



Llano and San Saba County Hazard Mitigation Action Plan 2023 Update





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Volume I

Draft - March 2023

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Section 1 Introduction

1.1 Purpose

Llano County, San Saba County, and its participating jurisdictions (the Planning Area) have prepared this multi-hazard mitigation plan to better protect the residents and property throughout the Planning Area from the effects of hazard events. This plan demonstrates the Planning Area's commitment to reducing risk from hazards, increasing resilience overall, and provides a tool to help decision makers integrate mitigation in their day-to-day processes. This plan was also developed to position Llano County, San Saba County, and its participating jurisdictions for eligibility of pre- and post-disaster Federal Emergency Management Agency (FEMA) grants, including Hazard Mitigation Assistance grant programs (HMA), which include Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC), and Flood Mitigation Assistance (FMA). This plan also aligns with the planning elements of the National Flood Insurance Program's Community Rating System (CRS) which provides for lower flood insurance premiums in CRS communities.

1.2 Background

A Hazard Mitigation Action Plan (HMAP) is a living document that communities use to reduce their vulnerability to hazards. It forms the foundation for a community's long-term strategy to reduce disaster losses and creates a framework for decision making to reduce loss of life and damages to property and the economy from future disasters. Examples of mitigation projects include home acquisitions or elevations to remove structures from high-risk areas, upgrades to critical public facilities, and infrastructure improvements. Ultimately, these actions reduce vulnerability, and communities are able to recover more quickly from disasters. The Planning Area has demonstrated its commitment to reducing disaster losses by initially developing its HMAP in 2016 and updating information upon which to base a successful mitigation strategy to reduce the impacts of natural disasters and to increase the resiliency of the Planning Area.

Hazard Mitigation is any sustained action taken to reduce or eliminate the long-term risk and effects that can result from specific hazards.

FEMA defines a **Hazard Mitigation Plan** as the documentation of a state or local government evaluation of natural hazards and the strategies to mitigate such hazards.

In response to the requirements of the Disaster Mitigation Act of 2000 (DMA 2000), which requires local governmental agencies to develop and update their HMP every five years, this plan serves as the 2023 update to the 2016 Llano County Hazard Mitigation Plan and the 2016 San Saba County Hazard Mitigation Plan. During the course of the planning process, the entire plan was updated with a focus on examining changes in vulnerability due to hazard events, reviewing capabilities and how they implement hazard mitigation, and reviewing the mitigation strategy and identifying new initiatives to increase overall resiliency in the Planning Area.

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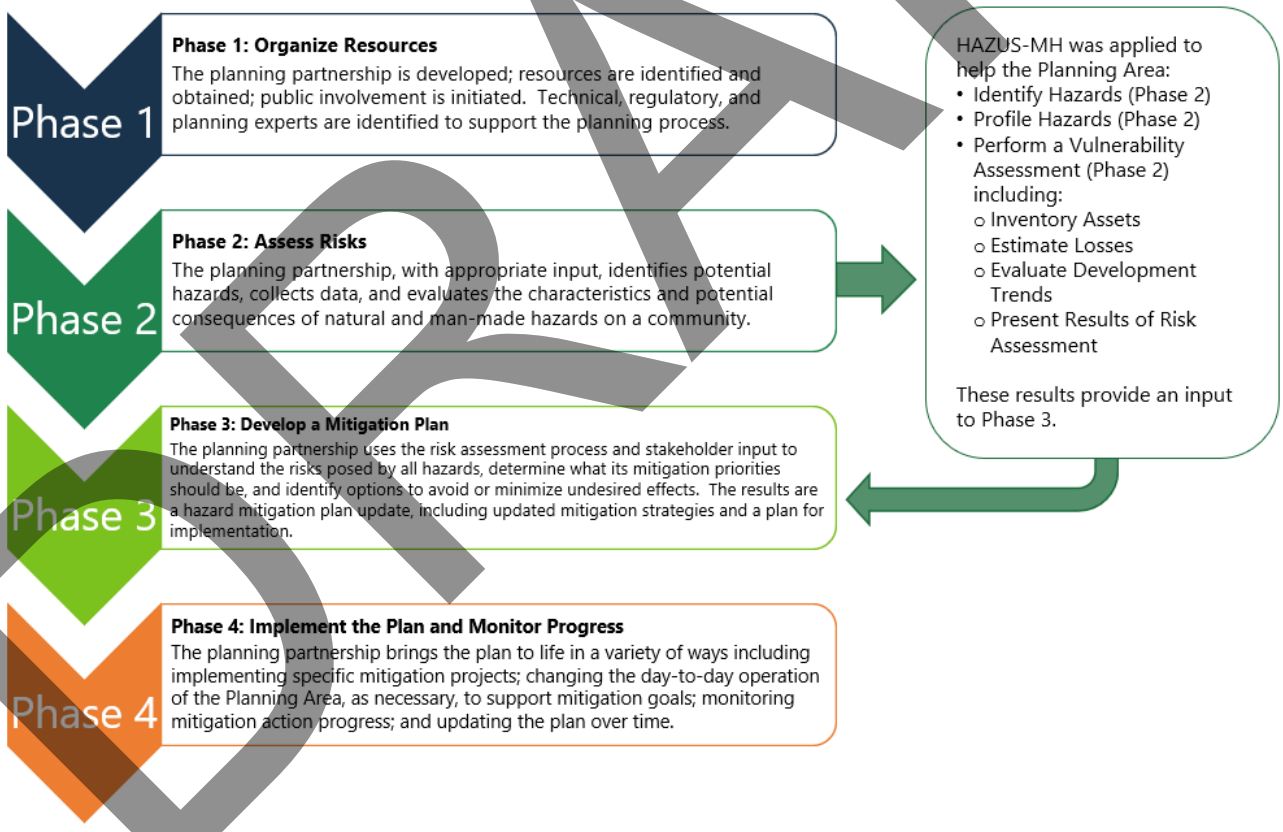
1.3 Plan Organization

The Llano and San Saba County Hazard Mitigation Action Plan 2023 Update is organized as a two-volume plan and is in alignment with the TDEM planning requirements, the 2013 FEMA Local Mitigation Planning Handbook, and the FEMA Local Mitigation Plan Review Tool.

Volume I provides information on the overall planning process and hazard profiling and vulnerability assessments, which serves as a basis for understanding risk and identifying mitigation actions. As such, Volume I is intended for use as a resource for ongoing mitigation analysis.

Volume II provides an annex dedicated to each participating jurisdiction. Each annex summarizes the jurisdiction's legal, regulatory, and fiscal capabilities; identifies vulnerabilities to hazards; documents mitigation plan integration with other planning efforts; records status of past mitigation actions; and presents an individualized mitigation strategy. The annexes are intended to provide a useful resource for each jurisdiction for implementation of mitigation projects and future grant opportunities, as well as a place for each jurisdiction to record and maintain their local aspect of the multi-jurisdictional plan.

Figure 1-1. Llano and San Saba County Hazard Mitigation Planning Process



Volume I of this HMP includes the following sections:

Section 1: Introduction: Overview of the planning process and layout of the plan.

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Section 2: Planning Process: Description of the HMP methodology and development process; Steering Committee, Planning Committee, Planning Partnership, and stakeholder involvement efforts; and a description of how this HMP will be incorporated into existing programs.

Section 3: County Profile: Overview of the Planning Area, including: (1) physical setting, (2) land use, (3) land use trends, (4) population and demographics, (5) general building stock and (6) critical facilities and lifelines.

Section 4: Risk Assessment: Documentation of the hazard identification and hazard risk ranking process, hazard profiles, and findings of the vulnerability assessment (estimates of the impact of hazard events on life, safety, health, general building stock, critical facilities, the economy); description of the status of local data; and planned steps to improve local data to support mitigation planning.

Section 5: Capability Assessment: A summary and description of the existing plans, programs, and regulatory mechanisms at all levels of government (federal, state, county, local) that support hazard mitigation within the Planning Area.

Section 6: Mitigation Strategy: This section provides information regarding the mitigation goals and objectives in response to priority hazards of concern and the process by which Planning Area mitigation strategies have been developed or updated.

Section 7: Plan Maintenance: System established to continue to monitor, evaluate, maintain, and update the HMAP.

Volume II of this plan includes the following sections:

Section 8: Planning Partnership: Description of the Planning Partnership, their responsibilities, and description of jurisdictional annexes.

Section 9: Annexes: Jurisdiction-specific annexes for Llano County and San Saba County containing their hazards of concern, hazard ranking, capability assessment, mitigation actions, action prioritization specific only to Llano County and San Saba County, progress on prior mitigation activities (as applicable), and a discussion of prior local hazard mitigation plan integration into local planning processes.

Appendices include the following:

Appendix A: Plan Adoption: Resolutions from Llano and San Saba Counties and all participating jurisdiction included as each formally adopts the HMP update.

Appendix B: Participation Documentation: Matrix to give a broad overview of who attended meetings and when input was provided to the HMP update and additional worksheets submitted during workshops conducted throughout the planning process.

Appendix C: Meeting Documentation: Agendas, attendance sheets, minutes, and other documentation (as available and applicable) of planning meetings convened during the development of the plan.

Appendix D: Public and Stakeholder Outreach Documentation: Documentation of the public and stakeholder outreach effort including webpages, informational materials, public and stakeholder meetings

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and presentations, surveys, and other methods used to receive and incorporate public and stakeholder comment and input to the plan process.

Appendix E: Mitigation Strategy Supplementary Data: Documentation of the broad range of actions identified during the mitigation process; types of mitigation actions; the mitigation catalog developed using jurisdiction input and potential mitigation funding sources.

Appendix F: Plan Maintenance Tools: Examples of plan review tools and templates available to support annual plan review.

Appendix G: Linkage Procedures: Includes steps non-participating local governments and other local jurisdictions such as Fire Districts, Utility Districts, School Districts, and any other eligible local government as defined in 44 CFR 201.2 within the planning area can join this plan as a participating jurisdiction and to ultimately achieve approved status.

Appendix H: Critical Facilities: Includes a full list of critical facilities identified for the update of the HMP. Due to the sensitive nature of the information, critical facility details have been redacted.

1.4 The Plan Update – What is Different?

The 2023 update builds on the previous plan and includes the following changes and enhancements:

- Updated data and tools provided for a more detailed and accurate risk assessment. The risk assessment was prepared to better support future grant applications by providing risk and vulnerability information that would directly support the measurement of "cost-effectiveness" required under FEMA mitigation grant programs.
- The plan identified implementable actions, with enough information to serve as the basis for policy and funding decisions and represent measurable impacts on resiliency and mitigation progress. Strategies provide direction, but actions are fundable under grant programs.
- Each participating jurisdiction has their own jurisdictional annex in the plan, found in Volume II, Section 9.

It should be noted that due to the limitations on participation posed by the pandemic and the strains on time and resources for many local governments and other community organizations from 2020 to present, participation of stakeholders at the municipal level was limited. In accordance with FEMA guiding principles for inclusive participation at various levels, the planning team will place a high priority on an expanded effort on stakeholder participation with local planning committees in future plan updates.

Table 1-1 indicates the major changes between the two plans as they relate to 44 CFR planning requirements.

Table 1-1. Llano County Plan Changes Crosswalk

44 CFR Requirement	2016 HMP	2023 Updated Plan
Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:	The 2016 plan followed an outreach strategy utilizing multiple media developed and approved by the Steering Committee. This strategy involved the following:	Building upon the success of the 2016 plan, the 2023 planning effort deployed the same public engagement methodology. The plan

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44 CFR Requirement	2016 HMP	2023 Updated Plan
(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval; *(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and non-profit interests to be involved in the planning process; and* *(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.*	• Key department personnel formed a Steering Committee for the plan. • All Planning Partnership meetings were open to the public. • A website was created on Llano County's domain to keep the public informed of the planning process and how to get involved. • Use of a public participation survey. • Press releases were distributed as key milestones were achieved and proper to each public meeting. • Stakeholders were identified and coordinated with throughout the process. • Draft plan deliverables were made available on the County and multiple City websites, local libraries, and City Hall's. • A variety of existing studies, plans, reports, and technical information were reviewed as part of the planning process.	included the following enhancements: • Adjacent communities, along with the County, were invited to participate in the planning meetings. • The 2023 plan includes San Saba County and its jurisdictions. • Social media was utilized to engage the public. As with the 2016 plan, the 2023 planning process identified key stakeholders and coordinated with them throughout the process. A comprehensive review of relevant plans and programs was performed by the planning team.
§201.6(c)(2): The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.	The 2016 plan included a risk assessment of hazards of concern. The risk assessment included frequency of return, approximate annualized losses, a description of general vulnerability, climate change impacts, secondary hazards, critical facilities and infrastructure, discussion on vulnerabilities, and future development trends.	The 2023 plan update includes a comprehensive update to the risk assessment. The flood hazard was expanded to include stormwater flooding (or flooding outside of the floodplain). New and updated hazards of concern were included. Jurisdiction-specific risk assessment results are summarized in Section 4 (Risk Assessment) and in each jurisdictional annex (Section 9).
§201.6(c)(2)(i): [The risk assessment] shall include a] description of the … location and extent of all-natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.	The 2016 plan presented a risk assessment of each hazard of concern. Each section included the following: • General background • Hazard profile • Past events • Location • Frequency	A similar but adjusted format, using new and updated data, was used for the 2023 plan update. Each hazard profile includes information for both Llano and San Saba County. Each section of the risk assessment includes the following: • Hazard profile, including hazard description and types, maps of extent and location, previous

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44 CFR Requirement	2016 HMP	2023 Updated Plan
	• Severity • Warning time • Secondary hazards • Climate change impacts • Exposure • Vulnerability • Future trends in development • Scenario • Issues	occurrences, and probability of future events. • Climate change impacts on future probability. • Vulnerability assessment including impact on life, safety, and health, general building stock, critical facilities, and the economy, as well as future changes that could impact vulnerability. The vulnerability assessment also includes changes in vulnerability since the 2016 plan.
§201.6(c)(2)(ii): [The risk assessment] shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i). This description shall include an overall summary of each hazard and its impact on the community.	Vulnerability was assessed for all hazards of concern. Each hazard of concern included a summary of assets exposed to the hazard (people/parcels annualized losses and expected damage to critical facilities and the environment).	A robust vulnerability assessment was conducted for the 2023 plan update, using new and updated asset and hazard data. Volume 1, Section 4.3 summarizes the planning area's vulnerability for each hazard of concern. The jurisdictional annexes (Section 9) include a summary table of impacts on both Planning Partners.
§201.6(c)(2)(ii): [The risk assessment] must also address National Flood Insurance Program insured structures that have been repetitively damaged by floods.	A summary of NFIP insured properties identified as repetitive loss and severe repetitive loss locations was included in the plan.	A summary of NFIP insured properties identified as repetitive loss and severe repetitive loss locations was included in the plan.
Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure and critical facilities located in the identified hazard area.	A complete inventory of the numbers and types of buildings exposed was generated for each hazard of concern. The Planning Partnership defined "critical facilities" for the planning area, and these were inventoried by exposure.	Quantitative and qualitative analyses were conducted using the updated hazard and inventory data as presented in Section 4 (Risk Assessment). In addition, critical facilities considered lifelines in accordance with FEMA's definition were identified.
Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) and a description of the methodology used to prepare the estimate.	Loss estimates were generated for all hazards of concern by using readily available information.	Quantitative and qualitative analyses were conducted using the updated hazard and inventory data as presented in Section 4 (Risk Assessment). Estimated potential losses are reported in both Volume 1 Section 4.3 and Volume II Section 9 for each jurisdiction.
Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation	There is a summary of future trends in development in each hazard profile.	A spatial analysis using identified growth areas, and potential new development identified by jurisdictions was conducted to determine if located in hazard areas.

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44 CFR Requirement	2016 HMP	2023 Updated Plan
options can be considered in future land use decisions.		These results were reported to all participants and summarized in their annexes to discuss mitigation measures. In Volume I, Section 4.3, projected changes in population and development are discussed in each hazard section and how these projected changes may lead to increased vulnerability, or plans/regulations/ordinances in place to implement mitigation to protect the development.
§201.6(c)(3):[The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.]	The 2016 plan contained goals, objectives, and actions. The identified actions covered multiple hazards, goals, and objectives.	The Planning Partnership reviewed and updated the goals and objectives. A mitigation strategy workshop with associated tools and guidance on problem statement development was deployed to inform the identification of mitigation actions. Actions that were completed or no longer considered to be feasible were removed. The balance of the actions was carried over to the 2023 plan, and in some cases, new actions were added to the action plan.
Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.	The Planning Partnership identified goals and objectives targeted specifically for this hazard mitigation plan. These planning components supported the actions identified in the plan.	The Planning Partnership reviewed and updated the goals and objectives. Several new objectives were identified to align with updated Planning Area priorities.
Requirement §201.6(c)(3)(ii): [The mitigation strategy shall 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.	For each identified hazard, mitigation strategies were developed and prioritized using mitigation action worksheets. The mitigation actions were displayed in a table, separated by jurisdiction.	For the 2023 update, a mitigation catalog was developed to provide a comprehensive range of specific mitigation actions to be considered. A table with the analysis of mitigation actions by type and hazard was used in jurisdictional annexes to the plan. Mitigation action worksheets with an alternative project evaluation were prepared for FEMA-eligible projects.
Requirement: §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program, and continued compliance with the program's requirements, as appropriate.	The County identified an action to place flood insurance materials/mortgage lending mandates in libraries	For the 2023 update, each jurisdictional annex includes a description on how each jurisdiction participates and implements the NFIP.

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44 CFR Requirement	2016 HMP	2023 Updated Plan
Requirement: §201.6(c)(3)(iii): [The mitigation strategy shall describe] how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.	Each of the actions in this were prioritized based on FEMA's STAPLEE criteria, which includes consideration of the social, technical, administrative, political, legal, economic, and environmental factors necessary for the implementation of each action.	A revised methodology based on the STAPLEE criteria and using new and updated data was used for the 2023 plan update. The 14 criteria were used to evaluate each potential mitigation action. The evaluation included a qualitative benefits and cost review. The results of the evaluation were used to identify the actions to include in the plan and assist with the prioritization.
Requirement §201.6(c)(4)(i): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.	The 2016 plan details a plan maintenance strategy stating that the plan will be revised and maintained as required.	The 2023 plan details a plan maintenance strategy similar to that of the initial plan. However, the 2023 plan maintenance strategy includes the use of the BATool[SM] which will enable municipal and county representatives to directly access mitigation initiatives to easily update the status of each project, document successes or obstacles to implementation, add or delete projects to maintain mitigation project implementation.
Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.	The 2016 plan details recommendations for incorporating the plan into other planning mechanisms.	The 2023 plan details recommendations for incorporating the plan into other planning mechanisms such as the following: • Comprehensive/Master Plan. • Emergency Response Plan/ Emergency Operations Plan. • Capital Improvement Programs. • Municipal Code.
Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.	The 2016 plan details a strategy for continuing public involvement.	The 2016 plan maintenance strategy was carried over to the 2023 plan.
Requirement §201.6(c)(5): [The local hazard mitigation plan shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).	Llano County and all the Planning Partners have adopted the plan.	The 2023 plan achieves DMA compliance for Llano and San Saba Counties. Resolutions for each Planning Partner adopting the plan can be found in Appendix A of this volume.

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Section 2 Planning Process

2.1 Introduction

This section includes a description of the planning process used to update the 2016 Llano and San Saba County Hazard Mitigation Action Plan (HMAP), including how it was prepared, who was involved in the process, and how the public was involved. To ensure that the plan meets the requirements of the DMA 2000 and that the planning process would have the broad and effective support of the participating jurisdictions, regional and local stakeholders, and the public, an approach to the planning process and plan documentation was developed to achieve the following goals:

- The HMAP is multi-jurisdictional and considers natural and human-caused hazards facing the Planning Area, thereby satisfying the natural hazards mitigation planning requirements specified in the DMA 2000.
- Llano County and San Saba County are the plan participants.
- The HMAP was developed following the process outlined by the DMA 2000, FEMA regulations, and prevailing FEMA and TDEM guidance. Following this process ensures all the requirements are met and support HMP review.

The Llano/San Saba HMAP update was written using the best available information obtained from a wide variety of sources. Throughout the HMAP update process, a concerted effort was made to gather information from local and regional agencies and staff, as well as stakeholders, federal and state agencies, and the residents of the Planning Area. The HMAP Planning Team solicited information from local agencies and individuals with specific knowledge of certain hazards and past historical events, as well as considering planning and zoning codes, ordinances, and other recent planning decisions. The hazard mitigation strategies identified in this HMP have been developed through an extensive planning process involving local, county, and regional agencies, Planning Area residents, and stakeholders.

This section describes the mitigation planning process, including (1) Organization of the Planning Process; (2) Stakeholder Outreach and Involvement; (3) Public Participation; (4) Incorporation of Existing Data, Plans, and Technical Information; (5) Integration with Existing Planning Mechanisms and Programs; and (6) Continued Public Involvement.

2.2 Organization of the Planning Process

Many parties supported the preparation of this HMAP update: County officials, municipal officials, the Planning Team, stakeholders, and the planning consultant. This planning process does not represent the start of hazard risk management in the Planning Area; rather it is part of an ongoing process that various state, county, and local agencies, and individuals have continued to embrace. A summary of the past and ongoing mitigation efforts is provided in Section 6 (Mitigation Strategy), as well as in Volume II Section 9 (Jurisdictional Annexes), to give a historical perspective of the Planning Area and local activities implemented to reduce vulnerability to hazards.

This section of the HMAP identifies how the planning process was organized with the many “Planning Partners” involved and outlines the major activities that were conducted in the development of this HMP update.

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2.2.1 Organization of the Planning Team

A contract planning consultant (Tetra Tech, Inc. referred herein as Tetra Tech) was selected to guide Llano/San Saba Counties through the HMAP update process. A contract between Tetra Tech and Llano County was executed in July 2022. Specifically, Tetra Tech, the contract consultant, was tasked with the following:

- Assisting with the organization of the Core Planning Team and Planning Team.
- Assisting with the development and implementation of a public and stakeholder outreach program.
- Data collection.
- Facilitation and attendance at meetings (Core Planning Team, Planning Team, stakeholder, public and other).
- Review and update of the hazards of concern, hazard profiling and risk assessment.
- Assistance with the review and update of mitigation planning goals and objectives.
- Assistance with the review of past mitigation strategies progress.
- Assistance with the screening of mitigation actions and the identification of appropriate actions.
- Assistance with the prioritization of mitigation actions.
- Authoring of the draft and final plan documents.

To facilitate plan development, Llano County developed a Planning Team to provide guidance and direction to the HMAP update effort and to ensure the resulting document will be embraced both politically and by the constituency within the planning area (Llano County and San Saba County) (Table 2-1). Specifically, the Planning Team was charged with the following:

- Attending and participating in Planning Team meetings.
- Represent their jurisdiction throughout the planning process and assure participation expectations are met by their jurisdiction.
- Support and promote the public involvement process.
- Assisting with the development and completion of certain planning elements, including:
  - Reviewing and updating the hazards of concern.
  - Developing a public and stakeholder outreach program.
  - Assuring that the data and information used in the plan update process are the best available.
  - Reviewing and updating the hazard mitigation goals.
  - Report on progress of mitigation actions identified in prior or existing HMAPs, as applicable.
  - Identifying and screening of appropriate mitigation strategies and activities.
- Reviewing and commenting on plan documents prior to submission to TDEM and FEMA.
- Adopt, implement, and maintain the plan update.

Table 2-1. Llano/San Saba County Hazard Mitigation Planning Team

Name	Title	Organization	Steering Committee Member	Planning Team Member
Linda Raschke	Commissioner	Llano County	Yes	Yes
Gilbert Bennett	EMC	Llano County	Yes	Yes
Cheryl Keep	Grants Administrator	Llano County	Yes	Yes
Cristy Vaught	Floodplain Administrator	Llano County	Yes	Yes
Byron Theodosis	Judge	San Saba County	No	Yes

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Name	Title	Organization	Steering Committee Member	Planning Team Member
Lois VanBeck	Treasurer	San Saba County	No	Yes
Marsha Hardy	EMC	San Saba County	No	Yes
Brent Batla	Fire Chief	City of Horsehoe Bay	No	Yes
Kelli Tudyk	Mayor	City of Llano	No	Yes
Frank Pearce	Mayor Pro-Tem	City of Richland Springs	No	Yes
Johnnie Reeves	Mayor	City of Richland Springs	No	Yes
John Bauer	Police Chief	City of San Saba	No	Yes
Michael Wadsworth	Inspector	City of San Saba	No	Yes
Scott Edmonson	Manager	City of San Saba	No	Yes
Scott Glaze	Public Works	City of San Saba	No	Yes
Chellie Stewart	Mayor	City of Sunrise Beach	No	Yes
Dan Gower	Fire Chief	City of Sunrise Beach	No	Yes
Laurie Brock	Police Chief	City of Sunrise Beach	No	Yes
Angela Thomas	Manager	Llano Co MUD #1 Blue Lake	No	Yes
Jamie Payne	Assistant Superintendent	Llano ISD	No	Yes
Chris Perry		Richard Springs Water	No	Yes
Chad Ashworth	Police Chief	Richland Springs ISD	No	Yes
James Womack	Superintendent	Richland Springs ISD	No	Yes
Rhonda Wyatt	Principal	Richland Springs ISD	No	Yes
Deana Sealy		Richland Springs Special UD	No	Yes
Buck Gilcrease	Superintendent	San Saba ISD	No	Yes
Jennifer Bordner	Superintendent	Cherokee ISD	No	Yes

Appendix B (Participation Matrix) identifies those individuals who represented the planning partners during this planning effort and indicates how they contributed to the planning process.

2.2.2 Planning Activities

Members of the Planning Team, as well as key stakeholders, convened and/or communicated regularly to share information and participate in workshops to identify hazards; assess risks; review existing inventories of and identify new critical facilities; assist in updating and developing new mitigation goals and strategies; and provide continuity through the process to ensure that natural hazards vulnerability information and appropriate mitigation strategies were incorporated. All members of the Planning Team and Planning Team had the opportunity to review the draft plan and supported interaction with other stakeholders and assisted with public involvement efforts.

A summary of Planning Team meetings held, and key milestones met during the development of the HMAP update is included in Table 2-2 that also identifies which DMA 2000 requirements the activities satisfy. Documentation of meetings (e.g., agendas, sign-in sheets, meeting notes) are in Appendix C (Meeting Documentation). Table 2-2 identifies only the formal meetings held during plan development and does not reflect all planning activities conducted by individuals and groups throughout the planning process. In addition to these meetings, there was a great deal of communication between Llano County, committee members, and the contract consultant through individual local meetings, electronic mail (email), and by phone.

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Table 2-2. Summary of Mitigation Planning Activities / Efforts

Date	DMA 2000 Requirement	Description of Activity	Participants
July 27, 2022	2	Pre-Kick Off Meeting with Llano County: Plan timing and administration, data needs and sharing, hazards of concern, dates, and next steps	County EMC, County Grants Administrator, County Development Services Department Administrator, Tetra Tech
August 19, 2022	2	Steering Committee Meeting #1: Introduce Steering Committee to the HMP update process, discuss mitigation planning, project organization, roles and responsibilities, data collection, hazards of concern, and schedule of the plan.	County Grant Administrator, County Emergency Manager, County Development Services Department Administrator, County 911 Coordinator/GIS, Tetra Tech
August 24, 2022	2, 4a	Planning Partnership Meeting #1: Introduce Planning Partnership to the HMP update process, discuss mitigation planning, project organization, roles and responsibilities, data collection, hazards of concern, and schedule of plan.	County Grant Administrator, County Emergency Manager, County Development Services Department Administrator, County 911 Coordinator/GIS, Richland Springs Police Chief, Richland Springs ISD Superintendent, City of San Saba CEO, Sunrise Beach VFD, Sunrise Beach Police Chief, City of Horseshoe Bay Fire Marshal, San Saba County staff, Llano County staff, Llano County Judge, Tetra Tech
October 13, 2022	2, 3a, 3b, 3c, 3d, 3e	Steering Committee Meeting #2: Welcome and Introductions, In-Kind Tracking, Project Schedule and Status Review, Hazards of Concern Review, Confirmation of Goals and Objectives, Next Steps	County Grant Administrator, County Emergency Manager, County Development Services Department Administrator, Tetra Tech
November 10, 2022	2, 4a, 4b	Risk Ranking Meeting: In-Kind Tracking, Project Overview and Status, Risk Assessment Overview, Review Calculated Hazard Ranking.	County Grants Administrator, City of Richland Springs, Sunrise Beach VFD, Tetra Tech
January 26, 2023	2	Draft Plan Review Presentation: Overview of entire plan and sections; confirmed plan maintenance schedule	Llano County Grant Administrator, San Saba County Emergency Management Coordinator, Sunrise Beach Police Chief, Sunrise Beach Fire Chief, City of Horseshoe Bay Fire Chief, Richland Springs Staff and Mayor, Llano County MUD #1, Tetra Tech
February 6, 2023	1b, 2	Draft HMP posted to public project website; all plan participants were notified and asked to assist with the public outreach including social media. Neighboring communities and stakeholders were notified of the posting as well.	Public and Stakeholders
February 21, 2023	2	HMP submitted to TDEM and FEMA Region VI	TDEM, FEMA Region VI

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Date	DMA 2000 Requirement	Description of Activity	Participants
Upon plan approval by FEMA	1a	Plan adoption by resolution by the governing bodies of all participating jurisdictions	All Plan Participants

Note: All activities/efforts were conducted during the National Emergency response to the COVID-19 pandemic.
TBD = to be determined.
Each number in column 2 identifies specific DMA 2000 requirements, as follows:
1a – Prerequisite – Adoption by the Local Governing Body
1b – Public Participation
2 – Planning Process – Documentation of the Planning Process
3a – Risk Assessment – Identifying Hazards
3b – Risk Assessment – Profiling Hazard Events
3c – Risk Assessment – Assessing Vulnerability: Identifying Assets
3d – Risk Assessment – Assessing Vulnerability: Estimating Potential Losses
3e – Risk Assessment – Assessing Vulnerability: Analyzing Development Trends
4a – Mitigation Strategy – Local Hazard Mitigation Goals
4b – Mitigation Strategy – Identification and Analysis of Mitigation Measures
4c – Mitigation Strategy – Implementation of Mitigation Measures
5a – Plan Maintenance Procedures – Monitoring, Evaluating, and Updating the Plan
5b – Plan Maintenance Procedures – Implementation through Existing Programs
5c – Plan Maintenance Procedures – Continued Public Involvement

2.3 Stakeholder Outreach and Involvement

Stakeholders are the individuals, agencies, and jurisdictions that have a vested interest in the recommendations of the HMAP, including all Planning Partners. Diligent efforts were made to assure broad regional, county, and local representation in this planning process. To that end, a comprehensive list of stakeholders was developed with the support of the Planning Team. Stakeholder outreach was performed early on, and continually throughout the planning process. This HMAP update includes information and input provided by these stakeholders where appropriate, as identified in the references.

This subsection discusses the various stakeholders that were invited to participate in the development of this HMAP update, and how these stakeholders participated and contributed. This summary listing cannot possibly represent the total of stakeholders that were aware of and/or contributed to this HMAP update, as outreach efforts were being made, both formally and informally, throughout the process by the many Planning Partners involved in the effort, and documentation of all such efforts is impossible. Instead, this summary is intended to demonstrate the scope and breadth of the stakeholder outreach efforts made during the plan update process:

- All Planning Team meetings were open to the public and advertised via the Planning Area's HMP website (https://www.llanocountytxhmp.com/).
- The Planning Team was provided outreach materials to post on their websites, social media platforms, and distribute printed materials.
- Distributed a stakeholder survey and neighbor survey to provide input regarding vulnerabilities, capabilities, and mitigation projects.
- Posted draft plan on the Llano County HMP website and advertised using social media platforms.
- Email correspondence to regional stakeholders and neighboring communities to review the draft HMP and provide input.

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2.3.1 Federal, State, and County Agencies

The following describes the various departments and agencies that were involved during the planning process.

Federal Agencies

Please see Appendix B (Participation Documentation) for further details regarding federal agency participation. All responses to the stakeholder surveys may be found in Appendix D (Outreach).

FEMA Region VI: Provided updated planning guidance and conducted plan review.

Information regarding hazard identification and the risk assessment for this plan update were requested and received or incorporated by reference from the following agencies and organizations:

- National Climatic Data Center (NCDC)
- National Hurricane Center (NHC)
- National Oceanic and Atmospheric Administration (NOAA)
- National Weather Service (NWS)
- Storm Prediction Center (SPC)
- U.S. Army Corps of Engineers (USACE)
- U.S. Census Bureau
- U.S. Department of Agriculture (USDA)
- U.S. Department of Health and Human Services
- U.S. Environmental Protection Agency (USEPA)
- U.S. Geological Survey (USGS)

State Agencies

Please see Appendix B (Participation Documentation) for further details regarding state agency participation. All responses to the surveys may be found in Appendix D (Outreach).

Texas Division of Emergency Management (TDEM): Administered the planning grant; provided updated planning guidance; provided review of the draft HMP update.

Planning Area Agencies and Departments

Several planning area agencies and departments were represented on the Planning Team and involved in the HMAP update planning process. Appendix B (Participation Matrix) provides further details regarding regional and local stakeholder agencies. All responses to the stakeholder surveys are in Appendix D (Outreach). Refer to Section 5 (Capability Assessment) for details on each department and their roles during the HMAP update and their overall responsibilities in the planning area.

- Llano County Commissioners Court
- Llano County Development Services
- Llano County Emergency Management
- Llano County Grants Administration
- Llano Independent School District
- Llano County Municipal Utility District #1 Blue Lake
- San Saba County Court
- San Saba County Emergency Management

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- San Saba Independent School District
- San Saba County Treasurer
- Cherokee Independent School District
- City of Horseshoe Bay Fire Department
- City of Llano Administration
- City of Llano Code Enforcement Department
- City of Richland Springs Administration
- City of Richland Springs Independent School District
- City of Richland Springs Police Department
- City of Richland Springs Special Utility District
- City of Richland Springs Water Supply
- City of San Saba Code Enforcement
- City of San Saba Manager and Administration
- City of San Saba Police Department
- City of San Saba Public Works
- City of Sunrise Beach Administration
- City of Sunrise Beach Fire Department
- City of Sunrise Beach Police Department

2.3.2 Regional and Local Stakeholders

All Planning Team meetings were announced on the Llano HMAP project website and posted on social media to invite residents and stakeholders. In addition, Planning Team representatives emailed regional and local stakeholders requesting their participation in stakeholder sector-specific surveys to provide input on vulnerable assets, capabilities, and current/potential future mitigation projects; and invited to provide input on the draft HMP. Refer to Appendix C (Participation Documentation) for further details regarding regional and local stakeholder agency attendance at meetings and Appendix D for additional details on the public and stakeholder outreach, including responses received to the surveys.

Academia

Schools, universities, and other academia institutions were invited to attend planning process meetings and asked to complete the stakeholder survey. The following provided input during the process:

- Central Texas College
- Cherokee Independent School District
- Llano Independent School District
- Richland Springs Independent School District
- San Saba Independent School District

Business, Commercial, and Non-Profit Interests

The following business and commercial industries in the planning area were invited to take the stakeholder survey and provide input to the planning process:

- San Saba Economic Development Corporation
- Llano County Development Services

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Emergency Services

Local emergency service providers (police, fire, and EMS) were invited to take the stakeholder survey and provide input to the planning process including the following:

- City of Llano Fire Department
- City of Llano Police Department
- City of San Saba Police Department
- Horseshoe Bay OEM
- Horseshoe Bay Police Department
- Lake Buchanan VFD
- Llano County ESD #1 – Llano
- Llano County ESD #1 – Horseshoe Bay
- Llano County ESD #2 – Lake Buchanan
- Llano County ESD #4 – Oakridge
- Llano County ESD #5 – Sunrise Beach
- Llano County OEM
- Llano County Sheriff's Department
- San Saba County OEM
- Sunrise Beach Village Fire Department
- Sunrise Beach Village Police Department
- Texas Division of Emergency Management (TDEM)
- Tow VFD

Healthcare

Healthcare facilities and providers located in the planning area were invited to take the stakeholder survey and provide input to the planning process, including:

- Hamilton Hospital
- Hill Country Direct Care
- Llano County Hospital Authority Board
- Llano County Indigent Health Care
- MidCoast Medical Center – Central

Transportation

County and local highway and public works departments were notified of the stakeholder survey and invited to provide input on the draft HMP, including the following:

- City of Llano Public Works Department
- City of Horseshoe Bay Public Works Department
- City of San Saba Public Works Department
- Llano County Road and Bridge Department
- San Saba County Department of Public Works
- San Saba Streets Department
- Texas DOT

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Utilities

Utility providers in the planning area were invited to take the stakeholder survey and provide input to the planning process, including the following:

- Blue Lake MUD
- Deerhaven WCID
- Hickory Underground Water Conservation District No. 1
- Horseshoe Bay Utility Department
- Horseshoe Bay Water & Wastewater Plant
- Llano Water/Wastewater Department
- Kingsland MUD
- San Saba Sanitation and Recycling
- San Saba Waste/Wastewater Department

County and Adjacent Municipalities

Llano and San Saba Counties have made efforts to keep the counties and surrounding municipalities appraised of the project, invited to take the stakeholder survey, and allowed the opportunity to provide input to this planning process, including the following:

- Brown County Emergency Management
- Burnet County Office of Emergency Management
- Gillespie County Floodplain and Sanitation
- Lampasas County Office of Emergency Management
- Mason County Road and Bridge Department
- Mills County Office of Emergency Management

2.3.3 Stakeholder Survey Summary

The following provides a summary of the results and feedback received by stakeholders who completed the survey. Feedback was reviewed by the Planning Team and integrated where appropriate in the plan.

Stakeholder Survey

The stakeholder survey was designed to help identify general needs for hazard mitigation and resiliency within Llano and San Saba Counties from their perspective, as well as to identify specific projects that may be included in the mitigation plan. It was distributed to identified stakeholders, including the various county and municipal departments and agencies in the county. As of January 17, 2023, twenty stakeholders completed the survey, representing the following sectors: academic/research, business/commerce, emergency services, hospitals/medical, transportation, public works, and utilities.

The majority of respondents stated the buildings/facilities/structures they have worked in and/or are responsible for have not been impacted by a hazard (50-percent-percent). Those that experienced damage stated that the structures damage due to winter weather, heavy rains, and flooding. When asked what areas are most vulnerable to hazards in the Planning Area, answers included low lying area, specifically those near rivers and other bodies of water.

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The respondents stated that they have the following plans in place: Emergency Operations Plan (58.82-percent), Business Continuity Plan (5.88-percent), and Continuity of Operations Plan (17.65-percent). 11.76-percent selected they have no plans in pace while 29.41-percent said they are unsure if there are any plans.

Neighbor Survey

The neighbor survey was sent to the surrounding municipalities and counties of Llano and San Saba Counties due to their proximity to and because effects of hazard events that impact the Planning Area would be similar to that of their neighbors. As of January 17, 2023, no responses have been received.

2.4 Public Participation – Public Involvement

In order to facilitate better coordination and communication between the Planning Team and citizens and to involve the public in the planning process, it was determined that meeting dates/locations will be made available to the public via the Llano HMAP website (https://www.llanocountytxhmp.com/) and social media; and the draft HMAP available on the Llano HMAP website. The participating partners also feel that community input on the HMAP will increase the likelihood of hazard mitigation becoming one of the standard considerations in the evolution and growth of the Planning Area.

The Planning Team has made the following efforts toward public participation in the development and review of the HMP:

- A dedicated website was created for this project (https://www.llanocountytxhmp.com/). The website went live in August 2022 and was continuously updated throughout the planning process. The public website contains a project overview, meeting announcements, draft documents for review and comment, and a link to the public and stakeholder surveys.
- All hazard mitigation Planning Team meetings that were open to the public were advertised on the Llano HMAP website and various social media accounts (Facebook and Twitter). Additional examples of municipal outreach are presented in Appendix D.
- An online natural hazards preparedness public survey was developed to gauge household preparedness that may impact the Planning Area and to assess the level of knowledge of tools and techniques to assist in reducing risk and loss of those hazards. The questionnaire asked quantifiable questions about citizen perception of risk, knowledge of mitigation, and support of community programs. The questionnaire also asked several demographic questions to help analyze trends. The questionnaire was available on the public website from September 2022 to January 2023, and further advertised on additional Planning Team websites and on printed materials. Reponses were collected and provided back to plan participants for consideration in the mitigation action development (35 responses in total). Appendix D summarizes public input received through the website, the online survey, and other sources.
    - Results from the natural hazards preparedness survey were used to inform the action plans of the Planning Partners. To address the most requested types of projects that residents wanted local and county agencies to be doing, many Planning Partners included actions to improve and strengthen infrastructure, improve the damage resistance of utilities, buy out flood prone properties, improve protective structures, and provide greater control over development in high hazard areas.

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- All plan participants were encouraged to post links to the project webpage and citizen survey. In addition, all participants were requested to advertise the availability of the project website, citizen survey and stakeholder surveys via local homepage links, and other available public announcement methods (e.g., Facebook, Twitter, email blasts). Refer to Appendix D which highlights these local efforts.
- Residents within the Planning Area were provided opportunity to comment on the draft HMP before submittal to FEMA. The HMAP was posted on the HMAP public website on February 8, 2023 for review. All Planning Team participants were requested to assist with advertising the plan was posted via their websites and social media. Public comments received through February 23, 2023 were distributed to Planning Team for their consideration.
- Additional examples of public outreach efforts, and results of surveys distributed, are presented in Appendix D (Public and Stakeholder Outreach Documentation).

2.4.1 Public Survey Responses

Demographically, survey respondents were from the City of Horseshoe Bay, City of Llano, City of Richland Springs, City of San Saba, City of Sunrise Beach, Village of Buchanan Lake, among others. The majority of survey participants have lived in their house for over 10 years (63-percent) and own their house (90-percent). The most common (53-percent) age of respondents were over the age of 61; about 26.67-percent were in the age range of 51 to 60. Residents were asked the ways in which they receive their information concerning a natural disaster. The majority of respondents rely on social media (82.86-percent) and mass notification systems (74.29-percent) to receive information concerning natural disasters. Roughly three-quarters of respondents (71.43-percent) receive information through the internet and just about half (48.57-percent) receive information through radio news.

Survey respondents were asked how concerned they were about 17 different hazards, on a scale of not concerned to extremely concerned. Respondents were most concerned (reporting “concerned”, “very concerned”, or “extremely concerned”) about severe winter storms, extreme temperatures (hot/cold), drought, and severe weather.

About 91.43-percent of respondents’ properties are not located in the floodplain, with 8.57-percent within a floodplain. Of the respondents in the floodplain, 9.09-percent do not have flood insurance and 6.06-percent do have flood insurance. Of the residents whose properties are located outside of the floodplain, 14.71-percent have flood insure and 64.71-percent do not. Residents were then asked what types of projects they believe local, county, state, or federal government agencies could be doing in order to reduce the damage and disruption of disasters in the Planning Area including:

- (33.33-percent) Retrofit and strengthen essential facilities such as police, schools, and hospitals
- (53.33-percent) Retrofit infrastructure, such as elevating roadways and improving drainage systems
- (76.67-percent) Work on improving the damage resistance of utilities (electricity, communications, water/wastewater facilities etc.)
- (20.00-percent) Install or improve protective structures, such as floodwalls, levees, bulkheads, and firebreaks
- (36.67-percent) Enhance stream maintenance programs/projects
- (46.67-percent) Replace inadequate or vulnerable bridges and causeways

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- (16.67-percent) Strengthen codes, ordinances and plans to require higher hazard risk management standards and/or provide greater control over development in high hazard areas
- (16.67-percent) Buyout flood prone properties and maintain as open space
- (46.67-percent) Inform property owners of ways they can mitigate damage to their properties
- (40.00-percent) Improve access to information about hazard risks and high-hazard areas
- (36.67-percent) Assist vulnerable property owners with securing funding to mitigate their properties
- (30.00-percent) Create a stream gage and weather monitoring program to provide more accurate data and warnings

2.5 Incorporation of Existing Plans, Studies, Reports, and Technical Information

The Llano and San Saba County HMAP strives to use the best available technical information, plans, studies, and reports throughout the plan process to support hazard profiling; risk and vulnerability assessment; review and evaluation of mitigation capabilities; and the identification, development, and prioritization of county and local mitigation strategies.

The asset and inventory data used for the risk and vulnerability assessments is presented in the County Profile (Section 3). Details of the source of this data, along with technical information on how the data was used to develop the risk and vulnerability assessment, is presented in the Risk Assessment, specifically in Section 4.1 Methodology and Tools, as well as throughout the hazard profiles in Section 4.3 (Hazard Profiles). Further, the source of technical data and information used may be found within the References section.

Plans, reports, and other technical information were identified and provided directly by the Planning Team, and numerous stakeholders involved in the planning effort, as well as through independent research by the planning consultant. The Planning Team was tasked with updating the inventory of their Planning and Regulatory capabilities in Section 9 (Annexes) and providing relevant planning and regulatory documents, as applicable. Relevant documents, including plans, reports, and ordinances were reviewed to identify the following:

- Existing local and regional capabilities.
- Needs and opportunities to develop or enhance capabilities, which may be identified within the mitigation strategies.
- Mitigation-related goals or objectives considered in the review and update of the overall Goals and Objectives in Section 6 (Mitigation Strategy).
- Proposed, in-progress, or potential mitigation projects, actions, and initiatives to be incorporated into the updated County and local mitigation strategies.

The following local regulations, codes, ordinances, and plans were reviewed during this process to develop mitigation planning goals, objectives, and strategies that are consistent across local and regional planning and regulatory mechanisms to accomplish complementary and mutually supportive strategies:

- Master/Comprehensive Plans
- Building Codes
- Zoning and Subdivision Ordinances
- NFIP Flood Damage Prevention Ordinances

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- Site Plan Requirements
- Stormwater Management Plans
- Emergency Management and Response Plans
- Land Use and Open Space Plans
- Capital Plans
- State of Texas Hazard Mitigation Plan (2018)
- San Saba County Hazard Mitigation Plan Update (2016)
- Llano County Hazard Mitigation Plan Update (2016)

2.6 Integration With Existing Planning Mechanisms and Programs

Effective mitigation is achieved when hazard awareness and risk management approaches and strategies become an integral part of public activities and decision-making. Within the Planning Area there are many existing plans and programs that support hazard risk management, and thus it is critical that this hazard mitigation plan integrate and coordinate with, and complement, those mechanisms.

Section 5 (Capability Assessment) provides a summary and description of the existing plans, programs, and regulatory mechanisms at all levels of government (federal, state, county, and local) that support hazard mitigation within the Planning Area. Within each annex in Section 9, the Counties, Cities, and entities identified how they integrate hazard risk management into their existing planning, regulatory, and operational/administrative framework (integration capabilities) and how they intend to promote this integration (integration actions). In addition, as noted above, a summary of the plan reviews indicating relevant goals and mitigation actions is provided in Appendix E. This information provided input to identify integration of mitigation concepts into the operations of the Planning Area.

A further summary of these continued efforts to develop and promote a comprehensive and holistic approach to hazard risk management and mitigation is presented in Section 7 (Plan Maintenance).

2.7 Continued Public Involvement

The Counties of Llano and San Saba are committed to the continued involvement of the public in the hazard mitigation process. This HMAP update will be made available for review on the HMAP public website. Each jurisdiction's elected official shall be responsible for receiving, tracking, and filing public comments regarding this HMAP update. Further details regarding continued public involvement are provided in Section 7 (Plan Maintenance).

A notice regarding annual updates of the plan and the location of plan copies will be publicized annually after the annual plan evaluation meeting (refer to Section 7 – Plan Maintenance) and posted on the public website at https://www.llanocountytxhmp.com/.

The public will have an opportunity to comment on the HMAP update as a part of the annual mitigation planning evaluation process and the next five-year mitigation plan update. The HMP Coordinator (currently Cheryl Kepp, Llano County Grants Administrator) is responsible for coordinating the plan evaluation portion of the meeting, soliciting feedback, collecting and reviewing the comments, and ensuring their incorporation in the 5-year plan update as appropriate; however, members of the Planning Team will assist the HMP Coordinator. Additional

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meetings may also be held as deemed necessary. The purpose of these meetings would be to provide the public an opportunity to express concerns, opinions, and ideas about the HMP.

After completion of this HMAP update, implementation and ongoing maintenance will continue to be a function of the Planning Team. The Planning Team will review the plan and accept public comment as part of an annual review and as part of five-year mitigation plan updates.

A notice regarding annual updates of the plan will be publicized annually after the HMP Committee's annual evaluation and posted on the public web site.

Llano County has identified the following as the ongoing HMAP Coordinator (see Section 7), and is responsible for receiving, tracking, and filing public comments regarding this HMP update. Contact information is:

Contact Name	Mailing Address	Email Address	Phone Number
Gilbert Bennett, Emergency Management Coordinator	100 W Sandstone St, Ste 200A, Llano, Texas 78643	gbennett@co.llano.tx.us	325-247-2039
Cheryl Kepp, Grant Administrator	801 Ford Street, Llano, Texas 78643	ckepp@co.llano.tx.us	325-247-7756

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Section 3 County Profile

3.1 General Information

3.1.1 Llano County

The word "llano" means "plain" in Spanish. The City of Llano was founded in 1855 on the Llano River and Llano County was established in 1856. Much of the following section was summarized from the Handbook of Texas Online (Speck 2010).

The first settlers of the area were the Tonkawa Indians. European explorers arrived in the region in approximately 1535. Spanish explorer Alvar Nunez Cabeza de Vaca led an expedition to explore the region. The Tonkawa Indians were displaced by the Apache Indians and in turn the Apache were displaced by the Comanche Indians. Settlers did not arrive in this area until the mid-1800s; before this time, the area was known as the West Texas Frontier-Indian Territory. The first European settlers arrived in 1845 after a treaty with the Comanche Indians, which allowed for settlement. The last battle between the settlers and the Comanche Indians occurred in 1873. Once the threat of Indian attacks passed, the area attracted ranchers, shops, and industrial work.

Through the 1870s, the local town (which later became the City of Llano) acted as a frontier trading center, with a handful of log buildings that housed business establishments, a post office, and a few homes. During the 1880s, a number of new enterprises serving the County's farmers and ranchers were established. In 1892, a fire destroyed the County Courthouse. The present courthouse was completed and occupied in 1893 and is listed in the National Register of Historic Places. Other historic buildings in Llano County include Badu Building, Red Top Jail, and Southern Hotel.

Iron deposits discovered at Iron Mountain, in the northwest portion of the County, attracted capital from Dallas and from northern states. Llano County experienced a boom between 1886 and 1893. The boom period faded because the County's mineral resources didn't exist in commercially exploitable concentrations. Farming, ranching, and the granite industry remained the foundations of the economy in the 20th century.

3.1.2 San Saba County

San Saba County was organized from Bexar County in 1856 and the majority of this section was summarized from the *Handbook of Texas Online* (Greene 1995). The County was named for the San Saba River. The Tonkawa, Apache, Caddoan, and Comanche Indian tribes inhabited the area at different times. Comanche and Lipan Apaches continued to live in the San Saba County area into the eighteenth and nineteenth centuries, often coming into conflict with Spanish missionaries, United States military forces, and Anglo-American settlers. The original surveys of present San Saba County indicate that the first land grants of a league each along the San Saba River were given to Spanish grantees. The earliest known record of Anglo-Americans in San Saba County was in December 1828 with a group from Austin's colony. A part of the County was included in one of the grants ceded to Stephen F. Austin under the Mexican empresario system. Early permanent settlers settled at Wallace, Richland, and Cherokee Creeks in the fall of 1854. The present site of the City of San Saba was selected for the County seat. Chappel, settled during the 1850s, was San Saba County's first town. During the Civil War, the citizens of San Saba County supported the Confederacy.

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The years between 1860 and 1920 marked a period of growth for San Saba County. During the 1880s, lawlessness became a problem, and the County experienced a period of "mob rule." In response, citizens formed an anti-mob organization. However, factions developed within the organization, and by 1896, the competing groups were conducting what amounted to open warfare. After a number of men were killed, the Texas Rangers were dispatched to the area, and order was eventually restored. By 1920, the population was 10,045. During this period, agriculture in San Saba County flourished. The number of farms, cattle, and sheep grew. Wheat and oats originally emerged as primary crops and peaches were produced in significant numbers after 1900. Pecans, already in natural abundance, also emerged as an important crop, largely because of the work of Edmund E. Riesen. Riesen is credited for laying the groundwork for the pecan industry that led San Saba County to proclaim itself Pecan Capital of the World (San Saba County 2013).

Difficult agricultural conditions in the 1920s, followed by the Great Depression, affected farming in the County. Although the number of farms increased, the overall value decreased, when half of the County farms were worked by tenants. The record-breaking flood of the San Saba River in July 1938 caused destruction throughout the County. A prolonged drought from 1953 to 1956 did extensive harm to the agricultural economy. Between 1950 and 1959 the number of farms decreased to only 784.

The first newspaper in West Texas was the San Saba County News, which was founded on January 1, 1873. The paper continued operating into the twentieth century, and in 1960 it merged with the San Saba Star. It was still being published as the San Saba News and Star into the late 1980s.

In 1886, the Santa Fe Railroad completed a line that came within 21 miles of the Town of San Saba, but it was 25 years before railroad officials were convinced that San Saba's level of agricultural production merited the extension of the line to the County seat. Not until 1911 was the Lometa-Eden branch of the Santa Fe build across the County. The County's progress in the area of highway construction was equally slow; it was the last county in Texas to have its roads paved. In 1982, San Saba had one railroad branch line used for freight; 755 miles of public roads; and one airport, the San Saba County Municipal Airport.

The economy of San Saba County became more diversified in the late 1980s. The manufacturing base remained small, constituting only seven percent of the business sector. Sixteen percent of the labor force was employed in wholesale and retail trade, and almost twenty-five percent in agribusiness, forestry, fishing, or mining. The industries with the most employment were agribusiness, stone quarrying, and tourism. Tourism showed the highest rate of growth. The County has a variety of recreational opportunities and is a popular deer hunting area (JSW & Associates, Halff Associates, Tetra Tech 2016).

3.2 Major Past Hazard Events

Presidential disaster declarations are issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal government. No specific dollar loss threshold has been established for these declarations. A presidential disaster declaration puts operationalizes federal recovery programs to assist disaster victims, businesses, and public entities. Programs can be matched by state programs. Review of presidential disaster declarations helps establish the probability of reoccurrence for each hazard and identify targets for risk reduction. Table 3-1 shows FEMA disaster declarations that have included Llano County between 2001 and February 2021. Table 3-2 shows FEMA disaster declarations that have included San Saba County between 2001 and February 2021.

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Review of these events helps identify targets for risk reduction and ways to increase a community's capability to avoid large-scale events in the future. Still, many natural hazard events do not trigger federal disaster declaration protocol but have significant impacts on their communities. These events are also important to consider in establishing recurrence intervals for hazards of concern. More detailed event tables can be found in the individual hazard profile sections.

Table 3-1. History of Hazard Events in Llano County, Texas

Disaster Number	Declaration Date	Event Date	Incident Type	County Included	Title
DR-4586-TX	February 19, 2021	February 11, 2021-February 21, 2021	Severe Winter Storm	Yes	Texas Severe Winter Storm
EM-3554-TX	February 14, 2021	February 11, 2021-February 21, 2021	Severe Winter Storm	Yes	Texas Severe Winter Storm
DR-4485-TX	March 25, 2020	January 20, 2020 - Continuing	Pandemic	Yes	COVID-19 Pandemic
EM-3458-TX	March 13, 2020	January 20, 2020 - Continuing	Pandemic	Yes	COVID-19 Pandemic
DR-4416-TX	February 25, 2019	September 10, 2018 – November 2, 2018	Flood	Yes	Texas Severe Storms and Flooding
EM-3284-TX	March 14, 2008	March 14, 2008 – September 1, 2008	Wildfire	Yes	Texas Wildfires
DR-1709-TX	June 29, 2007	June 16, 2007 – August 3, 2007	Severe Weather	Yes	Texas Severe Storms, Tornadoes, and Flooding
DR-1624-TX	January 11, 2006	November 27, 2005 – May 14, 2006	Wildfire	Yes	Texas Extreme Wildfire Threat
DR-1606-TX	September 24, 2005	September 23, 2005 – October 14, 2005	Hurricane	Yes	Texas Hurricane Rita
EM-3261-TX	September 21, 2005	September 20, 2005 – October 14, 2005	Hurricane	Yes	Texas Hurricane Rita
EM-3216-TX	September 2, 2005	August 29, 2005 – October 1, 2005	Hurricane	Yes	Texas Hurricane Katrina
EM-3142-TX	September 1, 1999	August 1, 1999 - December 10, 1999	Wildfire	Yes	Texas Extreme Fire Hazards
DR-1239-TX	August 26, 1998	August 22, 1998 - August 31, 1998	Hurricane	Yes	Texas Tropical Storm Charley
DR-1179-TX	July 7, 1997	June 21, 1997 - July 15, 1997	Severe Weather	Yes	Texas Severe Storms/flooding
EM-3113-TX	September 10, 1993	August 30, 1993 - November 15, 1993	Wildfire	Yes	Texas Extreme Fire Hazard
DR-930-TX	Dec 26, 1991	Dec 20, 1991 - Jan 14, 1992	Severe Weather	Yes	Texas Severe Storm, Thunderstorms

Source: FEMA 2022

Table 3-2. History of Hazard Events in San Saba County, Texas

Disaster Number	Declaration Date	Event Date	Incident Type	County Included	Title
DR-4586-TX	February 19, 2021	February 11, 2021-February 21, 2021	Severe Winter Storm	Yes	Texas Severe Winter Storm

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Disaster Number	Declaration Date	Event Date	Incident Type	County Included	Title
EM-3554-TX	February 14, 2021	February 11, 2021- February 21, 2021	Severe Winter Storm	Yes	Texas Severe Winter Storm
DR-4485-TX	March 25, 2020	January 20, 2020 - Continuing	Pandemic	Yes	COVID-19 Pandemic
EM-3458-TX	March 13, 2020	January 20, 2020 - Continuing	Pandemic	Yes	COVID-19 Pandemic
DR-4416-TX	February 25, 2019	September 10, 2018 – November 2, 2018	Flood	Yes	Texas Severe Storms and Flooding
DR-1999-TX	July 1, 2011	April 6, 2011 – August 29, 2011	Wildfire	Yes	Texas Wildfires
EM-3284-TX	March 14, 2008	March 14, 2008 – September 1, 2008	Wildfire	Yes	Texas Wildfires
DR-1709-TX	June 29, 2007	June 16, 2007 – August 3, 2007	Severe Weather	Yes	Texas Severe Storms, Tornadoes, and Flooding
DR-1624-TX	January 11, 2006	November 27, 2005 – May 14, 2006	Wildfire	Yes	Texas Extreme Wildfire Threat
DR-1606-TX	September 24, 2005	September 23, 2005 – October 14, 2005	Hurricane	Yes	Texas Hurricane Rita
EM-3261-TX	September 21, 2005	September 20, 2005 – October 14, 2005	Hurricane	Yes	Texas Hurricane Rita
EM-3216-TX	September 2, 2005	August 29, 2005 – October 1, 2005	Hurricane	Yes	Texas Hurricane Katrina
DR-1425-TX	July 4, 2002	June 29, 2022 – July 31, 2022	Severe Weather	Yes	Texas Severe Storms and Flooding
EM-3142-TX	September 1, 1999	August 1, 1999 - December 10, 1999	Wildfire	Yes	Texas Extreme Fire Hazards
DR-1239-TX	August 26, 1998	August 22, 1998 - August 31, 1998	Severe Weather	Yes	Texas Tropical Storm Charley
DR-1179-TX	July 7, 1997	June 21, 1997 - July 15, 1997	Flood	Yes	Texas Severe Storms/Flooding
EM-3117-TX	February 23, 1996	February 23, 1996 - September 19, 1996	Wildfire	Yes	Texas Fire Emergency
EM-3113-TX	September 10, 1993	August 30, 1993 - November 15, 1993	Drought	Yes	Texas Extreme Fire Hazard

Source: FEMA 2022

3.3 Physical Setting

This section presents the physical setting of the County, including land use/land cover, location, climate, hydrography and hydrology, topography, and geology.

3.3.1 Location

Llano County

Llano County covers approximately 966 square miles and is located in central Texas. The County was named for the Llano River, which crosses through the center of the County. The Llano River and the Colorado River (which flows along the eastern border of the County) contribute to Lake Buchanan, Inks Lake, and Lake Lyndon B. Johnson, which are all partially located within the County.

