proofing a wastewater facility, infrastructure must be mitigated from natural hazards in order to continue providing essential utility and emergency response services in a fast-growing planning area.

Based on the American Community Survey 2023 estimates, 63.5 percent of the population 16 years and over (1,168) is employed in the labor force. The per capita income is \$25,240, and the median household income countywide is \$38,500. Families with incomes below the poverty level in 2023 made up 26.7 percent of all families. Of families that have children under 18 years old, 40.5 percent are below the poverty level.

Tables 3-5 and 3-6 show the various occupations and industries within Edwards County, according to the 2023 estimates by the American Community Survey.

Table 3-5. Occupations of Employed Population in Edwards County⁷

OCCUPATION	ESTIMATE	PERCENT
Civilian employed population 16 years and over	742	
Natural resources, construction, and maintenance occupations	235	31.7%
Service occupations	207	27.9%
Management, business, science, and arts occupations	171	23.0%
Production, transportation, and material moving occupations	106	14.3%
Sales and office occupations	23	3.1%

⁵ U.S. Census Bureau

⁶ County totals include the entire population within the county lines, including unincorporated areas and non-participating jurisdictions within the County.

⁷ 2023 American Community Survey 5-Year Estimates Data Profiles.

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Table 3-6. Industries of Employed Population in Edwards County⁸

INDUSTRY	ESTIMATE	PERCENT
Civilian employed population 16 years and over	742	
Agriculture, forestry, fishing and hunting, and mining	146	19.7%
Construction	121	16.3%
Educational services, and health care, and social assistance	121	16.3%
Information	90	12.1%
Manufacturing	78	10.5%
Arts, entertainment, and recreation, and accommodation and food services	60	8.1%
Professional, scientific, and management, and administrative and waste management services	55	7.4%
Retail trade	45	6.1%
Transportation and warehousing, and utilities	26	3.5%
Finance and insurance, and real estate and rental and leasing	0	0.0%
Other services, except public administration	0	0.0%
Public administration	0	0.0%
Wholesale trade	0	0.0%

NATURAL, CULTURAL, AND HISTORIC RESOURCES

Edwards County encompasses 2,120 square miles of the Edwards Plateau region, of which 2,118 square miles are land and 2 square miles are water. The elevation varies from 1,500 to 2,410 feet. The average annual rainfall is twenty-two inches. The temperature ranges from 34° F to 62° in January and 71°F to 97°F in July; the growing season lasts 250 days, beginning in mid-March and ending in late November. The eastern section of the county has generally rolling terrain, with many hills and caves. The western region is typically flat. The county is situated upon a major limestone deposit surfaced with dark, calcareous stony clays and clay loams that principally support oak, juniper, mesquite, and cedar trees, as well as prairie grasses. Edwards County has more than fifteen natural springs that flow year-round; the headwaters of the Llano, Nueces, and West Nueces rivers are in the county. The vegetation, temperature, and abundant water supply make this an ideal area for many types of game animals, including white-tail deer, javelina, turkey, and quail. The area is rich in iron ore and sulfur and has some silver deposits, though these have not been mined or developed.

⁸ 2023 American Community Survey 5-Year Estimates Data Profiles.

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Kickapoo Cavern State Park opened to the public in 1991. The park boasts caves, birds, bats, and trails. Visitors can take advantage of hiking, biking, camping, birdwatching, and enjoy evening bat flights. In 1992 Devil's Sinkhole State Natural Area opened to the public, it is home to the largest single-chambered cavern and third deepest in the state. It is a bat habitat and is home to several million Mexican free-tailed bats that emerge April through October.

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. A federally endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or most of its range. A threatened species is a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Both endangered and threatened species are protected by federal law, and any future hazard mitigation projects are subject to these laws. Candidate species are plants and animals that have been proposed as endangered or threatened but are not currently listed.

According to the U.S. Fish and Wildlife Service, as of January 2025, there are eighteen federally endangered, threatened, or candidate species in Edwards County, listed in Table 3-7. Additionally, one species is listed as being resolved (Black-capped vireo).

Table 3-7. Endangered Species in Edwards County⁹

TYPE of SPECIES	COMMON NAME	SCIENTIFIC NAME	SPECIES STATUS
Clams	Balcones Spike	<i>Fusconaia iheringi</i>	Endangered
Clams	False Spike	<i>Fusconais mitchelli</i>	Endangered
Clams	Texas Hornshell	<i>Popenaias popeii</i>	Endangered
Clams	Texas Fatmucket	<i>Lampsilis bracteata</i>	Endangered
Clams	Texas Pimpleback	<i>Cyclonaias petrina</i>	Endangered
Crustaceans	Peck's Cave Amphipod	<i>Stygobromus</i> (= <i>Stygonectes pecki</i>)	Endangered
Birds	Golden-Cheeked Warbler	<i>Setophaga chrysoparia</i>	Endangered
Birds	Southwestern Willow Flycatcher	<i>Empidonax traillii</i> <i>extimus</i>	Endangered
Flowering Plants	Texas Snowbells	<i>Styrax platanifolius</i> ssp. <i>Texanus</i>	Endangered
Flowering Plants	Texas Wild-Rice	<i>Zizania texana</i>	Endangered

⁹ Source: <https://ecos.fws.gov/ecp/report/species-listings-by-current-range-county?fips=48137>

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TYPE of SPECIES	COMMON NAME	SCIENTIFIC NAME	SPECIES STATUS
Insects	Comal Springs Riffle Beetle	Heterelmis comalensis	Endangered
Insects	Comal Springs Dryopid Beetle	Stygoparnus comalensis	Endangered
Clams	Mexican Fawnsfoot	Truncilla cognata	Proposed Endangered
Mammals	Tricolored Bat	Perimyotis subflavus	Proposed Endangered
Birds	Rufa Red Knot	Calidris canutus rufa	Threatened
Flowering Plants	Bracted Twistflower	Streptanthus bracteatus	Threatened
Flowering Plants	Tobusch Fishhook Cactus	Sclerocactus brevihamatus ssp. tobuschii	Threatened
Insects	Monarch Butterfly	Danaus plexippus	Proposed Threatened

Edwards County's designated historic buildings and sites preserve a rich history. The County has one building 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 3-8. Historic Properties on the National Register¹⁰

PROPERTY NAME	LOCATION	ADDRESS
Edwards County Courthouse and Jail	City of Rocksprings	Public Square – 100 West Main Street

EXISTING LAND USE AND DEVELOPMENT TRENDS

A zoning ordinance sets forth regulations and standards related to the extent of land and structure uses that are allowed in certain areas. A zoning map shows the location of zoning districts and standards within a community, gives an overall picture of the types of developments, and is used as a tool to inform continued growth efforts and initiatives. The City of Rocksprings has zoning ordinances in place.

A review of building permits can also give a picture of the built environment and the number of buildings being constructed in the county and each jurisdiction. Table 3-9 lists the number of residential buildings and total units authorized through a permit from each jurisdiction, where data was available, between 2019 and 2023. The data includes total buildings and total units permitted.

¹⁰ National Register of Historic Places

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Permits are reported annually in September, and the data includes information from 2019 through 2023 to demonstrate growth. In this period there were no residential permits that were applied for or issued. Housing type can also be an indication of an individual's ability to recover from a disaster.

Table 3-9. Building Permits, by Jurisdiction, 2019-2023¹¹

JURISDICTION	2019		2020		2021		2022		2023	
	Total Buildings	Total Units	Total Buildings	Total Units	Total Buildings	Total Units	Total Buildings	Total Units	Total Buildings	Total Units
City of Rocksprings*	-	-	-	-	-	-	-	-	-	-
Edwards County*	-	-	-	-	-	-	-	-	-	-
Planning Area Total*	-	-	-	-	-	-	-	-	-	-

*Data for jurisdiction was not included in the database.

Certain types of housing found in the Edwards County planning area are more vulnerable than typical site-built, newly constructed residential structures. This includes mobile or manufactured homes, of which 210 (23 percent of total housing stock) are 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 65 percent (584 structures) of housing stock in the planning area. Table 3-10 includes housing inventory data for the participating jurisdictions per the 2023 American Community Survey five-year estimates.

Table 3-10. Housing Inventory and Vulnerable Structures, By Jurisdiction¹²

JURISDICTION	TOTAL HOUSING UNITS	BUILT PRIOR TO 1980	MOBILE HOME
Edwards County ¹³	903	584	210
City of Rocksprings	366	312	38

CHANGES IN VULNERABILITY

The Edwards County planning area experienced an overall population decrease of 29 percent between 2010 and 2020. The American Community Survey estimates the 2023 total housing units for the planning area to be 903. The total building permits issued between 2019 and 2023 were not available in the database, there was no information for the County or City. The overall population decline and lack of available housing unit information would indicate no notable increase in vulnerability to all hazards in terms of populations and the built environment. Changes

¹¹ U.S. Census Bureau, Building Permit Survey, 1992-2023, <https://www.census.gov/construction/bps/>

¹² The Housing Inventory and Vulnerable Structures are based off the 2023 American Community Survey 5-Year Estimates Data Profiles.

¹³ County totals include all housing units within the county lines, including unincorporated areas and non-participating jurisdictions within the County.

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in vulnerability vary by jurisdiction based on each jurisdiction's trends in population and development (Table 3-11).

Table 3-11. Changes in Vulnerability, by Jurisdiction

JURISDICTION	POPULATION TREND	HOUSING TREND	OVERALL VULNERABILITY CHANGES
Edwards County	Decreasing	No Change	No Change
City of Rocksprings	Decreasing	No Change	No Change

Changes in vulnerability are applicable to all natural hazards. While flood and wildfire hazards feature geographical boundaries, decreases in population and building inventory have no notable increase in 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. While the actual numbers of new structures in the floodplain and Wildland Urban Interface (WUI) are not available, decreases in population and no movement in building inventory suggest that vulnerability has not increased and has likely remained the same, even within these specific geographic areas.

FUTURE GROWTH AND DEVELOPMENT

To better understand how future growth and development in Edwards 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. This section includes an analysis of the projected population change and economic impacts.

Population projections from 2010 to 2050 are listed in Table 3-12, provided by the Office of the State Demographer, Texas State Data Center, and the Institute for Demographic and Socioeconomic Research. Population projections are based on a 0.5 scenario growth rate, which is 50 percent of the population growth rate from 2000-2010. This information is only available at the county level; however, the population projection shows a decrease in population density for the county, which would mean overall decrease in growth for the county.

Table 3-12. Edwards County Population Projections¹⁴

LAND AREA (SQ MI)	2010		2020		2030		2040		2050	
	Population									
	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)
2117.87	2,002	0.95	1,422	0.67	1,136	0.54	909	0.43	728	0.34

¹⁴ Office of the State Demographer, Texas State Data Center, and the Institute for Demographic and Socioeconomic Research

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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 an environment for citizens and consider the general desire of the community to conserve, preserve, and protect the natural environment of their jurisdiction. These plans guide staff, decision-makers, and citizens in making decisions that affect the community with an understanding of the long-term effects.

Currently, none of the jurisdictions in the planning area have a comprehensive plan; however, Edwards County and the City of Rocksprings have an opportunity to improve and expand existing capabilities by developing a comprehensive plan based on information in the risk assessment and identified mitigation projects within the Hazard Mitigation Action Plan. Refer to the Capability Assessment in Appendix E for a complete list of the plans, ordinances, and other resources for all participating jurisdictions.



SECTION 4

RISK OVERVIEW

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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 19, which include hazard descriptions and vulnerability assessments.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, Edwards County and the City of Rocksprings identified 11 natural hazards and 4 human-caused hazards that are addressed in the Hazard Mitigation Plan Update 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 three main categories of natural hazards: atmospheric, hydrologic, and technological. 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).

Hydrologic hazards are events or incidents associated with water-related damage, accounting 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.

For the Risk Assessment, the earthquake and wildfire hazards are considered “other” since these hazards are not regarded as atmospheric, 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. The human-caused hazards identified as significant for the County include cyber-attack, hazardous materials, infectious disease, and terrorism.

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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	A thunderstorm occurs when an observer hears thunder. Radar observers use the intensity of the radar echo to distinguish between rain showers and thunderstorms. Lightning detection networks routinely track cloud-to-ground flashes and, therefore, thunderstorms.
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.
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.

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HAZARD	DESCRIPTION
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	
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.
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.
HUMAN-CAUSED	
Cyber Attack	A cyber-attack is any type of offensive maneuver employed by individuals or whole organizations that targets computer information systems, infrastructures, computer networks, and/or personal computer devices by various means of malicious acts, usually originating from an anonymous source that either steals, alters, or destroys a specified target by hacking into a susceptible system.
Hazardous Materials	Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. A hazardous material (HAZMAT) incident involves a substance outside normal safe containment in sufficient concentration to pose a threat to life, property, or the environment.
Infectious Disease	A clinically evident disease resulting from the presence of pathogenic microbial agents. These infecting agents may be transmitted through liquids, food, bodily fluids, contaminated objects, airborne inhalation, or through vector-borne dissemination.
Terrorism	Terrorism is the unlawful use of violence and intimidation, especially against civilians, in the pursuit of political aims. Terrorism can be classified as either domestic, which involves groups or individuals without foreign direction, or international terrorism, those whose actions are foreign-based and/or directed. Terrorist incidents can be of many types, including biological or chemical weapons, the use of firearms or

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HAZARD	DESCRIPTION
	explosives, cyber-attacks, or various other means that pose a threat to civilians, property, and the environment.

Hazards that were not considered significant or included in the Plan Update are located in Table 4-2, along with the evaluation process used for determining the significance of each hazard. 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.
Expansive Soils	There are no historical occurrences of expansive soils in the planning area, and it is in an area where occurrences are considered rare. There is no history of impact on critical structures, systems, populations, or other community assets or vital services due to expansive soils, and none is expected in the future.

DISASTER DECLARATION HISTORY

One method of understanding hazards that pose a risk to Edwards 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 Edwards County. Many of the disaster events were regional or statewide.

Between 1953 and 2024, Edwards County received 17 federal disaster declarations. Out of the 17 federally declared disasters, the largest share is related to fires (4), followed by declarations for severe storms (3), hurricanes (3), flood (2), biological (2), severe ice storms (2), and drought (1).

In addition to the 17 federally declared disasters, there have been 31 U.S. Department of Agriculture (USDA) Secretarial disaster designations between 2012 and 2024. 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.¹ Many of the 31 USDA designations for Edwards County listed multiple factors

¹ United States Department of Agriculture https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/FactSheets/emergency_disaster_designation_declaration_process-factsheet.pdf

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that caused the disaster area designation. The leading cause was drought, which was included in 29 designations. Other factors listed include excessive heat (9 designations), high wind (8), fire/wildfire (8), insects (8), flood (1), and excessive rain (1).

Table 4-3. Disaster Declaration History of Edwards County, 1953-2024

YEAR	DECLARATION TITLE	HAZARD	DECLARATION TYPE	DISASTER No.
1993	Extreme Fire Hazard	Drought	EM	EM-3113
1997	Severe Storms and Flooding	Flood	DR	DR-1179
1998	Tropical Storm Charley	Severe Storm	DR	DR-1239
1999	Extreme Fire Hazards	Fire	EM	EM-3142
2005	Hurricane Katrina Evacuation	Hurricane	EM	EM-3216
2005	Hurricane Rita	Hurricane	EM	EM-3261
2005	Hurricane Rita	Hurricane	DR	DR-1606
2006	Extreme Wildfire Threat	Fire	DR	DR-1624
2007	Severe Storms, Tornadoes, and Flooding	Severe Storm	DR	DR-1709
2008	Wildfires	Fire	EM	EM-3284
2011	Wildfires	Fire	DR	DR-4029
2015	Severe Storms, Tornadoes, Straight-Line Winds, and Flooding	Severe Storm	DR	DR-4223
2019	Severe Storms and Flooding	Flood	DR	DR-4416
2020	Covid-19	Biological	EM	EM-3458
2020	Covid-19 Pandemic	Biological	DR	DR-4485
2021	Severe Winter Storm	Severe Ice Storm	EM	EM-3554
2021	Severe Winter Storms	Severe Ice Storm	DR	DR-4586

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

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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.²

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^{3,4}

HAZARDS	EXPECTED TRENDS
Extreme Temperatures	<ul style="list-style-type: none">➤ 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.➤ Nearly double the number of 100°F days by 2036 compared to 2001-2020.➤ Higher frequency of 100°F days in urban areas.➤ The number of nighttime temperatures below 32°F is expected to decrease.➤ The number of frost days per year is expected to decrease.➤ The coolest days of the summer are expected to continue becoming warmer.➤ The number of heatwaves per year and number of days per year classified as heatwaves are expected to increase.
Precipitation	<ul style="list-style-type: none">➤ Precipitation has increased by 10 percent or more in eastern Texas, but little trend is present in western Texas.➤ Precipitation trends to 2036 are likely to be dominated by natural variability.➤ Extreme precipitation is expected to increase in intensity on average statewide by 6-10 percent compared to the 1950-1999 averages and 2-3 percent relative to the 2001-2020 averages.➤ This translates to an increase in the frequency of extreme rain of 30-50 percent relative to the climatological expected frequency in 1950-1999 and 10-15 percent relative to 2001-2020.➤ Annual precipitation is projected to increase while the number of extreme precipitation (>2") will remain relatively consistent.

² 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/>

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>

⁴ University of Texas at Austin, February 2023, *Austin Future Climate, Climate Change Predictions for the City of Austin 2022*, Technical Report.

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HAZARDS	EXPECTED TRENDS
Drought	<ul style="list-style-type: none"> ➤ Increasing temperatures, rainfall variability, and other factors will decrease water availability, but impact changes will vary strongly across applications. ➤ Impact trends to be highly sector-specific, with the impacts possibly smaller for agriculture than for surface water supply.
Flood	<ul style="list-style-type: none"> ➤ No long-term river flooding trend has been identified in the observations, nor is such a trend projected at this point, except perhaps for the most extreme floods and areas with normally high rainfall. ➤ Urban flooding is projected to increase, both as a simple matter of urban population increase and because of the projected increase of precipitation intensity, which drives flooding in fast-response drainages like those usually found in urban areas. ➤ 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	<ul style="list-style-type: none"> ➤ As the climate warms, the likelihood of winter weather decreases. ➤ Both extreme cold and snowfall either become less frequent or are expected to do so. ➤ Widespread snowfall events in Texas, such as the one that took place in February 2021, are extremely rare. ➤ Fewer cold spells are projected to occur per year, but the length of cold spells will be longer when they do occur.
Thunderstorms (Wind, Hail, Lightning)	<ul style="list-style-type: none"> ➤ Historical trend data is unreliable. ➤ Indirect evidence supports an increase in the number of days capable of producing severe thunderstorms and an increase in the frequency of very large hail in early springtime. Still, these possible trends are too uncertain to quantify.
Wildfire	<ul style="list-style-type: none"> ➤ Weather and climate drivers of wildfire risk are projected to increase the risk of wildfires throughout the state, primarily due to increased drying rates and fuel load.

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 retrieved from the National Centers for Environmental Information (NCEI) and the National Oceanic and Atmospheric Administration (NOAA) were reported for Edwards County and the City of Rocksprings. The remaining records identifying the occurrence of hazard events in the planning area and the maximum recorded magnitude of each event were also evaluated.

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Geographic information system (GIS) technology was used to identify and assess risks for Edwards County and evaluate community assets and their 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 the 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. The frequency of return statements is 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.
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 is the total of 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

SECTION 4: RISK OVERVIEW

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 the Edwards County region 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 Edwards County and the City of Rocksprings was reviewed based on recent development changes that occurred throughout the planning area. The population of Edwards County has decreased by 29 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 2024 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 and potential severity and the Planning Team's self-assessment for hazard ranking based on local knowledge of past hazard 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
NATURAL HAZARDS			
Drought	Highly Likely	Limited	High
Extreme Heat	Highly Likely	Limited	High
Flood	Highly Likely	Substantial	High
Hail	Highly Likely	Limited	High
Lightning	Highly Likely	Limited	High
Thunderstorm Wind	Highly Likely	Limited	High
Wildfire	Highly Likely	Limited	High
Tornado	Unlikely	Substantial	Moderate
Winter Storm	Highly Likely	Limited	Moderate
Earthquake	Unlikely	Limited	Low
Hurricane / Tropical Storm	Occasional	Limited	Low

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HAZARD	FREQUENCY OF OCCURRING	POTENTIAL SEVERITY	RANKING
HUMAN-CAUSED HAZARDS			
Cyber-Attack	Highly Likely	Major	Moderate
Hazardous Materials	Unlikely	Limited	Moderate
Infectious Disease	Unlikely	Substantial	Moderate
Terrorism	Unlikely	Substantial	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 Center 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 including winter weather (extreme cold and winter storm), drought, earthquake, 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 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 otherwise notable 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 or recorded 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 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.

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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 **DROUGHT**

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HAZARD DESCRIPTION

Drought is a period of time without substantial rainfall that persists from one year to the next. Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of anticipated natural precipitation reduction over an extended period of time, usually a season or more in length. Droughts can be classified as meteorological, hydrologic, agricultural, and socioeconomic. Table 5-1 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 lead to 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 5-1. Drought Classification Definitions¹

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

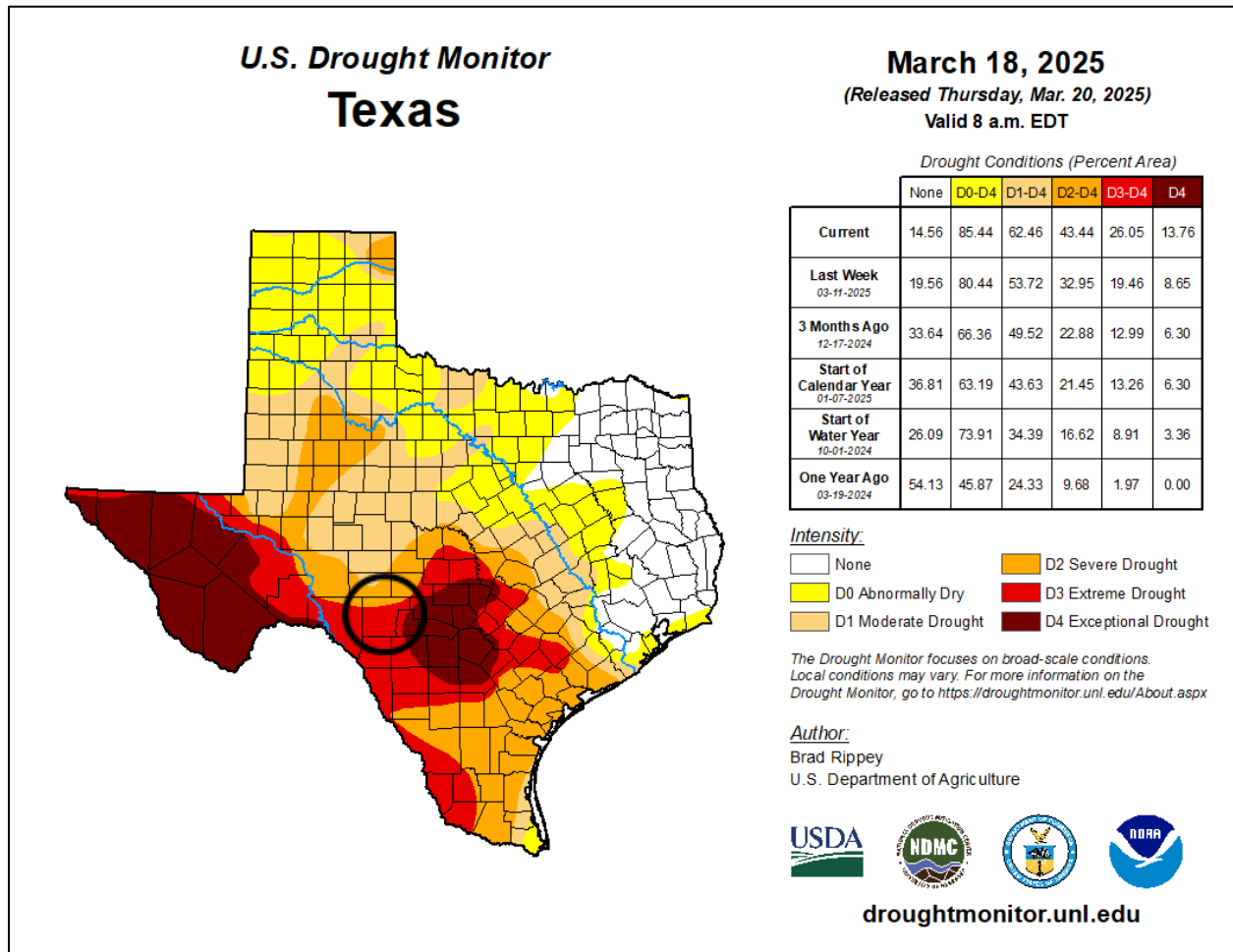
Droughts occur regularly throughout Texas and the Edwards County planning area and are considered a normal condition. However, they can vary greatly in their intensity and duration. The U.S. Drought Monitor, produced through a partnership between the National Drought Mitigation

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

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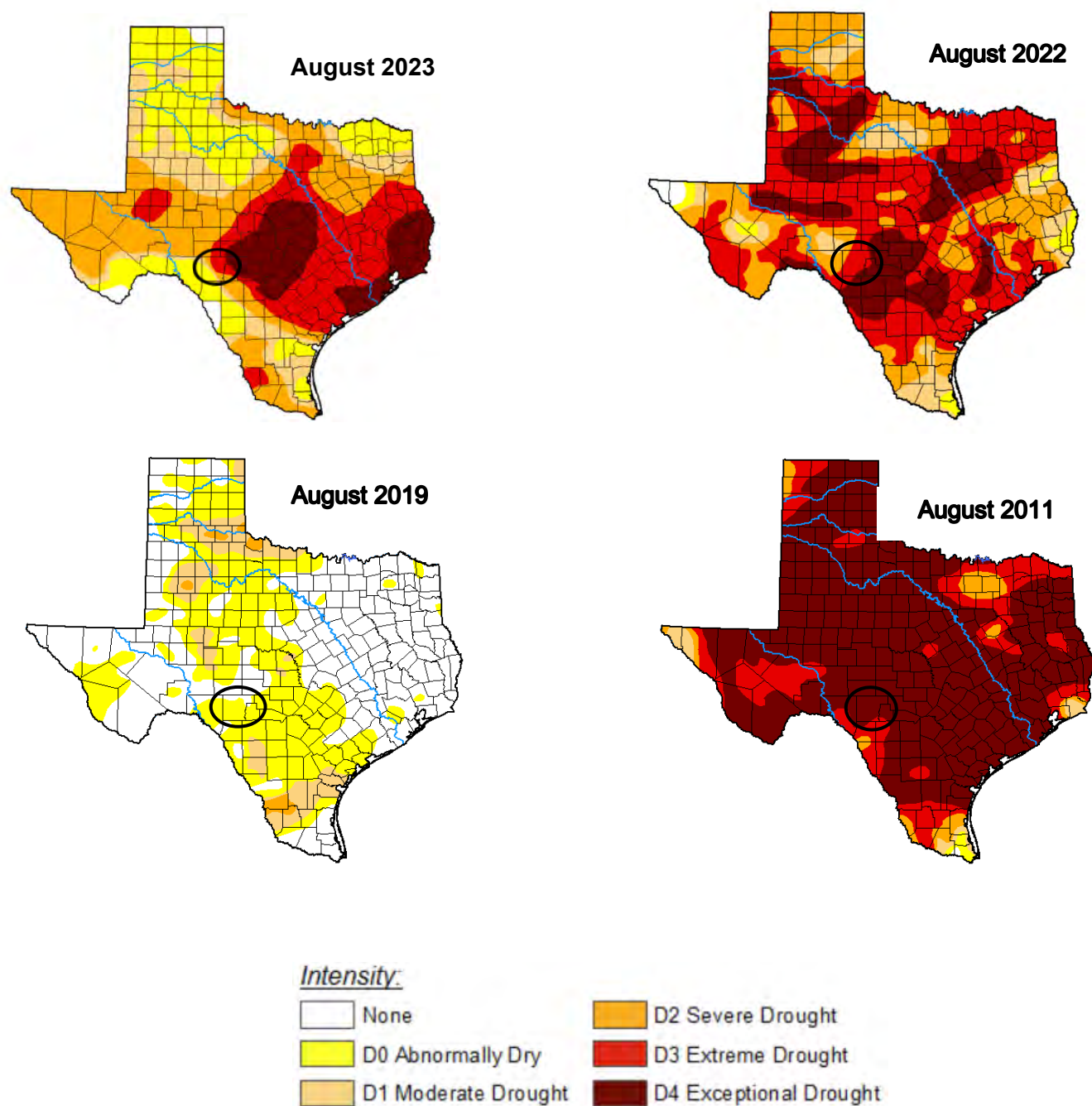
Center at the University of Nebraska-Lincoln, U.S. Department of Agriculture and the National Oceanic and Atmospheric Administration, shows the planning area is currently experiencing severe to extreme drought conditions (Figure 5-1) but has experienced a range of conditions from normal (none) to exceptional drought conditions in the past (Figure 5-2). There is no distinct geographic boundary to drought; therefore, it can occur anywhere throughout the Edwards County planning area.

Figure 5-1. U.S. Drought Monitor, March 2025



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Figure 5-2. U.S. Drought Monitor, August 2011, August 2019, August 2022, August 2023



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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 5-2 depicts magnitude of drought, while Table 5-3 describes the classification descriptions.

Table 5-2. 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 5-3. Palmer Drought Category Descriptions²

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

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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 Edwards 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. The entire planning area has experienced exceptional drought conditions. This is the highest level of drought severity and the most extreme drought conditions the planning area can anticipate in the future.

HISTORICAL OCCURRENCES

The Edwards County planning area may experience an extreme drought in any given year. According to the U.S. Drought Monitor, between January 2000 and June 2024, the Edwards County planning area spent 923 weeks (72%) in some level of drought as defined as Abnormally Dry (D0) or worse conditions. The longest drought during this period lasted for more than 4.5 years. Edwards County has received 29 USDA disaster designations for drought from 2012 through 2024.

Figure 5-3. Edwards County Drought Intensity, 2000-2024³

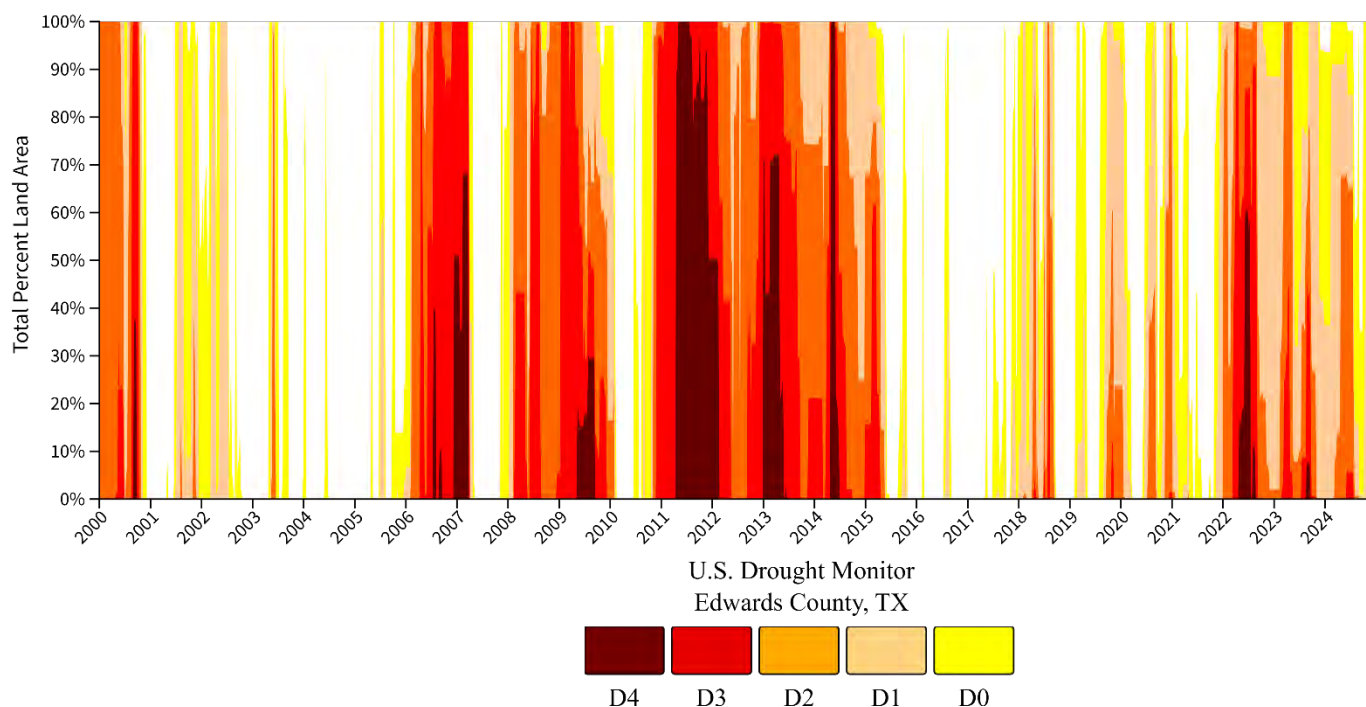


Table 5-4 lists historical events that have occurred in Edwards County as reported in the National Centers for Environmental Information Storm Events Database (NCEI). A total of 97 drought impacts were reported in the NCEI over 19 unique drought periods in Edwards County from

³ U.S. Drought Monitor

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January of 2000 through June of 2024. Historical drought impacts reported in the NCEI database for the Edwards County planning area over the 24.5-year reporting period have resulted in no reported property or crop damages.

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. Historical drought data for all participating jurisdictions are provided on a county-wide basis per the NCEI database. A summary of historical drought events is provided in Table 5-4.

Table 5-4. Historical Drought Events Summary, January 2000 – June 2024

JURISDICTION	DROUGHT IMPACTS	INJURIES	DEATHS	PROPERTY DAMAGE	CROP DAMAGE
Edwards County	97	0	0	\$0	\$0

Based on the historical drought events for the Edwards County planning area, 29 drought impacts were reported over 7 unique drought periods since the 2012 Plan.

SIGNIFICANT EVENTS

August 2010 – June 2015

One of the most severe droughts on record impacted the Edwards County planning area. The dry, parched conditions caused over \$7 billion in crop and livestock losses statewide, sparked wildfires, pushed power grids to the limit, and reduced reservoirs to dangerously low levels. The planning area was not spared from these drought conditions and remained at some level of drought for nearly five years.

According to the NCEI, by May of 2011, all of South Central Texas was in either extreme (D3) or exceptional (D4) drought conditions. Fire danger in South Central Texas remained high and burn bans were in effect for Edwards County. The Texas A&M agricultural program report indicated the agricultural situation was rapidly deteriorating. Forage availability remained below average. Many stock tanks remained extremely low, and some were in danger of drying up. Many communities across South Central Texas had some level of water restrictions in place.

These conditions continued for many months, and despite beneficial rains at some points, the county remained at some level of drought. By April of 2015, Edwards County received significant rainfall, up to 300 percent above normal amounts. Edwards County has been in Stage D2 or worse for all but two months (May 2012 and November 2014) until this point. This rainfall helped alleviate the drought conditions by June of 2015.

PROBABILITY OF FUTURE EVENTS

Based on available records of historic events, there have been 97 reported drought impacts in the NCEI over 19 unique drought periods (ranging from one month to nearly five years) within a 24.5-year reporting period, which provides a probability of approximately one event every year. This frequency supports a “Highly Likely” probability of future events for the Edwards County planning area.

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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 Edwards County will include increased temperatures, which according to the U.S. Climate Explorer, the planning area may experience a 5°F increase in average extreme heat temperatures. Historically, extreme temperatures averaged 98°F in Edwards County, but between 2035 and 2064 the average will be 103°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 24.5 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 or crop and livestock losses on agricultural lands and typically have minimal impact on buildings.

The Edwards 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 by participating jurisdiction, please see Appendix C.

Table 5-5. Critical Facilities Vulnerable to Drought Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS, Hospitals)	<ul style="list-style-type: none">➤ 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.

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.

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CRITICAL FACILITIES	POTENTIAL IMPACTS
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters, Governmental Facilities	<ul style="list-style-type: none">➤ Strain on staff as drought may cause health problems related to low water flows and poor water quality.➤ Operations dependent on water supply may be adversely impacted.
Commercial Suppliers (food, gas, etc.)	<ul style="list-style-type: none">➤ Operations dependent on water supply may be adversely impacted.➤ There may be reduced food availability due to widespread agricultural losses.
Utility Services and Infrastructure (electric, water, wastewater, communications)	<ul style="list-style-type: none">➤ Potential for increased number of emergency calls as drought events can lead to cascading hazard events such as wildfires and flash flooding.➤ 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. During summer drought, or hot and dry conditions, elderly persons, small children, infants, those with disabilities, or who do not have adequate cooling units in their homes may become more vulnerable to injury and/or death. 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 Edwards County planning area is estimated at 23 percent of the total population and children under the age of 5 are estimated at 2 percent. The population with a disability is estimated at 17 percent of the total population. An estimated 25 percent of the planning area population live below the poverty level and 8 percent of the populations speak English 'less than very well' (Table 5-6).

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Table 5-6. Populations at Greater Risk by Participating Jurisdiction

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Edwards County	315	21	240	352	117
City of Rocksprings	206	21	149	167	101

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 Edwards 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.

Edwards County has a prominent agricultural sector and features 456 farms over 1,011,179 acres of land including cotton, fruits, poultry and eggs, pigs, sheep, and horses. Edwards County's annual market value of agricultural products sold is over \$11,392,000.⁵ Crop production can also suffer greatly during extreme drought conditions, limiting fresh local food supplies, driving up costs, and negatively impacting the local economy. Drought conditions could adversely affect the agricultural industry throughout the Edwards County planning area.

Impacts of past droughts experienced in the Edwards County planning area have not resulted in injuries, fatalities, property, or crop damages supporting a "Limited" severity of impact meaning injuries and illnesses are treatable with first aid, the shutdown of critical facilities and services for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

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 by individuals at Federal, State, and local agencies, as well as the general public. Table 5-7 lists the drought impacts to Edwards County from January 2005 to June 2024 based on reports received by the Drought Impact Reporter.

Table 5-7. Drought Impacts, 2005-2024

DROUGHT IMPACTS	
Agriculture	87

⁵ Census of Agriculture. Edwards County, Texas County Profile. 2022.

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DROUGHT IMPACTS	
Business & Industry	0
Energy	0
Fire	18
Plants & Wildlife	65
Relief, Response & Restrictions	29
Society & Public Health	8
Tourism & Recreation	2
Water Supply & Quality	35

Drought has the potential to impact people in the Edwards 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. 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:

- 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 and City 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.

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- 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 18 federally endangered, threatened or candidate species in Edwards 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 and city 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 6 **EARTHQUAKE**

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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 6-1 describes definition of examples.

Table 6-1. Definitions of Earthquake Hazards¹

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.

¹ Source: USGS, 2012

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HAZARD	DESCRIPTION
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.
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 6-1 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 6-3). 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 Edwards County planning area, as identified in Figure 6-1, is located in a low hazard area, with a less than five percent chance of experiencing a strong earthquake every 100 years.