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The City of Llano is the largest city and holds the County seat for Llano County. Other incorporated communities include Bluffton, Buchanan Dam, Castell, Click, Horseshoe Bay, Kingsland, Sunrise Beach Village, Tow, and Valley Spring. As of the 2020 US Census, Llano County had a population of 21,243, a 10.1-percent increase from the 2010 population (U.S. Census Bureau 2020). The County has one hospital, Mid Coast Central Medical Center , located in the City of Llano.

Llano County is primarily rural and undeveloped with land dedicated to ranching. Most of its economy comes from tourism, ranch trading centers, and vineyards. Llano County is a leading deer-hunting county in Texas, which results in most of the County's tourism. Other tourist attractions include Enchanted Rock, the Bluebonnet Festival, and the Hill County Wine Trail. The County is also a popular place for retirement (Llano County HMAP 2016).

San Saba County

San Saba County covers 1,138 square miles of which all is land except for 3 square miles of water. It is located on the Edwards Plateau in the central part of Texas. The San Saba River bisects the County from southwest to northeast and joins the Colorado River on the eastern border. The San Saba River is a typical Hill Country river consisting of clear water that flows through limestone bluffs and hills. Primary streams include Richland, Wallace, Simpson, Rough, Wilbarger, Brady, and Cherokee Creeks. The City of San Saba is the largest city and holds the County seat for San Saba County. As of the 2010 U.S. Census, San Saba County had a population of 6,131. The County does not have any hospitals.

The major livestock are beef cattle, sheep, and goats. Many ranchers lease their ranches for deer hunting. The main crops are grain sorghum, small grains, and improved pasture. Pecans are produced in native groves mostly along the Colorado and San Saba Rivers. Soil and water are important natural resources in the County. Most people earn their living from the land and the Colorado and San Saba Rivers provide water for livestock and irrigation.

Limestone, sand, and gravel are other natural resources in the County. Limestone is used as building material and some is crushed for roadbed material (JSW & Associates, Halff Associates, Tetra Tech 2016).

3.3.2 Topography and Geology

Llano County

Texas is broadly divided into four regions by physical geography features such as landforms, climate, and vegetation. Llano County lies entirely in the Llano Basin which is located near the center of Texas. It forms an egg-shaped area south of the North Central Plains and east of the Balcones Escarpment. The terrain can be described as rolling and hilly. The Llano Basin is made up of granite, an extremely hard rock that is formed when molten rock cools slowly under the earth's surface.

Llano County has an incredibly unique geology. Llanite is a rare type of brown rhyolite porphyry with sky blue quartz crystals and rusty-pink microcline feldspar that is found only in Llano County. There are five primary types of bedrock within the County. They are granite, gneiss, schist, limestone, and sandstone. The age of the bedrock ranges from Precambrian (1.3 billion years old) to Ordovician (425 million years old). Llano County has several granite quarries; vermiculite and marble are also mined. The pink granite used to build the State of Texas Capitol building in Austin came from the Llano Basin. Enchanted Rock, a designated state natural area and popular tourist destination, is located in southern Llano County (Llano County HMAP, 2016).

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The soils of Llano County range from sandy-to-sandy loam. The elevation of this subregion ranges between 800 and 2,000 feet above sea level. Precipitation averages about 28 inches per year, and the growing season lasts about 230 days. The vegetation is made up of mesquite, live oak, and post oak trees, and short grasses. Pecan and oak trees often grow in low areas and along streams. Llano County is within the Llano and Buchanan-Lyndon watersheds and the County is bisected from west to east by the Llano River. The other significant river is the Colorado River. Figure 67 shows the Texas natural regions with Llano County highlighted (Llano County HMAP, 2016).

San Saba County

Texas is broadly divided into four regions by physical geography features such as landforms, climate, and vegetation. San Saba County is in central Texas. The County is roughly triangular. In most areas, the topography is undulating to hilly and generally slopes to the southeast. The elevation ranges from 1,100 to 1,800 feet above sea level (JSW & Associates, Halff Associates, Tetra Tech 2016). It lies in three major land resource areas. The majority of the County is within the Edwards Plateau, with remaining portions in the North Central Plains and a sliver in the Texas Central Basin.

The soils in much of the Southern part of San Saba County are within the Edwards Plateau, which formed on mesas and plateaus of erosion-resistant limestone containing canyons, limestone ridges and hills, and gently sloping valley floors. The Tarrant, Lozier, Ector, Langtry, Brackett, Eckrant, and Real soils are shallow to limestone and differ in texture, mineralogy, and organic matter content.

The North Central Plains soils of San Saba County, located in the Northern half of the County, formed on a dissected plateau with narrow, steep-sided valleys carved by generally southeastward flowing streams. The sedimentary rocks that make up the region are of the Pennsylvanian age and include sandstone, siltstone, or claystone, which occur on gently sloping to steep, broad ridges and plains.

The small portion of Southwestern San Saba County which exists in the Texas Central Basin has soils that formed on an erosional surface of outcropping Precambrian igneous and metamorphic rocks and sedimentary rocks of Cambrian and Cretaceous age. The landscape is dominated by hills of granite, gneiss, and schist that are incised by southeastward-flowing rivers. Shallow Keese soils formed over granite and gneiss on gently sloping to steep hillslopes. Moderately deep Ligon soils formed in schist and gneiss on gently sloping, broad, convex ridges (USDA, NRCS 2008).

3.3.3 Hydrography and Hydrology

Llano County

The dominant water body in Llano County is the Colorado River which forms the County's eastern border and flows north to south. Lake Buchanan, Inks Lake, and Lake Lyndon B. Johnson are found along the river. Numerous creeks and rivers flow into the Colorado River, generally flowing west to east. Llano County is comprised of three HUC-8 sub-basins:

- The Austin Travis-Lakes drains 1240.8 square miles. The primary flooding source is the Colorado River.
- The Buchanan-Lyndon B. Johnson Lakes drains 1270.0 square miles. The primary flooding source is the Colorado River.
- The Llano basin drains 2,613.4 square miles. The primary flooding source is the Llano River (FEMA 2021).

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San Saba County

The dominant water body in San Saba County is the Colorado River which forms the County's northeastern border and flows northwest to southeast. The San Saba watershed is the dominant watershed in the County, draining the center of the County to the southwestern border of the County (SNOFLO 2022).

3.3.4 Climate

Llano County

Llano County has a humid, subtropical climate, with hot summer days and generally mild winters. Temperatures range from 84°F in the summer to 46°F in the winter. The Southern Regional Climate Center reports data from the City of Llano weather station in Llano County.

Precipitation is highest during June, July, and August. The average annual precipitation is 26.79 inches. Severe thunderstorms occur mostly in the spring. Llano County received 6,221 cloud-to-ground lightning strikes and 34,843 cloud-to-cloud lightning strikes in 2019 (Earth Networks 2020).

San Saba County

San Saba County is hot in summer but cool in winter when an occasional surge of cold air causes a sharp drop in otherwise mild temperatures. Average temperatures range from 95.8 degrees Fahrenheit (°F) in the summer to 33.9°F in the winter. The Western Regional Climate Center reports data from the City of San Saba weather station in San Saba County.

Rainfall is uniformly distributed throughout the year, reaching a slight peak in spring. Snowfalls are infrequent. Precipitation is highest in May. The average annual precipitation is 26.92 inches. Severe thunderstorms occur mostly in the spring (Western Regional Climate Center 2022). According to the Earth Network's 2020 US Lightning Report, Texas is the state with the most lightning in 2020. Texas also led the United States in 2020 for the total number of lightning pulses (63,683,799), which includes cloud-to-cloud and cloud-to-ground lightning pulses, and total thunder days (278) (Earth Networks 2020). San Saba County received 7,589 cloud-to-ground lightning strikes and 37,592 cloud-to-cloud lightning strikes in 2019 (Earth Networks 2020).

3.3.5 Land Use and Land Cover

Llano County

Llano County land use is dominated by rangeland (80.9-percent), followed by forest (12.7-percent). 3.0-percent of the County is developed.

Table 3-3. Land Use Breakdowns for Llano County

Land Use Category	2019 Data	
	Acreage	Percent of County
Agriculture	2,688	0.4%
Barren	178	0.0%
Forest	77,282	12.7%
Rangeland	494,124	80.9%
Urban	18,131	3.0%
Water	18,014	2.9%

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Land Use Category	2019 Data	
	Acreage	Percent of County
Wetland	251	0.0%
Llano County (Total)	**610,669**	**100.0%**

Source: NLCD 2019

San Saba County

San Saba County land use is dominated by rangeland (69.4-percent), followed by forest (22.4-percent). 2.1-percent of the County is developed.

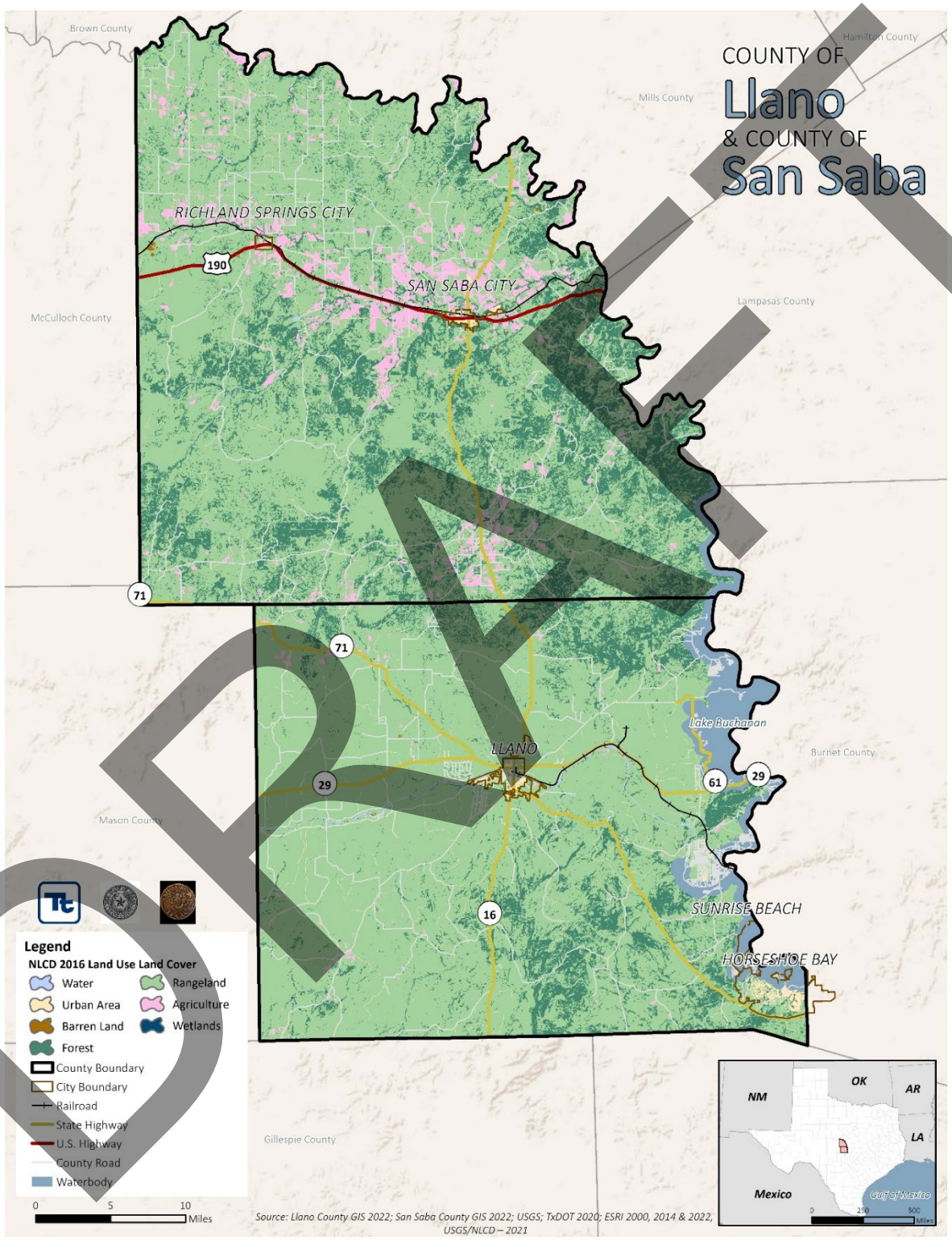
Table 3-4. Land Use Breakdowns for San Saba County

Land Use Category	2019 Data	
	Acreage	Percent of County
Agriculture	42,035	5.8%
Barren	385	0.1%
Forest	161,854	22.2%
Rangeland	505,107	69.4%
Urban	15,507	2.1%
Water	2,783	0.4%
Wetland	386	0.1%
Llano County (Total)	**728,056**	**100.0%**

Source: NLCD 2019

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Figure 3-1. Land Use in Llano County, Texas and San Saba County, Texas



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3.4 Population and Demographics

Llano County

According to the 2020 Decennial Census, Llano County had a population of 21,243 people which represents an increase from the 2010 U.S. Census population of 19,301 people. Table 3-5 presents the population statistics for Llano County based on the 2020 U.S. Census data.

Table 3-5. Recent Population by Jurisdiction in Llano County

Llano Jurisdiction	Population (2020 Decennial)	
	Total	Percent of County Total
Horseshoe Bay (C)	4,257	20.0%
Sunrise Beach (C)	739	3.5%
Llano (C)	3,325	15.7%
Unincorporated Llano County	12,922	60.8%
Llano County (Total)	21,243	100.0%

Source: U.S. Census 2020
Notes: (C) = City

San Saba County

According to the 2020 Decennial Census, San Saba County had a population of 5,730 people which represents a decrease from the 2010 U.S. Census population of 6,131 people. Table 3-6 presents the population statistics for San Saba County based on the 2020 U.S. Census data.

Table 3-6. Recent Population by Jurisdiction in San Saba County

San Saba Jurisdiction	Population (2020 Decennial)	
	Total	Percent of County Total
Richland Springs (T)	244	4.3%
San Saba (C)	3,117	54.4%
Unincorporated San Saba County	2,369	41.3%
San Saba County (Total)	**5,730**	**100.0%**

Source: U.S. Census 2020
Notes: (C) = City

3.4.1 Population and Demographic Trends

This section discusses population trends to use as a basis for estimating future changes that could result from the seasonal character of the population and significantly change the character of the area. Population trends can provide a basis for making decisions on the type of mitigation approaches to consider and the locations in which these approaches should be applied. This information can also be used to support planning decisions regarding future development in vulnerable areas.

Llano County

According to the U.S. Census Bureau, the 2010 population for Llano County was 19,301 persons, which is a 13.2-percent increase from the 2000 Census population of 17,044. Over the last 50 years, from 1970 to 2020, the

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County has seen notable population growth. The largest increase in absolute terms and in percentage was between 1990 and 2000.

Table 3-7. Llano County Population Trends, 1970 to 2020

Year	Population	Change in Population	Percent (%) Population Change
2020	21,243	1,942	10.1
2010	19,301	2,257	13.2
2000	17,044	5,360	46.2
1990	11,684	1,561	15.4
1980	10,123	3,144	45.0
1970	6,979	-	-

Source: Texas Demographic Center n.d.

The Texas Demographic Center has produced population estimates for the region that were last updated in 2018 based on 2010 Census data. The estimates show a slight projected decline between 0.14 and 0.25 percent every five years from 2025 to 2035, followed by a projected growth between 0.68 and 3.3 percent every five years from 2035 to 2050 (Texas Demographic Center n.d.).

San Saba County

According to the U.S. Census Bureau, the 2010 population for San Saba County was 6,131 persons, which is a 0.89-percent decrease from the 2000 Census population of 6,186. Over the last 50 years, from 1970 to 2020, the County has seen relatively stable population. In fact, the population in 1970 was 5,540 persons, only 190 persons fewer than the 5,730 persons in San Saba County today – a 6.6-percent change in population.

Table 3-8. San Saba County Population Trends, 1970 to 2020

Year	Population	Change in Population	Percent (%) Population Change
2020	5,730	401	-6.6
2010	6,131	55	-0.89
2000	6,186	808	15.02
1990	5,378	451	7.7
1980	5,829	289	5.2
1970	5,540	-	-

Source: Texas Demographic Center n.d.

The Texas Demographic Center has produced population estimates for the region that were last updated in 2018 based on 2010 Census data. The estimates show projected decline between 1.51 and 4.3 percent every five years from 2025 to 2050 (Texas Demographic Center n.d.).

3.4.2 Vulnerable Populations

DMA 2000 requires that HMPs consider socially vulnerable populations. These populations can be more susceptible to hazard events, based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. For the purposes of this study, vulnerable populations shall include (1) the elderly (persons aged 65 and over) and (2) those living in low-income households.

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It is noted that the Census data for household income provided in HAZUS includes two ranges ($0-10,000 and $10,000-$20,000/year) that were totaled to provide the "low-income" data used in this study. This does not correspond exactly with the "poverty" thresholds established by the 2019 U.S. Census Bureau, which identifies households with three adults and no children with an annual household income below $19,998 per year, or households with two adults and one child with an annual household income below $17,622 per year as "low income" for this region. This difference is not believed to be significant for the purposes of this planning effort.

Llano County

The 2020 American Community Survey data identified approximately 1,612 people in Llano County living below the poverty line. This represents nearly 7.6 percent of the population. Though this is a decrease from 2,661 in 2012, the proportion of individuals in poverty has declined by 39.4-percent since 2012.

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Table 3-9. Llano County Vulnerable Population Statistics

Llano Jurisdiction	Population (2020 Decennial) Total	Percent of County Total	American Community 5-year Estimates 2020 Population Over 65	Percent of Jurisdiction Total	Under 5	Percent of Jurisdiction Total	Non-English Speaking Households	Percent of Jurisdiction Total	Disability	Percent of Jurisdiction Total	Poverty Level	Percent of Jurisdiction Total
Horseshoe Bay (C)	4,257	20.0%	2,221	52.2%	93	2.2%	0	0.0%	928	21.8%	156	3.7%
Sunrise Beach (C)	739	3.5%	383	51.8%	16	2.2%	0	0.0%	176	23.8%	30	4.1%
Llano (C)	3,325	15.7%	691	20.8%	314	9.4%	12	0.4%	719	21.6%	531	16.0%
Unincorporated Llano County	12,922	60.8%	4,680	36.2%	414	3.2%	56	0.4%	3,490	27.0%	895	6.9%
Llano County (Total)	21,243	100.0%	7,975	37.5%	837	3.9%	68	0.3%	5,313	25.0%	1,612	7.6%

Source: U.S. Census 2020
Notes: (C) = City

San Saba County

The 2020 American Community Survey data identified approximately 714 people in San Saba County living below the poverty line. This represents nearly 12.5 percent of the population and decrease from 1,032 persons in 2012; the proportion of individuals in poverty has declined by approximately 31-percent since 2012.

Table 3-10. San Saba County Vulnerable Population Statistics

San Saba Jurisdiction	Population (2020 Decennial) Total	Percent of County Total	American Community 5-year Estimates 2020 Population Over 65	Percent of Jurisdiction Total	Under 5	Percent of Jurisdiction Total	Non-English Speaking Households	Percent of Jurisdiction Total	Disability	Percent of Jurisdiction Total	Poverty Level	Percent of Jurisdiction Total
Richland Springs (T)	244	4.3%	62	0.0%	14	0.0%	0	0.0%	58	0.0%	41	0.0%
San Saba (C)	3,117	54.4%	588	18.9%	191	6.1%	86	2.8%	405	13.0%	510	16.4%
Unincorporated San Saba County	2,369	41.3%	757	0.0%	107	0.0%	9	0.0%	519	0.0%	163	0.0%
San Saba County (Total)	**5,730**	**100.0%**	**1,407**	**10.3%**	**312**	**3.3%**	**95**	**1.5%**	**982**	**7.1%**	**714**	**8.9%**

Data Sources: Census 2020
Notes: (C) = City, (T) = Town

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Income

Llano County

The 2020 American Community Survey 5-Year Estimates provides that the median household income in Llano County was $58,941. The U.S. Census Bureau identifies households with two adults and one child with an annual household income below $17,622 per year as *low income* (U. S. Census 2021). The 2020 American Community Survey 5-Year Estimates indicates that nearly 7.6 percent of persons are below the poverty level within the County.

San Saba County

The 2020 American Community Survey 5-Year Estimates provides that the median household income in San Saba County was $45,169. The U.S. Census Bureau identifies households with two adults and one child with an annual household income below $17,622 per year as *low income* (U. S. Census 2021). The 2020 American Community Survey 5-Year Estimates indicates that nearly 12.5 percent of persons are below the poverty level within the County.

Physically or Mentally Disabled

Llano County

According to the Centers for Disease Control, "A disability is any condition of the body or mind (impairment) that makes it more difficult for the person with the condition to do certain activities (activity limitation) and interact with the world around them (participation restrictions) (CDC 2020)." Cognitive impairments can increase the level of difficulty that individuals might face during an emergency and reduce an individual's capacity to receive, process, and respond to emergency information or warnings. Individuals with a physical or sensory disability can face issues of mobility, sight, hearing, or reliance on specialized medical equipment. According to the 2020 American Community Survey, 5,313 persons or 25 percent of residents in Llano County are living with a disability.

San Saba County

According to the Centers for Disease Control, "A disability is any condition of the body or mind (impairment) that makes it more difficult for the person with the condition to do certain activities (activity limitation) and interact with the world around them (participation restrictions) (CDC 2020)." Cognitive impairments can increase the level of difficulty that individuals might face during an emergency and reduce an individual's capacity to receive, process, and respond to emergency information or warnings. Individuals with a physical or sensory disability can face issues of mobility, sight, hearing, or reliance on specialized medical equipment. According to the 2020 American Community Survey, 982 persons or approximately 17 percent of residents in San Saba County are living with a disability.

Non-English Speakers

Llano County

Individuals who are not fluent or working proficiency in English are vulnerable because they can have difficulty with understanding information being conveyed to them. Cultural differences also can add complexity to how information is being conveyed to populations with limited proficiency of English (CDC 2021). According to the 2020 American Community Survey, 6.6-percent of the County's population over the age of 5 primarily speaks a language other than English at home. Approximately, 1.5-percent of the population over the age of 5 speaks limited English.

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San Saba County

Individuals who are not fluent or working proficiency in English are vulnerable because they can have difficulty with understanding information being conveyed to them. Cultural differences also can add complexity to how information is being conveyed to populations with limited proficiency of English (CDC 2021). According to the 2020 American Community Survey, 20-percent of the County's population over the age of 5 primarily speaks a language other than English at home. Approximately, 7.2-percent of the population over the age of 5 speaks limited English.

3.4.3 General Building Stock

Llano County

For this Plan, the default general building stock in Hazus v5.1 was used to develop the general building stock inventory for Llano and San Saba Counties at the aggregate level, incorporating 2010 Census data with 2018 RS Means replacement cost values. For the purposes of this plan, there are approximately 13,604 structures identified through Census data. These structures account for a replacement cost value of approximately $4.2 billion (structure and contents). Table 3-11 presents building and improvement values in the County.

Table 3-11. Number of Buildings and Improvement Value in Llano County

Jurisdiction	Count	All Occupancies Total Replacement Cost Value (Structure + Contents)
Horseshoe Bay (C)	2,174	$921,317,000
Sunrise Beach (C)	909	$345,382,000
Llano (C)	1,733	$564,332,000
Unincorporated Llano County	8,788	$2,408,418,000
Llano County (Total)	**13,604**	**$4,239,449,000**

Data Sources: Census 2010, Census 2020
Notes: (C) = City, (T) = Town, (V) = Village
**Disclaimer: Horseshoe Bay City statistics are based on both Llano County and Burnet County coverage. Results may be over or under estimated.*

San Saba County

For this Plan, the default general building stock in Hazus v5.1 was used to develop the general building stock inventory for Llano and San Saba Counties at the aggregate level, incorporating 2010 Census data with 2018 RS Means replacement cost values. For the purposes of this plan, there are approximately 3,343 structures identified through Census data. These structures account for a replacement cost value of approximately $957.5 million (structure and contents). Table 3-12 presents building and improvement values in the County.

Table 3-12. Number of Buildings and Improvement Value in San Saba County

Jurisdiction	Count	All Occupancies Total Replacement Cost Value (Structure + Contents)
Richland Springs (T)	213	$66,306,000
San Saba (C)	1,311	$410,811,000
Unincorporated San Saba County	1,819	$480,386,000
San Saba County (Total)	**3,343**	**$957,503,000**

Data Sources: Census 2010, Census 2020
Notes: (C) = City, (T) = Town, (V) = Village

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This Hazard Mitigation Plan provides a general overview of population, land use, and types of development occurring within the study areas. An understanding of these development trends can assist in planning for further development and ensuring that appropriate mitigation, planning, and preparedness measures are in place to protect human health and community infrastructure.

3.4.4 Land Use Trends

Llano County

While Llano County does not have a comprehensive plan to cite land use trends, patterns emerge from the statistics in this plan and the previous HMAP. Overall, the percentage of developed land has remained roughly the same since the previous HMP. While the number of farms has increased significantly, the workforce in the County is predominantly in the accommodation and food services sectors. The aging population is also a trend that may impact land use in the County.

Economy

The U.S. Census Bureau's Economic Census provides an annual series of sub-national economic data by industry covering the majority of the country's economic activity. According to the 2020 Llano County Economic Census, the retail trade sector has the largest number of establishments, while the accommodation and food services sector has the largest number of employees. The accommodation and food services sector comprises the highest payroll.

Table 3-13. 2017 Economic Census for Llano County, Texas

Sector	Number of Establishments	Number of employees	Annual payroll ($1,000)
Utilities	D	20-99	D
Manufacturing	16	63	3,720
Wholesale trade	13	217	10,217
Retail trade	67	597	14,876
Transportation and warehousing	5	21	789
Information	7	16	482
Finance and insurance	30	165	7,744
Real estate and rental and leasing	22	62	1,712
Professional, scientific, and technical services	39	147	6,042
Professional, scientific, and technical services (establishments subject to federal income tax)	39	147	6,042
Administrative and support and waste management and remediation services	22	101	3,357
Educational services	D	0-19	D
Educational services (establishments subject to federal income tax)	D	0-19	D
Educational services (establishments exempt from federal income tax)	-	-	-
Health care and social assistance	49	624	21,154
Health care and social assistance (establishments subject to federal income tax)	37	392	11,101

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Sector	Number of Establishments	Number of employees	Annual payroll ($1,000)
Health care and social assistance (establishments exempt from federal income tax)	12	232	10,053
Arts, entertainment, and recreation	6	41	1,184
Arts, entertainment, and recreation (establishments subject to federal income tax)	D	20-99	D
Arts, entertainment, and recreation (establishments exempt from federal income tax)	-	-	-
Accommodation and food services	48	1,145	28,069
Other services (except public administration)	25	84	2,234
Other services (except public administration) (establishments subject to federal income tax)	18	70	1,845
Other services (except public administration) (establishments exempt from federal income tax)	7	14	389
Total (does not include withheld data or range of numbers)	**462**	**4,138**	**131,010**

Source: U.S. Census, Economic Census 2017

D = Withheld to avoid disclosing data for individual companies; data are included in higher level totals.

Agriculture

Approximately 85-percent of the land in Llano County is being used for pastureland for the purpose of raising livestock. The US Department of Agriculture produces a Census of Agriculture that tracks agricultural data on the County level. In Llano County, the number of farms has increased by 13-percent since 2012, while the acreage of farms has decreased only 1-percent during the same time to just over 523,000 acres of land for farming. Cattle, calves, hay, grains, sheep, goats, and layers make up the main sales for farms in the County. Llano County's agriculture products generate more than $15.7 million in sales each year, but farms operate at a net loss (USDA 2017).

Corridors and Gateways

The majority of corridors in Llano County are State Highways, including State Highways 16, 29, 71, and 261; other main roads include "Farm-to-Market" or "Ranch-to-Market" roads RM-152, RM-2241, and RM-2323, which are State or County roads that connect rural or agricultural areas to nearby market towns. State Highway 16 is a North-South corridor which is located through the center of Llano County; this State Highway extends from the Texas-Mexico border, through Llano City, and up to Wichita Falls. State Highway 29 is another Texas DoT maintained highway that extends West-to-East from Menard County, through Llano City, and to Circleville in Williamson County. State Highway 71, an East-West highway, spans 253 miles, entering Llano County near Field Creek and exiting to the Southeast, just below Horseshoe Bay. State Highway 261 borders Lake Buchanan in Llano County, beginning at the bend just after Bluffton and continuing around the lake until merging with State Highway 29 at Buchanan Dam. RM-152 is a Ranch-to-Market road, running from Llano City in the East until it intersects US Highway 87 to the West in Mason County. RM-2241, a Ranch-to-Market road, begins just outside of Llano City off of State Highway 29. RM-2241 continues Northwest through Lone Grove and Bluffton up to Tow. RM-2323, also a Ranch-to-Market road, begins South of Llano City off of State Highway 16, and continues Southwest into Gillespie County until it intersects with US Highway 87.

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San Saba County

While San Saba County does not have a comprehensive plan to cite land use trends, patterns emerge from the statistics in this plan. Land use has remained fairly consistent when comparing 2019 data to the previous HMAP. While the amount of agricultural land has increased slightly, the workforce in the County is predominantly in the retail, accommodations and food services, and healthcare sectors. The aging population is also a trend that may impact land use in the County.

Economy

The U.S. Census Bureau's Economic Census provides an annual series of sub-national economic data by industry covering the majority of the country's economic activity. According to the 2017 San Saba County Economic Census, the retail sector has the largest number of establishments, while the accommodation and food services sector has the largest number of employees. The healthcare and social assistance industry comprises the highest payroll.

Table 3-14. 2017 Economic Census for San Saba County, Texas

Sector	Number of Establishments	Number of employees	Annual payroll ($1,000)
Utilities	-	-	-
Manufacturing	9	41	1,864
Wholesale trade	8	46	2,109
Retail trade	32	158	3,476
Transportation and warehousing	11	36	1,526
Information	-	-	-
Finance and insurance	5	27	1,277
Real estate and rental and leasing	-	-	-
Professional, scientific, and technical services	11	32	978
Professional, scientific, and technical services (establishments subject to federal income tax)	11	32	978
Administrative and support and waste management and remediation services	3	12	348
Educational services	-	-	-
Educational services (establishments subject to federal income tax)	-	-	-
Educational services (establishments exempt from federal income tax)	-	-	-
Health care and social assistance	12	126	4,123
Health care and social assistance (establishments subject to federal income tax)	6	20-99	D
Health care and social assistance (establishments exempt from federal income tax)	6	20-99	D
Arts, entertainment, and recreation	-	-	-
Arts, entertainment, and recreation (establishments subject to federal income tax)	-	-	-
Arts, entertainment, and recreation (establishments exempt from federal income tax)	-	-	-
Accommodation and food services	D	100-249	D
Other services (except public administration)	D	20-99	D

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Sector	Number of Establishments	Number of employees	Annual payroll ($1,000)
Other services (except public administration) (establishments subject to federal income tax)	7	19	451
Other services (except public administration) (establishments exempt from federal income tax)	-	-	-
Total (does not include withheld data or range of numbers)	**121**	**529**	**17,130**

Source: U.S. Census, Economic Census 2017
D = Withheld to avoid disclosing data for individual companies; data are included in higher level totals.

Agriculture

San Saba County farming contribution is fairly average compared to other counties in Texas with the County ranking 146th out of 254 counties in market value of agricultural products sold. The US Department of Agriculture produces a Census of Agriculture that tracks agricultural data on the County level. In San Saba County, the number of farms has increased by 4-percent since 2012 but the acreage of farms has decreased 2-percent during the same time to just over 660,000 acres of land for farming. Cattle, calves, sheep, goats, fruits, tree nuts, berries, grain, oilseeds, dry beans, and dry peas make up the main sales for farms in the County. San Saba County's agriculture products generate more than $35.8 million in sales each year (USDA 2017).

Corridors and Gateways

The majority of corridors in San Saba County are "Farm-to-Market" or "Ranch-to-Market" roads, which are State or County roads that connect rural or agricultural areas to nearby market towns. FM-500 is a Texas Department of Transportation (DoT) maintained roadway that runs North-to-South from FM-45 just outside of Skeeterville to San Saba City. RM-501 is another Texas DoT maintained highway that extends from State Highway 71 in Pontotoc, Mason County to FM-850 near Bend, San Saba County. FM-45, a county road in the Northwest corner of the County, connects Richland Springs, San Saba County from US-190 to US-377 in Brownwood, Brown County. State Highway 16 is a North-South corridor which is located through the eastern portion of San Saba County; this State Highway extends from the Texas-Mexico border, through San Saba City, and up to Wichita Falls. US-190 begins in Louisiana and continues to Western Texas, passing directly through San Saba County.

3.4.5 Population Trends

Llano County

Llano County has grown significantly in recent years. Between 2010 and 2020 alone, the estimated population has increased from 19,301 residents to 21,243 residents, a 10.1 percent increase. The County has grown steadily since 1970, adding between 10 and 16 percent to its population every decade, with a few years of larger percentages of growth, such as 45 percent from 1970 to 1980 and 46.2 percent from 1990 to 2000. The County's median age increased from 32.5 years in 2000 to 38.7 years in 2020.

As the County has grown, it has also aged and change composition. In 2000, those 65+ years of age represented the plurality of residents. As of 2020, those 65+ years of age represent the plurality. Whereas the population share of those aged 5 to 19 years has remained relatively constant, the share of residents between the ages of 35 and 49 years has increased from 12.5 percent to 18 percent during the same time. The County has also diversified racially and ethnically, with the share of Hispanic/Latino residents increasing by 6.2 percent from 2000 to 2020 (USA Facts 2022).

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San Saba County

San Saba County has had rotating increases and decreases in population throughout the years but has remained mostly stagnant in its growth since 1970. The 1980 Census has the population estimate at 5,829, an increase of 5.2 percent, followed by a 7.7 percent decrease from 1980 to 1990. The year 2000 saw a Census estimated population of 6,186, a 16.5 percent increase from 1990's population estimate of 5,578. However, between 2010 and 2020, the estimated population decreased from 6,131 residents to 5,730 residents, a 6.6 percent decrease. Despite these incremental changes, the overall population change from 1970 to 2020 is just 3.4 percent, or an increase of about 190 persons. The County's median age increased from 39.4 years in 2000 to 42.4 years in 2020.

As the County has grown, it has also aged and change composition. In 2000, those between the ages of 5 and 19 years old represented the plurality of residents. As of 2020, those 65+ years of age represent the plurality. Whereas the population share of those between 0 to 4 and 50 to 64 have remained relatively constant, the share of residents between the ages of 20 to 34 years has increased from 12.4 percent to 21.4 percent during the same time. The County has also diversified racially and ethnically, with the share of Hispanic/Latino residents increasing by 9.8 percent from 2000 to 2020 (USA Facts 2022).

3.4.6 Future Growth and Development

Llano County

The municipal Planning Partners have adopted plans that govern land use decision and policy making in their jurisdictions. Decisions on land use will be governed by these programs. This plan will work together with these programs to support wise land use in the future by providing vital information on the risk associated with natural hazards in the planning area.

It is the goal that all municipal Planning Partners will incorporate this hazard mitigation plan update in their comprehensive plans (if applicable) by reference. This will help ensure that future development trends can be established with the benefits of the information on risk and vulnerability to natural hazards identified in this plan. None of the Planning Partners has formally tracked the impacts of changes in development over the last five years and how these changes in development were influenced by the risk associated with natural hazards in the County or the communities. As part of this hazard mitigation plan update, Llano County and the Cities of Horseshoe Bay, Llano, and Sunrise Beach Village are now equipped with the knowledge and the tools to track and implement changes to the plan during their annual reviews and 5-year updates to reflect development changes. However, it should be noted that the mitigation actions developed and prioritized through the mitigation action ranking process reflect the current development conditions and applicable policies (JSW & Associates, Halff Associates, Tetra Tech 2016).

San Saba County

The municipal Planning Partners have adopted plans that govern land use decision and policy making in their jurisdictions. Decisions on land use will be governed by these programs. This plan will work together with these programs to support wise land use in the future by providing vital information on the risk associated with natural hazards in the planning area.

It is the goal that all municipal Planning Partners will incorporate this hazard mitigation plan update in their comprehensive plans (if applicable) by reference. This will help ensure that future development trends can be established with the benefits of the information on risk and vulnerability to natural hazards identified in this plan.

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San Saba County consists primarily of agricultural land, forest land, and grassland/prairie (JSW & Associates, Halff Associates, Tetra Tech 2016).

3.5 Lifelines and Critical Facilities

Critical infrastructure and facilities are those that are essential to the health and welfare of the population. These facilities are especially important after any hazard event. Critical facilities are those that maintain essential and emergency functions and are typically defined to include police and fire stations, schools, and emergency operations centers. Critical infrastructure can include the roads and bridges that provide ingress and egress and allow emergency vehicles access to those in need and the utilities that provide water, electricity, and communication services to the community. Also included are Tier II facilities (hazardous materials) and rail yards; rail lines hold or carry significant amounts of hazardous materials with a potential to impact public health and welfare in a hazard event.

Critical Facilities are those facilities considered critical to the health and welfare of the population and that are especially important following a hazard. As defined for this HMP, critical facilities include transportation systems, lifeline utility systems, high-potential loss facilities, and hazardous material facilities, and essential facilities

Essential facilities are a subset of critical facilities that include those facilities that are important to ensure a full recovery following the occurrence of a hazard event. For the County risk assessments, this category was defined to include police, fire, EMS, schools/colleges, shelters, senior facilities, and medical facilities.

Lifelines enable the continuous operation of critical business and government functions and are essential to human health and safety or economic security.

Beginning in 2017, FEMA developed a new construct to increase effectiveness for disaster operations and position response to catastrophic incidents. This construct, known as "community lifelines", represents the most fundamental services in the community that, when stabilized, enable all other aspects of society. Following a disaster event, intervention is required to stabilize community lifelines. Lifelines are divided into seven categories which include:

- Safety and Security
- Food, Water, Shelter
- Health and Medical
- Energy (Power and Fuel)
- Communications
- Transportation
- Hazardous Materials

To facilitate consistency with the National Response Framework, FEMA Strategic Plan, and guidance for the Building Resilient Infrastructure and Communities grant program, critical facilities in Llano and San Saba Counties are discussed in terms of lifelines.

A comprehensive inventory of critical facilities and lifelines in Llano and San Saba Counties was developed from various sources including input from the Steering Committee and Planning Partnership. The inventory of critical facilities presented in this section represents the current state of this effort at the time of publication of the HMP and was used for the risk assessment in Section 4 (Risk Assessment). Table 3-15 summarizes the number of critical facilities, by category, in Llano County. Table 3-16 summarizes the number of community lifelines, by category, in

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Llano County. Table 3-17 summarizes the number of critical facilities, by category, in San Saba County. Table 3-18 summarizes the number of community lifelines, by category, in San Saba County.

Table 3-15. Critical Facilities in the Planning Area, Llano County

Facility Type	City of Horseshoe Bay	City of Llano	City of Sunrise Beach	Unincorporated or Other	Total
Airport	0	1	0	0	**1**
Airport Runway	0	1	0	0	**1**
Bridge (Highway)	0	11	2	146	**159**
Bridge (Railway)	0	1	0	15	**16**
Child Care Facility	0	2	0	4	**6**
Church	0	1	0	1	**2**
City Hall	0	1	1	1	**3**
Communication Facility	0	3	0	2	**5**
Courthouse	0	0	0	1	**1**
Dam	0	2	0	10	**12**
DOT	0	0	0	1	**1**
Electric Power Facility	0	0	0	1	**1**
Electric Substation	0	1	1	2	**4**
EOC	0	1	0	1	**2**
Fire Station	0	1	1	5	**7**
Gas Facility	0	9	0	14	**23**
Government Facility	0	0	0	1	**1**
Grocery Store	0	5	0	3	**8**
Hazardous Material Facility	0	1	0	6	**7**
Medical Care	0	9	0	5	**14**
Police Station	0	1	1	4	**6**
Potable Water Facility	0	0	1	0	**1**
Potable Water Treatment Plant	0	0	0	1	**1**
Primary Education Facility	0	2	0	1	**3**
Secondary Education Facility	0	2	0	0	**2**
Wastewater Lift Station	0	0	0	2	**2**
Wastewater Treatment Plant	0	0	0	4	**4**
Total	**0**	**55**	**7**	**231**	**293**

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

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Table 3-16. Community Lifelines in the Planning Area, Llano County

Facility Type	City of Horseshoe Bay	City of Llano	City of Sunrise Beach	Unincorporated or Other	Total
Communication	0	4	0	2	**6**
Energy	0	10	1	17	**28**
Food, Water, Shelter	0	6	1	11	**18**
Hazardous Materials	0	1	0	6	**7**
Health and Medical	0	9	0	5	**14**
Safety and Security	0	10	3	25	**38**
Transportation	0	13	2	161	**176**
Total	**0**	**53**	**7**	**227**	**287**

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

Table 3-17. Critical Facilities in the Planning Area, San Saba County

Facility Type	Town of Richland Springs	City of San Saba	Unincorporated or Other	Total
Airport	0	1	0	**1**
Bridge (Highway)	1	1	92	**94**
Bridge (Railway)	0	1	15	**16**
Communication Facility	0	2	0	**2**
EOC	0	1	0	**1**
Fire Station	1	1	2	**4**
Government Facility	1	0	1	**2**
Police Station	0	2	0	**2**
Primary Education Facility	0	2	0	**2**
Secondary Education Facility	1	1	2	**4**
Wastewater Treatment Plant	1	0	1	**2**
Total	**5**	**12**	**113**	**130**

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

Table 3-18. Community Lifelines in the Planning Area, San Saba County

Facility Type	Town of Richland Springs	City of San Saba	Unincorporated or Other	San Saba County Total
Communication	0	2	0	**2**
Food, Water, Shelter	1	0	1	**2**
Safety and Security	3	7	5	**15**
Transportation	1	2	107	**111**
Total	**5**	**11**	**113**	**130**

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

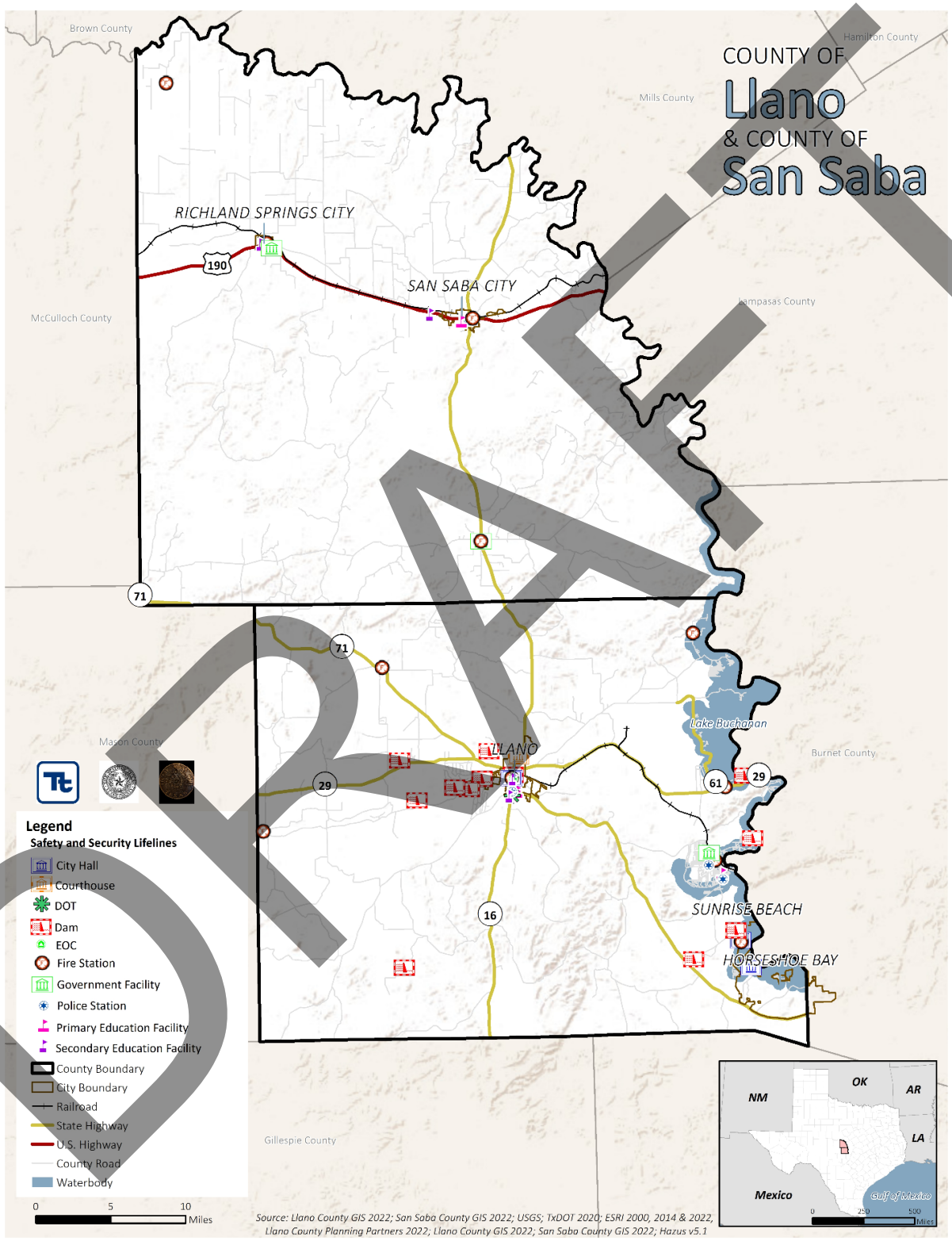
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3.5.1 Safety and Security

This section provides information on Safety and Security lifelines. Components of this lifeline category include law enforcement/security, fire services, search and rescue services, government services, and community safety (e.g., dams). There are 36 safety and security lifelines in Llano County and 20 safety and security lifelines in San Saba County. Figure 3-2 shows the location of these facilities.

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Figure 3-2. Safety and Security Lifelines in Llano County, Texas and San Saba County, Texas



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3.5.2 Food, Water, and Shelter Lifelines

Food, Water, and Shelter lifelines include facilities pertaining to food supply (distribution facilities, programs, and supply chain), water supply (including both potable and wastewater systems), shelter (housing and hotels), and agricultural facilities. Figure 3-3 shows the location of these facilities in the Planning Area.

3.5.3 Health and Medical Lifelines

Health and medical lifelines include medical care (e.g., hospitals, pharmacies, long-term care facilities), patient movement (e.g., EMS), fatality management, public health, and medical supply chain. Figure 3-4 shows the location of these facilities in the Planning Area.

3.5.4 Energy (Power and Fuel) Lifelines

The energy (power and fuel) lifeline includes facilities pertaining to the power grid and fuel supplies. Figure 3-5 shows the location of these facilities in the Planning Area.

3.5.5 Communication Lifelines

Communication lifelines include facilities pertaining to infrastructure, alerts/warnings/messages, 911 and dispatch, responder communications, and finance. Figure 3-6 illustrates the communication facilities in the Planning Area.

3.5.6 Transportation Lifelines

Transportation lifelines include facilities pertaining to highway/roadway, mass transit, railway, aviation, and maritime. Major highways in the County include Interstate 45 and State Highways 3, 6, 87, and 146. Major highways in the County include Interstate 190, State Highway 16, Farm-to-Market Roads FM-45, FM-500, and RM-501, a Ranch-to-Market Road (San Saba Central Appraisal District n.d.). Figure 3-7 illustrates the transportation lifelines in the Planning Area.

3.5.7 Hazardous Materials Lifelines

The hazardous material lifeline includes facilities pertaining to facilities containing hazardous materials and HAZMAT/pollutants/containments. There are six hazardous material lifelines in Llano County and no Superfund sites. Meanwhile in San Saba County, there are no hazardous materials lifelines or Superfund sites.

Llano County

HAZMAT Facilities

A Superfund site consists of land in the United States that has been contaminated by hazardous waste and identified by the U.S. Environmental Protection Agency (EPA) as a candidate for cleanup because it poses a risk to human health or the environment. These sites are placed on the National Priorities List (NPL), the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL is intended primarily to guide EPA in determining which sites warrant further investigation.

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Abandoned hazardous waste sites placed on the federal NPL include those that EPA has determined present *a significant risk to human health or the environment*, with the sites being eligible for remediation under the Superfund Trust Fund Program. As of 2022, Llano County hosts no hazardous sites in the federal Superfund Program that are listed as on the NPL (US EPA 2022).

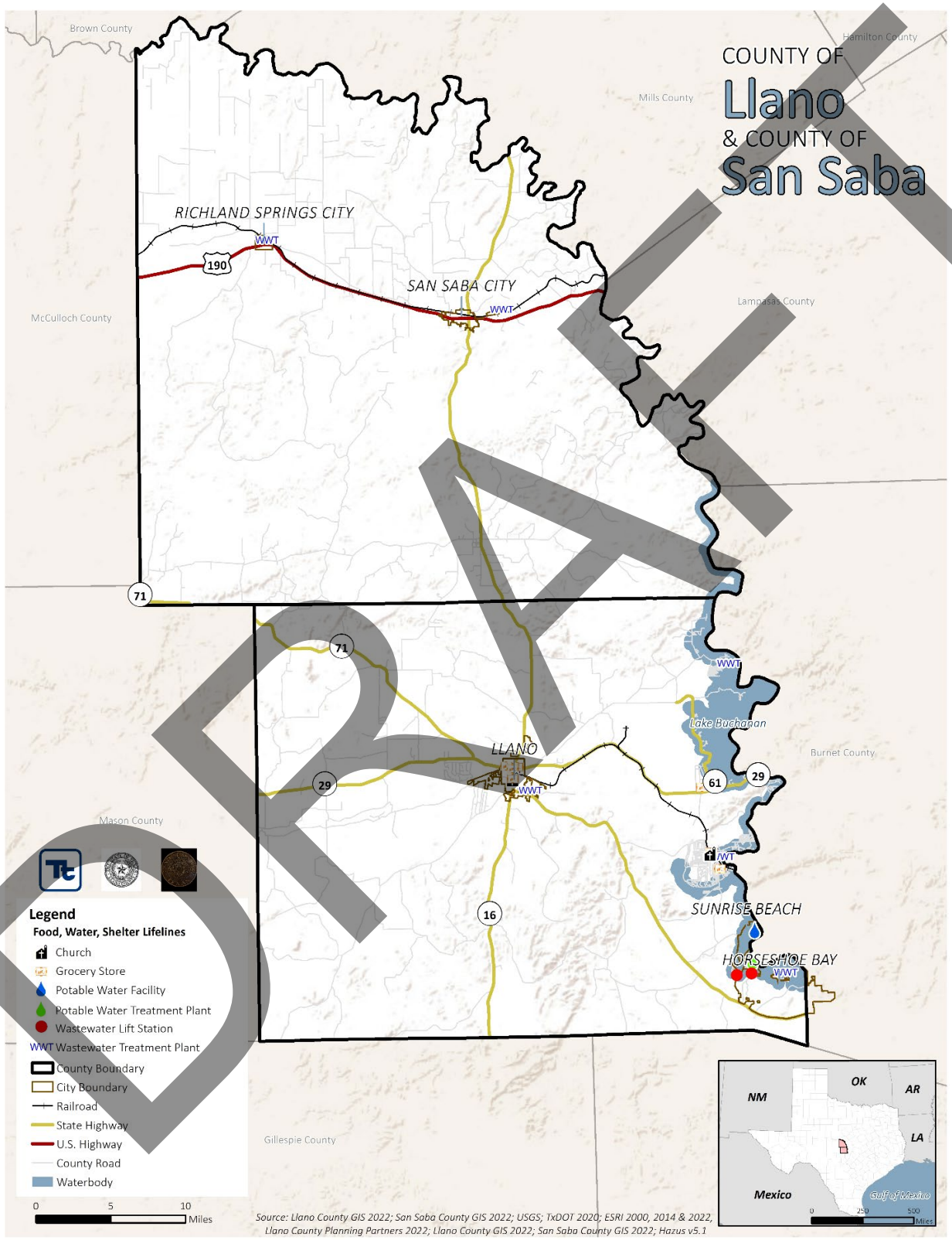
San Saba County

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Abandoned hazardous waste sites placed on the federal NPL include those that EPA has determined present *a significant risk to human health or the environment*, with the sites being eligible for remediation under the Superfund Trust Fund Program. As of 2022, San Saba County hosts no hazardous sites in the federal Superfund Program that are listed as on the NPL (US EPA 2022).

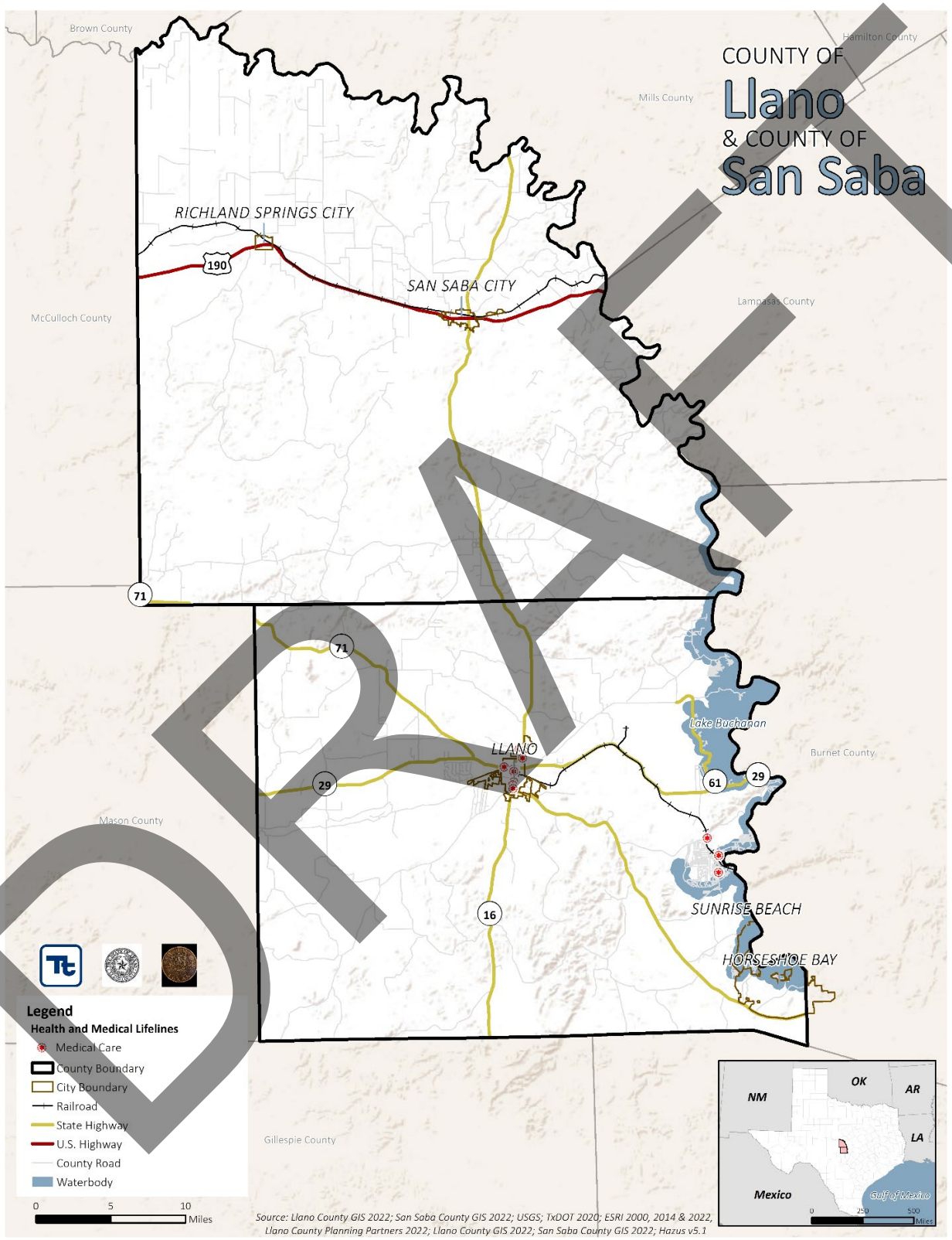
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Figure 3-3. Food, Water, and Shelter Lifelines in Llano County, Texas and San Saba County, Texas



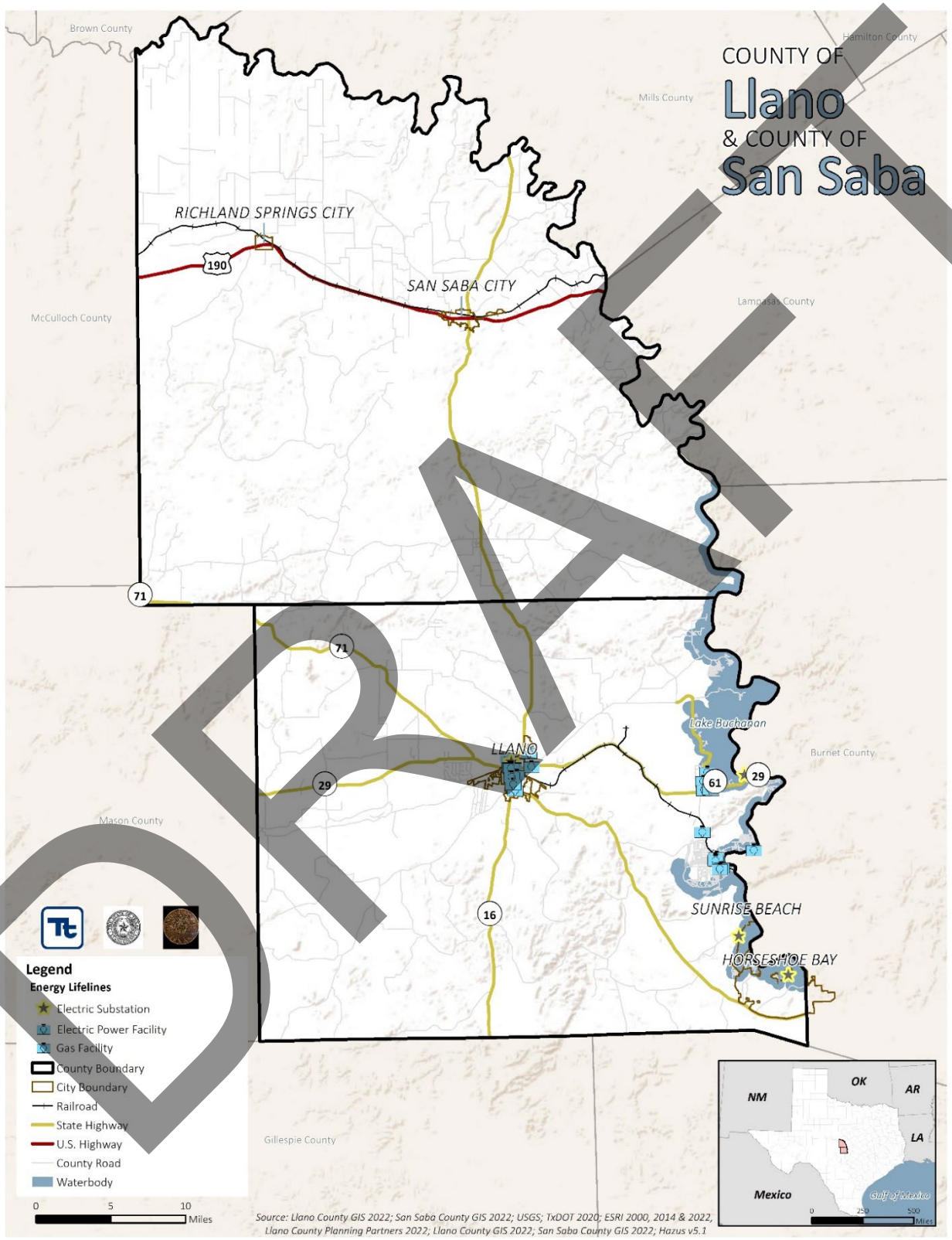
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Figure 3-4. Health and Medical Lifelines in Llano County, Texas and San Saba County, Texas



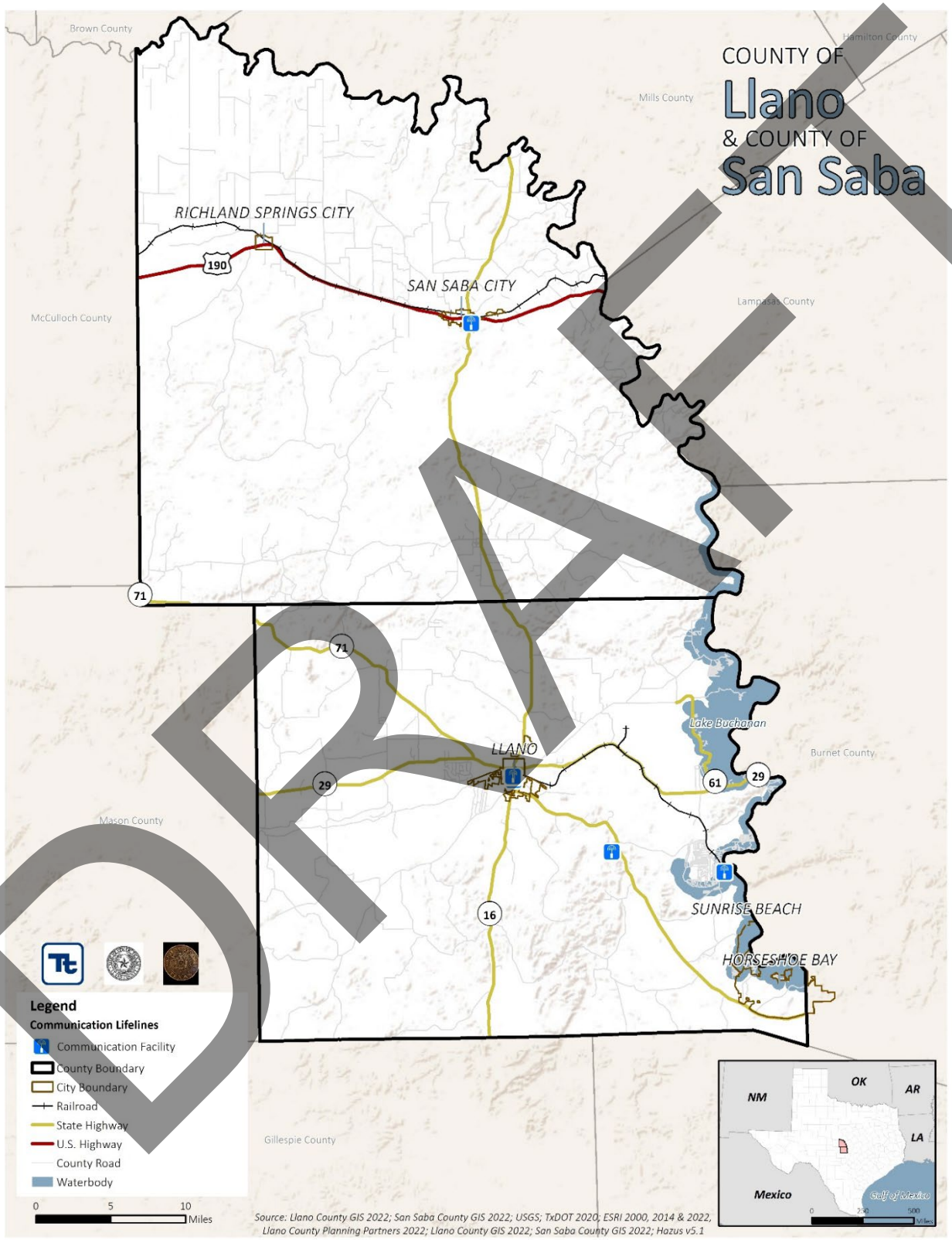
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Figure 3-5. Energy Lifelines in Llano County, Texas and San Saba County, Texas



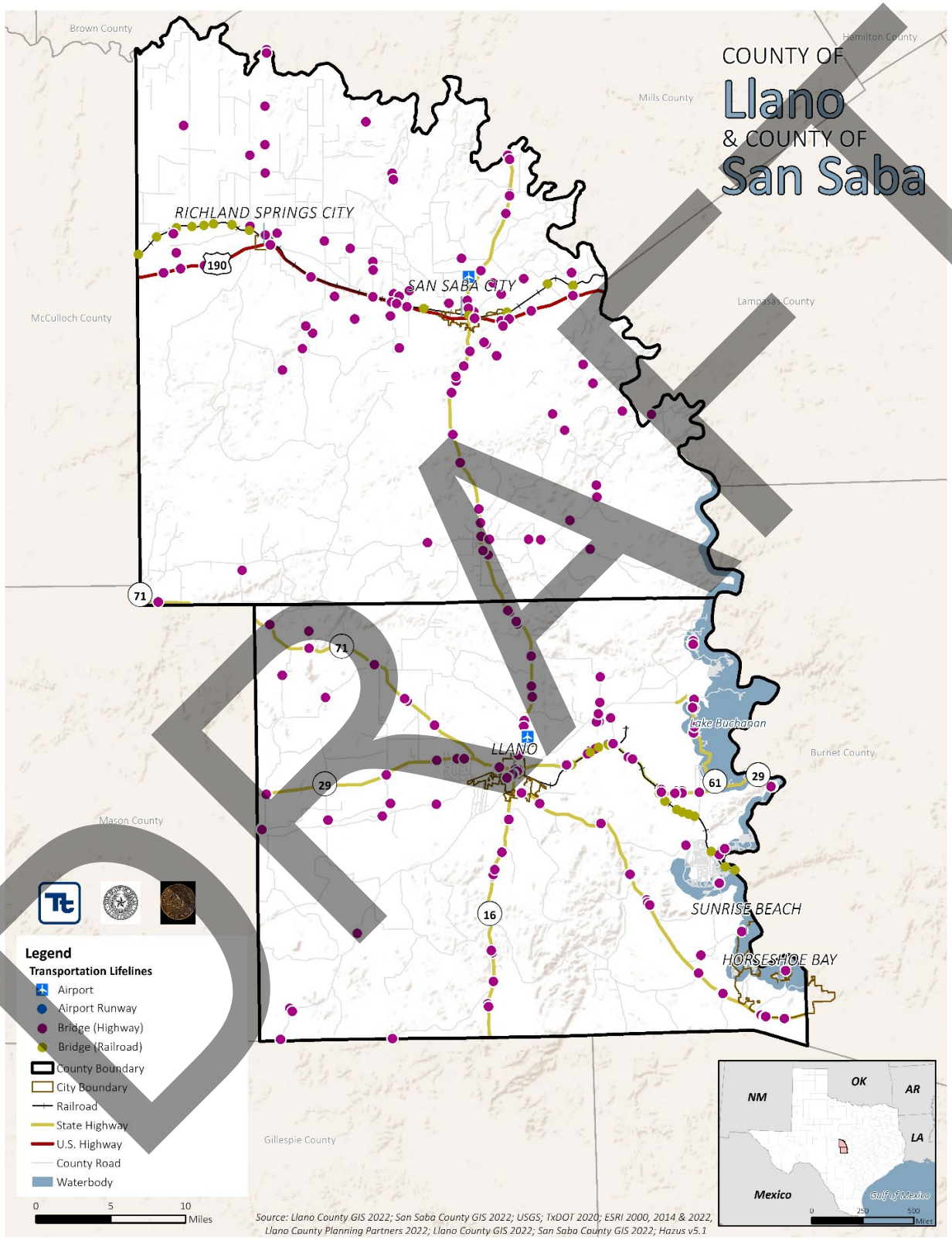
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Figure 3-6. Communications Lifelines in Llano County, Texas and San Saba County, Texas



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Figure 3-7. Transportation Lifelines in Llano County, Texas and San Saba County, Texas



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Section 4 Risk Assessment

4.1 Methodology and Tools

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from identified hazards. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The process focuses on the following elements:

- Hazard identification—Use all available information to determine what types of hazards may affect a jurisdiction, how often they can occur, and their potential severity.
- Exposure identification—Estimate the total number of people and properties in the jurisdiction that are likely to experience a hazard event if it occurs.
- Vulnerability identification and loss estimation—Assess the impact of hazard events on the people, property, environment, economy, and lands of the region, including estimates of the cost of potential damage or cost that can be avoided by mitigation.

The risk assessment for this hazard mitigation plan update evaluates the risk of natural hazards prevalent in the planning area and meets requirements of the Disaster Mitigation Act (44 CFR, Section 201.6(c)(2)).

To protect individual privacy and the security of critical facilities, information on properties assessed is presented in aggregate, without details about specific individual personal or public properties.

The following describes the methodology and tools used to conduct the risk assessment for the Llano and San Saba County Hazard Mitigation Action Plan 2023 update.

4.1.1 Risk Assessment Tools

Mapping

National, state, and county databases were reviewed to locate available spatially based data relevant to this planning effort. Maps were produced using geographic information system (GIS) software to show the spatial extent and location of hazards when such datasets were available. These maps are included in the hazard profile chapters of this document.

Hazus

In 1997, FEMA developed the standardized Hazards U.S. (Hazus) model to estimate losses caused by earthquakes and identify areas that face the highest risk and potential for loss. Hazus was later expanded into a multi-hazard methodology with new models for estimating potential losses from hurricanes and floods.

Hazus is a GIS-based software program used to support risk assessments, mitigation planning, and emergency planning and response. It provides a wide range of inventory data, such as demographics, building stock, critical facility, transportation and utility lifeline, and multiple models to estimate potential losses from natural disasters. The program maps and displays hazard data and the results of damage and economic loss estimates for buildings and infrastructure. Its advantages include the following:

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- Provides a consistent methodology for assessing risk across geographic and political entities.
- Provides a way to save data so that they can readily be updated as population, inventory, and other factors change and as mitigation planning efforts evolve.
- Facilitates review of mitigation plans because it helps to ensure that FEMA methodologies are incorporated.
- Supports grant applications by calculating benefits using FEMA definitions and terminology.
- Produces hazard data and loss estimates that can be used in communication with local stakeholders.
- Is administered by the local government and can be used to manage and update a hazard mitigation plan throughout its implementation.

Level of Detail for Evaluation

Hazus provides default data for inventory, vulnerability, and hazards; these default data can be supplemented with local data to provide a more refined analysis. The model can carry out three levels of analysis, depending on the format and level of detail of information about the planning area:

- Level 1—All of the information needed to produce an estimate of losses is included in the software's default data. These data are derived from national databases and describe in general terms the characteristic parameters of the planning area.
- Level 2—More accurate estimates of losses require more detailed information about the planning area. To produce Level 2 estimates of losses, detailed information is required about local geology, hydrology, hydraulics, and building inventory, as well as data about utilities and critical facilities. This information is needed in a GIS format.
- Level 3—This level of analysis generates the most accurate estimate of losses. It requires detailed engineering and geotechnical information to customize it for the planning area.

4.1.2 Risk Assessment Approach

The risk assessments in this plan describe the risks associated with each hazard of concern identified. The following steps were used to define the risk of each hazard:

- **Identify and profile each hazard**—The following information is given for each hazard:
  - Geographic areas most affected by the hazard
  - Event frequency estimates
  - Severity estimates
  - Warning time likely to be available for response.
- **Determine exposure to each hazard**—Exposure was assessed by overlaying hazard maps with an inventory of structures, facilities, and systems to decide which of them would be exposed to each hazard.
- **Assess the vulnerability of exposed facilities**—Vulnerability of exposed structures and infrastructure was evaluated by interpreting the probability of occurrence of each event and assessing structures, facilities, and systems that are exposed to each hazard. Tools such as GIS and FEMA's hazard-modeling program Hazus were used for this assessment for the earthquake, flood, and hurricane hazards. Outputs similar to those from Hazus were generated for other hazards, using data generated through GIS.

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Earthquake

A probabilistic assessment was conducted for Llano and San Saba Counties for the 100-year and 500-year mean return periods (MRPs) through a Level 2 analysis in Hazus v5.1 to analyze the earthquake hazard and provide a range of loss estimates. The probabilistic method uses information from historic earthquakes and inferred faults, locations, and magnitudes, and computes the probable ground shaking levels that may be experienced during a recurrence period by Census tract.

As noted in the Hazus Earthquake User Manual, "*Although the software offers users the opportunity to prepare comprehensive loss estimates, it should be recognized that uncertainties are inherent in any estimation methodology, even with state-of-the-art techniques. Any region or city studied will have an enormous variety of buildings and facilities of different sizes, shapes, and structural systems that have been constructed over a range of years under diverse seismic design codes. There are a variety of components that contribute to transportation and utility system damage estimations. These components can have differing seismic resistance.*" (FEMA 2020). However, Hazus' potential loss estimates are acceptable for the purposes of this HMP.

Ground shaking is the primary cause of earthquake damage to man-made structures and soft soils amplify ground shaking. One contributor to the site amplification is the velocity at which the rock or soil transmits shear waves (S-waves). The National Earthquake Hazard Reductions Program (NEHRP) has developed five soil classifications defined by their shear-wave velocity that impact the severity of an earthquake. The soil classification system ranges from A to E, where A represents hard rock that reduces ground motions from an earthquake and E represents soft soils that amplify and magnify ground shaking and increase building damage and losses. Class D and E NEHRP soils are the two classes most susceptible to amplified ground motion during an earthquake. If NEHRP data is not available for a project area, Hazus defaults all soil types to Class D. Other default assumptions used in the Hazus model include the following: groundwater was set at a depth of five (5) feet and each mean return period event was set to a magnitude 7.0 earthquake.

Although damages are estimated by Hazus at the census tract level, results were presented at the municipal level. Since there are multiple census tracts that contain more than one jurisdiction, an area analysis was used to extract the percent of each tract that falls within individual jurisdictions. The percentage was multiplied against the results calculated for each tract and summed for each jurisdiction.

Damage estimates are calculated for losses to buildings (structural and non-structural) and contents; structural losses include load carrying components of the structure, and non-structural losses include those to architectural, mechanical, and electrical components of the structure, such as nonbearing walls, veneer and finishes, HVAC systems, boils, etc.

Expansive Soils

Best available data was used to assess Llano County's and San Saba County's vulnerability to expansive soils. To help understand the geographic distribution of expansive soils, USDA's Natural Resources Conservation Service's 2022 soil data for Llano and San Saba County was referenced. Soils with linear extensibility greater than or equal to 6-percent were selected as expansive soils. Asset data (population, building stock, critical facilities, and new development) were used to support an evaluation of assets exposed and potential impacts and losses. To determine what assets are at risk to impacts from expansive soils, the County's assets were overlaid with the hazard area. Assets with their centroid located in the hazard area were totaled to estimate the number of persons, buildings, and facilities at risk to impacts from expansive soils.

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Flood

The 1-percent and 0.2-percent chance flood events were examined to evaluate Llano County's and San Saba County's risk and vulnerability to the flood hazard.

The effective Llano County FEMA Digital Flood Insurance Rate Map (DFIRM) dated January 29, 2021, and 2021 cursory fluvial floodplain data from the Texas Water Development Board was used to evaluate potential future losses caused by the 1-percent and 0.2-percent annual chance flood events. These flood events are generally those considered by planners and evaluated under federal programs such as the NFIP.

The riverine flood risk areas for the 1-percent and 0.2-percent annual chance flood events were published on the FEMA map service center in January 2021. The effective flood data for Llano County was processed into a depth grid using a 2018 USGS 1-meter resolution Digital Elevation Model (DEM).

The FEMA map service center did not have effective DFIRM data available for San Saba County. Therefore, the 2021 cursory floodplain dataset published by the Texas Water Development Board was considered best available data for this HMAP update. The fluvial floodplain depth grid data incorporates Texas Water Development Board LiDAR data and NOAA Atlas 14 rainfall data mapped to a 3-meter resolution and converted into feet. More information about this product can be found here: Overview of Cursory Floodplain Dataset.

These depth grids were integrated into the Hazus v5.1 riverine flood models used to estimate potential losses for the 1-percent annual chance flood event.

A Level 2 Hazus riverine flood analysis was performed. Updated critical facilities were formatted to be compatible with Hazus and its Comprehensive Data Management System (CDMS). Default general building stock data was used from the Hazus model to assess building loss and population displacement. Once updated with the critical facility data, the Hazus riverine flood model was run to estimate potential losses in Llano and San Saba County for the 1-percent annual chance flood event. Hazus calculated the estimated potential losses to the population (default 2010 U.S. Census data), potential damages to the general building stock, and potential damages to critical facility inventories based on the depth grids generated and the default Hazus damage functions in the flood model. Furthermore, building losses, social impacts, and debris were estimated by Hazus at the census block level. These results were presented at the municipal level. Since there are multiple census blocks that contain more than one jurisdiction, an area analysis was used to extract the percent of each jurisdiction within each block. The percentage was multiplied against the results calculated for each block and summed for each municipality.

Hurricane

A Hazus probabilistic analysis was performed to analyze the wind hazard losses for Llano County and San Saba County for the 100-year and 500-year mean return period events. The probabilistic Hazus hurricane model activates a database of thousands of potential storms that have tracks and intensities reflecting the full spectrum of Atlantic hurricanes observed since 1886 and identifies those with tracks associated with the County. Hazus contains data on historic hurricane events and wind speeds. It also includes surface roughness and vegetation (tree coverage) maps for the area. Surface roughness and vegetation data support the modeling of wind force across various types of land surfaces. Default demographic and updated building and critical facility inventories in Hazus were used for the analysis. Although damages are estimated at the census tract level, results were presented at the municipal level. Since there are multiple census tracts that contain more than one jurisdiction,

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a density analysis was used to extract the percent of each jurisdiction within each tract. The percentage was multiplied against the results calculated for each tract and summed for each municipality.

Land Subsidence

Best available data was used to assess Llano and San Saba County's vulnerability to land subsidence. Llano County and San Saba County assessed the land subsidence hazard area using 2017 geologic data created by USGS. Areas of karst carbonate rock were extracted to represent the land subsidence hazard area. Asset data (population, building stock, and critical facilities) were used to support an evaluation of assets at risk to potential impacts and losses associated with this hazard. To determine what assets are at risk to landslide events, available and appropriate GIS data were overlaid with the hazard area.

Landslide

Best available data was used to assess Llano County and San Saba County's vulnerability to landslide events. Llano County and San Saba County assessed the landslide hazard area using the 2018 1-meter digital elevation model (DEM) created by USGS. The 1-meter DEM was used to determine areas where land area is sloping greater than 25-percent grade. Asset data (population, building stock, and critical facilities) were used to support an evaluation of assets at risk to potential impacts and losses associated with this hazard. To determine what assets are at risk to landslide events, available and appropriate GIS data were overlaid with the hazard area.

Wildfire

The 2022 wildfire threat hazard area obtained through Texas A&M Forest Service was referenced to delineate wildfire hazard areas. Wildfire threat was measured by the Texas A&M Forest Service using the Wildland Fire Susceptibility Index (WFSI), which is defined as the likelihood of an acre burning. This data is derived at a 30-meter resolution.

Asset data (population, building stock, critical facilities, and new development) were used to support an evaluation of assets exposed and potential impacts and losses. To determine what assets are at risk to impacts from wildfires, the County's assets were overlaid with the hazard area. Assets with their centroid located within the wildfire hazard areas were totaled to estimate the number of persons, buildings, and facilities at risk to impacts from wildfire events.

All Other Assessed Hazards

No GIS format datasets appropriate for an exposure analysis were identified for the following hazards: dam failure; drought; extreme temperature; pandemic, health, and safety; severe weather; and winter weather.

4.1.3 Sources of Data Used in Hazus Modeling and Exposure Analyses

Llano County and San Saba County assets were identified to assess potential exposure and loss associated with the hazards of concern. For the HMP update, Llano County and San Saba County assessed exposure vulnerability of the following types of assets: population, buildings, and critical facilities/infrastructure. Some assets may be more vulnerable because of their physical characteristics or socioeconomic uses. To protect individual privacy and the security of critical facilities, information on properties assessed is presented in aggregate, without details about specific individual personal or public properties.

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Building and Cost Data

The default general building stock data within Hazus v5.1 was used to assess building exposure and losses for Llano County and San Saba County. The general building stock is analyzed at the aggregate Census Block and Census Tract levels and incorporates 2010 Census data with 2018 RS Means replacement cost values. The occupancy classes available in Hazus were condensed into the categories of residential, commercial, industrial, agricultural, religious, governmental, and educational to facilitate analysis and presentation of results. Residential loss estimates addressed both multi-family and single-family dwellings.

Critical Facilities and Lifelines

The 2023 HMAP critical facility inventory, which includes essential facilities, utilities, government offices, transportation features and user-defined facilities was updated by the Planning Partnership. The update involved a review for accuracy, additions, or deletions of new/moved critical assets, identification of backup power for each asset (if known) and whether the critical facility is considered a lifeline in accordance with FEMA's definition. To protect individual privacy and the security of assets, information is presented in aggregate, without details about specific individual properties or facilities.

Population

Llano County and San Saba County used the total population statistics from the 2020 Decennial Census data and 2016-2020 American Community Survey (ACS) 5-year estimate to estimate the exposure and potential impacts to the County's population in place of the 2010 U.S. Census block estimates. Borough and township populations were extracted directly from the Census Bureau and ACS. Population counts at the jurisdictional level were averaged among the total number of residential properties for each dasymetric Census Block within the County to estimate the population distribution at the aggregate Census Block level. Limitations of these analyses are recognized, and thus the results are used only to provide a general estimate for planning purposes.

As discussed in Section 3.0 (County Profile), research has shown that some populations are at greater risk from hazard events because of decreased resources or physical abilities. Vulnerable populations in Llano County and San Saba County included in the risk assessment are children, elderly, and people living in low-income households.

Hazus Data Inputs

The following hazard datasets were used for the Hazus Level 2 analysis conducted for the risk assessment:

- **Earthquake**—Hazus earthquake probabilistic data were used for the analysis of this hazard.
- **Flood**—The FEMA 2021 effective Digital Flood Insurance Rate Map (DFIRM) 2021 cursory fluvial floodplain data from the Texas Water Development Board was used to delineate the riverine flood hazard areas to estimate potential losses. Using the DFIRM floodplain boundaries and base flood elevation information, and the USGS 1-meter digital elevation model data, flood depth grids were generated and integrated into the Hazus model.
- **Hurricane**—Hazus hurricane probabilistic data were used for the analysis of this hazard.

Other Local Hazard Data

Locally relevant information on hazards was gathered from a variety of sources. Frequency and severity indicators include past events and the expert opinions of geologists, emergency management specialists, and others. Data sources for specific hazards were as follows:

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- **Expansive Soils**—2022 USDA's Natural Resources Conservation Service's soil data for soil types with a linear extensibility >6%
- **Land Subsidence**—2017 USGS geologic data for areas of karst carbonate rock
- **Landslide**—2018 USGS 1-meter digital elevation model (DEM) where slopes >25% grade
- **Wildfire**—2022 Texas A&M Forest Service wildfire threat hazard area

No GIS format datasets appropriate for an exposure analysis were identified for the following hazards: dam failure; drought; extreme temperature; pandemic, health, and safety; severe weather; and winter weather.

Data Source Summary

Table 4.1-1 summarizes the data sources used for the risk assessment for this plan.

Table 4.1-1. Data Source Summary

Data	Source	Date	Format
Population Data	U.S. Census Bureau; American Community Survey 5-Year Estimates	2010/2020; 2016-2020	Digital (GIS) Format; CSV
Building Inventory	Hazus v5.1	2010/2018	Digital (GIS) Format
Critical Facilities	Llano and San Saba County; Hazus v5.1	2022	Digital (GIS) Format
Digitized Effective FIRM Data	FEMA	2021	Digital (GIS) Format
Digital Elevation Model	USGS	2018	Digital (GIS) Format
Fluvial Flood Depth Grids	Texas Water Development Board	2021	Digital (GIS) Format
Expansive Soils	USDA	2022	Digital (GIS) Format
Land Subsidence	USGS	2017	Digital (GIS) Format
Landslide (Steep Slopes)	USGS	2018	Digital (GIS) Format
Wildfire	Texas A&M Forest Service	2022	Digital (GIS) Format

Notes: FEMA – Federal Emergency Management Agency; USDA – United States Department of Agriculture; USGS – United States Geological Survey

4.1.4 Limitations

Loss estimates, exposure assessments, and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from the following:

- Approximations and simplifications necessary to conduct a study
- Incomplete or outdated inventory, demographic, or economic parameter data
- The unique nature, geographic extent, and severity of each hazard
- Mitigation measures already employed
- The amount of advance notice residents has to prepare for a specific hazard event.

These factors can affect loss estimates by a factor of two or more. Therefore, potential exposure and loss estimates are approximate and should be used only to understand relative risk. Over the long term, Llano and San Saba County will collect additional data to assist in estimating potential losses associated with other hazards.

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Section 4 Risk Assessment

4.2 Identification of Hazards of Concern

To provide a strong foundation for mitigation actions considered in Sections 6 (Mitigation Strategy), the Planning Team focused on considering a full range of hazards that could impact the area and then identified and ranked those hazards that presented the greatest concern. The hazard of concern identification process incorporated input from the Planning Team; review of the State of Texas Hazard Mitigation Plan (2019); review of the 2016 Llano County and San Saba County HMAP; research and local, state, and federal information on the frequency, magnitude, and costs associated with the various hazards that have previously, or could feasibly, impact the region; and qualitative or anecdotal information regarding natural (not manmade) hazards and the perceived vulnerability of the study area's assets to them. Table 4.21 documents the process of identifying the natural hazards of concern for further profiling and evaluation. Specific hazards not identified as a hazard of concern for the Planning Area will not be further discussed in detail.

4.2.1 Changes from the 2016 Hazard Mitigation Plan

Since the development of the last plan, hazards and disasters not assessed in the prior plan have occurred in the Planning Area. These hazards were identified by stakeholders as areas to address in the plan. One hazard is new to San Saba but was present in Llano's 2016 plan. A few hazards were renamed, and some were pulled out of combined sections to be stand-alone sections.

- The prior plan did not address Disease Outbreak as a hazard of concern. Beginning in March 2020, the Planning Area was hit with the COVID-19 pandemic along with the rest of the world.
- The prior plan only addressed extreme heat in combination with drought. The update addressed extreme temperatures as its own section which includes extreme cold as well.
- The prior plan addressed Lightning, Hail and Wind as a hazard of concern. The Planning Team agreed to break these hazards into their own sections and include an overarching Severe Weather hazard profile.
- The prior plan addressed Expansive Soils, Earthquake, and Land Subsidence as individual hazards. The Planning Team agreed to break these hazards into their own sections and include an overarching Geological hazard profile.
- The 2023 Llano and San Saba Hazard Mitigation Plan Update includes best available data throughout the plan to present an updated understanding the Planning Area's risk.

4.2.2 Hazard Groupings

As per the 2016 Llano and San Saba HMAPs, the Planning Team maintained the grouping of hazards based on the similarity of hazard events, typical concurrence or impacts, consideration of how hazards have been grouped in FEMA guidance documents (*FEMA 386-2 Understanding Your Risks, Identifying Hazards and Estimating Losses*; *Multi-Hazard Identification and Risk Assessment – The Cornerstone of the National Mitigation Strategy*; *Local Mitigation Planning Handbook*), and consideration of hazard grouping in the State of Texas HMP.

The *Dam Failure* profile addresses dam/levee failures that may impact the Planning Area.

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The *Drought* hazard profile specifically addresses drought events that occurred in the Planning Area.

The *Extreme Temperature* hazard profile specifically addresses periods of extreme heat and cold that occurred in the Planning Area.

The *Flood* hazard includes riverine, flash flooding, and stormwater flooding. Inclusion of the various forms of flooding is consistent with that used in FEMA's *Multi-Hazard Identification and Risk Assessment* guidance.

The *Geologic* profile addresses expansive soils, land subsidence, and earthquakes that may impact the Planning Area.

The *Hurricane and Tropical Storm* profile addresses hurricanes and tropical storms that occurred in or impacted the Planning Area.

The Severe Weather hazard profile addresses lightning, wind events, tornadoes, and thunderstorms.

The *Pandemic/Health and Safety* hazard profile addresses diseases with the potential to impact the Planning Area, including the novel coronavirus (COVID-19), West Nile Virus, and Influenza.

The *Wildfire* profile addresses wildfire events that may impact the Planning Area.

The *Winter Weather* profile includes heavy snow, blizzards, and ice storms. This grouping is consistent with the State of Texas HMP.

Table 4.2-1. Identification of Hazards of Concern for the Planning Area

Hazard	Description
Dam Failure	• The 2018 State of Texas HMP includes dam/levee failure as a hazard of concern for the State. • According to the National Inventory of Dams, there are 40 dams in San Saba County. None of them have hazard classifications. • According to the National Inventory of Dams, there are 10 dams in Llano County. None of them have hazard classifications (Times, n.d.). • There have been no reported dam or levee incidents in the Planning Area. • Dam and levee failure was identified as a hazard of concern for the Planning Area.
Pandemic/Health and Safety	• The Planning Areas have experienced two separate public health events since 2003. These include West Nile Virus and COVID-19. • At the time of this plan's writing, COVID-19 continues to impact public health both locally and globally.
Drought	• Llano and San Saba Counties both had one FEMA drought declaration in 1993. • Both Llano and San Saba Counties have experienced numerous droughts since 2018 according to the NCEI database. • Due to the history of occurrence and the impacts drought can have, drought was identified as a hazard of concern for the Planning Area.
Expansive Soils	• Expansive soils are common throughout Texas because Texas has a lot of soils with clay that have a high swelling potential and move and change depending on water ground level. • There is no FEMA declared disaster, however, expanding soils have led to extensive damages that have destroyed building foundations.

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Hazard	Description
	• Expansive soils was identified as a hazard of concern for the Planning Area and incorporated into the Geological Hazards hazard profile.
Extreme Temperature	• Extreme heat was identified as a hazard of concern in the State of Texas HMP. • Llano and San Saba Counties were identified in a total of three extreme temperature events since 2018. • Llano and San Saba Counties have experienced extreme heat events and will continue to experience them in the future. In addition, the Planning Team identified extreme cold as a hazard of concern. Therefore, extreme heat and cold (extreme temperature) was identified as a hazard of concern for the Planning Area.
Flood	• Riverine flooding was identified as a hazard of concern in the 2018 State of Texas Hazard Mitigation Plan. • 14 flood events have been identified as occurring in the Planning Area since 1954. The flood events have resulted in three FEMA disaster declarations. • Based on the history of events and losses, flooding was identified as a hazard of concern for the Planning Area.
Land Subsidence	• Land Subsidence was identified as a hazard of concern in the 2018 Texas State Hazard Mitigation Plan. • Llano and San Saba Counties were not subject to a land subsidence-related major disaster/emergency declaration • Land Subsidence was identified as a hazard of concern for the Planning Area and incorporated into the Geological Hazards hazard profile.
Hurricane & Tropical Storm	• Hurricanes and tropical storms were identified as a hazard of concern in the 2018 State Hazard Mitigation Plan. • Llano and San Saba Counties was included 3 hurricane-related FEMA major disaster and emergency declarations and have led to flooding recorded by the NCEI database. • Based on history of occurrences and losses, the hazard was identified as a hazard of concern for the Planning Area.
Lightning	• Lightning was identified as a hazard of concern in the 2018 State Hazard Mitigation Plan. • Lightning is a somewhat frequent occurrence in the Planning Area. • The hazard was identified as a hazard on concern for the Planning Area and incorporated into the Severe Weather hazard profile.
Tornado	• The Texas State Hazard Mitigation Plan identified tornadoes as a state hazard of concern. • Llano and San Saba Counties have not been included in any tornado specific-related FEMA disaster declarations. • The hazard was identified as a hazard on concern for the Planning Area and incorporated into the Severe Weather hazard profile.
Wildfire	• The Texas State Hazard Mitigation Plan identified wildfires as a state hazard of concern. • Llano and San Saba have experienced a sufficient number of fires in the planning area; San Saba has experienced 7 FEMA fire declarations, three of which were wildfires and Llano has experienced 3 FEMA fire declarations, one of which was a wildfire. • The wildfire hazard was identified as a hazard of concern for the Planning Area.
Winter Weather	• Winter weather was identified as a hazard of concern in the State Hazard Mitigation Plan. • Two recorded FEMA events have occurred in 2021 that spanned both counties. • The hazard was identified as a hazard of concern for the Planning Area.

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Section 4 Risk Assessment

4.3 Hazard Profiles

4.3.1 Dam Failure

The following section provides the hazard profile and vulnerability assessment for the dam failure hazard in the Planning Area. When referring to the Planning Area, it includes both Llano County and San Saba County.

Hazard Profile

Hazard Description

A dam failure is defined as systematic failure of dam structure resulting in the uncontrolled release of water, often resulting in floods that could exceed the 100-year flood plain boundaries. A dam failure could cause mass fatalities and extensive structural damage if populated and/or industrial areas are located near or downstream of the dam structure.

Dam failure can cause severe downstream flooding, depending on the magnitude of the failure. Other potential secondary hazards of dam failure are landslides around the reservoir perimeter, bank erosion on the rivers, and destruction of downstream habitat.

Dam failure is a collapse or breach in a dam. While most dams have storage volumes small enough that failures have little or no repercussions, dams with large storage amounts can cause significant downstream flooding. Dam failures in the United States typically occur from any one or combination of the following:

- Overtopping of the primary dam structure, which accounts for 34-percent of all dam failures, can occur due to inadequate spillway design, settlement of the dam crest, blockage of spillways, and other factors.
- Foundation defects due to differential settlement, slides, slope instability, uplift pressures, and foundation seepage can also cause dam failure. These account for 30-percent of all dam failures.
- Failure due to piping and seepage accounts for 20-percent of all failures. These are caused by internal erosion due to piping and seepage, erosion along hydraulic structures such as spillways, erosion due to animal burrows, and cracks in the dam structure.
- Failure due to problems with conduits and valves, typically caused by the piping of embankment material into conduits through joints or cracks, constitutes 10-percent of all failures (Llano County 2016).

The remaining 6-percent of U.S. dam failures are due to miscellaneous causes. Many dam failures in the United States have been secondary results from other disasters. The prominent causes are earthquakes, landslides, extreme storms, massive snowmelt, equipment malfunction, structural damage, foundation failures, and sabotage (Llano County 2016).

Poor construction, lack of maintenance and repair, and deficient operational procedures are preventable or correctable by a program of regular inspections. Terrorism and vandalism are serious concerns that all operators of public facilities must plan for; these threats are under continuous review by public safety agencies.

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Location

The majority of dams and lakes in Texas are used for water supply. Dams also provide benefits such as irrigation for agriculture, hydropower, flood control, maintenance of lake levels, and recreation. However, despite the benefits and importance of dams to our public works infrastructure, many safety issues exist for dams as with any complex infrastructure; the most serious threat is dam failure.

There are 12 total dams located in Llano County and 41 total dams located within San Saba County. Four of the dams in Llano County and seven of the dams San Saba County require an EAP (USACE 2022). Table 4.3.1-1 and Table 4.3.1-2 shows the documented dams in Llano County and San Saba County, respectively. There was no data available to identify the hazard ranking of the dams in both Llano and San Saba County based on the information provided.

Table 4.3.1-1. Dams in Llano County and Participating Communities

Name	Ownership Type	Max Storage (Acre-Feet)	Hazard Class	Emergency Action Plan (EAP) Prepared
Barry Dam	Private	60.0	N/A	Not Required
Buchanan Dam	USACE	185,256	N/A	Yes
Freight Development Lake Dam	Private	1,008	N/A	Not Required
Gary Cooper Dam	Private	115.0	N/A	Not Required
Horseshoe Bay West Dam C	Private	31.0	N/A	Yes
Inks Dam	Private	63,500	N/A	Yes
Kingsland Lake Dam	Private	22.0	N/A	Yes
Llano City Lake Dam	Local Government	383.0	N/A	Not Required
Llano Park Dam	Local Government	317.0	N/A	Not Required
Moss Dam 2	Private	128.0	N/A	Not Required
Ratliff Dam	Private	435.0	N/A	Not Required
Slator Ranch Dam 3	Private	126.0	N/A	Not Required

Source: *USACE 2022*
Notes: *N/A* *Not Available*

Table 4.3.1-2. Dams in San Saba County and Participating Communities

Name	Ownership Type	Max Storage (Acre-Feet)	Hazard Class	Emergency Action Plan (EAP) Prepared
Barfield Lake Dam	Private	106.0	N/A	Not Required
Barnett Lake Dam	Private	280	N/A	Not Required
Childress Lake Dam	Private	314.0	N/A	Not Required
Deep Creek Ranch Dam	Private	126.0	N/A	Not Required
Dyer Lake Dam	Private	152.0	N/A	Not Required
Gardner Dam A	Private	113.0	N/A	Not Required
Gardner Pond Dam	Private	94.0	N/A	Not Required
Lake Margery Dam	Private	1,215.0	N/A	Yes

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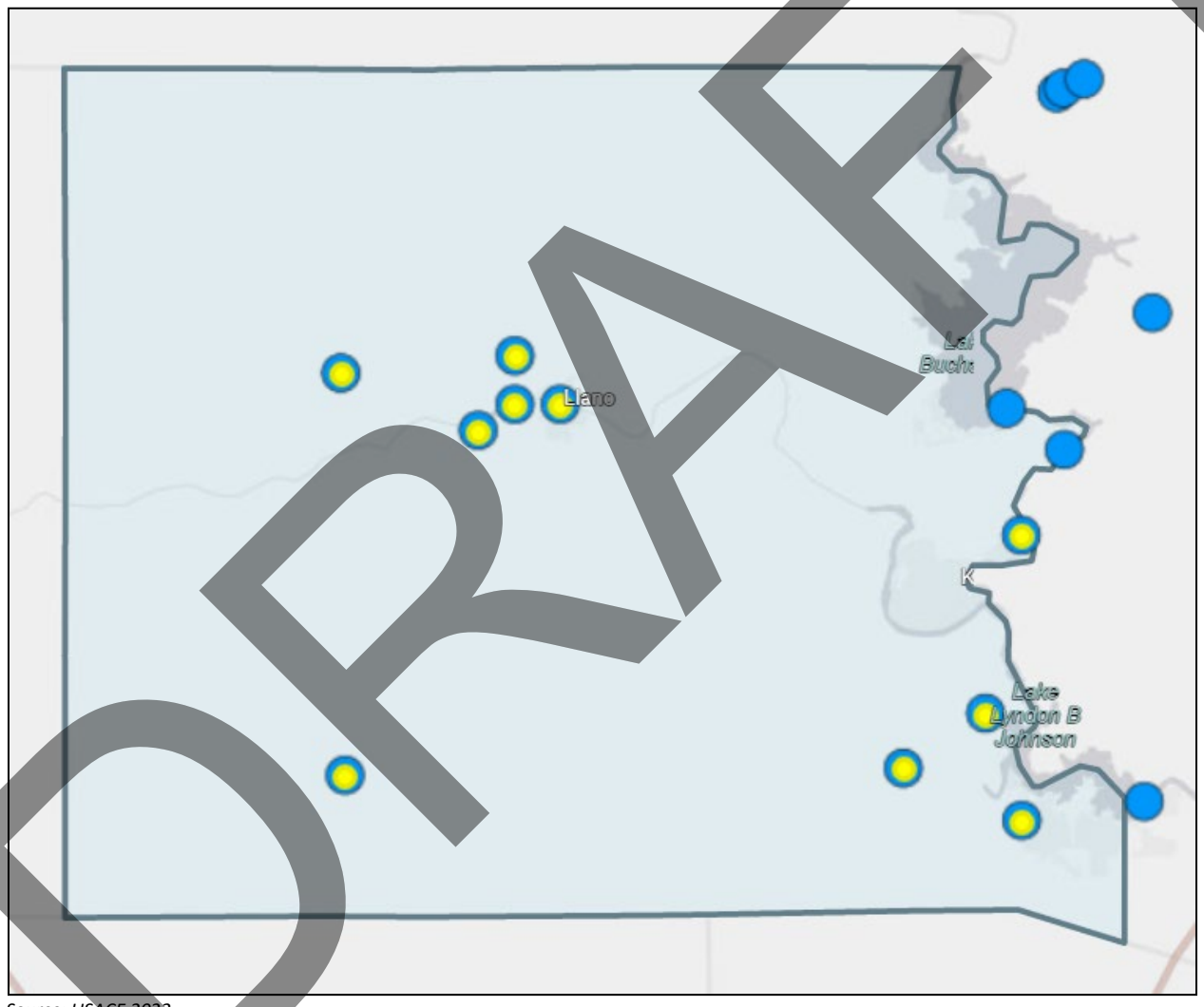
Name	Ownership Type	Max Storage (Acre-Feet)	Hazard Class	Emergency Action Plan (EAP) Prepared
Lower San Saba River WS SCS Site 10 Dam	Local Government	1,300.0	N/A	Not Required
Lower San Saba River WS SCS Site 11 Dam	Local Government	1,793.0	N/A	No
Lower San Saba River WS SCS Site 12 Dam	Local Government	1,242.0	N/A	No
Lower San Saba River WS SCS Site 13a Dam	Local Government	4,269.0	N/A	Yes
Lower San Saba River WS SCS Site 14a Dam	Local Government	4,185.0	N/A	Yes
Lower San Saba River WS SCS Site 15 Dam	Local Government	1,037.0	N/A	Not Required
Lower San Saba River WS SCS Site 16 Dam	Local Government	1,632.0	N/A	Not Required
Lower San Saba River WS SCS Site 2 Dam	Local Government	4,846.0	N/A	Not Required
Lower San Saba River WS SCS Site 3 Dam	Local Government	2,106.0	N/A	Not Required
Lower San Saba River WS SCS Site 4 Dam	Local Government	2,319.0	N/A	Not Required
Lower San Saba River WS SCS Site 5 Dam	Local Government	1,099.0	N/A	Yes
Lower San Saba River WS SCS Site 6 Dam	Local Government	1,107.0	N/A	Not Required
Lower San Saba River WS SCS Site 7 Dam	Local Government	2,392.0	N/A	Not Required
Lower San Saba River WS SCS Site 8 Dam	Local Government	696.0	N/A	Not Required
Lower San Saba River WS SCS Site 9 Dam	Local Government	1,004.0	N/A	Not Required
Mcdaniel Lake Dam	Private	286.0	N/A	Not Required
Mill Pond Dam	Local Government	32.0	N/A	Yes
Miller Dam	Private	384.0	N/A	Not Required
Ratliff Lake Dam	Private	158.0	N/A	Not Required
Se Laterals WS SCS Site 1 Dam	Local Government	1,710.0	N/A	Not Required
Se Laterals WS SCS Site 2 Dam	Local Government	665.0	N/A	Not Required
Se Laterals WS SCS Site 3 Dam	Local Government	647.0	N/A	Yes
Se Laterals WS SCS Site 4 Dam	Local Government	530.0	N/A	Not Required
Se Laterals WS SCS Site 5 Dam	Local Government	562.0	N/A	Not Required
Se Laterals WS SCS Site 6 Dam	Local Government	560.0	N/A	Not Required
Se Laterals WS SCS Site 7 Dam	Local Government	1,051.0	N/A	Not Required
Se Laterals WS SCS Site 8 Dam	Local Government	5,899.0	N/A	Not required
Se Laterals WS SCS Site 9 Dam	Local Government	602.0	N/A	Not Required
Sofge Bates Lake No 1 Dam	Private	212.0	N/A	Not Required

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Name	Ownership Type	Max Storage (Acre-Feet)	Hazard Class	Emergency Action Plan (EAP) Prepared
Sofge Bates Lake No 2 Dam	Private	109.0	N/A	Not Required
Southeast Laterals WS SCS Site 8a-1 Dam	Local Government	2,020.0	N/A	Yes
William Harlow Lake Dam	Private	645	N/A	Not Required
Wilson Lake Dam	Private	378.0	N/A	Not Required

Source: USACE 2022
Notes: N/A Not Available

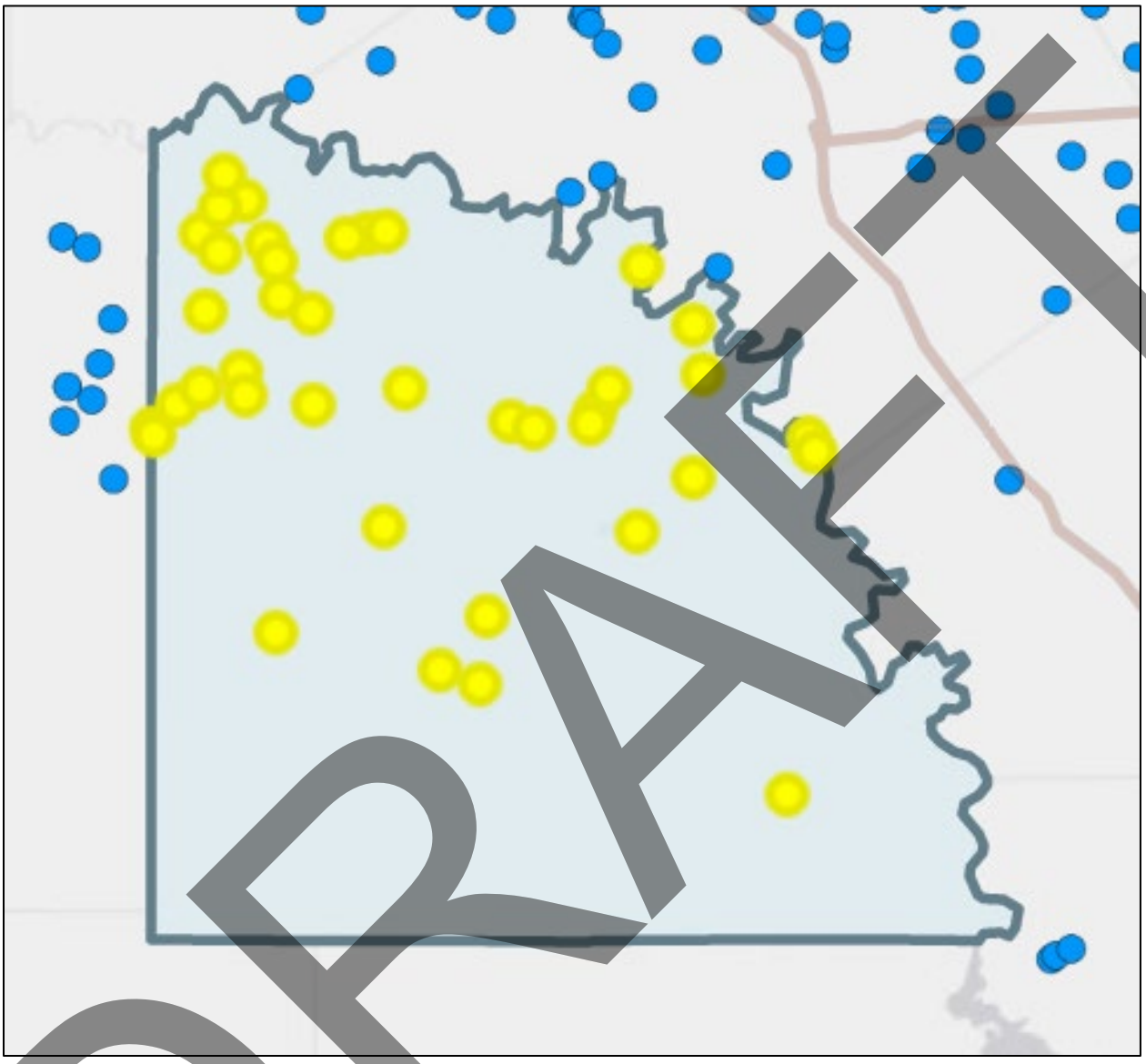
Figure 4.3.1-1. Locations of Dams in Llano County



Source: USACE 2022

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Figure 4.3.1-2. Locations of Dams in San Saba County



Source: USACE 2022

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The areas of the participating communities most likely to be impacted by a dam failure are the Kingsland area through the City of Sunrise Beach Village to Horseshoe Bay and along the Colorado River. Llano County could be impacted by several high-hazard dams that are located outside of the County. If a failure of one of these high-hazard dams occurred, it could result in loss of life. Other high-hazard dams are located outside of the planning area and their drainages enter Llano County either by direct drainage through parts of the County or by inflow into the Colorado River or Llano River upstream from Llano County.

The areas of San Saba County and the City of San Saba most likely to be impacted by a dam failure are the downstream areas of the City of San Saba along the San Saba River and the Richland Springs Creek Community along Richland Springs Creek. San Saba County could be impacted by several high-hazard dams that are located outside of the planning area. If a failure of one of these high-hazard dams occurred, it could result in loss of life. Other high-hazard dams are located outside of the County and their drainages enter San Saba County either by

direct drainage through parts of the County or by inflow into the San Saba River or Richland Springs Creek upstream from McCulloch County. Dams upstream and outside of the planning area that may affect the unincorporated area include Brady Dam and Richards Park Dam. These dams are approximately 25- and 20-miles upstream Brady Creek from San Saba County. Both dams are in McCulloch County. However there have not been any dam breaches immediately upstream of or within the City of San Saba, thus the overall chance of this occurring is minimal, and therefore classified as 'No Exposure'.

Overall, dam failure impacts in Llano County would likely be rare and limited to Llano County and the participating communities.

Extent

The extent or magnitude of a dam failure event can be measured in terms of the classification of the dam. Additionally, there are two factors that influence the potential severity of a full or partial dam failure are: (1) the amount of water impounded; and (2) the density, type, and value of development and infrastructure located downstream (Association of State Dam Safety Officials 2020). The following classification system is used by the USACE for the hazard potential of dams.

- **Low Hazard Potential Dams** are dams where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.
- **Significant Hazard Potential Dams** where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.
- **High Hazard Potential Dams** are dams where failure or mis-operation will probably cause loss of human life (USACE 2022).

Worst-Case Scenario

While the probability of a dam failure is low, a worst-case scenario would be a hurricane or tropical storm that would stall over the Planning Area, causing the dam to breech, impacting areas that are supposed to be protected. If a dam failure were to occur, properties protected by the structure could see standing water and minor injuries, but loss of life is not expected.

Previous Occurrences and Losses

FEMA Disaster Declarations

Between 1954 and 2022, Llano and/or San Saba County were not included in any disaster (DR) or emergency (EM) declarations for dam failure-related events. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 3 (County Profile).

U.S. Department of Agriculture Disaster Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2018 and 2022, Llano and/or San Saba County were included in no dam failure-related agricultural disaster declarations.

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Previous Events

Although the hazard ranking for Llano County is high, the County has not recorded a dam failure of levee failure event in the last 100 years (Llano County 2016). San Saba County has not recorded a dam failure or levee failure in the last 100 years. According to FEMA and USDA, between 2018 and 2022 there have been no recorded dam or levee failure events for Llano County or San Saba County. For events prior to 2018, refer to Appendix I (Supplementary Data).

Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of dam failure events for the County. Information from NOAA-NCEI storm events database, the 2018 State of Texas HMP, the 2016 Llano and San Saba County HMPs were used to identify the number of dam failure events that occurred between 1950 and 2022. Table 4.3.1-3 and Table 4.3.1-4 present the probability of future events for the dam/levee failure in Llano County and San Saba County, respectively.

Table 4.3.1-3. Probability of Future Dam Failure Events, Llano County

Hazard Type	Number of Occurrences Between 2017 and 2022	% Chance of Occurring in Any Given Year
Dam Failure	0	0%
Levee Failure	0	0%
Total	**0**	**0%**

Sources: *NOAA NCEI 2022; State of Texas 2018; Llano County 2016*
Note: *Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all dam failure events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.*

Table 4.3.1-4. Probability of Future Dam Failure Events, San Saba County

Hazard Type	Number of Occurrences Between 2017 and 2022	% Chance of Occurring in Any Given Year
Dam Failure	0	0%
Levee Failure	0	0%
Total	**0**	**0%**

Sources: *NOAA NCEI 2022; State of Texas 2018; San Saba County 2016*
Note: *Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all dam failure events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.*

In Section 4.4, the identified hazards of concern for the Planning Area were ranked (Table 4.4-4 and Table 4.4-5). The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Team, the probability of occurrence for dam failure in the Planning Area is considered 'rare'.

Climate Change Projections

The climate of Texas is changing. Most of the State has warmed between one half and one degree Fahrenheit in the past century. In the eastern two-thirds of the State, rainstorms are more intense, and floods are becoming more severe. In the coming decades, storms are likely to become more severe in Texas (EPA 2016). Periods of extreme precipitation increase the risk of dam failure (Centers for Climate and Energy Solutions n.d.).

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Vulnerability Assessment

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The locations in the Planning Area that are downstream of a dam are vulnerable to the dam failure hazard. The following text evaluates and estimates the potential impact of the dam failure hazard in Llano County and San Saba County as a whole.

Impact on Life, Health, and Safety

The impact of dam failure on life, health, and safety is dependent on several factors such as the class of dam, the area that the dam is protecting, the location of the dam, and the proximity of structures, infrastructure, and critical facilities to the dam structure. The United States Army Corp of Engineers (USACE) classifies dams based on the potential hazard to the downstream area resulting from failure or mis-operation of the dam or facilities. Please refer to Table 4.3.1-5 below.

Table 4.3.1-5. USACE Hazard Potential Classifications for Dams

Hazard Category (a)	Direct Loss of Life (b)	Lifeline Losses (c)	Property Losses (d)	Environmental Losses (e)
Low	None (rural location, no permanent structures for human habitation)	No disruption of services (cosmetic or rapidly repairable damage)	Private agricultural lands, equipment, and isolated buildings	Minimal incremental damage
Significant	Rural location, only transient or day-use facilities	Disruption of essential facilities and access	Major public and private facilities	Major mitigation required
High	Certain (one or more) extensive residential, commercial, or industrial development	Disruption of essential facilities and access	Extensive public and private facilities	Extensive mitigation cost or impossible to mitigate

Sources: *FEMA 2004*

Notes:
a. Categories are assigned to overall projects, not individual structures at a project.
b. Loss-of-life potential is based on inundation mapping of area downstream of the project. Analyses of loss-of-life potential should take into account the population at risk, time of flood wave travel, and warning time.
c. Lifeline losses include indirect threats to life caused by the interruption of lifeline services from project failure or operational disruption; for example, loss of critical medical facilities or access to them.
d. Property losses include damage to project facilities and downstream property and indirect impact from loss of project services, such as impact from loss of a dam and navigation pool, or impact from loss of water or power supply.
e. Environmental impact downstream caused by the incremental flood wave produced by the project failure, beyond what would normally be expected for the magnitude flood event under which the failure occurs.

Dam failure impacts depend on several factors including severity of the event and whether or not adequate warning time is provided to residents. The population living in or near the inundation areas are considered exposed to the hazard. However, exposure should not be limited only to those who reside within a defined hazard zone, but everyone who may be affected by a hazard event (e.g., people are at risk while traveling in flooded areas, or their access to emergency services is compromised during an event); the degree of that impact varies and is not strictly measurable.

Vulnerable populations are all populations downstream from dam failures that are incapable of escaping the area within the allowable time frame. This population includes the elderly, young and individuals with disabilities,

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access or functional needs who may be unable to get themselves out of the inundation area. The vulnerable population also includes individuals who would not have adequate warning from the emergency warning system (e.g., television or radio); this would include residents and visitors. The population adversely affected by a dam failure may also include those beyond the disaster area that rely on the dam for providing potable water.

Floods created from a dam failure and their aftermath present numerous threats to public health and safety including exposure to unsafe food, contaminated drinking and washing water, mosquitoes, animals, mold, and mildew. For more detailed descriptions of these and additional threats to public health and safety, refer to Section 4.3.5 (Flood). Current loss estimation models such as Hazus are not equipped to measure public health impacts such as these. The best preparation for these effects includes awareness that they can occur, education of the public on prevention, and planning to deal with them during responses to dam failure events.

Impact on General Building Stock

Vulnerable properties are those within the dam failure inundation area. These properties would experience the largest, most destructive surge of water. Transportation routes are vulnerable to dam inundation and have the potential to be wiped out, creating isolation issues. This includes all roads, railroads, and bridges in the path of the dam inundation. Those that are most vulnerable are those that are already in poor condition and would not be able to withstand a large water surge. Utilities such as overhead power lines, cable and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

Impact on Critical Facilities

Transportation routes are vulnerable to dam inundation and have the potential to be wiped out, creating isolation issues and significant disruption to travel, including all roads, railroads, and bridges in areas in and around the dam. Those that are most vulnerable are those that are already in poor condition and would not be able to withstand a large water surge. Utilities such as overhead power lines, cable and phone lines in the inundation zone could also be vulnerable. If phone lines were lost, significant communication issues may occur in the planning area due to limited cell phone reception in many areas. In addition, emergency response would be hindered due to the loss of transportation routes as well as some protective-function facilities located in the inundation zone. Recovery time to restore many critical functions after an event may be lengthy, as wastewater, potable water, and other community facilities are located in the dam inundation zone.

Impact on Economy

Severe flooding that follows an event like a dam failure can cause extensive structural damage and withhold essential services. The cost to recover from flood damages after a surge will vary depending on the hazard risk of each dam. Severe flooding that follows an event like a dam failure can cause extensive damage to public utilities and disruptions to delivery of services. Loss of power and communications may occur and drinking water and wastewater treatment facilities can become temporarily out of operation. Debris from surrounding buildings can accumulate should the dam mimic major flood events, such as the 1-percent annual chance flood event that is discussed in Section 4.3.5 (Flood).

Dam failure events can significantly impact the local and regional economy. Similar to flooding, losses include, but are not limited to, damages to buildings and infrastructure, agricultural losses, business interruption and impacts on tax base. Loss of power and communications may occur and drinking water and wastewater treatment facilities may be temporarily out of operation.

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Impact on the Environment

The environmental impacts of a dam failure can include significant water-quality and debris-disposal issues or severe erosion that can impact local ecosystems. Flood waters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooded waterway. The contents of unsecured containers of oil, fertilizers, pesticides, and other chemicals may get added to flood waters. Hazardous materials may be released and distributed widely across the floodplain. Water supply and wastewater treatment facilities could be offline for weeks. After the flood waters subside, contaminated and flood-damaged building materials and contents must be properly disposed of. Contaminated sediment must be removed from buildings, yards, and properties.

Future Changes That May Impact Vulnerability

Understanding future changes that effect vulnerability in the Planning Area can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The Planning Area considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

Any areas of growth in Llano County and San Saba County could be potentially impacted by the dam failure hazard because these areas are exposed and vulnerable. Areas downstream of dams are the most vulnerable to losses; therefore, any development in these areas will be more susceptible to dam failure impacts.

Projected Changes in Population

Llano County has experienced an increase in population between the 2010 Census (19,301) and the 2020 Census population of 21,243. The population of the County is expected to increase over the next few years. San Saba County experienced a decrease in population between the 2010 Census (6,131) and the 2020 Census population of 5,730. The Texas Demographic Center has produced population estimates for the region that were last updated in 2018 based on 2010 Census data. The estimates show a slight projected decline for Llano County between 0.14 and 0.25 percent every five years from 2025 to 2035, followed by a projected growth between 0.68 and 3.3 percent every five years from 2035 to 2050. The estimates show projected decline for San Saba County between 1.51 and 4.3 percent every five years from 2025 to 2050 (Texas Demographic Center n.d.).

Increases in population in dam failure inundation areas will result in increased risk to life to the dam failure hazard.

Climate Change

An increasing average annual temperature will directly impact the atmospheric moisture potential. The probability of expanding atmospheric moisture leads to an increasing amount of rainfall during storm events. The increased potential volume of rainfall will directly lead to an increasing pressure placed on levee systems during future riverine flood events (State of Texas HMP 2018).

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Change of Vulnerability Since 2016 HMP

Overall, Llano County and San Saba County's vulnerability has not changed. Each county will continue to be exposed and vulnerable to dam failure events, especially those located within or near downstream inundation zones. Because of the sensitive nature of the dam failure inundation zones, potential losses have not been quantified and presented in this plan. To estimate potential losses to population, buildings, critical facilities and infrastructure, inundation areas and depths of flooding may be used to generate depth grids. Hazus may be used to estimate potential losses for Llano County and San Saba County and participating municipalities in future HMP updates.

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Section 4 Risk Assessment

4.3 Hazard Profiles

4.3.2 Drought

The following section provides the hazard profile and vulnerability assessment for the drought hazard in the Planning Area. When referring to the Planning Area, it includes both Llano County and San Saba County.

Hazard Profile

Hazard Description

Drought is the consequence of a natural reduction in the amount of precipitation expected for a given area or region over an extended period of time, usually a season or more in length. Drought can occur anywhere in the state of Texas.

Drought is a normal phase in the climatic cycle of most geographical areas. According to the National Drought Mitigation Center, drought originates from a deficiency of precipitation over an extended period, usually a season or more. This results in a water shortage for some activity, group, or environmental sector. Drought is the result of a significant decrease in water supply relative to what is "normal" in a given location. Unlike most disasters, drought normally occur slowly but last a long time. There are four generally accepted operational definitions of drought:

- **Meteorological drought** is an expression of precipitation's departure from normal over some period of time. Meteorological measurements are the first indicators of drought. Definitions are usually region-specific and based on an understanding of regional climatology. A definition of drought developed in one part of the world may not apply to another, given the wide range of meteorological definitions.
- **Agricultural drought** occurs when there is not enough soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought happens after meteorological drought but before hydrological drought. Agriculture is usually the first economic sector to be affected by drought.
- **Hydrological drought** refers to deficiencies in surface and subsurface water supplies. It is measured as stream flow and as lake, reservoir, and groundwater levels. There is a time lag between lack of rain and the volume of water in streams, rivers, lakes, and reservoirs, so hydrological measurements are not the earliest indicators of drought. After precipitation has been reduced or deficient over an extended period of time, this shortage is reflected in declining surface and subsurface water levels. Water supply is controlled not only by precipitation, but also by other factors, including evaporation (which is increased by higher-than-normal heat and winds), transpiration (the use of water by plants), and human use.
- **Socioeconomic drought** occurs when a physical water shortage starts to affect people, individually and collectively. Most socioeconomic definitions of drought associate it with the supply and demand of an economic good.