² 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>

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Figure 6-1. U.S. Map of Peak Ground Acceleration³

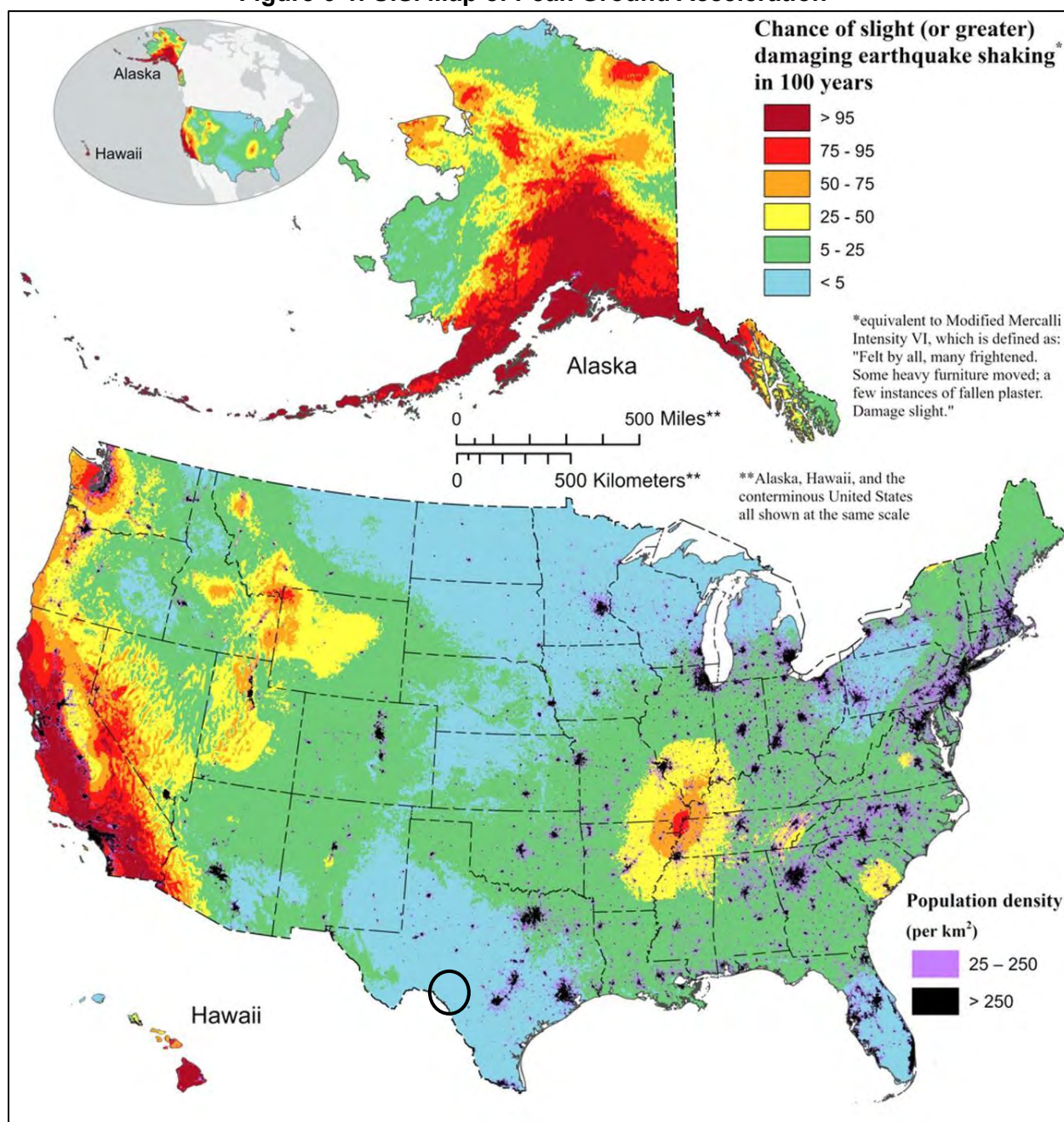
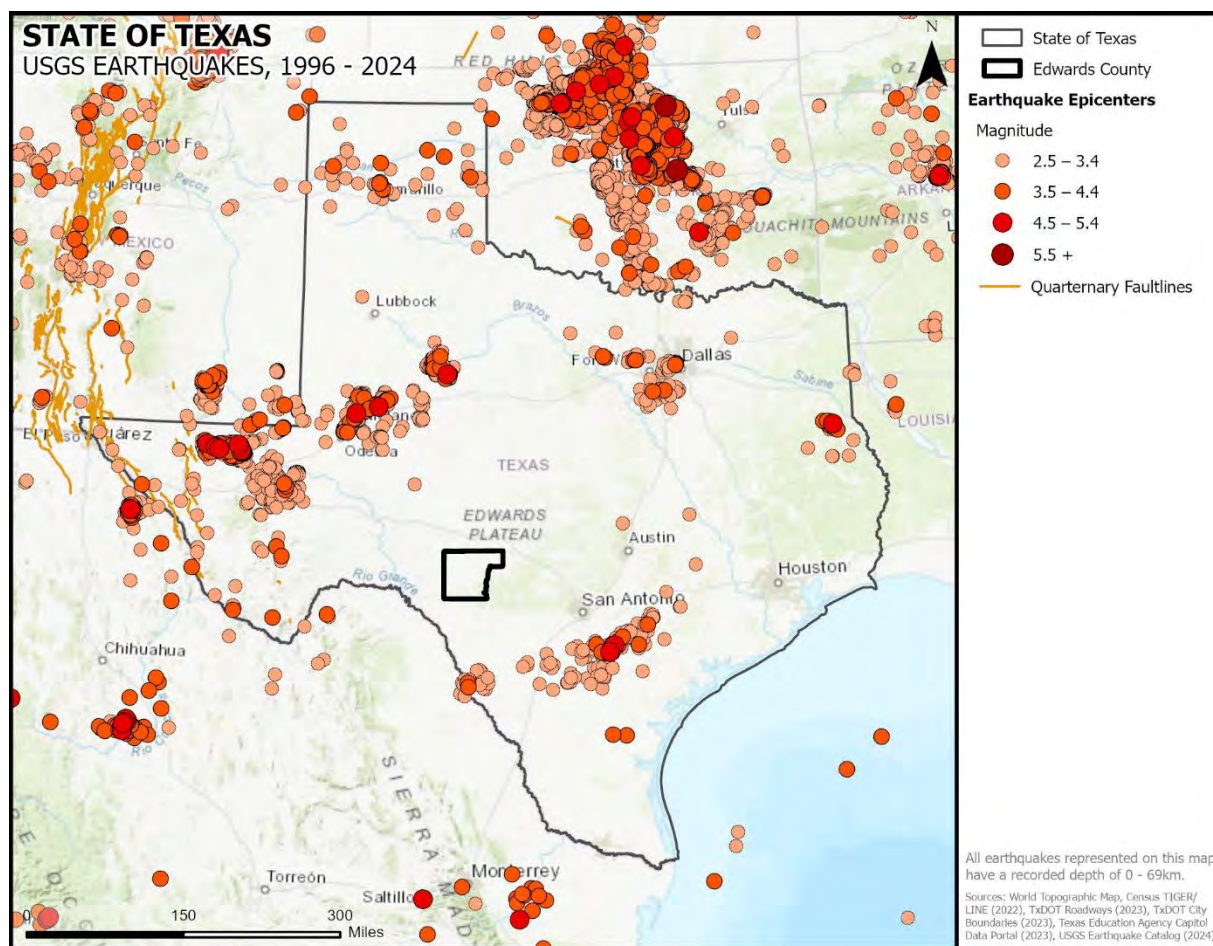


Figure 6-2 maps historic earthquake epicenters across Texas between 1996 and 2024.

³ The Edwards County planning area is indicated by the black circle.

SECTION 6: EARTHQUAKE

Figure 6-2. Historic Earthquake Epicenters in Texas, 1996-2024⁴



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 as “Richter” magnitude. Table 6-2 shows the magnitude levels for the current Richter / Moment Magnitude scale.

⁴ Edwards County is indicated by the black polygon.

⁵ (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.>

SECTION 6: EARTHQUAKE

Table 6-2. Richter / Moment Magnitude Scale⁶

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 6-3 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 (n.d.). Earthquakes. Britannica. <https://www.britannica.com/science/earthquake-geology>

⁷ 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.

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Table 6-3. Magnitude and Modified Mercalli Intensity (MMI) Scale⁸

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

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Taking into consideration the possible extent of an earthquake for the area, by reviewing Tables 6-2 and 6-3 in conjunction with no significant previous occurrences, as depicted in Figure 6-2, the Edwards County planning area experiences on average less than 3.0 magnitude or Levels II-III (weak impact) 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 Edwards 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 between January 1996 and June 2024, there were no earthquakes reported directly within the planning area or within a 50-mile radius. During that same period, 42 earthquakes were reported within a 100-mile radius of the planning area. Of those, the maximum magnitude recorded was a 3.5 magnitude earthquake, considered a Level II-III (weak) on the MMI scale. None of these earthquakes within 100 miles of Edwards County are known to have caused damages.

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. All recorded earthquakes near the Edwards County planning area have originated at depths categorized as shallow (1-70 km) or very shallow (<1 km).

While it is possible for the planning area to feel stronger earthquakes that occur inside county boundaries, or within the 100-mile area around the planning area, at this time, there are no known damages associated with these events for the Edwards County planning area. Table 6-4 summarize historical earthquake events that have occurred near the Edwards County planning area.

SECTION 6: EARTHQUAKE

Figure 6-3. Historic Earthquake Events in or Near Edwards County, 1996 – 2024

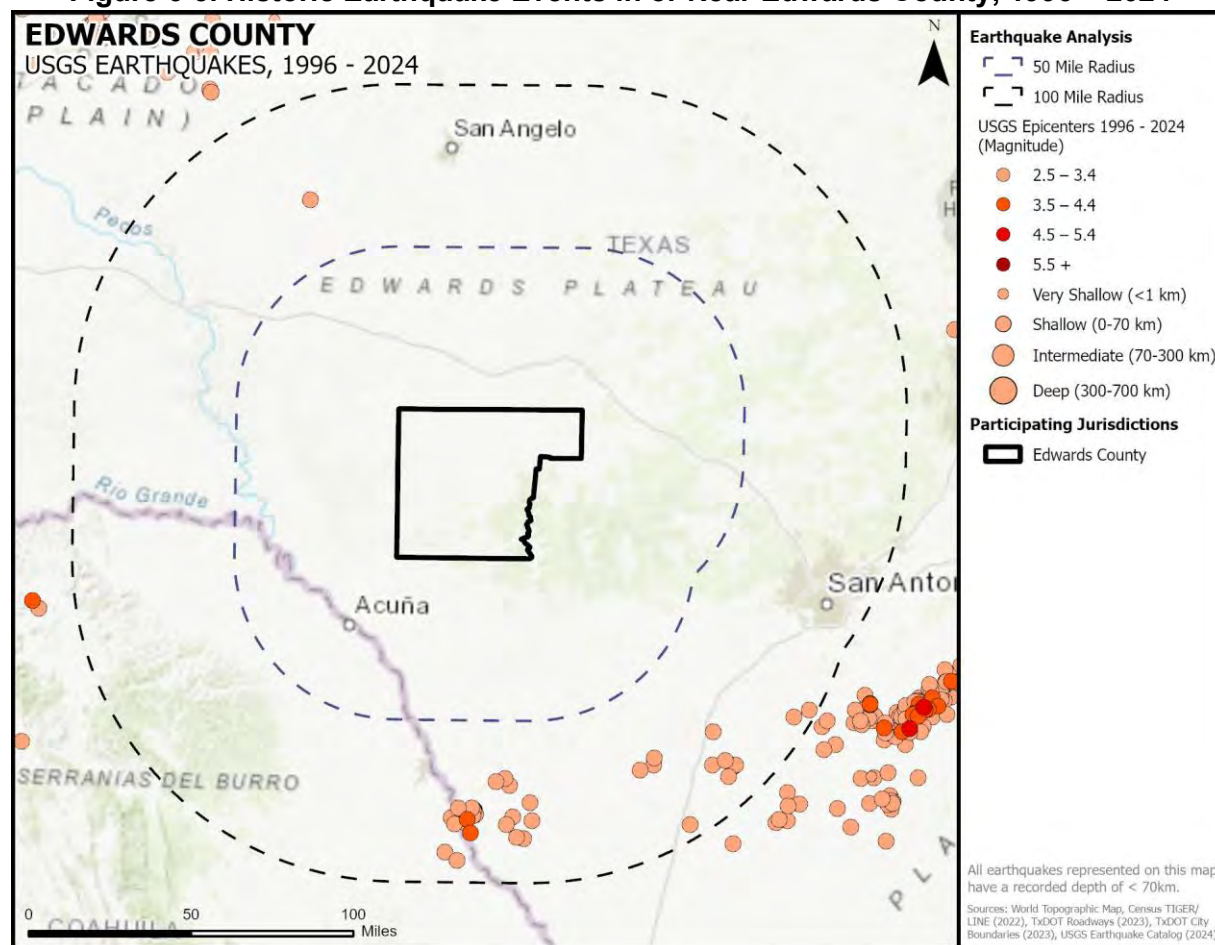


Table 6-4. Historical Earthquake Event Summary, 1996 –2024⁹

JURISDICTION	NUMBER OF EVENTS	MAXIMUM EXTENT	DEPTH RANGE (km)	INJURIES & FATALITIES	PROPERTY & CROP DAMAGE
Edwards County	0	-	-	-	-
50-Mile Radius	0	-	-	-	-
100-Mile Radius	42	3.5	0.5 – 12.1	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 Edwards County planning area has less than a five percent chance of a slightly damaging (or greater) earthquake within 100 years. Based on historical records, the probability of an earthquake affecting the planning area is “Unlikely,” meaning that an event is probable in the next 10 years.

⁹ Source: USGS

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CLIMATE CHANGE CONSIDERATIONS

Damaging earthquakes are rare within the State of Texas, including the Edwards 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 Edwards County planning area is located outside of any known earthquake hazard areas and is not located on or near any active fault lines. 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 Edwards County planning area.

The Edwards 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 by participating jurisdiction, please see Appendix C.

Table 6-5. Critical Facilities Vulnerable to an Earthquake

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	<ul style="list-style-type: none">➤ 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.➤ Extended power outages may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

¹⁰ (n.d.). *Natural Hazards*. United States Geological Survey. <https://www.usgs.gov/faqs/there-earthquake-weather>

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CRITICAL FACILITIES	POTENTIAL IMPACTS
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	<ul style="list-style-type: none"> ➤ 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.)	<ul style="list-style-type: none"> ➤ 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)	<ul style="list-style-type: none"> ➤ 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 or a breakdown of potential dollar losses of critical facilities and infrastructure from earthquakes are available. The potential severity of impact from an earthquake for the entire Edwards County planning area is classified as “Limited”, meaning injuries and illnesses are treatable with first aid, less than 10 percent of infrastructure would be damaged, and critical facilities being shut down for less than 24 hours.



SECTION 7

EXTREME HEAT

SECTION 7: EXTREME HEAT

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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 Edwards 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

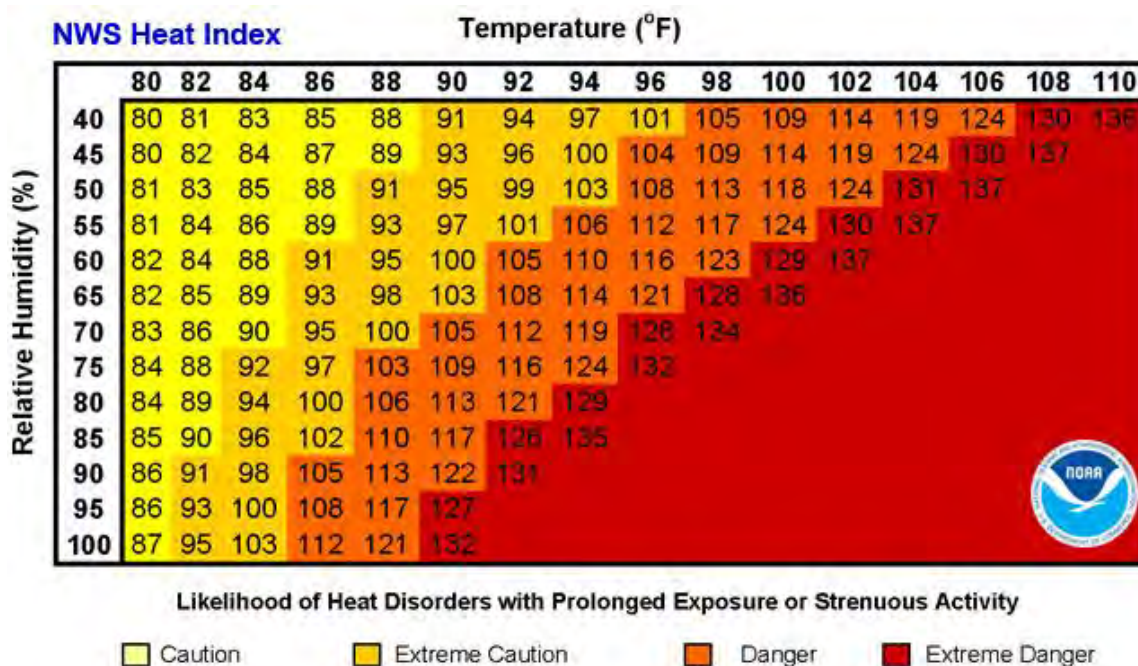
Extreme heat events can occur anywhere throughout the Edwards County planning area, as there is no specific geographic scope for the extreme heat hazard.

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 7-1. This index measures how hot it feels outside when humidity is combined with high temperatures.

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Figure 7-1. Extent Scale for Extreme Heat¹



The index in Figure 7-1 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. “Caution” is the first category of intensity, and it indicates when fatigue due to heat exposure is possible. “Extreme Caution” indicates that sunstroke, muscle cramps, or heat exhaustion are possible, and a “Danger” level means that these symptoms are likely. “Extreme Danger” indicates that heat stroke is likely. The National Weather Service (NWS) initiates alerts based on the Heat Index as shown in Table 7-1.

Table 7-1. 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

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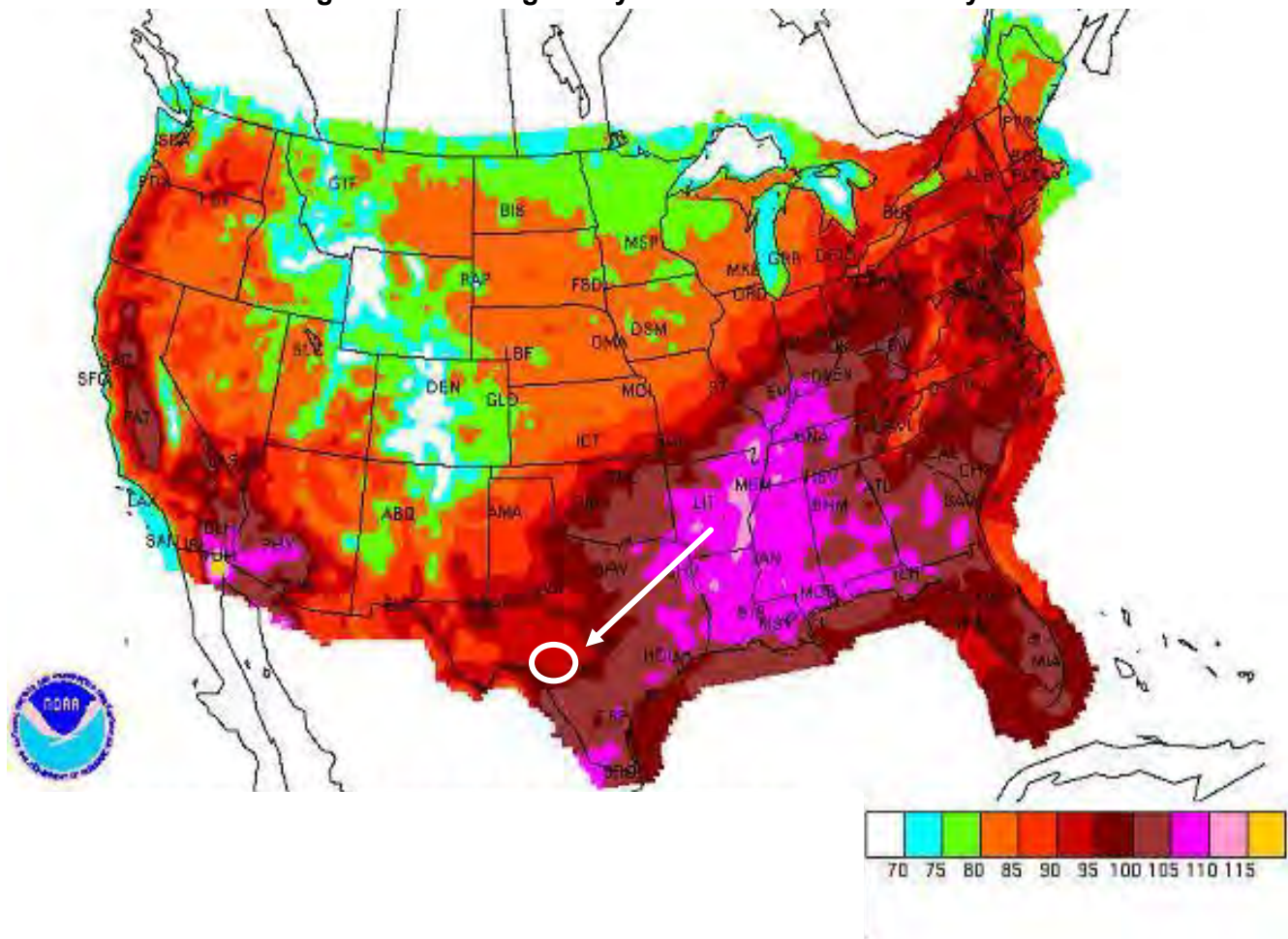
CATEGORY	HEAT INDEX	POSSIBLE HEAT DISORDERS	WARNING TYPE
Extreme Caution	90 – 103°F	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.	A Heat Advisory will be issued to warn that the Heat Index may exceed 105°F.
Caution	80 – 90°F	Fatigue is possible with prolonged exposure and/or physical activity.	A Heat Advisory will be issued to warn that the Heat Index may exceed 105°F.

Due to its geography and its warm, sunny, and humid subtropical climate, the Edwards 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 7-2 displays the daily maximum heat index as derived from NOAA based on data compiled from 1838 to 2015. The white circle shows the Edwards 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, Edwards County could experience dangerous heat from 90°F to 95°F and should mitigate to the extent of “Extreme Caution”, which can include sunstroke, muscle cramps, and heat exhaustion. This is the average maximum temperature the planning area can anticipate based on historical events.

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Figure 7-2. Average Daily Maximum Heat Index Days²



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 derived from the NCEI database, which identifies extreme heat events at the county level for each event. According to heat related incidents located within Edwards County, there have been three extreme heat events on record for the planning area (Table 7-2). Historical extreme heat information, as provided by the NCEI, shows extreme heat 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.

² NRDC and the white circle indicates the Edwards County planning area.

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Historical data for all participating jurisdictions are provided on a county-wide basis per the NCEI database from January of 1996 through June of 2024. No damages, injuries, or fatalities were reported to the NCEI for the Edwards County planning area.

Only extreme heat events that have been reported have been factored into this Risk Assessment. It is highly likely additional extreme heat occurrences have gone unreported before and during the recording period. Due to the limited number of reported events, average high temperatures have been analyzed in order to determine the probability of future events.

Table 7-2. Historical Extreme Heat Events, January of 1996 – June 2024³

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Edwards County	7/23/2018	0	0	\$0	\$0
Edwards County	6/15/2023	0	0	\$0	\$0
Edwards County	8/6/2023	0	0	\$0	\$0
TOTALS		0	0	\$0	\$0

Table 7-3. Historical Extreme Heat Events Summary, January 1996 – June 2024

JURISDICTION	NUMBER OF EVENTS	DEATH	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Edwards County	3	0	0	\$0	\$0

Based on the list of historical extreme heat events for the Edwards County planning area, three events were reported to the NCEI since the 2012 Plan.

SIGNIFICANT EVENTS

June 15, 2023

A strong high pressure system settled over South Central Texas, and temperatures and heat indices soared. The heat wave started on June 14, 2023, in Atascosa County where the heat index reached 113°F. The excessive heat expanded until it reached its peak on the 21st when all counties reached excessive heat criteria. A number of record highs were set during this period. Del Rio set new record highs every day from the 18th until the 28th including a new all-time record high of 115°F on the 21st. Peak heat index values included 122°F degrees at Pleasanton on the 21st, 125°F at New Braunfels on the 21st, and 120°F at San Marcos on the 21st.

August 6, 2023

Excessive heat was observed nearly every day in August of 2023 across parts of South Central Texas. The heat wave started on the 1st in Blanco, Caldwell, De Witt, Lavaca, Llano, Gonzales, Guadalupe, and Travis Counties when temperatures reached 107°F. The heat spread to the rest of the area by the 4th and continued through the end of the month. Temperatures reached as high as 112°F. All of the NOAA climate sites set or tied numerous daily record high temperatures and

³ NOAA, NCEI Storm Events Database

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record high low temperatures. Del Rio set a new monthly record high of 111°F on the 10th in addition to 16 other daily records. San Antonio had 14 daily record highs.

PROBABILITY OF FUTURE EVENTS

According to historical records, the Edwards County planning area has experienced three events in a 28.5-year reporting period. Historical records in combination with an analysis of maximum average temperatures provides a probability of at least one event every year. This frequency supports a “Highly Likely” probability of future events.

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.⁴

In addition, it is projected that future changes to Edwards County will include increased temperatures, which according to the U.S. Climate Explorer, the planning area may experience a 5°F increase in the average extreme heat temperatures. Historically, extreme temperatures averaged 98°F in Edwards County, but between 2035 and 2064 the average will be 103°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 entirety of the Edwards 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 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. The population below the poverty level are less

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>

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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 Edwards County planning area is estimated at 23 percent of the total population and children under the age of 5 are estimated at 2 percent. The population with a disability is estimated at 17 percent of the total population. An estimated 25 percent of the planning area population live below the poverty level and 8 percent of the populations speak English 'less than very well' (Table 7-4).

Table 7-4. Populations at Greater Risk by Participating Jurisdiction

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Edwards County	315	21	240	352	117
City of Rocksprings	206	21	149	167	101

Extremely high temperatures can have significant secondary impacts, leading to droughts, water shortages, increased fire danger, and prompt excessive demands for energy. The possibility of rolling blackouts increases with unseasonably high temperatures in what is a normally mild month with low power demands. 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. It is possible that critical facilities and infrastructure could be shut down for 24 hours if cooling units are running constantly, leading to a temporary power outage (Table 7-5). Less than ten percent of residential and commercial property could be damaged if extreme heat events lead to structure fires. Based on historical records, annualized property and crop losses for the Edwards County planning area are negligible. The impact is considered "Limited" meaning injuries and illnesses are treatable with first aid, the shutdown of critical facilities and services for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

The Edwards 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 heat events in the Edwards County planning area. For a comprehensive list by participating jurisdiction, please see Appendix C.

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Table 7-5. Critical Facilities Vulnerable to Extreme Heat Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS, Hospitals)	<ul style="list-style-type: none"> ➤ 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. ➤ Extended power outages due to increased usage may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters, Governmental Facilities	<ul style="list-style-type: none"> ➤ 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.)	<ul style="list-style-type: none"> ➤ 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)	<ul style="list-style-type: none"> ➤ 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:

- Vulnerable populations, particularly the elderly (23 percent of total population), children under 5 (2 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

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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 8 **FLOOD**

SECTION 8: FLOOD

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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 Edwards 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 Edwards 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.

The current effective Flood Insurance Rate Map or FIRM (map ID 481217, panels 25-550, dated February 19, 1982) data provided by FEMA for Edwards County shows the following flood hazard areas:

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- 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.

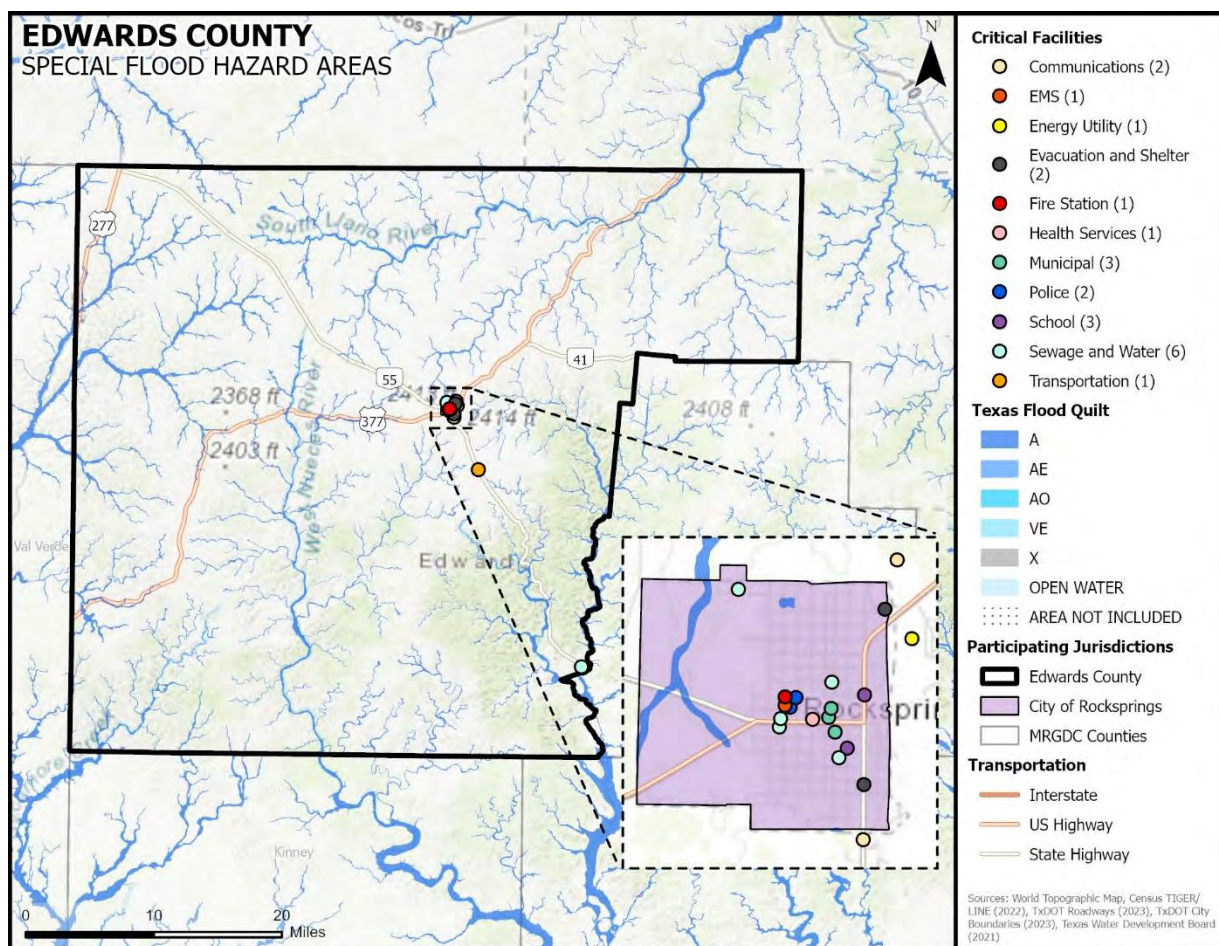
The Texas Water Development Board (TWDB) created a “floodplain quilt” to serve as a starting point for flood risk analysis in areas where digital flood mapping is limited or nonexistent. The floodplain quilt is a compilation of available flood risk data in the state. The quilt prioritizes layer types and shows the highest ranked data as the top layer 1. The available flood quilt data in Edwards County is comprised of approximate base level engineering (BLE) data and digitized flood hazard information from previously published FIRMs. These floodplain boundaries portray approximate A zones for the planning area where data is available. Locations of flood zones in Edwards County based on the TWDB Floodplain Quilt are illustrated in Figures 8-1 and 8-2.

Known localized flood risk areas are identified below. These descriptions were derived from NCEI event narrative from historical events as well as planning team members. General areas subject to flooding include:

- Areas along the Nueces River (eastern Edwards County)
- Highway 55, particularly between Rocksprings and Barksdale
- Highway 377, particularly between Carta Valley and Rocksprings
- State Highway 41
- State Highway 337
- Highway 55, particularly north of Barksdale
- Highway 674
- Farm to Market (FM) Road 337
- FM 674, south of Rocksprings
- FM 2523, near Carta Valley
- FM 335
- Ranch Road 335, along the Nueces River north of Barksdale
- FM 674, between Rocksprings and Kickapoo Cavern State Park
- Low water crossing on Dry Creek Road near Barksdale
- Ben Williams Crossing on the Nueces River
- Areas along Hackberry Road
- Areas along County Road 520

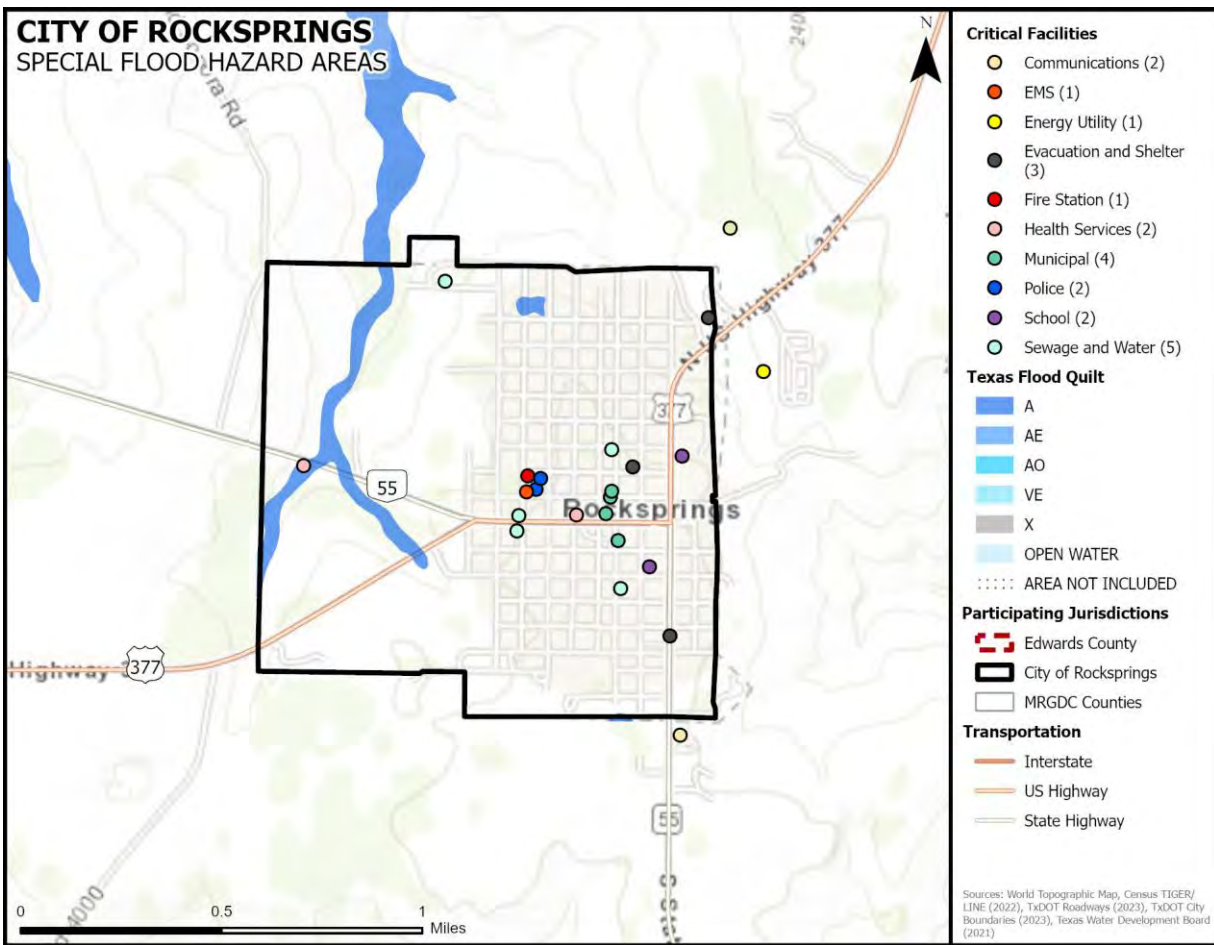
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Figure 8-1. Estimated Flood Zones in Edwards County



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Figure 8-2. Estimated Flood Zones in the City of Rocksprings



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 flood waters. 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 flood water. Flood zones are the categories that are mapped on FIRMs. Table 8-1 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 8-1 and 8-2 should be read in conjunction with the extent for flooding in Tables 8-1 and 8-2 to determine the intensity of a potential flood event.

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Table 8-1. 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.
MODERATE to LOW	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.
	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.

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Structures built in the SFHA are subject to damage by rising waters and floating debris. Moving flood water 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 flood water. Table 8-2 describes the stream gauge data provided by the United States Geological Survey (USGS). Peak flood data at the locations available in the planning area indicate a peak flood depth range of 0 to 15 feet above average peak flows.

Table 8-2. Extent for Edwards County¹

JURISDICTION ²	PEAK FLOOD EVENT
Edwards County	The Nueces River near Barksdale in Edwards County, Texas reached an overflow elevation of 32 feet in October of 2018. The average peak flow for the Rio Grande is 17 feet at this site. This indicates a maximum flood depth of 15 feet above the average peak flow at this site.

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 3 inches of rain within a 2-hour period, resulting in flash flooding.

The data described in Tables 8-1 and 8-2, together with Figures 8-1 and 8-2, and historical occurrences for the area, provides an estimated potential magnitude and severity for the Edwards 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. It is likely that additional flood occurrences have gone unreported before and during the recording period. Table 8-3 identifies historical flood events that resulted in damages, injuries, or fatalities within the Edwards County planning area. Table 8-4 provides the historical flood event summary by jurisdiction. Historical data is provided by the Storm Prediction Center (NOAA), National Centers for Environmental Information (NCEI) database for Edwards County. There have been 91 recorded flood events in Edwards County.

¹ Severity estimated by averaging floods at certain stage level over the history of flood events. Severity and peak events are based on USGS data.

² Severity is provided where peak data was available for streams, creeks and rivers throughout the planning area.

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Table 8-3. Historical Flood Events, January 1996 – June 2024³

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Edwards County	10/28/1996	0	0	\$4,000	\$0
Edwards County	10/28/1996	1	0	\$6,000	\$0
Edwards County	6/6/1997	0	0	\$9,800	\$0
Edwards County	6/15/1997	0	0	\$9,800	\$0
Edwards County	6/16/1997	0	0	\$29,400	\$0
Edwards County	6/21/1997	0	10	\$195,700	\$97,900
Edwards County	3/15/1998	0	0	\$5,800	\$0
Edwards County	8/23/1998	0	0	\$191,900	\$19,200
Edwards County	8/23/1998	0	0	\$96,000	\$9,600
Edwards County	9/16/1998	0	0	\$9,600	\$0
Edwards County	4/25/1999	0	0	\$18,900	\$0
Edwards County	5/10/1999	0	0	\$18,900	\$0
Edwards County	6/21/1999	0	0	\$5,700	\$0
Edwards County	5/1/2000	0	0	\$9,200	\$0
Edwards County	6/18/2000	0	0	\$36,400	\$0
Edwards County	10/23/2000	0	0	\$45,100	\$0
Edwards County	11/3/2000	0	0	\$9,100	\$0
Edwards County	5/4/2001	0	0	\$17,700	\$0
Edwards County	11/14/2001	0	0	\$35,400	\$0
Edwards County	11/15/2001	1	5	\$141,400	\$0
Edwards County	10/8/2002	0	0	\$51,900	\$0
Edwards County	10/24/2002	0	0	\$51,900	\$0
Edwards County	6/15/2003	0	0	\$8,600	\$0
Edwards County	10/11/2003	0	0	\$135,600	\$0

³ Table only includes historical flood events that resulted in damages, injuries, or fatalities between January of 1996 and June of 2024 in the NCEI database. Values are in 2024 dollars.

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JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Edwards County	3/14/2004	0	0	\$8,400	\$0
Edwards County	6/10/2007	0	0	\$15,100	\$0
City of Rocksprings	8/17/2007	0	0	\$30,200	\$0
Total Losses		2	15	\$1,197,500	\$126,700

Table 8-4. Summary of Historical Flood Events, January 1996 – June 2024

JURISDICTION	NUMBER OF EVENTS	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Edwards County	62	2	15	\$1,167,300	\$126,700
City of Rocksprings	29	0	0	\$30,200	\$0
Total Losses	91	2	15	\$1,324,200	

Based on the list of historical flood events for the Edwards County planning area, 13 events have occurred since the 2012 Plan.

SIGNIFICANT EVENTS

Flash Flood on October 28, 1996 – Edwards County

Severe flash flooding developed due to heavy rainfall in Edwards County. The heaviest rain amounts were reported in the eastern half of the county. The areas west of Barksdale and the near the City of Rocksprings reported 11 inches of rain from the evening of the 27th through the morning of the 28th. An individual drowned near Barksdale where the Nueces River crosses Highway 55 near the Edwards and Real County line. Witnesses indicated that the individual drove around a barrier in an attempt to cross the river and their truck was swept away into the flooded waters. Four other people were rescued by helicopters as their vehicles were swept away in flooded draws.

Flash Flood on June 21, 1997 – Edwards County

Heavy rain saturated soils in South Central Texas and conditions worsened as a storm caused more rainfall over the western Texas Hill Country. This led to widespread flooding and flash flooding, impacting many counties across the region. Rainfall totals ranged from 4 to 6 inches, with some areas receiving over 15 inches.

The headwaters of the Nueces River above Camp Wood received very heavy rainfall. Numerous homes were flooded and rescues were required in areas impacted along the river. The Red Cross and FEMA estimated the number of homes and businesses damaged or destroyed in this flood across South Central Texas, according to NCEI records. Homes and businesses damaged or destroyed accounted for approximately 200 structures in Guadalupe County, 150 structures in each of Bandera and Bexar Counties, 100 structures in each of Medina and Kendall Counties, and 50 structures in each of neighboring Real, Uvalde and Comal Counties. An estimated 10 injuries and \$293,600 (2024 dollars) in property and crop damages were reported in the Edwards County planning area for this event.

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Flash Flood on November 15, 2001 – Edwards County

On the evening of November 14, 2001, rainfall began to accumulate over the Edwards Plateau and western Hill Country. By the morning of the 15th, rainfall redeveloped, adding an additional 3 to 4 inches across Edwards County. This brought total rainfall amounts up to 12 inches in the area southeast of the City of Rocksprings, with up to 18 inches reported near Barksdale in the southeastern part of the county along the Real County line. One fatality was reported due to this incident when an individual was swept off a low water crossing on SH55 into Hackberry Creek. Five other injuries were reported during this event and several water rescues were needed. This event resulted in \$141,400 (2024 dollars) in property damages.

PROBABILITY OF FUTURE EVENTS

Based on 91 recorded historical occurrences within a 28.5-year reporting period within the Edwards 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.⁴

According to the Climate Risk and Resilience Portal (ClimRR), the historical annual total precipitation for Edwards County is 25.77 inches and the current ClimRR climate change projections estimate the annual minimum precipitation at mid-century to be 26.37 inches, which represents an increase from current averages. End of century projections are higher with a new annual minimum precipitation at 29.28 inches. An increase in precipitation and precipitation events could increase flood risk, however, projections are subject to change over time.

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. Edwards County promotes development outside of the floodplain. In terms of structure and infrastructure damages and service disruptions, the potential severity of impacts 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. However, due to reported injuries and fatalities, the impact of flooding in Edwards County is considered “Substantial” with multiple deaths possible, depending on the size and extent of the event.

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.