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Location

A drought occurs on a regional scale; therefore, the entire Planning Area is vulnerable and at risk. Droughts can occur at any time and have the potential to directly or indirectly impact every person in the Planning Area, as well as the local economy.

Extent

The severity of a drought depends on the degree of moisture deficiency, the duration of the event, and the size and location of the affected area. The longer the duration of the drought and the larger the area impacted, the more severe the potential (University of Nevada, Reno Extension College of Agriculture, Biotechnology & Natural Resources n.d.).

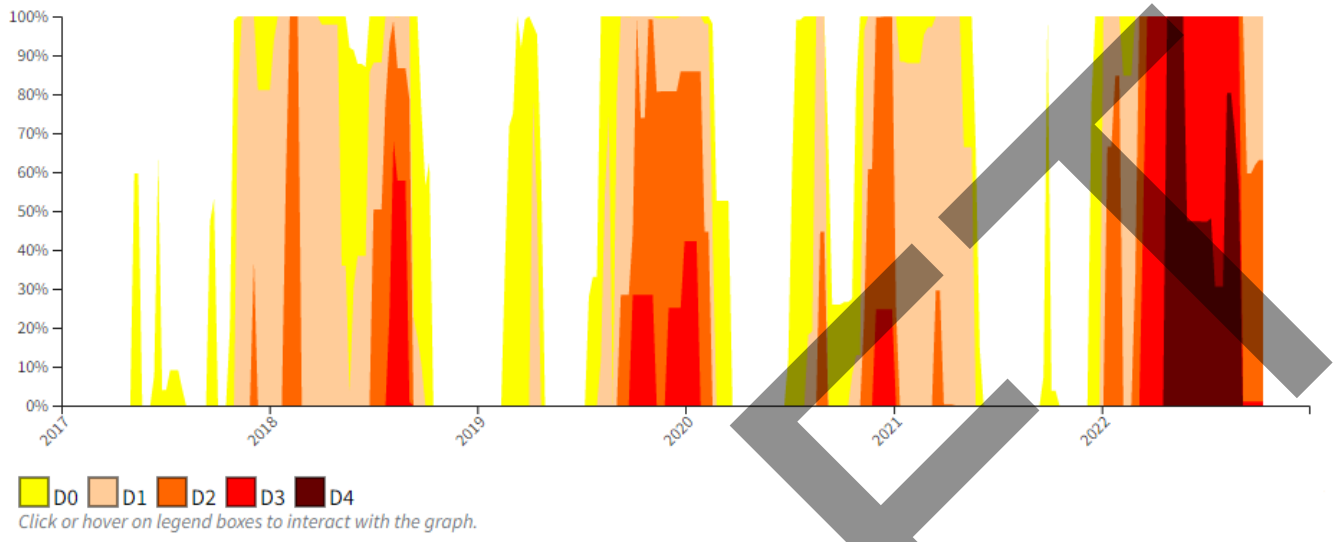
The following description of drought measures comes from a NOAA's National Integrated Drought Information System. It explains the measures of drought from the United States Drought Monitor (USDM) from 2017 to 2022 for Llano County and San Saba County's, shown in the graphic below.

The USDM's drought intensity scale is composed of five different levels:

- D0, abnormally dry, corresponds to an area experiencing short-term dryness that is typical with the onset of drought. This type of dryness can slow crop growth and elevate fire risk to above average. This level also refers to areas coming out of drought, which have lingering water deficits and pastures or crops that have not fully recovered.
- D1, moderate drought, corresponds to an area where damage to crops and pastures can be expected and where fire risk is high, while stream, reservoir, or well levels are low.
- D2, severe drought, corresponds to an area where crop or pasture losses are likely, fire risk is very high, water shortages are common, and water restrictions are typically voluntary or mandated.
- D3, extreme drought, corresponds to an area where major crop and pasture losses are common, fire risk is extreme, and widespread water shortages can be expected requiring usage restrictions.
- D4, exceptional drought, corresponds to an area experiencing extraordinary and widespread crop and pasture losses, fire risk, and water shortages that result in water emergencies (NOAA 2022).

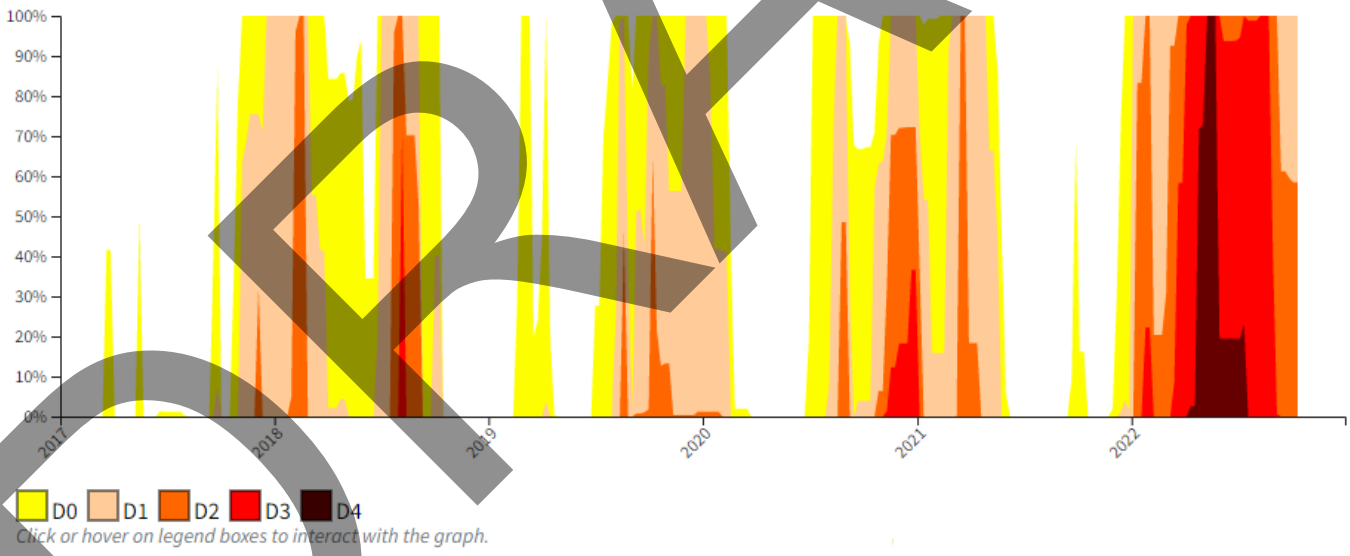
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Figure 4.3.2-1. Historical Drought Conditions for Llano County



Source: NOAA 2022

Figure 4.3.2-2. Historical Drought Conditions for San Saba County



Source: NOAA 2022

Worst-Case Scenario

A multi-year drought with a Palmer Drought Category of D4 (exceptional drought) that impacts the Planning Area is the worst-case scenario for the Planning Area. If another severe drought occurs before these systems have a chance to recover, it could exacerbate the stress already placed on existing Planning Area water resources. Severe droughts can also lead to crop and livestock losses, impacting the food supply and economy.

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Previous Occurrences and Losses

FEMA Disaster Declarations

Between 1954 and 2022, Llano County was not included in any disaster (DR) or emergency (EM) declarations for drought-related events. San Saba County was included in one drought-related EM declaration. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 3 (County Profile).

U.S. Department of Agriculture Disaster Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2017 and 2022, Llano and/or San Saba County were included in 10 drought-related agricultural disaster declarations. These declarations are identified in Table 4.3.2-1.

Previous Events

For this 2023 HMP update, known drought events that impacted the Planning Area between 2017 and 2022 are discussed below. For events prior to 2017, refer to Appendix I (Supplementary Data).

Table 4.3.2-1. Drought Events in the Planning Area (2017 to 2022)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
January 30, 2018 – January 31, 2018	Drought	N/A	N/A	After several months with less than normal rainfall Burnet and Llano Counties fell into severe drought (Stage D2) during January. Both counties enacted outdoor burn bans. Lake Buchanan, on the border between the two counties, was 4.6 feet below conservation pool level at the end of the month. No property or crop damages were reported.
February 1, 2018 – February 27, 2018	Drought	N/A	N/A	A heavy rain event on the 20-21 dropped one to four inches of rain over Llano and Burnet Counties and this was enough to move them out of severe drought category. No property or crop damages were reported.
June 1, 2018 – June 30, 2018	Drought	N/A	N/A	Most of the Hill Country and Rio Grande Plains region received less than 25% of normal precipitation during the month of June. Drought conditions worsened across South Central Texas with Kinney and Maverick Counties entering exceptional drought category (Stage D4), Dimmit, Uvalde, Real, Val Verde, and Zavala moving into extreme category (D3), and Bandera, Comal, Edwards, Frio, Gillespie, Kendall, Kerr, and Llano in severe category (D2). Of these counties Dimmit, Edwards, Frio, Gillespie, Kerr, Kinney, Llano, Maverick, Val Verde, and Zavala had outdoor burn bans in effect at the end of the month. The main effects of the drought conditions were hydrological. The seven-day

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
				stream flow averages for the Rio Grande, Pecos, Nueces, Guadalupe, and Colorado Rivers were below normal (10-24%) at the end of the month. Lake Amistad was 32.9 feet below Conservation Pool level, Medina Lake was 24.9 feet below, Canyon Lake was 5.1 feet below, and Lake Buchanan was 6.2 below. The Edwards Aquifer was 5.1 feet below average and 3.0 feet below the 2017 level. Fredericksburg was in Stage 3 water restrictions, New Braunfels was in Stage 2, and Uvalde was in Stage 1. No property or crop damages were reported.
June 19, 2018	Drought	USDA S4380	Llano, San Saba	Drought
July 1, 2018 – July 31, 2018	Drought	N/A	N/A	July was a mixed bag as far as the drought was concerned. Parts of South-Central Texas had enough rain to improve a category while several others received little rain and the drought worsened. Kinney (Extreme D3), Maverick (D3), and Val Verde (Severe D2) Counties saw improvement while Gillespie (D3), Llano (D3), Blanco (D2), and Burnet (D2) got worse. Dimmit County remained in Extreme (D3) and Edwards and Kerr Counties remained in Severe (D2). Fire danger at the end of the month was moderate. All the counties in D2 or worse drought had outdoor burn bans in effect. The seven-day stream flow averages for the Pecos, Frio, Upper Guadalupe, and the Upper Colorado Rivers were much below normal (< 10%). The Rio Grande, Devils, and Nueces basins were below normal (10-24%). Lake Amistad was 35.2 feet below Conservation Pool elevation and Lake Buchanan was 8.5 feet below. The Edwards Aquifer was 16.1 feet below normal and 17.6 feet below the 2017 level. Llano was in Stage 5 water restrictions, Fredericksburg was in Stage 3, and Uvalde and Kerrville were in Stage 1. No property or crop damages were reported.
July 31, 2018	Drought	USDA S4375	Llano, San Saba	Drought
August 1, 2018 – August 31, 2018	Drought	N/A	N/A	A large part of South-Central Texas received 50% or less of normal rain in August. This led to worsening drought conditions in Maverick (Exceptional D4), Zavala (D4), Caldwell (Severe D2), Comal (D2), Guadalupe (D2), Hays (D2), Kendall (D2), Real (D2), and Williamson (D2) Counties. Gillespie, Kinney, Llano, and Uvalde Counties remained in Extreme (D3) drought and Blanco, Burnet, Edwards, Kerr, and Val Verde were still in D2. Dimmit (D2) County saw some improvement. Fire danger at the end of

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
				the month was moderate. All the counties in D2 or worse drought had outdoor burn bans in effect. The seven-day stream flow averages for the Pecos, Frio, Upper Guadalupe, and the Upper Colorado Rivers were much below normal (< 10%). The Rio Grande, Devils, and Nueces basins were below normal (10-24%). Llano was in Stage 5 water restrictions, Fredericksburg was in Stage 3, and Uvalde and Kerrville were in Stage 1. No property or crop damages were reported.
September 1, 2018 – September 11, 2018	Drought	N/A	N/A	After a month of record setting rain in some places and nearly all of South-Central Texas receiving at least 150% of normal all of our counties were in less than Severe (D2) drought at the end of the month. Severe category drought ended in Blanco, Burnet, Caldwell, Comal, Dimmit, Edwards, Gillespie, Guadalupe, Hays, Kendall, Kerr, Kinney, Llano, Maverick, Real, Uvalde, Val Verde, Williamson, and Zavala Counties. No property or crop damages were reported.
September 1, 2019 – September 30, 2019	Drought	N/A	N/A	Most of South-Central Texas received less than 50% of normal precipitation during July, August, and September, and a large part of the region had less than 25%. This resulted in drought conditions setting in. Atascosa, Bexar, De Witt, Gonzales, Guadalupe, Hays, Karnes, Kendall, Lee, Medina, Travis, Uvalde, and Val Verde Counties went into Severe (D2) drought. Comal, Frio, Kinney, Llano, Maverick, Williamson, and Wilson Counties went into Extreme (D3) drought. Zavala County remained in D2 and Dimmit County in D3. Stage 2 water restrictions were instituted in parts of Guadalupe and Hays Counties. Stage 1 restrictions were in place in Atascosa, Bexar, Comal, Karnes, Kendall, Llano, Medina, Travis, Uvalde, and Williamson Counties and voluntary restrictions were encouraged in Bastrop, Dimmit, Gonzales, Lee, Val Verde, Wilson, and Zavala. Burn bans were in place in all the affected counties except Williamson and Uvalde. Texas A&M Agrilife reported rangelands were dry with very short soil moisture levels. Livestock were in fair condition and supplemental feeding continued. Lake Amistad was 32.2 feet below Conservation Pool Level. No property or crop damages were reported.
September 10, 2019	Drought	USDA S4577	Llano, San Saba	Drought
September 24, 2019	Drought	USDA S4543	Llano	Drought

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
October 1, 2019	Drought	USDA S4552	Llano, San Saba	Drought
October 1, 2019 – October 31, 2019	Drought	N/A	N/A	Nearly all of South-Central Texas had less than normal rainfall during October. Much of the northwestern part of the area had less than 50% of normal. This put Bandera, Bastrop, Blanco, Burnet, Caldwell, Edwards, Fayette, Lavaca, and Real Counties into Severe Drought (D2) and Uvalde and Zavala Counties into Extreme Drought (D3). De Witt, Gonzales, Guadalupe, Hays, Karnes, Kendall, Lee, Travis, and Val Verde remained in D2 and Kinney, Llano, and Maverick in D3. There was enough rain in Comal, Dimmit, Frio, Williamson, and Wilson Counties to improve conditions from D3 to D2. Burn bans were in effect for all of the counties in D2 or worse drought except Uvalde, Comal, Guadalupe, Gonzales, De Witt, Lavaca, Williamson, Bastrop, Lee, and Burnet. Lake Amistad was at 50% of conservation storage and Lake Georgetown was at 65%. The Llano, Pedernales, Upper Colorado, San Gabriel, Nueces, Frio, and Navidad Rivers had below normal streamflow and the Atascosa River had a new record low streamflow. Larger Public Water Systems in Bandera, Bastrop, Blanco, Burnet, Caldwell, Comal, Dimmit, Fayette, Gonzales, Hays, Karnes, Kendall, Llano, Travis, Uvalde, Val Verde, Williamson, Wilson, and Zavala Counties were in Voluntary or Stage 1 water restrictions. Systems in Guadalupe and Real Counties were in Stage 2 and some smaller Public Water Systems across the region were in Stage 2 or Stage 3. The Texas A&M AgriLife Texas Crop and Weather Report stated Ranchers around the district were still culling herds due to drought conditions despite some improvement. Cattle market prices were low due to the high numbers of livestock for sale. The district in this case includes Maverick, Zavala, Dimmit, and Frio Counties. No property or crop damages were reported.
October 8, 2019	Drought	USDA S4596	Llano	Drought
November 1, 2019	Drought	USDA S4654	Llano, San Saba	Drought
November 1, 2019 – November 30, 2019	Drought	N/A	N/A	Most of South-Central Texas received only 50% or less of normal precipitation during November and drought conditions remained unchanged across much of the northern and western parts of the region. Kinney, Llano, Uvalde, and Zavala Counties stayed in Extreme Drought (D3) and Bandera, Blanco, Burnet, Karnes, Kendall, Real,

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
				and Val Verde Counties stayed in Severe Drought (D2) conditions. There was enough rain in Maverick County to improve conditions from D3 to D2. Larger public water systems in Real County were in Stage 2 water restrictions. In Bandera, Blanco, Burnet, Karnes, Kendall, and Llano there were Stage 1 restrictions and in Val Verde and Zavala there were voluntary restrictions. Area reservoirs were beginning to drop with the most significant impact at Lake Amistad which was 31.1 feet below Conservation Pool level. Of the counties in D2 or worse drought Blanco, Karnes, Kendall, Kinney, Maverick, Real, Val Verde, and Zavala had burn bans if effect. The Texas A&M Agrilife Texas Crop and Weather Report pointed out that livestock were in fair condition and producers continued with supplemental feeding. No property or crop damages were reported.
December 1, 2019 – December 31, 2019	Drought	N/A	N/A	December was another dry month with nearly all of South-Central Texas seeing 50% or less of normal precipitation. Most of Kinney, Maverick, Uvalde, Zavala, and Dimmit Counties had 10% or less of normal. With this lack of rain, the drought status was unchanged across the region. Kinney, Llano, Uvalde, and Zavala Counties remained in Extreme Drought (D3) and Bandera, Blanco, Burnet, Karnes, Kendall, Maverick, Real, and Val Verde Counties stayed in Severe Drought (D2). Larger public water systems in Real County were in Stage 2 water restrictions. In Bandera, Blanco, Burnet, Karnes, Kendall, and Llano there were Stage 1 restrictions and in Val Verde and Zavala there were voluntary restrictions. Area reservoirs were beginning to drop with the most significant impact at Lake Amistad which was 31.1 feet below Conservation Pool level. Of the counties in D2 or worse drought Karnes, Kendall, Kinney, Maverick, Real, Uvalde, Val Verde, and Zavala had burn bans if effect. No property or crop damages were reported.
January 1, 2020 – January 31, 2020	Drought	N/A	N/A	There were three precipitation regimes over South Central Texas in January. The area east of Hwy 281 received between 75% and 125% of normal. The area west of Hwy 281 and north of Hwy 90 received between 125% and 300% or normal. The area west of Hwy 281 and south of Hwy 90 received less than 50%. This led to some improvement and some worsening of drought conditions. Maverick County went from Severe (D2) Drought to Extreme (D3) Drought. Atascosa, Caldwell, Comal, De Witt, Dimmit, Frio, Gonzales, Guadalupe, Hays, Williamson, and

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
				Wilson Counties moved from no drought to Severe (D2). Kinney, Llano, and Uvalde Counties improved from D3 to D2. Zavala stayed in D3, and Blanco, Burnet, Karnes, and Val Verde stayed in D2. Of the counties in D2 or worse drought Atascosa, Dimmit, Frio, Karnes, Kinney, Maverick, Uvalde, Val Verde, and Zavala had burn bans in place. Larger public water systems in Blanco, Burnet, Karnes, and Llano Counties were in Stage 1 water restrictions and in Val Verde and Zavala there were voluntary restrictions. No property or crop damages were reported.
February 1, 2020 – February 18, 2020	Drought	N/A	N/A	The northern half of South-Central Texas had above normal precipitation during February. Parts of this region received 125% to 200% of normal. This led to Blanco, Burnet, Comal, Hays, Llano, and Williamson Counties improving to better than Severe (D2) drought category. No property or crop damages were reported.
August 1, 2020 – August 31, 2020	Drought	N/A	N/A	The U.S. Drought Monitor placed a large portion of West Central Texas in a Severe Drought for the month of August. A period of very hot temperatures and below normal rainfall amounts led to a flash drought across a large part of West Central Texas. These hot temperatures resulted in numerous grass fires. According to the Texas Crop Report, dryland cotton across the northern Edwards Plateau and northwest Hill Country continued to show signs of stress where moisture had been inadequate. Also, some ranchers, in this region, had to provide supplemental feed to their livestock because of the lack of grasses. The U.S. Drought Monitor placed a portion of San Saba County into the severe drought category. No property or crop damages were reported.
November 1, 2020	Drought	USDA S4924	Llano, San Saba	Drought
November 1, 2020 – November 20, 2020	Drought	N/A	N/A	November was another month of mostly below normal rainfall across South Central Texas. Most of the northern half of the area had less than 50% of normal with some places in the northwest having less than 10%. In most of our counties the drought worsened during the month. Bandera, Comal, Gillespie, Kendall, and Kerr Counties entered Extreme (D3) Drought. Bastrop, Bexar, Blanco, Burnet, Caldwell, Edwards, Guadalupe, Hays, Kinney, Lee, Llano, Real, Travis, Val Verde, and Williamson ended the month in Severe (D2) Drought. Uvalde and Zavala remained in D3, and Dimmit, Frio, and Maverick stayed in D2. Medina County with near normal rain actually

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
				improved from D3 to D2. Public water systems across the region had instituted some level of water restrictions. The Pecos, Frio, Nueces, Medina, and lower Guadalupe river basins reported much below normal seven-day stream flows at the end of the month. The upper and middle Guadalupe, San Antonio, Blanco, San Marcos. Brazos, and Colorado river basins reported below normal seven-day flows. Reservoirs in the drought areas were below normal with Lake Amistad 44 feet below normal. All of the counties in D2 or worse drought had outdoor burn bans in effect except Burnet, Kerr, and Bastrop. No property or crop damages were reported.
November 1, 2020 – November 20, 2020	Drought	N/A	N/A	The month of November featured an extended period of dry weather, above normal temperatures and well below normal rainfall. According to the U.S. Drought Monitor, the drought became severe over a large part of West Central Texas by the middle of November, especially south of Interstate 20. The drought was exceptional in portions of McCulloch and Mason Counties. According to the Agrlife Texas Crop and Weather Report, the area from Barnhart to San Saba and north across I20, needed moisture. Wheat and oat fields were progressing slowly. Stock tank levels remained very low. Cotton harvest continued with below average yields reported. Pecan harvest was mixed with some reporting low yields and others reporting fair to good yields. Feeder cattle prices were mostly steady at local auctions with steer prices up $10-15 per hundredweight. South of Barnhart to San Saba across I10, Trace amounts of rain were reported, but more rain was needed. Spring wheat planting began with oats and rye coming along nicely. Livestock conditions were good with supplemental feeding. Wildlife were in fair condition. U.S. Drought Monitor placed a large part of San Saba County in a severe drought category by November 17. The extreme southwest part of the county was in an exceptional drought. No property or crop damages were reported.
December 1, 2020 – December 31, 2020	Drought	N/A	N/A	The drought continued over most of South-Central Texas in December. Most of the area had less than normal precipitation during the month. Drought conditions worsened from Severe (D2) to Extreme (D3) in Caldwell, Guadalupe, Kinney, Val Verde, and Williamson Counties and from Moderate (D1) to D2 in Fayette County. Bandera, Comal, Gillespie, Kendall, Kerr, Uvalde, and Zavala Counties remained in D3 and Bastrop, Bexar, Blanco,

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
				Burnet, Dimmit, Edwards, Frio, Hays, Lee, Llano, Maverick, Medina, Real, and Travis remained in D2. Large public water systems in Austin, Del Rio, Fredericksburg, Kerrville, New Braunfels, San Antonio, San Marcos, and Uvalde had some level of water restrictions. Most area reservoirs were below Conservation Pool level. Lake Amistad was 43.3 feet below, Medina Lake 32.2 feet, and Lake Travis 21.8 feet. Outdoor burn bans were in effect in Bandera, Bexar, Dimmit, Edwards, Frio, Kendall, Kinney, Maverick, Medina, Real, Val Verde, and Zavala Counties. No property or crop damages were reported.
December 01, 2020 – December 31, 2020	Drought	N/A	N/A	Lack of rainfall has caused the drought to continue to expand and worsen in December. According to the Texas Ag Report from Agrilife, small-grain growth slowed due to drought, and insect pests increased. Livestock looked fair to poor due to the lack of grazing. Supplemental feeding of livestock increased. U.S. Drought monitor placed San Saba County in severe drought across the extreme western part of the county and severe drought in the middle part of the county. No property or crop damages were reported.
December 22, 2020	Drought	USDA S4902	San Saba	Drought
January 1, 2021 – January 31, 2021	Drought	N/A	N/A	Most of South-Central Texas received enough rain to bring drought relief in January. Bastrop, Blanco, Burnet, Caldwell, Edwards, Fayette, Gillespie, Guadalupe, Hays, Kendall, Kerr, Kinney, Lee, Llano, Maverick, Real, Travis, Val Verde, and Williamson Counties all improved to better than Severe (D2) Drought. No property or crop damages were reported.
November 01, 2021	Drought	USDA S5158	Llano, San Saba	Drought
January01, 2022 – January 31, 2022	Drought	N/A	N/A	Most of west central Texas experienced an intensifying drought during January. The US Drought Monitor indicated severe to extreme drought conditions across San Saba County during January. No property or crop damages were reported.
January 1, 2022 – January 31, 2022	Drought	N/A	N/A	Most of the western half of South-Central Texas received less than 25% of normal precipitation during January and the north central part of the area had less than 75% of normal. The lack of rainfall led to Severe (D2) Drought conditions developing in Atascosa, Bandera, Blanco, Burnet, Frio, Gillespie, Kendall, Kerr, Kinney, Llano, Medina, Real, Uvalde, and Zavala Counties. Dimmit County

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
				worsened from Severe to Extreme (D3) and Edwards, Maverick, and Val Verde remained in D2. At the end of the month, the seven-day streamflow for rivers in the region were below to much below normal. The Edwards Aquifer was 4.6 feet below normal. Area reservoirs were below normal. Lake Amistad was 48 feet below normal, and Medina Lake was 47.3 feet below normal. Of the counties in D2 or worse drought Atascosa, Blanco, Burnet, Dimmit, Frio, Kendall, Kinney, Llano, Maverick, Val Verde, and Zavala had outdoor burn bans in effect. No property or crop damages were reported.
February 1, 2022 – February 28, 2022	Drought	N/A	N/A	Another month of below normal precipitation left much of South-Central Texas in Severe (D2) or worse drought conditions. Dimmit County stayed in Extreme (D3) drought and Atascosa, Bandera, Blanco, Burnet, Edwards, Frio, Gillespie, Kendall, Kerr, Kinney, Llano, Maverick, Medina, Real, Uvalde, Val Verde, and Zavala Counties remained in D2. The 7-day average streamflow at the end of the month was Much Below normal on the Frio, Medina, San Antonio, Upper Guadalupe, Pedernales, and Llano Rivers. It was Below normal on the Nueces River. Fredericksburg was in Stage 3 water restrictions. The Edwards Aquifer was 9.6 feet below normal. Area lakes and reservoirs were below normal with Lake Amistad 48.3 feet below and Medina Lake 48.1 feet below. Atascosa, Blanco, Dimmit, Frio, Kendall, Kinney, Llano, Maverick, Uvalde, Val Verde, and Zavala Counties had outdoor burn bans in effect. No property or crop damages were reported.
March 1, 2022 – March 31, 2022	Drought	N/A	N/A	The dry conditions rolled on through March resulting in severe to extreme drought conditions across much of the area. The U.S. Drought Monitor indicated severe to extreme drought conditions across San Saba County during March. No property or crop damages were reported.
March 1, 2022 – March 31, 2022	Drought	N/A	N/A	Nearly all of South-Central Texas had below normal precipitation during the month and the area west of a line from Burnet to San Antonio and Pleasanton had less than 25% of normal. This worsened the drought across the region. Dimmit County ended the month in Exceptional (D4) drought category. Atascosa, Bandera, Blanco, Burnet, Edwards, Frio, Gillespie, Kendall, Kerr, Kinney, Llano, Maverick, Medina, Real, Uvalde, Val Verde, and Zavala Counties moved into Extreme (D3) drought. Bexar, Comal, De Witt, Gonzales, Guadalupe, Karnes, and Wilson entered Severe (D2) drought. Fredericksburg was in Stage 3 water

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
				restrictions and San Antonio and New Braunfels were in Stage 1. The Edwards Aquifer was 15.4 feet below normal at the end of the month. Area reservoirs were down with Lake Amistad 51.3 feet below conservation pool level and Medina Lake 51.6 feet below. The only counties in D2 or worse drought without a burn ban in effect at the end of the month were Bexar, Edwards, and Kerr. No property or crop damages were reported.
April 1, 2022 – April 30, 2022	Drought	N/A	N/A	The drought persisted across much of west central Texas during April. Most areas reported severe to extreme conditions. The US Drought Monitor indicated extreme to exceptional drought conditions across San Saba County during April. No property or crop damages were reported.
April 1, 2022 – April 30, 2022	Drought	N/A	N/A	Most of South-Central Texas had another dry month in April with all but a few spots receiving less than normal rainfall. This led to a worsening of drought conditions for Atascosa, Bandera, Burnet, Gillespie, Llano, Medina, Real, and Uvalde Counties all of which went from Extreme (D3) drought to Exceptional (D4) drought conditions. Bexar, Karnes, and Wilson Counties went from Severe (D2) drought to D3 drought. Lavaca County went into D2 drought. Blanco, Edwards, Frio, Kendall, Kerr, Kinney, Maverick, and Zavala Counties remained in D3. Comal, De Witt, Gonzales, and Guadalupe Counties remained in D2. Near normal rain moved Dimmit County from D4 to D3 and above normal precipitation moved Val Verde County from D3 to D2. All public water systems encouraged at least voluntary water restrictions, and many had mandatory restrictions in effect. Some the larger services had the following: Fredericksburg Stage 3, New Braunfels Stage 2, San Antonio Stage 2, Del Rio Stage 1, Kerrville Stage 1, and Pleasanton Stage 1. The Edwards Aquifer was 19.6 feet below normal at the end of the month. Area reservoirs were generally below normal conservation pool levels with Lake Amistad 55.7 feet below normal and Medina Lake 56.5 feet below normal. All the counties in D2 or worse drought had outdoor burn bans in effect except Uvalde, Gonzales, and Lavaca. The 7-day streamflow at the end of the month was well below normal on the rivers across the northern part of South-Central Texas and below normal across the southern part of the area. No property or crop damages were reported.
May 1, 2022 – May 31, 2022	Drought	N/A	N/A	May was another dry month across most of South-Central Texas which exacerbated the ongoing drought. In Blanco,

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				Karnes, Kendall, and Kerr Counties the drought worsened to Exceptional (D4) drought. Hays and Williamson Counties moved into Severe (D2) drought for the first time. Bandera, Gillespie, Medina, Real, and Uvalde remained in D4. Bexar, Edwards, Frio, Kinney, Maverick, Wilson, and Zavala stayed in Extreme (D3) drought. Comal, De Witt, Gonzales, Guadalupe, Lavaca, and Val Verde remained in D2. There were a few small areas that had above normal rainfall and the drought category improved. Atascosa, Burnet, and Llano improved from D4 to D3. Dimmit improved from D3 to D2. All public water systems encouraged at least voluntary water restrictions, and many had mandatory restrictions in effect. Some the larger systems had the following: Fredericksburg Stage 3, New Braunfels Stage 2, San Antonio Stage 2, San Marcos Stage 2, Austin Stage 1, Del Rio Stage 1, Kerrville Stage 1, and Pleasanton Stage 1. The Edwards Aquifer was 26.4 feet below normal. Area reservoirs were below normal Conservation Pool level. Lake Amistad was 58.0 feet below normal; Medina Lake was 61.5 feet below normal, and Lake Travis was 28.5 feet below normal. Rivers across the region were below or much below normal seven-day streamflow at the end of the month. All the counties in D2 or worse drought had outdoor burn bans in effect at the end of the month. No property or crop damages were reported.
May 1, 2022 – May 31, 2022	Drought	N/A	N/A	The drought continued and intensified across much of the area, besides Crockett County, during the month of May. The US Drought Monitor indicated mainly exceptional drought conditions across San Saba County during the month of May. No property or crop damages were reported.
June 1, 2022 – June 30, 2022	Drought	N/A	N/A	June was another month with below normal precipitation across South Central Texas and the drought continued to worsen. Atascosa and Edwards Counties moved from Extreme (D3) to Exceptional (D4) drought. Comal, De Witt, Gonzales, and Guadalupe moved from Severe (D2) to D3. Caldwell, Lee, and Travis moved into D2. Bandera, Blanco, Gillespie, Karnes, Kendall, Kerr, Medina, Real, and Uvalde remained in D4. Bexar, Burnet, Frio, Kinney, Llano, Maverick, Wilson, and Zavala remained in D3. Dimmit, Hays, Lavaca, Val Verde, and Williamson remained in D2. All public water systems encouraged at least voluntary water restrictions, and many had mandatory restrictions in effect. Some the larger services had the following:

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
				Fredericksburg Stage 3, New Braunfels Stage 3, San Antonio Stage 2, San Marcos Stage 2, Austin Stage 1, Del Rio Stage 1, Kerrville Stage 1, and Pleasanton Stage 1. The Edwards Aquifer dropped 1.9 feet and was 28.3 feet below normal. Area reservoirs continued to fall farther below normal conservation pool levels. Lake Amistad fell 4.5 feet to 62.5 feet below normal; Medina Lake was down 4.7 feet to 66.2 below normal, and Lake Travis dropped 2.5 feet to 31.0 feet below normal. All the counties in D2 or worse drought had outdoor burn bans in effect. The 7-day average streamflow on the Upper Guadalupe River was near the all-time low. All the other rivers in the region were below to much below normal. No property or crop damages were reported.
June 1, 2022 – June 30, 2022	Drought	N/A	N/A	The drought persisted across much of West Central Texas during the month of June. The US Drought Monitor indicated severe/exceptional drought conditions across San Saba County during the month of June. No property or crop damages were reported.
July 1, 2022 – July 31, 2022	Drought	N/A	N/A	The drought intensified across much of west central Texas during July. The US Drought Monitor indicated extreme/exceptional drought conditions across San Saba County during the month of July. No property or crop damages were reported.
July 1, 2022 – July 31, 2022	Drought	N/A	N/A	July was another month with below normal precipitation across nearly all of South-Central Texas and the drought continued to worsen. Bexar, Gonzales, Guadalupe, Karnes, Kinney, Maverick, Uvalde, Wilson, and Zavala Counties moved from Extreme (D3) to Exceptional (D4) drought. Caldwell, Dimmit, Hays, Lavaca, Lee, Travis, and Williamson moved from Severe (D2) to D3. Bastrop and Fayette moved into D2. Atascosa, Bandera, Blanco, Gillespie, Kendall, Kerr, Medina, and Real remained in D4. Burnet, Comal, De Witt, Frio, and Llano remained in D3. Val Verde remained in D2. Edwards County which had some areas get above normal rainfall improved from D4 to D3. All public water systems encouraged at least voluntary water restrictions, and many had mandatory restrictions in effect. Some the larger services had the following: Fredericksburg Stage 3, New Braunfels Stage 3, San Antonio Stage 2, San Marcos Stage 2, Austin Stage 1, Del Rio Stage 1, Kerrville Stage 1, and Pleasanton Stage 1. Georgetown declared Stage 2 this month, and Hutto declared Stage 3. The Edwards Aquifer dropped 1.3 feet

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
				and was 27.2 feet below normal. Area reservoirs continued to fall farther below normal conservation pool levels. Lake Amistad fell 1.4 feet to 63.9 feet below normal; Medina Lake was down 5.3 feet to 71.5 below normal, and Lake Travis dropped 3.5 feet to 34.5 feet below normal. All the counties in D2 or worse drought had outdoor burn bans in effect. The 7-day average streamflow on the Upper Guadalupe River was near the all-time low. All the other rivers in the region were below to much below normal. No property or crop damages were reported.
August 1, 2022 – August 31, 2022	Drought	N/A	N/A	Several heavy rain episodes during August led to above normal precipitation across South Central Texas. Much of the western half of the area received three to four times their normal. The result was improvement on the drought in all but two counties. The central part of the area had the least rain and Comal County was the only county that saw the drought worsen from Extreme (D3) category to Exceptional (D4) category. Next door Hays County remained in D3. All other counties saw improvement. Bandera, Gillespie, Gonzales, Kerr, Kinney, Maverick, Real, Uvalde, and Wilson improved from D4 to Severe (D2) category. Bexar, Blanco, Guadalupe, Kendall, and Medina improved from D4 to D3. Burnet, Caldwell, Llano, and Williamson improved from D3 to D2. Of the counties in D2 or worse drought Maverick, Kerr, Bandera, Medina, Bexar, Comal, Hays, and Wilson had outdoor burn bans in effect at the end of the month. The 7-day average streamflow on the Nueces River was normal (25%-75%), the Frio River was much below normal (<10%), the Medina River was below normal (10%-24%), the San Antonio River was normal, the upper Guadalupe River was much below normal, the lower Guadalupe River was below normal, the upper Colorado River was normal to below normal, and the lower Colorado River was below to much below (<10%) normal. The Edwards Aquifer rose 4.2 feet but was still 27.2 feet below normal. Lake Amistad rose 9.8 feet but was still 54.1 feet below normal conservation pool level. Medina Lake dropped 4.2 feet and was 75.7 feet below normal and Lake Travis fell 1.7 feet to 36.2 feet below normal. Most public water systems encouraged at least voluntary water restrictions, and many had mandatory restrictions in effect. Some of the larger services had the following: Fredericksburg Stage 3, New Braunfels Stage 1, San Antonio Stage 2, San Marcos Stage 2, Austin Stage 1,

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
				Kerrville Stage 1, and Georgetown Stage 2. No property or crop damages were reported.
August 1, 2022 – August 31, 2022	Drought	N/A	N/A	The drought intensified across west central Texas during the month of August. The extreme/exceptional conditions expanded to cover 79 percent of the area. The US Drought Monitor indicated extreme drought conditions across San Saba County during the month of August. No property or crop damages were reported.
September 1, 2022 – September 30, 2022	Drought	N/A	N/A	After beneficial rain in August, dry weather returned in September. Most of South-Central Texas had below normal precipitation and drought conditions worsened or remained the same. Guadalupe and Hays Counties worsened from Extreme (D3) category to Exceptional (D4) category. Bandera and Caldwell went from Severe (D2) category to D3. Bastrop, Fayette, Lavaca, and Travis worsened to D2. Comal remained in D4. Bexar, Blanco, Kendall, and Medina stayed in D3. Burnet, Gillespie, Gonzales, Kerr, Kinney, Llano, Maverick, Real, Uvalde, Williamson, and Wilson remained in D2. Of the counties in D2 or worse drought Comal, Hays, Bexar, Blanco, Caldwell, Medina, Fayette, Maverick, Travis, and Wilson had outdoor burn bans in effect. At the end of the month the 7-day average streamflow was much below (<10%) normal on the Frio River, below (10%-24%) normal on the Medina River, below normal on the San Antonio River, much below normal on the Guadalupe River, normal to below normal on the upper Colorado River, and much below normal on the lower Colorado. The Edwards Aquifer dropped 3.6 feet and was 32.2 feet below normal at the end of the month. Area reservoirs continued to lose water. Medina Lake was down 1.1 feet to 76.8 feet below conservation pool level, and Lake Travis was down 2.0 feet to 38.2 feet below conservation level. Lake Amistad rose 12.6 feet during the month due to rainfall in Mexico but was still 41.5 feet below conservation level. Most public water systems encouraged at least voluntary water restrictions, and many had mandatory restrictions in effect. Some the larger services had the following: New Braunfels Stage 1, San Antonio Stage 2, Austin Stage 1, and Kerrville Stage 1. No property or crop damages were reported.
September 1, 2022 – September 30, 2022	Drought	N/A	N/A	The drought weakened across west central Texas during the month of September. The US Drought Monitor indicated moderate/severe drought conditions across San

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
				Saba County during the month of September. No property or crop damages were reported.
October 1, 2022 – October 31, 2022	Drought	N/A	N/A	The drought remained across much of west central Texas during the month of October. The US Drought Monitor indicated moderate/severe drought conditions across San Saba County during the month of October. No property or crop damages were reported.
October 1, 2022 – October 31, 2022	Drought	N/A	N/A	Rainfall was a bit of a mixed bag in October. A swath of the central part of the area had 10-50% of normal. The area along the Rio Grande had 100-200% of normal. The rest of the area was in between. There was enough rainfall in Bandera County for that county to improve from Extreme (D3) drought to Severe (D2) drought. Lack of rain worsened the drought from D2 to D3 in Fayette and Gonzales Counties. All other counties remained where they were in September. Comal, Guadalupe, and Hays stayed in Exceptional (D4) drought. Bexar, Blanco, Caldwell, Kendall, and Medina remained in D3. Bastrop, Burnet, Gillespie, Kerr, Kinney, Lavaca, Llano, Real, Travis, Uvalde, Williamson, and Wilson stayed in D2. Of the counties in D2 or worse drought Comal, Guadalupe, Hays, Bexar, Blanco, Caldwell, Fayette, Gonzales, Kendall, Medina, Burnet, Gillespie, Llano, Travis, and Wilson had outdoor burn bans in effect at the end of the month. The 7-day average streamflow at the end of the month was normal (25%-75%) to below normal (10%-24%) on the Nueces River, much below normal (<10%) on the Frio River, below normal (10%-24%) on the Medina River, below normal (10%-24%) on the San Antonio River, much below normal (<10%) on the upper and lower Guadalupe River, and normal (25%-75%) to below normal (10%-24%) on the upper Colorado River. Area reservoirs were below normal pool level. Lake Amistad rose 4.5 feet but was still 37.0 feet below normal. Medina Lake decreased 1.2 feet to 78.0 feet below normal and Lake Travis dropped 2.4 feet to 40.6 feet below normal. The Edwards Aquifer rose 2.3 feet but was 33.2 feet below average. Most public water systems encouraged at least voluntary water restrictions, and many had mandatory restrictions in effect. Some of the larger services had the following: New Braunfels Stage 1, San Antonio Stage 2, Austin Stage 1, and Kerrville Stage 1. No property or crop damages were reported.

Sources: NOAA 2023; USDA 2023; FEMA 2023

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Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of drought events for the Planning Area. Information from NOAA-NCEI storm events database and the 2018 State of Texas HMP were used to identify the number of drought events that occurred between 1950 and 2022. Table 4.3.2-2 and Table 4.3.2-3 present the probability of future events for the drought hazard in Llano County and San Saba County, respectively.

Table 4.3.2-2. Probability of Future Drought Events, Llano County

Hazard Type	Number of Occurrences Between 1950 and 2022	% Chance of Occurring in Any Given Year
Drought	71	97.26%

Sources: NOAA 2023; TDEM 2018
Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all drought events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.

Table 4.3.2-3. Probability of Future Drought Events, San Saba County

Hazard Type	Number of Occurrences Between 1950 and 2022	% Chance of Occurring in Any Given Year
Drought	62	84.93%

Sources: NOAA 2023; TDEM 2018
Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all drought events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.

In Section 4.4, the identified hazards of concern for the Planning Area were ranked (Table 4.4-4 and Table 4.4-5). The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Team, the probability of occurrence for drought in the Planning Area is considered 'occasional'.

Climate Change Projections

The climate of Texas is changing. Climate is defined not simply as average temperature and precipitation but also by the type, frequency, and intensity of weather events. Both globally and at the local scale, climate change has the potential to alter the prevalence and severity of extremes such as droughts. While predicting changes of drought events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating future climate change impacts on human health, society, and the environment (EPA 2016).

With a warmer climate, droughts can become more frequent, more severe, and longer lasting. According to the National Climate Assessment, variable precipitation and rising temperatures are intensifying droughts, increasing heavy downpours, reducing snowpack, and causing declines in water survey quality. Future warming will add to the stress on water supplies and impact the availability of water supply (USGCRP 2018).

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The entire Planning Area is exposed to the drought hazard; therefore, all assets within Llano County and San Saba

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County (population, structures, critical facilities, and lifelines), as described in Section 3 (County Profile), are potentially vulnerable to a drought event. The following text evaluates and estimates the potential impact of the drought hazard in Llano County and San Saba County as a whole.

Impact on Life, Health, and Safety

The entire population of Llano County and San Saba County is vulnerable to drought events (2020 Census: 21,243 in Llano County, 5,730 in San Saba County). Drought conditions can affect public health and safety, including reduced local firefighting capabilities, health problems related to low water flows and poor water quality, and health problems related to dust. If droughts are severe enough, these health problems can lead to loss of human life.

Other possible impacts include recreational risks; effects on air quality; diminished living conditions related to energy, air quality, and sanitation and hygiene; compromised food and nutrition; and increased incidence of illness and disease. Due to their age, health conditions, and limited ability to mobilize to shelters, cooling, and medical resources, the infirm, young, and elderly are particularly susceptible to drought and extreme temperatures, sometimes associated with drought conditions. Some drought-related health effects are short term, while others can be long term (CDC 2012).

Impact on General Building Stock

No structures will be directly affected by drought conditions, though some structures may become vulnerable to wildfires, which are more likely following years of drought. Droughts can have significant impacts on other types of property such as landscaped areas and economically important natural resources.

Impact on Critical Facilities

Water supply facilities may be affected by drought events. However, a majority of the critical facilities defined for this plan will continue to be operational during a drought.

Impact on Economy

Drought causes the most significant economic impacts on industries that use water or depend on water for their business, most notably agriculture and related sectors, power plants, and oil refineries. In addition to losses in yields in crop and livestock production, drought is associated with increased insect infestations, plant diseases, and wind erosion. Drought can lead to other losses because so many sectors interconnected. This can lead to unemployment, increased credit risk for financial institutions, capital shortfalls, and loss of tax revenue. Prices for food, energy, and other products may also increase as supplies decrease.

According to the 2017 Census of Agriculture, Llano County has 523,436 acres of farmland, resulting in a $15.7 million market value of products sold (USDA 2017). Saba County has 660,016 acres of farmland, resulting in a $35.8 million market value of products sold (USDA 2017).

According to the 2018 State of Texas HMP, between 1996 and 2016, Llano County experienced drought-related losses (property plus crop losses) ranging between $143 million and $3.1 billion. San Saba County did not experience drought-related losses (TDEM 2018).

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Impact on the Environment

Drought can impact the environment because it can trigger wildfires, increase insect infestations, and exacerbate the spread of disease (NOAA 2000). Droughts will also impact water resources that are relied upon by aquatic and terrestrial species. Ecologically sensitive areas, such as wetlands, can be particularly vulnerable to drought periods because they are dependent on steady water levels and soil moisture availability to sustain growth. As a result, these types of habitats can be negatively impacted after long periods of dryness.

Future Changes That May Impact Vulnerability

Understanding future changes that effect vulnerability in the Planning Area can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The Planning Area considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

Any areas of growth could be potentially impacted by the drought hazard because the entire Planning Area is exposed and vulnerable to droughts. Future growth and development could impact the amount of potable water available due to a drain on the available water resources. An increased drain on water resources would not only impact the Planning Area's population, but it would also exacerbate impacts to other areas of the Planning Area as discussed above, including agriculture and recreational facilities.

Projected Changes in Population

Llano County has experienced an increase in population between the 2010 Census (19,301) and the 2020 Census population of 21,243. The population of the County is expected to increase over the next few years. San Saba County experienced a decrease in population between the 2010 Census (6,131) and the 2020 Census population of 5,730. The Texas Demographic Center has produced population estimates for the region that were last updated in 2018 based on 2010 Census data. The estimates show a slight projected decline for Llano County between 0.14 and 0.25 percent every five years from 2025 to 2035, followed by a projected growth between 0.68 and 3.3 percent every five years from 2035 to 2050. The estimates show projected decline for San Saba County between 1.51 and 4.3 percent every five years from 2025 to 2050 (Texas Demographic Center n.d.).

With an increase in population, the demand for water supply will increase. During a drought, the amount of water needed might not be available. This might require reallocation of water resources to meet demands during a drought. If needed, the counties can pass special ordinances regulating the amount of water consumed and used during periods of drought to conserve water.

Climate Change

Climate change has the potential to impact the number of and the severity of droughts. An increased incidence of drought might impact availability of water supplies, primarily placing an increased stress on the population. It is unlikely that structure exposure and vulnerability would increase as a direct result of drought, although secondary impacts of drought, such as wildfire, could increase and threaten structures. If a wildfire were to occur during a

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drought, emergency services might face complications from a water shortage depending on their water source, and critical water-related service sectors might need to adjust management practices and actively manage resources. Increased incidence of drought increases the potential for impacts on the local economy, including the production of agricultural products.

Change of Vulnerability Since 2016 HMP

Since the 2016 HMP, Llano County has grown in population, while San Saba County has decreased in population. Overall, Llano County and San Saba County will continue to be exposed and vulnerable to drought events.

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Section 4 Risk Assessment

4.3 Hazard Profiles

4.3.3 Extreme Temperatures

The following section provides the hazard profile and vulnerability assessment for the extreme temperatures hazard in the Planning Area. When referring to the Planning Area, it includes both Llano County and San Saba County.

Hazard Profile

Hazard Description

Extreme Heat

Extreme heat events are defined by the U.S. Environmental Protection Agency (EPA) as "summertime weather that is substantially hotter or more humid than average for a location at that time of year" (US EPA 2016). Criteria that define an extreme heat event may differ among jurisdictions and in the same jurisdiction depending on the time of year.

The summer months in Texas are frequently affected by extreme heat hazards. Persistent domes of high pressure establish themselves, which set up hot and dry conditions. This high pressure prevents other weather features such as cool fronts or rain events from moving into the area and providing necessary relief. Daily high temperatures range into the upper 90s and low 100s. When combined with moderate to high relative humidity levels, the heat index moves into dangerous levels, and a heat index of 105°F is considered the level where many people begin to experience extreme discomfort or physical distress (Llano County 2016).

Extreme Cold

Extreme cold events are when temperatures drop well below normal in an area. What constitutes as extreme cold varies in different parts of the country. In the southern United States, near freezing temperatures are considered extreme cold. Freezing temperatures can cause severe damage to citrus fruit crops and other vegetation. Pipes may freeze and burst in homes that are poorly insulated or without heat (NWS n.d.).

Extreme cold often accompanies a winter storm or is left in its wake. It is most likely to occur in the winter months of December, January, and February. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Extreme cold can disrupt or impair communications facilities (Llano County 2016) (San Saba County 2016).

Location

Extreme Heat

All of the state is vulnerable to extreme heat. In addition, large metropolitan areas, such as Dallas/Fort Worth and Houston may experience extreme heat since they have an abundance of concrete which absorbs and then radiates solar energy. This effect is known as urban heat island and can be dangerous to those without air conditioners (State of Texas 2018).

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The record highs for Texas occurs during May through October. Llano County experiences an average of 13 100°F--and-above days during these months according to data recorded by the National Weather Service between 1900 and 2014. San Saba County experiences an average of 17 days with temperatures 100°F or above during these months, according to data recorded by the National Weather Service between 1900 and 2014.

The entire planning area is at risk to extreme heat events; however, these events may be exacerbated in urban areas, where reduced air flow, reduced vegetation, and increased generation of waste heat can contribute to temperatures that are several degrees higher than in surrounding rural (Llano County and San Saba Unincorporated Areas) or less urbanized areas. This phenomenon is known as urban heat island effect. This can happen in the City of Llano, Horseshoe Bay, and Sunrise Beach Village in Llano County and in the City of San Saba and Richland Springs in San Saba County (Llano County 2016) (San Saba County 2016).

Extreme Cold

Extreme cold can happen anywhere in the state, although its levels can range extensively. In the panhandle extreme cold means days below zero Fahrenheit while in the Rio Grande Valley it means reaching temperatures below freezing (State of Texas 2018).

The record lows for Texas occurs during October through March. The average first freeze in the HMP update area usually occurs late November to early December and the last freeze late February to early March according to data recorded by the National Weather Service.

All participating communities in the project area do not experience extreme cold temperature events consistently, but the events can affect the HMP update area (Llano County 2016) (San Saba County 2016).

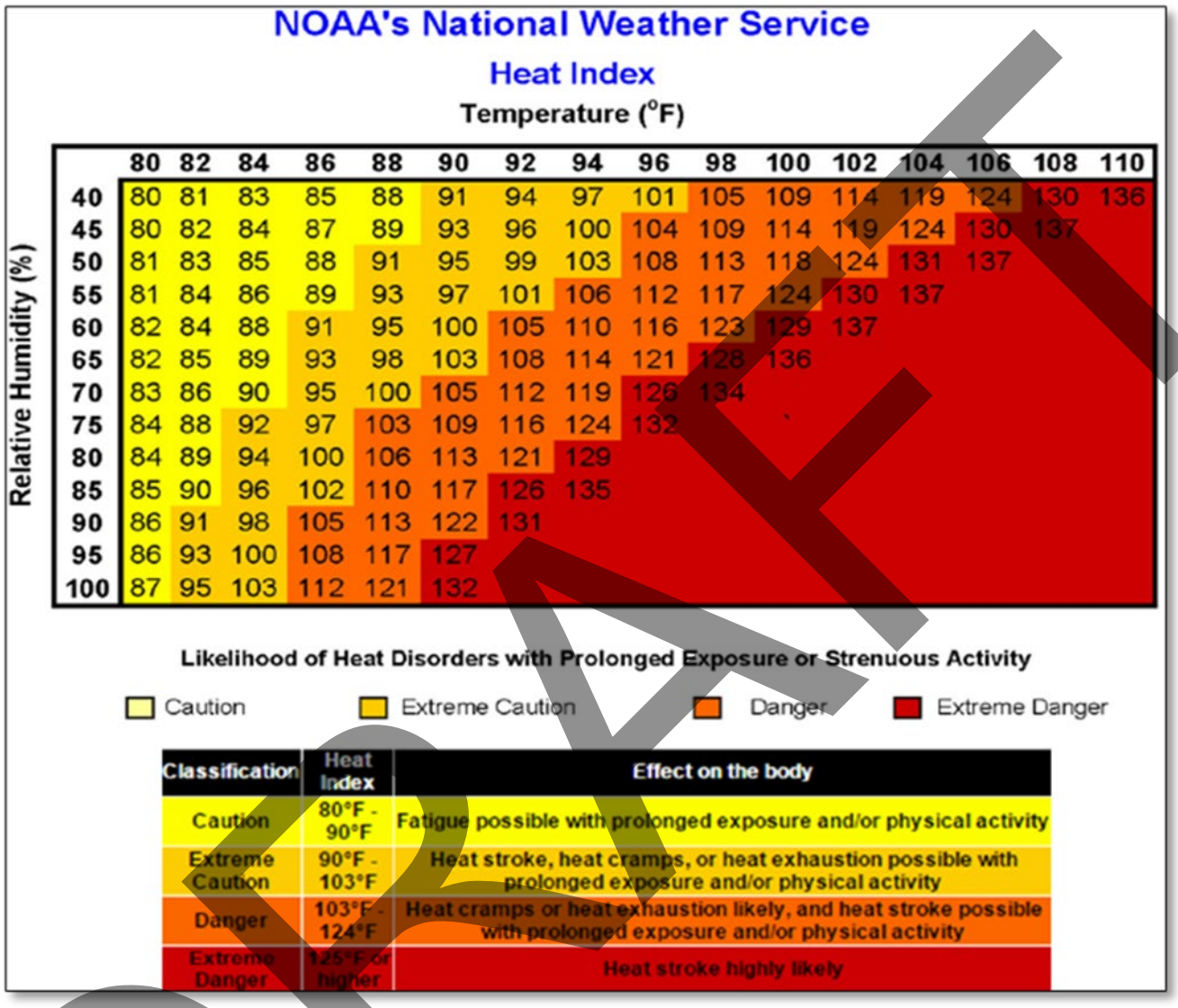
Extent

Extreme Heat

The extent of extreme heat temperatures generally is measured through the Heat Index. Heat index tables (see Figure 4.3.3-1) are commonly used to provide information about how hot it feels, which is based on the interactions between several meteorological conditions. Since heat index values were devised for shady, light wind conditions, exposure to full sunshine can increase heat index values by up to 15 degrees Fahrenheit (°F). Also, strong winds, particularly with very hot, dry air, can be extremely hazardous. Extreme heat is defined as a combination of very high temperatures and, usually, exceptionally humid conditions. When persisting over a period of time, it is called a heat wave (State of Texas 2018).

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Figure 4.3.3-1. NOAA's National Weather Service Heat Index Table (°F)



Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Source: NOAA National Weather Service

Each National Weather Service office issues some or all of the following heat-related products as conditions warrant (Table 4.3.3-1):

Table 4.3.3-1. National Weather Service Alerts for Extreme Heat

Alert	Criteria
Excessive Heat Warning—Take Action!	An Excessive Heat Warning is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Warning is when the maximum heat index temperature is expected to be 105° or higher for at least 2 days and nighttime air temperatures will not drop below 75°; however, these criteria vary across the country, especially for areas not used to extreme heat conditions. If you don't take precautions immediately when conditions are extreme, you may become seriously ill or even die.

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Alert	Criteria
Excessive Heat Watches—Be Prepared!	Heat watches are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A Watch is used when the risk of a heat wave has increased but its occurrence and timing is still uncertain.
Heat Advisory—Take Action!	A Heat Advisory is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Advisory is when the maximum heat index temperature is expected to be 100° or higher for at least 2 days, and nighttime air temperatures will not drop below 75°; however, these criteria vary across the country, especially for areas that are not used to dangerous heat conditions. Take precautions to avoid heat illness. If you don't take precautions, you may become seriously ill or even die.
Excessive Heat Outlooks—Be Aware!	The outlooks are issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to those who need considerable lead-time to prepare for the event.

Source: NWS n.d.

Worst-Case Scenario

An extreme multi-year drought with extreme heat conditions could impact the region with little warning. Combinations of low precipitation and unusually high temperatures could occur over several consecutive years. Intensified by such conditions, extreme wildfires could break out throughout the planning area, increasing the need for water. Surrounding communities, also in drought and extreme heat conditions, could increase their demand for water supplies relied upon by the planning partnership, causing social and political conflicts. If such conditions persisted for several years, the economy of both Llano County and San Saba County could experience setbacks, especially in water dependent industries. The following are extreme heat-related issues:

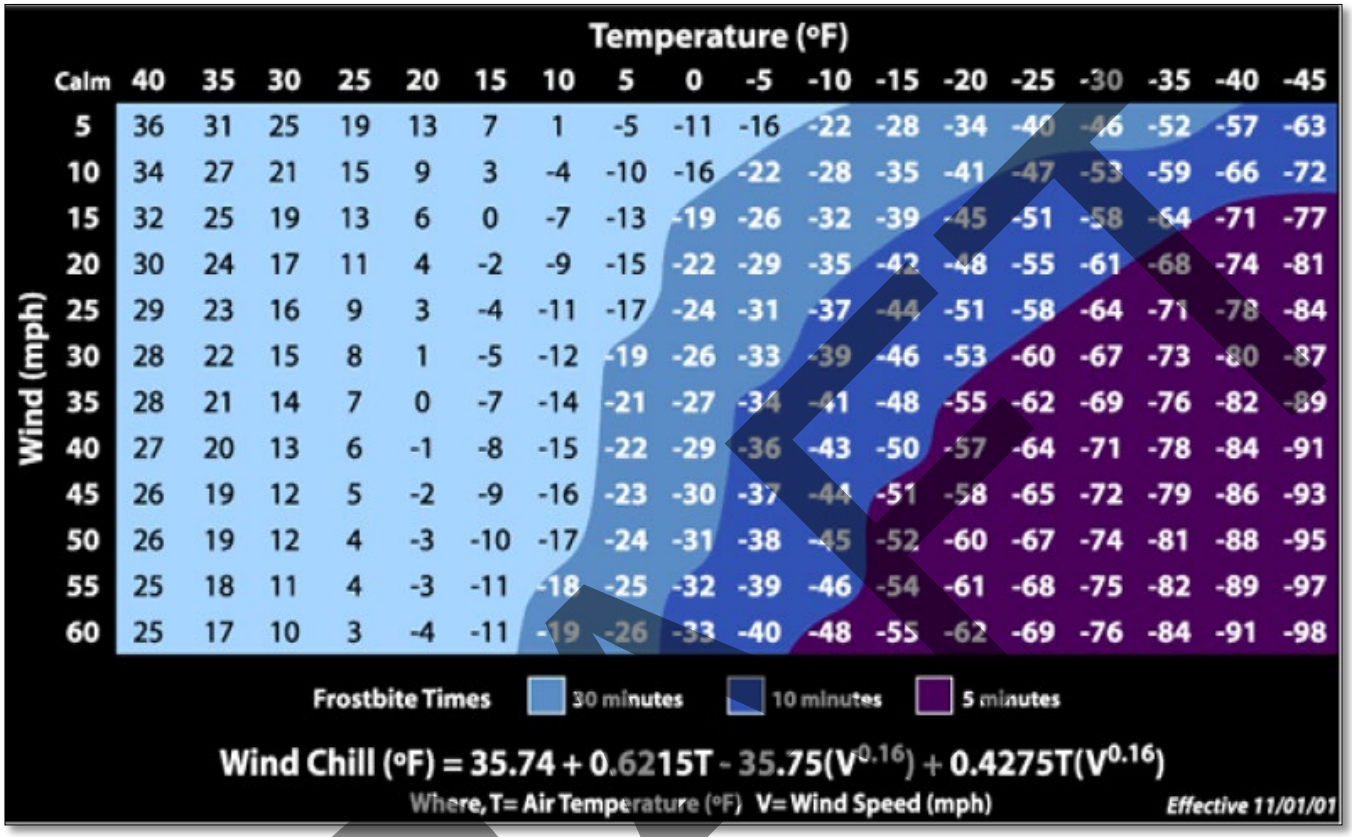
- Identification and development of alternative water supplies.
- Utilization of groundwater recharge techniques to stabilize the groundwater supply.
- The probability of increased drought frequencies and durations due to climate change.
- The promotion of active water conservation even during non-drought periods.
- Increasing vulnerability to drought over time as demand for water from different sectors increases.
- The effects of climate change may result in an increase in frequency of extreme heat events.
- The effects of recent droughts have exposed the vulnerability of the planning areas economy to drought events.
- Environmental and erosion control impact analysis for transportation projects.
- Wildlife habitat management for landowners.
- Human health impacts from droughts and extreme heat.
- Monitoring and evaluating risks to power supply and water rights.
- Development of mitigation- or response-based state drought plans.

Extreme Cold

In 2001, the NWS implemented an updated wind chill temperature index (see Figure 4.3.3-2). This index describes the relative discomfort or danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature (NOAA 2022).

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Figure 4.3.3-2. National Weather Service Wind Chill Chart (°F)



Source: NWS 2019

The NWS provides alerts when Wind Chill indices approach hazardous levels. Table 4.3.3-2 explains these alerts.

Table 4.3.3-2. National Weather Service Alerts for Extreme Cold

Alert	Criteria
Wind Chill Warning – Take Action!	NWS issues a wind chill warning when dangerously cold wind chill values are expected or occurring. If you are in an area with a wind chill warning, avoid going outside during the coldest parts of the day. If you do go outside, dress in layers, cover exposed skin, and make sure at least one other person knows your whereabouts. Update them when you arrive safely at your destination.
Wind Chill Watch – Be Prepared	NWS issues a wind chill watch when dangerously cold wind chill values are possible. As with a warning, adjust your plans to avoid being outside during the coldest parts of the day. Make sure your car has at least a half a tank of gas and update your winter survival kit.
Wind Chill Advisory – Be Aware	NWS issues a wind chill advisory when seasonably cold wind chill values, but not extremely cold values are expected or occurring. Be sure you and your loved one's dress appropriately and cover exposed skin when venturing outdoors.

Source: NWS n.d.

The most significant secondary hazards associated with extreme cold temperatures occur after a severe winter storm when there are falling and downed trees, landslides, broken pipes, and downed power lines. Heavy rain

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and icy conditions can overwhelm both natural and manmade drainage systems, causing overflow and property destruction. Landslides occur when the soil on slopes becomes oversaturated and fails. Additionally, the storms may result in closed highways and blocked roads. It is not unusual for motorists and residents to become stranded. Annually, icy conditions and frozen pipes cause damage to residences and businesses. Late season winter events will typically cause some plant and crop damage (Llano County 2016) (San Saba County 2016).

Worst-Case Scenario

Primarily, the extreme cold faced in Llano and San Saba Counties is coupled with severe winter weather. A worst-case event would involve prolonged high winds during a winter storm. Such an event would have both short-term and longer-term effects. Initially, schools and roads would be closed due to power outages caused by high winds and downed tree obstructions. In more rural areas, some subdivisions could experience limited ingress and egress. Important issues associated with a winter storm in the planning area include the following:

- Older building stock in the planning area is built to low code standards or none at all. These structures could be highly vulnerable to winter weather, particularly freezing temperatures, high winds, and ice.
- Redundancy of power supply must be evaluated.
- The capacity for backup power generation is limited.
- Future efforts should be made to identify populations at risk and determine special needs during a winter storm event

Previous Occurrences and Losses

FEMA Disaster Declarations

Between 1954 and 2022, Llano County and San Saba County were included in no disaster (DR) or emergency (EM) declarations for extreme heat-related events. Between 1954 and 2022, Llano County and San Saba County were included in two disaster (DR) or emergency (EM) declarations for extreme cold-related events; the two declarations, FEMA DR-4586 and FEMA-3554-EM, were for the same event, Winter Storm Uri.

Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 3 (County Profile).

U.S. Department of Agriculture Disaster Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2012 and 2022, Llano County and San Saba County were not included in extreme heat-related agricultural disaster declarations. Between 2012 and 2022, Llano County and San Saba County were not included in extreme cold-related agricultural disaster declarations (USDA FSA 2022).

Previous Events

For this 2023 HMP update, known extreme heat events that impacted the Planning Area between 2017 and 2022 are discussed below. For events prior to 2017, refer to Appendix I (Supplementary Data).

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Table 4.3.3- 3. Extreme Temperature Events in the Planning Area (2017 to 2022)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
July 19, 2018	Excessive Heat	N/A	N/A	Strong high pressure settled over South Central Texas, and temperatures soared to record levels. The heat wave started on the 19th in Burnet, Frio, Llano, Medina, Travis, and Williamson Counties with high temperatures reaching 105 and higher. The hot temperatures spread across the region, reaching their greatest extent on the 23rd when 22 counties reached extreme heat criteria.
July 13, 2020	Excessive Heat	N/A	N/A	Temperatures exceeded 105 degrees across Atascosa, Bastrop, Bexar, Burnet, Caldwell, De Witt, Fayette, Gillespie, Gonzales, Guadalupe, Hays, Kerr, Lee, Llano, Medina, Travis, and Uvalde Counties.
February 14, 2021	Severe Winter Storm	FEMA DR-4586, FEMA-3554-EM	Llano County and San Saba County	A series of weather systems brought several rounds of winter weather to South and West Central Texas from February 11 through February 18. The second round came on the 13th and 14th with cold air still in place in the low levels, another upper-level shortwave trough moved across Texas providing lift for precipitation. The deeper atmosphere had warm air above the cold leading to a second round of freezing rain. The third round of winter weather was initiated by another upper-level shortwave trough on the 14th and 15th. This system brought cooler air above the boundary layer and turned precipitation to snow. Most of the area had only snow, but there were also short periods of freezing rain in a few places. In addition to the snow, bitterly cold air and breezy winds combined to bring extreme wind chill values on the 15th.

Sources: *NOAA NCEI 2022; USDA FSA 2022; FEMA 2022; San Saba County 2016; Llano County 2016*
Notes: *Llano County was affected by the two excessive heat events listed in the above table. San Saba County was not impacted by any heat-related events between the years 2017-2022. No declarations were issued by FEMA or the USDA for either County.*

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Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of extreme heat and cold events for the project area. Information from NOAA-NCEI storm events database on the historical occurrence of extreme heat and cold events that occurred between 1950 and 2022 was limited. Instead, information from the Midwestern Regional Climate Center was used to identify the number of days with greater than 105 degrees F to represent extreme heat events and the number of days with a minimum temperature below 10 degrees F to represent extreme cold events. Table 4.3.3-4 presents the probability of future events for extreme temperatures in Llano County; Table 4.3.4-5 presents the probability of future events for extreme temperatures in San Saba County.

Table 4.3.3-4. Probability of Future Extreme Temperature Events, Llano County

Hazard Type	Number of Occurrences Between 1950 and 2022	% Chance of Occurring in Any Given Year
Maximum Temperature >105 degrees F	290	100%
Minimum Temperature <10 degrees F	28	38.36%
Total	**318**	**100%**

Sources: MRCC 2023
Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all Extreme Heat events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.

Table 4.3.3-5. Probability of Future Extreme Temperature Events, San Saba County

Hazard Type	Number of Occurrences Between 1950 and 2022	% Chance of Occurring in Any Given Year
Maximum Temperature >105 degrees F	51	69.86%
Minimum Temperature <10 degrees F	21	28.77%
Total	**72**	**98.63%**

Sources: MRCC 2023
Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all Extreme Heat events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.

In Section 4.4, the identified hazards of concern for the Planning Area were ranked (Table 4.4-4 and Table 4.4-5). The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Team, the probability of occurrence for extreme temperatures in the Planning Area is considered 'frequent'.

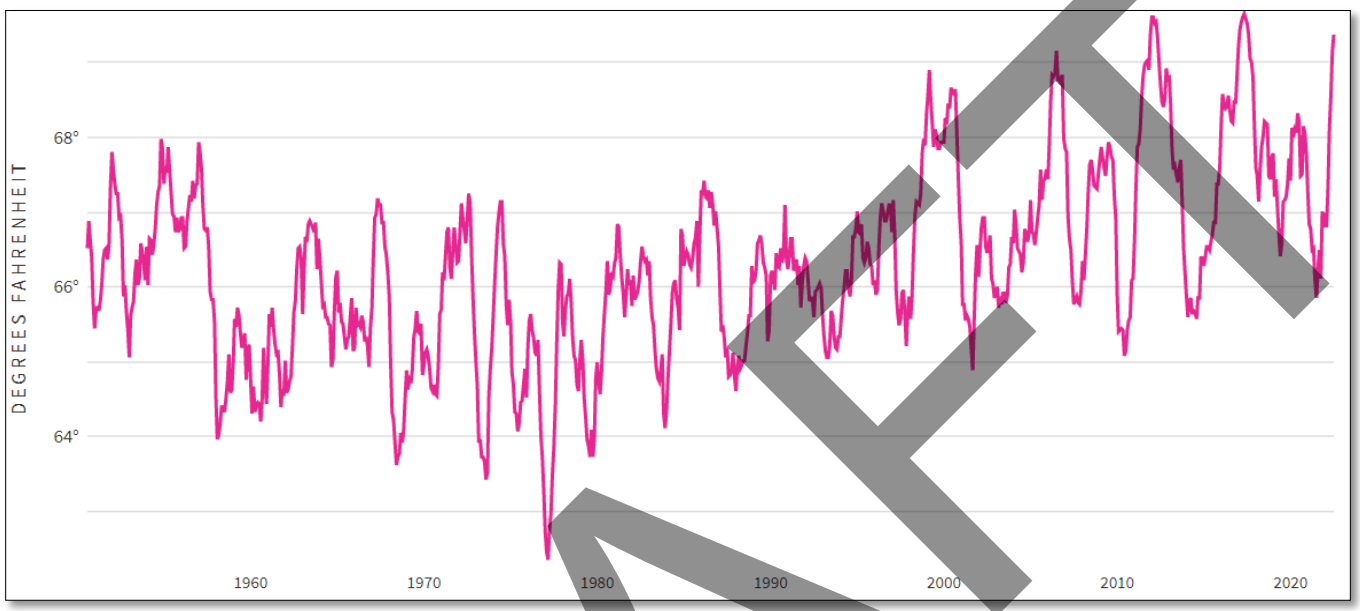
Climate Change Projections

Temperature trends in the project area, like the rest of the globe, are increasing. Between September 1950 to August 2022, the 12-month average temperature in Llano County increased 2.8°F; from September 1950 to August 2022, the 12-month average temperature was 66.3°F (see Figure 4.3.4-3) (USA Facts, NCEI 2022). Similarly, between September 1950 to August 2022 the 12-month average temperature in San Saba County increased 3.2°F;

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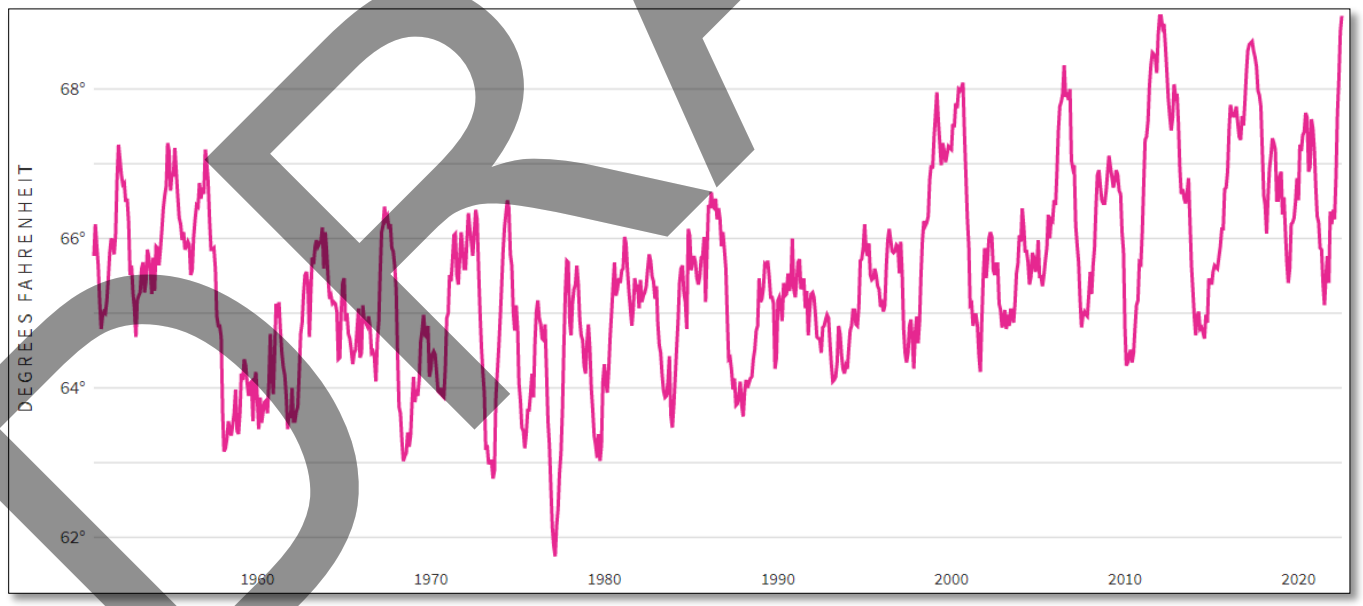
from September 1950 to August 2022, the 12-month average temperature was 65.5°F (see Figure 4.3.4-4) (USA Facts, NCEI 2022).

Figure 4.3.3-3. 12-month temperature averages in Llano County, Sept. 1950 – Aug. 2022



Source: USA Facts, NCEI

Figure 4.3.3-4. 12-month temperature averages in San Saba County, Sept. 1950 – Aug. 2022



Source: USA Facts, NCEI

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Extreme heat has always been prevalent in Texas. Unusually hot summer temperatures have become more common across the contiguous 48 states in recent decades, extreme heat events (heat waves) have become more frequent and intense, and these trends are expected to continue. As a result, the risk of heat-related deaths and illness is also expected to increase. Death rates can also change, however, as people acclimate to higher

temperatures and as communities strengthen their heat response plans and take other steps to continue to adapt (US EPA 2022).

Extreme cold temperatures have become more prevalent in Texas in recent years. However, extreme cold waves are likely to decrease as winter temperatures increase in the future. This winter warming is expected to reduce the number of direct cold-related deaths, but the decrease is projected to be smaller than increases in heat-related deaths in most regions. This is because some of the factors that lead to higher death rates in the winter are not particularly sensitive to climate change, because extreme heat has a more immediate and direct effect on death rates than extreme cold, and because the solutions to protect against cold exposure (such as staying indoors, wearing more clothing, turning on the heat) are more widely accessible than protection against extreme heat. Cold-related death rates can change as communities strengthen their cold weather plans and take other steps to protect vulnerable people during cold winter months (US EPA 2022).

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The entire Planning Area is exposed to the extreme temperature hazard. The following text evaluates and estimates the potential impact of the extreme temperature hazard in Llano County and San Saba County as a whole.

Impact on Life, Health, and Safety

The entire population of Llano County (21,243) and San Saba County (5,730) is exposed to the extreme temperature hazard. Extreme temperature events have potential health impacts including injury and death. According to the Centers for Disease Control and Prevention, populations most at risk to extreme cold and heat events include the following: 1) the elderly, who are less able to withstand temperatures extremes due to their age, health conditions, and limited mobility to access shelters; 2) infants and children up to four years of age; 3) individuals with chronic medical conditions (e.g., heart disease, high blood pressure), 4) low-income persons that cannot afford proper heating and cooling; and 5) the general public who may overexert during work or exercise during extreme heat events or experience hypothermia during extreme cold events (CDC 2007). The number of people vulnerable to extreme temperatures are presented in Table 4.3.4-6.

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Table 4.3.3-6. Vulnerable Populations in the Llano County

Llano Jurisdiction	Population (2020 Decennial)		American Community 5-year Estimates 2020 Population									
	Total	Percent of County Total	Over 65	Percent of Jurisdiction Total	Under 5	Percent of Jurisdiction Total	Non-English Speaking Households	Percent of Jurisdiction Total	Disability	Percent of Jurisdiction Total	Poverty Level	Percent of Jurisdiction Total
Horseshoe Bay (C)	4,257	20.0%	2,221	52.2%	93	2.2%	0	0.0%	928	21.8%	156	3.7%
Sunrise Beach (C)	3,325	15.7%	691	20.8%	314	9.4%	12	0.4%	719	21.6%	531	16.0%
Llano (C)	739	3.5%	383	51.8%	16	2.2%	0	0.0%	176	23.8%	30	4.1%
Unincorporated Llano County	12,922	60.8%	4,680	36.2%	414	3.2%	56	0.4%	3,490	27.0%	895	6.9%
Llano County (Total)	**21,243**	**100.0%**	**7,975**	**37.5%**	**837**	**3.9%**	**68**	**0.3%**	**5,313**	**25.0%**	**1,612**	**7.6%**

Source: U.S. Census 2020
Notes: (C) = City, (T) = Town

Table 4.3.3-7. Vulnerable Populations in the San Saba County

San Saba Jurisdiction	Population (2020 Decennial)		American Community 5-year Estimates 2020 Population									
	Total	Percent of County Total	Over 65	Percent of Jurisdiction Total	Under 5	Percent of Jurisdiction Total	Non-English Speaking Households	Percent of Jurisdiction Total	Disability	Percent of Jurisdiction Total	Poverty Level	Percent of Jurisdiction Total
Richland Springs (T)	244	4.3%	62	0.0%	14	0.0%	0	0.0%	58	0.0%	41	0.0%
San Saba (C)	3,117	54.4%	588	18.9%	191	6.1%	86	2.8%	405	13.0%	510	16.4%
Unincorporated San Saba County	2,369	41.3%	757	0.0%	107	0.0%	9	0.0%	519	0.0%	163	0.0%
San Saba County (Total)	**5,730**	**100.0%**	**1,407**	**10.3%**	**312**	**3.3%**	**95**	**1.5%**	**982**	**7.1%**	**714**	**8.9%**

Source: U.S. Census 2020
Notes: (C) = City, (T) = Town

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Exposure to extreme temperature can pose a number of health risks to individuals. Table 4.3.3-8 and Table 4.3.3-9 identify different health hazards related to extreme heat and extreme cold conditions.

Table 4.3.3-8. Health Effects of Extreme Heat

Health Hazard	Symptoms
Sunburn	Redness and pain. In severe cases: swelling of skin, blisters, fevers, and headaches
Dehydration	Excessive thirst, dry lips, and slightly dry mucous membranes
Heat Cramps	Painful spasms, usually in muscles of legs and abdomen, and possible heavy sweating
Heat Exhaustion	Heavy sweating; weakness; cold, pale and clammy skin; weak pulse; possible fainting and vomiting
Heat Stroke	High body temperature (104ºF or higher), hot and dry skin, rapid and strong pulse, and possible coma

Source: CDC 2016

Table 4.3.3-9. Health Effects of Extreme Cold

Health Hazard	Symptoms
Wind Chill	Wind chill is not the actual temperature but rather how wind and cold feel on exposed skin. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature. Animals are also affected by wind chill; however, cars, plants and other objects are not.
Frostbite	Frostbite is damage to body tissue caused by extreme cold. A wind chill of -20°F will cause frostbite in just 30 minutes. Frostbite causes a loss of feeling and a white or pale appearance in extremities, such as fingers, toes, ear lobes or the tip of the nose. If symptoms are detected, get medical help immediately! If you must wait for help, slowly re-warm affected areas. However, if the person is also showing signs of hypothermia, warm the body core before the extremities.
Hypothermia	Hypothermia is a condition brought on when the body temperature drops to less than 95°F. It can kill. For those who survive, there are likely to be lasting kidney, liver and pancreas problems. Warning signs include uncontrollable shivering, memory loss, disorientation, incoherence, slurred speech, drowsiness and apparent exhaustion.

Source: CDC 2007

Meteorologists can accurately forecast extreme heat and cold event development and the severity of the associated conditions with several days of lead time. These forecasts provide an opportunity for public health and other officials to notify vulnerable populations, implement short-term emergency response actions, and focus on surveillance and relief efforts on those at greatest risk. Adhering to extreme temperature warnings can significantly reduce the risk of temperature-related deaths.

Impact on General Building Stock

All the building stock in the Planning Area is exposed to the extreme temperature hazard. Extreme heat generally does not impact buildings; however, elevated summer temperatures increase the energy demand for cooling. Losses can be associated with the overheating of heating, ventilation, and air conditioning (HVAC) systems. Extreme cold temperature events can damage buildings through freezing/bursting pipes and freeze/thaw cycles, as well as increasing vulnerability to home fires. Additionally, manufactured homes (mobile homes) and antiquated or poorly constructed facilities can have inadequate capabilities to withstand extreme temperatures.

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Due to the expansive nature of soils in this area, extreme heat could pose foundation issues. The lack of air conditioning in businesses and homes can exacerbate existing health conditions, particularly in senior citizens (Llano County 2016) (San Saba County 2016).

Impact on Critical Facilities

All critical facilities in the Planning Area are exposed to the extreme temperature hazard. Impacts to critical facilities are the same as described for general building stock. Additionally, it is essential that critical facilities remain operational during natural hazard events. Extreme heat events can sometimes cause short periods of utility failures, commonly referred to as brownouts, due to increased usage from air conditioners and other energy-intensive appliances. Similarly, heavy snowfall and ice storms, associated with extreme cold temperature events, can cause power interruption. Backup power is recommended for critical facilities and infrastructure.

Impact on Economy

Extreme temperature events also have impacts on the economy, including loss of business function and damage to and loss of inventory. Business-owners can be faced with increased financial burdens due to unexpected repairs caused to the building (e.g., pipes bursting), higher than normal utility bills, or business interruption due to power failure (i.e., loss of electricity, telecommunications).

Similar to drought, extreme temperature events can result in damages to agricultural products. According to the 2017 Census of Agriculture, Llano County has 523,436 acres of farmland, resulting in a $15.7 million market value of products sold (USDA 2017). Saba County has 660,016 acres of farmland, resulting in a $35.8 million market value of products sold (USDA 2017).

Impact on the Environment

Extreme temperature events can have a major impact on the environment. For example, freezing and warming weather patterns create changes in natural processes. An excess amount of snowfall and earlier warming periods may affect natural processes such as flow within water resources (USGS 2020). Extreme heat events can have particularly negative impacts on aquatic systems, contributing to fish kills, aquatic plant die offs, and increased likelihood of harmful algal blooms.

Future Changes That May Impact Vulnerability

Understanding future changes that effect vulnerability in the Planning Area can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The Planning Area considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

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Projected Development

The ability of new development to withstand extreme temperature impacts can be enhanced through land use practices and consistent enforcement of codes and regulations for new construction. New development will change the landscape where buildings, roads, and other infrastructure potentially replace open land and vegetation. Transformation of pervious surfaces (including vegetation) to impervious surfaces causes an island of higher temperatures.

Projected Changes in Population

Llano County has experienced an increase in population between the 2010 Census (19,301) and the 2020 Census population of 21,243. The population of the County is expected to increase over the next few years. San Saba County experienced a decrease in population between the 2010 Census (6,131) and the 2020 Census population of 5,730. The Texas Demographic Center has produced population estimates for the region that were last updated in 2018 based on 2010 Census data. The estimates show a slight projected decline for Llano County between 0.14 and 0.25 percent every five years from 2025 to 2035, followed by a projected growth between 0.68 and 3.3 percent every five years from 2035 to 2050. The estimates show projected decline for San Saba County between 1.51 and 4.3 percent every five years from 2025 to 2050 (Texas Demographic Center n.d.). Increases in population will increase the exposure to the extreme temperature hazard.

Climate Change

As the climate warms, extreme cold events might decrease in frequency, while extreme heat events might increase in frequency; the shift in temperatures could also result in hotter extreme heat events. With increased temperatures, vulnerable populations could face increased vulnerability to extreme heat and its associated illnesses, such as heatstroke and cardiovascular and kidney disease. Additionally, as temperatures rise, more buildings, facilities, and infrastructure systems may exceed their ability to cope with the heat.

Change of Vulnerability Since 2016 HMP

Overall, the vulnerability to the extreme temperature hazard since the 2016 HMP remains unchanged.

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Section 4 Risk Assessment

4.3 Hazard Profiles

4.3.4 Flood

The following section provides the hazard profile and vulnerability assessment for the flood hazard in the Planning Area. When referring to the Planning Area, it includes both Llano County and San Saba County.

Hazard Profile

Hazard Description

A flood is a general and temporary condition of partial or complete inundation of normally dry land areas from:

- The overflow of stream banks
- The unusual and rapid accumulation of runoff of surface waters from any source
- Mudflows or the sudden collapse of shoreline land

Flooding results when the flow of water is greater than the normal carrying capacity of the stream channel. Rate of rise, magnitude (or peak discharge), duration, and frequency of floods are a function of specific physiographic characteristics. Generally, the rise in water surface elevation is quite rapid on small (and steep gradient) streams and slow in large (and flat sloped) streams.

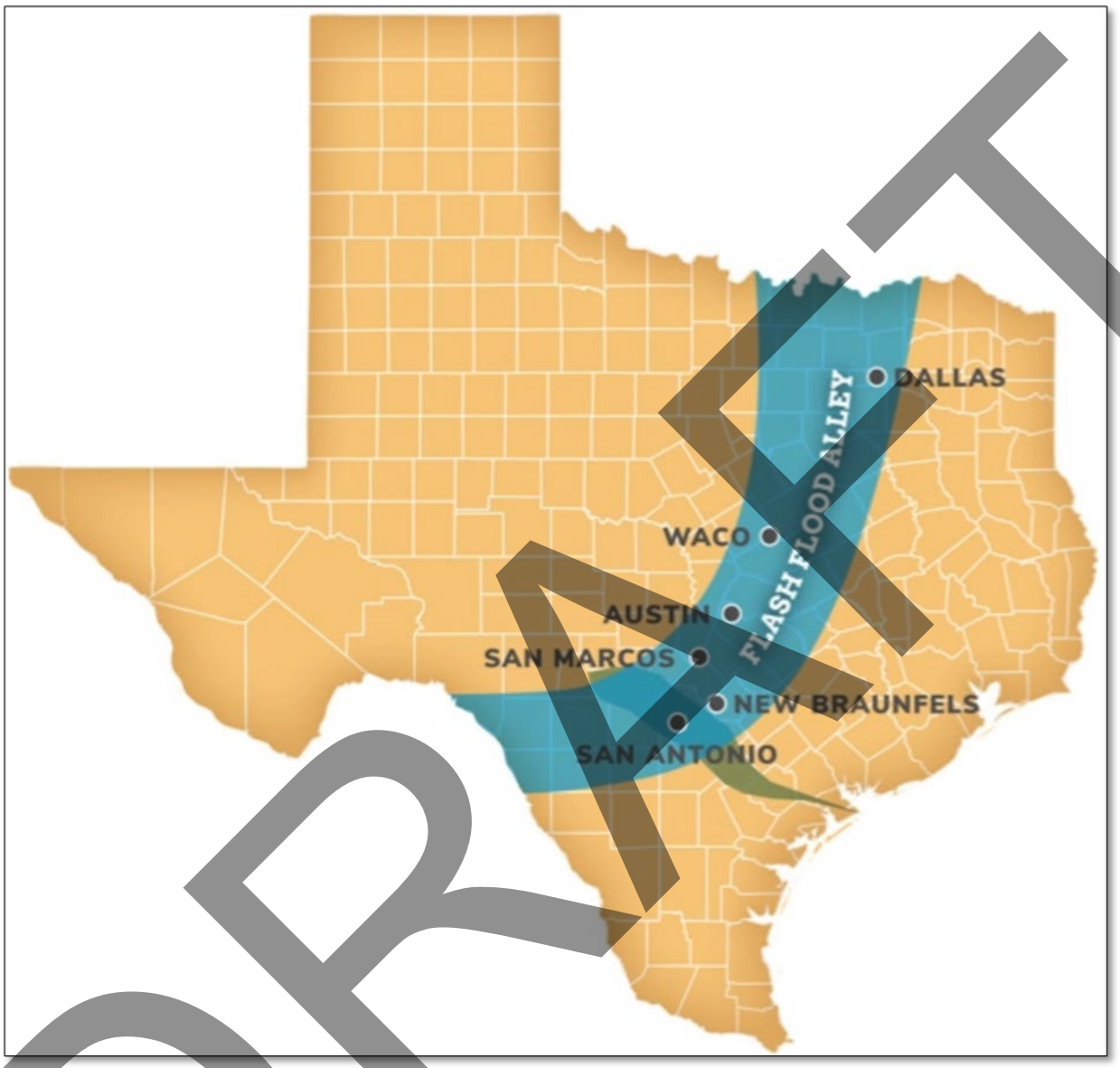
The causes of floods relate directly to the accumulation of water from precipitation, or the failure of man-made structures, such as dams or levees. Floods caused by precipitation are further classified as coming from: rain in a general storm system, rain in a localized intense thunderstorm, melting snow, and ice.

Floods may also be caused by structural or hydrologic failures of dams or levees. A hydrologic failure occurs when the volume of water behind the dam or levee exceeds the structure's capacity resulting in overtopping. Structural failure arises when the physical stability of the dam or levee is compromised due to age, poor construction and maintenance, seismic activity, rodent tunneling, or myriad other causes. For more information on dam failure, refer to Section 4.3.1.

Texas has the most flash flood deaths of any state in the country and while San Saba lies just north of the "Flash Flood Alley" area of Texas, a portion of Llano County is within the region (see Figure 4.3.4- 1). The terrain in the "Flash Flood Alley" area is punctuated by a large number of limestone or granite rocks and boulders and a thin layer of topsoil, which makes the region very dry and prone to flash flooding. Other factors contributing to flash floods in the area include its location between the Rocky Mountains and the moisture laden Gulf of Mexico. As weather systems stall and dissipate over Texas, and they drop intense rains over small areas. In the past, Llano and San Saba Counties have had significant seasonal floods along the Colorado and Llano Rivers; however, these floods have been greatly reduced by the construction of large reservoirs along the Colorado River. This has also helped to reduce the impacts of seasonal floods in the planning area.

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Figure 4.3.4-1 Flash Flood Alley in Texas



Source: San Antonio River Authority 2022

The potential for flooding can change and increase through various land use changes and changes to land surface. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining watersheds or natural drainage channels. These changes are commonly created by human activities (e.g., development). These changes can also be created by other events such as wildfires. Wildfires create hydrophobic soils, a hardening or "glazing" of the earth's surface that prevents rainfall from being absorbed into the ground, thereby increasing runoff, erosion, and downstream sedimentation of channels (Llano County 2016) (San Saba County 2016).

Riverine Flooding

Though local in the immediate impacts, riverine flooding damages are widely dispersed in Texas. The majority of flood-related deaths are caused by people attempting to drive through moving water.

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Riverine flood risks are calculated in hydrologic and hydraulic (H&H) studies. These studies yield the most specific and localized risk maps. Hydrologic elements calculate the amount of water that is expected in a given system, either from contributing waterways or from precipitation. Hydraulic elements calculate how the water can be expected to flow through the system based on its capacity to move the water. The engineering process produces estimates at various points along the waterway that make up expected water levels of various probabilities or return periods. H&H studies determine at what volumes waters will overflow the banks of the river systems and what the resultant areas or chance of flooding will be at given return periods.

Federal regulations require houses with their base floor elevation within one foot of the 100-year-floodplain to participate in the National Flood Insurance Program (NFIP). This is a federally subsidized insurance program administered by FEMA in coordination with state and local governments. This program seeks to limit damages through regulation and also to help stabilize real estate markets nationwide. NFIP requires that FEMA develop and maintain maps of nationwide 100-year floodplains prioritized for high-risk areas. The vast majority of Texas is covered by these studies (State of Texas 2018).

Thunderstorm/Flash Flooding

Damaging thunderstorm floods are caused by intense rain over basins of relatively small area. They are characterized by a sudden rise in stream level, short duration, and a relatively small volume of runoff. Because there is little or no warning time, the term “flash flood” is often used to describe thunderstorm floods. Texas is known as the “Flash Flood Alley” and the area along the Balcones Escarpment (from Austin south to San Antonio, then west to Del Rio) is one of the nation's three most flash flood-prone regions. Figure 12-1 and Figure 12-2 show the number of flash floods and storm centers in the HMP update area. Llano County lies in the path of the “Flash Flood Alley,” while San Saba lies just to its North.

Thunderstorm floods occur in every month of the year in Texas but are most common in the spring and summer. The mean annual number of thunderstorm flood days varies from 40 in eastern Texas to 60 in western Texas. Most flash flooding is caused by slow-moving thunderstorms, thunderstorms repeatedly moving over the same area, or heavy rains from hurricanes and tropical storms.

Flash floods can occur within a few minutes or after hours of excessive rainfall. Flash floods can roll boulders, tear out trees, destroy buildings and bridges, and carve out new channels. Rapidly rising water can reach heights of thirty feet or more. Flash flood-producing rains can also trigger catastrophic mudslides. Often there is no warning that flash floods are coming. Hill Country flash floods devastated the river basin and are a major reason why the LCRA located Mansfield Dam and Lake Travis (the flood control components of the Highland Lake chain) upstream of Austin. Flash flooding poses a deadly danger to residents of the Lower Colorado River Basin. Several roads run through low-lying areas that are prone to sudden and frequent flooding during heavy rains. Motorists often attempt to drive through barricaded or flooded roadways. It takes only 18 to 24 inches of water moving across a roadway to carry away most vehicles. Floating cars easily get swept downstream, making rescues difficult and dangerous (Llano County 2016) (San Saba County 2016).

Stormwater Flooding

Stormwater flooding is generated from rain and snowmelt events that flow over land or impervious surfaces, such as paved streets, parking lots, and building rooftops, and does not soak into the ground. The runoff picks up pollutants like trash, chemicals, oils, and dirt/sediment that can harm our rivers, streams, lakes, and coastal waters. Population growth and the development of urban/urbanized areas are major contributors to the number of pollutants in the flood waters as well as the volume and rate from impervious surfaces. Together, they can

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cause changes in hydrology and water quality that result in habitat modification and loss, increased flooding, decreased aquatic biological diversity, and increased sedimentation and erosion (US EPA 2022).

During periods of heavy rainfall or snowmelt, some wastewater systems are designed to occasionally overflow and discharge excess untreated sewage directly to nearby streams, rivers, or other water bodies. These discharges are known as combined sewer overflows and are common in many cities nationwide.

Green infrastructure can be used to address stormwater runoff and sewer overflow problems. Green infrastructure works by slowing down the runoff, spreading it out over the land, and slowly soaking it into the ground, or in some cases reusing the water onsite. Green infrastructure is also sometimes referred to as low impact development. These techniques also help to remove pollutants from runoff, buy allowing plants to filter out pollutants as the water slowly infiltrates into the ground. Some examples of green infrastructure techniques include rain gardens, pervious pavement, rain barrels, and green roofs (US EPA 2022).

Location

Llano County and the participating communities in this HMP update are located in the Llano and Buchanan-Lyndon watersheds. All streams in the County are either direct or indirect tributaries of the Llano River or the Colorado River. The Llano River runs west to east centrally across the County and drains into the Colorado River. Small creeks in the County that flow into the Llano River include Hickory Creek, Honey Creek, Little Llano River, Pecan Creek, and San Fernando Creek. These streams normally flow year-round, although they may dry up during unusually dry years. Additionally, large irrigation canals (not mapped) also contribute to local flooding (Llano County 2016).

San Saba County lies completely within the Colorado River basin. The Colorado River runs west to southeast in this area along the north and east boundary of the County. Some local waterbodies include the San Saba River, as well as Antelope, Simpson, Richland Springs, Wallace, and Wilbarger Creeks. These streams normally flow year-round, although they may dry up during unusually dry years. Additionally, large irrigation canals (not mapped) also contribute to local flooding (San Saba County 2016).

Run off in Llano County is captured to fill several lakes and reservoirs in the County. The LCRA operates several dams in the area and uses the floodgates to manage floodwaters with the overall goal of reducing downstream flooding. Run off in San Saba County is captured to fill several lakes and reservoirs. The San Saba soil and water conservation districts (SWCD) operates several dams within the County. Some with the highest storage volumes include the Lower San Saba River WS Site 2, 7, and 15 Dams. These dams are used to manage floodwaters with the overall goal of reducing downstream flooding.

In addition to the riverine flooding, the project area also experiences stormwater flooding caused by urbanization, which may increase the run-off potential of an area.

The floodplain boundary extents for most of the creeks, streams, rivers, and lakes in the project area have been mapped by FEMA. The resulting FIRMs provide an official depiction of flood hazard risks and

risk premium zones for each community and for properties located within it. The updated maps in Llano County became effective January 29, 2021 and have been effective in San Saba County since July 2, 1991. However, areas in the southeast corner as well as the north central border of San Saba County have not yet had the flood map boundaries printed. The FIRMs mapped for San Saba County have not yet been remapped as part of the FEMA Map Modernization Program providing Digital Flood Insurance Rate Maps, or DFIRMs. While the FEMA digital

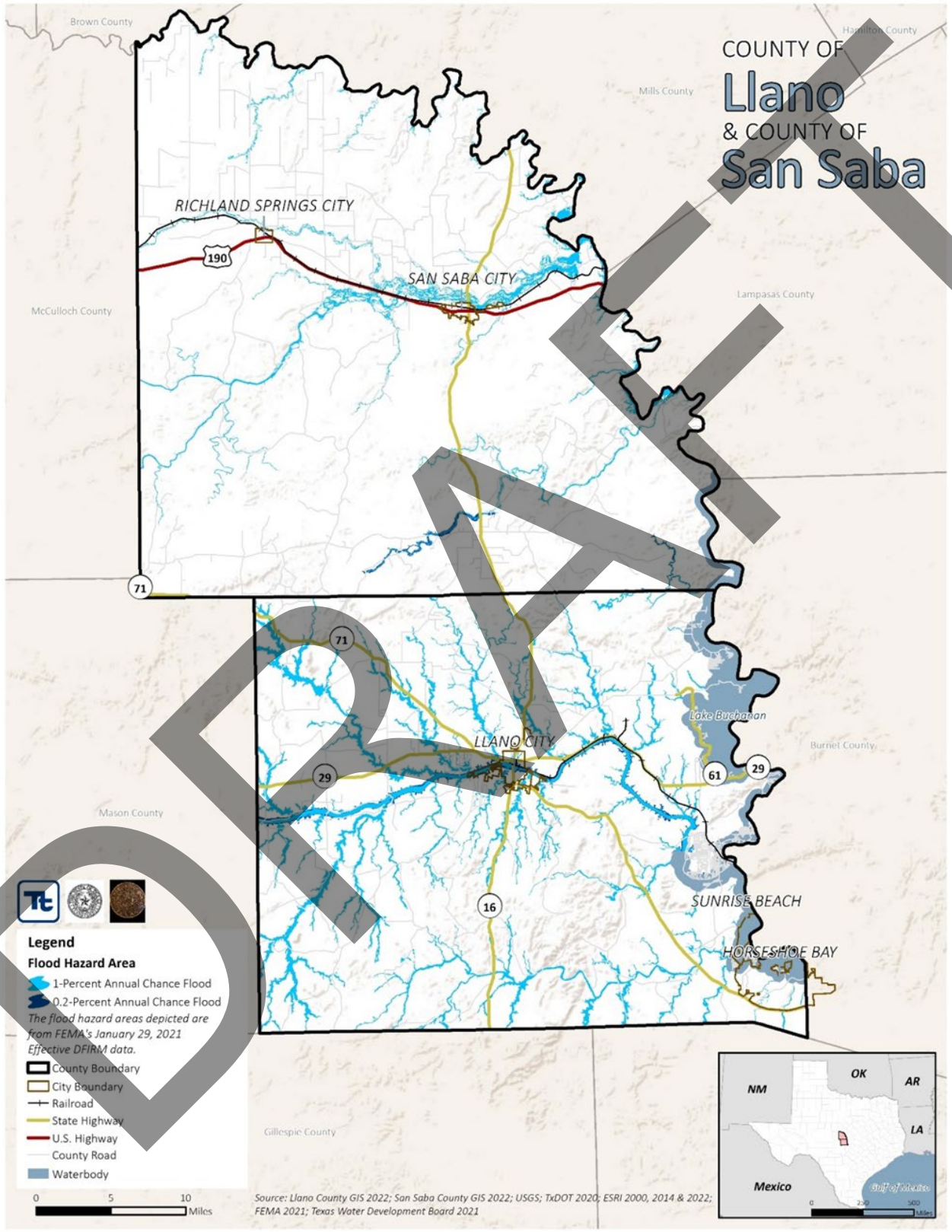
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flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Riverine flooding, stormwater flooding, and flood-related losses often do occur outside of delineated SFHAs.

Excluding waterbodies, Llano County has 50,502 acres in the 100-year floodplain and 106,355 acres in 500-year floodplain; San Saba County has 11,408 acres in the 100-year floodplain, and 23,185 acres in the 500-year floodplain (FEMA 2021)(NHD 2022).

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Figure 4.3.4-2 Special Flood Hazard Areas for the County of Llano and the County of San Saba



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Extent

Intensity of floods is the damage caused by it. It can be characterized by depth of inundation, volume of inundation, velocity of flow and rate of rise of water. The more the depth of water, more will be its volume, velocity, and its damaging capacity. A high rate of rise for water also means less preparation time for people in the area.

Flooding in the HMP update area is mostly caused by slow-moving thunderstorms, thunderstorms repeatedly moving over the same area, or heavy rains from hurricanes and tropical storms. Flash floods can occur within a few minutes or after hours of excessive rainfall. These rain events are most often microbursts, which produce a large amount of rainfall in a short amount of time. Flash floods, by their nature, occur suddenly but usually dissipate within hours. Despite their sudden nature, the NWS is usually able to issue advisories, watches, and warnings in advance of a flood.

Worst-Case Scenario

An intense, short-duration storm could move slowly across the planning area creating significant flash floods with little or no warning. Injuries or fatalities may result if residents are caught off guard by the flood event. Stormwater systems could be overwhelmed, and significant flooding could impact a substantial portion of structures within the planning area. Transportation routes could be cut off due to floodwaters, isolating portions of the planning area. These impacts may last after the floodwater recedes as flash floods in the area have been known to cause extensive damage to roadway infrastructure. Areas that have recently experienced wildfires would contribute to the extent of flooding impacts. The major issues for flooding are the following:

- Flash flooding that occurs with little or no warning will continue to impact the planning area.
- The duration and intensity of storms contributing to flooding issues may increase due to climate change.
- Flooding may be exacerbated by other hazards, such as wildfires.
- Damages resulting from flood may impact tourism, which may have significant impacts on the local economy.
- The promotion of flood insurance as a means of protecting private property owners from the economic impacts of frequent flood events should continue.

Previous Occurrences and Losses

FEMA Disaster Declarations

Between 1954 and 2022, Llano County was included in four disaster (DR) or emergency (EM) declaration for flood-related events. San Saba County were included in three disaster (DR) or emergency (EM) declaration for flood-related events. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 3 (County Profile).

U.S. Department of Agriculture Disaster Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2017 and 2022, Llano and/or San Saba County were not included in flood-related agricultural disaster declarations.

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Previous Events

For this 2023 HMP update, known flood events that impacted the Planning Area between 2017 and 2022 are discussed below in Table 4.3.4-1. For events prior to 2017, refer to Appendix I (Supplementary Data).

Table 4.3.4-1 Flood Events in the Planning Area (2017 to 2022)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
April 10, 2017	Flash Flood	N/A	N/A	A cold front moved through South Central Texas and generated thunderstorms. Some of these storms produced large hail and heavy rain that led to flash flooding. This storm amounted to $500,000.00 worth of property damages.
August 7, 2017	Flash Flood	N/A	N/A	A line of thunderstorms formed ahead of a cold front in North Texas and moved southward. This line moved into a very moist airmass and produced heavy rain as it moved slowly across Llano County. It continued to move southward, and convection was enhanced by interaction with an outflow boundary over Bexar County where additional heavy rain developed.
September 10 – November 2, 2018	Severe Storms and Flooding	FEMA-4416-DR	Llano and San Saba Counties	Prolonged and cascading weather impacts from several successive weather patterns, including tropical Atlantic moisture and impacts from Pacific hurricanes, hit Texas from September 10, 2018 through October 28, 2018 causing catastrophic river flooding. Numerous heavy rain events created cascading effects, saturating soils, and preventing sensitive river basins from recovering. Texas experienced historic river flooding along the Llano and Colorado River basins with major flood waves on the Brazos, Trinity, and Nueces Rivers. Catastrophic flooding in the Colorado River basin led to unprecedented releases into the Highland Lakes, necessitating the Lower Colorado River Authority to conduct massive river releases. These releases overwhelmed the city of Austin's water and wastewater treatment plants due to the high amounts of silt in the floodwaters and caused a city-wide water crisis.
October 15-16, 2018	Riverine Flood and Flash Flood	N/A	N/A	An upper-level low pressure system remained parked through October 17. This feature interacted with plenty of moisture and resulted in periods of very heavy rain from October 15 through the 17. Widespread flooding developed across the area and many lakes and rivers rose above flood stage and resulted in widespread flooding. Millions of dollars

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
				of damage was done to roads and county infrastructure. Johnson Fork Creek rose high enough that it caused some water to overflow onto one of the lanes on Interstate 10. Interstate 10 had to be closed. The Clear Fork on the Brazos River near Fort Griffin rose to 36.18 feet on October 15; The Llano River at Mason rose to 32.89 foot on October 16; Colorado River near San Saba rose to 32.53 feet on October 17; Colorado River near Ballinger rose to 22.97 feet on October 17; and the San Saba River at San Saba rose to 28.54 inches on October 16. This storm caused $111 million worth of property damages.
July 12, 2021	Flash Flood	N/A	N/A	The combination of abundant tropical moisture, moderate instability and a weak upper-level disturbance produced thunderstorms with heavy rainfall across the Concho Valley and Heartland. A few of the thunderstorms produced flash flooding.

Sources: NOAA NCEI 2022; USDA FSA 2022; FEMA 2022; San Saba County 2016; Llano County 2016
Notes: Llano County and San Saba County were affected by several flooding events between 2017 and 2022.

Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of flood events for the County. Information from NOAA-NCEI storm events database, the 2019 State of Texas HMP, the 2016 Llano HMP and the 2016 San Saba County HMP were used to identify the number of flood events that occurred between 1950 and 2022. Table 4.3.4-2 presents the probability of future flood events in Llano County; Table 4.3.4-3 presents the probability of future flood events in San Saba County.

Table 4.3.4-2 Probability of Future Flood Events in Llano County

Hazard Type	Number of Occurrences Between 1950 and 2022	% Chance of Occurring in Any Given Year
Flash Flood	77	100%
Flood	12	16.44%
Total	**89**	**100%**

Sources: NOAA NCEI 2022; State of Texas 2018; Llano County 2016
Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all flood events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.

Table 4.3.4-3 Probability of Future Flood Events in San Saba County

Hazard Type	Number of Occurrences Between 1950 and 2022	% Chance of Occurring in Any Given Year
Flash Flood	23	31.52%

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Flood	9	12.33%
Total	**32**	**43.84%**

Sources: NOAA NCEI 2022; State of Texas 2018; San Saba County 2016
Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all flood events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.

In Llano County, seasonal flooding on the Llano River and Colorado River have increased over time due to increased rainfall events and weather patterns. In San Saba County, seasonal flooding on the Colorado River and Richland Springs Creek have increased over time due to increased rainfall events and weather patterns (San Saba County 2016).

In Section 4.4, the identified hazards of concern for the Planning Area were ranked (Table 4.4-4 and Table 4.4-5). The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Team, the probability of occurrence for floods in the Planning Area is considered 'frequent'.

Climate Change Projections

The climate of Texas is changing. Most of the State has warmed between one half and one degree Fahrenheit in the past century. In the eastern two-thirds of the State, rainstorms are more intense, and floods are becoming more severe. In the coming decades, storms are likely to become more severe in Texas (EPA 2016). Periods of extreme precipitation increase the risk of flood (Centers for Climate and Energy Solutions n.d.).

High frequency flood events (e.g., 10-year floods) in particular will likely increase with a changing climate. Along with reductions in the amount of the snowpack and accelerated snowmelt, scientists project greater storm intensity, resulting in more direct runoff and flooding. Changes in watershed

vegetation and soil moisture conditions will likewise change runoff and recharge patterns. As stream flows and velocities change, erosion patterns will also change, altering channel shapes and depths, possibly increasing sedimentation behind dams, and affecting habitat and water quality. With potential increases in the frequency and intensity of wildfires due to climate change, there is potential for more floods following fire, which increase sediment loads and water quality impacts.

As hydrology changes, what is currently considered a 100-year flood may strike more often, leaving many communities at greater risk. Planners will need to factor a new level of safety into the design, operation, and regulation of flood protection facilities such as dams, floodways, bypass channels, and levees, as well as the design of local sewers and storm drains (Llano County 2016) (San Saba County 2016).

Use of historical hydrologic data has long been the standard of practice for designing and operating water supply and flood protection projects. For example, historical data are used for flood forecasting models. This method of forecasting assumes that the climate of the future will be similar to that of the period of historical record. However, the hydrologic record cannot be used to predict changes in frequency and severity of extreme climate events such as floods. Going forward, model calibration or statistical relation development must happen more frequently, new forecast-based tools must be developed, and a standard of practice that explicitly considers climate change must be adopted. Climate change is already impacting water resources, and resource managers have observed the following:

- Historical hydrologic patterns can no longer be solely relied upon to forecast the water future.

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- Precipitation and runoff patterns are changing, increasing the uncertainty for water supply and quality, flood management, and ecosystem functions.

Extreme climatic events will become more frequent, necessitating improvement in flood protection, drought preparedness, and emergency response.

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The locations in the Planning Area that are located in the 1-percent and 0.2-percent annual chance floodplain are most vulnerable to the flood hazard. The following text evaluates and estimates the potential impact of the flood hazard in the 1-percent and 0.2-percent floodplains.

Impact on Life, Health, and Safety

Impacts of flooding on life, health, and safety depend on several factors including severity of the event and whether adequate warning time is provided to residents. Vulnerable populations are all populations residing or located in the floodplain that are incapable of escaping the area within the required timeframe to reach safety. However, exposure should not be limited only to those who reside within a defined hazard zone, but everyone who may be affected by a hazard event (e.g., people are considered at risk if they are traveling in flooded areas, or their access to emergency services is compromised during an event). Flash floods can be localized events that affect areas outside of the floodplain due to localized drainage issues and can directly impact populations and comprise access to emergency services. The degree of that impact varies and is not strictly measurable.

In Llano County, an estimated 1,706 people reside in the 1-percent annual chance event boundary, and 4,490 people within the 0.2-percent annual chance flood boundary. These residents may be displaced by the flooding of their homes, requiring them to seek temporary shelter with friends and family or in emergency shelters. Table 4.3.4-4 lists population estimates within flood hazard zones in Llano County.

Table 4.3.4-4 Estimated Population Exposed to the Flood Hazard in Llano County

Jurisdiction	Total Population (2020 Decennial Census)	Estimated Population Located in the Flood Hazard Areas			
		Number of Persons Located in the 1-percent Annual Chance Flood Event Hazard Area	Percent of Total	Number of Persons Located in the 0.2-percent Annual Chance Flood Event Hazard Area	Percent of Total
Horseshoe Bay (C)	4,257	252	5.9%	791	18.6%
Sunrise Beach (C)	739	120	16.2%	347	47.0%
Llano (C)	3,325	242	7.3%	765	23.0%
Unincorporated Llano County	12,922	1,092	8.5%	2,587	20.0%

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Llano County (Total)	**21,243**	**1,706**	**8.0%**	**4,490**	**21.1%**

Source: Hazus v5.1; FEMA 2021; Census 2020
Note: (C) = City
**Disclaimer: Horseshoe Bay City statistics are based on both Llano County and Burnet County coverage. Results may be over or underestimated.*

In San Saba County, an estimated 132 people reside in the 1-percent annual chance event boundary, and 143 people within the 0.2-percent annual chance flood boundary. These residents may be displaced by the flooding of their homes, requiring them to seek temporary shelter with friends and family or in emergency shelters. Table 4.3.4-5 lists population estimates within flood hazard zones in San Saba County.

Table 4.3.4-5 Estimated Population Exposed to the Flood Hazard in San Saba County

Jurisdiction	Total Population (2020 Decennial Census)	Estimated Population Located in the Flood Hazard Areas			
		Number of Persons Located in the 1-percent Annual Chance Flood Event Hazard Area	Percent of Total	Number of Persons Located in the 0.2-percent Annual Chance Flood Event Hazard Area	Percent of Total
Richland Springs (T)	244	2	0.7%	2	0.7%
San Saba (C)	3,117	25	0.8%	25	0.8%
Unincorporated San Saba County	2,369	106	4.5%	117	4.9%
San Saba County (Total)	**5,730**	**132**	**2.3%**	**143**	**2.5%**

Source: FEMA 2021; Texas Water Development Board 2021; Census 2020
Note: (C) = City, (T) = Town
**Disclaimer: Horseshoe Bay City statistics are based on both Llano County and Burnet County coverage. Results may be over or underestimated.*

Of the population exposed, the most vulnerable include the economically disadvantaged and the population over age 65. Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions to evacuate based on net economic impacts to their families. The population over age 65 is also more vulnerable because available medical services may be disrupted, and they are more likely to seek or need medical attention that may not be available due to isolation during a flood event. They also may have more difficulty evacuating. Table 4.3.4-6 and Table 4.3.4-7 presents the estimated potential sheltering needs as a result of the 1-percent flood event.

Table 4.3.4-6 Estimated Llano County Population Displaced or Seeking Short-Term Shelter from Flood Events

Llano Jurisdiction	Total Population (2020 Decennial Census)	1-Percent Annual Chance Flood Event	
		Displaced Population*	Persons Seeking Short-Term Sheltering
Horseshoe Bay (C)	4,257	175	39
Sunrise Beach (C)	3,325	113	23
Llano (C)	739	241	31
Unincorporated Llano County	12,922	975	209
Llano County (Total)	**21,243**	**1,505**	**302**

Source: FEMA 2021; Hazus v5.1; Census 2010/2020
Notes: (C) = City, (T) = Town
**The number of displaced persons may overestimate the impacted population located in the 1-percent annual chance flood hazard area due to the limitations of the Hazus model using Census 2010 census block data*

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Table 4.3.4-7 Estimated San Saba County Population Displaced or Seeking Short-Term Shelter from Flood Events

San Saba Jurisdiction	Total Population (2020 Decennial Census)	1-Percent Annual Chance Flood Event	
		Displaced Population*	Persons Seeking Short-Term Sheltering
Richland Springs (T)	244	318	2
San Saba (C)	3,117	2,574	51
Unincorporated San Saba County	2,369	3,240	87
San Saba County (Total)	**5,730**	**6,131**	**140**

Source: FEMA 2021; Texas Water Development Board 2021; Hazus v5.1; Census 2010/2020
Notes: (C) = City, (T) = Town
**The number of displaced persons may overestimate the impacted population located in the 1-percent annual chance flood hazard area due to the limitations of the Hazus model using Census 2010 census block data*

Total numbers of injuries and casualties resulting from typical riverine flooding are generally limited based on advance weather forecasting, blockades, and warnings. Injuries and deaths generally are not anticipated if proper warning and precautions occur. In contrast, warning time for flash flooding is limited. These events are frequently associated with other natural hazard events such as earthquakes, landslides, or severe weather, which limits their predictability and compounds the hazard. Populations without adequate warning of the event are highly vulnerable to this hazard.

Cascading impacts may also include exposure to pathogens such as mold. After flood events, excess moisture and standing water contribute to the growth of mold in buildings. Mold may present a health risk to building occupants, especially those with already compromised immune systems such as infants, children, the elderly and pregnant women. The degree of impact will vary and is not strictly measurable. Molds can grow in as short a period as 24-48 hours in wet and damaged areas of buildings that have not been properly cleaned. Very small mold spores can easily be inhaled, creating the potential for allergic reactions, asthma episodes, and other respiratory problems. Buildings should be properly cleaned and dried out to safely prevent mold growth (CDC 2021).

Molds and mildews are not the only public health risk associated with flooding. Floodwaters can be contaminated by pollutants such as sewage, human and animal feces, pesticides, fertilizers, oil, asbestos, and rusting building materials. Common public health risks associated with flood events also include:

- Unsafe food
- Contaminated drinking and washing water and poor sanitation
- Mosquitos and animals
- Carbon monoxide poisoning
- Secondary hazards associated with re-entering/cleaning flooded structures
- Mental stress and fatigue (CDC 2021)

Current loss estimation models such as Hazus v5.1 cannot measure public health impacts. The best ways to mitigate these impacts are to be aware that they can occur, educate the public on prevention, and be prepared to deal with these vulnerabilities in responding to flood events.

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Impact on General Building Stock

To assess potential impacts on buildings, exposure (located in the hazard area) of the building stock was examined for the 1-percent and 0.2-percent flood scenarios. Overall, 11-percent of buildings and 11.5-percent of the replacement cost value of buildings in Llano County are exposed to the 1-percent flood scenario. 2.9-percent of buildings and 2.6-percent of the replacement cost value of buildings in San Saba County are exposed to the 1-percent flood scenario. 26.7-percent of buildings and 24.5-percent of the replacement cost value of buildings in Llano County are exposed to the 0.2-percent flood scenario. 3.2 percent of buildings and 2.9 percent of the replacement cost value of buildings in San Saba County are exposed to the 0.2-percent flood scenario.

Hazus v5.1 was used to calculate the projected building stock impacts from the 1-percent flood event. In Llano County, the 1-percent event is anticipated to result in damages to 11 percent of the total replacement cost value of the building stock of the County's . In San Saba County, the 1-percent event is anticipated to result in damages to less than 0.1 percent of the total replacement cost value of the County's building stock. Table 4.3.4-8 through Table 4.3.4-11 summarize these results.