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Table 8-5 includes the comprehensive critical facilities identified in Appendix C 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 by participating jurisdiction, please see Appendix C.

Table 8-5. Critical Facilities in the Floodplain by Participating Jurisdiction

CRITICAL FACILITY TYPES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
Emergency Response Departments (EOC, Fire, Police, EMS), Hospitals	City of Rocksprings: 1 Healthcare Facility	<ul style="list-style-type: none"> ➤ Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. ➤ Emergency vehicles can be damaged by rising flood waters. ➤ 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. ➤ Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters, Governmental Facilities	N/A	<ul style="list-style-type: none"> ➤ Structures can be damaged by rising flood waters. ➤ 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. ➤ 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

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CRITICAL FACILITY TYPES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
		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.)	N/A	➤ 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)	N/A	➤ 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 flood waters. ➤ 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. ➤ Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

Historic loss estimates due to flood are presented in Table 8-6 below. Considering 91 flood events over a 28.5-year period, frequency is approximately three events every year.

Table 8-6. Average Annualized Losses by Jurisdiction, January 1996 – June 2024

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Edwards County	\$1,294,000	\$45,400
City of Rocksprings	\$30,200	\$1,100
TOTALS	\$1,324,200	\$46,500

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,

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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 Edwards County planning area is estimated at 23 percent of the total population and children under the age of 5 are estimated at 2 percent. The population with a disability is estimated at 17 percent of the total population. An estimated 25 percent of the planning area population live below the poverty level and 8 percent of the populations speak English ‘less than very well’.

Table 8-7. Populations at Greater Risk by Jurisdiction⁵

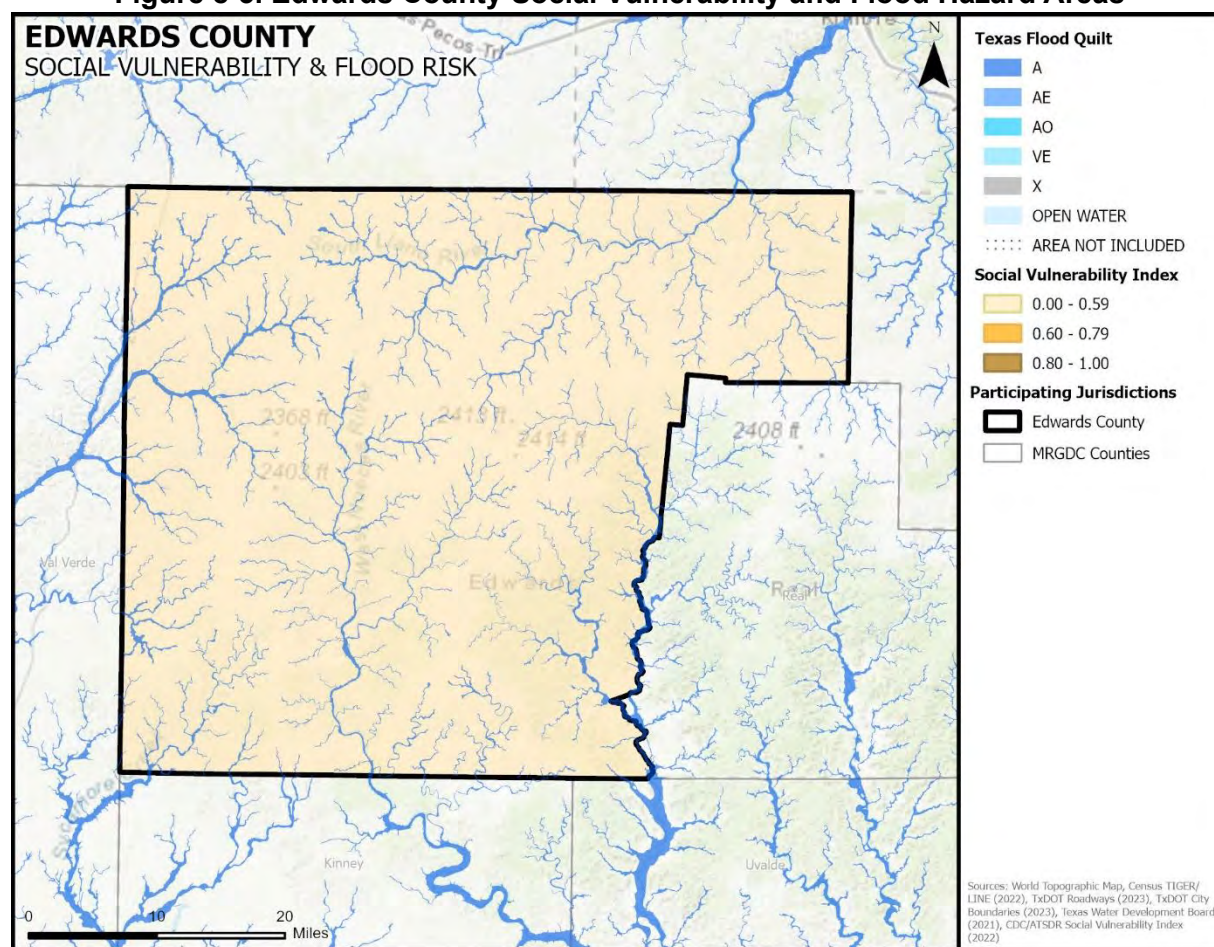
JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Edwards County	315	21	240	352	117
City of Rocksprings	206	21	149	167	101

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 8-3 identifies areas of social vulnerability using the CDC’s SVI and where these areas overlap with the Edwards County flood hazard areas.

⁵ U.S. Census Bureau Five-Year estimates

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Figure 8-3. Edwards 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 Edwards 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 flood waters have receded due to contaminated flood waters (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.

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- 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.
- City or 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 a 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.

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- 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 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. The City of Rocksprings participates in the NFIP and is in good standing. Edwards County is not currently participating in the NFIP. The County does not currently have the capacity to administer the program. The County will reevaluate their capacity to administer the program during the next plan update.

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, neither Edwards County nor the City of Rocksprings participate in the CRS. Edwards County and the City of Rocksprings may evaluate their capacity for CRS participation in the next planning cycle.

The City of Rocksprings currently has in place minimum NFIP standards for new construction and substantial improvements of structures. The city is considering adopting additional higher regulatory NFIP standards to limit floodplain development.

The flood hazard areas throughout Edwards 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 expanding drainage culverts and storm water structures to convey flood water more adequately.

It is the purpose of the City of Rocksprings to continue to promote public health, safety, and general welfare by minimizing public and private losses due to flood conditions in specific areas. As a NFIP participating jurisdiction, the city is guided by their local Flood Damage Prevention Ordinance. The community will continue to comply with NFIP requirements through their local permitting, inspection, and record-keeping requirements for new and substantially developed

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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, the City of Rocksprings seek 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

As a NFIP participating jurisdiction, the City of Rocksprings developed mitigation actions that relate to either NFIP maintenance or compliance. Compliance and maintenance actions can be found in Section 22.

Flooding was identified as a significant risk hazard during hazard ranking activities at the Risk Assessment Workshop by the planning team. As such, many of the mitigation actions were developed with flood mitigation in mind. Many of these flood actions address compliance with the NFIP and implementing flood awareness programs. The city recognizes the need and are working towards adopting higher NFIP regulatory standards to further minimize flood risk in their community. In addition, the city focuses on public flood awareness activities. This includes promoting the availability of flood insurance by placing NFIP brochures and flyers in public libraries or public meeting places in the jurisdiction.

The NFIP participating jurisdiction in this planning process has a designated floodplain administrator. The floodplain administrator in the planning area will continue to maintain compliance with the NFIP, including continued floodplain administration, zoning ordinances, and

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development regulations. The floodplain ordinance adopted by the city outlines the minimum requirements for development in Special Flood Hazard Areas.

The city 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 8-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 8-year period and must be greater than 10 days apart.⁶ Edwards County and the City of Rocksprings have no repetitive loss or severe repetitive loss properties.

⁶ Source: Texas Water Development Board.



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HAIL

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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 Edwards 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.rmiiia.org/downloads/PUBLIC%202018%20-%202020%20Hail%20foreCAST-%20TJM.pdf>

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risk to the hazard of hail. Refer to Figure 9-1 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 9-1.

Table 9-1. Hail Intensity and Magnitude²

SIZE CODE	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 9-1 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 Edwards County planning area may experience hailstorms ranging from an H0 (pea size) to an H10 (tennis ball size). The largest size hail to be reported since 1962 was 4.5 inches in diameter, or an H10, which is considered a super hailstorm that can cause extensive structural damage and potentially fatal injuries. An event of this

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

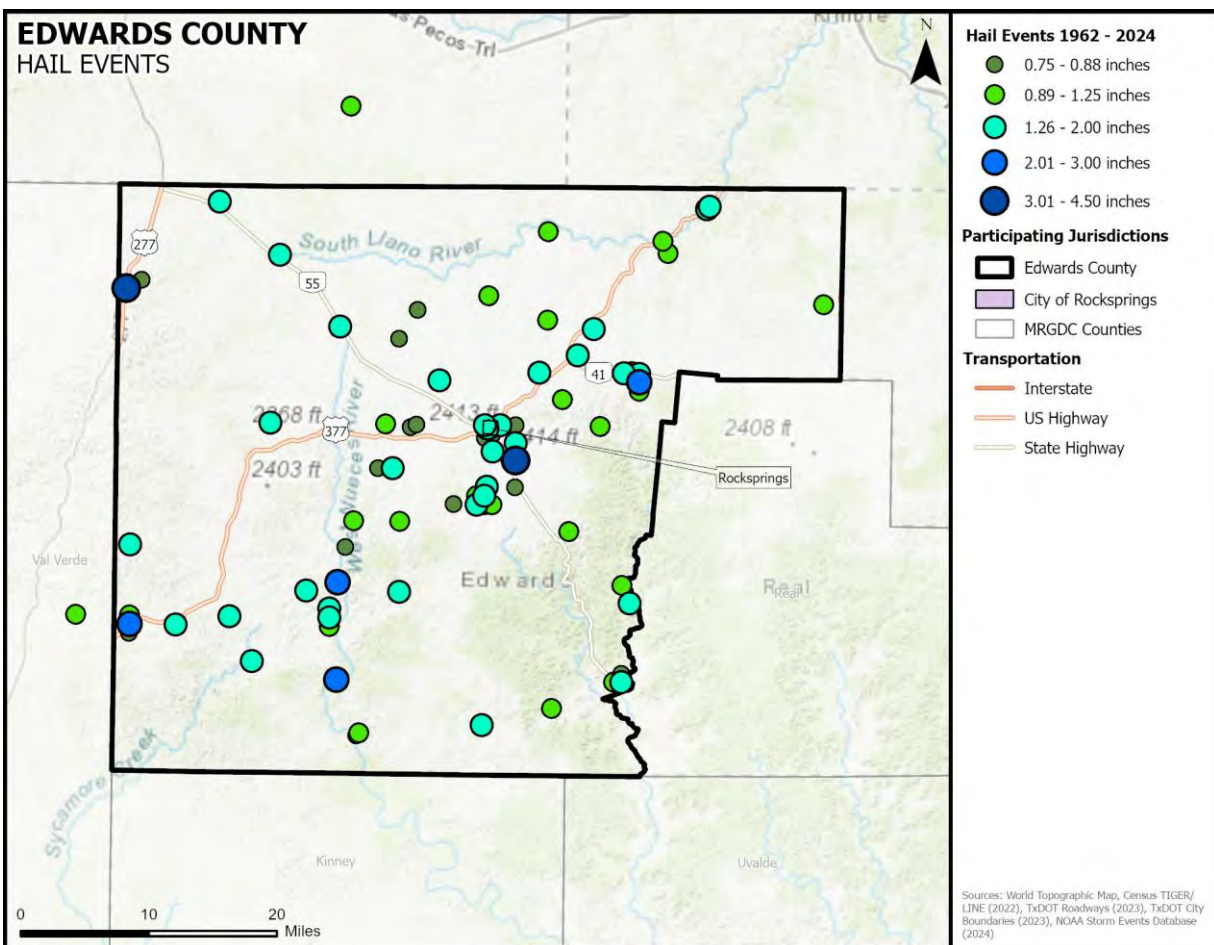
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magnitude occurred on May 28, 1962. This is likely the greatest extent the planning area can anticipate in the future, based on historical events.

HISTORICAL OCCURRENCES

Historical evidence shown in Figure 9-1 demonstrates that the planning area is vulnerable to hail events overall. Historical events with reported damages, injuries, or fatalities are shown in Table 9-2. A total of 110 reported historical hail events impacted the Edwards County planning area between January 1962 and June 2024; these events were reported to NCEI and NOAA databases and may not represent all hail events to have occurred during the past 62.5 years. Only those events for the Edwards County planning area with latitude and longitude available were plotted (Figure 9-1).

Figure 9-1. Spatial Historical Hail Events, January 1962 – June 2024



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Table 9-2. Damaging Historical Hail Events, January 1962 – June 2024³

JURISDICTION	DATE	MAGNITUDE (inches)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Rocksprings	6/23/1994	2.75	0	0	\$0	\$1,100
City of Rocksprings	11/4/1994	1	0	0	\$10,500	\$6,300
City of Rocksprings	4/30/2010	1.5	0	0	\$14,400	\$0
Edwards County	5/28/2017	2.75	0	0	\$6,500	\$0
Edwards County	5/28/2017	3	0	0	\$6,500	\$0
TOTALS		(Max Extent)	0	0	\$37,900	\$7,400

Table 9-3. Historical Hail Events Summary, January 1962 – June 2024

JURISDICTION	NUMBER of EVENTS	MAX MAGNITUDE (inches)	INJURIES	DEATHS	PROPERTY DAMAGE	CROP DAMAGE
Edwards County	55	4.5	0	0	\$13,000	\$0
City of Rocksprings	55	2.75	0	0	\$24,900	\$7,400
TOTAL LOSSES	110	(Max Extent)	0	0	\$45,300	

Based on the list of historical hail events for the Edwards County planning area (listed above), 45 of the events have occurred since the 2012 Plan according to reports in the NCEI database.

SIGNIFICANT EVENTS

November 4, 1994 – City of Rocksprings

A hailstorm in the late evening brought 1-inch hail to the City of Rocksprings, damaging both crops and property. A total of \$16,800 (in 2024 dollars) was reported by the sheriff's department in the City of Rocksprings.

April 30, 2010 – City of Rocksprings

A cold front moved through South Central Texas and caused severe thunderstorms, which brought 1.5-inch hail to the City of Rocksprings. This hail broke windows in numerous buildings in the City of Rocksprings, including homes, office buildings, and the county courthouse. Total damages were estimated at \$14,400 (2024 dollars).

May 28, 2017 – Edwards County

Thunderstorms developed along a cold front, some of which produced severe hail and damaging wind gusts. The hail fell over large portions of the planning area, with 2.75-inch hail reported in Carta Valley on the western edge of the county and 3.0-inch hail reported northeast of the City of Rocksprings along Highway 41. This very large hail was estimated to cause \$13,000 (2024 dollars) in property damages.

³ Only recorded events with damages are listed. No reports of injuries or fatalities were recorded in the NCEI database. Monetary damages have been inflated to their 2024 value.

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PROBABILITY OF FUTURE EVENTS

Based on available records of historic events, 110 events in a 62.5-year reporting period for Edwards County provides an average annual occurrence of approximately one to two events per year. This frequency supports a “Highly Likely” probability of future events for the Edwards County 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

Much of the damage inflicted by hail is to crops. 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 Edwards County planning area features mobile or manufactured home parks throughout the planning area. These parks are typically more vulnerable to hail events than typical site-built structures. In addition, manufactured homes are located sporadically throughout the planning area. The U.S. Census data indicates a total of 210 (23 percent of total housing stock) manufactured homes located in the Edwards County planning area. In addition, 65 percent (584 structures) of the housing structures in the Edwards 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 9-4. Structures at Greater Risk by Participating Jurisdiction

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Edwards County	584	210
City of Rocksprings	312	38

⁴ Yale Climate Connections, Hailstorms and Climate Change, March 17, 2022.

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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 long-term stay away from home, and to rebuild or repair their homes. An estimated 25 percent of the planning area population live below the poverty level (Table 9-5). 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 9-5. Populations at Greater Risk by Jurisdiction⁵

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Edwards County	315	21	240	352	117
City of Rocksprings	206	21	149	167	101

The Edwards County Planning Team identified the following critical facilities (Table 9-6) 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 by participating jurisdiction, please see Appendix C.

Table 9-6. Critical Facilities Vulnerable to Hail

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	<ul style="list-style-type: none"> ➤ 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. ➤ Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/	<ul style="list-style-type: none"> ➤ 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.

⁵ US Census Bureau 2023 data for Edwards County

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CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
Assisted Living Facilities	<ul style="list-style-type: none">➤ 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.)	<ul style="list-style-type: none">➤ 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)	<ul style="list-style-type: none">➤ 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.➤ Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

Hail has been known to cause injury to humans and occasionally has been fatal, though no injuries or fatalities due to hail have been reported in the planning area. Overall, the total loss estimate of property and crops in the planning area is \$45,300 (2024 dollars) with an average annualized loss of \$700. Based on historic loss and damages, the impact of hail damages on the Edwards County planning area can be 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 9-7. Estimated Annualized Losses by Jurisdiction

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Edwards County	\$13,000	\$200
City of Rocksprings	\$32,300	\$500
TOTALS	\$45,300	\$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.

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- 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 is one historical site, the Edwards County Courthouse and Jail in the City of Rocksprings, listed on the National Register of Historic Places for Edwards 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 10 **HURRICANE/ TROPICAL STORM**

SECTION 10: HURRICANE / TROPICAL STORM

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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 Edwards County planning area is approximately 220 miles from the coast, making the planning area vulnerable to threats directly and indirectly related to a hurricane event, such as high-force winds and flooding. While Edwards County is not located along the Gulf Coast, due to the regional nature of hurricanes and tropical storms, the County is exposed and susceptible to the impacts of hurricane and tropical storm events. Hurricanes and tropical storms can impact Edwards County primarily from June to November, the official Atlantic U.S. hurricane season. Edwards County planning area is in a low to moderate risk area for hurricane wind speeds up to 200 miles per hour (mph).

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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 10-1). A Category 1 storm has the lowest wind speeds, while a Category 5 hurricane has the highest. However, a lower category storm can inflict greater damage than higher category storms depending on where they strike, the amount of storm surge, other weather they interact with, and how slow they move.

Table 10-1. Extent Scale for Hurricanes¹

CATEGORY	MAXIMUM SUSTAINED WIND SPEED (mph)	MINIMUM SURFACE PRESSURE (millibars)	STORM SURGE (feet)
1	74 – 95	Greater than 980	3 – 5
2	96 – 110	979 – 965	6 – 8
3	111 – 130	964 – 945	9 – 12
4	131 – 155	944 – 920	13 – 18
5	155+	Less than 920	19+

Based on the historical storm tracks, most hurricanes turn into tropical storms by the time they reach Edwards County, however, the average estimated extent to be mitigated for is a Category 1 storm.

HISTORICAL OCCURRENCES

Edwards County is located inland and is not directly along the coastline. As hurricanes typically form over the ocean and affect coastal areas, Edwards County is less prone to direct impacts from hurricanes. The hurricanes usually fade and 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.

Hurricanes and tropical storms do not typically track across the planning area. The last known system to track across Edwards County was Tropical Storm Hermine in 2010. Historical systems that have tracked in close proximity to the planning area, bringing storm systems, excessive precipitation and potentially damaging wind to Edwards County and the City of Rocksprings, are listed in Table 10-2 below.

¹ Source: National Hurricane Center, https://www.nhc.noaa.gov/HAW2/english/basics/saffir_simpson.shtml

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Table 10-2. Historical Hurricane / Tropical Storm Events, January 1996 – June 2024²

DATE	STORM NAME	CATEGORY (max)
08/21/1998 – 08/24/1998	Charley	Tropical Storm
09/05/2002 – 09/11/2002	Fay	Tropical Storm
07/07/2003 – 07/17/2003	Claudette	Category 1
08/15/2007 – 08/19/2007	Erin	Tropical Storm
09/04/2010 – 09/10/2010	Hermine	Tropical Storm

According to the historical hurricane tracks from NOAA's National Hurricane Center, there have been five storms known to have come within 60 miles of the Edwards County planning area from January 1996 through June 2024.

Table 10-3 lists the storms that have impacted the Edwards County planning area from January 1996 through June 2024 as reported in the NCEI. These events are related to Tropical Storm Charley and Tropical Storm Erin. Not all events reported by the NOAA National Hurricane Center are reported by the NCEI, so some damages and events may be underreported. Historical hurricane data for Edwards County is provided on a countywide basis per the NCEI and NOAA databases.³

Table 10-3. Historical Flood Events, January 1996 – June 2024⁴

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Edwards County	8/23/1998	0	0	\$191,900	\$19,200
Edwards County	8/23/1998	0	0	\$96,000	\$9,600
Edwards County	8/25/1998	0	0	\$0	\$0
Edwards County	8/16/2007	0	0	\$0	\$0
Edwards County	8/17/2007	0	0	\$30,200	\$0
Total Losses		0	0	\$318,100	\$28,800

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

² Source: NOAA Historical Hurricane Tracks, <https://coast.noaa.gov/hurricanes/#map=4/32/-80>

³ These events were reported under flooding in the NCEI database, and an analysis was performed to cross reference applicable hurricane and tropical storm events to create the most comprehensive dataset possible.

⁴ Values are in 2024 dollars.

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SIGNIFICANT EVENTS

There have been 3 declared disasters and emergency declarations between 1996 and 2024 (Table 10-4) related to hurricane or tropical storm events.

Table 10-4. Disaster Declarations for Hurricane/Tropical Storm, 1996-2024

YEAR	DECLARATION TITLE	DECLARATION TYPE	DISASTER NO.
2005	Hurricane Katrina in Texas	EM	3216
2005	Hurricane Rita in Texas	EM	3261
2005	Hurricane Rita in Texas	DR	1606

Tropical Storm / Depression Charley on August 23 - 25, 1998

Tropical Storm Charley was the third named storm of the 1998 Atlantic hurricane season. The storm originated with a tropical wave that moved off the West African coast on August 9th. The wave moved generally west northwestward, producing occasional bursts of convection, finally arriving in the southeastern Gulf of Mexico by August 19th, when animated satellite images began to indicate it had possibly developed a low pressure center. The system lingered for two days, lacking an organized low-level center of circulation until early on the morning of August 21st, when advisories were initiated on the tropical depression, 185 miles (298 km) east of Brownsville, Texas. The depression became a tropical storm later that day, as it moved steadily west northwestward, strengthening, and then weakening again before making landfall the next morning around Port Aransas, Texas. The storm moved slowly inland and finally dissipated on the morning of August 24th near the town of Del Rio, Texas.

Charley's impacts in Texas and Mexico were locally severe. In Texas, over 2,000 homes were destroyed by the locally severe flooding, and 13 people died. In Mexico, over 12 inches of rain fell in northern areas near the Texas-Mexico border, and seven people were killed. Heavy rainfall from thunderstorms in the bands produced rainfall at rates approaching five inches per hour. A total of between 6 and 8 inches was reported between the towns of Uvalde, Batesville and Leakey. A devastating flood wave developed along the Frio, Dry Frio, Sabinal and Nueces Rivers and moved over camps, recreational areas and residential sections of neighboring Uvalde, Real and Zavala Counties. For Edwards County, \$287,900 (2024 dollars) in property damages and \$19,200 (2024 dollars) in crop damages were reported due to flooding associated with the tropical storm.

Tropical Storm Erin on August 16 and 17, 2007

Tropical Storm Erin moved inland near Port Aransas on the morning of August 16, 2007, and continued toward the northwest, in the general direction of San Antonio. The remnants of Tropical Storm Erin moved into the City of Rocksprings area by midnight that night and just south of Ozona on the morning of August 17th.

Showers and thunderstorms associated with Tropical Storm Erin developed over the northwest quarter of Edwards County in the late afternoon of the 17th. Rain totals averaged between 3 and 4 inches in the northwest corner of the county, closing U.S. 277 and SH55 near the Val Verde County line in the late evening hours. A total of \$30,200 (2024 dollars) in property damages were reported due to flood related damages.

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PROBABILITY OF FUTURE EVENTS

Based on historical occurrences of significant hurricane events, the probability of future events is “Occasional”, with an event probable in the next five years for Edwards 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.⁵

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 Edwards County planning area features multiple mobile or manufactured home parks throughout the planning area. These mobile home parks are typically more vulnerable to hurricane events than typical site-built structures. The U.S. Census data indicates a total of 210 (23 percent of total housing stock) manufactured homes located in Edwards County planning area (Table 10-5). In addition, 65 percent of the single family residential (SFR) structures in Edwards County were built before 1980.⁶ 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 10-5. Structures at Greater Risk⁷

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Edwards County	584	210
City of Rocksprings	312	38

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.

⁶ U.S. Census Bureau American Community Survey Five-Year Estimates 2019-2023 data for Edwards County.

⁷ U.S. Census Bureau American Community Survey Five-Year Estimates 2019-2023 data for Edwards County.

SECTION 10: HURRICANE / TROPICAL STORM

The Edwards 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 hurricane and tropical storm events. For a comprehensive list by participating jurisdiction, please see Appendix C.

Table 10-6. Critical Facilities Vulnerable to Hurricane and Tropical Storm Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	<ul style="list-style-type: none"> ➤ 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. ➤ Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	<ul style="list-style-type: none"> ➤ 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.)	<ul style="list-style-type: none"> ➤ 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)	<ul style="list-style-type: none"> ➤ 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.

SECTION 10: HURRICANE / TROPICAL STORM

CRITICAL FACILITIES	POTENTIAL IMPACTS
	<ul style="list-style-type: none">➤ 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.

Storm track data was available for the past 150 years; however, property and crop loss data records in the NCEI are only available since 1996. Losses during this period were only reported for two hurricane and tropical storm events so some damages and events may be unreported or underreported.

Table 10-7 shows impact or loss estimation for storms impacting Edwards County. Damages within the NCEI database are reported on a countywide basis and there are no losses reported separately for the City of Rocksprings. Annual loss estimates were based on the 28.5-year reporting period for such damages. The average annual loss estimate for the Edwards County planning area is approximately \$12,200 (2024 dollars).

Table 10-7. Summary of Annualized Losses, January 1996 – June 2024

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Edwards County	\$346,900	\$12,200

With limited reported damages and no reported injuries or fatalities, the potential severity of impact from a hurricane event for Edwards 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.

SECTION 10: HURRICANE / TROPICAL STORM

- Emergency evacuations may be necessary prior to a hurricane landfall, requiring emergency responders, evacuation routing, and temporary shelters.
- Even if Edwards County is not impacted by a direct hurricane, the County often serves as a hurricane evacuation site and may be impacted by the influx of evacuees, requiring emergency response and shelter operations.
- 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 at 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 and City departments may be damaged, delaying response and recovery efforts for the entire community.
- Private sector entities that the County, Cities, 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 Edwards County, 65 percent of homes were built before 1980, and one building in the County is on the National Register of Historic Places, which pre-date modern building codes.
- Vegetation in urban parks may become flattened or oversaturated from high winds and heavy rains.

SECTION 10: HURRICANE / TROPICAL STORM

- Large scale hurricanes can have a significant economic impact on the affected area, as it must 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.

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 11 **LIGHTNING**

SECTION 11: LIGHTNING

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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 the 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 wildfires that can result in widespread damages to property before firefighters have the ability to contain and suppress the resultant fire.

LOCATION

Lightning can strike in any geographic location and is considered a common occurrence in Texas. The Edwards County planning area is in a region of the country that is moderately susceptible to lightning strikes. Therefore, lightning could occur at any location within the entire planning area. It is assumed that the entire Edwards County planning area is uniformly exposed to the threat of lightning.

EXTENT

According to the 2024 Annual Lightning Report by Vaisala, the State of Texas ranks fifth in the U.S. for lightning strike density with an average of 150.5 flashes per square mile.¹ Vaisala’s U.S. National Lightning Detection Network lightning flash density map shows an average of 83 lightning events per square mile per year for the Edwards County planning area. This rate equates to

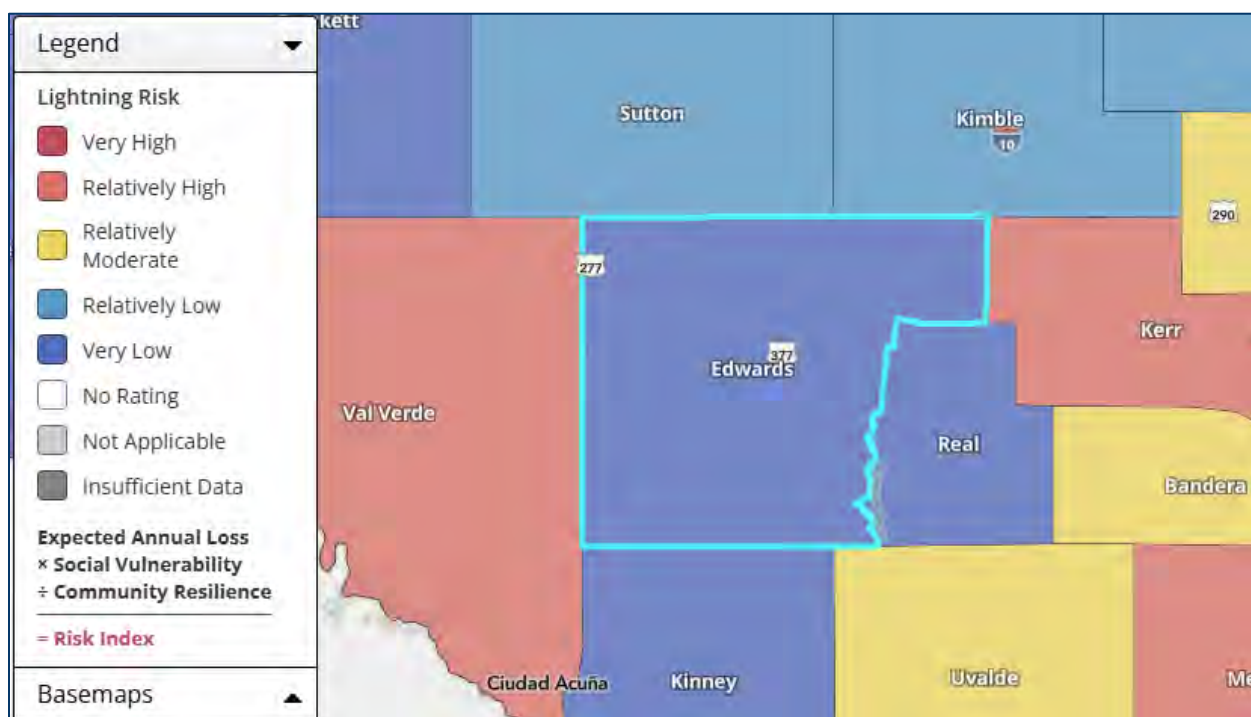
¹ Source: <https://www.xweather.com/annual-lightning-report>

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approximately 175,600 flashes per year for the entire planning area, or five to six flashes per 15-minute interval during storm events.

FEMA's National Risk Index includes an analysis of the planning area's expected annual loss and the community's risk factor which incorporates social vulnerability as well as community resilience to determine the lightning risk for the area, compared to the rest of the United States. Edwards County is located in an area where the extent is classified as very low (Figure 11-1).

Figure 11-1. Edwards County Lightning Risk, National Risk Index, February 2025²



HISTORICAL OCCURRENCES

Since January 1996, there have been no recorded lightning events for the Edwards County planning area, based upon NCEI records. 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 across the planning area that simply have not been reported.

PROBABILITY OF FUTURE EVENTS

Based on historical records and input from the planning team the probability of occurrence for future lightning events in the Edwards County planning area is considered “Highly Likely”, or an event probable in the next year. The planning team stated that lightning occurs regularly in the area. According to the 2024 Annual Lightning Report by Vaisala, the Edwards County planning

² Source: Map | National Risk Index, <https://hazards.fema.gov/nri/map>

SECTION 11: LIGHTNING

area is located in an area of the country that experiences approximately 83 lightning flashes per square mile per year (approximately 175,600 flashes per year). Given this estimated probability of events, it can be expected that future lightning events will continue to threaten life and cause minor property damage throughout the planning area.

CLIMATE CHANGE CONSIDERATIONS

As CO₂ increases and the land surface warms, stronger updrafts are more likely to produce lightning. In a climate with double the amount of CO₂, 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.³

Lightning events have the potential to pose a significant risk to people and property throughout the Edwards 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 Edwards 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 Edwards 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 Edwards 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.

³ Environmental Journal, Nathan Neal, January 11, 2021.

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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 travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 25 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 11-1 lists these vulnerable populations and several others for Edwards County and the City of Rockspring.

Table 11-1. Populations at Greater Risk by Jurisdiction⁴

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Edwards County	315	21	240	352	117
City of Rocksprings	206	21	149	167	101

The Edwards County Planning Team identified the following critical facilities (Table 11-2) 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 by participating jurisdiction, please see Appendix C.

Table 11-2. Critical Facilities Vulnerable to Lightning Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	<ul style="list-style-type: none">➤ 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.➤ Extended power outages may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters,	<ul style="list-style-type: none">➤ Structures can be damaged by falling trees damaged by lightning.➤ Power outages could disrupt critical care.➤ Backup power sources could be damaged.

⁴ US Census Bureau, American Community Survey Five-Year Estimates, 2023

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CRITICAL FACILITIES	POTENTIAL IMPACTS
Governmental Facilities, Residential/ Assisted Living Facilities	<ul style="list-style-type: none"> ➤ Evacuations may be necessary due to extended power outages, fires, or other associated damages to facilities.
Commercial Supplier (food, fuel, etc.)	<ul style="list-style-type: none"> ➤ 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)	<ul style="list-style-type: none"> ➤ 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. ➤ Extended power outages may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

There are no recorded fatalities or injuries within the Edwards County planning area due to lightning events. Additionally, there are no recorded lightning events in the planning area, and therefore total monetary losses or annual loss estimates due to lightning are difficult to determine. The limited recorded impacts on the Edwards County planning area indicate a “Limited” severity of impact, 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.

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 Edwards 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. 65 percent of homes in Edwards County were built before 1980. Similarly, historic buildings may lack fire mitigation

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materials or measures due to their historic status. One historic site in the planning area, the Edwards County Courthouse and Jail in the City of Rocksprings, is 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 and city departments may be damaged, delaying response and recovery efforts for the entire community.
- 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 12

THUNDERSTORM WIND

SECTION 12: THUNDERSTORM WIND

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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 Edwards 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 Edwards County planning area is uniformly exposed to the threat of thunderstorm winds.

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EXTENT

The extent or magnitude of a thunderstorm wind event is measured by the Beaufort Wind Scale. Table 12-1 describes the different intensities of wind in terms of speed and effects, from calm to violent and destructive.

Table 12-1. Beaufort Wind Scale¹

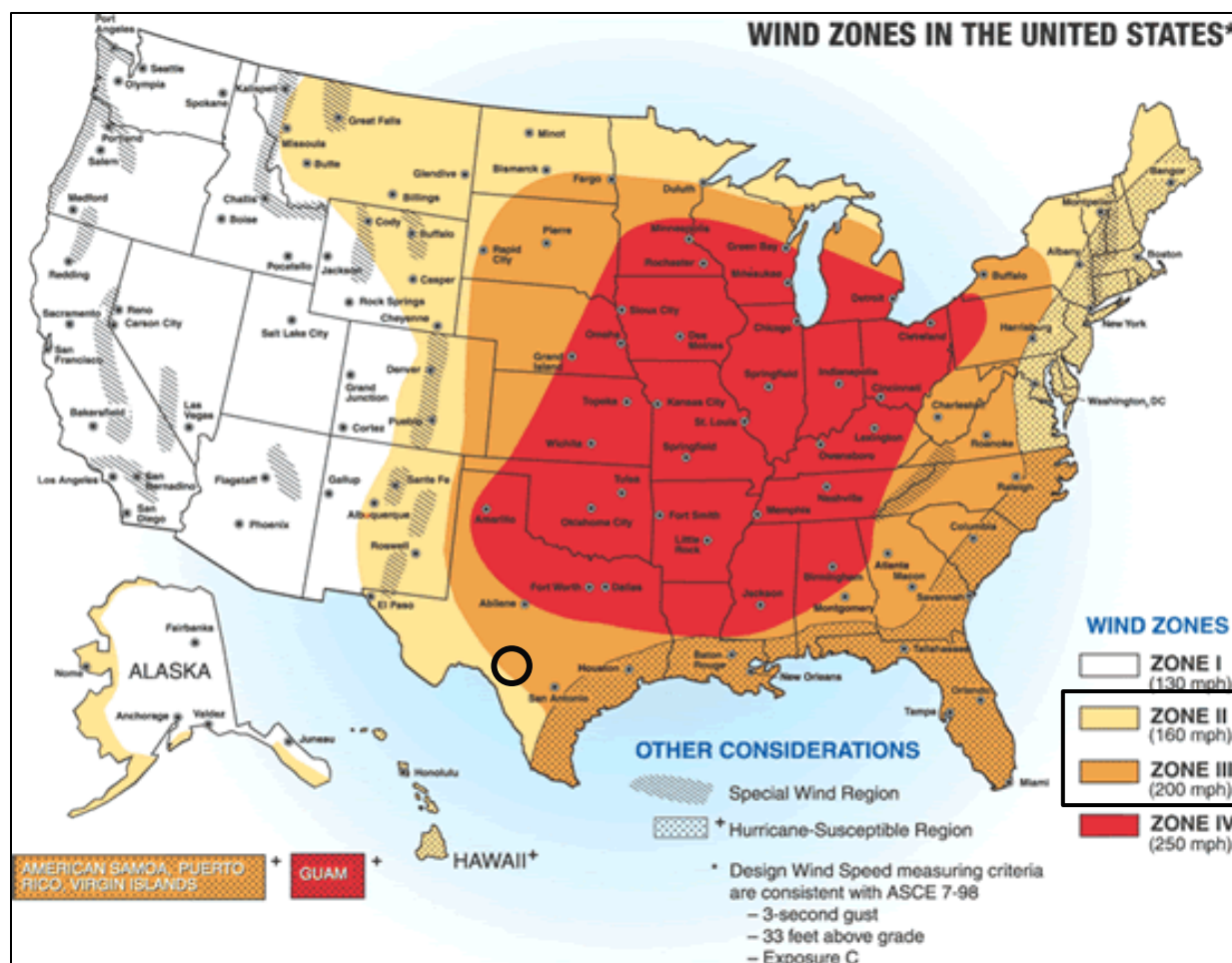
FORCE	WIND		WMO CLASSIFICATION	APPEARANCE OF WIND EFFECTS
	(mph)	(knots)		
0	Less than 1	Less than 1	Calm	Calm, smoke rises vertically
1	1-3	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4-7	4-6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	7-10	Gentle 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 12-1 displays the wind zones as derived from NOAA.

¹ Source: World Meteorological Organization

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Figure 12-1. Wind Zones in the United States²



On average, the planning area experiences one thunderstorm wind event every one to two years. The Edwards County planning area is located within Wind Zones II and III. This means the planning area can experience maximum windspeeds between 160 to 200 mph. The Edwards County 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. This event occurred on May 26, 2016 with winds recorded at 65 knots, or 75 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 Edwards County planning area is indicated by the black circle.

SECTION 12: THUNDERSTORM WIND

28.5 years. Tables 12-2, 12-3, and 12-4 depict historical occurrences of thunderstorm wind events for the Edwards County planning area according to the NCEI database.

Since 1996, 15 thunderstorm wind events are known to have occurred in the Edwards County planning area. Table 12-3 presents information on known historical events impacting the Edwards County planning area, resulting in damages, injuries, or fatalities. The strongest event reported in the planning area occurred on May 26, 2016, with reported wind speeds of 65 knots, or 75 mph.

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 2024 dollars.

Table 12-2. Historical Thunderstorm Wind Speeds, January 1996 – June 2024

MAXIMUM WIND SPEED RECORDED (knots)	NUMBER OF REPORTED EVENTS
0-30	0
31-40	0
41-50	4
51-60	7
61-70	2
71-80	0
81-90	0
91-100+	0
Unknown	2

Table 12-3. Historical Thunderstorm Wind Events, January 1996 – June 2024³

JURISDICTION	DATE	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Edward County	5/24/2001	-	0	0	\$53,000	\$0
Edward County	11/15/2001	-	0	0	\$176,800	\$0
Edward County	2/10/2009	43	0	0	\$73,900	\$0
Edward County	5/1/2010	50	0	0	\$2,900	\$0
City of Rocksprings	8/11/2012	50	0	0	\$6,900	\$0
Edward County	6/12/2014	56	0	0	\$13,200	\$0

³ Only recorded events with fatalities, injuries or damages are listed. Magnitude is listed when available. Damage values are in 2024 dollars.

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JURISDICTION	DATE	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Rocksprings	5/30/2019	61	0	0	\$2,500	\$0
TOTALS		(MAX EXTENT)	0	0	\$329,200	\$0

Table 12-4. Summary of Historical Events by Jurisdiction, January 1996 – June 2024

JURISDICTION	NUMBER OF EVENTS	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Edward County	6	65	0	0	\$319,800	\$0
City of Rocksprings	9	61	0	0	\$9,400	\$0
TOTALS	15	(MAX EXTENT)	0	0	\$329,200	

Based on the list of historical thunderstorm wind events for the Edwards County planning area, 11 events have occurred since the 2012 Plan.