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Table 4.3.4-8 Estimated General Building Stock Exposure to a 1-Percent and 0.2-Percent Annual Chance Flood Event in Llano County

Jurisdiction	Total Number of Buildings	Total Replacement Cost Value (RCV)	Estimated Number and Total Replacement Cost Value of Structures Located Within the 1-Percent Annual Chance Flood Hazard Area				Estimated Number and Total Replacement Cost Value of Structures Located Within the 0.2-Percent Annual Chance Flood Hazard Area			
			Number of Buildings Located in the 1-percent Annual Chance Flood Event Hazard Area	Percent of Total	Total Replacement Cost Value of Buildings Located in the 1-percent Annual Chance Flood Event Hazard Area (Haz_RCV)	Percent of Total	Number of Buildings Located in the 0.2-percent Annual Chance Flood Event Hazard Area	Percent of Total	Total Replacement Cost Value of Buildings Located in the 0.2-percent Annual Chance Flood Event Hazard Area (Haz_RCV)	Percent of Total
Horseshoe Bay (C)	2,174	$921,317,000	228	10.5%	$94,642,983	10.3%	632	29.1%	$271,865,160	29.5%
Sunrise Beach (C)	909	$345,382,000	183	20.1%	$68,940,918	20.0%	510	56.1%	$193,297,404	56.0%
Llano (C)	1,733	$564,332,000	128	7.4%	$47,358,862	8.4%	407	23.5%	$133,367,474	23.6%
Unincorporated Llano County	8,788	$2,408,418,000	958	10.9%	$276,242,103	11.5%	2,077	23.6%	$592,861,416	24.6%
Llano County (Total)	**13,604**	**$4,239,449,000**	**1,497**	**11.0%**	**$487,184,866**	**11.5%**	3,626	26.7%	$1,191,391,455	28.1%

Source: FEMA 2021; Census 2020
Notes: (C) = City
**Disclaimer: Horseshoe Bay City statistics are based on both Llano County and Burnet County coverage. Results may be over or underestimated.*

Table 4.3.4-9 Estimated Building Stock Impacts to a 1-Percent Annual Chance Flood Event in Llano County

Jurisdiction	Total Replacement Cost Value (RCV)	All Occupancies	
		Estimated Loss	Percent of Total Replacement Cost Value
Horseshoe Bay (C)	$921,317,000	228	10.5%
Sunrise Beach (C)	$345,382,000	183	20.1%
Llano (C)	$564,332,000	128	7.4%
Unincorporated Llano County	$2,408,418,000	958	10.9%
Llano County (Total)	**$4,239,449,000**	**1,497**	**11.0%**

Source: FEMA 2021; Hazus v5.1; Census 2010/2020
Notes: (C) = City
**Disclaimer: Horseshoe Bay City statistics are based on both Llano County and Burnet County coverage. Results may be over or underestimated.*

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Table 4.3.4-10 Estimated General Building Stock Exposure to a 1-Percent and 0.2-Percent Annual Chance Flood Event in San Saba County

Jurisdiction	Total Number of Buildings	Total Replacement Cost Value (RCV)	Estimated Number and Total Replacement Cost Value of Structures Located Within the 1-Percent Annual Chance Flood Hazard Area				Estimated Number and Total Replacement Cost Value of Structures Located Within the 0.2-Percent Annual Chance Flood Hazard Area			
			Number of Buildings Located in the 1-percent Annual Chance Flood Event Hazard Area	Percent of Total	Total Replacement Cost Value of Buildings Located in the 1-percent Annual Chance Flood Event Hazard Area (Haz RCV)	Percent of Total	Number of Buildings Located in the 0.2-percent Annual Chance Flood Event Hazard Area	Percent of Total	Total Replacement Cost Value of Buildings Located in the 0.2-percent Annual Chance Flood Event Hazard Area (Haz_RCV)	Percent of Total
Richland Springs (T)	213	$66,306,000	1	0.7%	$427,534	0.6%	1	0.7%	$427,534	0.6%
San Saba (C)	1,311	$410,811,000	9	0.7%	$2,158,751	0.5%	9	0.7%	$2,158,751	0.5%
Unincorporated San Saba County	1,819	$480,386,000	85	4.7%	$22,448,577	4.7%	96	5.3%	$25,231,364	5.3%
San Saba County (Total)	**3,343**	**$957,503,000**	**95**	**2.9%**	**$25,034,862**	**2.6%**	107	3.2%	$27,817,649	2.9%

Source: *FEMA 2021; Texas Water Development Board 2021; Census 2020*
Notes: *(C) = City, (T) = Town*

Table 4.3.4-11 Estimated Building Stock Impacts to a 1-Percent Annual Chance Flood Event in San Saba County

Jurisdiction	Total Replacement Cost Value (RCV)	All Occupancies	
		Estimated Loss	Percent of Total Replacement Cost Value
Richland Springs (T)	$66,306,000	$0	0.0%
San Saba (C)	$410,811,000	$2,000	0.0%
Unincorporated San Saba County	$480,386,000	$0	0.0%
San Saba County (Total)	**$957,503,000**	**$2,000**	**<0.1%**

Source: *FEMA 2021; Texas Water Development Board 2021; Hazus v5.1; Census 2010/2020*
Notes: *(C) = City*

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NFIP

According to data from FEMA, as of October 2022, Llano County has 542 NFIP policies for a total NFIP premium of $536,514 and $152,807,000 in coverage. There have been 478 closed paid losses for a value of $13,054,686.

Table 4.3.4-12 NFIP Statistics for Llano County

Property Type	Policies in Force for All Properties	Premium Value for All Properties	Insurance in Force for All Properties	Number of Closed Paid Losses for All Properties	Value of Closed Paid Losses for All Properties
Single Family	509	$508,377	$146,659,200	446	$12,373,022
2-4 Family	8	$10,898	$1,721,800	8	$248,506
All Other Residential	18	$10,644	$3,162,000	9	$268,631
Non-Residential	7	$6,595	$1,264,000	15	$164,527
Llano County (Total)	**542**	**$536,514**	**$152,807,000**	**478**	**$13,054,686**

Source: FEMA 2022

According to data from FEMA, as of October 2022, San Saba County has 15 NFIP policies for a total NFIP premium of $10,756 and $2,546,000 in coverage. There have been 8 closed paid losses for a value of $106,713.

Table 4.3.4-13 NFIP Statistics for San Saba County

Property Type	Policies in Force for All Properties	Premium Value for All Properties	Insurance in Force for All Properties	Number of Closed Paid Losses for All Properties	Value of Closed Paid Losses for All Properties
Single Family	11	$8,547	$2,109,600	8	$106,713
2-4 Family	0	$0	$0	0	$0
All Other Residential	0	$0	$0	0	$0
Non-Residential	4	$2,209	$437,000	0	$0
San Saba County (Total)	**15**	**$10,756**	**$2,546,600**	**8**	**$106,713**

Source: FEMA 2022

A property is considered a repetitive loss (RL) property when there are "two or more losses reported which were paid more than $1,000 for each loss. The two losses must be within 10 years of each other and be at least 10 days apart. Only losses from (*sic* since) January 1, 1978 that are closed are considered. A severe repetitive loss (SRL) property is defined as a residential property covered under an NFIP flood insurance policy, and satisfying either of conditions 1 and 2, as well as condition 3 (Section 1361A of the National Flood Insurance Act 42 *United States Code* 4102a):

1. "At least four NFIP claim payments for the property (including building and contents) over $5,000 each have occurred, and the cumulative amount of such claims payments exceeded $20,000.
2. At least two separate claims payments for the property (building payments only) have occurred, and the cumulative amount of the building portion of such claims exceeded the market value of the building.
3. For either of the above, at least two of the referenced claims must have occurred within any 10-year period and must have occurred more than 10 days apart"

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The Flood Mitigation Assistance (FMA) Program has separate definitions for repetitive and severe repetitive loss. According to the FMA program, an RL property, as defined under 42 U.S.C. § 4121(a)(7), is a structure covered by a contract for flood insurance made available under the NFIP that:

1. Has incurred flood-related damage on two occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structure at the time of each flood event; and
2. At the time of the second incidence of flood-related damage, the contract for flood insurance contains Increased Cost of Compliance (ICC) coverage.

According to the FMA program, an SRL property, as defined under 42 U.S.C. § 4104c(h)(3), is a structure that:

1. Is covered under a contract for flood insurance made available under the NFIP; and
2. Has incurred flood-related damage
    a. For which four or more separate claims payments (includes building and contents) have been made under flood insurance coverage with the amount of each such claim exceeding $5,000, and with the cumulative amount of such claims payments exceeding $20,000, or
    b. For which at least two separate claims payments (includes only building) have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured structure

According to the NFIP definition of repetitive loss, Llano County has 13 repetitive loss properties and 1 severe repetitive loss property. According to the FMA definition of repetitive loss, Llano County has four repetitive loss properties and one severe repetitive loss property.

Table 4.3.4-14 Repetitive Loss Statistics for Llano County

Property Type	Number of NFIP Repetitive Loss Properties	Number of NFIP Severe Repetitive Loss Properties	Number of FMA Repetitive Loss Properties	Number of FMA Severe Repetitive Loss Properties
Single Family	12	1	4	1
2-4 Family	0	0	0	0
All Other Residential	0	0	0	0
Non-Residential	1	0	0	0
Llano County (Total)	**13**	**1**	**4**	**1**

Source: FEMA 2022

According to the NFIP definition of repetitive loss, San Saba County has two repetitive loss properties and no severe repetitive loss properties. According to the FMA definition of repetitive loss, San Saba County has no repetitive loss or severe repetitive loss properties.

Table 4.3.4-15 Repetitive Loss Statistics for San Saba County

Property Type	Number of NFIP Repetitive Loss Properties	Number of NFIP Severe Repetitive Loss Properties	Number of FMA Repetitive Loss Properties	Number of FMA Severe Repetitive Loss Properties
Single Family	2	0	0	0
2-4 Family	0	0	0	0

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Property Type	Number of NFIP Repetitive Loss Properties	Number of NFIP Severe Repetitive Loss Properties	Number of FMA Repetitive Loss Properties	Number of FMA Severe Repetitive Loss Properties
All Other Residential	0	0	0	0
Non-Residential	0	0	0	0
Llano County (Total)	**2**	**0**	**0**	**0**

Source: FEMA 2022

Impact on Critical Facilities

It is important to determine the critical facilities and infrastructure within the Planning Area that may be at risk to flooding (riverine, flash/stormwater flooding), and who may be impacted should damage occur. Critical services during and after a flood event may not be available if critical facilities are directly damaged or transportation routes to access these critical facilities are impacted. Roads that are blocked or damaged can isolate residents and can prevent access throughout the Planning Area to many service providers needing to get to vulnerable populations or to make repairs. Utilities such as overhead power, cable, and phone lines could also be vulnerable due to utility poles damaged by standing water or the surge of moving water. Loss of these utilities could create additional isolation issues for the inundation zones.

Critical facility exposure to the flood hazard was examined. Table 4.3.4-16 and Table 4.3.4-17 summarize these results.

Table 4.3.4-16 Critical Facility Types Located in the 1-Percent and 0.2-Percent Annual Chance Flood Hazard Areas and Damages in Llano County

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the 1-percent Annual Chance Flood Event Hazard Area	Number of Lifelines Located in the 0.2-percent Annual Chance Flood Event Hazard Area
Communications	5	0	2
Energy	28	4	6
Food, Water, Shelter	18	3	3
Hazardous Material	7	1	2
Health and Medical	14	1	1
Safety and Security	38	5	8
Transportation	177	104	110
Llano County (Total)	**287**	**118**	**132**

Source: Llano County GIS 2022; Hazus v5.1; Texas A&M 2022; FEMA 2021

Table 4.3.4-17 Critical Facility Types Located in the 1-Percent and 0.2-Percent Annual Chance Flood Hazard Areas and Damages in San Saba County

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the 1-percent Annual Chance Flood Event Hazard Area	Number of Lifelines Located in the 0.2-percent Annual Chance Flood Event Hazard Area
Communications	2	0	0

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FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the 1-percent Annual Chance Flood Event Hazard Area	Number of Lifelines Located in the 0.2-percent Annual Chance Flood Event Hazard Area
Energy	0	0	0
Food, Water, Shelter	2	1	1
Hazardous Material	0	0	0
Health and Medical	0	0	0
Safety and Security	15	0	0
Transportation	111	43	43
San Saba County (Total)	**130**	**44**	**44**

Source: Llano County GIS 2022; Texas Water Development Board 2021; Hazus v5.1; Texas A&M 2022; FEMA 2021
Note: San Saba County identified critical facilities using a different process than Llano County.

Impact on Economy

Flood events can significantly impact the local and regional economy. This includes but is not limited to general building stock damages and associated tax loss, impacts to utilities and infrastructure, agricultural losses, business interruption, and effects on tourism.

In areas that are directly flooded, renovations of commercial and industrial buildings may be necessary, disrupting associated services. Refer to the section earlier which discusses direct impacts to buildings in the Planning Area.

Flooding can cause extensive damage to public utilities and disruptions to the delivery of services. Loss of power and communications may occur; drinking water and wastewater treatment facilities may be temporarily out of operation.

Debris management may also be a large expense after a flood event. Hazus v5.1 estimates the number of structural debris generated during a flood event. The model breaks down debris into three categories: (1) finishes (dry wall, insulation, etc.); (2) structural (wood, brick, etc.); and (3) foundations (concrete slab and block, rebar, etc.). These distinctions are necessary because of the different types of equipment needed to handle debris. Table 4.3.4-18 and Table 4.3.4-19 summarize the Hazus v5.1 countywide debris estimates for the 1-percent annual chance flood event in Llano County and San Saba County. Table 4.3.4-20 and Table 4.3.4-21 summarize the estimated losses for the 1-percent annual chance flood event in Llano County and San Saba County. Please note that these tables only estimate structural debris generated by flooding and does not include non-structural debris or additional potential damage and debris possibly generated by wind that may be associated with a flood event or storm that causes flooding.

Table 4.3.4-18 Estimated Debris Generated from a 1-Percent Chance Annual Flood in Llano County

Jurisdiction	1-Percent Annual Chance Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Horseshoe Bay (C)	584	506	37	42
Sunrise Beach (C)	806	622	70	114
Llano (C)	2,136	610	739	787

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Jurisdiction	1-Percent Annual Chance Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Unincorporated Llano County	15,783	5,177	4,235	6,370
Llano County (Total)	**19,309**	**6,915**	**5,081**	**7,313**

Source: FEMA 2021; Hazus v5.1; Census 2010/2020
Note: (C) = City

Table 4.3.4-19 Estimated Debris Generated from a 1-Percent Chance Annual Flood in San Saba County

Jurisdiction	1-Percent Annual Chance Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Horseshoe Bay (C)	584	506	37	42
Sunrise Beach (C)	806	622	70	114
Llano (C)	2,136	610	739	787
Unincorporated Llano County	15,783	5,177	4,235	6,370
Llano County (Total)	**19,309**	**6,915**	**5,081**	**7,313**

Source: FEMA 2021; Texas Water Development Board 2021; Hazus v5.1; Census 2010/2020
Note: (C) = City

Table 4.3.4-20 Estimated Losses from a 1-Percent Chance Annual Flood in Llano County

Flood Hazard	Inventory Loss	Relocation Loss	Building Loss	Content Loss	Wage Loss	Rental Loss	Income Loss
1-Percent Annual Chance Flood Event	$350,000	$21,390,000	$75,310,000	$48,990,000	$16,620,000	$7,090,000	$7,170,000

Source: FEMA 2021; Hazus v5.1

Table 4.3.4-21 Estimated Losses from a 1-Percent Chance Annual Flood in San Saba County

Flood Hazard	Inventory Loss	Relocation Loss	Building Loss	Content Loss	Wage Loss	Rental Loss	Income Loss
1-Percent Annual Chance Flood Event	$0	$60,000	$0	$0	$180,000	$10,000	$30,000

Source: FEMA 2021; Texas Water Development Board 2021; Hazus v5.1

Impact on the Environment

Floodplains serve beneficial and natural functions on ecological, environmental, social, and economic levels. Areas in the floodplain that typically provide these natural functions and benefits are wetlands, riparian areas, sensitive areas, and habitats for rare and endangered species. Floods, however, can also lead to negative impacts on the environment. Disruption of natural systems and the benefits they provide can have long-term consequences for entire regions. According to FEMA, well-known, water-related functions of floodplains include the following:

- Natural flood and erosion control
- Provide flood storage and conveyance
- Reduce flood velocities
- Process organic wastes
- Moderate temperatures of water
- Groundwater recharge

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- Reduce flood peaks
- Reduce sedimentation
- Surface water quality maintenance
- Filter nutrients and impurities from runoff
- Promote infiltration and aquifer recharge
- Reduce frequency and duration of low-surface flows

Future Changes That May Impact Vulnerability

Understanding future changes that effect vulnerability in the Planning Area can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The Planning Area considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

Any areas of growth could be impacted by the flood hazard if located in the floodplain. The Flood Damage Prevention Ordinance regulates not only how land in designated floodplain areas may be used or altered, but the location and types of structures that are permitted in those areas as well as the specifications to which they must build. All structures, including residential and commercial properties, manufactured homes, and the developments of subdivisions are regulated.

Projected Changes in Population

Llano County has experienced an increase in population between the 2010 Census (19,301) and the 2020 Census population of 21,243. The population of the County is expected to increase over the next few years. San Saba County experienced a decrease in population between the 2010 Census (6,131) and the 2020 Census population of 5,730. The Texas Demographic Center has produced population estimates for the region that were last updated in 2018 based on 2010 Census data. The estimates show a slight projected decline for Llano County between 0.14 and 0.25 percent every five years from 2025 to 2035, followed by a projected growth between 0.68 and 3.3 percent every five years from 2035 to 2050. The estimates show projected decline for San Saba County between 1.51 and 4.3 percent every five years from 2025 to 2050 (Texas Demographic Center n.d.).

Any increases in population, specifically in the 1-percent annual chance flood hazard area, will increase the overall flood risk in the Planning Area.

Climate Change

Increases in precipitation may alter and expand the floodplain boundaries and runoff patterns, resulting in the exposure of populations, buildings, and critical facilities and infrastructure that were previously outside the floodplain. This increase in exposure would result in an increased risk to life and health, an increase in structural losses, a diversion of additional resources to response and recovery efforts, and an increase in business closures affected by future flooding events due to loss of service or access.

Climate change may result in changes in the intensity and frequency of hurricanes, leading to more heavy precipitation events.

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Change of Vulnerability Since 2016 HMP

The Planning Area continues to be vulnerable to floods. The 2023 update includes the updated flood maps for Llano County. The 2023 update therefore provides more accurate estimated exposure and potential losses due to flooding for the Planning Area.

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Section 4 Risk Assessment

4.3 Hazard Profiles

4.3.5 Geologic Hazards

The following section provides the hazard profile and vulnerability assessment for the geologic hazard in the Planning Area. Geologic hazards in the Planning Area include earthquake, expansive soils, and subsidence. When referring to the Planning Area, it includes both Llano County and San Saba County.

Hazard Profile

Hazard Description

Earthquake

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, a volcanic eruption, or by a manmade explosion (FEMA 2013). Most earthquakes occur at the boundaries where the Earth's tectonic plates meet (faults); however, less than 10-percent of earthquakes occur within plate interiors. New York State is in an area where plate interior-related earthquakes occur. As plates continue to move and plate boundaries change over geologic time, weakened boundary regions become part of the interiors of the plates. These zones 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 (Shedlock and Pakiser 1997).

The location of an earthquake is commonly described by its focal depth and the geographic position of its 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 of an earthquake is the point on the Earth's surface directly above the hypocenter (Shedlock and Pakiser 1997). Earthquakes usually occur without warning and their effects can impact areas of great distance from the epicenter.

Expansive soils

Expansive soils are soils that expand when water is added and shrink when they dry out. This continuous change in soil volume can cause structures to move unevenly and crack and roads and sidewalks to buckle. Soils with a high clay content exhibit high expansive properties. Slab on grade construction is the most susceptible to damage from expansive clays.

Subsidence

Land subsidence is the gradual lowering of land-surface elevation. In the Planning Areas, land subsidence is caused by compaction of fine-grained aquifer sediments (silts and clays) below the land surface due to groundwater withdrawals. Removing water from fine-grained aquifer sediments compresses the aquifer leaving less pore space available to store water resulting in the lowering (sinking or settling) of the land-surface. Most compaction that occurs as a result of groundwater withdrawals is irreversible; even if groundwater levels rise, compacted sediments and the associated land-surface lowering would remain (USGS n.d.).

Consequences of land subsidence in the Planning Area include:

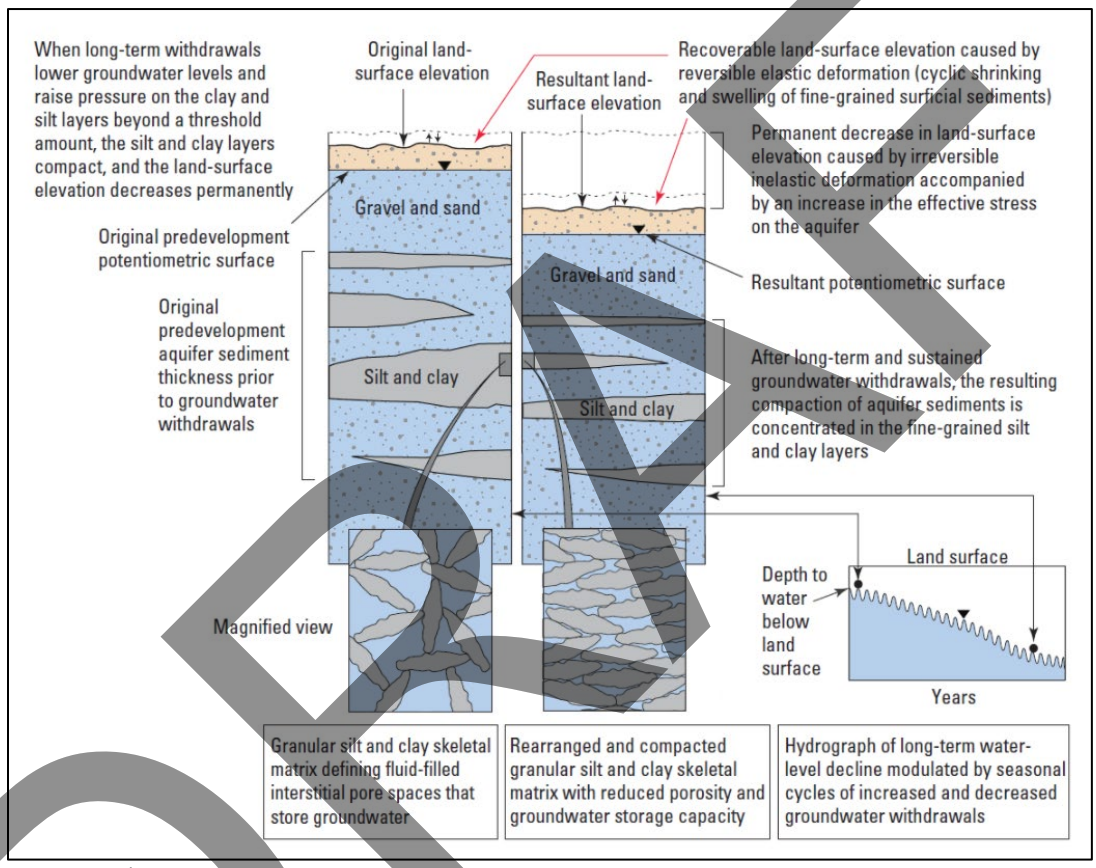
- Reduces the ability to store water in an aquifer

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- Partially or completely submerges land
- Collapses water well casings
- Disrupts collector drains and irrigation ditches
- Alters the flow of creeks and bayous which may increase the frequency and severity of flooding
- Damages roadways, bridges, building foundations, and other infrastructure

Figure 4.3.5-1 below illustrates the land subsidence process, wherein soil layers become compacted and unstable due to the loss of groundwater.

Figure 4.3.5-1. The Subsidence Process



Source: USGS n.d.

Location

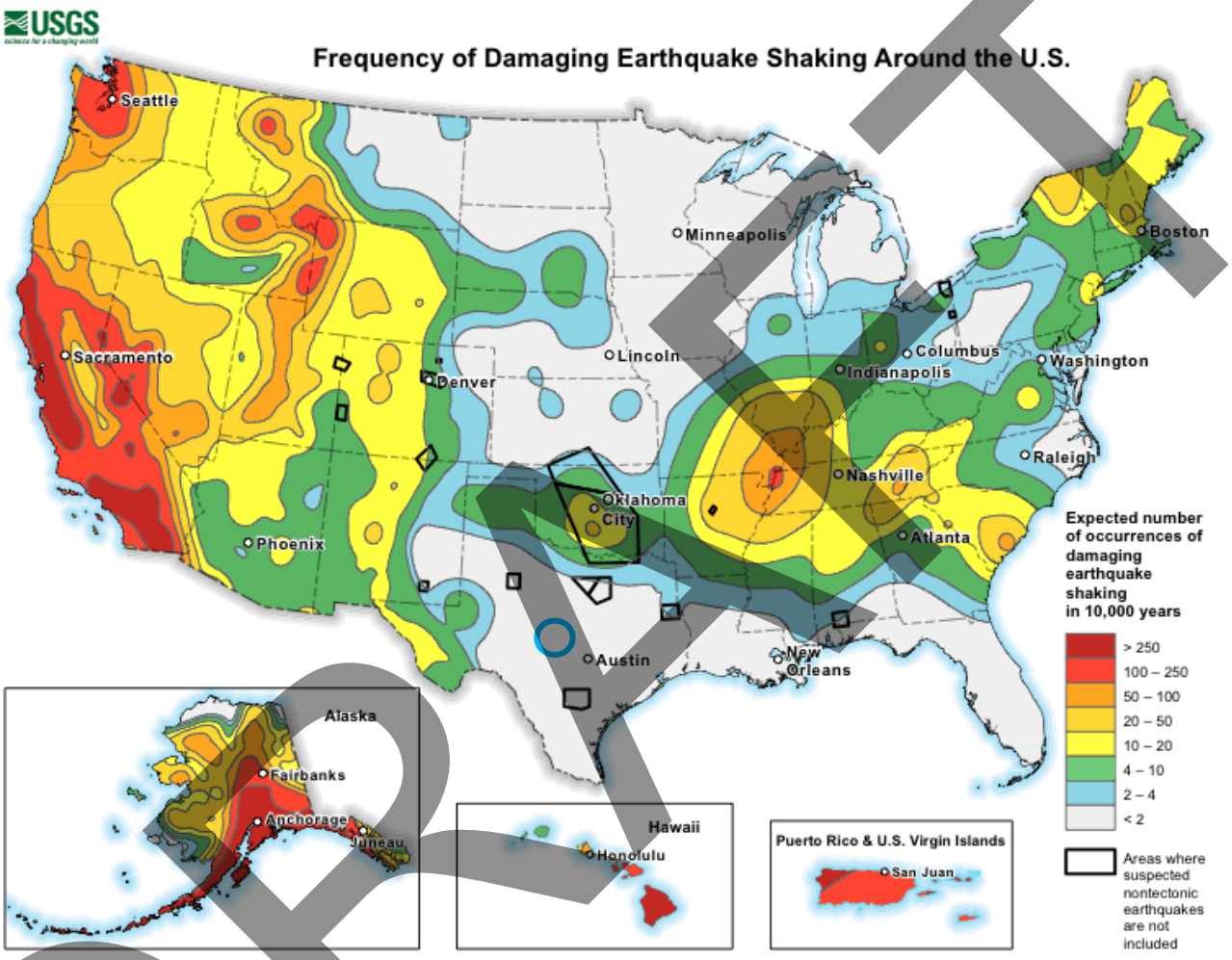
Earthquake

While Texas does face some earthquake hazard, this hazard is very small in comparison to many other states. The biggest threat appears to be from the New Madrid fault system in Missouri, a system powerful enough to pose a risk to the north Texas area. Two regions, near El Paso and in the Panhandle, should expect earthquakes with magnitudes of approximately 5.5 to 6.0 to occur every 50 to 100 years, with even larger earthquakes possible. In Central Texas, the hazard is generally low, but residents should be aware that small earthquakes can occur, including some that are theoretically triggered by oil or gas production. Elsewhere in Texas, earthquakes are

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exceedingly rare. However, the hazard level is not zero anywhere in Texas; small earthquakes are possible almost anywhere, and all regions face possible ill effects from very large, distant earthquakes (Llano County 2016).

Figure 4.3.5-2. Frequency of Damaging Earthquake Shaking Around the U.S.



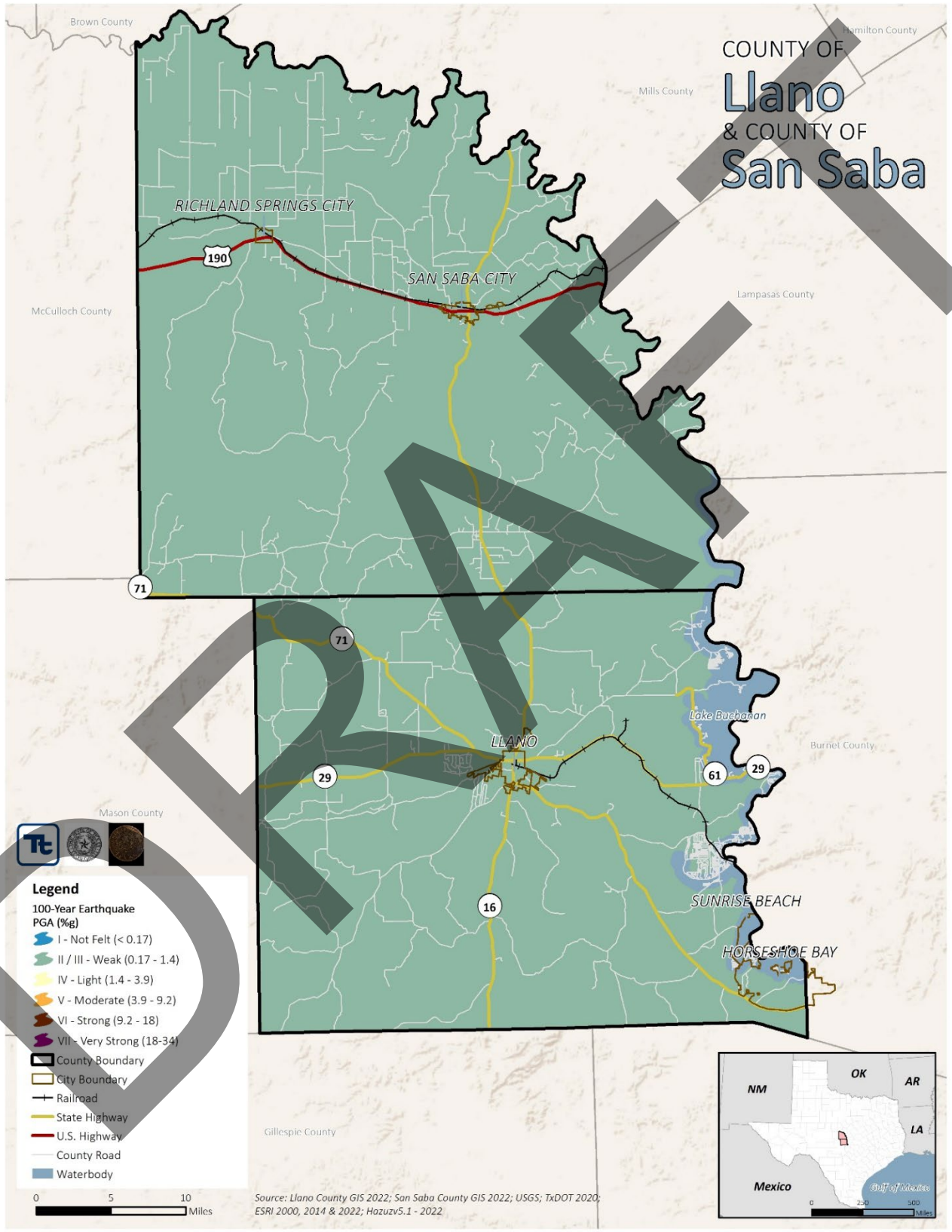
Source: USGS n.d.
Note: The blue circle shows the general location of the Planning Area.

A probabilistic assessment was conducted for the 100- and 500-year mean return periods (MRP) through a Level 2 analysis using the HAZUS-MH, Version 2.2 (HAZUS-MH) probabilistic model to analyze the earthquake hazard for the Planning Area. The Level 2 HAZUS analysis evaluates the statistical likelihood that a specific event will occur and what consequences will occur. A 100-year MRP event is an earthquake with a 1-percent chance that the mapped ground motion levels (PGA) will be exceeded in any given year. For a 500-year MRP, there is a 0.2-percent chance the mapped PGA will be exceeded in any given year.

Figure 4.3.5-3 and Figure 4.3.5-4 illustrate the geographic distribution of PGA (*g*) across the Planning Area for 100- and 500-year MRP events.

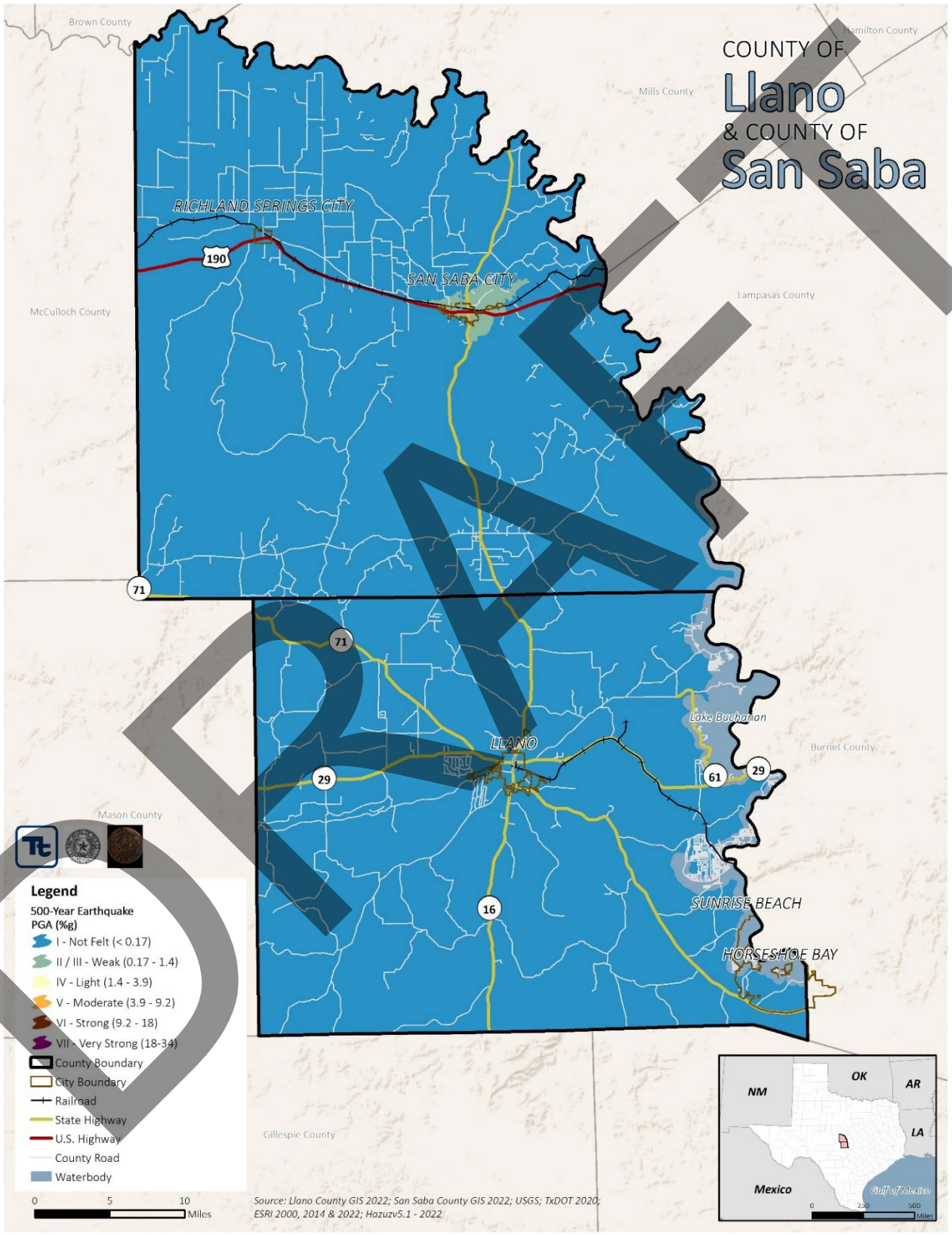
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Figure 4.3.5-3. 100-Year Earthquake PGA in the Planning Area



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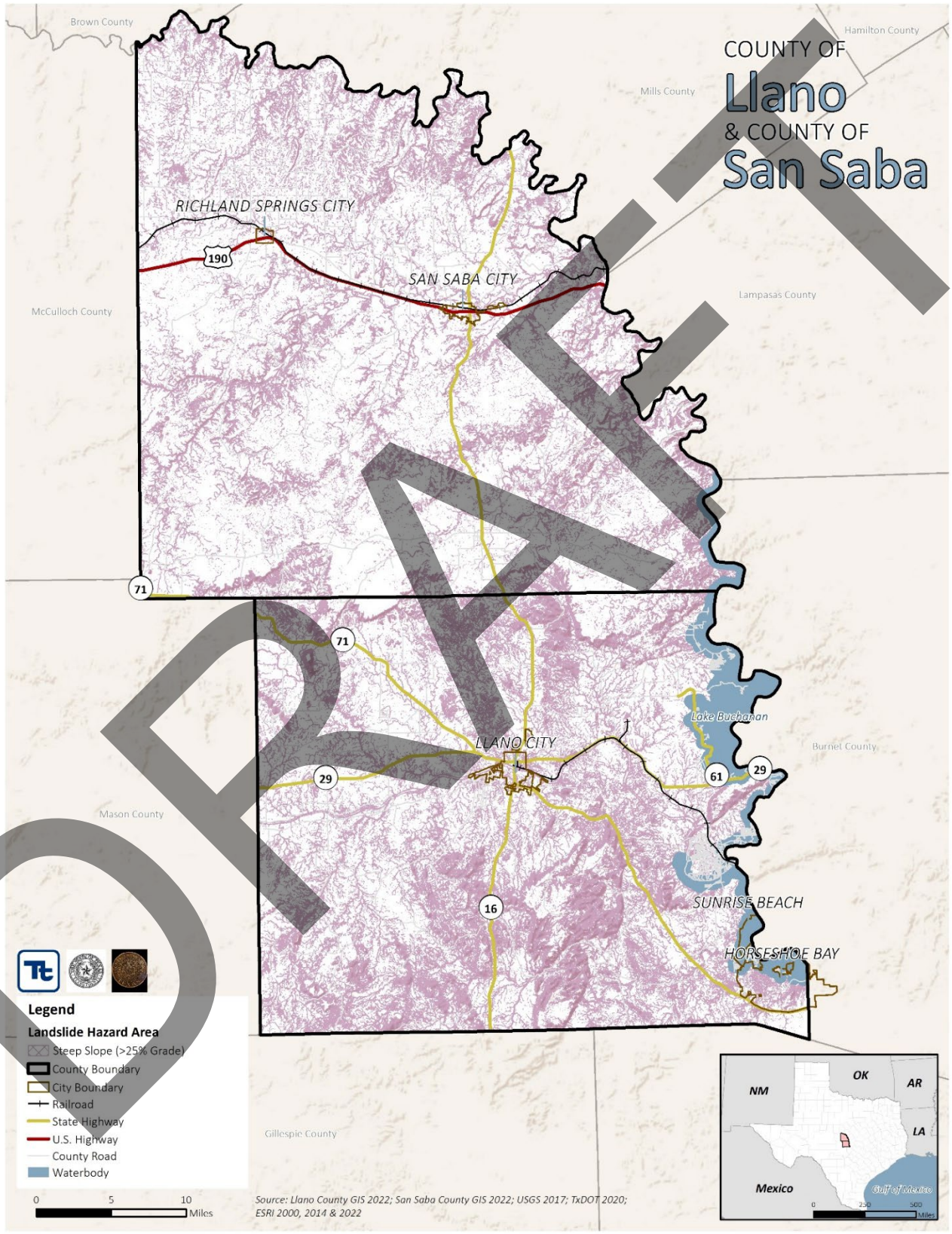
Figure 4.3.5-4. 500-Year Earthquake PGA in the Planning Area



Earthquakes can also trigger landslides. Landslides most commonly occur in areas with steep slopes. For this assessment, areas with slopes with greater than a 25-percent grade were considered to be steep slopes that form the landslide hazard area. Figure 4.3.5-5 displays the areas of Llano County and San Saba County prone to landslides.

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Figure 4.3.5-5. Landslide Hazard Area



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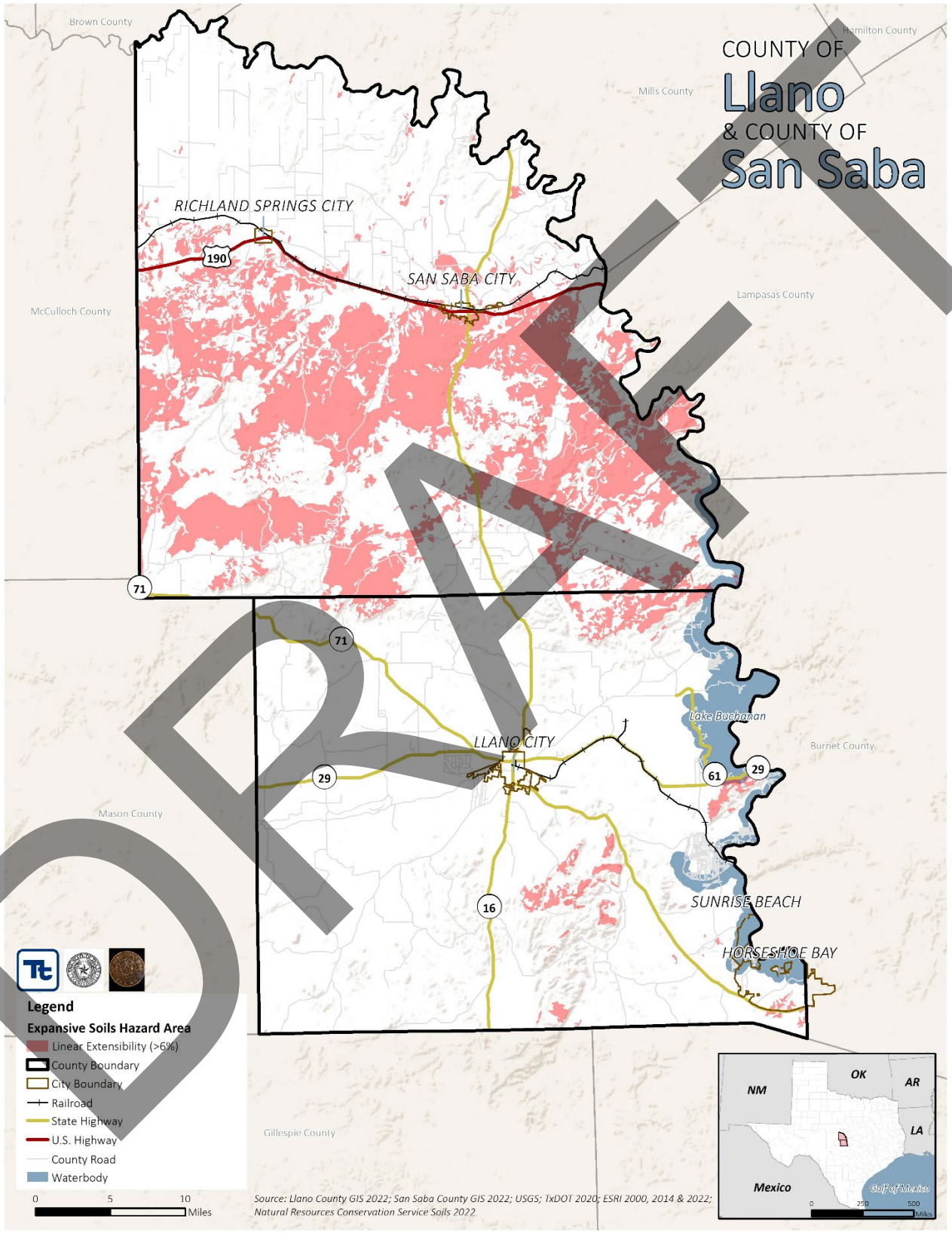
Expansive soils

Damage to buildings and critical infrastructure due to expansive soils can occur throughout the Planning Area. The hazard is most prevalent in areas with clay or sandy soil which are prone to expanding and contracting in periods of heavy precipitation followed by periods of drought.

The predominant soil types in the Planning Area are formed of granite, gneiss, and limestone rock. These soils are stronger and more resilient to expansion and contraction than softer, clay- or sand-dominant soils. Figure 4.3.5-6 below shows the locations with the potential for swelling of soils in the Planning Area. Expansive soils are most common in the southern half of San Saba County.

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Figure 4.3.5-6. Location of Potential Swelling from Expansive Soils in the Planning Area



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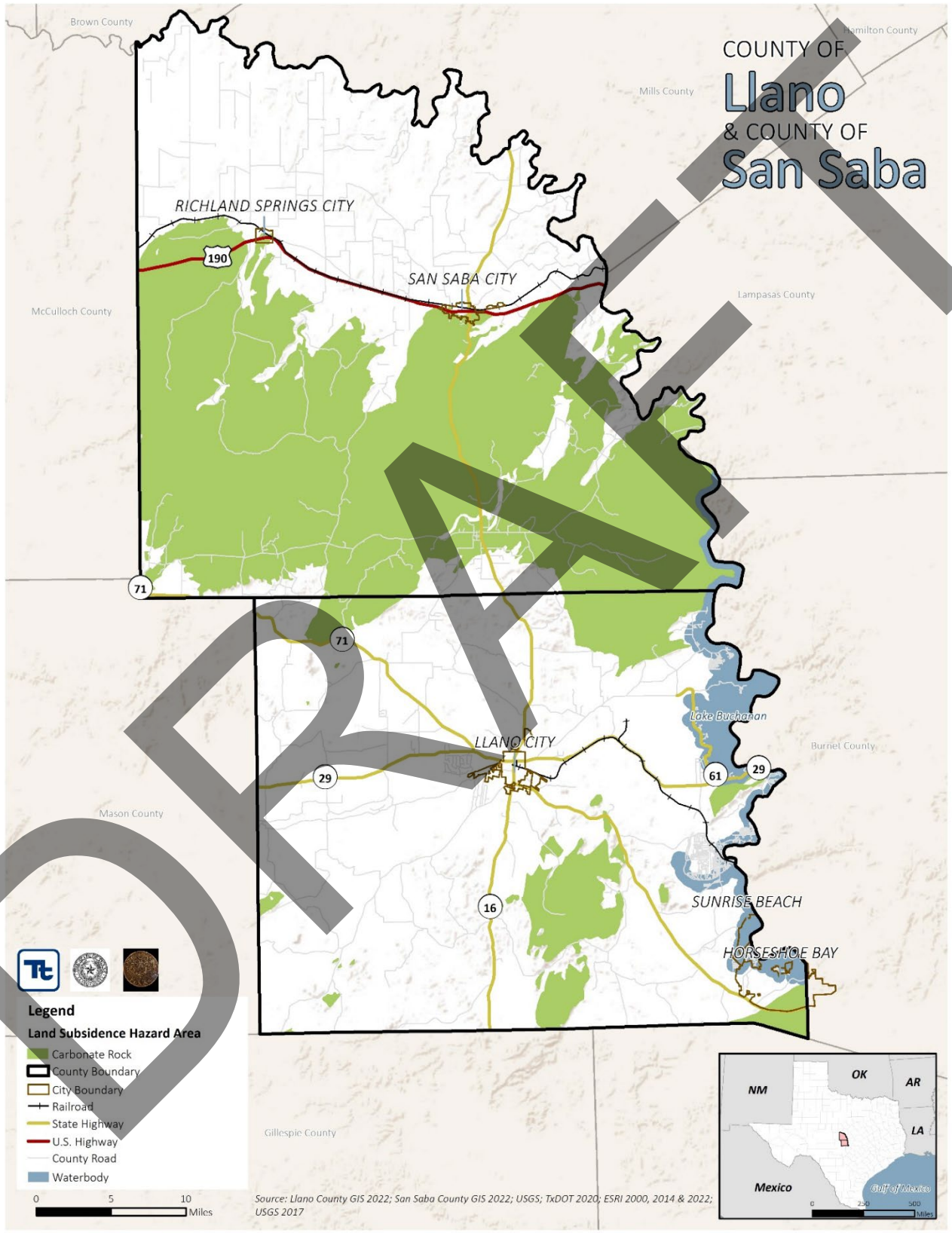
Subsidence

The US Geological Survey (USGS) notes that "subsidence is a global problem and, in the United States, more than 17,000 square miles in 45 States, an area roughly the size of New Hampshire and Vermont combined, have been directly affected by subsidence" (USGS 2018).

To identify areas where subsidence may occur, locations with carbonate rock were mapped. Figure 4.3.5-7 shows the land subsidence hazard area in Llano County and San Saba County. Land subsidence risk is focused in the southern half of San Saba County with small areas in Llano County.

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Figure 4.3.5-7. Land Subsidence Hazard Area



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Extent

Earthquake

An earthquake's magnitude and intensity are used to describe the severity and size of the event. intensity describes the overall felt severity of shaking during the event and magnitude describes the size at the focus of an earthquake. The earthquake's magnitude is a measure of the energy released at the source of the earthquake. Magnitude was formerly expressed by ratings on the Richter scale. It is now most commonly expressed using the moment magnitude (Mw) scale. This scale is based on the total moment release of the earthquake (the product of the distance a fault moved, and the force required to move it). The scale is as follows:

- Great Mw > 8
- Major Mw = 7.0 – 7.9
- Strong Mw = 6.0 – 6.9
- Moderate Mw = 5.0 – 5.9
- Light Mw = 4.0 – 4.9
- Minor Mw = 3.0 – 3.9
- Micro Mw = 3.0 – 3.9

The most commonly used intensity scale is the modified Mercalli intensity scale. Ratings of the scale, as well as the perceived shaking and damage potential for structures, are shown in Table 4.3.5-1. The modified Mercalli intensity scale is generally represented visually using shake maps, which show the expected ground shaking at any given location produced by an earthquake with a specified magnitude and epicenter. An earthquake has only one magnitude and one epicenter, but it produces a range of ground shaking at sites throughout the region. This shaking depends on the distance from the earthquake, the rock and soil conditions at sites, and variations in the propagation of seismic waves from the earthquake due to complexities in the structure of the earth's crust. A USGS shake map shows the variation of ground shaking in a region immediately following significant earthquakes. Table 4.3.5-1 displays the MMI scale and its relationship to the areas peak ground acceleration.

Table 4.3.5-1. Modified Mercalli Intensity Scale

Mercalli Intensity	Shaking	Description
I	Not Felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing automobiles may rock slightly. Vibrations are similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing automobiles rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.

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VII	Very Strong	Felt by all. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Felt by all. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Felt by all. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Felt by all. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Source: USGS 2014

Expansive Soils

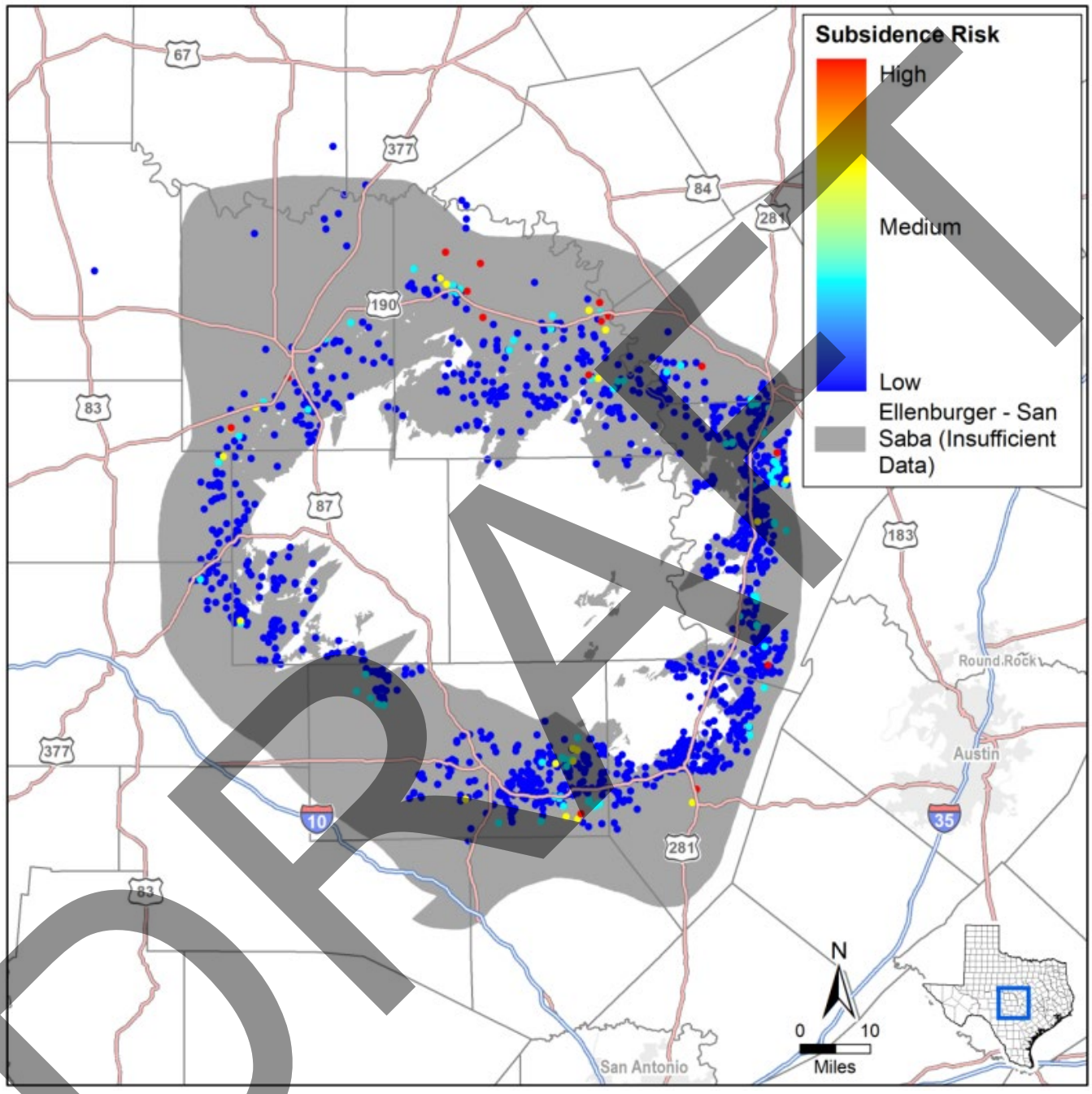
The Planning Area is considered to be at low to extremely limited potential of potential swelling. The effects of this hazard can impact a community similarly to those of drought and land subsidence, with the ground shifting and causing structural damage to the built environment. With limited documentation of national datasets addressing expansive soils, however, providing a measure of expansive soil impacts poses a challenge.

Subsidence

The primary cause of land subsidence in the Planning Area is groundwater pumping. The Texas Water Development Board's 2016 report classifies the risk of land subsidence from the Ellenburger-San Saba Aquifer as low, given the thickness of clay in the region's soils and the generally stable water levels within the aquifer (Texas Water Development Board 2016). Figure 4.3.5-8 below maps the risk of land subsidence at various wells throughout the aquifer region.

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Figure 4.3.5-8. Land Subsidence Risk at Well Locations in the Ellenburger-San Saba Aquifer

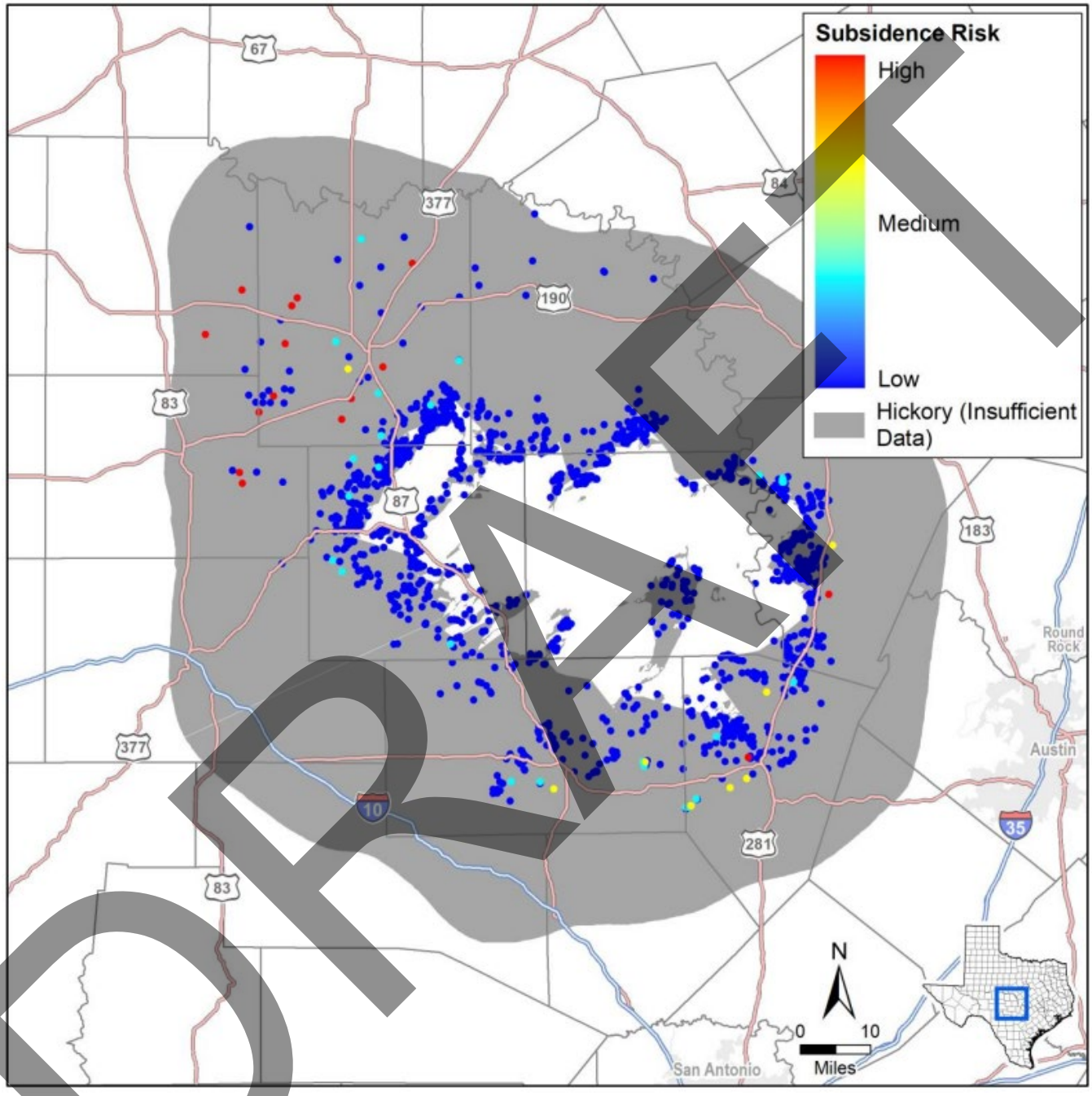


Source: Texas Water Development Board

Subsidence risk from the Hickory Aquifer is also low due to the thickness of clay in the region's soils and the generally stable water levels within the aquifer (Texas Water Development Board 2016). Figure 4.3.5-9 below maps the risk of land subsidence at various wells throughout the aquifer region.

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Figure 4.3.5-9. Land Subsidence Risk at Well Locations in the Hickory Aquifer



Source: Texas Water Development Board

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Worst-Case Scenario

A worst-case scenario for earthquake would be a moderate strength earthquake with a Mercalli Intensity of V. This level event would be felt by nearly everyone in the Planning Area. Some dishes and windows would be broken with unstable objects overturned.

A season of flooding with rapid drying conditions such as in a drought would present a worst-case scenario for the expansive soils hazard. Underground utility pipes, foundations, roadways, and sidewalks would be vulnerable to cracking or buckling, causing damage to the built environment.

A worst-case scenario for land subsidence would be an increase in its rate, causing damage to the built environment. Impacts from this land subsidence would include road closures, damage to infrastructure and buildings, and inaccessible areas that can disrupt emergency response.

Previous Occurrences and Losses

FEMA Disaster Declarations

Between 1954 and 2022, Llano and/or San Saba County were not included in any disaster (DR) or emergency (EM) declarations for geologic hazard-related events. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 3 (County Profile).

U.S. Department of Agriculture Disaster Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2012 and 2022, Llano and/or San Saba County were not included in any geologic-related agricultural disaster declarations.

Previous Events

There is insufficient data on losses from earthquakes, expansive soils, and land subsidence in the Planning Area, and there are no recorded previous occurrences in the FEMA, NCEI, USGS, or USDA databases.

Probability of Future Occurrences

In Section 4.4, the identified hazards of concern for the Planning Area were ranked (Table 4.4-4 and Table 4.4-5). The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Team, the probability of occurrence for geologic events in the Planning Area is considered 'rare'.

Earthquake

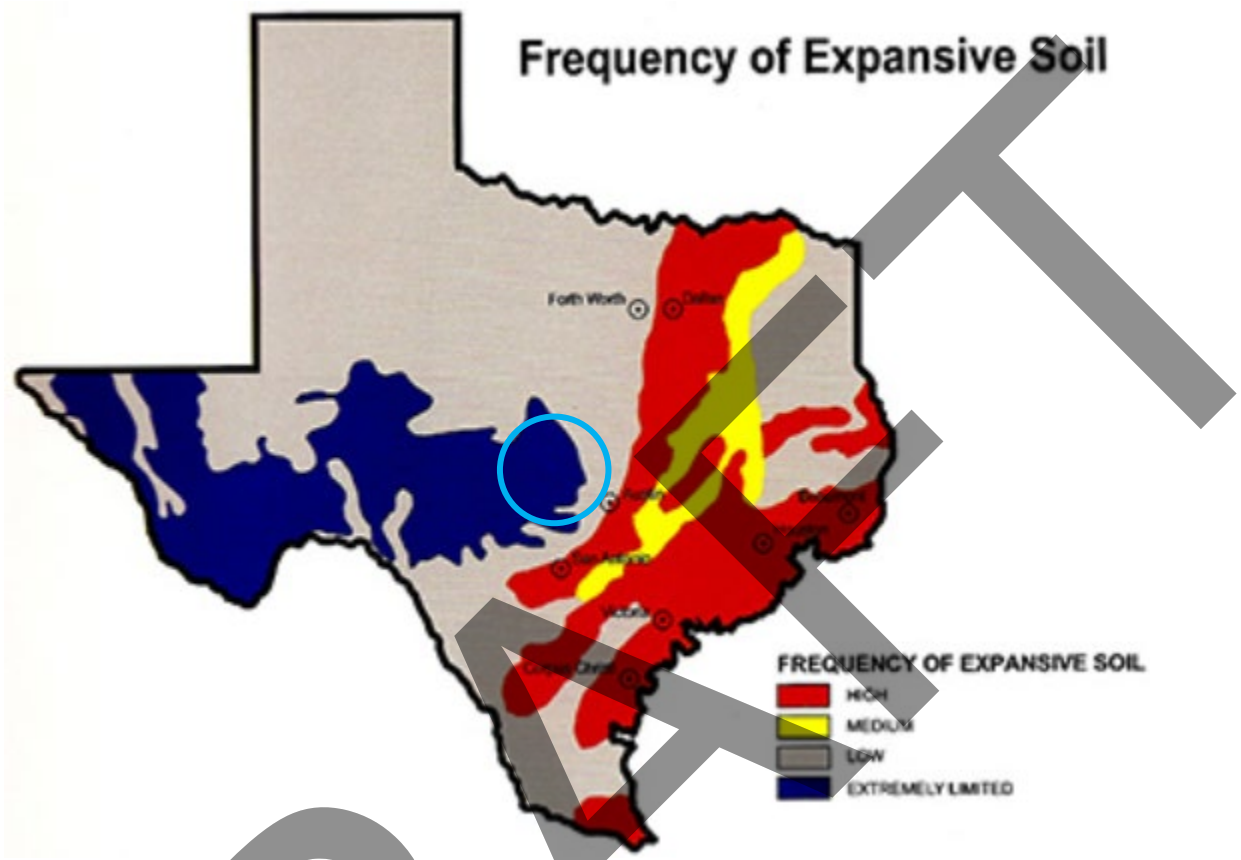
Earthquake hazard maps illustrate the distribution of earthquake shaking levels that have a certain probability of occurring over a given time period. According to the USGS, in 2017 (the date of the most recent analysis), the Planning Area has less than a 0.1-percent annual probability of an occurrence of a damaging earthquake.

Expansive Soils

Despite having areas susceptible to expansive soils, the strong soil types of Llano and San Saba counties, mostly made of granite, gneiss, and limestone rock, limit the planning area's vulnerability to the hazard. Compared to the rest of Central Texas, Llano and San Saba counties are in the 'extremely limited' area for frequency of expandable soils, meaning it is unlikely the hazard will occur at a rapid pace or in the near future. Areas close by, including Travis County to the East and Bear County further South, have high frequencies of expansive soils. See Figure 4.3.5-*10* below to view the frequency of expansive soils in the Central Texas corridor.

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Figure 4.3.5-10. Frequency of Expansive Soils in the Central Texas Corridor



Source: *Tella Firma Foundations 2017*
Note: *The blue circle shows the general location of the Planning Area.*

Subsidence

Subsidence is usually a continual process, slowly progressing over time. Although land subsidence is primarily being seen in the coastal areas of Texas, as the demand for water in central Texas increases, including in Llano and San Saba counties, the aquifers below the region will decrease in volume, causing a gap of space to emerge between the land and the water below the surface. This gap of empty space could cause the land above it to begin to subside. As mentioned, this process is slow paced, and movements will not be rapid.

Climate Change Projections

Secondary impacts of earthquakes could be magnified by climate change. Soils saturated by repetitive storms could experience liquefaction during seismic activity due to the increased saturation. Dams storing increased volumes of water due to changes in the hydrograph could fail during seismic events. There are currently no models available to estimate these impacts.

Climate change is likely to have significant impacts on the performance of residential buildings constructed on expansive soils. Precipitation and temperature are the primary weather parameters used for determining ground movement (Sun, Li and Zhou 2017). The climate of Texas is changing. Most of the State has warmed between one half and one degree Fahrenheit in the past century. In the eastern two-thirds of the State, average annual rainfall is increasing; however, the soil is becoming drier. Rainstorms are more intense, and floods are becoming more severe. In the coming decades, storms are likely to become more severe in Texas (EPA 2016).

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While there is no established connection that climate change increases land subsidence, secondary impacts of climate change such as drought and flood may have a greater impact on areas experiencing land subsidence. As drought levels increase, the need to pump water from aquifers also increases which exacerbates subsidence (Shirzaei and Bürgmann 2018).

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The entire Planning Area is exposed to the geologic hazard. The following text evaluates and estimates the potential impact of the geologic hazard in the Planning Area as a whole.

Impact on Life, Health, and Safety

Earthquake

The impact of an earthquake on life, health, and safety is dependent upon the severity of the event. Risk to public safety and loss of life from an earthquake in the Planning Area is minimal. However, a higher risk would occur in for those inside buildings, due to structural damage, or people walking below building ornamentation and chimneys that may be loose and fall as a result of the earthquake.

A strong correlation exists between structural building damage and the number of injuries and casualties from an earthquake event. Further, the time of day also exposes different sectors of the community to the hazard. For example, Hazus considers the residential occupancy at its maximum at 2:00 a.m., where the educational, commercial, and industrial sectors are at their maximum at 2:00 p.m., and peak commute time is at 5:00 p.m. Whether directly impacted or indirectly impacted, the entire population will be affected to some degree. Business interruption could keep people from working, road closures could isolate populations, and loss of utilities could impact populations that suffered no direct damage from an event itself.

Hazus was used to examine potential the impacts from the 100- and 500-year MRP earthquake events in the Planning Area. For each event, there are no expected displaced households or people requiring short-term shelter. No injuries, hospitalizations, or casualties are expected for the 100- or 500-year MRP earthquake events in the Planning Area.

Expansive Soils

The population living in areas of high linear extensibility are considered especially vulnerable to the expansive soils hazard. A quantitative analysis was conducted using expansive soil hazard areas to determine the population living in expansive soils hazard areas. It was found that, while a low percentage of the population of Llano County is located in the expansive soils hazard area, almost a quarter of the population of San Saba County is exposed to this hazard. However, exposure should not be limited only to those who reside within a defined hazard zone, but everyone who may be affected by a hazard event (e.g., people are at risk while traveling, people inside of vulnerable buildings, or people whose access emergency services is compromised during an event); the degree of that impact varies and is not strictly measurable.

Table 4.3.5-2. Estimated Population Located in the Expansive Soils Hazard Area in Llano County

Llano Jurisdiction	Total Population (2020 Decennial Census)	Estimated Population Located in the Expansive Soils Hazard Area	
		Number of Persons	Percent of Total
Horseshoe Bay (C)	4,257	13	0.3%

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Llano Jurisdiction	Total Population (2020 Decennial Census)	Estimated Population Located in the Expansive Soils Hazard Area	
		Number of Persons	Percent of Total
Sunrise Beach (C)	739	0	0.0%
Llano (C)	3,325	0	0.0%
Unincorporated Llano County	12,922	23	0.2%
Llano County (Total)	**21,243**	**36**	**0.2%**

Source: USDA 2003; Census 2020
Notes: (C) = City
**Disclaimer: Horseshoe Bay City statistics are based on both Llano County and Burnet County coverage. Results may be over or underestimated.*

Table 4.3.5-3. Estimated Population Located in the Expansive Soils Hazard Area in San Saba County

San Saba Jurisdiction	Total Population (2020 Decennial Census)	Estimated Population Located in the Expansive Soils Hazard Area	
		Number of Persons	Percent of Total
Richland Springs (T)	244	1	0.4%
San Saba (C)	3,117	921	29.5%
Unincorporated San Saba County	2,369	425	17.9%
San Saba County (Total)	**5,730**	**1,346**	**23.5%**

Source: USDA 2003; Census 2020
Notes: (C) = City; (T) = Town

Subsidence

Subsidence negatively impacts roadways, buildings, water, and sewer infrastructure which increases safety hazards. The most common problems associated with land subsidence are loss of utilities and power outages which can be life threatening to those dependent on electricity for life support.

The impact of subsidence on life, health, and safety is dependent upon several factors including the severity of the event and the populations access to food, water, and shelter. In addition, residents can also be displaced or require temporary to long-term sheltering depending on viability of utilities.

Most fracking, pumping, or mining is done near communities that are economically disadvantaged, making this population more vulnerable to subsidence. Although the entire population of the Planning Area is exposed to geologic hazards, some populations are more vulnerable. Vulnerable populations include the elderly, low income, linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. In general, populations who are reliant on sustained sources of power to survive, and those who live in isolated areas with limited ingress and egress options are the most vulnerable to geologic hazards.

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Table 4.3.5-4. Estimated Population Located in the Subsidence (Carbonate Karst) Hazard Area in Llano County

Llano Jurisdiction	Total Population (2020 Decennial Census)	Estimated Population Located in the Subsidence (Carbonate Karst) Hazard Area	
		Number of Persons	Percent of Total
Horseshoe Bay (C)	4,257	543	12.8%
Sunrise Beach (C)	739	0	0.0%
Llano (C)	3,325	0	0.0%
Unincorporated Llano County	12,922	159	1.2%
Llano County (Total)	**21,243**	**702**	**3.3%**

Source: USGS 2017; Census 2020
Notes: (C) = City
**Disclaimer: Horseshoe Bay City statistics are based on both Llano County and Burnet County coverage. Results may be over or underestimated.*

Table 4.3.5-5. Estimated Population Located in the Subsidence (Carbonate Karst) Hazard Area in San Saba County

San Saba Jurisdiction	Total Population (2020 Decennial Census)	Estimated Population Located in the Subsidence (Carbonate Karst) Hazard Area	
		Number of Persons	Percent of Total
Richland Springs (T)	244	182	74.5%
San Saba (C)	3,117	1,289	41.4%
Unincorporated San Saba County	2,369	637	26.9%
San Saba County (Total)	**5,730**	**2,109**	**36.8%**

Source: USGS 2017; Census 2020
Notes: (C) = City, (T) = Town

Impact on General Building Stock

Earthquake

The entire Planning Area's general building stock is considered at risk and exposed to this hazard. A building's construction determines how well it can withstand the force of an earthquake. Hazus considers building construction and age of building as part of the analysis. Because a custom general building stock was used for this analysis, the building ages and building types from the inventory were incorporated into the Hazus model. Potential building damage was evaluated by Hazus across the following damage categories (none, slight, moderate, extensive, and complete). Hazus estimates that no building damages are expected for the 100-year and 500-year MRP earthquake event.

Expansive Soils

Soils capable of changes in volume present a hazard to structures built over them and to the pipelines, sewer and water lines buried in them. Houses and one-story commercial buildings are more apt to be damaged by the expansion of swelling clays than are multi-story buildings, which are usually heavy enough to counter swelling pressures. However, if constructed on wet clay, multi-story buildings may also be damaged by clay shrinkage when moisture levels are substantially reduced (Texas Division of Emergency Management 2018).

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An estimated 21.7-percent of buildings in San Saba County are located in the expansive soils hazard area.

Table 4.3.5-6. Estimated Number and Total Replacement Cost Value of Structures Located in the Expansive Soils Hazard Area in Llano County

Llano Jurisdiction	Total Number of Buildings	Total Replacement Cost Value (RCV)	Estimated Number and Total Replacement Cost Value of Structures Located in the Expansive Soils Hazard Area			
			Number of Buildings	Percent of Total	Total Replacement Cost Value of Buildings	Percent of Total
Horseshoe Bay (C)	2,174	$921,317,000	8	0.4%	$3,245,145	0.4%
Sunrise Beach (C)	909	$345,382,000	0	0.0%	$0	0.0%
Llano (C)	1,733	$564,332,000	0	0.0%	$0	0.0%
Unincorporated Llano County	8,788	$2,408,418,000	15	0.2%	$4,183,170	0.2%
Llano County (Total)	**13,604**	**$4,239,449,000**	**23**	**0.2%**	**$7,428,316**	**0.2%**

Source: USDA 2003; Census 2020
Notes: (C) = City
**Disclaimer: Horseshoe Bay City statistics are based on both Llano County and Burnet County coverage. Results may be over or underestimated.*

Table 4.3.5-7. Estimated Number and Total Replacement Cost Value of Structures Located in the Expansive Soils Hazard Area in San Saba County

San Saba Jurisdiction	Total Number of Buildings	Total Replacement Cost Value (RCV)	Estimated Number and Total Replacement Cost Value of Structures Located in the Expansive Soils Hazard Area			
			Number of Buildings	Percent of Total	Total Replacement Cost Value of Buildings	Percent of Total
Richland Springs (T)	213	$66,306,000	1	0.3%	$120,412	0.2%
San Saba (C)	1,311	$410,811,000	380	29.0%	$122,890,202	29.9%
Unincorporated San Saba County	1,819	$480,386,000	320	17.6%	$84,597,342	17.6%
San Saba County (Total)	**3,343**	**$957,503,000**	**701**	**21.0%**	**$207,607,955**	**21.7%**

Source: USDA 2003; Census 2020
Notes: (C) = City, (T) = Town

While all infrastructures in the higher-risk areas are vulnerable, slab-on-grade structures are most likely to suffer damages from expansive soils. In addition, older structures built to less stringent building codes may be more susceptible to damages than new construction. Bridges, highways, streets, and parking lots are especially vulnerable when they are constructed when clays are dry, such as during a drought, and then subsequent soaking rains swell the clay (State of Texas HMP 2018).

Subsidence

Buildings that are located on or near areas that have a higher chance of failing due to subsidence may need to be relocated or reinforced to ensure building stability. Extreme subsidence can crack and break building materials, so building construction plays a major role in the extent of damage resulting from levels of subsidence. Due to differences in construction, residential structures are generally more susceptible to subsidence than commercial

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and industrial structures, especially homes and buildings that may be built on top of land that has materials being extracted underneath. Wood and masonry buildings, in general, regardless of their occupancy class, tend to experience more damage than concrete or steel buildings.

Table 4.3.5-8. Estimated Number and Total Replacement Cost Value of Structures Located in the Subsidence (Carbonate Karst) Hazard Area in Llano County

Llano Jurisdiction	Total Number of Buildings	Total Replacement Cost Value (RCV)	Estimated Number and Total Replacement Cost Value of Structures Located in the Subsidence (Carbonate Karst) Hazard Area			
			Number of Buildings	Percent of Total	Total Replacement Cost Value of Buildings	Percent of Total
Horseshoe Bay (C)	2,174	$921,317,000	194	8.9%	$76,151,461	8.3%
Sunrise Beach (C)	909	$345,382,000	0	0.0%	$0	0.0%
Llano (C)	1,733	$564,332,000	0	0.0%	$0	0.0%
Unincorporated Llano County	8,788	$2,408,418,000	133	1.5%	$37,681,202	1.6%
Llano County (Total)	**13,604**	**$4,239,449,000**	**327**	**2.4%**	**$113,832,663**	**2.7%**

Source: USGS 2017; Census 2020
Notes: (C) = City
**Disclaimer: Horseshoe Bay City statistics are based on both Llano County and Burnet County coverage. Results may be over or underestimated.*

Table 4.3.5-9. Estimated Number and Total Replacement Cost Value of Structures Located in the Subsidence (Carbonate Karst) Hazard Area in San Saba County

San Saba Jurisdiction	Total Number of Buildings	Total Replacement Cost Value (RCV)	Estimated Number and Total Replacement Cost Value of Structures Located in the Subsidence (Carbonate Karst) Hazard Area			
			Number of Buildings	Percent of Total	Total Replacement Cost Value of Buildings	Percent of Total
Richland Springs (T)	213	$66,306,000	160	75.3%	$52,310,036	78.9%
San Saba (C)	1,311	$410,811,000	514	39.2%	$150,046,862	36.5%
Unincorporated San Saba County	1,819	$480,386,000	499	27.4%	$117,810,455	24.5%
San Saba County (Total)	**3,343**	**$957,503,000**	**1,173**	**35.1%**	**$320,167,354**	**33.4%**

Source: USGS 2017; Census 2020
Notes: (C) = City, (T) = Town

Impact on Critical Facilities

Earthquake

After considering the general building stock exposed to, and damaged by, 100- and 500-year MRP earthquake events, critical facilities were evaluated. All critical facilities in Llano County and San Saba County are considered exposed and vulnerable to the earthquake hazard. The Hazus model estimates that less than 0.1-percent of critical

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facilities in the Planning Area will be damaged by the 100- or 500-year MRP earthquake event. Critical facilities are expected to maintain functionality in each event.

Expansive Soils

Expansive soil events may potentially impact critical facilities and lifelines identified within the County. Critical services may not be available if critical facilities or lifelines are directly damaged or transportation routes to access these critical facilities are breached due to expansive soil events. In Llano County, only one lifeline facility is located in the expansive soils hazard area. In San Saba County, 20 lifeline facilities are located in the expansive soils hazard area.

Table 4.3.5-10. Number of Lifelines Located in the Expansive Soils Hazard Area in Llano County

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the Expansive Soils Hazard Area
Communications	5	1
Energy	28	0
Food, Water, Shelter	18	0
Hazardous Material	7	0
Health and Medical	14	0
Safety and Security	38	0
Transportation	177	0
Llano County (Total)	**287**	**1**

Source: Llano County GIS 2022; Hazus v5.1; Texas A&M 2022; FEMA 2021; USDA 2003

Table 4.3.5-11. Number of Lifelines Located in the Expansive Soils Hazard Area in San Saba County

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the Expansive Soils Hazard Area
Communications	2	2
Energy	0	0
Food, Water, Shelter	2	0
Hazardous Material	0	0
Health and Medical	0	0
Safety and Security	15	3
Transportation	111	15
San Saba County (Total)	**130**	**20**

Source: Llano County GIS 2022; Hazus v5.1; Texas A&M 2022; FEMA 2021; USDA 2003

Subsidence

Overall, all critical facilities in the Planning Area are vulnerable to being affected by subsidence. Subsidence can destroy roadways and buildings which can affect emergency services getting to a location in a timely manner. Utility infrastructure could suffer damage collapsing land resulting in the loss of power or other utility service. Loss of service can impact residents, critical facilities, and business operations alike. Loss of power can impact other public utilities, including potable water, wastewater treatment, and communications. In addition to public water

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services, property owners with private wells might not have access to potable water until power is restored. Lack of power to emergency facilities, including police, fire, EMS, and hospitals, will inhibit a community's ability to effective respond to an event and maintain the safety of its citizens.

Table 4.3.5-12. Number of Lifelines Located in the Subsidence (Carbonate Karst) Hazard Area in Llano County

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the Subsidence (Carbonate Karst) Hazard Area
Communications	5	0
Energy	28	0
Food, Water, Shelter	18	0
Hazardous Material	7	0
Health and Medical	14	0
Safety and Security	38	0
Transportation	177	3
Llano County (Total)	**287**	**3**

Source: USGS 2017

Table 4.3.5-13. Number of Lifelines Located in the Subsidence (Carbonate Karst) Hazard Area in San Saba County

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the Subsidence (Carbonate Karst) Hazard Area
Communications	2	2
Energy	0	0
Food, Water, Shelter	2	0
Hazardous Material	0	0
Health and Medical	0	0
Safety and Security	15	9
Transportation	111	31
San Saba County (Total)	**130**	**42**

Source: Llano County GIS 2022; Hazus v5.1; Texas A&M 2022; FEMA 2021; USGS 2017

Impact on Economy

Earthquake

Earthquakes also impact the economy, including loss of business function, damage to inventory (buildings, transportation, and utility systems), relocation costs, wage loss, and rental loss due to repair and replacement of buildings. Hazus estimates building-related economic losses, including income losses (wage, rental, relocation, and capital-related losses) and capital stock losses (structural, non-structural, content, and inventory losses). For the 100- and 500-year MRP earthquake events, Hazus estimates no losses due to inventory losses, relocation losses, building and content losses, wages losses, rental losses, or capital-related losses.

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Additionally, Hazus estimates volume of debris that may be generated as a result of an earthquake event to enable the study region to prepare for and rapidly and efficiently manage debris removal and disposal. For the 100- and 500-year MRP earthquake events, Hazus does not estimate debris will be generated.

Expansive Soils

Expansive soil events can significantly impact the local and regional economy. Losses include, but are not limited to, damages to buildings and infrastructure, agricultural losses, business interruption, and disruptions in delivery of service.

Subsidence

Subsidence damage to buildings, including residential, commercial, and public buildings, can increase initial construction costs as well as long-term maintenance needs. Impacted roadways and other infrastructure will also need to be replaced and maintained to mitigate risks associated with failing infrastructure. Impacts also include loss of business function, damage to inventory, relocation costs, wage loss, and rental loss due to the repair or replacement of buildings. Business interruption losses include losses associated with the inability to operate a business because of utility failure. Impacts to transportation lifelines affect both short-term (e.g., evacuation activities) and long-term (e.g., day-today commuting and goods transport) transportation needs. Utility infrastructure (power lines, gas lines, electrical systems) could suffer damage and impacts can result in the loss of power, which can impact business operations and can further impact heating or cooling provision to the populations.

Table 4.3.5-14. Estimated Number and Total Replacement Cost Value of Structures Located in the Subsidence (Carbonate Karst) Hazard Area in Llano County

Llano Jurisdiction	Total Number of Buildings	Total Replacement Cost Value (RCV)	Estimated Number and Total Replacement Cost Value of Structures Located in the Subsidence (Carbonate Karst) Hazard Area			
			Number of Buildings	Percent of Total	Total Replacement Cost Value of Buildings	Percent of Total
Horseshoe Bay (C)	2,174	$921,317,000	194	8.9%	$76,151,461	8.3%
Sunrise Beach (C)	909	$345,382,000	0	0.0%	$0	0.0%
Llano (C)	1,733	$564,332,000	0	0.0%	$0	0.0%
Unincorporated Llano County	8,788	$2,408,418,000	133	1.5%	$37,681,202	1.6%
Llano County (Total)	**13,604**	**$4,239,449,000**	**327**	**2.4%**	**$113,832,663**	**2.7%**

Source: USGS 2017; Census 2020
Notes: (C) = City
**Disclaimer: Horseshoe Bay City statistics are based on both Llano County and Burnet County coverage. Results may be over or underestimated.*

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Table 4.3.5-15. Number and Total Replacement Cost Value of Structures Located in the Subsidence (Carbonate Karst) Hazard Area in San Saba County

San Saba Jurisdiction	Total Number of Buildings	Total Replacement Cost Value (RCV)	Estimated Number and Total Replacement Cost Value of Structures Located in the Subsidence (Carbonate Karst) Hazard Area			
			Number of Buildings	Percent of Total	Total Replacement Cost Value of Buildings	Percent of Total
Richland Springs (T)	213	$66,306,000	160	75.3%	$52,310,036	78.9%
San Saba (C)	1,311	$410,811,000	514	39.2%	$150,046,862	36.5%
Unincorporated San Saba County	1,819	$480,386,000	499	27.4%	$117,810,455	24.5%
San Saba County (Total)	**3,343**	**$957,503,000**	**1,173**	**35.1%**	**$320,167,354**	**33.4%**

Source: USGS 2017; Census 2020
Notes: (C) = City, (T) = Town

Impact on the Environment

Earthquake

According to USGS, earthquakes can cause damage to the surface of the Earth in various forms depending on the magnitude and distribution of the event (USGS 2020). Surface faulting is one of the major seismic components to earthquakes that can create wide ruptures in the ground. Ruptures can have a direct impact on the landscape and natural environment because it can disconnect habitats for miles isolating animal species or tear apart plant roots.

Furthermore, ground failure as a result of soil liquefaction can have an impact on soil pores and retention of water resources (USGS 2020). The greater the seismic activity and liquefaction properties of the soil, the more likely drainage of groundwater can occur which depletes groundwater resources. In areas where there is higher pressure of groundwater retention, the pores can build up more pressure and make soil behave more like a fluid rather than a solid increasing risk of localized flooding and deposition or accumulation of silt.

Expansive Soils

Expansive soils are not expected to have substantial impacts on the environment.

Subsidence

Major environmental impacts from subsidence includes an increased flood risk with more frequent inundation caused by rainfall because of the limited effectiveness of the drainage system. In addition, there can be a change in the gradient of streams, canals, and rivers.

Indirect damages also occur such as a decrease of farmland productivity in areas because freshwater availability has been limited by an increase in saltwater intrusion (resulting from a decreased land elevation). The most common indirect effects are related to changes in relative surface and subsurface water levels (The Groundwater Project 2021).

Future Changes That May Impact Vulnerability

Understanding future changes that effect vulnerability in the Planning Area can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The

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Planning Area considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

It is anticipated that the human exposure and vulnerability to geologic hazard impacts in newly developed areas will be similar to those that currently exist within the Planning Area. Current building codes require seismic provisions that should render new construction less vulnerable to seismic impacts than older, existing construction that may have been built using lower construction standards.

Projected Changes in Population

Llano County has experienced an increase in population between the 2010 Census (19,301) and the 2020 Census population of 21,243. The population of the County is expected to increase over the next few years. San Saba County experienced a decrease in population between the 2010 Census (6,131) and the 2020 Census population of 5,730. The Texas Demographic Center has produced population estimates for the region that were last updated in 2018 based on 2010 Census data. The estimates show a slight projected decline for Llano County between 0.14- and 0.25-percent every five years from 2025 to 2035, followed by a projected growth between 0.68- and 3.3-percent every five years from 2035 to 2050. The estimates show projected decline for San Saba County between 1.51- and 4.3-percent every five years from 2025 to 2050 (Texas Demographic Center n.d.). Changes in the density of population can impact the number of persons exposed to geologic hazards.

Climate Change

Secondary impacts of earthquakes could be magnified by climate change. Soils saturated by repetitive storms could experience liquefaction during seismic activity due to the increased saturation. Dams storing increased volumes of water due to changes in the hydrograph could fail during seismic events. There are currently no models available to estimate these impacts.

Climate change is likely to have significant impacts on the performance of residential buildings constructed on expansive soils. Precipitation and temperature are the primary weather parameters used for determining ground movement (Sun, Li and Zhou 2017). The climate of Texas is changing. Most of the State has warmed between one half and one degree Fahrenheit in the past century. In the eastern two-thirds of the State, average annual rainfall is increasing; however, the soil is becoming drier. Rainstorms are more intense, and floods are becoming more severe. In the coming decades, storms are likely to become more severe in Texas (EPA 2016).

While there is no established connection that climate change increases land subsidence, secondary impacts of climate change such as drought and flood may have a greater impact on areas experiencing land subsidence. As drought levels increase, the need to pump water from aquifers also increases which exacerbates subsidence (Shirzaei and Bürgmann 2018).

Change of Vulnerability Since 2016 HMP

Earthquake, expansive soils, and subsidence were separate hazards of concern in the 2016 HMP. Based on the connected impacts, these hazards have been grouped together in this HMP update. Overall, the vulnerability to geologic hazards has remained unchanged since the 2016 plan.

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Section 4 Risk Assessment

4.3 Hazard Profiles

4.3.6 Hurricanes/Tropical Storms

The following section provides the hazard profile and vulnerability assessment for the hurricane and tropical storm hazard in the Planning Area. When referring to the Planning Area, it includes both Llano County and San Saba County.

Hazard Profile

Hazard Description

Hurricanes, tropical storms, and depressions (hurricane TS/D) that impact Texas form over warm tropical waters of the Gulf of Mexico or the Atlantic Ocean. The warm, moist air over the ocean rises upward from near the surface, creating an area of lower air pressure. These areas of relative low pressure draw in new air from the surrounding high-pressure areas. Quickly cyclonic (counterclockwise) circulation begins, and rain bands spin out from a wall of wind that surrounds a central area of low barometric pressure (the "eye"). Such storms can grow to a thousand miles in diameter and sustain winds near the eye that approach 200 miles an hour (TDEM 2018).

According to NOAA, tropical cyclones are classified into three main categories (per intensity): tropical depressions, tropical storms, and hurricanes.

Tropical depressions have a maximum sustained winds of 38 mph. Though not as strong as its successors, tropical depressions can bring heavy downpours and sustained winds strong enough to generate rough surf and life-threatening rip currents. When a tropical depression approaches, the National Weather Service may issue a tropical storm watch or warning for the area.

A tropical storm is a tropical cyclone in which the maximum sustained surface wind speeds range from 39 to 73 mph. At this time the tropical cyclone is assigned a name. During this time, the storm itself becomes more organized and begins to become more circular in shape, resembling a hurricane.

Hurricanes are areas of disturbed weather in the tropics with closed isobars and strong and very pronounced rotary circulation. An area of clear weather called an "eye" is present in the center of the circulation. To qualify as a hurricane, the wind speed is 74 miles per hour (mph) or more. Hurricanes are classified into categories based on wind speed. Thunderstorm rain resulting in urban flooding, battering wave action, intense sea level rise, localized coastal erosion, and significant winds are associated with hurricanes.

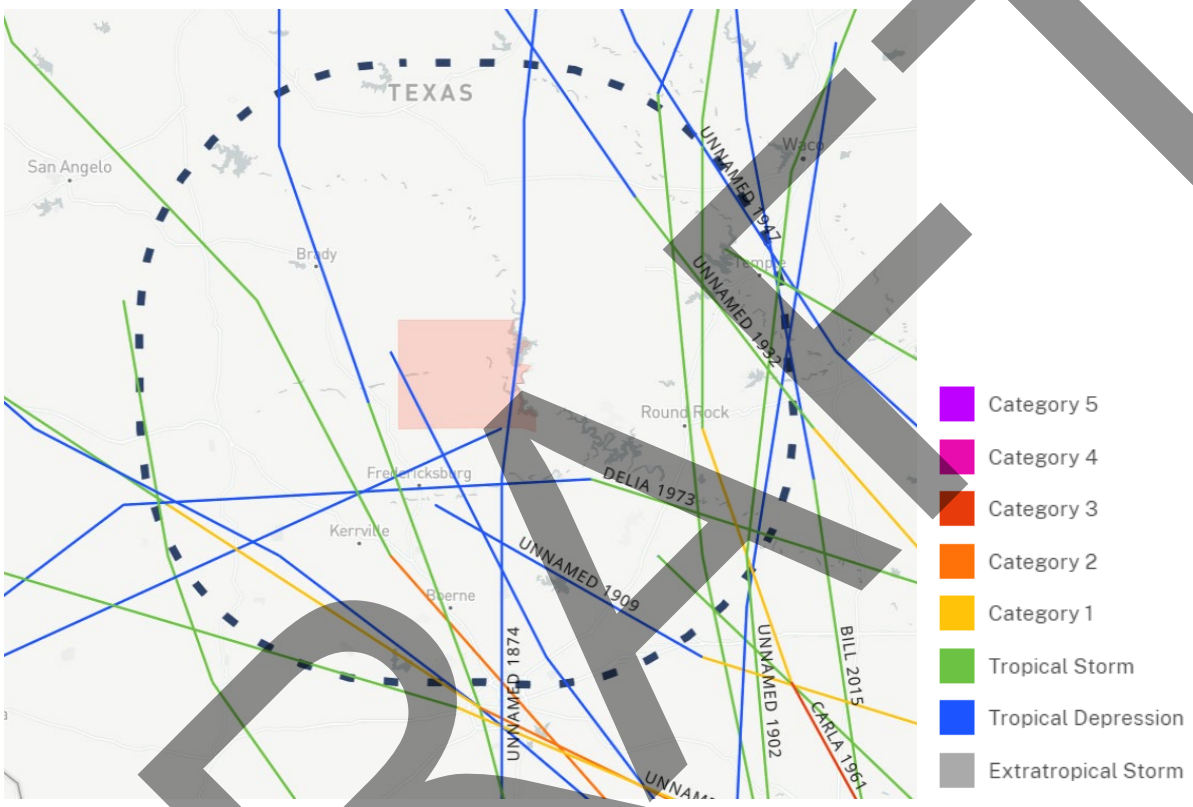
Location

Due to Llano County and participating communities' interior location (approximately 200 miles inland), it is not exposed directly to hurricanes. While the County is considered to have no exposure to hurricanes, the City of Horseshoe Bay has a low-ranking exposure, and the City of Sunrise Beach Village has a medium ranking exposure to hurricanes and tropical storms. San Saba County and the City of San Saba's interior location (approximately 250 miles inland), it is not exposed directly to hurricanes. San Saba County and the City of San Saba both have a low-ranking exposure to hurricanes and tropical storms.

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A hurricane or tropical storm event can occur anywhere within the hazard mitigation plan area, moving inland from the Gulf of Mexico. Hurricane events become tropical depressions or tropical storms by the time they reach the planning areas. Within Llano County, the City of Llano and the City of Sunrise Beach Village are within 12 miles of hurricane paths based on historical events. Figure 4.3.6-1 and Figure 4.3.6-2 below show the hurricane path for both Llano and San Saba County's.

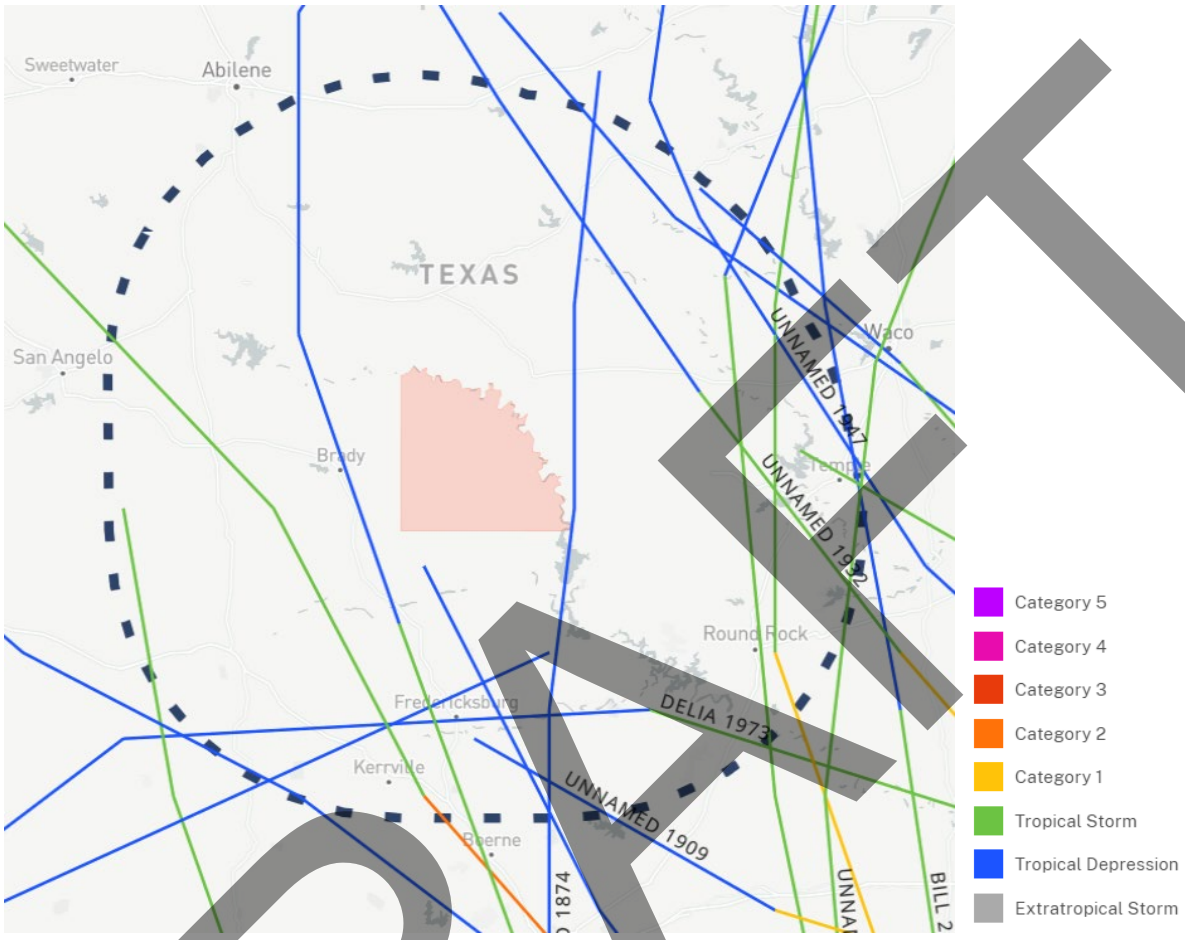
Figure 4.3.6-1. Historical Hurricane and Tropical Storms Affecting Llano County



Source: National Hurricane Center 2022

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Figure 4.3.6-2. Historical Hurricane and Tropical Storms Affecting San Saba County



Source: National Hurricane Center 2022

Extent

The extent of a hurricane or tropical storm is commonly categorized in accordance with the Saffir-Simpson Hurricane Wind Scale, which assigns a designation of tropical storm for storms with sustained wind speeds below 74 mph and a hurricane category rating of 1–5 based on a hurricane's increasing sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered *major hurricanes* because of their potential for significant loss of life and damage. Tropical Storms and Category 1 and 2 storms are still dangerous and require preventative measures (NWS NOAA n.d.)

The NWS issues hurricane and tropical storm watches and warnings. These watches and warnings are issued or will remain in effect after a tropical cyclone becomes post-tropical, when such a storm poses a significant threat to life and property. The NWS allows the National Hurricane Center (NHC) to issue advisories during the post-tropical stage. The following are the definitions of the watches and warnings:

- *Hurricane/Typhoon Warning* is issued when sustained winds of 74 mph or higher are expected somewhere within the specified area in association with a tropical, subtropical, or post-tropical cyclone. Because hurricane preparedness activities become difficult once winds reach tropical storm force, the warning is issued 36 hours in advance of the anticipated onset of tropical storm-force winds. The warning can remain

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in effect when dangerously high water or combination of dangerously high water and waves continue, even though winds may be less than hurricane force.

- *Hurricane Watch* is issued when sustained winds of 74 mph or higher are possible within the specified area in association with a tropical, subtropical, or post-tropical cyclone. Because hurricane preparedness activities become difficult once winds reach tropical storm force, the hurricane watch is issued 48 hours prior to the anticipated onset of tropical storm-force winds.
- *Tropical Storm Warning* is issued when sustained winds of 39 to 73 mph are expected somewhere within the specified area within 36 hours in association with a tropical, subtropical, or post-tropical storm.
- *Tropical Storm Watch* is issued when sustained winds of 39 to 73 mph are possible within the specified area within 48 hours in association with a tropical, sub-tropical, or post-tropical storm (NHC NOAA 2010).

Hurricanes are classified according to the Saffir-Simpson Hurricane Wind Scale from a Category 1 to Category 5 by sustained wind intensity. Table 4.3.6-1 below shows the categories and the type of damage they produce.

Table 4.3.6-1. Saffir-Simpson Hurricane Wind Scale

Category	Sustained Winds (miles per hour)	Types of Damage Due to Hurricane Winds
1	74-95	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding, and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (Major)	111-129	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (Major)	130-156	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (Major)	157 or higher	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
Other non-hurricane classifications are tropical storms (39-73 miles per hour) and tropical depressions (0-38 miles per hour)		

Source: NOAA n.d.

Mean Return Period

In evaluating the potential for hazard events of a given magnitude, a mean return period (MRP) is often used. The MRP provides an estimate of the magnitude of an event that may occur within any given year based on past recorded events. The MRP is the average period of time, in years, between occurrences of a particular hazard event, equal to the inverse of the annual frequency of exceedance.

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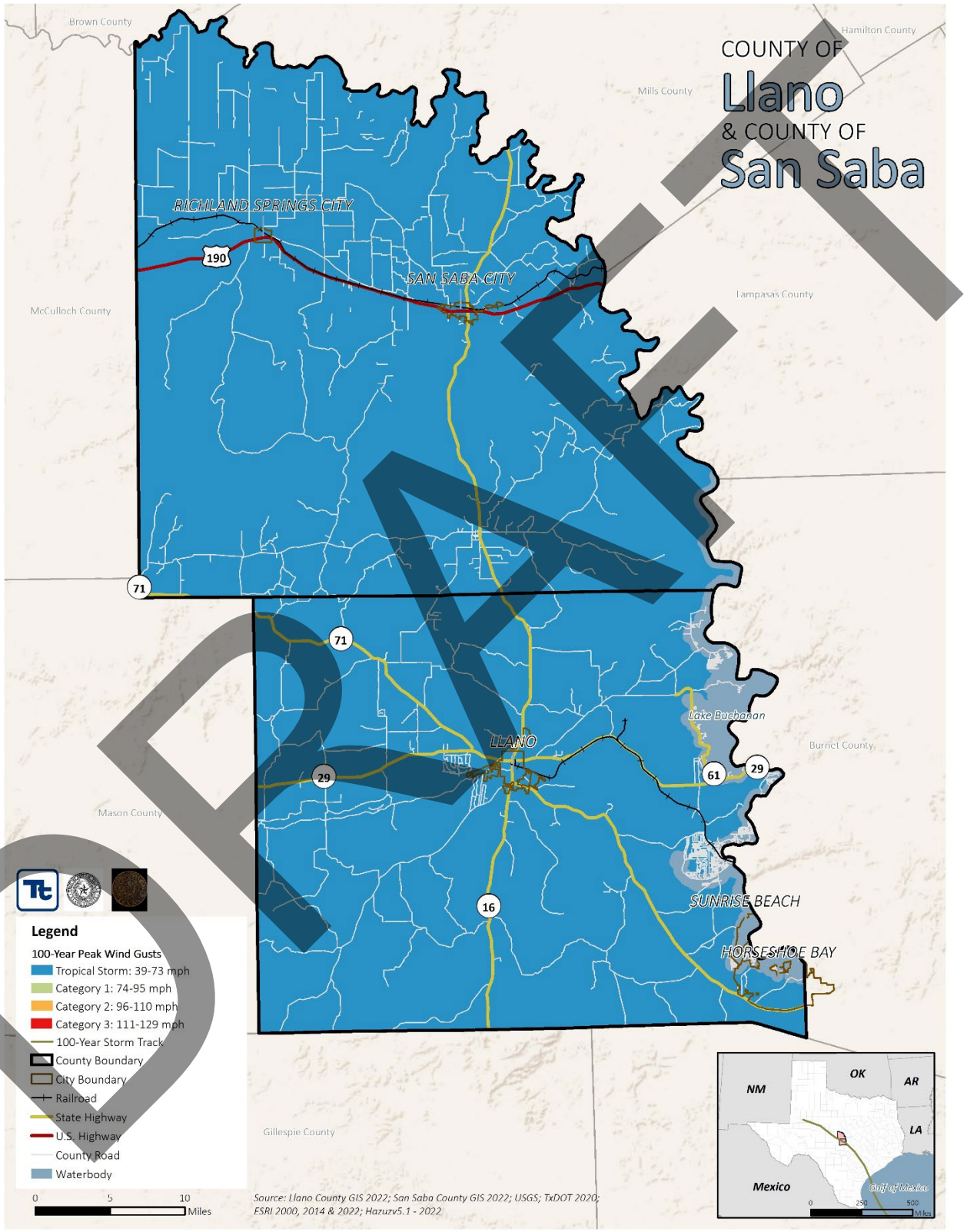
Peak wind speed projections were generated using Hazus v5.0. Hazus v5.0 estimated the maximum 3-second gust wind speeds for Llano and San Saba County:

- Llano:
  - 100-year MRP – between 39 and 73 mph (Tropical Storm)
  - 500-year MRP – between 39 and 73 mph (Tropical Storm)
- San Saba:
  - 100-year MRP – between 39 and 73 mph (Tropical Storm)
  - 500-year MRP – between 74 and 95 mph (Category 1 Hurricane)

Refer to Figure 4.3.6-3 and Figure 4.3.6-4 below to view the 100- and 500-year MRPs, respectively.

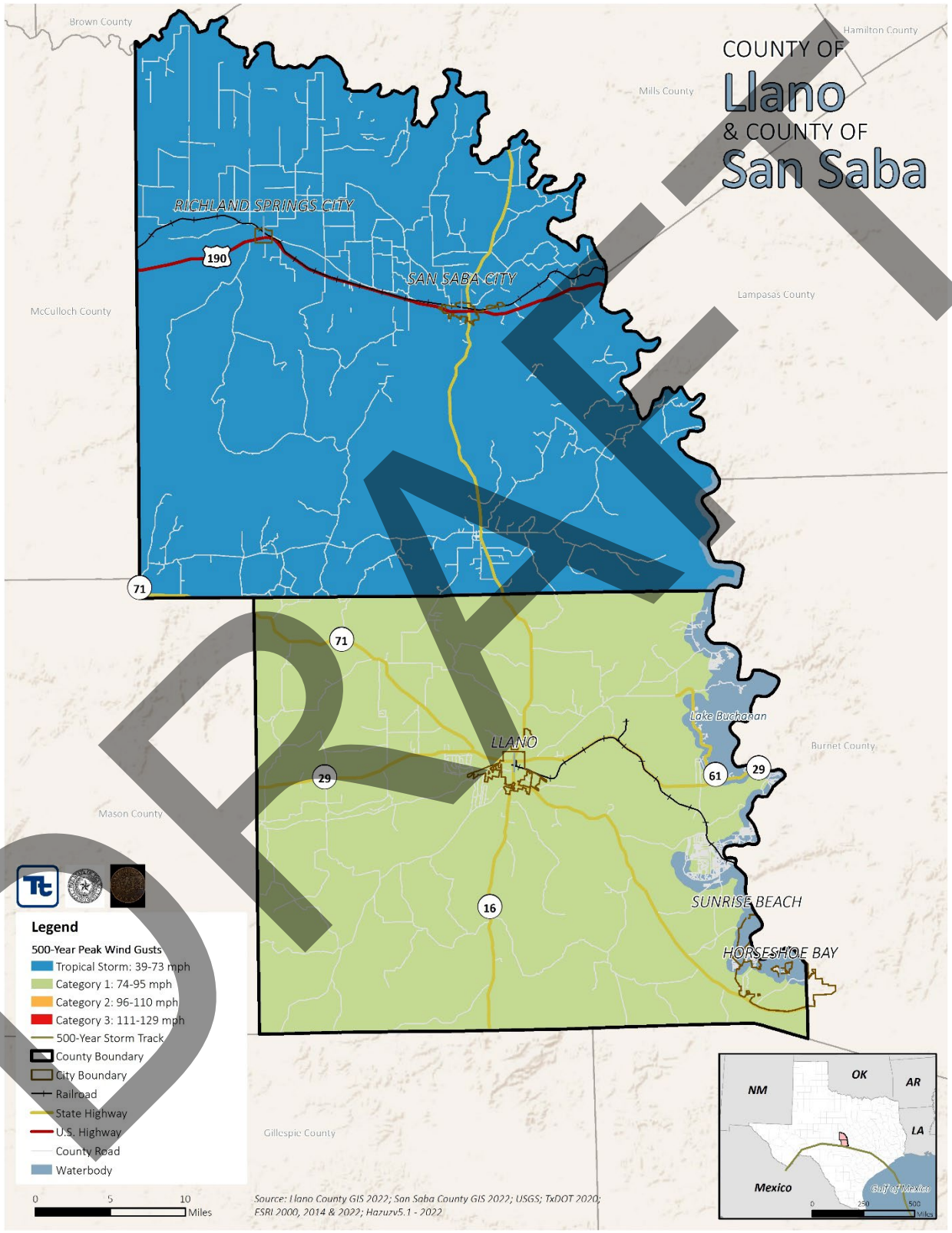
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Figure 4.3.6-3. Wind Speeds for the 100-year MRP Event



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Figure 4.3.6-4. Wind Speeds for the 500-year MRP Event



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Worst-Case Scenario

The 500-year MRP event (Category 1 Hurricane for Llano County and Tropical Storm for San Saba County) would be the worst-case scenario for Llano County. A storm of this magnitude could moderate damage to 12 occupied buildings and minor damages to 291. Critical facilities in the planning area would likely sustain moderate damages, particularly to schools and medical care facilities. There would be over $7.4 million in building damages, causing over 787 tons of debris. The winds associated with a category 1 (speeds between 74 and 95 mph) would cause damages to the roofs, shingles, vinyl sidings, and gutters of buildings. Large branches of trees wills nap and shallowly rooted trees may be toppled. Extensive damage to powerlines and poles likely will result in power outages that could last a few to several days. Winds associated with tropical depressions, will not bring much, if any, wind damage to an area. Windy conditions will be present, and it can be expected item such as lawn accessories and furniture, garbage bins, and other outside items may be strewn by the sustained winds. However, tropical depressions can still bring heavy downpours and cause intense floods.

Previous Occurrences and Losses

FEMA Disaster Declarations

Between 1954 and 2022, Llano and/or San Saba County were both included in four disaster (DR) or emergency (EM) declarations for hurricane/tropical storm-related events. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 3 (County Profile).

Table 4.3.6-2. FEMA Disaster Declaration for the Project Area (1954-2022)

Date(s) of Event	Event Name	FEMA Declaration Number	Llano and/or San Saba County included in Declaration?
August 22, 1998 - August 31, 1998	Texas Tropical Storm Charley	DR-1239-TX	Llano County, San Saba County
September 23, 2005 - October 14, 2005	Hurricane Rita	DR-1606-TX	Llano County, San Saba County
September 20, 2005 - October 14, 2005	Hurricane Rita	EM-3261-TX	Llano County, San Saba County
August 29, 2005 - October 1, 2005	Hurricane Katrina	EM-3216-TX	Llano County, San Saba County

Source: FEMA 2023

U.S. Department of Agriculture Disaster Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2017 and 2022, Llano and/or San Saba County were not included any hurricane and tropical storm-related agricultural disaster declarations.

Previous Events

Between 2017 and 2022, the Planning Area was not impacted by any topical depression, tropical storm, or hurricane activity. For events prior to 2017, refer to Appendix I (Supplementary Data).

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Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of hurricane and tropical storm events for the County. Information from NOAA-NCEI storm events database, the 2018 State of Texas HMP, the 2016 Llano County HMP, the San Saba County HMPs, and FEMA's Disaster Declarations for States and Counties were used to identify the number of hurricane and tropical storm events that occurred between 1950 and 2022. Table 4.3.6-3 presents the probability of future events for the hurricane and tropical storm hazard.

Table 4.3.6-3. Probability of Future Hurricane and Tropical Storm Events

Hazard Type	Number of Occurrences Between 1950 and 2022	% Chance of Occurring in Any Given Year
Hurricane	3	4.11%
Tropical Storm	1	1.37%
Total	**4**	**5.48%**

Sources: NOAA 2023; TDEM 2018; Llano County 2016; San Saba County 2016; FEMA 2022
Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all hurricane and tropical storm events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.

In Section 4.4, the identified hazards of concern for the Planning Area were ranked (Table 4.4-4 and Table 4.4-5). The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Team, the probability of occurrence for hurricanes and tropical storms in the Planning Area is considered 'occasional'.

Climate Change Projections

Temperatures are predicted to increase in the Planning Area and ocean temperatures are forecast to continue to increase, which may lead to an increase in intensity and frequency of hurricanes. As oceans warm, the length of hurricane season may expand. Recent hurricane seasons have featured a tropical system occurring before the official start of the season. In 2016, a very rare winter hurricane named Alex developed in the middle of January (BBC 2019). According to NOAA's database, 40 storms formed in the Atlantic Basin before June 1 from 1851 through 2021, a long-term average of one such early storm every four to five years. The 2010s had the most such storms, and there has been a steady increase since the 1990s. However, the 1950s had six such storms, the 1930s had four and there was another four preseason storm streak from 1887 through 1890. It is possible there were other such storms in the era before satellites – before the mid-1960s – that were missed by ship observations or reports from areas impacted. It remains to be seen if expansion of the traditional hurricane season is a long-term trend or a common occurrence (The Weather Channel 2020). It remains to be seen if other factors such as steering currents, atmospheric sheer, and the presence of Saharan dust will be impacted in ways which increase or decrease the risk of hurricanes in the Planning Area.

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The entire Planning Area is vulnerable to the hurricane and tropical storm hazard. The following text evaluates and estimates the potential impact of the hurricane and tropical storm hazard in the Planning Area as a whole.

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Impact on Life, Health, and Safety

The impact of hurricanes and tropical storms on life, health, and safety is dependent upon several factors including the severity of the event and whether or not adequate warning time was provided to residents. All residents in the Planning Area (21,243 in Llano County and 5,730 in San Saba County) are exposed to the hurricane storm and tropical storm hazard.

Research has shown that some populations, while they may not have more hazard exposure, may experience exacerbated impacts and prolonged recovery if/when impacted. This is due to many factors including their physical and financial ability to react or respond during a hazard. Economically disadvantaged populations are vulnerable because they are likely to evaluate their risk and make decisions based on the major economic impact to their family and may not have funds to evacuate. The population over the age of 65 is also vulnerable and, physically, they may have more difficulty evacuating. Additionally, the elderly are considered vulnerable because they require extra time or outside assistance during evacuations and are more likely to seek or need medical attention which may not be available due to isolation during a storm event. According to the 5-year population estimates from the American Community Survey, Llano County has a total of 1,612 persons living in poverty and 7,975 over the age of 65 years old. San Saba County has a total of 714 persons living in poverty and 1,407 over the age of 65 years old. Please refer to Section 3 (County Profile) for the statistics of these populations.

Residents may be displaced or require temporary to long-term sheltering. In addition, downed trees, damaged buildings and debris carried by high winds can lead to injury or loss of life. Socially vulnerable populations are most susceptible, based on a number of factors including their physical and financial ability to react or respond during a hazard and the location and construction quality of their housing. Hazus estimates that no households in the Planning Area will be displaced or seek short-term shelter during the 100-year and 500-year MRP hurricane wind events, respectively. Please note that estimates are only based on wind speed and do not account for sheltering needs associated with flooding and storm surge that may accompany hurricane and tropical storm events.

Impact on General Building Stock

Damage to buildings is dependent upon several factors, including wind speed, hail size, storm duration, and storm path. Building construction also plays a major role in the extent of damage resulting from a storm. Due to differences in construction, residential structures are generally more susceptible to storm damage than commercial and industrial structures. Wood and masonry buildings, in general, regardless of their occupancy class, tend to experience more damage than concrete or steel buildings. Lightning can spark wildfires or building fires, especially if structures are not protected by surge protectors on critical electronic, lighting, or information technology systems.

Table 4.3.6-4. Expected Damage for 100-Year Mean Return Period Hurricane Event in the Planning Area

Occupancy Class	Total Number of Buildings Assessed in Occupancy	Severity of Expected Damage	Building Count	Percent of Buildings in Occupancy Class
Residential Exposure (Single and Multi-Family Dwellings)	16,021	NONE	16,013	99.9%
		MINOR	8	0.1%
		MODERATE	0	0.0%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%
Commercial Buildings	600	NONE	598	99.6%
		MINOR	2	0.3%

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Occupancy Class	Total Number of Buildings Assessed in Occupancy	Severity of Expected Damage	Building Count	Percent of Buildings in Occupancy Class
		MODERATE	0	0.0%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%
Industrial Buildings	148	NONE	147	99.6%
		MINOR	1	0.3%
		MODERATE	0	0.0%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%
Government, Religion, Agricultural, and Education Buildings	178	NONE	177	99.6%
		MINOR	1	0.4%
		MODERATE	0	0.0%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%

Source: Hazus v5.1
**Disclaimer: Results show overall impacts for the entire Planning Area*

Table 4.3.6-5. Expected Damage for 500-Year Mean Return Period Hurricane Event in the Planning Area

Occupancy Class	Total Number of Buildings Assessed in Occupancy	Severity of Expected Damage	Building Count	Percent of Buildings in Occupancy Class
Residential Exposure (Single and Multi-Family Dwellings)	16,021	NONE	15,734	98.2%
		MINOR	275	1.7%
		MODERATE	11	0.1%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%
Commercial Buildings	600	NONE	588	98.0%
		MINOR	11	1.8%
		MODERATE	1	0.2%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%
Industrial Buildings	148	NONE	145	98.3%
		MINOR	2	1.6%
		MODERATE	0	0.0%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%
Government, Religion, Agricultural, and Education Buildings	178	NONE	175	98.3%
		MINOR	3	1.6%
		MODERATE	0	0.0%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%

Source: Hazus v5.1
**Disclaimer: Results show overall impacts for the entire Planning Area*

Impact on Critical Facilities

Critical facilities are at risk of being impacted by high winds associated with structural damage, or falling tree limbs/flying debris, which can result in the loss of power. Power loss can greatly impact households, business operations, public utilities, and emergency personnel. For example, vulnerable populations in the Planning Area are at risk if power loss results in interruption of heating and cooling services, stagnated hospital operations, and

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potable water supplies. Emergency personnel such as police, fire, and EMS will not be able to effectively respond in a power loss event to maintain the safety of its citizens.

Hazus estimates that critical facilities in the Planning Area have a low probability of sustaining minor to moderate damages from the 100-year MRP hurricane wind event.

Table 4.3.6-6. Impact of 100-Year Mean Return Period Hurricane Event on Critical Facilities in the Planning Area

Facility Type	100-Year Mean Return Period Hurricane				
	Loss of Days	Percent-Probability of Sustaining Damage			
		Minor	Moderate	Severe	Complete
Medical Care Facilities	0	0.1% - 0.2%	0.0%	0.0%	0.0%
Fire Stations	0	0.2%	0.0% - <0.1%	0.0%	0.0%
Police Stations	0	0.3% - 0.5%	0.0%	0.0%	0.0%
Emergency Response Centers	0	0.3% - 0.4%	0.0%	0.0%	0.0%
Schools	0	0.2%	0.0%	0.0%	0.0%

Source: Llano County GIS 2022; Hazus v5.1; Texas A&M 2022; FEMA 2022

Table 4.3.6-7. Impact of 500-Year Mean Return Period Hurricane Event on Critical Facilities in the Planning Area

Facility Type	500-Year Mean Return Period Hurricane				
	Loss of Days	Percent-Probability of Sustaining Damage			
		Minor	Moderate	Severe	Complete
Medical Care Facilities	0	1.2% - 2.0%	<0.1% - 0.2%	0.0%	0.0%
Fire Stations	0	0.2% - 1.4%	0% - 0.1%	0.0%	0.0%
Police Stations	0	0.5% - 2.5%	0% - 0.1%	0.0%	0.0%
Emergency Response Centers	0	0.5% - 2.0%	0% - <0.1%	0.0%	0.0%
Schools	0	0.3% - 2.4%	0% - 0.4%	0.0%	0.0%

Source: Llano County GIS 2022; Hazus v5.1; Texas A&M 2022; FEMA 2022

At this time, Hazus does not estimate losses to transportation lifelines and utilities as part of the hurricane model. Transportation lifelines are not considered particularly vulnerable to the wind hazard; they are more vulnerable to cascading effects such as flooding, falling debris etc. Impacts to transportation lifelines affect both short-term (e.g., evacuation activities) and long-term (e.g., day-to-day commuting) transportation needs. Furthermore, evacuation routes are vulnerable to hurricane wind events.

The Planning Area is often impacted by evacuations from coastal communities along the Gulf Coast and experiences an influx of evacuees.

Impact on Economy

Damage to structures from wind can be the most immediate result of hurricane and tropical storm events; however, this damage can have long-lasting impacts on the economy. When a business is closed during storm recovery, there is lost economic activity in the form of day-to-day business and wages to employees. Overall, economic impacts include the loss of business function (e.g., tourism, recreation), damage to inventory, relocation costs, wage loss, and rental loss due to the repair/replacement of buildings.

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Table 4.3.6-8. Estimated Losses from the 100-Year and 500-Year Hurricane Events in the Planning Area

Mean Return Period (MRP)	Income Loss	Relocation Loss	Building Losses	Wages Losses	Rental Losses
100-Year	$0	$390	$1,034,790	$0	$0
500-Year	$0	$304,500	$7,426,450	$0	$103,800

Source: Hazus v5.1
**Disclaimer: Results show overall impacts for the entire Planning Area*

Hazus estimates the total economic loss associated with each storm scenario (direct building losses and business interruption losses). Direct building losses are the estimated costs to repair or replace the damage caused to the building. This is reported in the "Impact on General Building Stock" section discussed earlier. Business interruption losses are the losses associated with the inability to operate a business because of the wind damage sustained during the storm or the temporary living expenses for those displaced from their home because of the event.