SIGNIFICANT EVENTS

November 15, 2001 – Edwards County

Severe thunderstorm winds in the afternoon damaged homes, barns, and knocked down trees both east and west of the community of Barksdale in both Edwards and Real Counties. In Edwards County, these winds caused an estimated total of \$176,800 (2024 dollars) in property damage.

February 10, 2009 – Edwards County

A cold front moved through South Central Texas in the evening, producing a line of severe thunderstorms with very strong, gusty wind that impacted Edwards County. These damaging winds, with gusts up to 50 mph, downed power lines one mile north of the City of Rocksprings. Damages were estimated at \$73,900 (2024 dollars).

August 11, 2012 – City of Rocksprings

A very hot day in South Central Texas made the atmosphere conditionally unstable and a weak moisture convergence boundary added enough lift to produce thunderstorms. In the City of Rocksprings, these thunderstorms produced damaging wind gusts up to 58 mph which damaged or destroyed several outbuildings. Total property damage in the city was estimated at \$6,900 (2024 dollars).

May 30, 2019 – City of Rocksprings

A cold front moved in South Central Texas and stalled, forming thunderstorms with damaging wind gusts over the Edwards County planning area. Near the City of Rocksprings, wind gusts up to 70 mph knocked down trees northeast of Devil's Sinkhole State Natural Area. Damages were estimated at \$2,500 (2024 dollars).

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 15 events in a 28.5-year reporting period, which provides an estimated annual frequency

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of one to two events. Even though the intensity of thunderstorm wind events is not always damaging for the Edwards 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 Edwards County 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 Edwards 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 receptacles, 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 2023, a total of 210 manufactured homes are located in the Edwards County planning area (23 percent of total housing stock). In addition, 65 percent (584 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.

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.

SECTION 12: THUNDERSTORM WIND

Table 12-5. Structures at Greater Risk by Participating Jurisdiction

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Edwards County	584	210
City of Rocksprings	312	38

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 travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 25 percent of the planning area population live below the poverty level (Table 12-6). 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 12-6. Populations at Greater Risk by Jurisdiction⁵

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Edwards County	315	21	240	352	117
City of Rocksprings	206	21	149	167	101

The Edwards County Planning Team identified the following critical facilities (Table 12-7) 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 by participating jurisdiction, please see Appendix C.

⁵ US Census Bureau 2023 data for Edwards County.

SECTION 12: THUNDERSTORM WIND

Table 12-7. Critical Facilities Vulnerable to Thunderstorm Wind Event

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	<ul style="list-style-type: none"> ➤ 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	<ul style="list-style-type: none"> ➤ 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.)	<ul style="list-style-type: none"> ➤ 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)	<ul style="list-style-type: none"> ➤ 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.

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CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
	<ul style="list-style-type: none">➤ 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.

A thunderstorm wind event can also result in traffic disruptions, injuries and in rare cases, fatalities. The impacts of thunderstorm winds experienced in the Edwards County planning area have not resulted in any reported injuries or fatalities. Overall, in the past 28.5 years there has been an estimated total of \$329,200 in damages (2024 dollars) in the Edwards County planning area due to thunderstorm wind events. The estimated average annual loss from thunderstorm wind events is \$11,600. Based on historic loss and damages, the impact of thunderstorm winds on the Edwards County planning area can be 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 12-8. Estimated Annualized Losses by Participating Jurisdiction

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Edwards County	\$319,800	\$11,200
City of Rocksprings	\$9,400	\$300
PLANNING AREA	\$329,200	\$11,600

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.

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- 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 (65 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. One historical site, the Edwards County Courthouse and Jail in the City of Rocksprings, is listed on the National Register of Historic Places for Edwards 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 13

TORNADO

SECTION 13: TORNADO

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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 13-1. Variations among Tornadoes

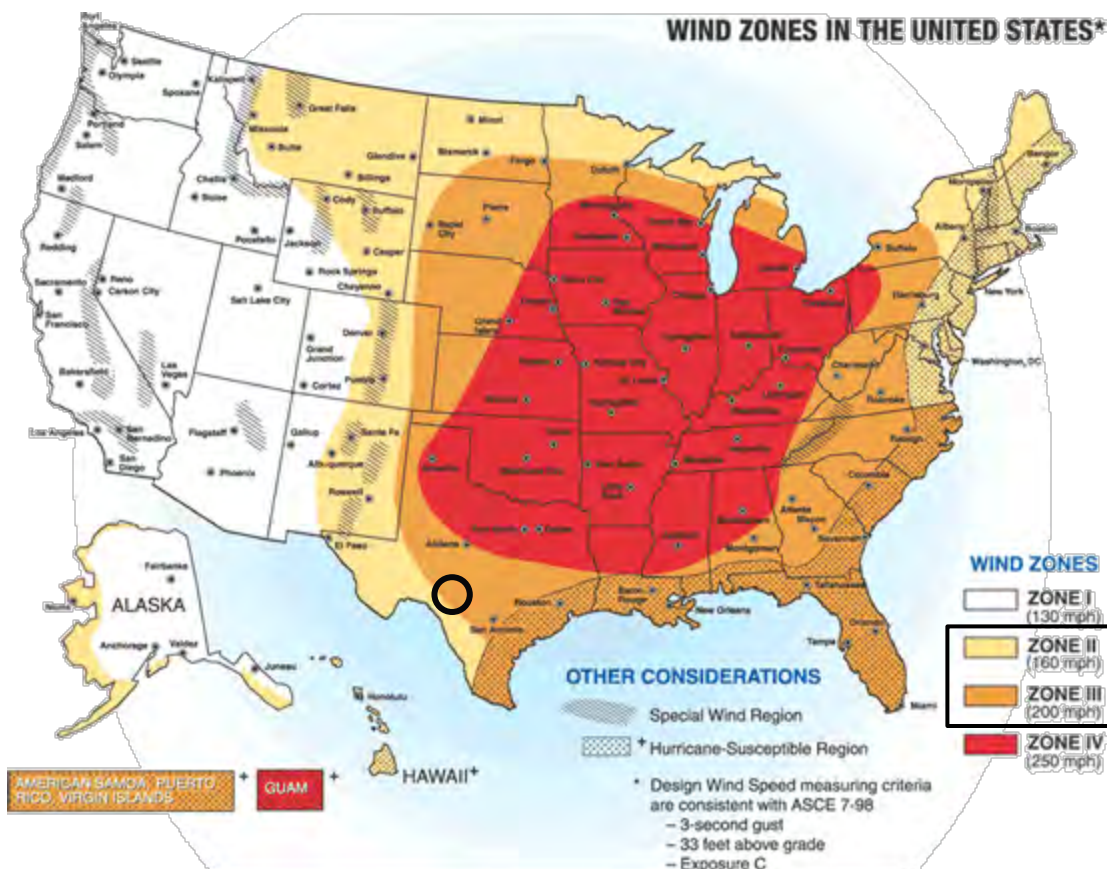
WEAK TORNADOES	STRONG TORNADOES	VIOLENT TORNADOES
<ul style="list-style-type: none">➤ 69% of all tornadoes➤ Less than 5% of tornado deaths➤ Lifetime 1-10+ minutes➤ Winds less than 110 mph	<ul style="list-style-type: none">➤ 29% of all tornadoes➤ Nearly 30% of all tornado deaths➤ May last 20 minutes or longer➤ Winds 110–205 mph	<ul style="list-style-type: none">➤ 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 Edwards County planning area is uniformly exposed to tornado activity. The entire Edwards County planning area is in Wind Zones II and III (Figure 13-1), where tornado winds can be as high as 160 to 200 mph.

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Figure 13-1. FEMA Wind Zones in the United States¹



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 13-2 includes both scales for reference when analyzing historical tornadoes, since tornado events prior to 2007 will follow the original Fujita Scale.

¹ The Edwards County planning area is indicated by the circle.

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Table 13-2. The Fujita and Enhanced Fujita Tornado Scale²

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>

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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 F0, a gale tornado capable of minor damage to trees, chimneys, and sign boards. Based on the planning area's location in Wind Zones II and 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 Edwards County planning area (converted from the Fujita Scale) have all been of EF0 magnitudes (Figure 13-2). 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 13-2 identifies the locations of previous occurrences in the Edwards County planning area from 1988 through June 2024. A total of four events have been recorded by NOAA's Storm Prediction Center and the NCEI Storm Events databases for the Edwards County planning area. All tornado events reported in the planning area have been of F0 or EF0 magnitude, none of which resulted in any reported damages.

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Figure 13-2. Spatial Historical Tornado Events, January 1988 – June 2024³

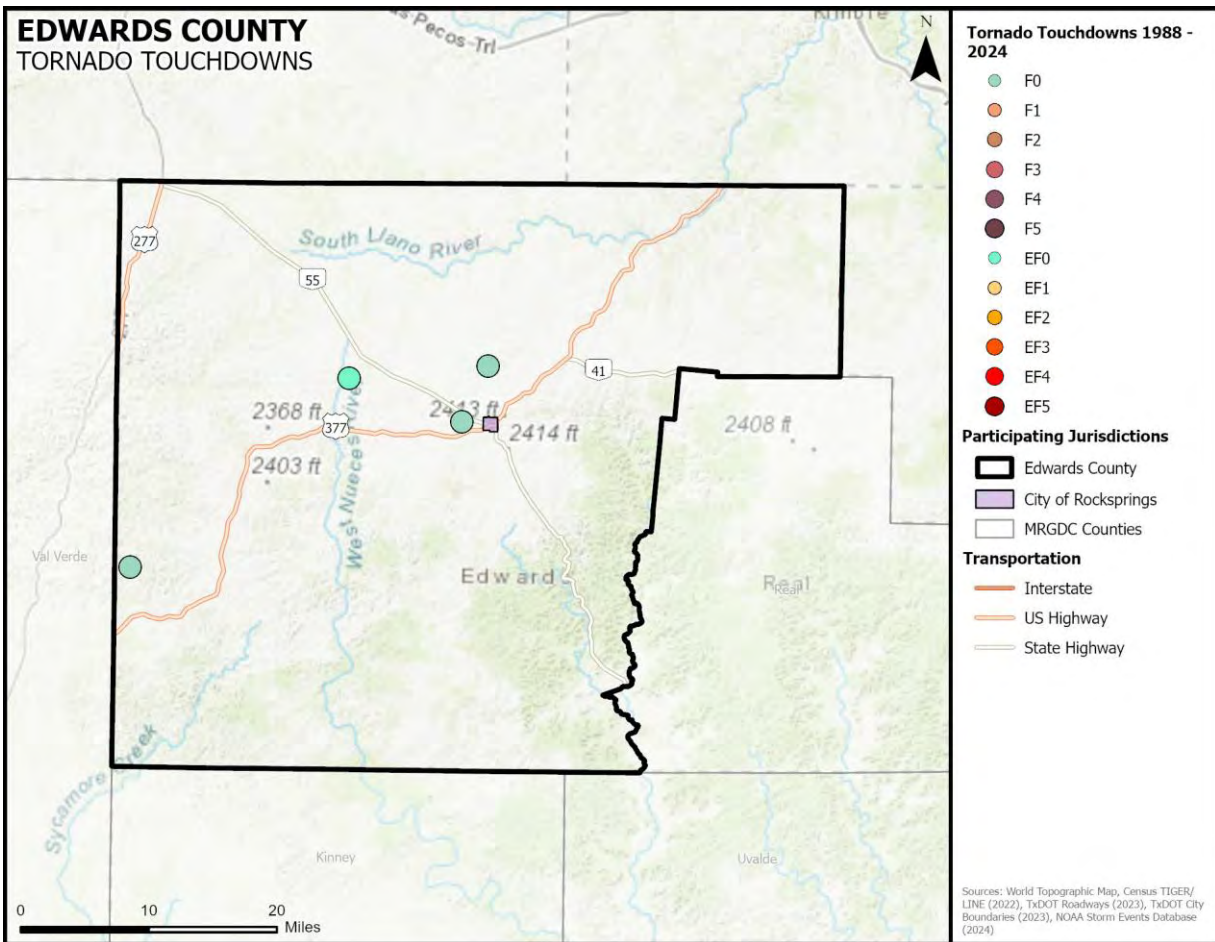


Table 13-3. Historical Tornado Events, January 1988 – June 2024

JURISDICTION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Edwards County	9/17/1988	F0	0	0	\$0	\$0
Edwards County	5/9/1989	F0	0	0	\$0	\$0
City of Rocksprings	5/24/2001	F0	0	0	\$0	\$0
City of Rocksprings	1/24/2012	F1	0	0	\$0	\$0
TOTALS		(MAX EXTENT)	0	0	\$0	\$0

³ Source: NOAA Storm Prediction Center

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Table 13-4. Summary of Historical Tornado Events, January 1988 – June 2024

JURISDICTION	NUMBER OF EVENTS	MAX MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Edwards County	2	F0	0	0	\$0	\$0
City of Rocksprings	2	EF0	0	0	\$0	\$0
TOTALS	4	(MAX EXTENT)	0	0	\$0	

Based on the list of historical tornado events for the Edwards County planning area, there has been one recorded event since the 2012 Plan.

SIGNIFICANT EVENTS

April 12, 1927 – City of Rocksprings

Although it falls outside the reporting period, this tornado is considered the third deadliest in Texas history, according to the National Weather Service, and highlights the significant impact such events can have on the Edwards County planning area.

On the evening of Tuesday, April 12, 1927, an F5 tornado touched down approximately three miles northwest of the City of Rocksprings and cut a devastating path southeast toward the city. By the time it reached Rocksprings, the tornado had expanded to nearly a mile wide and, within minutes, had destroyed 235 of the city's 247 buildings. Entire structures were torn apart with occupants still inside. With this storm, hail "the size of dinner plates" fell from the sky.

The storm left 74 people dead and 205 injured, which accounts for nearly one-third of the city's population. Many others were left isolated, with no easy way to call for help due to rough terrain and downed telephone lines. The tornado continued its path for at least 35 miles, as according to some reports possibly as far as 65 miles, before dissipating.

In the aftermath, residents searched for survivors in the darkness, using only matches or the flames from burning buildings to light their way. By morning, survivors were met with a scene of complete devastation. All of the town's churches had been destroyed, the telegraph and telephone office was gone, trees were snapped like toothpicks, and the water tower had collapsed, likely causing a flash flood that drowned additional victims. A mass grave was dug in the Rocksprings Cemetery by the Texas Highway Department, which used dynamite to blast through the limestone bedrock beneath the soil.⁴

January 24, 2012 – City of Rocksprings

A deep upper-level low pressure center brought a frontal system through Texas which caused some thunderstorms across South Central Texas. These storms formed into a mesoscale convective system and produced several tornadoes, one of which touched down northwest of the City of Rocksprings. The EF0 magnitude tornado was approximately 10 yards wide and followed

⁴ This event is not included in NCEI totals, as it falls outside the database's reporting period. However, it has been incorporated into this risk assessment with considerations for overall impact and hazard analysis.

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a three-mile path northeast before dissipating. The tornado tore up several trees on a ranch, but no monetary damages or further impacts were reported.

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 4 historical events over a 36.5-year reporting period, the Edwards County planning area can anticipate a tornado touchdown approximately once every nine to ten years. This frequency supports an “Unlikely” probability of future events for the Edwards County planning area.

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 Edwards 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.

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.

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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.

The Edwards County planning area features mobile or manufactured home parks throughout the planning area. These parks are typically more vulnerable to tornado events than typical site-built structures. In addition, manufactured homes are located sporadically throughout the planning area, which would also be more vulnerable. The U.S. Census data indicates a total of 210 (23 percent of total housing stock) manufactured homes located in the Edwards County planning area. In addition, 65 percent (584 structures) of the housing structures in the Edwards 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 significant tornado events (Table 13-5).

Table 13-5. Structures at Greater Risk by Participating Jurisdiction

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Edwards County	584	210
City of Rocksprings	312	38

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 Edwards County planning area is estimated at 23 percent of the total population and children under the age of 5 are estimated at 2 percent. The population with a disability is estimated at 17 percent of the total population. An estimated 25 percent of the planning area population live below the poverty level and 8 percent of the populations speak English 'less than very well' (Table 13-6).

Table 13-6. Populations at Greater Risk by Participating Jurisdiction⁷

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Edwards County	315	21	240	352	117
City of Rocksprings	206	21	149	167	101

⁷ U.S. Census Bureau 2023 data for Edwards County

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The Edwards 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 13-7). The critical infrastructure with the greatest vulnerability 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 by participating jurisdiction, please see Appendix C.

Table 13-7. Critical Facilities Vulnerable to Tornado Event

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	<ul style="list-style-type: none"> ➤ 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. ➤ Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	<ul style="list-style-type: none"> ➤ 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 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.)	<ul style="list-style-type: none"> ➤ 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	<ul style="list-style-type: none"> ➤ Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications.

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CRITICAL FACILITIES	POTENTIAL IMPACTS
(electric, water, wastewater, communications)	<ul style="list-style-type: none">➤ 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.➤ Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

Based on NCEI records, tornado events in the Edwards County planning area have not caused any reported damages, fatalities, or injuries. However, based on additional historic losses and damages, the impact of tornado events on the Edwards County planning area can be considered “Substantial,” meaning Multiple deaths possible, the complete shutdown of facilities for 30 days or more, and more than 50 percent of property destroyed or with major damage.⁸

Table 13-8. Estimated Average Annual Losses by Jurisdiction

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Edwards County	\$0	\$0
City of Rocksprings	\$0	\$0
Planning Area	\$0	\$0

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.

⁸ Impact is assessed using events reported in the NCEI database, as well as historically significant events outside the official reporting period, such as the devastating 1927 tornado.

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- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Manufactured homes (23 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 a 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.

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- 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 18 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. The Edwards County planning area has one site, the Edwards County Courthouse and Jail in the City of Rocksprings, listed on the National Register of Historic Places.

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 14 **WILDFIRE**

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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. The Edwards County planning area has an estimated 98 percent of the total planning area population that live within the WUI.²

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 south Texas, resulting in more populated areas within the wildland interface / intermix. Additionally, the area is experiencing hotter, drier climatic conditions. These factors combine to make south Texas at risk from wildfires. 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).³

The Edwards County population is not expected to significantly increase over time, based on population trends over the last few decades. However, any continued housing development in the WUI will put more people at greater risk of catastrophic wildfires and put more pressure on land managers and fire department personnel to mitigate fire risk.

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

¹ Source: FEMA: <https://hazards.fema.gov/nri/wildfire>

² Source: Texas A&M Forest Service, Texas Wildfire Risk Assessment Summary Report, Edwards County: <https://texaswildfirerisk.com/>

³ 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/>

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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 spread more quickly.⁴ 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.

Texas has seen a significant increase in the number of wildfires in the past 30 years, which includes 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 face 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.

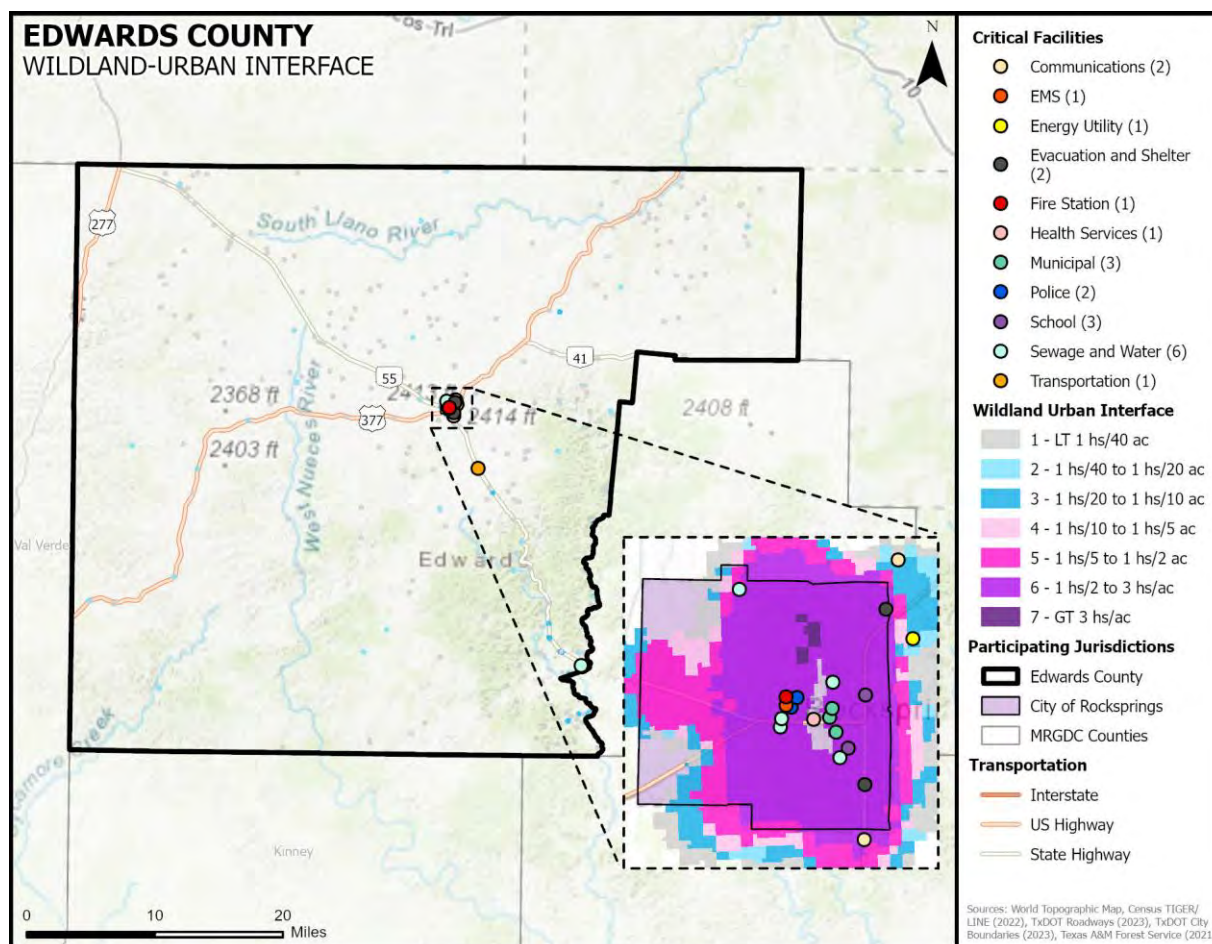
The Texas A&M Forest Service Wildfire Risk Assessment Portal (TxWRAP) provides historical wildfire data for Texas counties along with mapping resources that includes data layers on the WUI, ignition density, and fire intensity scales for communities throughout the Edwards County planning area, along 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 Wildland Urban Interface (WUI) (Figures 14-1 and 14-2). It is estimated that 98 percent of the total population in the Edwards County planning area live within the WUI. However, the entire planning area is at some risk for wildfires.

⁴ NOAA Weather Forecasting: <https://scijinks.gov/wildfires/>

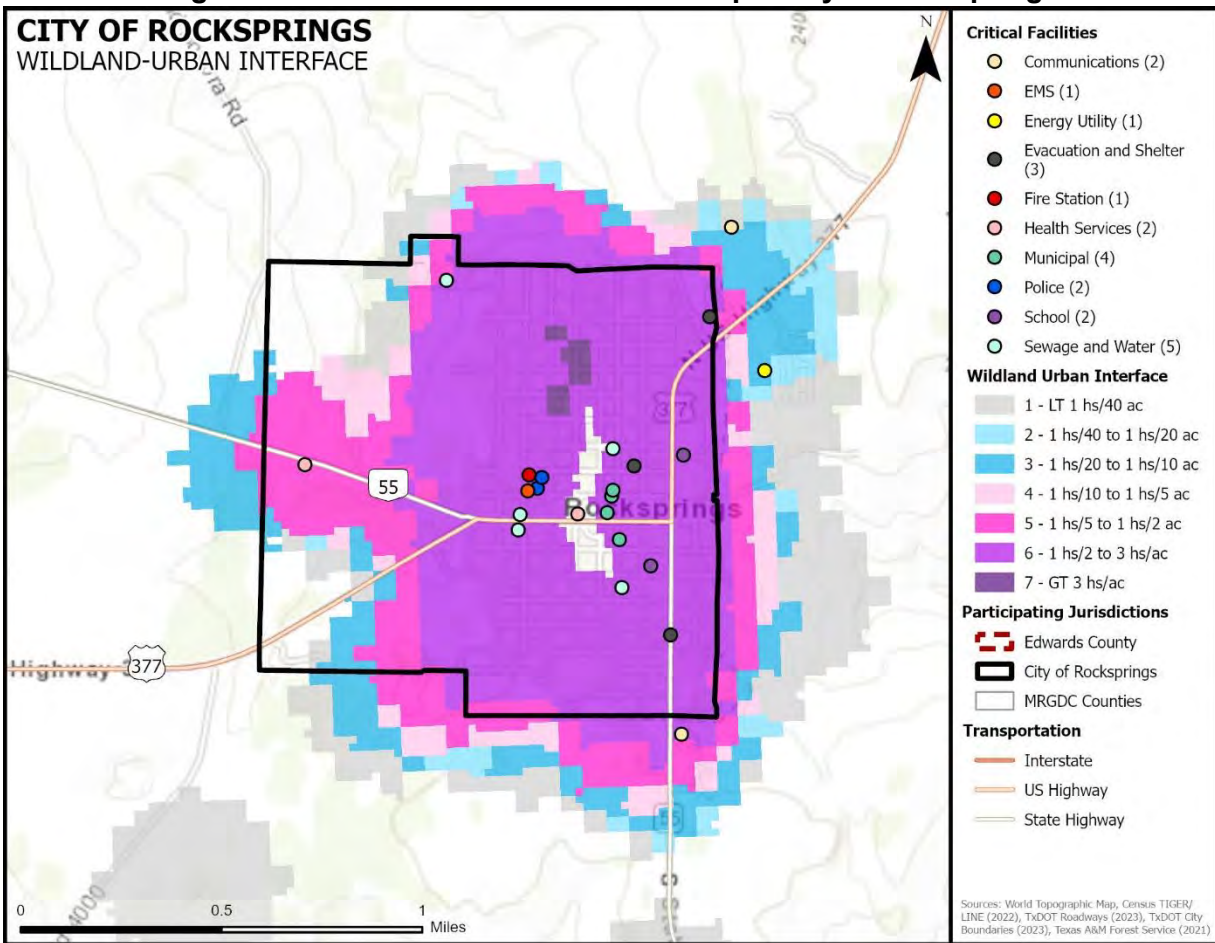
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Figure 14-1. Wildland Urban Interface Map – Edwards County



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Figure 14-2. Wildland Urban Interface Map – City of Rocksprings



It is estimated that 97 percent of the total population in the City of Rocksprings live within the WUI. However, the entire City is at some risk for wildfires.

EXTENT

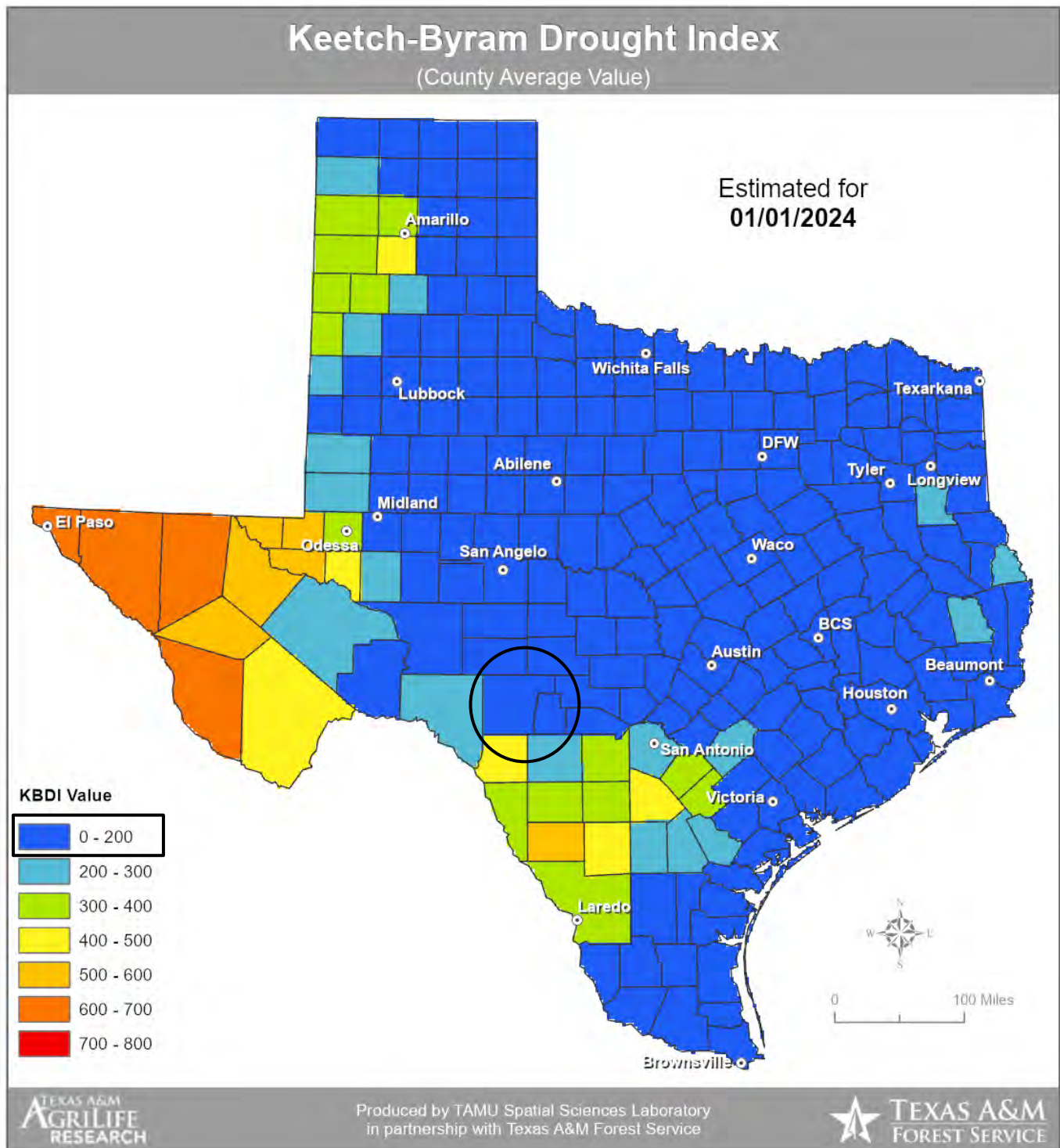


Risk for a wildfire event is measured in terms of magnitude and intensity using the Keetch Byram Drought Index (KBDI), a mathematical system for relating current and recent weather conditions to potential or expected fire behavior. The KBDI determines forest fire potential based on a daily water balance, derived by balancing a drought factor with precipitation and soil moisture (assumed to have a maximum storage capacity of eight inches), and is expressed in hundredths of an inch of soil moisture depletion.

Each color in Figure 14-3 and 14-4 represents the drought index at that location, by date. The drought index ranges from 0 to 800. A drought index of 0 represents no moisture depletion, and a drought index of 800 represents absolutely dry conditions.

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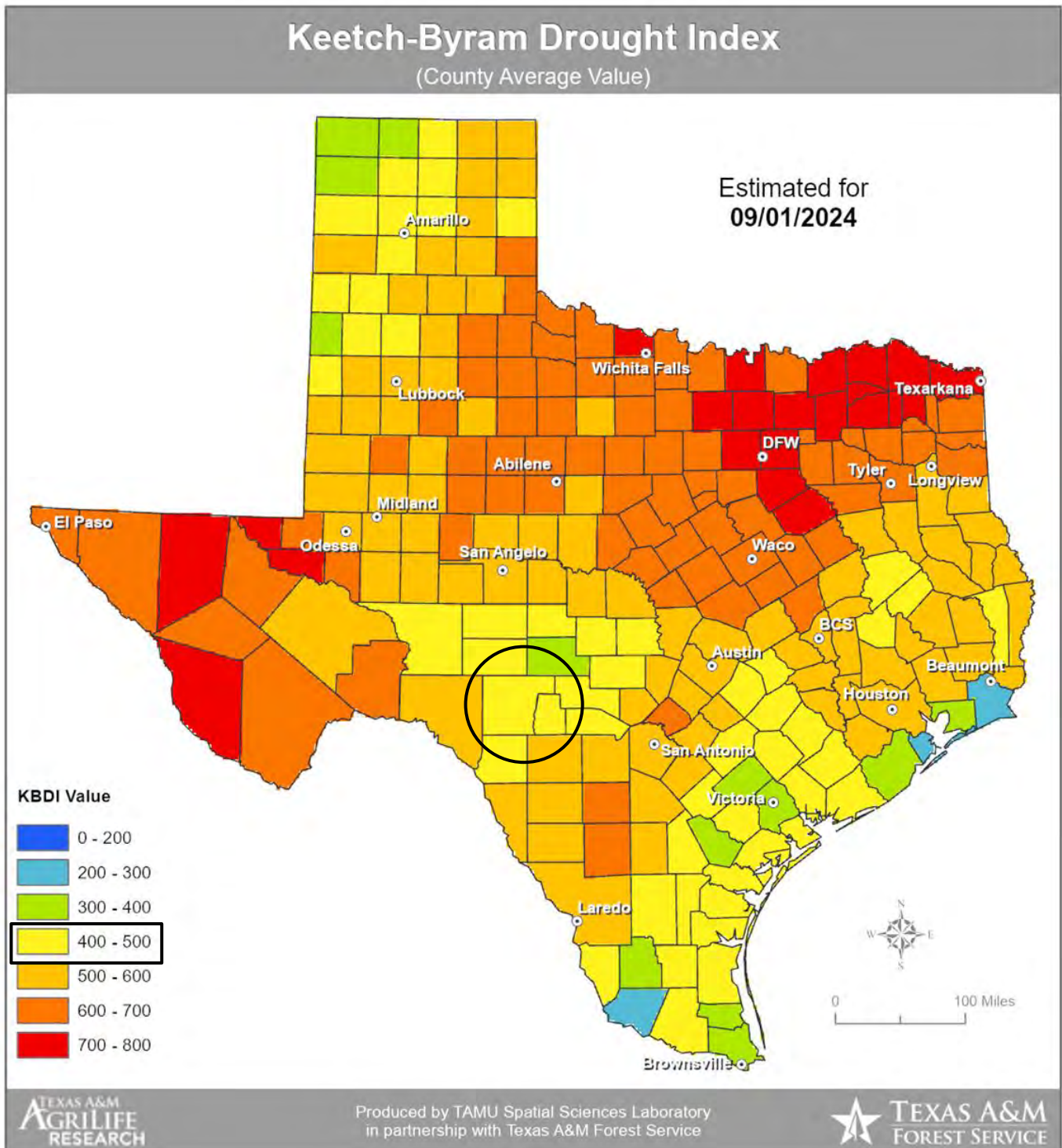
Figure 14-3. Keetch-Byram Drought Index (KBDI) for the State of Texas, 1/01/2024⁵



⁵ Edwards County planning area is located within the black circle.

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Figure 14-4. Keetch-Byram Drought Index (KBDI) for the State of Texas, 09/01/2024



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Fire behavior can be categorized at four distinct levels on the KBDI:

- **0 -200:** Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in spots and patches.
- **200 -400:** Fires more readily burn and will carry across an area with no gaps. Heavier fuels will not readily ignite and burn. Expect smoldering and the resulting smoke to carry into and possibly through the night.
- **400 -600:** Fires intensity begins to significantly increase. Fires will readily burn in all directions exposing mineral soils in some locations. Larger fuels may burn or smolder for several days creating possible smoke and control problems.
- **600 -800:** Fires will burn down to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity.

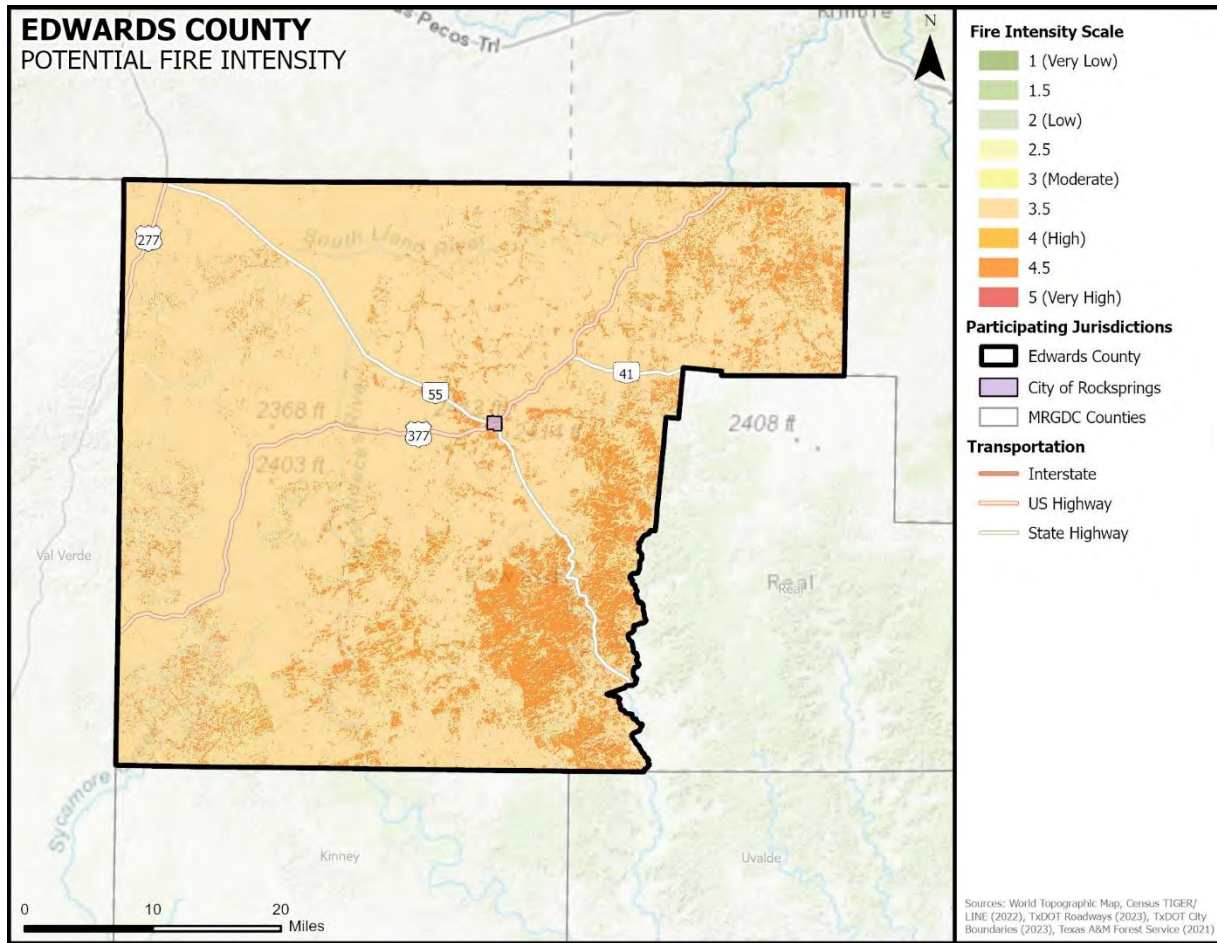
The KBDI is a good measure of the readiness of fuels for a wildfire event. It should be referenced as the area experiences changes in precipitation and soil moisture, while caution should be exercised in dryer, hotter conditions.

The range of intensity for the Edwards County planning area, in a wildfire event, is within 20 to 740. The average extent to be mitigated for the planning area is a KBDI of 450. Based on historical occurrences and readily available fuel, the planning area can anticipate a KBDI range from 0 to 800. At the high end of this range fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity.

The Texas Forest Service's Fire Intensity Scale identifies areas where significant fuel hazards and associated dangerous fire behavior potential exist based on weighted average of four percentile weather categories. The Edwards County planning area has a potential for a full range of wildfire intensities. Figure 14-5 and 14-6 identifies the wildfire intensity for the planning area.

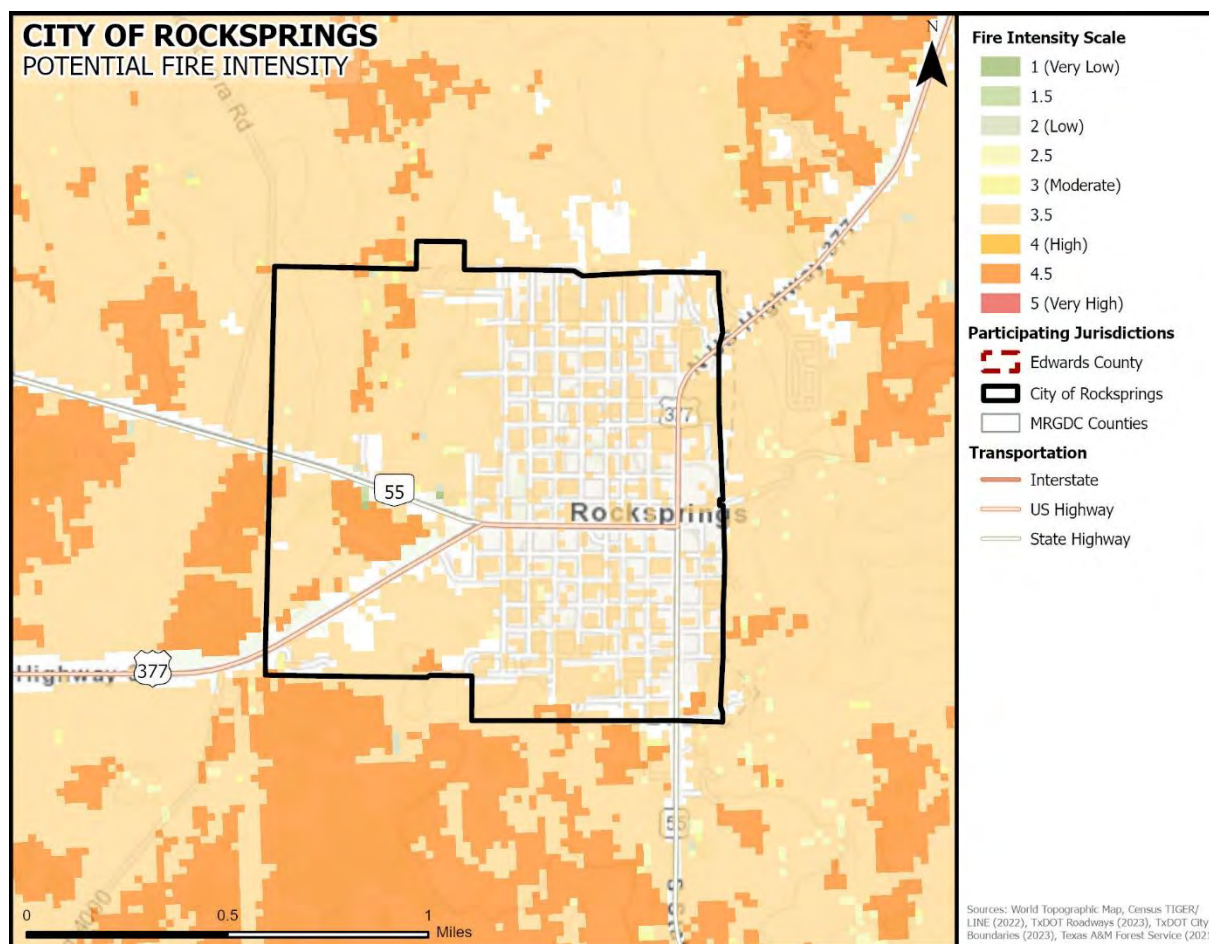
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Figure 14-5. Fire Intensity Scale Map – Edwards County



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Figure 14-6. Fire Intensity Scale Map – City of Rocksprings



HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) Storm Events Database includes three records of wildfire events from 1996 through June of 2024. These events took place in 2015, 2019, and 2022. The Brown Ranch Fire in 2015 resulted in \$657,900 (2024 dollars) in property damages. There are no other reported injuries, deaths, or damages for the events reported in the NCEI.

The Texas A&M Forest Service (TFS) reported 156 wildfire events for the Edwards County planning area between 2005 and 2021. 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 2021, frequency calculations are based on a 17-year reporting period, using only data from recorded years. The map below shows approximate locations of wildfires, which can be grass or brushfires of any size (Figure 14-7). Tables 14-1 through 14-3 identify the number of wildfires and total acreage burned each year within the county boundaries.

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Figure 14-7. Location and Historic Wildfire Events in Edwards County

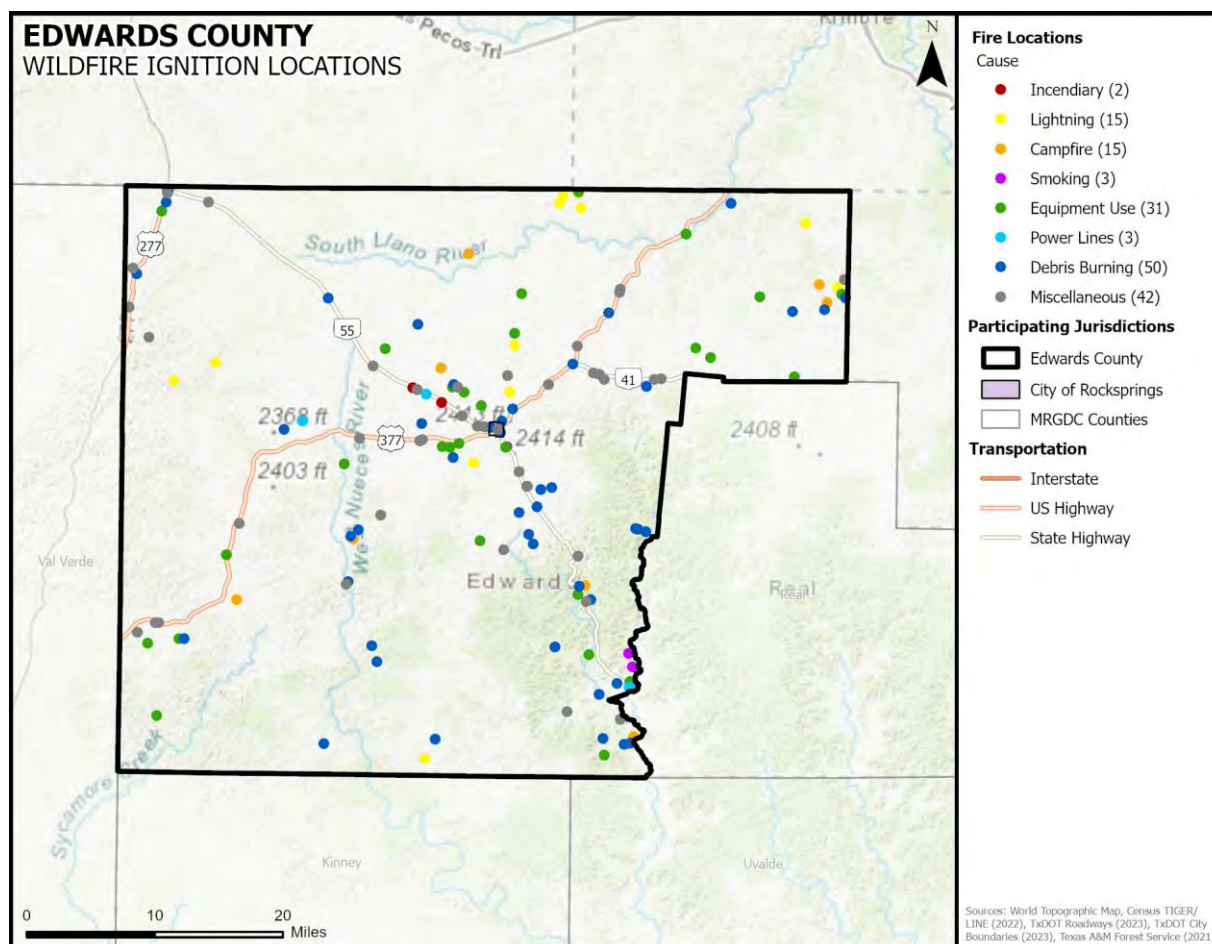


Table 14-1. Historical Wildfire Events Summary, 2005 - 2021⁶

JURISDICTION	NUMBER OF EVENTS	ACRES BURNED
Edwards County	153	52,881
City of Rocksprings	3	4

Table 14-2. Historical Wildfire Events by Year

YEAR	EDWARDS COUNTY	CITY OF ROCKSPRINGS
2005	3	0
2006	26	2
2007	4	0
2008	22	0

⁶ Source: Texas A&M Forest Service

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YEAR	EDWARDS COUNTY	CITY OF ROCKSPRINGS
2009	14	0
2010	9	1
2011	31	0
2012	7	0
2013	6	0
2014	3	0
2015	4	0
2016	15	0
2017	2	0
2018	1	0
2019	4	0
2020	0	0
2021	2	0
Total	153	3

Based on the list of historical wildfire events for the Edwards County planning area (listed above), 44 events have occurred since the 2012 plan.

Table 14-3. Acreage of Suppressed Wildfire by Year

YEAR	EDWARDS COUNTY	CITY OF ROCKSPRINGS
2005	1,004	0
2006	5,572	4
2007	129	0
2008	13,685	0
2009	4,709	0
2010	43	0
2011	4,542	0
2012	8	0
2013	84	0

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YEAR	EDWARDS COUNTY	CITY OF ROCKSPRINGS
2014	120	0
2015	19,354	0
2016	105	0
2017	2,286	0
2018	1	0
2019	1,238	0
2020	0	0
2021	1	0
Total	52,881	4

SIGNIFICANT EVENTS

There have been four declared disasters related to wildfire in Edwards County between 1996 and 2024 (Table 14-4). Additional details on certain wildfire events are described below.

Table 14-4. Disaster Declarations for Wildfire, 1996-2024

YEAR	DECLARATION TITLE	DECLARATION TYPE	DISASTER NO.
1999	Texas Extreme Fire Hazards	EM	EM-3142-TX
2006	Extreme Wildfire Threat in Texas	DR	DR-1624-TX
2008	Wildfires in Texas	EM	EM-3284-TX
2011	Wildfires in Texas	DR	DR-4029-TX

August 10, 2015 – Edwards County

The Brown Ranch Fire burned 17,831 acres in the Edwards County planning area. The wildfire started on August 10, 2015, and was 100% contained by August 16, 2015. Three homes were destroyed by the fire and at least another 40 were evacuated. According to the NCEI, this event caused an estimated \$657,900 (2024 dollars) in property damages.

PROBABILITY OF FUTURE EVENTS

Wildfires can occur at any time of the year. As Edwards County communities move into wildland, the potential area of occurrence of wildfire increases. With 156 events in a 17-year period, an event within the Edwards County planning area is “Highly Likely”, meaning an event is probable within the next year. According to NOAA, research shows that changes in climate create warmer, drier conditions, leading to longer and more active fire seasons, indicating an increase in the frequency and severity of events in the planning area going forward.

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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 Edwards County will include increased temperatures, which according to the U.S. Climate Explorer, the planning area may experience a 5°F increase in the average extreme heat temperatures. Historically, extreme temperatures averaged 98°F in Edwards County, but between 2035 and 2064 the average will be 103°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 5 and 7 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. Figure 14-8 and 14-9⁹ illustrates the areas that are the most vulnerable to wildfire throughout the Edwards County planning area.

The Edwards County Planning Team identified the following critical facilities (Table 14-5) as assets that are considered the most important to the planning area and are susceptible to a range

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 Source: TxWRAP portal at the following site: <https://texaswildfirerisk.com/>

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of impacts caused by wildfire events. For a comprehensive list by participating jurisdiction, please see Appendix C.

Table 14-5. Critical Facilities/Critical Services Vulnerable to Wildfire Events

CRITICAL FACILITIES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	<p>Edwards County: 1 EMS Facility, 1 Fire Station, 2 Police Stations</p> <p>City of Rocksprings: 1 EMS Facility, 1 Fire Station, 1 Healthcare Facility, 2 Police Stations</p>	<ul style="list-style-type: none"> ➤ 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 city 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/	Edwards County: 2 Evacuation Shelter Facilities, 3 Municipal Facilities, 3 School Facilities, 1 Transportation Facility	<ul style="list-style-type: none"> ➤ 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

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CRITICAL FACILITIES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
Assisted Living Facilities	City of Rocksprings: 3 Evacuation Shelter Facilities, 4 Municipal Facilities, 2 School Facilities	command centers for logistics, communications, and emergency operations.
Commercial Supplier (food, fuel, etc.)	N/A	<ul style="list-style-type: none"> ➤ 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)	Edwards County: 2 Communication Facilities, 1 Energy Utility, 6 Sewage and Water Facilities City of Rocksprings: 2 Communication Facilities, 1 Energy Utility, 5 Sewage and Water Facilities	<ul style="list-style-type: none"> ➤ 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.

Within the Edwards County planning area, a total of 156 fire events were reported from 2005 through 2021 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 14-6 below. The average frequency is approximately nine events every year.

Table 14-6. Average Annualized Acreage Losses¹⁰

JURISDICTION	TOTAL ACRES BURNED	AVERAGE ANNUAL ACRE LOSSES
Edwards County	52,881	3,110
City of Rocksprings	4	<1 Acre
PLANNING AREA	52,885	3,110

Wildfire Ignition Density shows the likelihood of a wildfire starting based on historical ignition patterns. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. The ignition rate is measured in the number of fires per year per 1,000 acres. Wildfire Ignition Density is a key input into the calculation of the Wildfire Threat output.

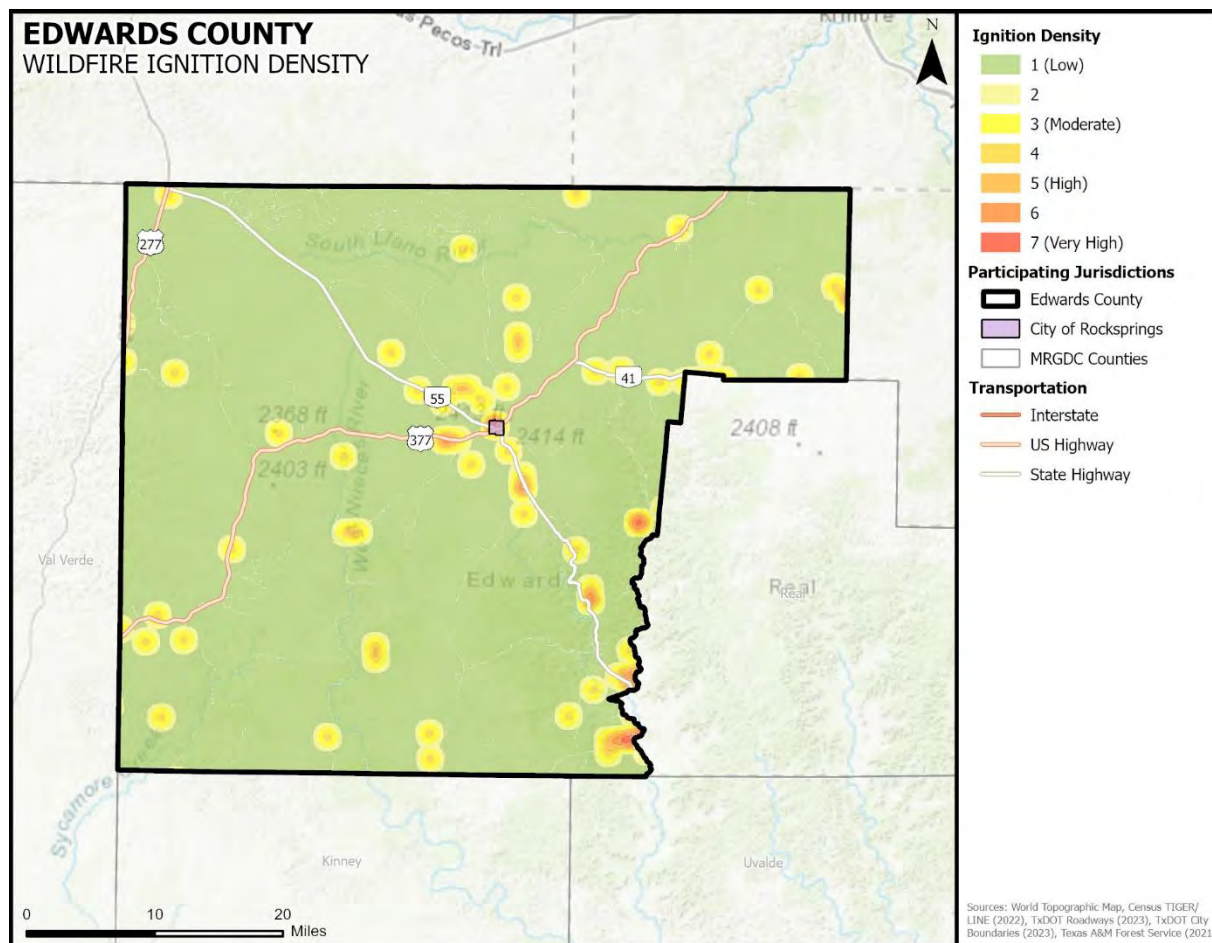
¹⁰ Events divided by 17 years of data.

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With most Texas fires being human caused, there is a repeatable spatial pattern of fire ignitions over time. This pattern identifies areas where wildfires are most likely to ignite, and prevention efforts can be planned accordingly.¹¹

Figures 14-8 through 14-9 show the threat of wildfire to the Edwards County planning area.

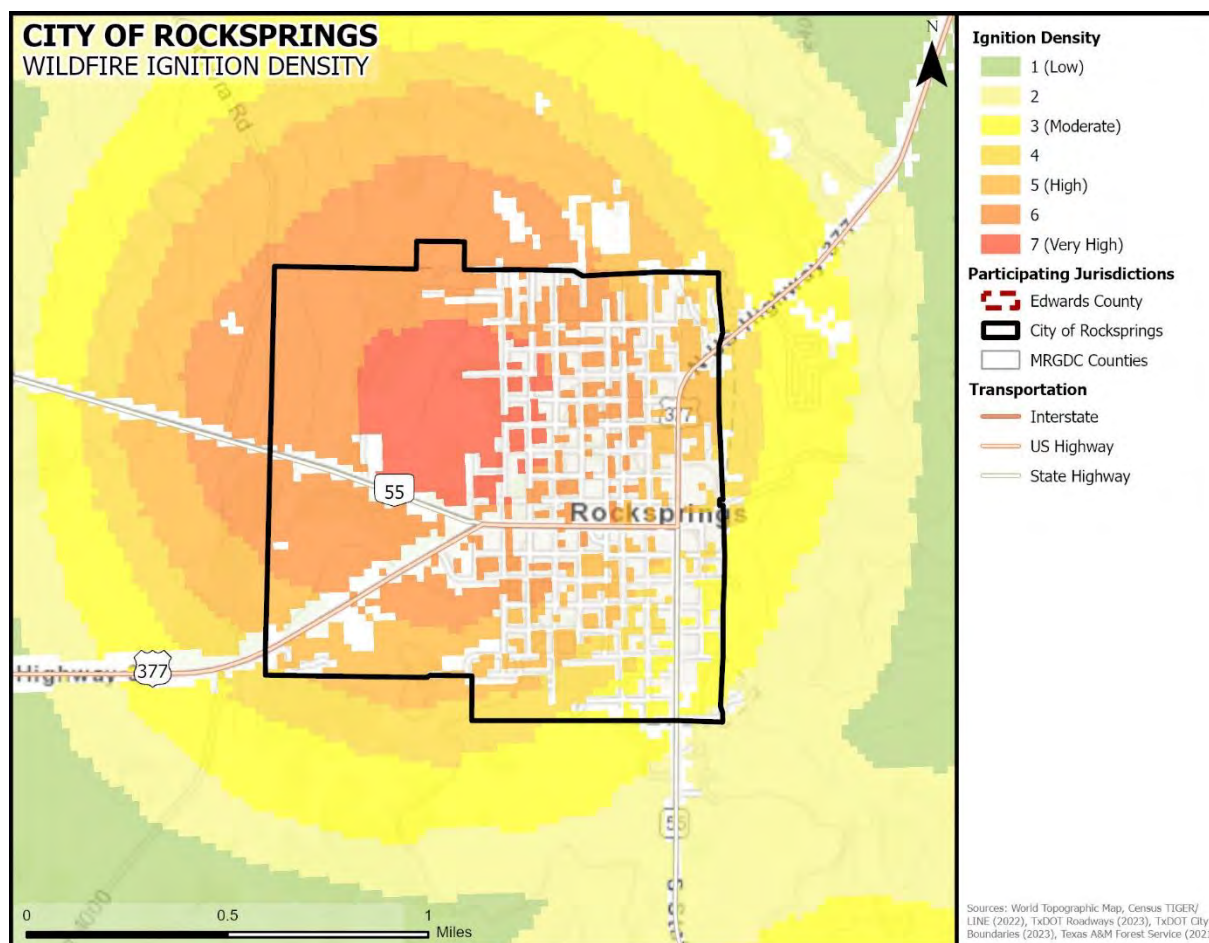
Figure 14-8. Wildfire Ignition Density – Edwards County



¹¹ Source: TxWRAP portal at the following site: <https://texaswildfirerisk.com/>

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Figure 14-9. Wildfire Ignition Density – City of Rocksprings

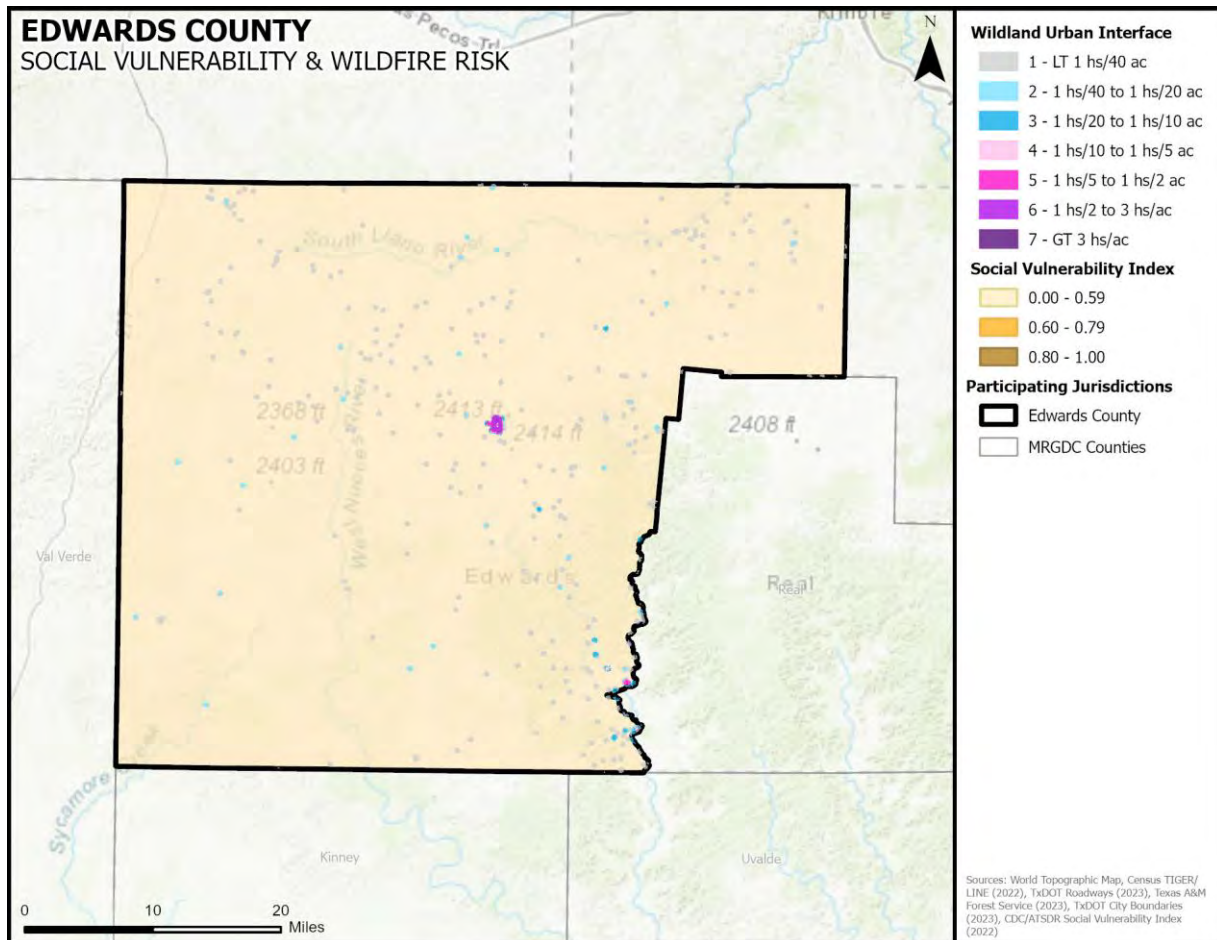


Diminished air quality is an environmental impact that can result from a wildfire event and pose a potential health risk. The smoke plumes from wildfires can contain potentially inhalable carcinogenic matter. Fine particles of invisible soot and ash that are too small for the respiratory system to filter 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 14-10 identifies areas of social vulnerability using the CDC's SVI and where these areas overlap with the Edwards County WUI areas, where wildfire risk is considered the highest.

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Figure 14-10. Edwards 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.

For the Edwards County planning area, the impact from a wildfire event can be 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. Severity of impact is gauged by acreage burned, homes and structures lost, injuries and fatalities.

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Table 14-7. Impact for Edwards County

JURISDICTION	IMPACT	DESCRIPTION
Edwards County	Limited	Edwards County has an estimated 1,817 people or 98 percent of the total population that live within the Wildland Urban Interface (WUI). The housing density is most commonly 1 house per 2 acres. Injuries and illnesses are treatable with first aid. Critical facilities and services could be shut down for 24 hours or less, and less than 10 percent of property destroyed or with major damage.
City of Rocksprings	Limited	Within the City of Rocksprings, it is estimated that 1,083 people or 97 percent of the total population live within the Wildland Urban Interface (WUI). Average housing density is most commonly 1 house per 2 acres. Injuries and illnesses are treatable with first aid. Critical facilities and services could be shut down for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

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 a wildfire are not limited to direct damage. Significant wildfire events can be frequently associated with a variety of impacts, including:

- The Edwards 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 county and city 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 and city 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.

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- 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.
- Older homes are generally exempt from modern building code requirements, which may require fire suppression equipment in the structure. An estimated 65 percent of homes in the planning area were built before 1980. Similarly, historic buildings may lack fire mitigation materials or measures due to their historic status. There is one historical site listed on the National Register of Historic Places for Edwards County.
- 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 a 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 15

WINTER STORM

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HAZARD DESCRIPTION



A severe winter storm event is identified as a storm with snow, ice, or freezing rain. This type of storm can cause significant problems for area residents. Winter storms are associated with freezing or frozen precipitation such as freezing rain, sleet, snow, and the combined effects of winter precipitation and strong winds. Wind chill is a function of temperature and wind. Low wind chill is a product of high winds and freezing temperatures.

Winter storms that threaten the Edwards County planning area usually begin as powerful cold fronts that push south from central Canada. Although the county is at risk of ice hazards, extremely cold temperatures, and snow, the effects and frequencies of winter storm events are generally mild and short-lived.

As indicated in Figure 15-1, the Edwards County planning area is mostly located in USDA Hardiness Zone 8b, indicating annual minimum temperatures between 15°F and 20°F. Table 15-1 describes the types of winter weather possible to occur in the Edwards County planning area.

SECTION 15: WINTER STORM

Figure 15-1. Annual Minimum Temperature¹

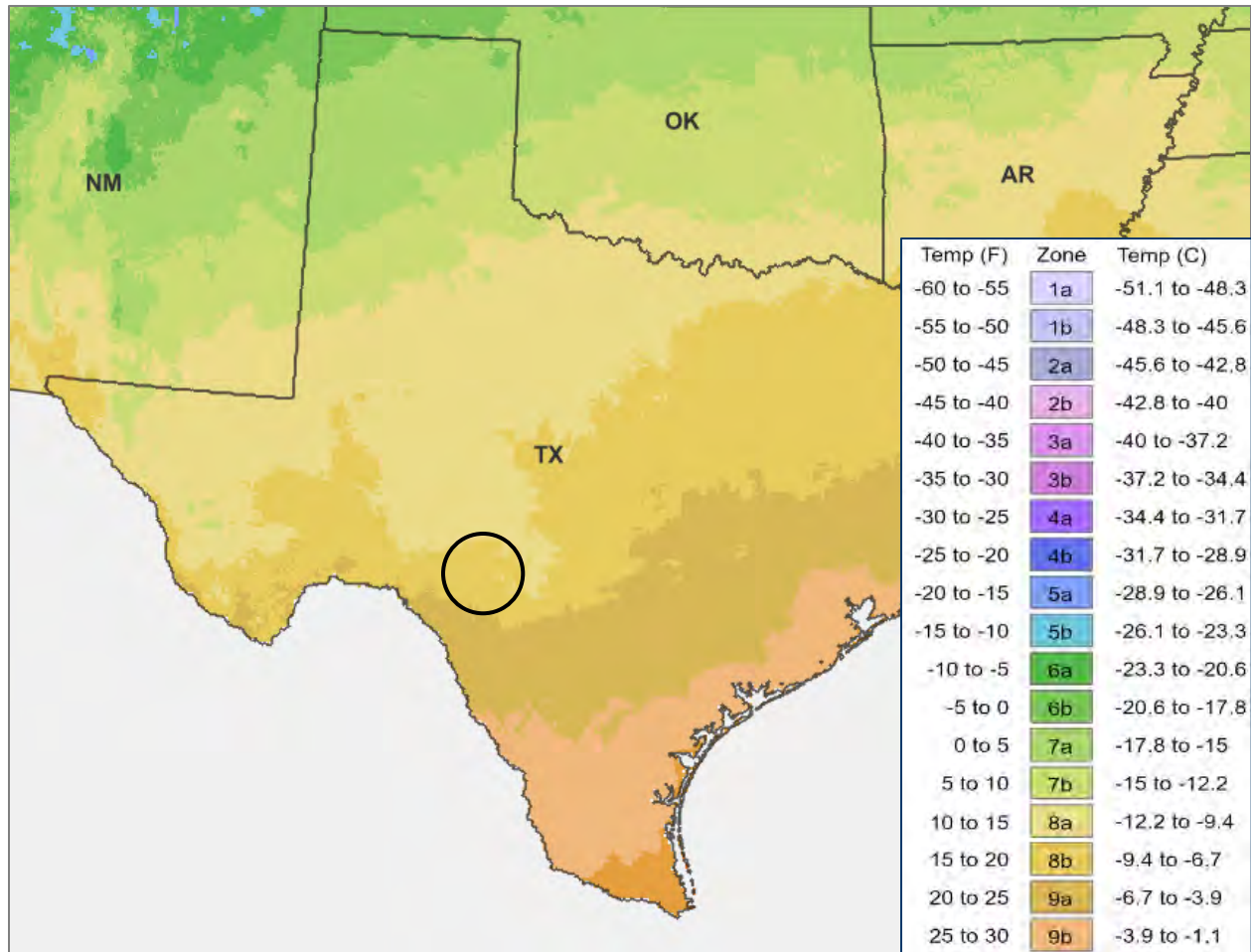


Table 15-1. Types of Winter Weather

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.
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.

¹ 2023 USDA Plant Hardiness Zone Map, <https://planthardiness.ars.usda.gov/>. The Edwards County planning area is indicated by the black circle.

SECTION 15: WINTER STORM

LOCATION

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

EXTENT

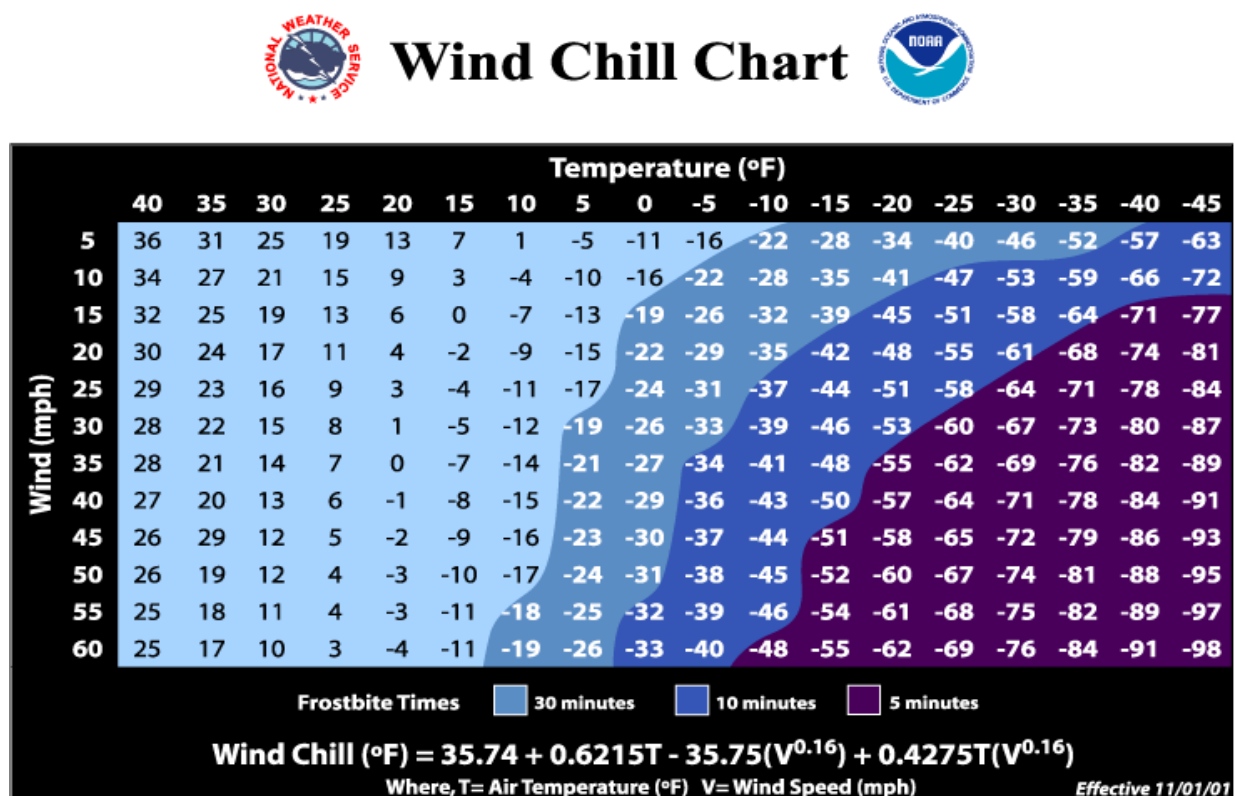
The extent or magnitude of a severe winter storm is measured in intensity based on the temperature and level of accumulations as shown in Table 15-2. Table 15-2 should be read in conjunction with the wind-chill factor described in Figure 15-2 to determine the intensity of a winter storm. The chart is not applicable when temperatures are over 50°F or winds are calm. This is an index developed by the National Weather Service.

Table 15-2. 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

SECTION 15: WINTER STORM

Figure 15-2. Wind Chill Chart



Wind chill temperature is a measure of how cold the wind makes real air temperature feel to the human body. Since wind can dramatically accelerate heat loss from the body, a blustery 30°F day would feel just as cold as a calm day with 0°F temperatures. The Edwards County planning area has 28 previous occurrences recorded from January 1996 through June 2024 in the National Centers for Environmental Information (NCEI) Storm Events Database. The planning area has never experienced a blizzard, but it has been subject to extreme cold and wind chill, heavy snow, winter weather, and winter storms.

The average number of cold days is similar for the entire planning area. Therefore, the intensity or extent of a winter storm event to be mitigated for the area ranges from significant to severe according to the definitions in Table 15-2. The Edwards County planning area can expect anywhere between 0.1 to 4.0 inches of ice and snow during a winter storm event, and temperatures between 15°F and 20°F with winds ranging from 0 to over 35 mph. During Winter Storm Uri in 2021, the Edwards County planning area experienced wind chill values as low as -10°F to -15°F. In December 2020, the City of Rocksprings received 4.5 inches of snowfall in some areas during a winter storm. This is likely the greatest extent the planning area can anticipate in the future, based on historical events.

The National Weather Service issues a winter storm watch, advisory or warning in advance of an event in order to give people enough time to prepare for an event. Edwards County could be under any of these warning types in advance of a winter storm event. Table 15-3 describes when each warning type would be issued.

SECTION 15: WINTER STORM

Table 15-3. Winter Storm Watch, Advisory, Warning Descriptions

TYPE OF WINTER WEATHER	DESCRIPTION
Winter Weather Advisory	This alert may be issued for a variety of severe conditions. Weather advisories may be announced for snow, blowing or drifting snow, freezing drizzle, freezing rain, or a combination of weather events.
Winter Storm Watch	Severe winter weather conditions may affect your area (freezing rain, sleet, or heavy snow may occur separately or in combination).
Winter Storm Warning	Severe winter weather conditions are imminent.
Freezing Rain or Freezing Drizzle	Rain or drizzle is likely to freeze upon impact, resulting in a coating of ice glaze on roads and all other exposed objects.
Sleet	Small particles of ice usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.
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.

HISTORICAL OCCURRENCES

According to historical records and the best available data there have been 28 recorded winter storm events in the Edwards County planning area. Historical winter storm information, as provided by the NCEI, identifies winter storm 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, when appropriate. Historical winter storm data for the planning area is provided on a County-wide basis per the NCEI database. Table 15-4 shows historical incident information for the planning area.

Table 15-4. Historical Winter Storm Events, January 1996 – June 2024

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Edwards County	11/24/1996	0	0	\$0	\$0
Edwards County	1/7/1997	0	0	\$0	\$0
Edwards County	1/11/1997	0	0	\$0	\$0
Edwards County	12/12/2000	0	0	\$0	\$0
Edwards County	11/28/2001	0	0	\$0	\$0

SECTION 15: WINTER STORM

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Edwards County	2/24/2003	0	0	\$0	\$0
Edwards County	1/16/2007	0	0	\$0	\$0
Edwards County	1/27/2009	0	0	\$0	\$0
Edwards County	2/12/2012	0	0	\$0	\$0
Edwards County	11/26/2013	0	0	\$0	\$0
Edwards County	12/5/2013	0	0	\$0	\$0
Edwards County	12/31/2014	0	0	\$0	\$0
Edwards County	1/9/2015	0	0	\$0	\$0
Edwards County	1/23/2015	0	0	\$0	\$0
Edwards County	12/7/2017	0	0	\$0	\$0
Edwards County	1/16/2018	0	0	\$0	\$0
Edwards County	11/11/2019	0	0	\$0	\$0
Edwards County	10/27/2020	0	0	\$0	\$0
Edwards County	12/31/2020	0	0	\$0	\$0
Edwards County	2/13/2021	0	0	\$0	\$0
Edwards County	2/14/2021	0	0	\$0	\$0
Edwards County	1/20/2022	0	0	\$0	\$0
Edwards County	2/3/2022	0	0	\$0	\$0
Edwards County	12/22/2022	0	0	\$0	\$0
Edwards County	2/1/2023	0	0	\$0	\$0
Edwards County	1/14/2024	0	0	\$0	\$0
Edwards County	1/15/2024	0	0	\$0	\$0
Edwards County	1/16/2024	0	0	\$0	\$0
TOTALS		0	0	\$0	

Table 15-5. Historical Winter Storm Events Summary, January 1996 – June 2024

JURISDICTION	NUMBER OF EVENTS	DEATHS	INJURIES	PROPERTY DAMAGES	CROP DAMAGES
Edwards County	28	0	0	\$0	\$0

SECTION 15: WINTER STORM

Based on the list of historical winter storm events for the Edwards County planning area, 19 of the events have occurred since the 2012 Plan.

SIGNIFICANT EVENTS

February 13, 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 Edwards 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.²

In Edwards County, the winter weather resulted in wind chill values as low as -10°F to -15°F. Emergency management also reported power lines downed across several roadways in the planning area due to ice accumulation, though property damage estimates are unavailable.

January 31, 2022 – February 2, 2023

A cold front brought a shallow layer of cold air, which combined with a warm, moist southeasterly flow above it to produce light freezing rain and freezing drizzle for several days. Freezing rain began around midnight on January 31st and continued sporadically through February 2nd. By the end of the storm, a quarter of an inch of ice had accumulated at Devil's Sinkhole State Natural Area within the Edwards County planning area. Though no damages for Edwards County were reported, Pedernales Electric Cooperative, which provides electricity to parts of Edwards County, reported \$13 million in damages from this winter storm.

PROBABILITY OF FUTURE EVENTS

According to historical records, the Edwards County planning area is expected to experience approximately one winter storm event each year. The probability of a future winter storm event affecting the Edwards County planning area is considered "Highly Likely", with a winter storm likely to occur 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.³ 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.⁴ A trend that is

² 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>

³ Fourth National Climate Assessment. Chapter 23 Southern Great Plains. U.S. Global Change Program. 2018.

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.

SECTION 15: WINTER STORM

expected to continue with winter extremes estimated to be milder by 2036 compared to extremes in the historic record.⁵

VULNERABILITY AND IMPACT

During periods of extreme cold and freezing temperatures, water pipes can freeze and crack, and ice can build up on power lines, causing them to break under the weight or causing tree limbs to fall on the lines. These events can disrupt electric service for long periods.

An economic impact may occur due to increased consumption of heating fuel, which can lead to energy shortages and higher prices. House fires and resulting deaths tend to occur more frequently from increased and improper use of alternate heating sources. Fires during winter storms also present a greater danger because water supplies may freeze and impede firefighting efforts.

The Edwards County Planning Team identified the following critical facilities (Table 15-6) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by winter storm events. For a comprehensive list by participating jurisdiction, please see Appendix C.

Table 15-6. Critical Facilities Vulnerable to Winter Storm Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	<ul style="list-style-type: none">➤ Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications.➤ Exposure to extreme cold can cause illnesses in first responders if exposed for a period of time.➤ Roads may become impassable due to snow and/or ice impacting response times by emergency services.➤ Extended power outages due to increased usage may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	<ul style="list-style-type: none">➤ Power outages due to increased usage could disrupt critical care.➤ Backup power sources could be damaged.➤ Increased number of patients due to exposure to cold temperatures could lead to a strain on staff.➤ 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.➤ Essential supplies like medicines, water, food, and equipment deliveries may be delayed.

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.

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CRITICAL FACILITIES	POTENTIAL IMPACTS
	<ul style="list-style-type: none"> ➤ Economic disruption due to power outages negatively impact airport services as well as area businesses reliant on airport operations. ➤ Exposure risks to outdoor workers.
Commercial Supplier (food, fuel, etc.)	<ul style="list-style-type: none"> ➤ 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)	<ul style="list-style-type: none"> ➤ 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. ➤ Power outages due to increased usage could disrupt critical care. ➤ Backup power sources could be damaged. ➤ Water pipes can freeze and burst leading to flooding within facilities.

People and animals are subject to health risks from extended exposure to cold air (Table 15-7). Elderly people are at greater risk of death from hypothermia during these events, especially in the neighborhoods with older housing stock. According to the U.S. Center for Disease Control, every year hypothermia kills about 600 Americans, half of whom are 65 years of age or older.

Due to factors like limited mobility, communication difficulties, medical needs, sensitivity to cold temperatures, reliance on support services, transportation challenges, housing accessibility issues, and possible shortages in emergency shelter accommodations, people with disabilities are particularly vulnerable to winter storms. Inclusive measures are crucial to address these vulnerabilities and ensure their safety during severe weather events.

Populations living below the poverty level may not be able to afford to run heat on a regular basis or an extended period of time. 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 Edwards County planning area is estimated at 23 percent of the total population and children under the age of 5 are estimated at 2 percent. The population with a disability is estimated at 17 percent of the total population. An estimated 25 percent of the planning area population live below the poverty level and 8 percent of the populations speak English 'less than very well' (Table 15-7).

Older homes tend to be more vulnerable to the impacts of winter storm events. Approximately 65 percent (584 structures) of the housing units in the planning area were built before 1980 (Table 15-8).

SECTION 15: WINTER STORM

Table 15-7. Populations at Greater Risk of Winter Storm Events⁶

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Edwards County	315	21	240	352	117
City of Rocksprings	206	21	149	167	101

Table 15-8. Structures at Greater Risk of Winter Storm Events

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980
Edwards County	584
City of Rocksprings	312

There are no recorded fatalities or injuries within the Edwards County planning area due to winter storm events. Additionally, there are no reported property or crop damages in the planning area. The limited recorded impacts of winter storms on the Edwards County planning area indicate a “Limited” severity of impact, 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.

ASSESSMENT OF IMPACTS

The greatest risk from a winter storm hazard is to public health and safety. The impact of climate change could produce longer, more intense winter storm events, exacerbating the current winter storm impacts. Worsening winter storm conditions can be frequently associated with a variety of impacts, including:

- Vulnerable populations, particularly the elderly (23 percent of total population), children under 5 (2 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.

⁶ U.S. Census Bureau 2023 data for Edwards County

SECTION 15: WINTER STORM

- 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 65 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 is one historical site, the Edwards County Courthouse and Jail in the City of Rocksprings, listed on the National Register of Historic Places for Edwards 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 16

CYBER ATTACK

SECTION 16: CYBER ATTACK

Portions of the La Salle County Hazard Mitigation Plan are considered confidential and not for release to the public. The information in this section is covered under Privacy Act of 1974 (5 U.S.C. Section 552a).



SECTION 17 **HAZARDOUS MATERIAL**

SECTION 17: HAZARDOUS MATERIALS

Portions of the La Salle County Hazard Mitigation Plan are considered confidential and not for release to the public. The information in this section is covered under Privacy Act of 1974 (5 U.S.C. Section 552a).



SECTION 18 **INFECTIOUS DISEASE**

SECTION 18: INFECTIOUS DISEASE

Portions of the La Salle County Hazard Mitigation Plan are considered confidential and not for release to the public. The information in this section is covered under Privacy Act of 1974 (5 U.S.C. Section 552a).



SECTION 19 **TERRORISM**

SECTION 19: TERRORISM

Portions of the La Salle County Hazard Mitigation Plan are considered confidential and not for release to the public. The information in this section is covered under Privacy Act of 1974 (5 U.S.C. Section 552a).



SECTION 20 **MITIGATION STRATEGY**

SECTION 20: MITIGATION STRATEGY

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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 Workshop in September 2024, 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 required some changes including expanding on existing goals and the addition of a goal around equity and vulnerable populations.

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

Build and support local partnerships to continuously become less vulnerable to hazards.

OBJECTIVE 2.2

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

OBJECTIVE 2.3

Build hazard mitigation concerns into county and city planning and budgeting processes.

SECTION 20: MITIGATION STRATEGY

GOAL 3

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

OBJECTIVE 3.1

Heighten public awareness regarding the full range of natural and man-made 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 repetitive losses to the National Flood Insurance Program (NFIP).

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 put people in harm's way or increase threats to 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.

SECTION 20: MITIGATION STRATEGY

OBJECTIVE 6.3

Utilize regulatory approaches to prevent 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 21

PREVIOUS ACTIONS

SECTION 21: PREVIOUS ACTIONS

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SUMMARY

This section includes analysis from the 2012 Edwards County Hazard Mitigation Plan. Planning Team members were given copies of the previous mitigation actions submitted in the 2012 Edwards County Hazard Mitigation Plan at the mitigation workshop. Each previously participating jurisdiction reviewed the previous actions and provided an analysis as to whether the action had been completed, should be deferred as an ongoing activity, 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 “2025 Analysis” section.

SECTION 21: PREVIOUS ACTIONS

EDWARDS COUNTY

Edwards County – Previous Action #1	
Proposed Action:	Conduct a comprehensive public outreach and education campaign for all hazards.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	The action will result in a more informed public, aware of the risks they face from various hazards and knowledgeable about how to protect their families, home, workplaces, communities, and livelihoods from the impact of disasters. It will also assist in the recovery process since damage will be minimized and more residents will be self-sustaining for a longer period

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorms, flooding, hazardous materials incidents, wildland fire, drought, fuel pipeline, tornado
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Minimal
Potential Funding Sources:	Hazard Mitigation Grant Program funds and general revenue, free resource materials
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend verbiage to include all forms of media, include all applicable hazards, update cost, and remove fuel pipeline as it is not being profiled in plan update.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #2	
Proposed Action:	Provide early warning of disaster by promoting the use of NOAA "All Hazards" radios for early warning and post-event information.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This mitigation action would provide early warning of dangerous conditions, allowing time for individuals to take appropriate action to protect lives and property.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorms, flooding, hazardous materials incidents, wildland fire, tornado
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	High
Estimated Cost:	Approximately \$25 per NOAA weather radio for a battery-powered unit with the SAME technology
Potential Funding Sources:	General revenue, partnerships with local retailers, and Federal grants such as the HMGP's initiative project.
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend action to include "Provide early warning of disaster by acquiring and distributing" update cost and include all applicable hazards.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #3	
Proposed Action:	Equip critical facilities with back-up generators to provide auxiliary power.
BACKGROUND INFORMATION	
Site and Location:	County Courthouse/Sheriffs Office, City Halls/Fire Stations and EMS Facilities
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action will provide for the continuity of critical facilities and operations of government in the event of a power supply disruption.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorms, flooding, hazardous materials incidents, wildland fire, tornado
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	High
Estimated Cost:	\$30,000 for all critical facilities within the county
Potential Funding Sources:	FEMA HMGP, Homeland Security grant funds, and general revenues.
Lead Agency/Department Responsible:	Emergency Management Coordinator in coordination with the Fire Department Chief
Implementation Schedule:	2016, with one critical facility equipped with auxiliary power per year

2025 ANALYSIS:
Defer to plan update. Amend action to include “identified critical facilities,” include all applicable CF locations and water/wastewater facilities, update costs, and all applicable hazards.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #4	
Proposed Action:	Develop a coordinated regional evacuation plan, working with officials from other Middle Rio Grande border region counties.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action will help ensure more orderly operations in the event of a large and/or transboundary disaster. It will also help ensure that the necessary transportation assets are available to support a large-scale evacuation.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Hazardous Material Incidents, Wildland Fire
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	High
Estimated Cost:	Minimal
Potential Funding Sources:	General revenue and grants from Homeland Security as well as the U.S. EPA's Border 2012 initiative
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2013

2025 ANALYSIS:
Defer to plan update. Amend to include all applicable hazards and update cost.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #5	
Proposed Action:	Install surge protector on critical electronic equipment.
BACKGROUND INFORMATION	
Site and Location:	County-wide critical electronic equipment
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action will reduce damage to critical electronic equipment, thereby reducing replacement costs and ensuring continuing operation in emergency conditions.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorms, Tornado
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Approximately \$40 per surge protector
Potential Funding Sources:	General Revenue
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend verbiage to include “all critical facilities,” update cost, and include all applicable hazards.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #6	
Proposed Action:	Develop a water conservation action plan, including public education and outreach to warn citizens about the risks to public health caused by drought. Promote xeriscaping. Develop steps to be taken in Level I, II, and III droughts.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	This action will help conserve scarce water resources needed not only for human consumption, farming, firefighting, and other needs.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Minimal
Potential Funding Sources:	TWDB, Natural Resources Conservation Service, and general revenue
Lead Agency/Department Responsible:	Emergency Management Coordinator in coordination with Director of Public Works
Implementation Schedule:	2015

2025 ANALYSIS:
Defer to plan update. Update spelling for xeriscaping and update cost.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #7	
Proposed Action:	Conduct analysis to determine expected flood levels. Identify and map low water crossings and roadways prone to flooding to serve a basis for evacuation planning.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	This action will identify and map low water crossings and roadways prone to flooding. It will serve to educate the public, facilitate emergency protective actions and serve as the basis for future evacuation planning.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Minimal
Potential Funding Sources:	General Revenue
Lead Agency/Department Responsible:	Police and Fire Departments
Implementation Schedule:	2014

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #8	
Proposed Action:	Join the National Flood Insurance Program.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action would provide the city residents and businesses with insurance coverage and reduce flood risks.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Effect on New/Existing Buildings:	This action will reduce flood risk to new buildings over time and can provide funding to permanently remove existing structures from the floodplain. It does not allow construction of new buildings in the affected area.
Priority (High, Medium, Low):	High
Estimated Cost:	Minimal
Potential Funding Sources:	Staff time only
Lead Agency/Department Responsible:	Floodplain Manager
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend action to update the cost.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #9	
Proposed Action:	Implement drainage projects, including building or upgrading culverts at low water crossings.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	New and upgraded culverts will help carry flood waters away from roads and bridges. This action will reduce the damage to vehicle drivers and pedestrians who may otherwise be swept away as they try to cross flooded areas. It will also help reduce damages to buildings and the disruption of transportation systems and critical utilities.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Effect on New/Existing Buildings:	Implementation of the study findings will provide protection for existing structures and enable new development outside the floodplain.
Priority (High, Medium, Low):	High
Estimated Cost:	To be determined
Potential Funding Sources:	TWDB, CDBG, and FEMA-HMGP, PDM, with matching funds from general revenues and CDBG.
Lead Agency/Department Responsible:	Department of Public Works
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #10	
Proposed Action:	Increase the level of hazardous materials training for first responders; Conduct a county-wide needs assessment and consider acquiring additional equipment and vehicles for hazardous materials response.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	This action will help improve knowledge and capabilities and minimize risk to the public. It will also provide responders with information on the nature and potential health threat of chemicals being transported and enable emergency officials to better respond to hazardous materials accidents.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials Incident
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	To be determined based on needs assessment results
Potential Funding Sources:	General Revenue
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #11	
Proposed Action:	Develop, train, and exercise plans, procedures and equipment for emergency personnel in the event of a hazardous materials incident.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action will help ensure that roles and responsibilities for a response to an incident are clear and personnel are adequately trained.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials Incident
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Specific costs are to be determined but are expected to be modest
Potential Funding Sources:	General revenue and grants from FEMA and other agencies
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	2015

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #12	
Proposed Action:	Develop emergency response and evacuation plan for use in the unlikely event of a major disaster.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action can save lives in the unlikely event of disaster.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All hazards
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Evacuation planning costs are estimated to be minimal, limited staff time
Potential Funding Sources:	General revenues may be needed to update the County's Emergency Response Plan based on the findings
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #13	
Proposed Action:	Obtain wildland firefighting equipment and work with the Texas Forest Service on fire breaks and other mitigation measures.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Creating fire breaks can slow or stop the spread of wildland fires by the removal of fuels for burning.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	This action will protect existing and new building by preventing or reducing the spread of fires
Priority (High, Medium, Low):	Medium
Estimated Cost:	To be determined after assessment of possible locations
Potential Funding Sources:	TFS, Natural Resources Conservation Services, and general revenues.
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	2015

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #14	
Proposed Action:	Review and update criteria for establishing burn bans and procedures for conduct and reporting of controlled burns.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: (<i>Current Cost/Losses Avoided</i>)	Together, these actions will help ensure that procedures are up to date and thus help prevent and manage wildland fires.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildland Fire
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Minimal
Potential Funding Sources:	TFS, Natural Resources Conservation Services, and general revenues.
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	2015

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #15	
Proposed Action:	Conduct a public information campaign for residents to improve anchoring of manufactured homes and exterior attachments such as carports and porches.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action prevents damage to manufactured homes and reduces the risk of loss of life and injury. It will help secure loose items so that they will not injure others.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorms
Effect on New/Existing Buildings:	This action will strengthen existing manufactured homes against severe winds. It will not affect new buildings.
Priority (High, Medium, Low):	Medium
Estimated Cost:	Minimal
Potential Funding Sources:	General Revenue
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2013

2025 ANALYSIS:
Defer to plan update. Amend to include applicable hazards, update cost, and combine with previous action 16.

SECTION 21: PREVIOUS ACTIONS

Edwards County – Previous Action #16	
Proposed Action:	Conduct a public information campaign for residents to improve anchoring of manufactured homes and exterior attachments such as carports and porches.
BACKGROUND INFORMATION	
Site and Location:	County-wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action prevents damage to manufactured homes and reduces the risk of loss of life and injury. It will help secure loose items so that they will not injure others.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorms, Tornado
Effect on New/Existing Buildings:	This action will strengthen existing manufactured homes against severe winds. It will not affect new buildings.
Priority (High, Medium, Low):	Medium
Estimated Cost:	Minimal, mostly requiring staff time
Potential Funding Sources:	Outreach funding, HMGP, general revenues
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend to include applicable hazards, update cost, and combine with previous action 15.

SECTION 21: PREVIOUS ACTIONS

CITY OF ROCKSPRINGS

City of Rocksprings – Previous Action #1	
Proposed Action:	Conduct a comprehensive public outreach and education campaign for all hazards, in partnership with the County.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action will result in a more informed public, aware of the risks they face from various hazards and knowledgeable about how to protect their families, homes, workplaces, communities and livelihoods from the impact of disasters. It will also result in lasting partnerships with those partners and community members who provide support. It will also assist in the recovery process since damage will be minimized and more residents will be self-sustaining for a longer period.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorms, flooding, hazardous materials incidents, wildland fire, drought, fuel pipeline failure, tornado
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Minimal
Potential Funding Sources:	Rio Grande Institute Outreach funding, HMGP, general revenues, free resource materials
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2015

2025 ANALYSIS:
Defer to plan update. Amend verbiage to include relevant media, update cost, and add applicable hazards.

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #2	
Proposed Action:	Use NOAA “All Hazards” radios for early warning and post-event information.
BACKGROUND INFORMATION	
Site and Location:	City-wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This mitigation action would provide early warning of dangerous conditions, allowing time for individuals to take appropriate action to protect lives and property.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorms, flooding, hazardous materials incidents, wildland fire, drought, fuel pipeline failure, tornado
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Approximately \$25 per radio for a battery-powered unit with the SAME technology.
Potential Funding Sources:	General Revenues, partnerships with local retailers, Federal grants
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend verbiage to include “Provide early warning of disaster by acquiring and distributing,” update cost, and include all applicable hazards.

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #3	
Proposed Action:	Equip critical facilities with back-up generators to provide auxiliary power.
BACKGROUND INFORMATION	
Site and Location:	Critical Facilities in city
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action will provide for continuity of critical facilities and operations of government in the event of a power supply disruption.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorms, flooding, hazardous materials incidents, wildland fire, fuel pipeline failures, tornado
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	High
Estimated Cost:	To be determined upon review of critical facilities list
Potential Funding Sources:	FEMA HMGP, Homeland Security Grants and General Revenues
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2012

2025 ANALYSIS:
Defer to plan update. Amend verbiage to include locations and applicable hazards.

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #4	
Proposed Action:	Install surge protectors on critical electronic equipment.
BACKGROUND INFORMATION	
Site and Location:	Critical Facilities
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action will reduce damage to critical electronic equipment, thereby reducing replacement costs and ensuring continuing operation in emergency conditions.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorms, tornado
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Approximately \$40 per surge protector
Potential Funding Sources:	General Revenues
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend verbiage to include “all critical facilities,” update cost, and include all applicable hazards.

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #5	
Proposed Action:	Develop a water conservation program, including public education and outreach to warn citizens about the risks to public health caused by drought. Promote zeroscaping to conserve water.
BACKGROUND INFORMATION	
Site and Location:	City Wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	This action will help conserve scarce water resources needed not only for human consumption, farming, firefighting and other needs.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Minimal
Potential Funding Sources:	TWDB, NRCS, general revenues
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2015

2025 ANALYSIS:
Defer to plan update. Update spelling for xeriscaping and update cost.

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #6	
Proposed Action:	Work with the County to identify and map low water crossings and roadways prone to flooding to serve as a basis for evacuation planning.
BACKGROUND INFORMATION	
Site and Location:	County/City Wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	With this action, the City will work with the County to identify and map low water crossings and roadways prone to flooding. It will serve to educate the public, facilitate emergency protective actions and serve as the basis for future evacuation planning.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Minimal
Potential Funding Sources:	General Revenues
Lead Agency/Department Responsible:	Police and Fire
Implementation Schedule:	2014

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #7	
Proposed Action:	Conduct an annual review of the National Flood Insurance Program’s “repetitive loss” list to determine if there are any properties within the City that repetitively flood.
BACKGROUND INFORMATION	
Site and Location:	City Wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Voluntary acquisitions permanently remove properties from the floodplain and provide open space for benefit of the public. Acquisitions also reduce costs for government to maintain infrastructure in flood prone areas and save emergency response costs.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Effect on New/Existing Buildings:	This action permanently removes existing structures from the floodplain. It does not allow construction of new buildings in the affected area.
Priority (High, Medium, Low):	High
Estimated Cost:	Minimal staff time would be required to review the repetitive loss list annually
Potential Funding Sources:	General Revenues
Lead Agency/Department Responsible:	Floodplain Manager
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #8	
Proposed Action:	Increase awareness of flood insurance and its benefits and costs.
BACKGROUND INFORMATION	
Site and Location:	City Wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Increased flood insurance coverage will provide greater financial protection for owners and renters.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Effect on New/Existing Buildings:	By proving financial protection to help rebuild after a disaster, this action will provide for faster rebuilding of existing structures after a disaster. The Increased Cost of Compliance insurance benefits will help rebuilding existing buildings in compliance with standards.
Priority (High, Medium, Low):	High
Estimated Cost:	Minimal; free training and publications are available.
Potential Funding Sources:	Training and publications are available at no cost through the Texas Water Development Board, the Texas Floodplain Management Association and the National Flood Insurance Program.
Lead Agency/Department Responsible:	Floodplain Administrator
Implementation Schedule:	2015

2025 ANALYSIS:
Defer to plan update. Amend action to update cost and verbiage to state “The awareness campaign will be aimed at local officials and property owners. It will encourage residents and business owners to purchase flood insurance.”

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #9	
Proposed Action:	Improve enforcement of the National Flood Insurance Program requirements, including those related to substantial damage/substantial improvement.
BACKGROUND INFORMATION	
Site and Location:	City wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	This action will reduce future flood risks and remove buildings from the floodplain over time.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Effect on New/Existing Buildings:	This will ensure that substantially improved or damaged buildings in Special Flood Hazard Areas are rebuilt in ways that reduce flood risks. It will not impact new buildings. It will, however, reduce buildings in the floodplain over time.
Priority (High, Medium, Low):	Medium
Estimated Cost:	Minimal
Potential Funding Sources:	General Revenues
Lead Agency/Department Responsible:	Floodplain Administrator
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #10	
Proposed Action:	Conduct a hazardous materials needs assessment and consider acquisition of additional equipment and vehicles. In partnership with the County, increase the level hazardous materials training for first responders.
BACKGROUND INFORMATION	
Site and Location:	City/County Wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	This action will help improve knowledge and capabilities and minimize risk to the public. It will also provide responders with information on the nature and potential health threat of chemicals being transported and enable emergency officials to better respond to hazardous materials accidents

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials Incident
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	To be determined based on needs assessment results.
Potential Funding Sources:	General Revenues
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #11	
Proposed Action:	Work with the County to implement drainage projects, including building or upgrading culverts at low water crossings.
BACKGROUND INFORMATION	
Site and Location:	City/County wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	New and upgraded culverts will help carry flood waters away from roads and bridges. This action will reduce the danger to vehicle drivers and pedestrians, who may otherwise be swept away as they try to cross flooded areas. It will also help reduce damage to buildings and the disruption of transportation systems, and critical utilities.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding
Effect on New/Existing Buildings:	Implementation of the study findings will provide protection for existing structures and enable new development outside the floodplain.
Priority (High, Medium, Low):	High
Estimated Cost:	To be determined
Potential Funding Sources:	TWDB, FEMA HMGP, PDM and CBDG
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	2016

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #12	
Proposed Action:	Write an emergency evacuation plan for use in the unlikely event of a major disaster.
BACKGROUND INFORMATION	
Site and Location:	City wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action can save lives in the unlikely event of major disaster
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	All Hazards
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Evacuation planning costs are estimated to be minimal, limited to staff time.
Potential Funding Sources:	General Revenues
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2016
2025 ANALYSIS:	
Defer to plan update. Amend action to update cost.	

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #13	
Proposed Action:	Write new, updated criteria for establishing burn bans; and procedures for conduct and reporting of controlled burns.
BACKGROUND INFORMATION	
Site and Location:	City wide
Risk Reduction Benefit: (<i>Current Cost/Losses Avoided</i>)	Together, these actions will help ensure that procedures are up to date and thus help prevent and manage wildland fires.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildland Fire
Effect on New/Existing Buildings:	None
Priority (High, Medium, Low):	Medium
Estimated Cost:	Minimal
Potential Funding Sources:	TX A&M Forest Service, NRCS, General Revenues
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	2015

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #14	
Proposed Action:	Educate citizens on wildfire prevention. Work with the Texas Forest Service on fire mitigation options and provide localized information to educate citizens.
BACKGROUND INFORMATION	
Site and Location:	City Wide
Risk Reduction Benefit: (Current Cost/Losses Avoided)	Creating fire breaks can slow or stop the spread of wildland fires by the removal of fuels for burning. Better equipment will help contain fires

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildland Fire
Effect on New/Existing Buildings:	This action will protect existing and new buildings by preventing or reducing the spread of fires.
Priority (High, Medium, Low):	Medium
Estimated Cost:	To be determined
Potential Funding Sources:	TX A&M Forest Service, NRCS, General Revenues
Lead Agency/Department Responsible:	Fire Department
Implementation Schedule:	2015

2025 ANALYSIS:
Defer to plan update. Amend action to update cost.

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #15	
Proposed Action:	Conduct a public information campaign for residents to improve anchoring of manufactured homes and exterior attachments such as carports and porches
BACKGROUND INFORMATION	
Site and Location:	City Wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action prevents damage to manufactured homes and reduces the risk of loss of life and injury. It will help secure loose items so that they will not injure others.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorms
Effect on New/Existing Buildings:	This action will strengthen existing manufactured homes against severe winds. It will not affect new buildings.
Priority (High, Medium, Low):	Medium
Estimated Cost:	Minimal
Potential Funding Sources:	General Revenue
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2013

2025 ANALYSIS:
Defer to plan update. Amend to include applicable hazards, update cost, and combine with Previous Action 16.

SECTION 21: PREVIOUS ACTIONS

City of Rocksprings – Previous Action #16	
Proposed Action:	Conduct a public information campaign for residents to improve anchoring of manufactured homes and exterior attachments such as carports and porches
BACKGROUND INFORMATION	
Site and Location:	City Wide
Risk Reduction Benefit: <i>(Current Cost/Losses Avoided)</i>	This action prevents damage to manufactured homes and reduces the risk of loss of life and injury. It will help secure loose items so that they will not injure others.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorms, Tornadoes
Effect on New/Existing Buildings:	This action will strengthen existing manufactured homes against severe winds. It will not affect new buildings.
Priority (High, Medium, Low):	Medium
Estimated Cost:	Minimal
Potential Funding Sources:	General Revenue
Lead Agency/Department Responsible:	Emergency Management Coordinator
Implementation Schedule:	2013

2025 ANALYSIS:
Defer to plan update. Amend to include applicable hazards, update cost, and combine with Previous Action 15.



SECTION 22 MITIGATION ACTIONS

SECTION 22: MITIGATION ACTIONS

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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 life¹.

As discussed in Section 2, at the mitigation 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, jurisdictions analyzed each action in terms of the overall costs, measuring whether the potential benefit to be gained from the action outweighed 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 worksheet, 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 worksheet, please see Appendix F for a list of all available State and Federal grant programs as of 2024. 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.

Edwards County is not a participant of the National Flood Insurance Program (NFIP) as they currently do not have the capability to administer the program. The City of Rocksprings is a participant in the National Flood Insurance Program (NFIP). Flooding was identified as a

¹ Cost, funding sources, and implementation schedules are subject to change upon full scoping of project and grant availability.

SECTION 22: MITIGATION ACTIONS

significant risk for these communities therefore many of the mitigation actions were developed with flood mitigation in mind. Actions related to NFIP compliance include additional narrative when deemed appropriate.

Table 22-1. Edwards 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	Drought	Earthquake	Extreme Heat	Flood	Hail	Hurricane/Tropical Storm	Lightning	Thunderstorm Wind	Tornado	Wildfire	Winter Storm
Edwards County	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●
City of Rocksprings	●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●

Jurisdiction	Cyber Attack	Hazardous Materials	Infectious Disease	Terrorism
Edwards County	●●●●	●●●●	●	●●●●
City of Rocksprings	●●●●	●●●●	●	●●●●

SECTION 22: MITIGATION ACTIONS

EDWARDS COUNTY

EDWARDS COUNTY MITIGATION ACTIONS														
<i>*Reduces risk to new and/or existing buildings and infrastructure</i>														
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	Implement a Phased Project for community shelters. Phase I: Complete a feasibility study of potential locations in Edwards County. This study will identify location suitability, shelter specifications, and costs. Phase II: Implement installation of shelters or FEMA complaint Domes at identified sites from the Phase I study.	County-wide	Reduce risk to citizens by providing shelter in high-risk areas during extreme weather events.	Structure and Infrastructure	Earthquake, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm, Wind, Tornado, Wildfire, Hazardous Materials, Terrorism	Safety/Security, Food/Hydration/Shelter	N/A	H	\$1,000,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Emergency Management Coordinator	60 Months	Emergency Operations Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
2	Harden/retrofit critical facilities to hazard-resistant levels.	County-wide	Reduce damages at critical facilities; Ensure continuity of critical services during and after event; Reduce risk of injury to emergency and critical personnel.	Structure and Infrastructure	Drought, Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm, Wind, Tornado, Wildfire, Winter Storm, Cyber Attack, Hazardous Materials, 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, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Emergency Management Coordinator	36-48 Months	Emergency Operations Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

EDWARDS 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	Develop and implement water well upgrade at county fairgrounds.	County fairgrounds	Reduce loss of water source during a hazard event.	Structure and Infrastructure Preparedness /Response	Drought	Water Systems	Y	M	\$100,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Emergency Management Coordinator	36 Months	Drought Contingency Plan	N/A
4	Implement drainage project at Cedar and Kimble Streets intersection.	County-wide including Rocksp rings	Reduce risk of flood damages through improved drainage capacity; Reduce risk of injuries to citizens; Reduce burden on emergency services during and after a flood event.	Structure and Infrastructure	Flood	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, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Emergency Management Coordinator	36 Months	N/A	Protects communities and reduces risk of flooding.

SECTION 22: MITIGATION ACTIONS

EDWARDS COUNTY MITIGATION ACTIONS														
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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	Implement education and awareness program utilizing media, social media, bulletins, flyers, etc. to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and property damages. Include links to weather alerts and departmental phone listings with contact personnel for residents.	County-wide	Promote hazard awareness and protect citizens from potential injuries and damages.	Education and Awareness	Drought, Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm, Cyber Attack, Hazardous Materials, Infectious Disease, Terrorism	Communication	N/A	M	\$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Emergency Management Coordinator	24 Months	Emergency Operations Plan	Promote public safety.
6	Provide early warning of disaster by acquiring and distributing NOAA "All Hazards" radios for early warning and post-event information.	County-wide	This action would provide early warning of dangerous conditions, allowing time for individuals to take appropriate action to protect lives and property.	Education and Awareness	Drought, Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm, Hazardous Materials, Terrorism	Communication	Y	H	\$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Emergency Manager Coordinator	24-36 Months	Emergency Operations Plan	Promote public safety.

SECTION 22: MITIGATION ACTIONS

EDWARDS 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	Equip identified critical facilities with back-up generators to provide auxiliary power.	County-wide critical facilities*	Provide power for critical facilities during power outages and ensure continuity of critical services.	Structure and Infrastructure	Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm, Wind, Tornado, Wildfire, Winter Storm, Cyber Attack, Hazardous Materials, Terrorism	Energy (Power/Fuel)	Y	H	\$700,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Emergency Management Coordinator in coordination with the Fire Department Chief	24-36 Months	Emergency Operations Plan	Helps ensure critical facilities continue to provide services during a power outage caused by unforeseen events.
*Identified critical facilities include County Courthouse @ 100 Main St.; County Annex @ 101 E. Main St.; County Sheriff/Fire Department/EMS building @400 W. Austin St.; County Road/Bridge building @ TX S55 Highway; County Fairgrounds Park Building @US 377; Rocksprings City Hall @100 W. Austin St.; water tower and well locations, and wastewater facilities														
8	Develop a coordinated regional evacuation plan, working with officials from other Middle Rio Grande border region counties.	County-wide	Life Safety benefits from coordinated evacuations.	Local Plans and Regulations Preparedness/Response	Earthquake, Flood, Hurricane/Tropical Storm, Tornado, Wildfire, Winter Storm, Hazardous Materials, Terrorism	Safety/Security	N/A	H	\$50,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Emergency Management Coordinator	12-24 Months	Emergency Operations Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

EDWARDS COUNTY MITIGATION ACTIONS														
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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	Install surge protectors on critical electronic equipment at all critical facilities.	County-wide critical electronic equipment	Reduce damage to critical electronic equipment and ensure continuity of operations.	Structure and Infrastructure	Earthquake, Flood, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm	Safety/Security	Y	M	\$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Emergency Management Coordinator	24-36 Months	Emergency Operations Plan	Helps ensure critical facilities continue to provide services during a power outage caused by unforeseen events.
10	Develop a water conservation action plan, including public education and outreach to warn citizens about the risks to public health caused by drought. Promote xeriscaping. Develop steps to be taken in Level I, II, and III droughts.	County-wide	Reduce impact of drought through education and conservation.	Education and Awareness	Drought	Safety/Security	Y	M	\$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Emergency Management Coordinator, Public Works	24-36 Months	Drought Contingency Plan	N/A

SECTION 22: MITIGATION ACTIONS

EDWARDS COUNTY MITIGATION ACTIONS														
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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	Conduct analysis to determine expected flood levels. Identify and map low water crossings and roadways prone to flooding to serve a basis for evacuation planning.	County-wide	Eliminate repetitive damage to flood prone structures; Identify low water crossings and roadways prone to flooding.	Local Plans and Regulations	Flood, Hurricane/Tropical Storm	Safety/Security	N/A	M	\$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Police Department, Fire Department	24-36 Months	Emergency Operations Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
12	Join the National Flood Insurance Program.	County-wide	Reduce flood risks while providing city residents and businesses with flood insurance coverage and reduce flood risks.	Education and Awareness	Flood	Communication	Y	H	\$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Floodplain Manager	12-24 Months	N/A	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

EDWARDS COUNTY MITIGATION ACTIONS														
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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	Implement drainage projects, including building or upgrading culverts at low water crossings.	County-wide	New and upgraded culverts will help carry flood waters away from roads and bridges. It will also help reduce damage to buildings and the disruption of transportation systems and critical utilities.	Structure and Infrastructure	Flood	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, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Department of Public Works	12-24 Months	N/A	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
14	Increase the level of hazardous materials training for first responders; Conduct a county-wide needs assessment and consider acquiring additional equipment and vehicles for hazardous materials response.	County-wide	This action will help improve knowledge and capabilities and minimize risk to the public.	Education and Awareness	Hazardous Materials	Communication	N/A	M	\$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Fire Department	24-36 Months	N/A	N/A

SECTION 22: MITIGATION ACTIONS

EDWARDS COUNTY MITIGATION ACTIONS														
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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
15	Develop, train, and exercise plans, procedures and equipment for emergency personnel in the event of a hazardous materials incident.	County-wide	This action will help ensure that roles and responsibilities for a response to an incident are clear and personnel are adequately trained.	Local Plans and Regulations Preparedness /Response	Hazardous Materials	Safety/Security	N/A	M	\$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Fire Department	24-36 Months	Emergency Operations Plan	N/A
16	Develop an emergency response and evacuation plan for use in the unlikely event of a major disaster.	County-Wide	This action can save lives in the unlikely event of disaster.	Local Plans and Regulations Preparedness /Response	Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm, Wind, Tornado, Wildfire, Winter Storm, Hazardous Materials, Terrorism	Safety/Security	N/A	M	\$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Emergency Management Coordinator	24-36 Months	Emergency Operations Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

EDWARDS 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
17	Obtain wildland firefighting equipment and work with the Texas Forest Service on fire breaks and other mitigation measures.	County-wide	Creating fire breaks can slow or stop the spread of wildland fires by the removal of fuels for burning.	Structure and Infrastructure	Wildfire	Safety/Security	Y	M	\$100,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Fire Department	12-24 Months	N/A	N/A
18	Review and update criteria for establishing burn bans and procedures for conducting and reporting of controlled burns.	County-wide	These actions will help ensure that procedures are up to date and thus help prevent and manage wildland fires.	Education and Awareness	Wildfire	Safety/Security	N/A	M	\$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Fire Department	24-36 Months	N/A	N/A

SECTION 22: MITIGATION ACTIONS

EDWARDS COUNTY MITIGATION ACTIONS														
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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
19	Conduct a public information campaign for residents to improve anchoring of manufactured homes and exterior attachments such as carports and porches.	County-Wide	This action prevents damage to manufactured homes and reduces the risk of loss of life and injury.	Education and Awareness	Earthquake, Hurricane/Tropical Storm, Thunderstorm Wind, Tornado	Communication	Y	M	\$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Edwards County Emergency Management Coordinator	24 Months	N/A	N/A

SECTION 22: MITIGATION ACTIONS

CITY OF ROCKSPRINGS

CITY OF ROCKSPRINGS MITIGATION ACTIONS														
<i>*Reduces risk to new and/or existing buildings and infrastructure</i>														
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	Harden/retrofit critical facilities to hazard-resistant levels.	City-wide	Reduce damages at critical facilities; Ensure continuity of critical services during and after event; Reduce risk of injury to emergency and critical personnel.	Structure and Infrastructure	Drought, Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm, Cyber Attack, Hazardous Materials, 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, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Emergency Management Coordinator	36-48 Months	Emergency Operations Plan	Protects infrastructure, reduces cost of repair, and prevents injury to residents.
2	Implement drainage project at Cedar and Kimble Streets intersection.	City-wide	Reduce risk of flood damages through improved drainage capacity; Reduce risk of injuries to citizens; Reduce burden on emergency services during and after a flood event.	Structure and Infrastructure	Flood	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, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Emergency Management Coordinator	36 Months	N/A	Protects communities and reduces risk of flooding.

SECTION 22: MITIGATION ACTIONS

CITY OF ROCKSPRINGS 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	Implement education and awareness program utilizing media, social media, bulletins, flyers, etc. to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and property damages. Include links to weather alerts and departmental phone listings with contact personnel for residents.	City-wide	Promote hazard awareness and protect citizens from potential injuries and damages.	Education and Awareness	Drought, Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm, Cyber Attack, Hazardous Materials, Infectious Disease, Terrorism	Communication	N/A	M	\$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Emergency Management Coordinator	24 Months	Emergency Operations Plan	Promote public safety.
4	Provide early warning of disaster by acquiring and distributing NOAA "All Hazards" radios for early warning and post-event information.	City-wide	This action would provide early warning of dangerous conditions, allowing time for individuals to take appropriate action to protect lives and property.	Education and Awareness	Drought, Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm, Hazardous Materials, Terrorism	Communication	Y	H	\$50,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Emergency Manager Coordinator	24-36 Months	Emergency Operations Plan	Promote public safety.

SECTION 22: MITIGATION ACTIONS

CITY OF ROCKSPRINGS MITIGATION ACTIONS														
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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	Equip identified critical facilities with back-up generators to provide auxiliary power.	City-wide identified critical facilities*	Provide power for critical facilities during power outages and ensure continuity of critical services.	Structure and Infrastructure	Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm, Hazardous Materials, Terrorism	Energy (Power/Fuel)	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, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Emergency Management Coordinator	24-36 Months	Emergency Operations Plan	Helps ensure critical facilities continue to provide services during a power outage caused by unforeseen events.
*Identified critical facilities include: Rocksprings City Hall @ 100 W. Austin St.; Wastewater Treatment Plant 923 N. Cedar St.; Water Tower @ 100 E. Kinney St.; Water Well 1 @ 504 W. Bandera St.; Water Well 2 @ 309 N. Well St.; Water Well 3 @ 101 N. Live Oak St.; Rocksprings Independent School District: All campus locations														
6	Install surge protectors on critical electronic equipment at all critical facilities.	City-wide critical electronic equipment	Reduce damage to critical electronic equipment and ensure continuity of operations.	Structure and Infrastructure	Earthquake, Flood, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm Wind, Tornado, Wildfire, Winter Storm	Safety/Security	Y	M	\$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Emergency Management Coordinator	24-36 Months	Emergency Operations Plan	Helps ensure critical facilities continue to provide services during a power outage caused by unforeseen events.

SECTION 22: MITIGATION ACTIONS

CITY OF ROCKSPRINGS MITIGATION ACTIONS														
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Action #	Proposed Action	Site	Benefit	Action Type	Hazards	Community Lifeline	Infra.*	Priority (High, Mod., Low)	Cost	Potential Funding Sources	Lead Agency	Timelin e	Existing Plans	NFIP
7	Develop a water conservation action plan, including public education and outreach to warn citizens about the risks to public health caused by drought. Promote xeriscaping to conserve water.	City-wide	Reduce impact of drought through education and conservation.	Education and Awareness	Drought	Safety/Security	Y	M	\$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Emergency Management Coordinator	24-36 Months	Drought Contingency Plan	N/A
8	Work with the County to identify and map low water crossings and roadways prone to flooding to serve as a basis for evacuation planning.	City-wide	With this action, the City will work with the County to identify and map low water crossings and roadways prone to flooding.	Local Plans and Regulations	Flood, Hurricane/Tropical Storm	Safety/Security	N/A	M	\$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Police Department, Fire Department	24-36 Months	N/A	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

CITY OF ROCKSPRINGS 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	Conduct an annual review of the National Flood Insurance Program's "repetitive loss" list to determine if there are any properties within the City that repetitively flood.	City-wide	Acquisitions also reduce costs for government to maintain infrastructure in flood prone areas and save emergency response costs.	Local Plans and Regulations	Flood	Safety/Security	Y	H	\$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Floodplain Manager	12-24 Months	Floodplain Ordinance	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
10	Increase awareness of flood insurance and its benefits and costs. The awareness campaign will be aimed at local officials and property owners. It will encourage residents and business owners to purchase flood insurance.	City-wide	Increased flood insurance coverage will provide greater financial protection for owners and renters.	Education and Awareness	Flood	Communication	Y	H	\$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Floodplain Manager	12-24 Months	Floodplain Ordinance	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

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CITY OF ROCKSPRINGS 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	Improve enforcement of the National Flood Insurance Program requirements, including those related to substantial damage / substantial improvement.	City-wide	This action will reduce future flood risks and remove buildings from the floodplain over time.	Local Plans and Regulations	Flood	Safety/Security	Y	M	\$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Floodplain Manager	24-36 Months	Floodplain Ordinance	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
12	Conduct a hazardous material needs assessment and consider acquisition of additional equipment and vehicles. In partnership with the County, increase the level of hazardous materials training for first responders.	City/County-Wide	The action will help improve knowledge and capabilities and minimize the risk to the public.	Education and Awareness	Hazardous Materials	Safety/Security, Communication	N/A	M	\$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Fire Department	24-36 Months	Emergency Operations Plan	N/A

SECTION 22: MITIGATION ACTIONS

CITY OF ROCKSPRINGS 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	Work with the County to implement drainage projects, including building or upgrading culverts at low water crossings.	City/County-Wide	New and upgraded culverts will help carry flood waters away from roads and bridges. It will also help reduce damage to buildings and the disruption of transportation systems, and critical utilities.	Structure and Infrastructure	Flood	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, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Public Works	12-24 Months	N/A	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
14	Write an emergency evacuation plan for use in the unlikely event of a major disaster.	City-Wide	This action can save lives in the unlikely event of disaster.	Local Plans and Regulations Preparedness/Response	Earthquake, Extreme Heat, Flood, Hail, Hurricane/Tropical Storm, Lightning, Thunderstorm, Wind, Tornado, Wildfire, Winter Storm, Hazardous Materials, Terrorism	Safety/Security	N/A	M	\$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Emergency Management Coordinator	24-36 Months	Emergency Operations Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 22: MITIGATION ACTIONS

CITY OF ROCKSPRINGS 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	Timelin e	Existing Plans	NFIP
15	Write new, updated criteria for establishing burn bans and procedures for conducting and reporting of controlled burns.	City-Wide	Reduce risk of wildfire.	Local Plans and Regulations	Wildfire	Safety/Security	Y	M	\$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Fire Department	48 Months	N/A	N/A
16	Educate citizens on wildfire prevention. Work with the Texas Forest Service on fire mitigation options and provide localized information to educate citizens.	City-Wide	Creating fire breaks can slow or stop the spread of wildland fires by the removal of fuels for burning. Better equipment will help contain fires.	Education and Awareness	Wildfire	Communication	Y	M	\$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Fire Department	48 Months	N/A	N/A

SECTION 22: MITIGATION ACTIONS

CITY OF ROCKSPRINGS 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
17	Conduct a public information campaign for residents to improve anchoring of manufactured homes and exterior attachments such as carports and porches.	City-Wide	This action prevents damage to manufactured homes and reduces the risk of loss of life and injury.	Education and Awareness	Earthquake, Hurricane/Tropical Storm, Thunderstorm Wind, Tornado	Communication	Y	M	\$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Rocksprings Emergency Management Coordinator	24 Months	N/A	N/A



SECTION 23 **PLAN MAINTENANCE**

SECTION 23: PLAN MAINTENANCE

Plan Maintenance Procedures	1
Incorporation	1
Process of Incorporation	1
Monitoring and Evaluation	3
Monitoring	4
Evaluation	4
Updating	5
Plan Revisions	5
Five (5) Year Review	5
Continued Public Involvement	5

PLAN MAINTENANCE PROCEDURES

The following is an explanation of how Edwards County, the City of Rocksprings, 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 Evaluation
- Updating
- Continued Public Involvement

INCORPORATION

Edwards County and the City of Rocksprings will be responsible for further development and implementation of mitigation actions. Each action has been assigned to a specific department within the county and city. The following describes the process by which participating jurisdictions will incorporate elements of the mitigation plan into other planning mechanisms.

PROCESS OF INCORPORATION

Once the Plan Update is adopted, Edwards County and the City of Rocksprings will implement actions based on priority and the availability of funding. The planning area currently implements policies and programs to reduce loss of life and property from hazards. The mitigation actions developed for this Plan Update enhance this ongoing effort and will be implemented through other program mechanisms where possible.

The potential funding sources listed for each identified action may be used when the jurisdictions seek funds to implement actions. An implementation time period or a specific implementation date has been assigned to each action as an incentive for completing each task and gauging whether actions are implemented in a timely manner.

Edwards County and the City of Rocksprings will integrate implementation of their mitigation actions with other plans and policies, such as construction standards and emergency management plans, and ensure that these actions, or proposed projects, are reflected in other planning efforts. Coordinating and integrating components of other plans and policies into the

SECTION 23: PLAN MAINTENANCE

goals and objectives of the Plan Update will further maximize funding and provide possible cost-sharing of key projects, thereby reducing loss of lives and property and mitigating hazards affecting the area.

Upon formal adoption of the Plan Update, Planning Team members from the county and city will work to integrate the hazard mitigation strategies into other plans and codes as they are developed. Participating team members will conduct periodic reviews of plans and policies, once per year at a minimum, and analyze the need for revisions in light of the approved Plan. The Planning Team will review all annual budget reviews, and Emergency Operations and/or Management Plans to guide and control development. Participating jurisdictions will ensure that capital improvement planning in the future will also contribute to the goals of this Hazard Mitigation Plan Update to reduce the long-term risk to life and property from all hazards. Within one year of formal adoption of the Hazard Mitigation Plan Update, existing planning mechanisms will be reviewed by each jurisdiction.

The Middle Rio Grande Development Council (MRGDC) is committed to supporting Edwards County and the City of Rocksprings as they implement their mitigation actions. Planning Team members will review and revise, as necessary, the long-range goals and objectives in strategic plans and budgets to ensure that they are consistent with this Hazard Mitigation Action Plan Update. Additionally, the planning area will work to advance the goals of this Hazard Mitigation Plan through its routine, ongoing, long-range planning, budgeting, and work processes.

Table 23-1 identifies types of planning mechanisms and examples of methods for incorporating the Plan Update into other planning efforts. The team members, listed in Table 23-2 below, will be responsible for the review of these planning mechanisms and their incorporation of the Plan, with the exception of the Floodplain Management Plans; the jurisdictions who have a Floodplain Administrator on staff will be responsible for incorporating the Plan when Floodplain Management Plans are updated, or new plans are developed.

Table 23-1. Methods of Incorporation of the Plan

PLANNING MECHANISM	DEPARTMENT / TITLE RESPONSIBLE	INCORPORATION OF PLAN
Annual Budget Review	Edwards County – Emergency Management Coordinator City of Rocksprings – Emergency Management Coordinator	Various departments and key personnel that participated in the planning process for Edwards County and the City of Rocksprings will review the Plan and mitigation actions therein when conducting their annual budget review. Allowances will be made in accordance with grant applications sought, and mitigation actions that will be undertaken, according to the implementation schedule of the specific action.

SECTION 23: PLAN MAINTENANCE

PLANNING MECHANISM	DEPARTMENT / TITLE RESPONSIBLE	INCORPORATION OF PLAN
Floodplain Management Plans	City of Rocksprings – Floodplain Administrator	Floodplain management plans include preventative and corrective actions to address the flood hazard. Therefore, the actions for flooding and information found in Section 8 of this Plan Update discussing the people and property at risk to flood will be reviewed and revised when the City updates their management plans.
Grant Applications	Edwards County – Emergency Management Coordinator City of Rocksprings – Emergency Management Coordinator	The HMAP will be evaluated by Edwards County and the City of Rocksprings 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	Edwards County – Emergency Management Coordinator City of Rocksprings – Emergency Management Coordinator	Edwards County and the City of Rocksprings have regulatory plans in place, such as Emergency Operations Plans. The Plan Update will be consulted when County and City departments review or revise their current regulatory planning mechanisms, or in the development of regulatory plans that are not currently in place.

MONITORING AND EVALUATION

Periodic revisions of the Plan are required to ensure that goals, objectives, and mitigation actions are kept current. When the Plan is discussed in these sections, it includes the risk assessment and mitigation actions as a part of the monitoring, evaluating, updating, and review process. Revisions may be required to ensure the Plan is in compliance with federal and state statutes and regulations. This section outlines the procedures for completing Plan revisions, updates, and reviews. Table 23-2 indicates the department and title of the party responsible for Plan monitoring, evaluating, updating, and review of the Plan.

SECTION 23: PLAN MAINTENANCE

Table 23-2. Team Members Responsible for Plan Monitoring, Evaluating, Updating, and Review of the Plan

ORGANIZATION / DEPARTMENT	TITLE
Middle Rio Grande Development Council	Planning / Operations Director
Edwards County – Emergency Management	Emergency Management Coordinator
City of Rocksprings – Emergency Management	Emergency Management Coordinator

MONITORING

Designated Planning Team members are responsible for monitoring, evaluating, updating, and reviewing the Plan, as shown in Table 23-2. Individuals holding the title listed in Table 23-2 will be responsible for monitoring the Plan on an annual basis. Plan monitoring includes reviewing and incorporating into the Plan other existing planning mechanisms that relate or support goals and objectives of the Plan; monitoring the incorporation of the Plan into future updates of other existing planning mechanisms as appropriate; reviewing mitigation actions submitted and coordinating with various county and city departments to determine if mitigation actions need to be re-evaluated and updated; evaluating and updating the Plan as necessary; and monitoring plan maintenance to ensure that the process described is being followed, on an annual basis, throughout the planning process. The Planning Team will develop a brief report that identifies policies and actions in the Plan that have been successfully implemented and any changes in the implementation process needed for continued success. A summary of meeting notes will report the particulars involved in developing an action into a project. In addition to the annual monitoring, the Plan will be similarly reviewed immediately after extreme weather events, including but not limited to state and federally declared disasters.

EVALUATION

As part of the evaluation process, the Planning Team 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.

The Planning Team will meet on an annual basis to evaluate the Plan, identify any needed changes, and assess the effectiveness of the Plan Update in achieving its stated purpose and goals. The team will evaluate the number of mitigation actions implemented along with the loss reduction associated with each action. Actions that have not been implemented will be evaluated to determine if any social, political, or financial barriers are impeding implementation and if any changes are necessary to improve the viability of an action. The team will evaluate changes in land development and/or programs that affect mitigation priorities in their respective jurisdictions. The annual evaluation process will help to determine if any changes are necessary. In addition, the Plan will be similarly evaluated immediately after extreme weather events, including but not limited to state and federally declared disasters.

SECTION 23: PLAN MAINTENANCE

UPDATING

PLAN REVISIONS

At any time, minor technical changes may be made to update the Edwards County Hazard Mitigation Action Plan Update 2025. Material changes to mitigation actions or major changes in the overall direction of the Plan or the policies contained within it must be subject to formal adoption by the participating jurisdictions.

The MRGDC, Edwards County, and the City of Rocksprings will review proposed revisions and vote to accept, reject, or amend the proposed change. Upon ratification, the Revision will be transmitted to the Texas Division of Emergency Management (TDEM).

In determining whether to recommend approval or denial of a Plan Revision request, participating jurisdictions will consider the following factors:

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

FIVE (5) YEAR REVIEW

The Plan will be thoroughly reviewed by the Planning Team at the end of three years from the approval date to determine whether there have been significant changes in the planning area that necessitate changes in the types of mitigation actions proposed. Factors that may affect the content of the 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 review process provides Edwards County and the City of Rocksprings 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.

It is recommended that the full Executive and Advisory Planning Team (Section 2, Tables 2-1 and 2-2) meet to review the Plan at the end of three years because grant funds may be necessary for the development of a five-year update. Reviewing planning grant options in advance of the five-year Plan update deadline is recommended considering the timelines for grant and planning cycles can be in excess of a year.

Following the Plan review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and Plan Revision process outlined herein. Upon completion of the review, update, and revision process the revised Plan will be submitted to TDEM for final review and approval in coordination with FEMA.

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.

SECTION 23: PLAN MAINTENANCE

The public can review the Plan on MRGDC's or participating jurisdictions' websites, or at the MRGDC facility, 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, such as Facebook, Instagram, and X (formerly Twitter), will keep the public and stakeholders apprised of potential opportunities to fund and implement mitigation projects identified in the Plan.



APPENDIX A **PLANNING TEAM**

APPENDIX A: PLANNING TEAM

Planning Team Members	1
Stakeholders	1

PLANNING TEAM MEMBERS

The Edwards County Hazard Mitigation Action Plan Update 2025 was organized using a direct representative model. An Executive Planning Team from the participating jurisdictions, shown in Table A-1, was formed to coordinate planning efforts and request input and participation in the planning process. Table A-2 reflects the Advisory Planning Team, consisting of area organizations and departments that participated throughout the planning process. Table A-3 is comprised of stakeholders who were invited to provide Plan input. Public outreach efforts and meeting documentation is provided in Appendix D.

Table A-1. Executive Planning Team

ORGANIZATION / DEPARTMENT	TITLE
Middle Rio Grande Development Council	Planning / Operations Director
Edwards County – Emergency Management	Emergency Management Coordinator
City of Rocksprings – Emergency Management	Emergency Management Coordinator

Table A-2. Advisory Planning Team

ORGANIZATION / DEPARTMENT	TITLE
Middle Rio Grande Development Council	Planning Assistant
Middle Rio Grande Development Council	Public Safety Director
Middle Rio Grande Development Council	911 Coordinator / Public Relations
Edwards County – Government	County Judge
Edwards County – Fire	Fire Chief
City of Rocksprings – Administration	City Clerk / Secretary
City of Rocksprings – Government	Mayor

STAKEHOLDERS

The following groups listed in Table A-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, school and universities, and state and federal agencies. The public were also invited to participate via e-mail throughout the planning process. Many of the organizations

APPENDIX A: PLANNING TEAM

invited and stakeholders participated were integral to providing comments and data for the Plan. For a list of attendees at meetings, please see Appendix D.¹

Table A-3. Stakeholders

AGENCY	TITLE	STAKEHOLDER TYPE
211 Texas	General Representative	Regional Agency
Alexander Memorial Library	Librarian	Community Organization
American Red Cross	Disaster Program Manager	Community Organization
American Red Cross	Regional Communications Director	Community Organization
Asherton VFD	Fire Chief	Community Organization
The ARC	Development and Events Manager	Community Organization
Bandera County	Emergency Management Coordinator	Neighboring Community
Batesville VFD	Fire Chief	Community Organization
Bethel Center	Food Bank Representative	Community Organization
Brush Country Chamber of Commerce	General Representative	Community Organization
Camino Real Community Services	Executive Director	Community Organization
Camp Wood Library	Director	Community Organization
Catholic Charities	Administrator	Community Organization
Catholic Charities	Executive Director	Community Organization
Carrizo Springs, City of	Streets Department Representative	City Department
Carrizo Springs, City of	Public Works Director	City Department
Carrizo Springs, City of	Wastewater Superintendent	City Department
Carrizo Springs ISD	Superintendent	Academia
Carrizo Springs Javelin	General Representative	Community Organization
Carrizo Springs VFD	Fire Chief	Community Organization
Community Service Agency	General Representative	Community Organization
Comstock ISD	Superintendent	Academia

¹ Information contained in Appendix D is exempt from public release under the Freedom of Information Act (FOIA).

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AGENCY	TITLE	STAKEHOLDER TYPE
Concan VFD	Fire Chief	Community Organization
Cotulla, City of	City Administrator	Neighboring Community
Cotulla ISD	Superintendent	Academia
Cotulla VFD	Fire Chief	Community Organization
Crockett County	County Judge	Neighboring Community
Crystal City, City of	Chief of Police	City Department
Crystal City, City of	Mayor	Local Government
Crystal City ISD	Director of Federal Programs	Academia
Crystal City ISD	Superintendent	Academia
Crystal City VFD	Fire Chief	Community Organization
Del Rio, City of	Administrative Captain - Police	City Department
Del Rio, City of	Community Services Director	City Department
Del Rio, City of	Economic Development Director	City Department
Del Rio, City of	International Bridge Superintendent	City Department
Del Rio, City of	Mayor	Local Government
Del Rio, City of	Neighborhood Services Administrative Assistant	City Department
Del Rio, City of	Nutrition & Social Services Center Director	City Department
Del Rio, City of	Parks and Recreation Superintendent	City Department
Del Rio, City of	Planning and Zoning Director	City Department
Del Rio, City of	Public Works Director / City Engineer	City Department
Del Rio, City of	Streets and Drainage Superintendent	City Department
Del Rio, City of	Transportation Director	City Department
Del Rio Economic Development Council	Council Representative	Community Organization
Del Rio Fire Department	Fire Chief	Community Organization
Dimmit County	County Judge	Local Government

APPENDIX A: PLANNING TEAM

AGENCY	TITLE	STAKEHOLDER TYPE
Dimmit County	Precinct 1 Commissioner	Local Government
Dimmit County	Precinct 2 Commissioner	Local Government
Dimmit County	Precinct 3 & 6 Commissioner	Local Government
Dimmit County	Precinct 4, 5, & 7 Commissioner	Local Government
Dimmit County	Sanitation Secretary	Utility Provider
Dimmit County	Utility Department Administrative Secretary	Utility Provider
Dimmit County Chambers of Commerce	General Representative	Community Organization
Dimmit County Fire Department	Fire Chief	Community Organization
Dimmit County Food Pantry	Food Services Coordinator	Community Organization
Dimmit County ISD	Director of Federal Programs	Academia
Dimmit County ISD	Superintendent	Academia
Dimmit County Public Library	Librarian	Community Organization
Dimmit County Sheriff's Office	County Sheriff	Community Organization
Dimmit Regional Hospital	Chief Executive Officer	Healthcare Agency
Duval County	Emergency Management Coordinator	Neighboring Community
Eagle Pass, City of	Chief of Police	Community Organization
Eagle Pass, City of	City Engineer	City Department
Eagle Pass, City of	Economic Development Director	City Department
Eagle Pass, City of	Water Works System Representative	City Department
Eagle Pass Chamber of Commerce	General Representative	Community Organization
Eagle Pass ISD	Deputy Superintendent for District Operations	Academia
Eagle Pass Library	Librarian	Community Organization
Eagle Pass - Maverick County (EPMC) Economic Development Alliance	General Representative	Community Organization
Eagle Pass VFD	Fire Chief	Community Organization

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AGENCY	TITLE	STAKEHOLDER TYPE
Edwards Community Food Bank	General Representative	Community Organization
Edwards County	Precinct 1 Commissioner	Local Government
Edwards County	Precinct 2 Commissioner	Local Government
Edwards County	Precinct 3 Commissioner	Local Government
Edwards County	Precinct 4 Commissioner	Local Government
Edwards County	Road and Bridges Superintendent	County Department
Edwards County Chamber of Commerce	President	Community Organization
Edwards County Fair Association	General Representative	Community Organization
Edwards County Sheriff's Office	County Sheriff	Community Organization
El Progreso Memorial Library	Librarian	Community Organization
Encinal Water Supply Corporation (WSC)	General Representative	Utility Provider
Environmental Protection Agency (EPA), Region 6	Director of Superfund and Emergency Management Division	Federal Agency
Fort Duncan Regional Medical Center	Assistant to Safety Officer / Operations Director	Healthcare Agency
Fort Duncan Regional Medical Center	Safety Officer / Operations Director	Healthcare Agency
Frio Canyon Chamber of Commerce	General Representative	Community Organization
Frio County	Emergency Management Coordinator	Neighboring Community
Gilmer Memorial Library	Director	Community Organization
Grace Community College	General Representative	Academia
Habitat for Humanity	General Representative	Community Organization
H.E. Butt Foundation	General Representative	Community Organization
Helping Hands Fund Program	General Representative	Community Organization
Hill Country Post	Editor	Community Organization
Keep It REAL Beautiful	General Representative	Community Organization

APPENDIX A: PLANNING TEAM

AGENCY	TITLE	STAKEHOLDER TYPE
Kerr County	Emergency Management Coordinator	Neighboring Community
Kickapoo Tribe	Tribal Representative	Tribal Community
Kimble County	County Judge	Neighboring Community
Kinney County	Precinct 1 Commissioner	Local Government
Kinney County	Precinct 2 Commissioner	Local Government
Kinney County	Precinct 3 Commissioner	Local Government
Kinney County	Precinct 4 Commissioner	Local Government
Knippa VFD	Fire Chief	Community Organization
KSAT	General Manager	Community Organization
La Pryor ISD	Director of Federal Programs	Academia
La Pryor ISD	Superintendent	Academia
La Pryor VFD	Fire Chief	Community Organization
La Salle County	County Judge	Local Government
La Salle County	Justice of the Peace Precinct 1, 5, and 6	Local Government
La Salle County	Precinct 1 Commissioner	Local Government
La Salle County	Precinct 2 Commissioner	Local Government
La Salle County	Precinct 3 Commissioner	Local Government
La Salle County	Precinct 4 Commissioner	Local Government
La Salle Community Outreach	Community Coordinator	Community Organization
La Salle County Sheriff's Office	County Sheriff	Community Organization
Leaky ISD	Superintendent	Academia
The Leaky Star	Editor	Community Organization
Leaky VFD	Fire Chief	Community Organization
Maverick County	Precinct 1 Commissioner	Local Government
Maverick County	Precinct 2 Commissioner	Local Government
Maverick County	Precinct 3 Commissioner	Local Government

APPENDIX A: PLANNING TEAM

AGENCY	TITLE	STAKEHOLDER TYPE
Maverick County	Precinct 4 Commissioner	Local Government
Maverick County Development Corporation	General Representative	Community Organization
Maverick County Food Pantry	Director	Community Organization
Maverick County Hospital District	Building Maintenance	Healthcare Agency
Maverick County Sheriff's Office	County Sheriff	Community Organization
Maverick County Times	Editor	Community Organization
Maverick County WCID 1	General Manager	Utility Provider
McMullen County	Emergency Management Coordinator	Neighboring Community
Medina County	Emergency Management Coordinator	Neighboring Community
Mi Familia Adult Day Care Center	General Representative	Community Organization
Middle Rio Grande Development Council	Area Agency on Aging Coordinator	Regional Agency
Nueces Canyon Chamber of Commerce	General Representative	Community Organization
Nueces Canyon Consolidated ISD	Superintendent	Academia
Nueces Canyon VFD	Fire Chief	Community Organization
NWS	Corpus Christi Representative	Federal Agency
NWS	Austin/San Antonio Representative	Federal Agency
Reagan Wells VFD	Fire Chief	Community Organization
Real County Library	Director	Community Organization
Rise Recovery	Chief of Operations	Community Organization
Rocksprings - Edwards County VFD	Fire Chief	Community Organization
Rocksprings ISD	Superintendent	Academia
Sabinal, City of	Chief of Police	City Department
Sabinal, City of	Director of Public Works	City Department
Sabinal, City of	Utilities Clerk	City Department

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AGENCY	TITLE	STAKEHOLDER TYPE
Sabinal EMS	Administrator	Community Organization
Sabinal VFD	Fire Chief	Community Organization
San Antonio Area – Uvalde Strong	General Representative	Community Organization
San Antonio River Authority	Regional Representative	Utility Provider
San Felipe-Del Rio CISD	Administration	Academia
San Lucas Lutheran Church	Pastor	Community Organization
Southwest Texas Junior College	Chief of Police	Academia
St. Joseph's Catholic Church	Food Bank Representative	Community Organization
Sul Ross University Center	Director of University Department of Public Safety	Academia
Sutton County	County Judge	Neighboring Community
SWCD #320	District Secretary	Utility Provider
Terrell County	County Clerk	Neighboring Community
Texas A&M AgriLife Extension	Dimmit County Extension Agent	State Agency
Texas A&M AgriLife Extension	District 10 - Disaster Assessment and Recovery (DAR) Agent	State Agency
Texas A&M AgriLife Extension	Edward County Extension Agent	State Agency
Texas A&M AgriLife Extension	Kinney County Extension Agent	State Agency
Texas A&M AgriLife Extension	La Salle County Extension Agent	State Agency
Texas A&M AgriLife Extension	Maverick County Extension Agent	State Agency
Texas A&M AgriLife Extension	Real County Extension Agent	State Agency
Texas A&M AgriLife Extension	Uvalde County Extension Agent	State Agency
Texas A&M AgriLife Extension	Val Verde County Extension Agent	State Agency
Texas A&M AgriLife Extension	Zavala County Extension Agent	State Agency
Texas A&M Forest Service	Area Operations Chief	State Agency

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AGENCY	TITLE	STAKEHOLDER TYPE
Texas A&M Forest Service	Central Texas Operations Department Head	State Agency
Texas A&M Forest Service	Regional District Coordinator	State Agency
Texas A&M Forest Service	Staff Forester III	State Agency
Texas A&M Forest Service	Staff Forester III ²	State Agency
Texas Commission on Environmental Quality (TCEQ), Region 13	Regional Director	State Agency
Texas Commission on Environmental Quality (TCEQ), Region 16	Regional Director	State Agency
Texas Commission on Fire Protection	County Representative	State Agency
Texas Department of Health Services (TDHS), Region 7	Regional Director	State Agency
Texas Department of Housing and Community Affairs (TDHCA)	Director of Single-Family and Homeless Program	State Agency
Texas Department of Housing and Community Affairs (TDHCA)	Manager of Single-Family Program	State Agency
Texas Department of Transportation (TXDOT)	Laredo District Engineer	State Agency
Texas Department of Transportation (TXDOT)	San Angelo District Engineer	State Agency
Texas Division of Emergency Management (TDEM), Region 6	District 24 Chief	State Agency
Texas Division of Emergency Management (TDEM), Region 6	Gillespie CLO	State Agency
Texas Division of Emergency Management (TDEM), Region 6	Maverick CLO	State Agency
Texas Division of Emergency Management (TDEM), Region 6	Regional Mitigation Coordinator	State Agency
Texas Division of Emergency Management (TDEM),	Recovery & Mitigation Section Chief	State Agency

² Please note this is not a duplicate entry.

APPENDIX A: PLANNING TEAM

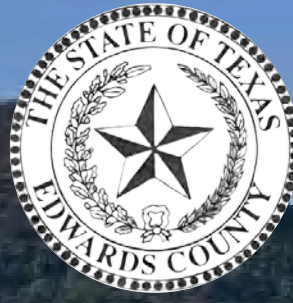
AGENCY	TITLE	STAKEHOLDER TYPE
Region 6		
Texas Floodplain Management Association, Region 3	Director	State Agency
Texas Floodplain Management Association, Region 6	Director	State Agency
Texas Land Conservation Assistance Network	Development Assistant and Grant Administrator	Private Organization
Texas Parks and Wildlife Department, Region 8	District Leader	State Agency
Texas Parks and Wildlife Department	District Leader for Edwards County	State Agency
Texas Soil and Water Conservation Districts	Field Representative	Utility Provider
Texas State Legislature	House District 31 Representative	State Agency
Texas State Legislature	House District 53 Representative	State Agency
Texas State Legislature	House District 74 Representative	State Agency
Texas State Legislature	House District 80 Representative	State Agency
Texas State Senate	District 19	State Agency
Texas State Senate	District 21	State Agency
Texas Water Development Board (TWDB)	General Representative	State Agency
Texas Windstorm Insurance Associations (TWIA)	General Representative	State Agency
U.S. Army Corps of Engineers	Fort Worth / Galveston Representative	Federal Agency
U.S. Fish and Wildlife	Southwest Regional Representative	Federal Agency
U.S. International Boundary and Water Commission	Area Operations Manager	Federal Agency
U.S. International Boundary and Water Commission	Patrol	Federal Agency
Utopia Volunteer Fire Rescue	Fire Chief	Community Organization
Uvalde, City of	Chief of Police	City Department

APPENDIX A: PLANNING TEAM

AGENCY	TITLE	STAKEHOLDER TYPE
Uvalde, City of	Director of Planning	City Department
Uvalde, City of	Director of Public Works	City Department
Uvalde, City of	District 1 Commissioner	Local Government
Uvalde, City of	District 2 Commissioner	Local Government
Uvalde, City of	District 3 Commissioner	Local Government
Uvalde, City of	District 4 Commissioner	Local Government
Uvalde, City of	District 5 Commissioner	Local Government
Uvalde Consolidated ISD	Executive Director of Student Services	Academia
Uvalde Consolidated ISD	Superintendent	Academia
Uvalde County	County Judge	Local Government
Uvalde County	Precinct 1 Commissioner	Local Government
Uvalde County	Precinct 2 Commissioner	Local Government
Uvalde County	Precinct 3 Commissioner	Local Government
Uvalde County	Precinct 4 Commissioner	Local Government
Uvalde County Sheriff's Office	County Sheriff	County Department
Uvalde Fire Department	Fire Chief	Community Organization
Uvalde Hesperian	Editor	Community Organization
Uvalde Leader News	Editor	Community Organization
Uvalde Leader News	Writer	Community Organization
Uvalde Memorial Hospital	Emergency Management Coordinator	Healthcare Agency
Uvalde Memorial Hospital	Public Information Official	Healthcare Agency
Val Verde Community Center – Precinct 2	Food Bank Representative	Community Organization
Val Verde Community Center – Precinct 4	Food Bank Representative	Community Organization
Val Verde County	Commissioner's Office Manager	Local Government
Val Verde County	Commissioner's Secretary	Local Government

APPENDIX A: PLANNING TEAM

AGENCY	TITLE	STAKEHOLDER TYPE
Val Verde County	Health Department / Risk Management Engineer	Local Government
Val Verde County	County Judge	Local Government
Val Verde County Fire Department	Fire Chief	Community Organization
Val Verde County Library	Librarian	Community Organization
Val Verde County WCID – Comstock	General Representative	Utility Provider
Val Verde Loaves and Fishes	Food Bank Representative	Community Organization
Val Verde International	Airport Advisory Board	Community Organization
Val Verde Regional Medical Center	Director of Public Relations, Marketing, and Communication	Healthcare Agency
Veterans Service Officer	Dimmit County	Community Organization
Webb County	Emergency Management Coordinator	Neighboring Community
Wintergarden Groundwater Conservation District	Director	Utility Provider
Wintergarden Groundwater Conservation District	General Manager	Utility Provider
Zavala County	County Judge	Local Government
Zavala County	Utility Manager	County Department
Zavala County Sherriff's Office	County Sheriff	County Department
Zavala County WCID #1	General Representative	Utility Provider



APPENDIX B **PUBLIC SURVEY RESULTS**

APPENDIX B: PUBLIC SURVEY RESULTS

Overview	1
Public Survey Results	2

OVERVIEW

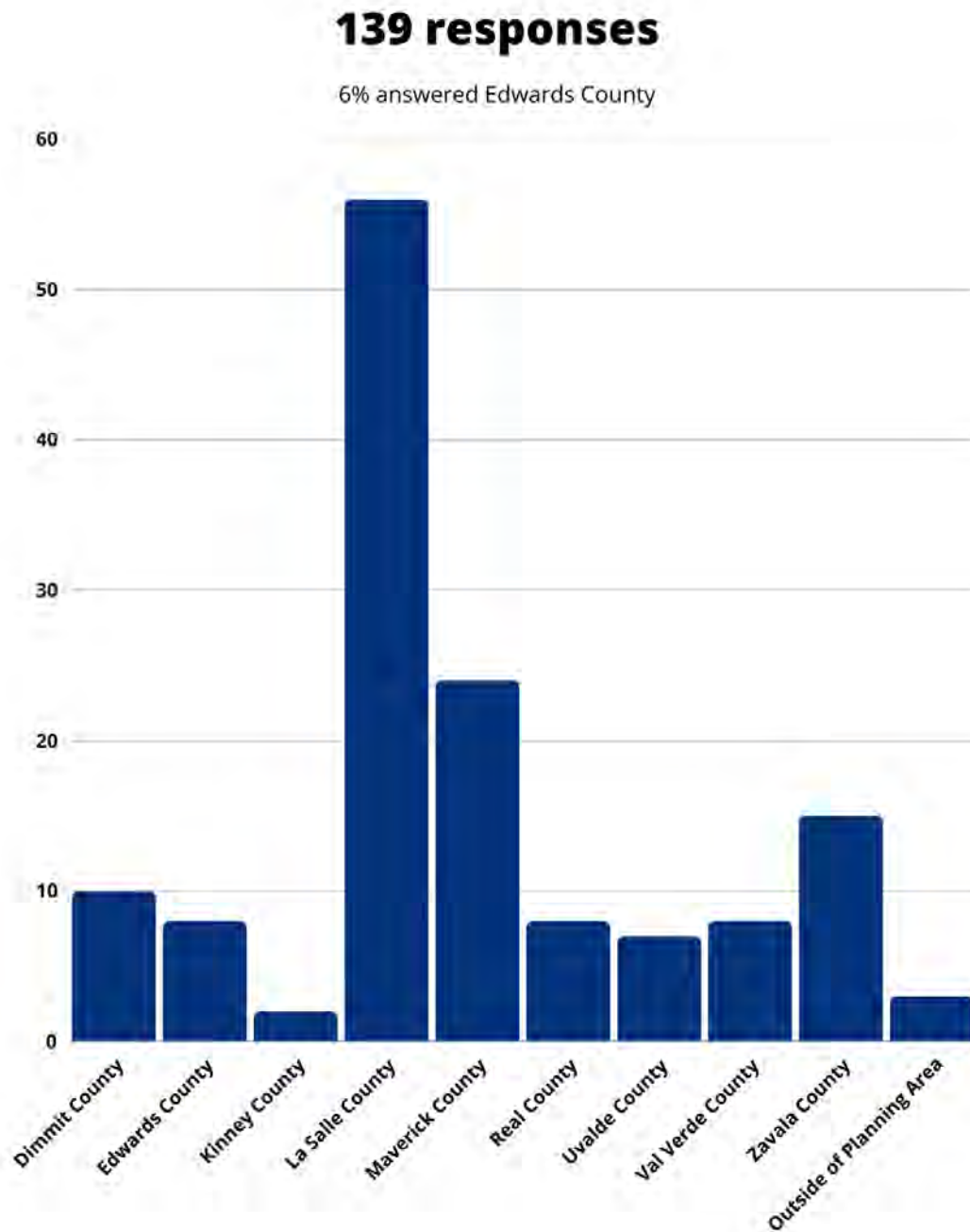
Middle Rio Grande Development Council and Edwards County prepared a public survey that requested public opinion on a wide range of questions relating to natural hazards. The survey was made available via the participating jurisdictions' websites. This survey link was also distributed at public meetings and stakeholder events throughout the planning process.

A total of 139 surveys were collected across the nine participating counties, the results of which are analyzed in Appendix B. The purpose of the survey was twofold: 1) to solicit public input during the planning process, and 2) to help the jurisdictions identify any potential 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, this survey enhances the mitigation planning process by ensuring the plan properly represents the community, is informed through local knowledge, and by promoting equity.

APPENDIX B: PUBLIC SURVEY RESULTS

PUBLIC SURVEY RESULTS



APPENDIX B: PUBLIC SURVEY RESULTS

Have you ever experienced or been impacted by a disaster?



**45%
Responded
'Yes'**

Personal experiences shared in survey responses included:

"Winter storm power outage for days, lead to no water, access to food, food preparation, parent on dialysis no power no treatment." - Dimmit County

"Extreme hail storm." - Edwards County

"In the past 20 years: flooding and drought." - Kinney County

"Hurricane that caused flooding and impacted our mobile home in rural parts of our county."
- La Salle County

"Winter Storm of 2021 left our city without water and light and very few resources were available within our community." - Maverick County

"Stranded at home during flood, and also stranded at home during icy weather, also endured drought and high heat." - Real County

"Public response in an active shooter event." - Uvalde County

"Hail storms destroying house and property, flooding in back yard due to poor drainage, fires at Moody ranch that I had evacuate." - Val Verde County

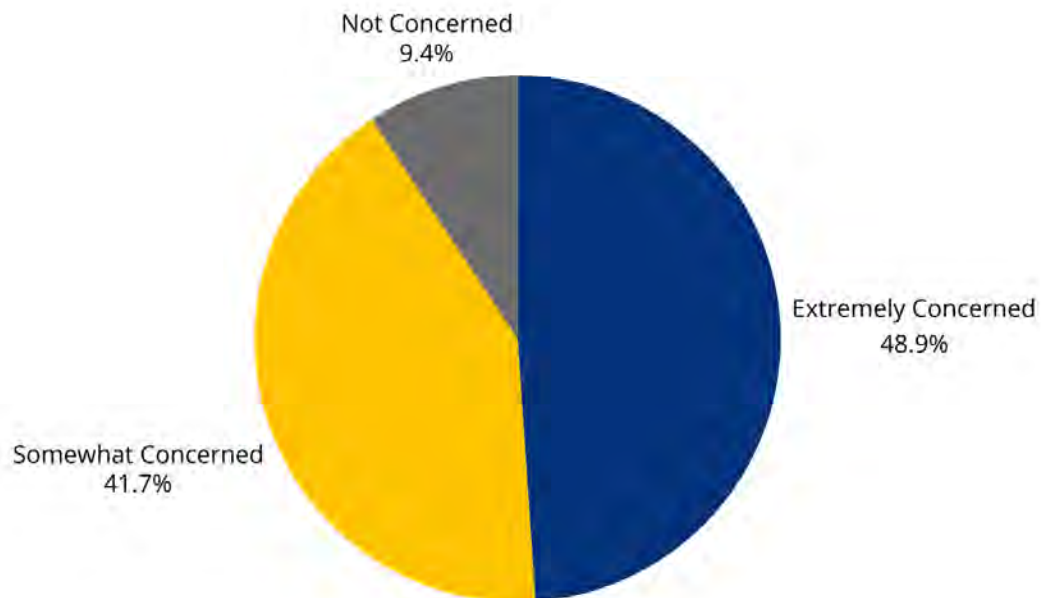
"The blizzard of Feb. 2021, Hail storms last year, Hard freeze 2022, 2023, Drought, lots of wind the the last 2 years all year long." - Zavala County

**48% of those who have been impacted by a disaster mentioned
flooding and/or winter storm in their explanations.**



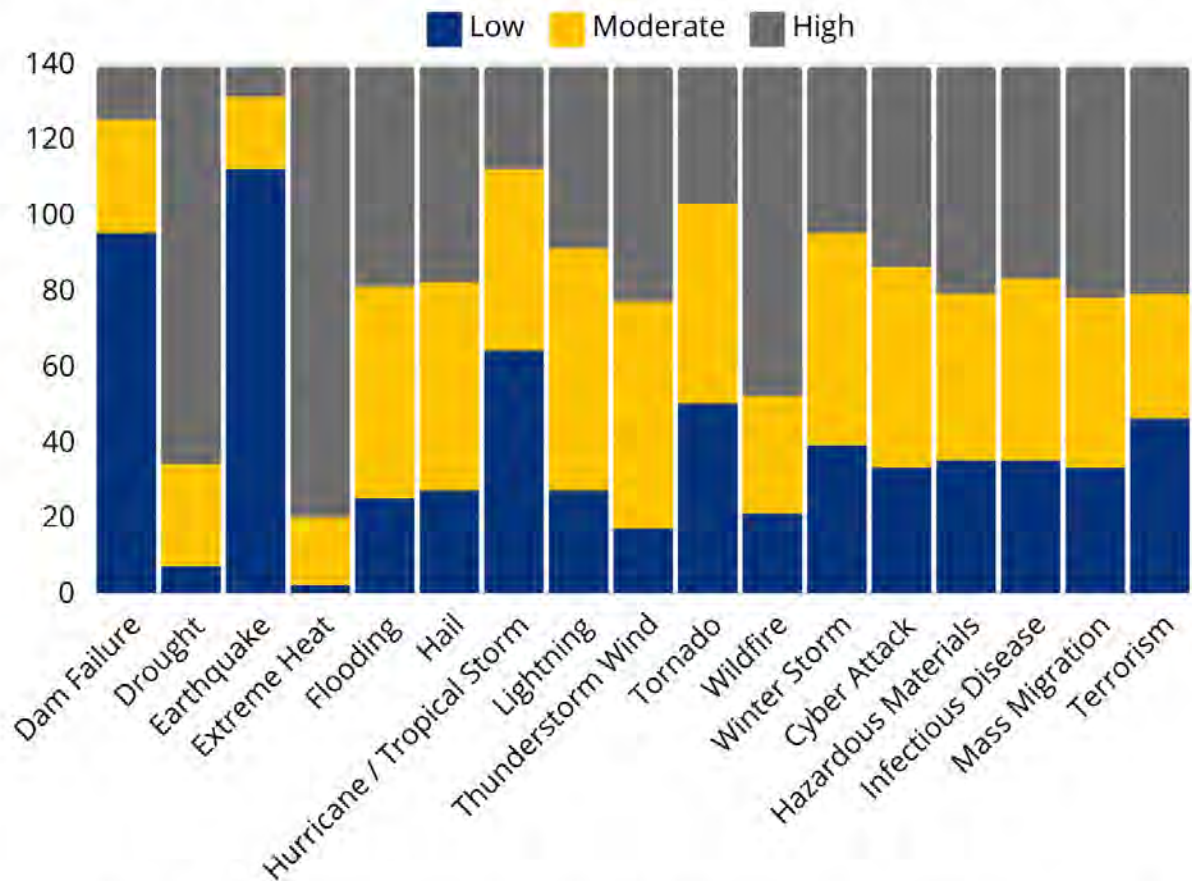
APPENDIX B: PUBLIC SURVEY RESULTS

Concern level for the possibility of their community being impacted by a disaster.



APPENDIX B: PUBLIC SURVEY RESULTS

With the consideration of frequency of occurrence and potential impact severity, please select the one hazard you think is the highest and second highest threat to your neighborhood:



Is there another hazard not listed above that you think is a wide-scale threat to your neighborhood?



Power Grid



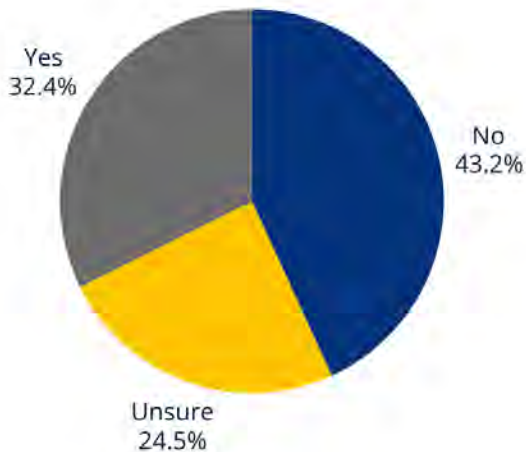
Water Contamination



Air Pollution

APPENDIX B: PUBLIC SURVEY RESULTS

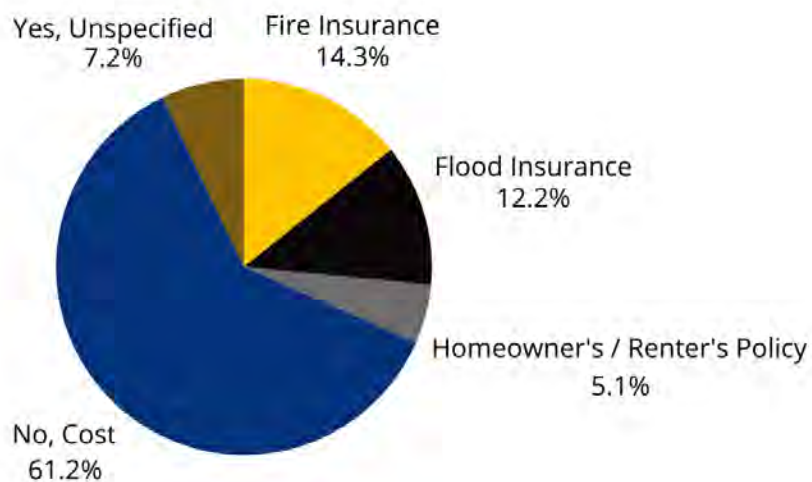
To your knowledge, is your home located in any high hazard risk zones?



Have you had any issues getting homeowners or renters insurance due to risks of hazardous events?

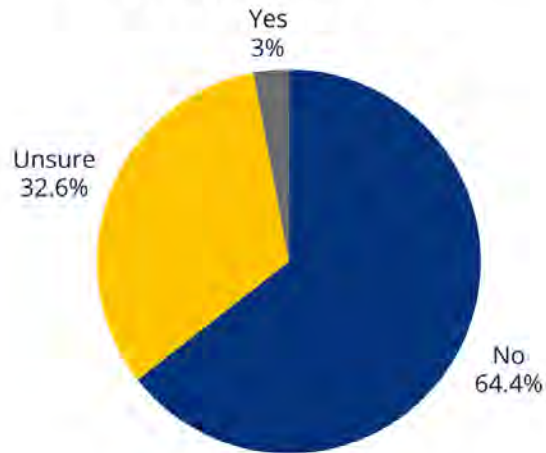


Do you have any hazard specific insurance? Why or why not?

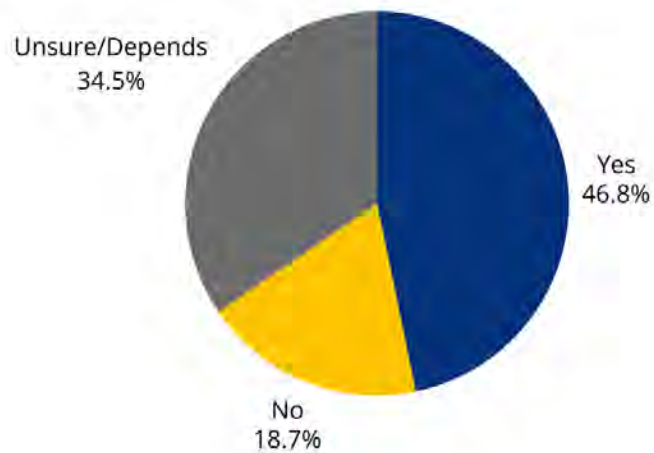


APPENDIX B: PUBLIC SURVEY RESULTS

Do you have any special access to functional needs (AFN) within your household that would require early warning or specialized response during disasters?



Would you support regulation (restrictions) on land uses within known high hazard areas?



APPENDIX B: PUBLIC SURVEY RESULTS

Have you taken any actions to make your home or neighborhood more resistant to hazards?



42%
Responded
'Yes'

Actions taken included:

45% of those who have taken action have done so through fuels reduction



90% of survey responders are interested in making their homes or neighborhoods more resistant to hazards.



"We live in a farming community and brush, limbs etc. have to be removed almost daily."

"I have a strong metal roof, a tornado shelter, and rock walls."

"Generators and landscaping."

"We cut our dead trees, have a generator, have non perishable food, camping food, and fire extinguishers."

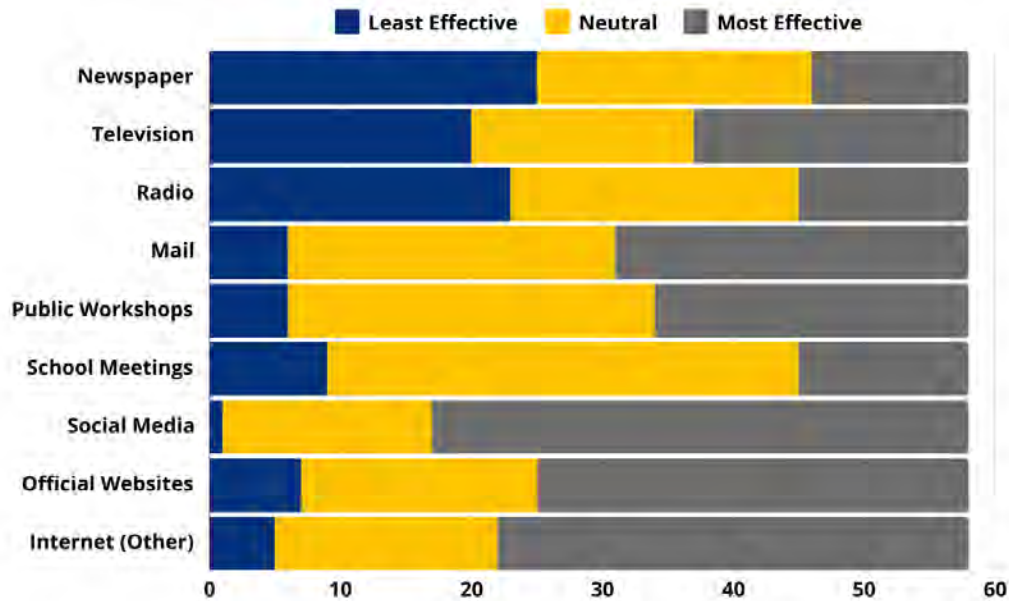
"We have 2 generators, and have cut back trees, conscious of conserving water during drought."

"Fire breaks."

"Elevating home for flooding issues."

APPENDIX B: PUBLIC SURVEY RESULTS

What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?



Effectiveness of communication methods for receiving information about how to make your home and neighborhood more resistant to hazards



Internet (Other)



Social Media

Additional communication methods recommended:



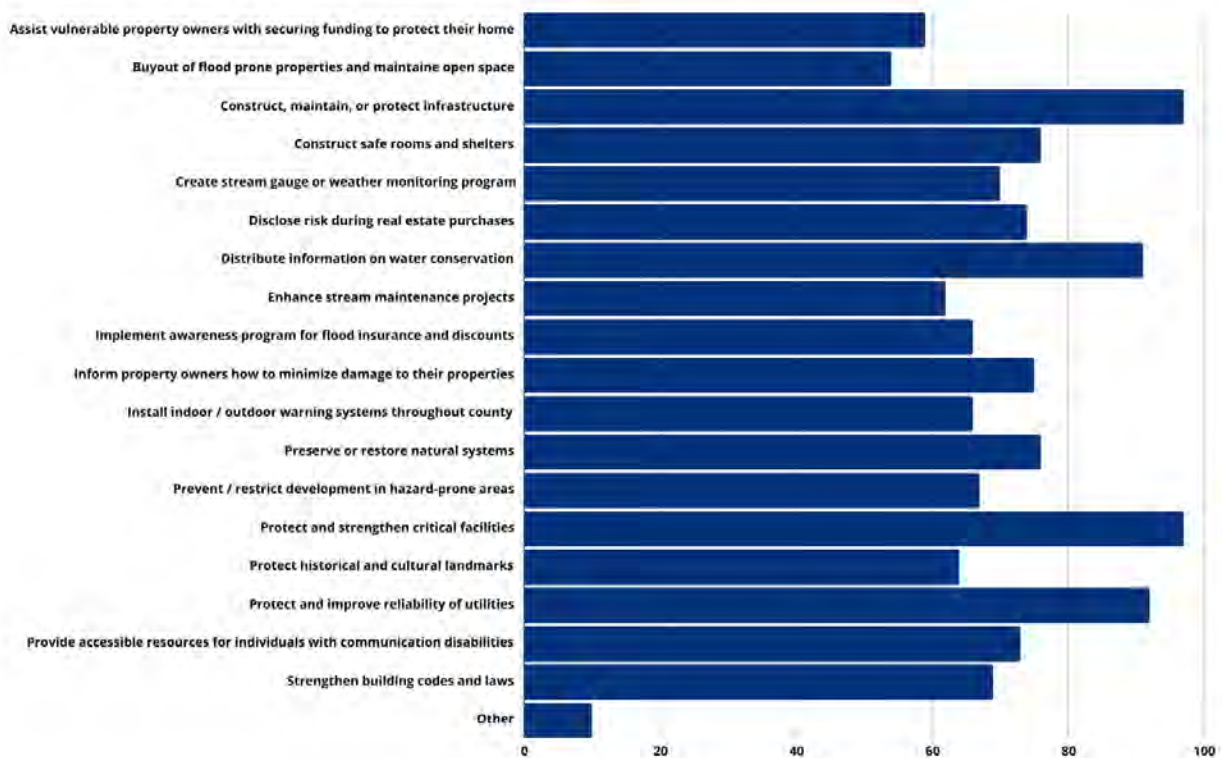
Texts / Alerts



Email

APPENDIX B: PUBLIC SURVEY RESULTS

In your opinion, please select steps your local government should prioritize to reduce or eliminate the risk of future hazard damages in your neighborhood.



Is there anything else regarding hazard mitigation that you would like to note?

"Enhance preparedness and better equip the fire department" - Edwards County

"County and city need to be prepared to make certain decisions if certain disasters are occurring. As an example, if there are high winds the decision may need to be made to shut off power to lines that may come down. As well as collaborate with energy companies to maintain power poles before they become a hazard." - Maverick County

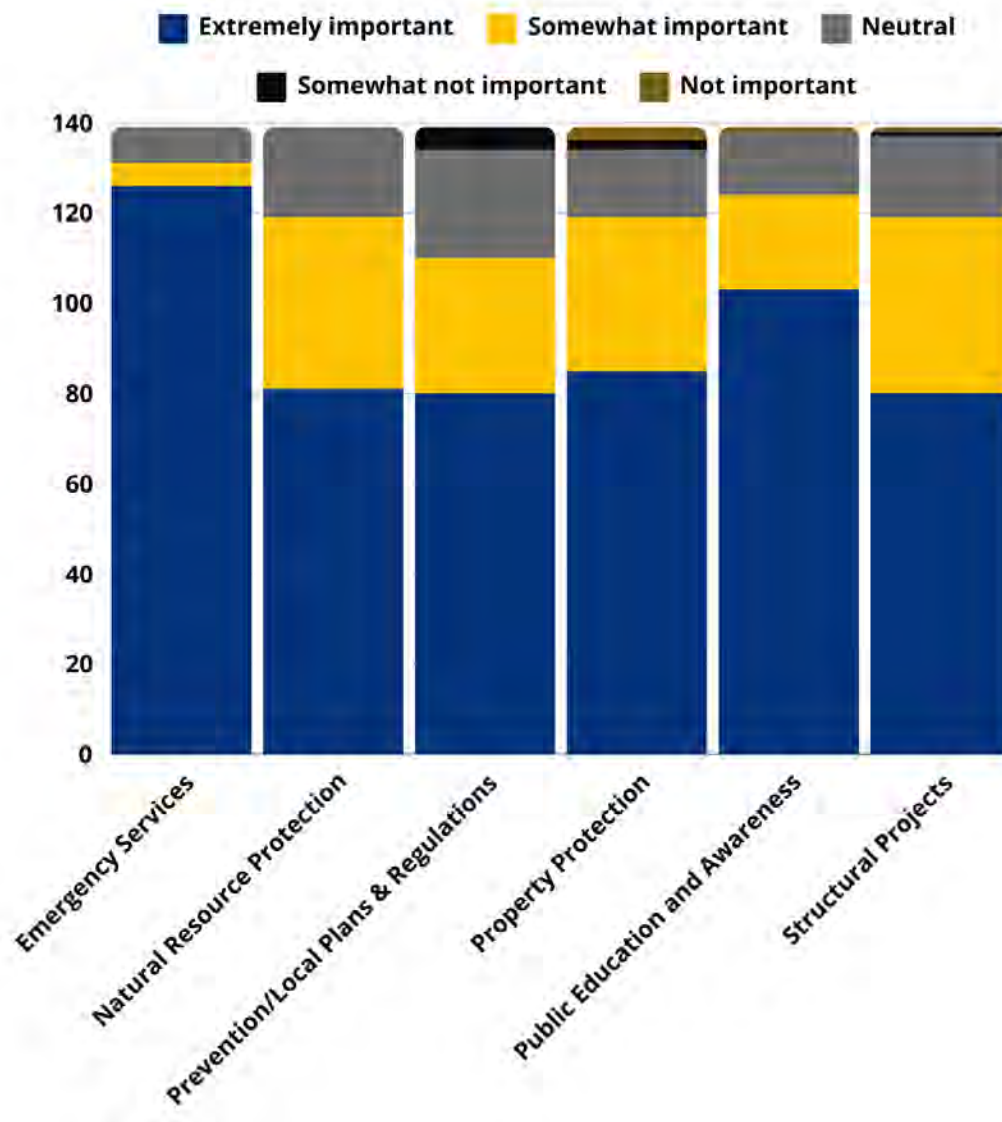
"Drainage and Debris and yard maintenance for homeowners to reduce hazard risk" - Real County

"Not enough fire or EMS to response to emergencies" and "Build a fire station on the N.W. part of town to service Lakeridge area. Relocate the new P.O.E. to a downriver location closer to the new I-27 ports to plains corridor" - Val Verde County

"Some of the flooding that occurs in the local happens because of interference or construction by the local county and municipalities. For example, creating or repairing roads but not considering drainage for runoff. This creates new flooding areas..." - Val Verde County

APPENDIX B: PUBLIC SURVEY RESULTS

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. Please tell us how important you think each one is for your community to consider pursuing.



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.

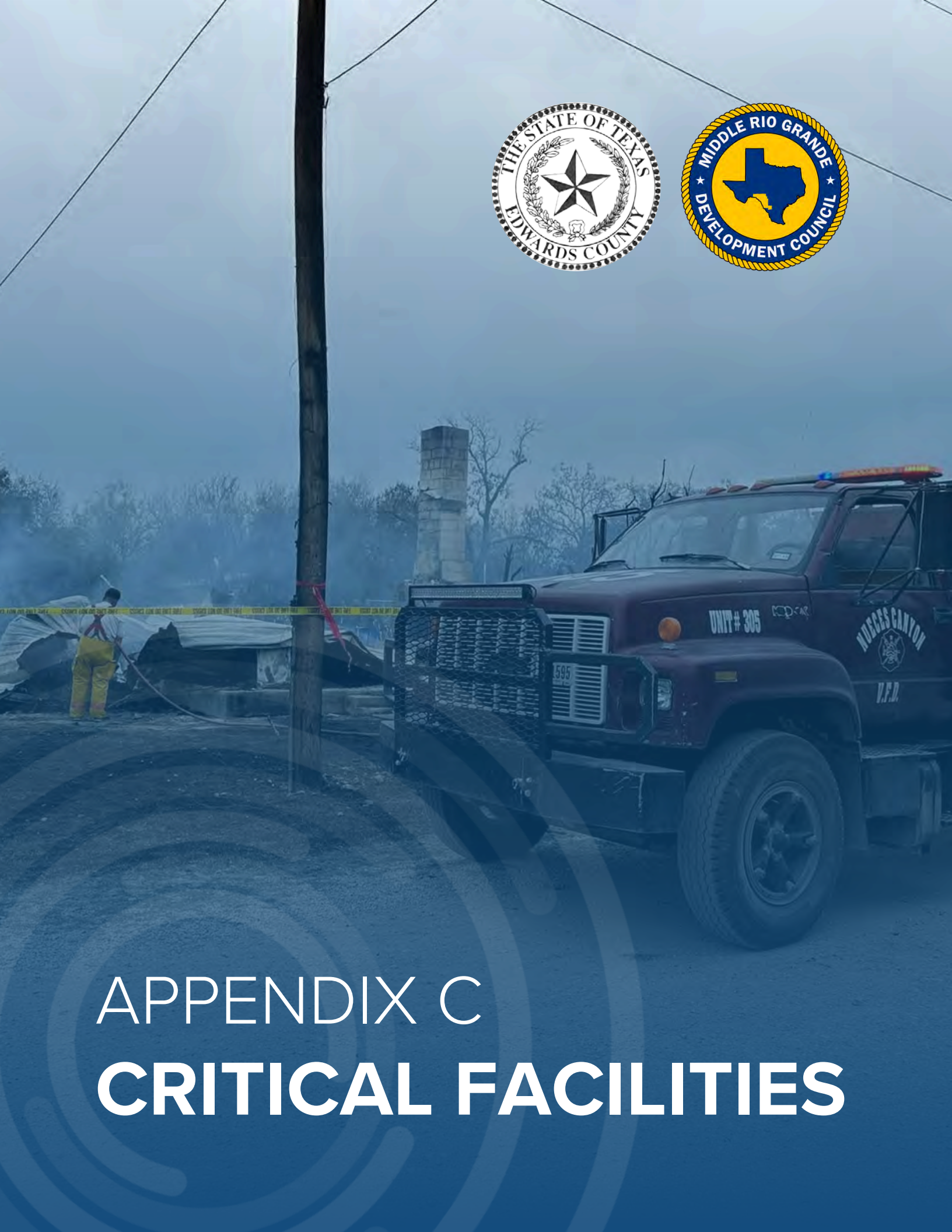
APPENDIX B: PUBLIC SURVEY RESULTS

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.



APPENDIX C

CRITICAL FACILITIES

APPENDIX C: CRITICAL FACILITIES

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



APPENDIX D **MEETING DOCUMENTATION**

APPENDIX D: MEETING DOCUMENTATION

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



APPENDIX E

CAPABILITY

ASSESSMENT

APPENDIX E: CAPABILITY ASSESSMENT

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



APPENDIX F STATE AND FEDERAL FUNDING OPPORTUNITIES

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

Overview.....	1
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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 facility and infrastructure upgrades, hazard mapping, mitigation planning, and other mitigation programmatic activities. Table F-1 describes a variety of loan and grant programs offered by state agencies for which mitigation activities may be eligible.

Table F-1. Summary of State Funded Mitigation Programs

AGENCY	FUNDING PROGRAM
Texas A&M Forest Service (TAMFS)	<ul style="list-style-type: none"> ➤ 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)	<ul style="list-style-type: none"> ➤ 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)	<ul style="list-style-type: none"> ➤ 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)	<ul style="list-style-type: none"> ➤ Texas HOME Disaster Relief
Texas Department of State Health Services (TXDSHS)	<ul style="list-style-type: none"> ➤ Hospital Preparedness Program (HPP) Cooperative Agreement ➤ Public Health Emergency Preparedness (PHEP) Cooperative Agreement

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

AGENCY	FUNDING PROGRAM
Texas Department of Transportation (TXDOT)	<ul style="list-style-type: none"> ➤ 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)	<ul style="list-style-type: none"> ➤ 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)	<ul style="list-style-type: none"> ➤ Economic Development Administration Grants and Investments
Texas General Land Office (TXGLO)	<ul style="list-style-type: none"> ➤ Beach 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)	<ul style="list-style-type: none"> ➤ 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)	<ul style="list-style-type: none"> ➤ Clean Water Act Section 319 Grants ➤ Nonpoint Source Grant Program
Texas Water Development Board (TWDB)	<ul style="list-style-type: none"> ➤ Agricultural Water Conservation Grants ➤ Agricultural Water Conservation Loans ➤ Clean Water State Revolving Fund (SWSRF) ➤ Community Assistance Program (CAP) ➤ Drinking Water State Revolving Fund (DWSRF) ➤ Economically Distressed Areas Program ➤ Emergency Community Water Assistance Grants ➤ Flood Infrastructure Fund (FIF)

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

AGENCY	FUNDING PROGRAM
TWDB (continued)	<ul style="list-style-type: none"> ➤ Flood Mitigation Assistance (FMA) Program ➤ Flood Mitigation Assistance (FMA) Swift 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 ➤ 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 ➤ Water SMART - 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 F-2 described additional Federal, State, Local, and Non-Profit mitigation funding sources specifically within the State of Texas.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

Table F-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 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	Provided to state agencies and political subdivisions for projects that support the implementation of conservation of water management strategies identified in state and regional water plans. Yearly applications. Up to \$1.2 million available annually. Grant categories vary from year to year.
Agricultural Water Conservation Loans	State	TWDB	TWDB	Agricultural water conservation loans to use either for improvements on facilities or as loan 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.
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.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
American Recovery and Reinvestment Act (ARRA)	Federal	DOT Federal Transit Administration	TDA	Nicknamed the Recovery Act, ARRA is a stimulus package enacted by the 111th U.S. Congress and signed into law by President Barack Obama in February 2009. Developed in response to the Great Recession, the primary objective of this federal statute was to save existing jobs and create new ones as soon as possible. Other objectives are to provide temporary relief programs for those most affected by the recession and invest in infrastructure, education, health, and renewable energy.
Aquatic Ecosystem Restoration	Federal	DOD-USACE		Direct support for carrying out aquatic ecosystem restoration project 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 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 keep their beaches maintained. 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.
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. The Bridge Division develops an initial list each FY of eligible bridges in each district and distributes to the districts for the annual program call.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
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 to replace 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.
Climate Pollution Reduction Grant	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 provided high-quality jobs, improve health, and keep families safe where they live.
Coastal Erosion Planning and Response Act (CEPRA)	State	GLO	TXGLO	Since 2000, the Texas General Land Office's Coastal Erosion Planning and Response Program has received more than \$62 million in state funding and more than \$62 million in matching funds, completing more than 200 coastal erosion projects and studies. The application process for non-emergency project funding requests opens every even year in February and closes in early June of that same year.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Coastal and Estuarine Land Conservation Program (CELCP)	Federal	NOAA	TXGLO	When NOAA provides funding for CELCP, the GLO provides coastal communities an opportunity to apply for up to three projects per year, with federal grants for any single project not to exceed \$3 million.
Coastal Management Program (CMP)	Federal	NOAA	TXGLO	Texas receives approximately \$2 million annually in grants from NOAA and 90% of the funds are passed through to local governments and entities to address environmental needs and to 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 and 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 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 are not eligible for direct CDBG funding from HUD may apply for funding through any of the Texas CDBG programs.

APPENDIX F: 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 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 to 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 delivered via USDA Forest Service and Private Forestry Coop Fire Program.
Community Rating System (CRS)	Federal	FEMA		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

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
CRS (continued)				losses, reduces human suffering, and protects the environment. Technical assistance on 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 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 mitigating 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. 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	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.
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 for research and related educational activities on risk, perception, communication, and management (primarily technological hazards).

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
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 support 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 towards 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	Invests and provides grants for community construction projects, including mitigation activities.
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.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
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 less than \$65,900. Aids communities who 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, planning.
Emergency Management Institute	Federal	FEMA		Education training programs to prepare emergency management professionals to prepare for, respond to, and recover from disasters and emergency.
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.
Emergency Relief (ER) Program	Federal	US DOT - FHWA	TXDOT	Provides funds for roads and bridges on Federal-aid highways that are damaged as a direct result of a natural disaster or catastrophic failure from an external cause.
Emergency Watershed Protection (EWP)	Federal	USDA, NRCS	TWDB	Provides funding and technical assistance for emergency measures such as floodplain easements in impaired watersheds. Funding available through the Simplified Acquisition Procedures (SAP) ranges from \$25K to \$100K. Funded through contracts between project sponsors and the NRCS. There are no grants. The NRCS pays 75% of the 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.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
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 State and local parks and recreation, such as open space.
Fire-Adapted Communities Program (FAC)	Federal	FEMA, USFA	TAMFS	Collaborates to identify wildfire risk and works collectively on actionable steps to reduce risk of loss by protecting property and increasing 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		Funds to support 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. The SWIFT Advisory Committee is the oversight entity.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
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		Technical and planning assistance at the local, regional, or national level needed to support effective floodplain management.
Flood Protection Planning Program	State	TWDB	TWDB	Grant available to political subdivisions of the State of Texas for evaluation of structural and nonstructural solutions to flooding problems. Upstream and/or downstream effects of proposed solutions must be considered in the planning. The proposed planning 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 problems resulting from or relating to flooding; conducting hydrologic and hydraulic studies; identifying potential solutions; estimating benefits and costs of potential solutions, including structural and nonstructural measures; determining the views and needs of the affected public relating to flooding problems; recommending feasible solutions to flood protection problems; evaluating environmental, social, and cultural factors; and ensuring proposed solutions are consistent with appropriate regional or statewide plans and 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. This program reduces 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.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
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.
Hazard Mitigation Grant Program Supplemental – Local Hazard Mitigation Plan Program (LHMPP)	Federal	FEMA	TXGLO	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 will range from \$20,000 – \$100,000.
Hazardous Materials Emergency Preparedness (HMEP) Grant Program	Federal	DOT	TDEM	Funding available to help facilitate preparedness in transporting hazardous materials. The program recognizes Local Emergency Planning Committees (LEPCs) as applicants to maximize funding impact in 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 easements.
High Hazard Potential Dam Program (HHPD)	Federal	FEMA	TCEQ	Pre-disaster/annual cycle, for non-federal high hazard dams classified as high hazard potential by the state/territory dam safety agency, has an approved EAP and rated in poor condition. Provides assistance for technical, planning, and design activities towards the repair, removal, and/or structural/nonstructural rehabilitation of eligible high hazard potential dams.
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	Homeland security activities identified in the state and local strategic plans. Funding supports threat & hazard and risk identification for natural, technological, and human-caused hazards. Some prevention activities may be considered mitigation.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Hospital Preparedness Program (HPP) Cooperative Agreement	Federal	HHS	TXDSHS	HPP is the primary source of federal funding for health care system preparedness and response and, in collaboration with public health, 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 and provide training, and coordinate regional exercises.
Hydrologic Research Grants	Federal	NOAA		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 are 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 the spacing of water wells, the production from water wells, or both. 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, and Texas, and their coastal political subdivisions (CPSs). Funds are used for coastal conservation, restoration, and hurricane protection. The second phase of GOMESA revenue sharing began in Fiscal Year 2017 and expands the definition of qualified Outer Continental Shelf revenues to include receipts from Gulf of Mexico leases 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 applies from fiscal years 2016 through 2055.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Indian Housing Assistance - Housing Improvement Program (HIP)	Federal	DOI-BIA		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 for American Indians and Alaska Native (AI/AN) individuals and families who have no immediate resource for standard housing.
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	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 or purchases easements on high quality lands and waters for inclusion into the National Wildlife Refuge System.
Landowner Incentive Program	Federal	USFWS	EMNRD	Collaboration with Forestry Division and private landowners to protect the habitat of at-risk species on private lands. Landowner involvement is voluntary.
Mapping Standards Support	Federal	DOI/USGS		Expertise in mapping and digital data standards to support the National Flood Insurance Program.
Mitigation Banks	Federal	USACE	Community Applicants	Mitigation Banks are sites approved by the Corps to sell compensatory mitigation credits for projects resulting in unavoidable impacts to waters of the U.S. When a permit is issued that requires compensatory mitigation, the permit will specify how many credits are required to be purchased at an approved mitigation bank.
National Dam Safety Program	Federal	FEMA		Technical assistance, training, and grants to help improve State dam safety programs.
National Digital Orthophoto Program	Federal	DOI-USGS		Develops topographic quadrangles for use in mapping of flood and other hazards.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
National Earthquake Hazards Reduction Program (NEHRP)	Federal	FEMA	TDEM	Provides money to support enhanced earthquake risk assessments in local hazard mitigation plans and other earthquake hazard mitigation and preparedness activities.
National Earthquake Hazard Reduction Program (NEHRP) in Earth Sciences	Federal	NSF		Research into 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.
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 stressors (e.g., cleanup activities) or chemical stressors (e.g., release of hazardous substances) 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.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
National Flood Insurance Program: Technical Mapping Advisory Council	Federal	DOI-USGS		Technical guidance and advice to coordinate FEMA's map modernization efforts for the National Flood Insurance Program (NFIP).
National Training and Education (NTE)	Federal	FEMA		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		NWS offers storm spotter training, along with weather and flooding safety guides. They can also sometimes provide funding to support severe weather signage in parks or other public places.
National Wildlife Wetland Refuge System	Federal	USFWS	TPWD	Provides funding for the acquisition of land into the federal wildlife refuge system.
Nonpoint Source Grant Program	Federal	EPA	TCEQ, TSSWCB	The federal Clean Water Act (CWA) requires States to develop a program to protect the quality of water resources from the adverse effects of nonpoint source (NPS) water pollution. TCEQ and TSSWCB administer federal grants for activities that prevent or reduce nonpoint source pollution (NPS).
Non-Structural Alternatives to Structural Rehabilitation of Damaged Flood Control Works	Federal	DOD-USACT		Direct planning and construction grants for non- structural alternatives to the structural rehabilitation of flood control works damaged in floods or coastal storms.
North American Wetland Conservation Fund	Federal	USFWS	TPWD	Provides funding for wetland conservation projects.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
NRCS Conservation Programs	Federal	USDA, NRCS	Community Applicants	Provides funding through several programs for the conservation of natural resources.
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 & 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 the development, utilization, and conservation of water and related land resources.
Pollution Prevention Grant: Environmental Justice in Communities	Federal	EPA		Technical assistance for businesses to specifically target an improve human health and the environment in disadvantaged communities.
Pollution Prevention Grant: Environmental Justice Through Safer and More Sustainable Products	Federal	EPA		Technical assistance to businesses to increase the supply, demand, and use of safer and more sustainable products.
Post-Disaster Economic Recovery Grants and Assistance	Federal	DOC-EDA		Provides funds 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.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Pre-Disaster Mitigation (PDM)	Federal	FEMA		Congressionally directed funding for local governments, tribes and states to plan for and implement sustainable cost-effective measures designed to reduce risk to individuals and property from future natural hazards.
Preparedness (Non-Disaster) Grants	Federal	FEMA		Provides financial assistance to state and local governments with preparedness program. Funds are allocated to enhance the capacity of state and local emergency responders to prevent, respond to, and recover from weapons of mass destruction terrorism incidents involving chemical, biological, radiological, nuclear, and explosive devices and cyber-attacks.
Prescribed Fire Grants	State	TAMFS	TAMFS	<p>TAMFS's Mitigation & Prevention Department annually implements four prescribed fire grants intended to protect local communities and restore ecosystems.</p> <p>(1) SFAM Plains Prescribed Fire Grant – aids communities that have been or may be threatened by wildland fire by funding prescribed burning to reduce hazardous fuels in or around communities. Treatment areas will be located adjacent to priority communities in Texas that are at the highest risk for loss during a Southern Plains Wildfire Outbreak event.</p> <p>(2) The Community Protection Program Grant – aids in reducing the hazard of high-risk fuels on private lands through the use of prescribed burning. The treatment area will be within 10 miles of the National Forest boundary. The grant's goal is to protect high-risk communities and associated forest resources by reducing the risk of catastrophic wildfire on private and public lands.</p> <p>(3) The State Fire Assistance for Mitigation Central & East Texas Grant – provides assistance to communities that have been or may be threatened by wildfire by funding prescribed burning to reduce hazardous fuels in and around communities. Treatment areas will be private property in the 43 Counties in Central and East Texas that have a Community Wildfire Protection Plan (CWPP) within the county. The goal is to protect high-risk communities and aid in ecosystem restoration by utilizing prescribed fire to consume excess vegetation before it contributes to catastrophic wildfire. Priority will</p>

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Prescribed Fire Grants (continued)				<p>be given to treatments sites that are within a CWPP, located near a Firewise community, located near homes based on Texas Wildfire Risk Assessment Portal and contain ecosystems that will benefit from prescribed fire.</p> <p>(4) Neches River and Cypress Basin Watershed Restoration Program – provides assistance to landowners in utilizing prescribed fire for ecological improvement to the Neches River and Cypress Basin watersheds. This program will benefit the public and natural resources through improvement of water quality and quantity, control of invasive species and enhancement of wildlife habitat. Treatment areas will be private property in the Neches River and Cypress Basin Watersheds. Priority will be given to prescribed burn treatments that promote native ecosystem restoration, are in priority watershed protection zones and near public land.</p>
Project Modifications for Improvement of the Environment	Federal	DOD-USACE		Provides funds for ecosystem restoration by modifying structures and/or operations or water resources projects constructed by the USACE or restoring areas where a USACE project contributed to the degradation of an area.
Protection of Essential Highways, Highway Bridge Approaches, and Public Works	Federal	USACE		Technical assistance to ensure bank protection of 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 allocated to States and communities to repair damaged infrastructure and public facilities and 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 when repairing damages to a public structure or infrastructure. Wildfire mitigation is also eligible under emergency protection if life is in imminent danger.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Public Health Emergency Preparedness (PHEP) Cooperative Agreement	Federal	CDC	TXDSHS	Aids health departments to build and strengthen their abilities 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 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.
Regional Facility Planning Grant Program	State	TWDB	TWDB	Provides funds to political subdivisions in the State of 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 feasible regional water supply and wastewater facility alternatives, and identify institutional arrangements to provide regional water supply and wastewater services for areas in Texas.
Regional Water Planning Group Grants	State	TWDB	TWDB	Developed to guide and support planning of the State's water resources by administering and assisting in the development of regional and state water plans. This program strives to improve the planning process by developing clear guidance for the program's stakeholders and utilizing the best-available data, methodologies, and technical innovations for each cycle of funding.
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 to 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. Activities eligible for funding are those related to the development, revision, or improvement of regional water plans including public meetings, hearings, and special studies. Plans should be in accordance with Texas Water Code, §16.053 and Chapter 357, or other special studies approved by the TWDB which will enhance water planning efforts in the region.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Resilient Landscapes Program	Federal	USDA, USFS	TAMFS	Provides coordination to restore healthy, resilient, fire-adapted ecosystems. Restoring ecosystems includes thinning crowded forests and using prescribed fire on two to three million acres each year, which can help 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.
Rural Development Grants	Federal	USDA-Rural Development	TWDB	Provides grants and loans for infrastructure and public safety development and enhancement in rural areas. Provides \$100,000 or 75% of the total project, 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. These include water and waste treatment, electric power, and telecommunications services.
Rural Water Assistance Fund (RWAF)	State	TWDB	TWDB	Designed to assist small rural utilities to obtain low-cost financing for water and wastewater projects. The RWAF offers tax-exempt equivalent interest rate loans with long-term finance options.
Safe Rest Stops Program	State	TXDOT	TXDOT	Texas has 21 major highways that serve as long distance travel corridors. Along each of these roadways, rest areas are an essential safety feature to reduce accidents caused by driver fatigue. These facilities give travelers a break from driving, and then return them to the road rested, refreshed and alert.
Section 108 Loan Guarantee Program	Federal	HUD		Loan towards public entities for community and economic development (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 to purchase, build, or rehabilitate a home in a rural area.
Section 504 Loans for Housing	Federal	USDA-RHS		Repair loans, grants and technical assistance to low-income senior homeowners living in rural areas to repair their homes and remove health and safety hazards.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Societal Dimensions of Engineering, Science, and Technology Program	Federal	NSF		Funding towards research and educational activities on topics such as ethics, values, and assessment, communication, management and perception of risk.
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 to reduce the hazard of high-risk fuels on private lands using hazardous fuel reduction. The grant's goal is to protect high risk communities within the 32 high risk counties in Central Texas identified by Texas A&M Forest Service Mitigation and Prevention Department. Priority will be given to landowners that live with in the 32 high risk counties, are in a county or city that has an active Community Wildfire Protection Plan or live with in a 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 the wind. Projects will be located within the Texas High Plains. The goal of the grant is to protect high-risk communities by reducing the risk of catastrophic wildfire 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 3 rows of trees and 400 feet in length.
Silver Jackets	Federal	USACE	TWDB	Provides funding for flood related studies, public awareness, risk analysis, and flood response plans. Construction of small flood control projects.
Small Flood Control Projects (USACE Section 205)	Federal	USACE	TWDB	Authorizes use of USACE to complete feasibility studies and construction of small flood control projects.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

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 a regional water, wastewater, or flood control project when the 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 the benefits can be documented, and where such development is unaffordable without state participation. The goal is to allow for the "right sizing" of projects in consideration of future needs.
State Water Implementation Fund for Texas (SWIFT)	State	TWDB	TWDB	The SWIFT program helps communities develop and optimize water supplies at cost-effective rates. The program provides low-interest loans, extended repayment terms, deferral of loan repayments, and incremental repurchase terms for projects with state ownership aspects.
State Water Resources Research Act Program	Federal	USGS	TWDB	USGS in cooperation with the National Institutes for Water Resources supports an annual call for proposals to focus on water problems and issues that are of a regional or interstate nature or 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 streams gauging stations that provide data on the flood characteristics of rivers.
Surface Transportation Program	Federal	USDOT/ FHWA		Funding allocated for activities including safety construction and transportation enhancements. Transportation enhancements encompass a broad range of safety education, environmental and historically related activities.
Texas Farm and Ranch Lands Conservation Program (TFRLCP)	State	TPWD	TPWD	Maintains and enhances the ecological and agricultural productivity of these lands through Agricultural Conservation Easements. The TFRLCP supports responsible stewardship and conservation of working lands, water, fish and wildlife, and agricultural production through: <ul style="list-style-type: none"> ➤ Generating interest and awareness in easement programs and other options for conserving working lands.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
TFRLCP (continued)				<p>➤ Leveraging available monies to fund as many high-quality projects as possible.</p> <p>Highlighting the ecological and economic value of working lands and the opportunities to conserve working lands for the future.</p>
Texas HOME Disaster Relief	Federal	TDHCA	TDHCA	<p>The Texas HOME Disaster Relief Program is a long-term housing program designed to help eligible organizations serve income eligible households impacted by disasters. Funds are available to assist with federal or state declared disasters, or other natural or man-made disasters that may occur. The Department's practice is to maintain a HOME Disaster Relief Fund balance of \$1 million whenever possible. These funds can be accessed to support impacted households not located in communities that receive HOME funds directly from the U.S. Department of Housing and Urban Development (HUD).</p>
Texas Longleaf Conservation Assistance Program	Federal	National Fish and Wildlife Foundation (NFWF)	TAMFS	<p>Provides eligible landowners with financial and technical assistance for establishing, enhancing, and managing longleaf pine. Landowners with property within 10 East Texas counties which include 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% 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.</p>
Texas Infrastructure Resiliency Fund (TIRF)	State	TWDB	TWDB	<p>The purpose of this program is to provide loans, grants, and matching funds for flood projects through four separate accounts. Enacted through Senate Bill 7 to address needs identified following the flood disasters of 2015, 2016, and 2017. Senate Bill 500 appropriated \$685 million. Each account has different purposes. The oversight entity is the TIRF Advisory Board (SWIFT Advisory Committee and TDEM Director as non-voting member).</p>

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Texas Water Development Fund (DFund)	State	TWDB	TWDB	Provides financing for various types of eligible infrastructure projects such as planning, design, acquisitions, and construction of projects for: water supply, including reservoirs and well fields, conservation, water quality enhancement, flood control, and wastewater. This program enables the TWDB to fund projects with multiple purposes (e.g., water and wastewater) in one 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 title of certain inventory farm properties owned by 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	Provides opportunities for non-traditional transportation-related activities. Projects should go above and beyond standard transportation activities and be integrated into the surrounding environment in a sensitive and creative manner that contributes to the livelihood of the communities, promotes the quality of our environment, and enhances the aesthetics of our roadways. Projects undertaken with enhancement funds are eligible for reimbursement of up to 80 percent of allowable costs.
United States Geological Survey (USGS)	Federal	USGS		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	Urban tree canopy (UTC) is the layer of leaves, branches, and stems of trees that cover the ground when viewed from above. In urban areas, the UTC provides an important stormwater management function by intercepting rainfall that would otherwise runoff of paved surfaces and be transported into local waters through the storm drainage system, picking up various pollutants along the way. UTC also reduces the urban heat island effect, reduces heating/cooling costs, lowers air temperatures, reduces air pollution, increases property values, provides wildlife habitat, and provides aesthetic and community benefits such as improved quality of life.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
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, this can include green infrastructure.
United States Geological Survey (USGS)	Federal	USGS		USGS issues competitive grants and cooperative agreements to support research in earthquake hazards, the physics of earthquakes, earthquake occurrence, and earthquake safety policy.
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, reducing soil erosion, wildlife habitat preservation, preservation and restoration of forests and wetlands, aiding farmers whose farms are 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 of protecting human health and the environment by providing critical resources for what is often an area's first drinking water and basic sanitation services.
Water Research Grant Program Water Research Grant Program	State	TWDB	TWDB	TWDB funds a variety of water planning and water research studies and projects intended to assist and support regional water planning efforts or to answer regional water planning questions.
Water Conservation Field Services Program	Federal	HUD	Texas A&M AgriLife	Encourage beneficiaries of Federal water projects to conserve water, and to assist agricultural and urban water districts in preparing 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, identifying water management improvements through System Optimization Reviews (SORs), designing water management improvements, and improving the understanding of water conservation techniques through demonstration activities. WaterSMART also supports

¹ 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.

APPENDIX F: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Water Conservation Filed Services Program (continued)				Reclamation's priorities to increase water reliability and resilience, support racial and economic equity, modernize infrastructure, and enhance water conservation, ecosystem, and climate resilience.
Water2025 Challenge Grant Program for Western States	Federal	Bureau of Reclamation	TWDB	Up to \$25,000 for projects that improve water use efficiency and improve water management practices.
Watershed Processes and Water Resources	Federal	Bureau of Reclamation	TWDB	Up to \$250,000 for projects that can be completed within 24 months and that reduce conflicts through water conservation, efficiency, and markets.
Watershed Processes and Water Resources – National Research Initiative Standard Research (Part T)	Federal	USDA	TWDB	\$100,000 available. Sponsors research that addresses two areas: (1) understanding fundamental watershed processes; and (2) developing appropriate technology and management practices for improving the effective use of water (consumptive and non-consumptive) and protecting or improving water quality for agriculture and forestry production.
WaterSMART – Drought Response Program	Federal	USDA	TWDB	\$500,000 available. Innovative research in understanding fundamental processes that affect the quality and quantity of water resources at diverse spatial and temporal scales, ways on improving water resource management in agriculture, forested, and rangeland watersheds, and developing appropriate technology to reach those goals.
Wetlands Protection – Development Grants	Federal	EPA		Provides funds to support the development and enhancement of state and tribal wetlands protection programs.
Wetlands Reserve Program	Federal	USDA, NRCS		Financial and technical assistance to protect and restore wetlands through easements and restoration agreements.
Wildlife Habitat Incentive Program (WHIP)	Federal	USDA, NRCS	TPWD	Voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forest land, and tribal land.



ADOPTION RESOLUTIONS