Building losses for the 100-year and 500-year hurricane events are expected to be less than 1-percent of the total replacement cost value for each county.

Table 4.3.6-9. Estimated Building Losses from the 100-Year and 500-Year Hurricane Events in Llano County

Llano Jurisdiction	Total Replacement Cost Value	Estimated Building Losses Caused by the 100-Year Mean Return Period Hurricane	Percent of Total	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane	Percent of Total
Horseshoe Bay (C)	$921,317,000	$0	0.0%	$0	0.0%
Sunrise Beach (C)	$345,382,000	$0	0.0%	$0	0.0%
Llano (C)	$564,332,000	$190,941	0.0%	$1,084,481	0.2%
Unincorporated Llano County	$2,408,418,000	$649,556	0.0%	$5,941,576	0.2%
Llano County (Total)	**$4,239,449,000**	**$840,497**	**0.0%**	**$7,026,056**	**0.2%**

Source: Hazus v5.1; Census 2010/2020
Notes: (C) = City

Table 4.3.6-10. Estimated Building Losses from the 100-Year and 500-Year Hurricane Events in San Saba County

San Saba Jurisdiction	Total Replacement Cost Value	Estimated Building Losses Caused by the 100-Year Mean Return Period Hurricane	Percent of Total	Estimated Building Losses Caused by the 500-Year Mean Return Period Hurricane	Percent of Total
Richland Springs (T)	$66,306,000	$0	0.0%	$0	0.0%
San Saba (C)	$410,811,000	$12,641	0.0%	$15,694	0.0%
Unincorporated San Saba County	$480,386,000	$181,648	0.0%	$384,698	0.0%
San Saba County (Total)	**$957,503,000**	**$194,288**	**0.0%**	**$400,392**	**0.0%**

Source: Hazus v5.1; Census 2010/2020
Notes: (C) = City; (T) = Town

Debris management can be costly and may also impact the local economy. Hazus estimates the amount of building and tree debris that may be produced as result of the 100- and 500-year MRP wind events. Because the estimated

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debris production does not include flooding, this is likely a conservative estimate and may be higher if multiple impacts occur. According to the Hazus Hurricane User Manual, estimates of weight and volume of eligible tree debris consist of downed trees that would likely be collected and disposed at public expense. Refer to the User Manual for additional details regarding these estimates.

Hazus estimates the 100-year and 500-year hurricane events in Llano County would generate 30 tons and 762 tons of debris respectively.

Table 4.3.6-11. Estimated Debris Created During the 100-Year Mean Return Period Hurricane Wind Event in Llano County

Llano Jurisdiction	Brick and Wood (Tons)	Concrete and Steel (Tons)	Tree (Tons)	Eligible Tree Volume (Cubic Yards)
Horseshoe Bay (C)	0	0	0	0
Sunrise Beach (C)	0	0	0	0
Llano (C)	8	0	0	0
Unincorporated Llano County	22	0	0	0
Llano County (Total)	**30**	**0**	**0**	**0**

Source: *Hazus v5.1; Census 2010*
Notes: *(C) = City*

Table 4.3.6-12. Estimated Debris Created During the 500-Year Mean Return Period Hurricane Wind Event in Llano County

Llano Jurisdiction	Brick and Wood (Tons)	Concrete and Steel (Tons)	Tree (Tons)	Eligible Tree Volume (Cubic Yards)
Horseshoe Bay (C)	0	0	0	0
Sunrise Beach (C)	0	0	0	0
Llano (C)	105	0	0	0
Unincorporated Llano County	657	0	0	0
Llano County (Total)	**762**	**0**	**0**	**0**

Source: *Hazus v5.1; Census 2010*
Notes: *(C) = City*

Hazus estimates the 100-year and 500-year hurricane events in San Saba County would generate 9 tons and 25 tons of debris respectively.

Table 4.3.6-13. Estimated Debris Created During the 100-Year Mean Return Period Hurricane Wind Event in San Saba County

San Saba Jurisdiction	Brick and Wood (Tons)	Concrete and Steel (Tons)	Tree (Tons)	Eligible Tree Volume (Cubic Yards)
Richland Springs (T)	0	0	0	0
San Saba (C)	1	0	0	0
Unincorporated San Saba County	8	0	0	0
San Saba County (Total)	**9**	**0**	**0**	**0**

Source: *Hazus v5.1; Census 2010*
Notes: *(C) = City; (T) = Town*

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Table 4.3.6-14. Estimated Debris Created During the 500-Year Mean Return Period Hurricane Wind Event in San Saba County

San Saba Jurisdiction	Brick and Wood (Tons)	Concrete and Steel (Tons)	Tree (Tons)	Eligible Tree Volume (Cubic Yards)
Richland Springs (T)	0	0	0	0
San Saba (C)	1	0	0	0
Unincorporated San Saba County	24	0	0	0
San Saba County (Total)	**25**	**0**	**0**	**0**

Source: Hazus v5.1; Census 2010
Notes: (C) = City; (T) = Town

Impact on the Environment

Wind from hurricanes and tropical storms can knock overpower lines sparking fires which can destroy forests and habitats. Winds can also carry debris and litter across areas which can negatively impact ecosystems and habitats, including water bodies.

Future Changes That May Impact Vulnerability

Understanding future changes that effect vulnerability in the Planning Area can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The Planning Area considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

Any areas of growth could be potentially impacted by the hurricane and tropical storm hazard because the entire Planning Area is exposed and vulnerable; however, due to increased standards and codes, new development can be less vulnerable to the hazard compared with the aging building stock in the Planning Area.

Projected Changes in Population

Llano County has experienced an increase in population between the 2010 Census (19,301) and the 2020 Census population of 21,243. The population of the County is expected to increase over the next few years. San Saba County experienced a decrease in population between the 2010 Census (6,131) and the 2020 Census population of 5,730. The Texas Demographic Center has produced population estimates for the region that were last updated in 2018 based on 2010 Census data. The estimates show a slight projected decline for Llano County between 0.14 and 0.25 percent every five years from 2025 to 2035, followed by a projected growth between 0.68 and 3.3 percent every five years from 2035 to 2050. The estimates show projected decline for San Saba County between 1.51 and 4.3 percent every five years from 2025 to 2050 (Texas Demographic Center n.d.).

An increase in population will expose more people to the hurricane and tropical storm hazard.

Climate Change

As noted previously, the entire State of Texas is projected to experience an increase in the frequency and severity of extreme storms and rainfall. Temperatures are predicted to increase in the Planning Area and ocean

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temperatures are forecast to continue to increase, which may lead to an increase in intensity and frequency of hurricanes. As oceans warm, the length of hurricane season may expand. Overall, the Planning Area will continue to remain vulnerable to the hurricane and tropical storm hazard.

Change of Vulnerability Since 2016 HMP

The Planning Area continues to be vulnerable to hurricanes and tropical storms. Hurricane models on debris created were not run for the 2016 HMP. Building losses were based on annualized losses instead of the 100 and 500-year mean return period events analyzed in this HMP update. Overall, the vulnerability assessment presented in this update uses Hazus v5.1 and a more accurate and updated building inventory. This provides more accurate estimated exposure and potential losses for the Planning Area.

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Section 4 Risk Assessment

4.3 Hazard Profiles

4.3.7 Pandemic/Health and Safety

The following section provides the hazard profile and vulnerability assessment for the Pandemic/Health and Safety hazard in the Planning Area. When referring to the Planning Area, it includes both Llano County and San Saba County.

Hazard Profile

Hazard Description

An outbreak or an epidemic occurs when new cases of a certain disease, in a given population, substantially exceed what is expected. An epidemic may be restricted to one locale, or it may be global, at which point it is called a pandemic. Pandemic is defined as a disease occurring over a wide geographic area and affecting a high proportion of the population. A disease outbreak can cause sudden, pervasive illness in all age groups on a local or global scale. A pandemic is a novel virus to which humans have no natural immunity that spreads from person-to-person. A pandemic will cause both widespread and sustained effects and is likely to stress the resources of both the State and federal government (Madhav, et al. 2017). In addition to health impacts, disease outbreaks reaching pandemic proportions can cause social and economic impacts on a global scale (Shang, Li and Zhang 2021).

Coronavirus

Coronavirus disease (COVID-19) is an infectious disease first identified in 2019. The virus rapidly spread into a global pandemic by spring of 2020. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness (World Health Organization n.d.). With the virus being relatively new, information regarding transmission and symptoms of the virus is still new. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. Reported illnesses have ranged from mild symptoms to severe illness. Reported symptoms include fever or chills, cough, shortness of breath or difficulty breathing and fatigue. Symptoms may appear 2-14 days after exposure to the virus (CDC 2021).

In an effort to slow the spread of the virus, the federal government and states have urged the public to avoid touching of the face, properly wash hands often, and use various social distancing measures. At the time of this plan update, there are three approved and authorized vaccines available in the United States to reduce risk of severe illness (CDC 2021).

Influenza

The risk of a global influenza pandemic has increased over the last several years. This disease is capable of claiming thousands of lives and adversely affecting critical infrastructure and key resources. An influenza pandemic has the ability to reduce the health, safety, and welfare of the essential services workforce; immobilize core infrastructure; and induce fiscal instability.

Pandemic influenza is different from seasonal influenza (or "the flu") because outbreaks of seasonal flu are caused by viruses that are already among people. An influenza pandemic is a global outbreak of a new influenza A virus.

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Pandemics happen when new (novel) influenza A viruses emerge which are able to infect people easily and spread from person to person in an efficient and sustained way (CDC n.d.).

At the national level, the CDC's Influenza Division has a long history of supporting the World Health Organization (WHO) and its global network of National Influenza Centers (NIC). With limited resources, most international assistance provided in the early years was through hands-on laboratory training of in-country staff, the annual provision of WHO reagent kits (produced and distributed by CDC), and technical consultations for vaccine strain selections. The Influenza Division also conducts epidemiologic research including vaccine studies and serologic assays and provided international outbreak investigation assistance (CDC n.d.).

West Nile Virus

West Nile Virus (WNV) encephalitis is a mosquito-borne viral disease, which can cause an inflammation of the brain. WNV is commonly found in Africa, West Asia, the Middle East and Europe. West Nile Virus was first reported in Texas in 2002. In a small number of cases, WNV has been spread by blood transfusion, which has resulted in the screening of blood donations for the virus in the US, or by organ transplantation. WNV can also be spread from mother to baby during pregnancy, delivery, or breast-feeding in a small number of cases. The symptoms of severe infection (West Nile encephalitis or meningitis) can include headache, high fever, neck stiffness, muscle weakness, stupor, disorientation, tremors, seizures, paralysis, and coma. WNV can cause serious illness, and in some cases, death. Usually, symptoms occur from two to 14 days after being bitten by an infected mosquito (Texas Department of State Health Services n.d.).

Location

Disease outbreaks can occur without regard for location. However, factors such as density, visitation, and the length of time in which the public spends in a location all contribute to the spread of infectious diseases. For example, COVID-19 is more likely spread by persons in close contact. Indoor areas in which people are in close contact with each other appear to be significant vectors for the disease, which is spread through respiratory droplets. Infectious diseases spread by insects may be subject to other types of location hazards. For example, the prevalence of standing water can provide breeding grounds for diseases such as West Nile Virus. Diseases that can infect humans are variable in nature and methods of transmission. Ultimately, residents need to be vigilant about diseases altogether in order to better understand and respond to disease outbreak hazards.

Extent

The exact size and extent of an infected population depends on how easily the illness is spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in more densely populated areas. The transmission rate of infectious diseases will depend on the mode of transmission of a given illness.

Worst-Case Scenario

A worst-case scenario would be a global pandemic similar to the COVID-19 pandemic that began affecting the Planning Area in early 2020, but with more severe health impacts. This could lead to high rates sickness and deaths; strain on healthcare systems; income stress and financial loss; and negative mental health impacts.

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Previous Occurrences and Losses

FEMA Disaster Declarations

Between 1954 and 2022, Llano and/or San Saba County were both included in two disaster (DR) or emergency (EM) declarations for pandemic-related events. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 3 (County Profile).

Table 4.3.7-1. Pandemic/Health and Safety FEMA Disaster Declarations in the Planning Area

Date(s) of Event	Event Type	FEMA Declaration Number	Llano and/or San Saba County included in Declaration?
January 2020 - Ongoing	COVID-19	DR-4485-TX; EM-3458-TX	Llano County, San Saba County

Source: FEMA 2022

U.S. Department of Agriculture Disaster Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2017 and 2022, Llano and/or San Saba County were not included in any pandemic-related agricultural disaster declarations.

Previous Events

For this 2023 HMP update, known pandemic events that impacted the Planning Area between 2017 and 2022 are discussed below. For events prior to 2017, refer to Appendix I (Supplementary Data).

Table 4.3.7-2. Pandemic/Health and Safety Events in the Planning Area (2017 to 2022)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
January 2020 - Ongoing	COVID-19	DR-4485-TX; EM-3458-TX	Llano County, San Saba County	As of December 8, 2022 there have been 4,860 positive COVID-19 cases in Llano County and 1,416 positive COVID-19 cases in San Saba County. 101 residents have died in Llano County. 156 residents have died in San Saba County

Sources: FEMA 2022; New York Times 2022; CDC 2023

Probability of Future Occurrences

Though occurrences of disease outbreaks overall are often difficult to predict at the local level, it is anticipated that the Planning Area will continue to be impacted by disease outbreaks for the foreseeable future. Additionally, seasonality for cold and flu is well established and anticipated in Texas on an annual basis.

In Section 4.4, the identified hazards of concern for the Planning Area were ranked (Table 4.4-4 and Table 4.4-5). The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Team, the probability of occurrence for pandemic/health and safety events in the Planning Area is considered 'occasional'.

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Climate Change Projections

Climate change will likely have significant indirect impacts on disease outbreaks. In Texas, higher temperatures, decreased water availability, and more severe storm events are anticipated due to climate change. According to the World Health Organization (WHO), changing climatic conditions are being studied for impacts upon disease transmission. Seasonal infectious diseases that are influenced by meteorological conditions may see significant variability in recurrence and duration. The WHO concludes that variations in infectious disease transmission patterns are likely major consequences of climate change (WHO 2021).

In the publication "What Climate Change Means for Texas," the US Environmental Protection Agency (EPA) notes that warming temperatures will exacerbate current public health concerns. "Seventy years from now, Texas is likely to have three or four times as many days per year above 100°F as it has today. Certain people are especially vulnerable, including children, the elderly, the sick, and the poor. High air temperatures can cause heat stroke and dehydration and affect people's cardiovascular and nervous systems" (EPA 2016).

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The following discusses the Planning Area's vulnerability, in a qualitative nature, to the pandemic hazard.

Impact on Life, Health, and Safety

The entire population of the Planning Area is vulnerable to the disease outbreak hazard. Due to a lack of quantifiable loss information, a qualitative assessment was conducted to evaluate the assets exposed to this hazard and the potential impacts associated with this hazard. Healthcare providers and first responders have an increased risk of exposure due to their frequent contact with infected populations. Areas with a higher population density also have an increased risk of exposure or transmission of disease to do the closer proximity of population to potentially infected people.

Most recently with COVID-19, the Centers for Disease Control and Prevention have indicated that persons over 65 years and older, persons living in a nursing home or long-term care facility, and persons with underlying medical conditions such as diabetes, severe obesity, serious heart conditions, etc. are at a higher risk of getting severely ill (CDC 2021). According to the 2020 American Community Survey, 37.5-percent of Llano County residents (or approximately 7,975 people) and 10.3-percent of San Saba County residents (approximately 1,407 people) are over the age of 65.

Impact on General Building Stock

No structures are anticipated to be directly affected by pandemic events.

Impact on Critical Facilities

No critical facilities are anticipated to be affected by disease outbreaks. Hospitals and medical facilities will likely see an increase in patients, but it is unlikely that there will be damages or interruption of services. However, large rates of infection may result in an increase in the rate of hospitalization which may overwhelm hospitals and medical facilities and lead to decreased services for those seeking medical attention. The 2020 coronavirus pandemic has led to overwhelmed hospitals in numerous hotspots throughout the Planning Area.

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Impact on Economy

Disease outbreaks impacts on the economy and estimated dollar losses are difficult to measure and quantify. Costs associated with the activities and programs implemented to conduct surveillance and address disease outbreaks have not been quantified in available documentation. As evidenced in the COVID-19 outbreak, quarantines, shutdowns, and social distancing measures can have outsized economic impacts, particularly on the leisure, tourism, and food/accommodations sectors.

Impact on the Environment

The environment is not anticipated to be directly affected by pandemic events.

Future Changes That May Impact Vulnerability

Understanding future changes that effect vulnerability in the Planning Area can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The Planning Area considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

Any areas of growth could be potentially impacted by the disease outbreak hazard because the entire Planning Area is exposed and vulnerable. Additional development of structures in close proximity to waterbodies or areas with high population density are at an increased risk.

Projected Changes in Population

Llano County has experienced an increase in population between the 2010 Census (19,301) and the 2020 Census population of 21,243. The population of the County is expected to increase over the next few years. San Saba County experienced a decrease in population between the 2010 Census (6,131) and the 2020 Census population of 5,730. The Texas Demographic Center has produced population estimates for the region that were last updated in 2018 based on 2010 Census data. The estimates show a slight projected decline for Llano County between 0.14 and 0.25 percent every five years from 2025 to 2035, followed by a projected growth between 0.68 and 3.3 percent every five years from 2035 to 2050. The estimates show projected decline for San Saba County between 1.51 and 4.3 percent every five years from 2025 to 2050 (Texas Demographic Center n.d.).

An increase in population will expose more people to the pandemic hazard as residents move into the area and the population exposed increases. Population density changes when households move throughout the Planning Area could influence the number of persons exposed to disease outbreaks. Higher density jurisdictions are not only at risk of greater exposure to disease outbreak, but density may also reduce available basic services provided by critical facilities such as hospitals and emergency facilities for persons that are not affected by a disease.

Climate Change

The relationship between infectious diseases occurrence and climate change is difficult to predict with certainty. However, there may be linkages between the two. Changes in the environment may create a more livable habitat for vectors carrying disease as suggested by the Centers for Disease Control and Prevention (CDC n.d.). Localized

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changes in climate and human interaction may also be a factor in the spread of disease. For example, in the wake of Hurricane Harvey prolonged and intense precipitation provided breeding grounds for mosquitos that necessitated mosquito control measures.

The relationship between climate change and infectious diseases is not universally agreed upon. Climate change may affect the spread of disease, while others are not convinced. However, research indicates that climate change is not the only force at work in increasing the spread of infectious diseases into the future. Other factors, such as expanded rapid travel and evolution of resistance to medical treatments, are already changing the ways pathogens infect people, plants, and animals. As climate change accelerates it is likely to work synergistically with many of these factors, especially in populations increasingly subject to massive migration and malnutrition (Harmon 2010).

Change of Vulnerability Since 2016 HMP

The pandemic hazard was not profiled in the 2016 HMP and is a new hazard of concern for this 2023 update.

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Section 4 Risk Assessment

4.3 Hazard Profiles

4.3.8 Severe Weather

The following section provides the hazard profile and vulnerability assessment for the severe weather hazard in the Planning Area. The severe weather hazard includes hail, lightning, wind, and tornado. When referring to the Planning Area, it includes both Llano County and San Saba County.

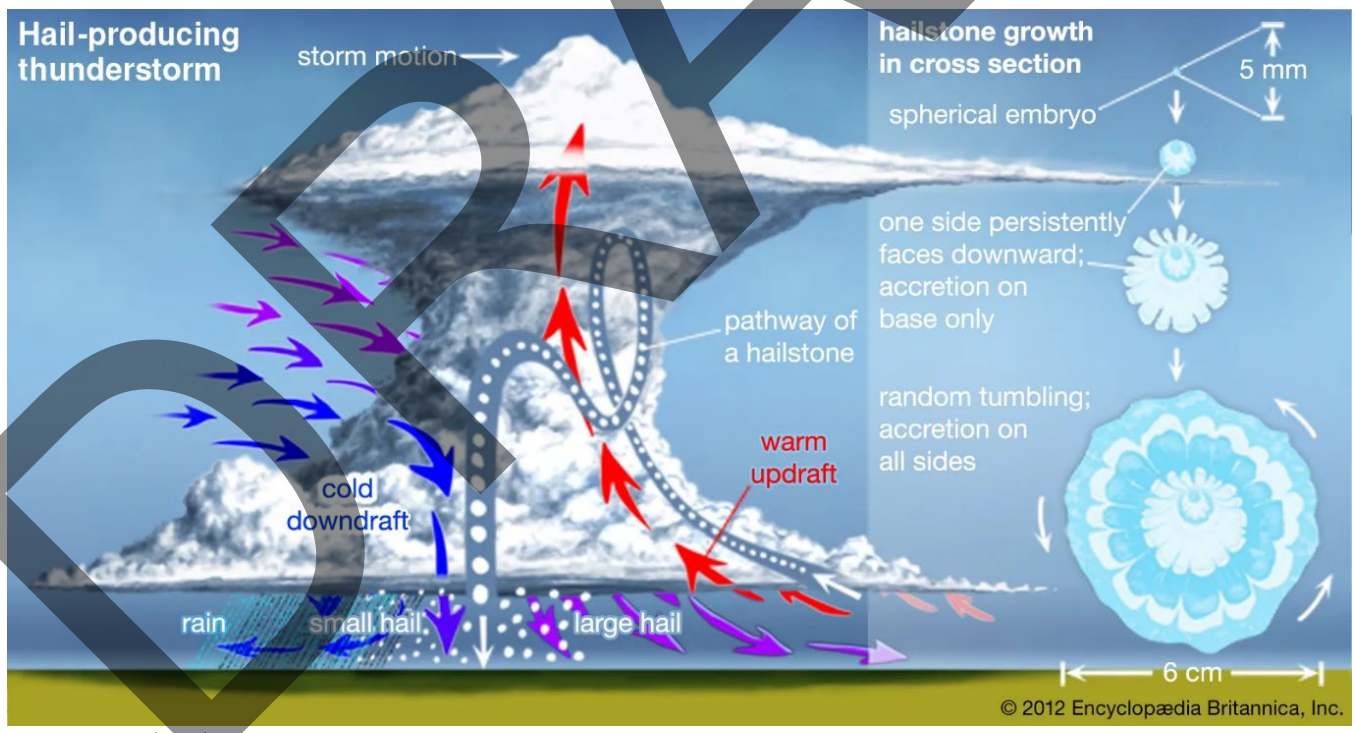
Hazard Profile

Hazard Description

Hail

Hail is a form of solid precipitation. It consists of balls or irregular lumps of ice, each of which is called a hailstone. Hailstones usually measure between 5 millimeters (0.2 in) and 15 centimeters (6 in) in diameter. Hail is possible within most thunderstorms as it is produced by cumulonimbus clouds. Hail formation requires environments of strong, upward motion of air and lowered heights of the freezing level. Any thunderstorm which produces hail that reaches the ground is known as a hailstorm.

Figure 4.3.8-1. Hail Producing Thunderstorm



Source: Encyclopædia Britannica 2019

Hailstones form by colliding with super cooled water drops. Super cooled water will freeze on contact with ice crystals, frozen raindrops, dust, or some other nuclei. The storm's updraft blows the forming hailstones up the cloud. As the hailstone ascends it passes into areas of the cloud where the concentration of humidity and super

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cooled water droplets varies. When the hailstone moves into an area with a high concentration of water droplets, it captures the latter and acquires a translucent layer. Should the hailstone move into an area where mostly water vapor is available, it acquires a layer of opaque white ice.

The hailstone will keep rising in the thunderstorm until its mass can no longer be supported by the updraft. It then falls toward the ground while continuing to grow, based on the same processes, until it leaves the cloud. It will later begin to melt as it passes into air that is above freezing temperature.

Lightning

Lightning is a giant spark of electricity in the atmosphere between clouds, the air, or the ground. In the early stages of development, air acts as an insulator between the positive and negative charges in the cloud and between the cloud and the ground. When the opposite charges build up enough, this insulating capacity of the air brakes down and there is a rapid discharge of electricity that we know as lightning. The flash of lightning temporarily equalizes the charged regions in the atmosphere until the opposite charges build up again. Lightning can occur between opposite charges within the thunderstorm cloud (intra-cloud lightning) or between opposite charges in the cloud and on the ground (cloud-to-ground lightning). Most lightning starts inside a thunderstorm and travels through the cloud. It can then stay within the cloud or continue to travel through the open air and eventually to ground. There are roughly 5 to 10 times as many flashes that remain in the cloud as there are flashes which travel to the ground, but individual storms may have more or fewer flashes reaching ground. Lightning can be seen in volcanic eruptions, extremely intense forest fires, surface nuclear detonations, heavy snowstorms, in large hurricanes, and obviously, thunderstorms (NOAA n.d.).

Wind

Differences in atmospheric pressure generate winds. At the Equator, the sun warms the water and land more than it does the rest of the globe. Warm equatorial air rises higher into the atmosphere and migrates toward the poles creating a low-pressure system. At the same time, cooler, denser air moves over Earth's surface toward the Equator to replace the heated air creating a high-pressure system. Winds generally blow from high-pressure areas to low-pressure areas. The boundary between these two areas is called a front. The complex relationships between fronts are what causes different types of wind and weather patterns.

Prevailing winds are winds that blow from a single direction over a specific area of the Earth. Areas where prevailing winds meet are called convergence zones. Generally, prevailing winds blow east-west rather than north-south because of Earth's rotation which generates what is known as the Coriolis effect. The Coriolis effect makes wind systems twist counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere (Turgeon and Morse 2022).

Tornado

A tornado appears as a rotating, funnel-shaped cloud that extends from a thunderstorm to the ground with whirling winds that can reach 300 miles per hour. Damage paths can be greater than 1 mile wide and 50 miles long. Tornadoes typically develop from either a severe thunderstorm or hurricane as cool air rapidly overrides a layer of warm air. Tornadoes typically move at speeds between 30 and 125 mph and can generate combined wind speeds (forward motion and speed of the whirling winds) exceeding 300 mph. Most tornadoes are on the ground for less than 15 minutes (NOAA n.d.).

Tornadoes are spun from two types of thunderstorms:

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- Supercell Tornados are the most common and most dangerous. A rotating updraft is key to a supercell and when combined with warm, moist air at ground level is often what can spawn a tornado.
- Non-Supercell Tornadoes are usually developed by a strong linear convection system; however, these storms tend to spawn much weaker tornadoes (NOAA n.d.).

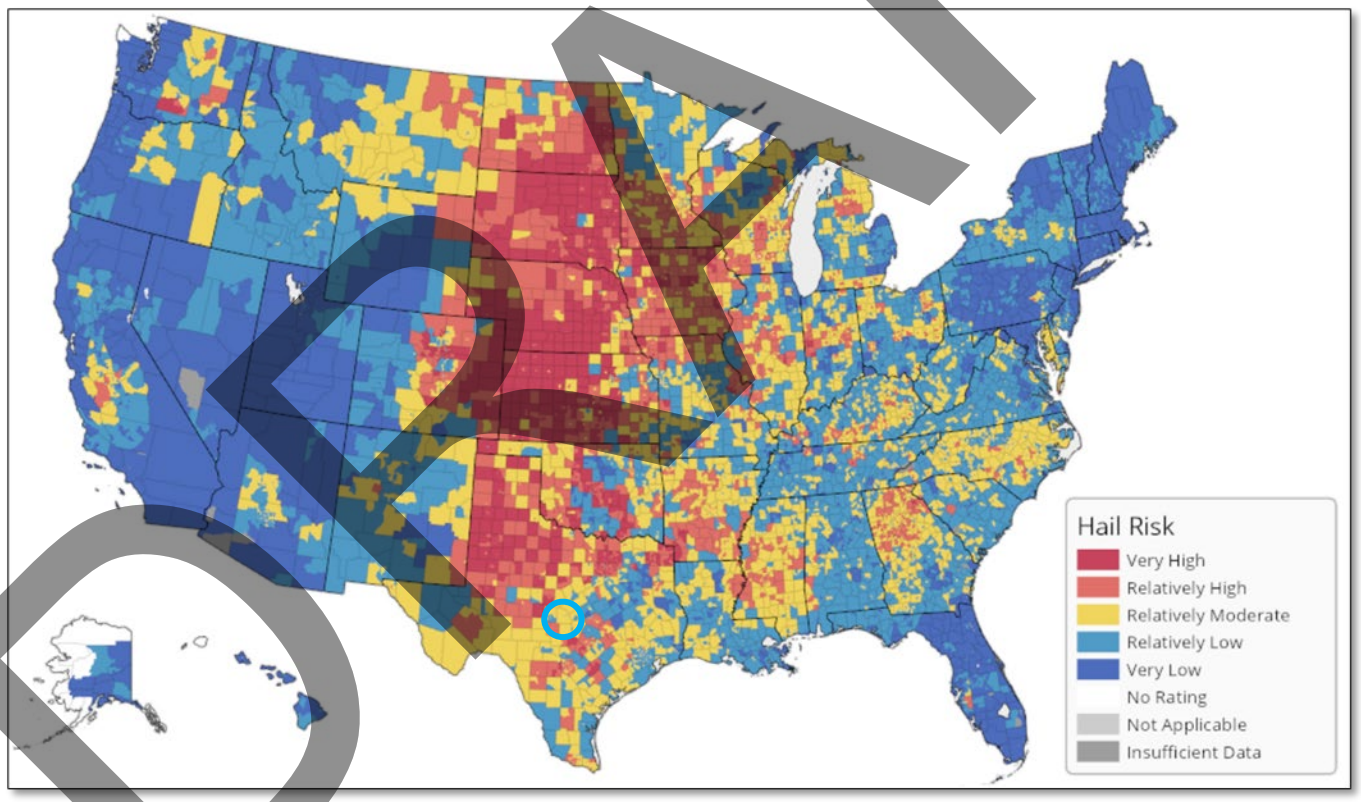
Location

The entire extent of the project area is exposed to the hailstorm hazard.

Hail

In the National Risk Index, a Hail Risk Index score and rating represent a community's relative risk for Hail when compared to the rest of the United States. Presented as a map above, the Hail Risk Index score and rating is shown nationwide. The State of Texas ranges from a very high to relatively high risk of hail in the Northwestern part of the State to a more relatively moderate and relatively low grouping in the western, central, and eastern parts of the State – some counties in these areas are labelled as relatively high risk. The project area, consisting of both Llano and San Saba Counties, are rated as being at a relatively moderate risk for hail.

Figure 4.3.8-2. FEMA's National Hail Risk and Rating Map



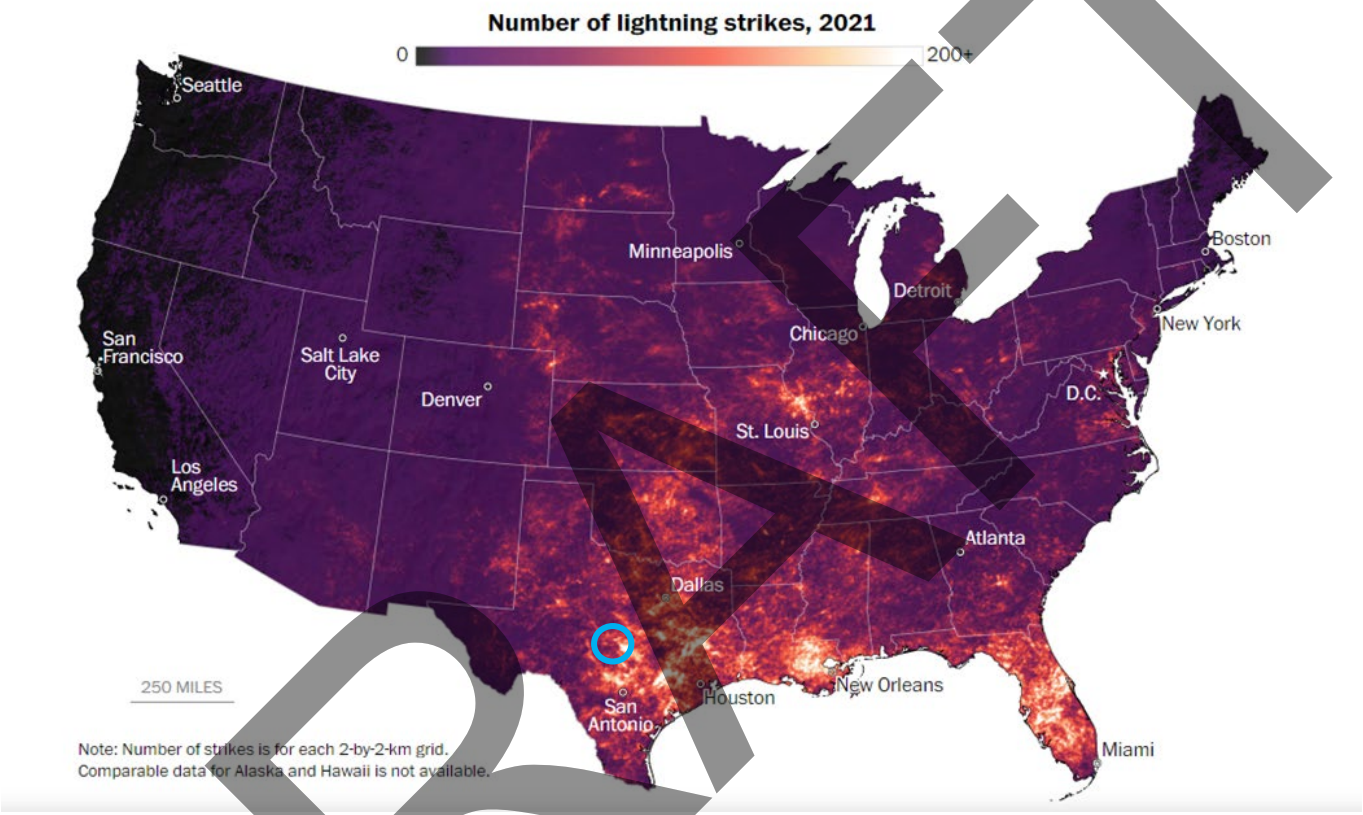
Source: *FEMA 2021*
Note: *The blue circle shows the general location of the Planning Area.*

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Lightning

In 2021, Texas was one of the top two states to experience lightning. This is thought to be attributed to their relatively tropical and less stable atmospheres (Patel and Dormido 2022). This being said, both counties are vulnerable to lightning, and it can affect all locations in both counties.

Figure 4.3.8-3. Distribution of Lightning Strikes



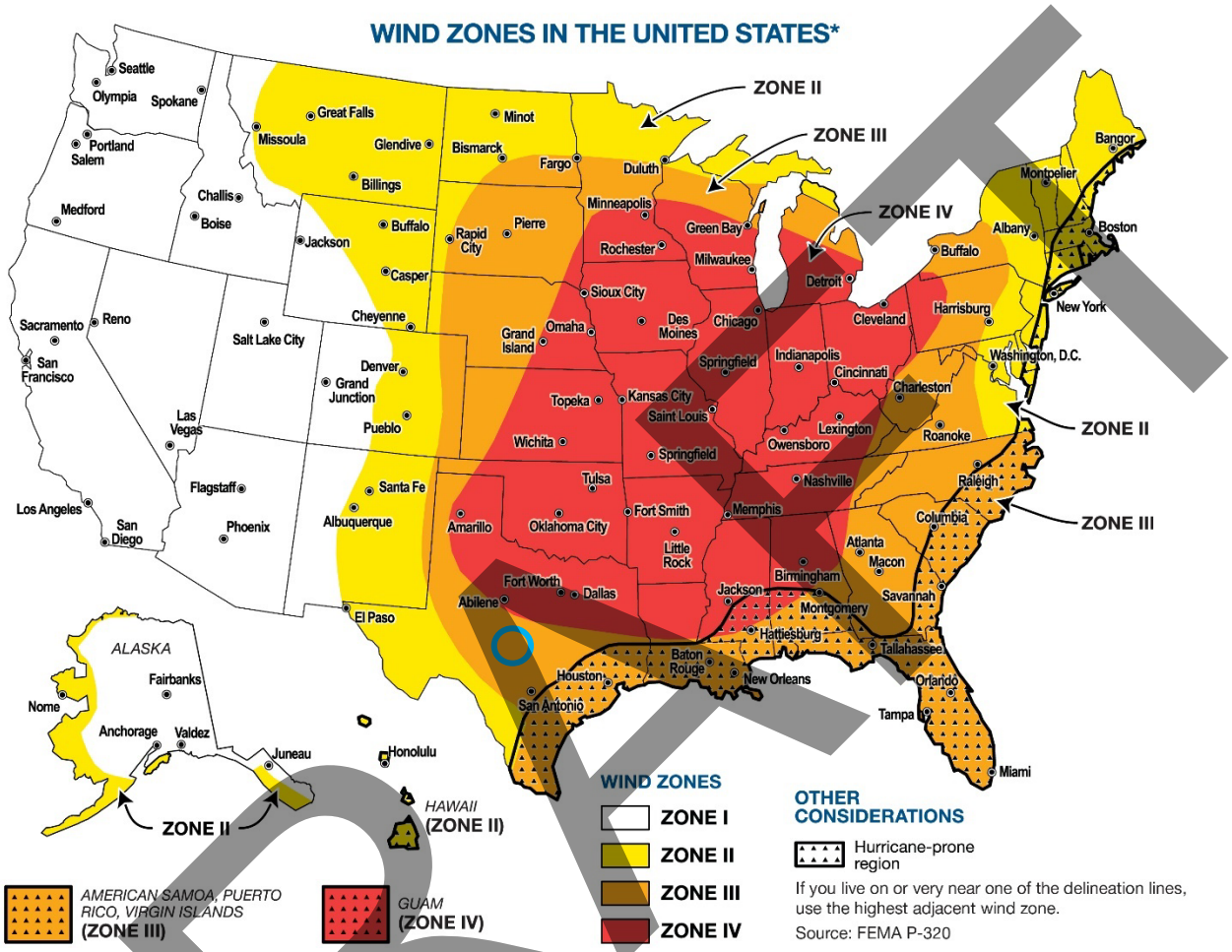
Source: *Patel and Dormido 2022*
Note: *The blue circle shows the general location of the Planning Area.*

Wind

According to the FEMA Winds Zones of the United States map, Llano County and San Saba County are in Wind Zone III, where wind speeds can reach up to 200 mph (Building America Solution Center n.d.).

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Figure 4.3.8-4. Wind Zones



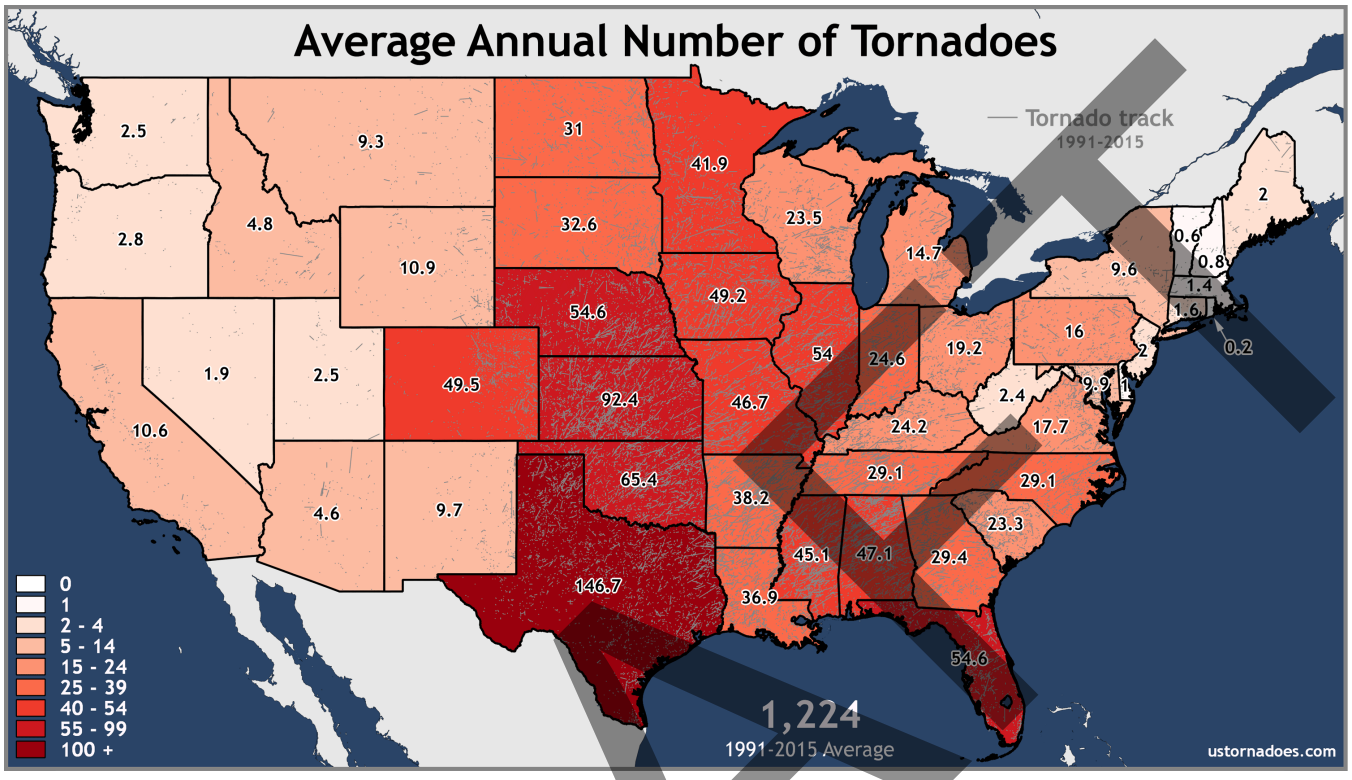
Source: *Building America Solution Center n.d.*
Note: *The blue circle shows the general location of the Planning Area.*

Tornado

Tornadoes can occur at any time of the year, with peak season for Texas from May into early June ((NOAA n.d.). An average of 1,141 tornadoes occurs in the United States each year, based on tornadoes recorded between 1985 and 2014. The State of Texas averages 140 tornadoes each year.

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Figure 4.3.8-5. Average Number of Tornados by State



Source: Livingston 2016

Extent

Hail

The severity of damage caused by hailstorms depends on the hailstone sizes (average and maximum), number of hailstones per unit area, and associated winds. Storms that produce high winds in addition to hail are most damaging and can result in numerous broken windows and damaged siding. The NOAA/TORRO Hailstorm Intensity Scale as seen in Table 4.3.8-1 is representative of the damage from hailstorms.

Table 4.3.8-1. Combined NOAA / TORRO Hailstorm Intensity Scales

Size Code	Intensity Category	Typical Hail Diameter (in.)	Approximate Size	Damage Impacts
H0	Hard Hail	Up to 0.33	Pea	No damage
H1	Potentially Damaging	0.33 - 0.60	Marble	Slight damage to plants, crops
H2	Potentially Damaging	0.60 - 0.80	Dime	Significant damage to fruit, crops, vegetation
H3	Severe	0.80 - 1.20	Nickel to Quarter	Severe damage to fruit and crops, damage to glass and plastic structures, plant and wood scored
H4	Severe	1.20 - 1.60	Ping Pong Ball	Widespread glass damage, vehicle bodywork damage

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Size Code	Intensity Category	Typical Hail Diameter (in.)	Approximate Size	Damage Impacts
H5	Destructive	1.60 - 2.0	Golf Ball	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	2.0 - 2.4	Egg	Aircraft bodywork dented, brick walls pitted
H7	Very Destructive	2.4 - 3.0	Tennis Ball	Severe roof damage, risk of serious injuries
H8	Very Destructive	3.0 - 3.5	Baseball	Severe damage to aircraft bodywork
H9	Super Hailstorm	3.5 - 4.0	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorm	4.0+	Softball and up	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Sources: *State of Texas 2018*
Notes: *The Hailstorm Intensity Scale allows planners to gauge past damage and mitigate for future expected damage.*

Hailstorms can cause extensive property damage affecting both urban and rural landscapes. Fortunately, most hailstorms produce marble-size or smaller hailstones. These can cause damage to crops but they normally do not damage buildings or automobiles. Larger hailstones can destroy crops, livestock, and wildlife and can cause extensive damage to buildings, including roofs, windows, and outside walls. Vehicles can be total losses. When hail breaks windows, water damage from accompanying rains can also be significant. A major hailstorm can easily cause damage running into the millions of dollars (State of Texas 2018).

Lightning

Lightning is most often associated with moderate to severe thunderstorms. The severity of lightning refers to the frequency of lightning strikes during a storm. The Lightning Activity Level (LAL) is a scale which describes lightning activity. The scale is part of the National Fire Danger Rating System. The scale is a range of numbers, from one to six, which reflects frequency and character of cloud-to-ground lightning (NWCG n.d.) (NOAA n.d.).

Table 4.3.8-2. Lightning Activity Level

Lightning Activity Level (LAL)	Conditions
1	No Thunderstorms
2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five-minute period.
3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lighting is infrequent, 6 to 10 cloud to ground strikes in a five-minute period.
4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent 11 to 15 cloud to ground strikes in a five-minute period.
5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud strikes in a five-minute period.
6	Dry lightning (same as LAL 3, but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

Sources: *NWCG n.d.*

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The National Lightning Detection Network, NLDN, consists of over 100 remote, ground-based sensing stations located across the United States that instantaneously detect the electromagnetic signals given off when lightning strikes the earth's surface. These remote sensors send the raw data via a satellite-based communications network to the Network Control Center operated by Vaisala Inc. in Tucson, Arizona. Within seconds of a lightning strike, the NCC's central analyzers process information on the location, time, polarity, and communicated to users across the country (NASA n.d.).

Wind

Wind is often measured in terms of wind shear. Wind shear is a difference in wind speed and direction over a set distance in the atmosphere. Wind shear is measured both horizontally and vertically. Wind shear is measured in meters per second times kilometers of height. Under normal conditions, the winds move much faster higher in the atmosphere, creating high wind shear in high altitudes.

The amount of force that wind is generating is measured according to the Beaufort scale. The scale is named for Sir Francis Beaufort, who established a system for describing wind force in 1805 for the British Royal Navy. The Beaufort scale has 17 levels of wind force. "0" describes conditions that are so calm that smoke rises vertically. "12" describes a hurricane, and "13-17" are reserved only for tropical typhoons, the most powerful and potentially destructive wind systems (Turgeon and Morse 2022).

Figure 4.3.8-6. Beaufort Wind Scale

#	MPH	Knots	Description	Specifications
0	< 1	< 1	Calm	Smoke rises vertically.
1	1-3	1-3	Light Air	Direction of wind shown by smoke drift but not by wind vanes.
2	4-7	4-6	Light Breeze	Wind felt on face; Leaves rustle; Wind vanes moved by wind
3	8-12	7-10	Gentle Breeze	Leaves and small twigs in constant motion; Wind extends light flag.
4	13-18	11-16	Moderate	Raises dust, loose paper; Small branches moved.
5	19-24	17-21	Fresh	Small trees begin to sway; Crested wavelets form on inland waters.
6	25-31	22-27	Strong	Large branches in motion; Whistling heard in telephone wires; Umbrellas used with difficulty.
7	32-38	28-33	Near Gale	Whole trees in motion; Inconvenience felt walking against the wind.
8	39-46	34-40	Gale	Twigs break off trees; Wind generally impedes progress; Mobile homes may shake.
9	47-54	41-47	Strong Gale	Slight structural damage occurs; Mobile homes, sheds, roofs, lanais, and RV's suffer minor damage.
10	55-63	48-55	Storm	Small trees uprooted; Moderate damage occurs to mobile homes and RV's; Brick and wood frame houses receive minor structural and roof damage; Some signs blown down.
11	64-73	56-63	Violent Storm	Moderate sized trees uprooted; Large branches snapped off trees; Chimneys and road signs toppled; Significant mobile home damage; Power lines downed.
12	74-95	64-83	Hurricane Category 1	Mobile homes overturned; Large trees and branches downed; Moderate roof damage to wood and brick homes; Minor pier damage.

Source: NOAA n.d.

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The NWS issues advisories and warnings for winds. Issuance is normally site-specific. High wind advisories, watches, and warnings are products issued by the NWS when wind speeds can pose a hazard or are life threatening.

Tornado

Damage from tornadoes can vary from minor damage that break tree limbs to massive damage demolishing homes in its path. The type of damage depends on the intensity, size, and duration of the tornado. The magnitude or severity of a tornado is categorized using the Enhanced Fujita Tornado Intensity Scale (EF Scale). This is the scale now used exclusively for determining tornado ratings by comparing wind speed and actual damage. Figure 4.3.8-7 illustrates the relationship between EF ratings, wind speed, and expected tornado damage.

Tornadoes are not measured as they happen. It takes surveyors to look at the damage to determine what wind speed could have caused the destruction. Also, they need to differentiate whether the wind damage was caused by a tornado or just straight-line winds (Beddoes 2022).

Figure 4.3.8-7. EF Scale

EF Rating	Wind Speeds	Expected Damage
EF-0	65-85 mph	'Minor' damage: shingles blown off or parts of a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled.
EF-1	86-110 mph	'Moderate' damage: more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged.
EF-2	111-135 mph	'Considerable' damage: roofs torn off well constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed.
EF-3	136-165 mph	'Severe' damage: entire stories of well constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their bark.
EF-4	166-200 mph	'Extreme' damage: Well constructed homes are leveled, cars are thrown significant distances, top story exterior walls of masonry buildings would likely collapse.
EF-5	> 200 mph	'Massive/incredible' damage: Well constructed homes are swept away, steel-reinforced concrete structures are critically damaged, high-rise buildings sustain severe structural damage, trees are usually completely debarked, stripped of branches and snapped.



Source: Beddoes 2022

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Worst-Case Scenario

Although severe local storms are infrequent, impacts can be significant, particularly when secondary hazards of flood and erosion occur. A worst-case event would involve prolonged high winds or a tornado, an intense hail event, and a lightning strike at a critical facility (such as an emergency service station) during a thunderstorm. Such an event would have both short-term and longer-term effects. Initially, schools and roads would be closed due to power outages caused by high winds and downed tree obstructions. In more rural areas, some subdivisions could experience limited ingress and egress. Prolonged rain could produce flooding, overtopped culverts with ponded water on roads and landslides on steep slopes. Flooding could further obstruct roads and bridges, further isolating residents. Important issues associated with a severe weather in the planning area include the following:

- Older building stock in the planning area is built to low code standards or none at all. These structures could be highly vulnerable to severe weather events such as windstorms.
- Redundancy of power supply must be evaluated.
- The capacity for backup power generation is limited.
- The potential for isolation after a severe storm event is high.
- There is limited information available for local weather forecasts.
- The lack of proper management of trees may exacerbate damage from high winds.

Previous Occurrences and Losses

FEMA Disaster Declarations

Between 1954 and 2022, Llano County was included in four disaster (DR) or emergency (EM) declarations for severe weather events. San Saba County was included in three disaster declarations. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 3 (County Profile).

- DR-930-TX- (1991) Severe Storm: Llano County
- DR-1179-TX- (1997) Severe Storm: Llano County
- DR-1239-TX- (1998) Severe Storm: Llano County and San Saba County
- DR-1425-TX- (2002) Severe Storm: San Saba County
- DR-1709-TX- (2007) Severe Storm: Llano County and San Saba County

U.S. Department of Agriculture Disaster Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2012 and 2022, Llano and/or San Saba County were not included in any severe weather-related agricultural disaster declarations.

Previous Events

For this 2023 HMP update, known severe weather events that impacted the Planning Area between 2017 and 2022 are discussed below. For events prior to 2017, refer to Appendix I (Supplementary Data).

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Table 4.3.8-3. Hail Events in the Planning Area (2017 to 2022)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
March 28, 2017	Thunderstorm Wind	N/A	N/A	A thunderstorm produced wind gusts estimated at 60 mph that damaged the roof of a business building.
April 3, 2018	Hail	N/A	N/A	Thunderstorms developed as a cold front moved into a warm, moist airmass over South Central Texas. Some of these storms produced severe hail.
April 10, 2017	Hail	N/A	N/A	A cold front interacting with a moist and unstable atmosphere resulted in severe storms that produced large hail across the Northwest Hill Country.
May 25, 2018	Thunderstorm Wind	N/A	N/A	Storms produced large hail and damaging winds that also contributed to flooding.
July 4, 2018	Thunderstorm Wind	N/A	N/A	A thunderstorm produced wind gusts estimated at 70 mph that uprooted trees at the Lighthouse Country Club in Kingsland.
April 17, 2019	Hail	N/A	N/A	A Pacific Cold Front and the West Texas dry line resulted in several severe thunderstorm reports of large hail and damaging winds.
May 8, 2019	Hail	N/A	N/A	Daytime heating, an approaching upper-level low pressure system and a dryline across West Central Texas triggered the development of a few supercell thunderstorms. These severe storms produced baseball size hail and damaging thunderstorm wind gust reports across the area.
May 30, 2019	Hail	N/A	N/A	A cold front moved into South Central Texas and stalled. Thunderstorms formed along this front and some of them produced large, 3-inch hail and damaging wind gusts.
June 9, 2019	Hail	N/A	N/A	Thunderstorms developed along a cold front that moved through the region. These storms formed in an unstable airmass with high CAPE and steep mid-level lapse rates leading to large, golf ball sized hail and widespread damaging wind gusts many of which were estimated to be over 70 mph.
January 10, 2020	Hail	N/A	N/A	A strong Pacific cold front moved into a warm, moist airmass and generated thunderstorms in the warm sector. Some of these storms produced large hail (half dollar sized) and damaging wind gusts.
April 12, 2020	Thunderstorm Wind	N/A	N/A	Some of these storms produced tornadoes and large hail and caused over 10 million dollars in damages.
May 27, 2020	Hail	N/A	N/A	An upper-level low and surface cold front interacted to generate thunderstorms. The airmass these features moved into was strongly unstable with steep lapse rates aloft and was conducive for storms producing large hail and damaging wind gusts.
March 22, 2021	Hail	N/A	N/A	Isolated severe thunderstorms formed and produced mainly large hail.

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
March 24, 2021	Hail	N/A	N/A	An upper-level low moved into west Texas and provided lift to generate convection. There was a warm, moist airmass over South Central Texas and a warm front just north of the area. The front acted as a focus for convection and some of the storms produced large hail.
April 12, 2021	Hail	N/A	N/A	Thunderstorms formed along a frontal boundary in Central Texas and moved through the northeastern part of South-Central Texas. Some of these storms produced tennis ball size hail.
April 15, 2021	Hail	N/A	N/A	A stationary cold front draped to the south of the region and potent upper-level disturbances approaching from Northern Mexico caused increasing wind shear and instability across portions of West Central Texas. These features triggered isolated elevated severe thunderstorms near Abilene on April 14. On April 15, more severe thunderstorms resulted in several large to very large hailstorms.
May 9, 2021	Hail	N/A	N/A	Thunderstorms developed along a cold front in Central Texas and moved into South Central Texas. Some of these storms produced quarter to ping pong ball sized hail.
June 2, 2021	Thunderstorm Wind	N/A	N/A	One of these storms produced damaging wind gusts.
May 28, 2021	Hail/Tornado	N/A	N/A	Thunderstorms developed in the warm sector ahead of a cold front. Some of these storms produced golf ball size hail, damaging winds, and heavy rain that led to flash flooding. There was one weak tornado.
May 14, 2022	Hail	N/A	N/A	Isolated to scattered thunderstorms developed during the late afternoon and early evening. A few storms became severe and produced large hail.
May 24, 2022	Thunderstorm Wind	N/A	N/A	Severe storms moved into the Heartland and produced large hail and wind damage through the early evening. A few more severe thunderstorms moved southeast into the Concho Valley from the Permian Basin and produced marginal severe hail and strong wind gusts around 70 mph.

Sources: NOAA 2022; USDA FSA 2022; FEMA 2022; San Saba County 2016; Llano County 2016

Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of hail events for the County Information from NOAA-NCEI storm events database, the 2018 State of Texas HMP, the 2016 Llano HMP and the 2016 San Saba County HMP were used to identify the number of hail events that occurred between 1950 and 2022. Table 4.3.8-4 presents the probability of severe weather events for Llano County; Table 4.3.8-5 presents the probability of future severe weather events for San Saba County.

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Table 4.3.8-4. Probability of Future Severe Weather Events, Llano County

Hazard Type	Number of Occurrences Between 1950 and 2022	% Chance of Occurring in Any Given Year
Hail	186	100%
Lightning	0	0%
Tornado	9	12.33%
Wind Events	77	100%
Total	**272**	**100%**

Sources: *NOAA 2022; State of Texas 2018; Llano County 2016*
Note: *Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all hail events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.*

Based on past occurrences, Llano County can expect to experience at least one severe weather event annually (NOAA 2022).

Table 4.3.8-5. Probability of Future Severe Weather Events, San Saba County

Hazard Type	Number of Occurrences Between 1950 and 2022	% Chance of Occurring in Any Given Year
Hail	140	100%
Lightning	0	0%
Tornado	13	17.81%
Wind Events	68	93.15%
Total	**221**	**100%**

Sources: *NOAA 2022; State of Texas 2018; San Saba County 2016*
Note: *Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all hail events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.*

Based on past occurrences, San Sabo County can expect to experience at least one severe weather event annually (NOAA 2022).

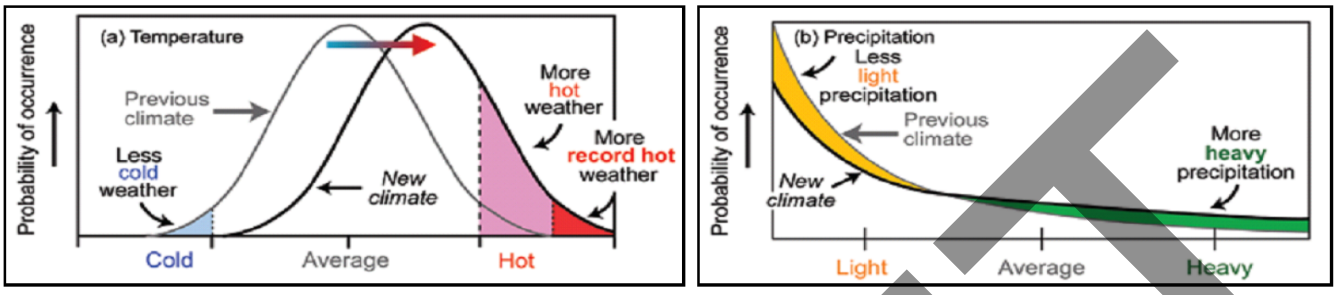
Climate Change Projections

The climate of Texas is changing. Most of the State has warmed between one half and one degree Fahrenheit in the past century. In the eastern two-thirds of the State, rainstorms are more intense, and floods are becoming more severe. In the coming decades, storms are likely to become more severe in Texas (EPA 2016). Periods of extreme precipitation increase the risk of hail and lightning (Centers for Climate and Energy Solutions n.d.). Major clusters of summertime thunderstorms in North America will grow larger, more intense, and more frequent later this century in a changing climate, leading to increased rainfall and posing a greater threat of flooding across wide areas (UCAR 2017).

Climate change presents a significant challenge for risk management associated with severe weather. The frequency of severe weather events has increased steadily over the last century. The number of weather-related disasters during the 1990s was four times that of the 1950s, and cost 14 times as much in economic losses. Historical data shows that the probability for severe weather events increases in a warmer climate (see Figure 4.3.8-8). The changing hydrograph caused by climate change could have a significant impact on the intensity, duration, and frequency of storm events. All of these impacts could have significant economic consequences (Llano County 2016) (San Saba County 2016).

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Figure 4.3.8-8. Severe Weather Probabilities in Warmer Climates



Source: Llano County 2016; San Saba County 2016

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The entire Planning Area is exposed to the severe weather hazard. The following text evaluates and estimates the potential impact of the severe weather hazard in the Planning Area as a whole.

Impact on Life, Health, and Safety

The impact of thunderstorms on life, health, and safety is dependent upon several factors including the severity of the event and whether adequate warning time was provided to residents. As a result of severe weather events, residents can be displaced or require temporary to long-term sheltering.

The most common problems associated with severe storms are immobility and loss of utilities. Residents impacted by severe weather may be displaced or require temporary to long-term sheltering. In addition, downed trees, damaged buildings, and debris carried by winds associated with severe weather can lead to injury or loss of life.

Although the entire population of both Counties is exposed to strong wind events, hail and lightning, some populations are more vulnerable. Vulnerable populations include the elderly, low income, linguistically isolated populations, people with life-threatening illnesses, and residents living in areas that are isolated from major roads. Power outages can be life threatening to those dependent on electricity for life support. In general, populations who lack adequate shelter during a thunderstorm or severe wind event, those who are reliant on sustained sources of power in order to survive, and those who live in isolated areas with limited ingress and egress options are the most vulnerable.

Impact on General Building Stock

The entire Planning Area's building stock is exposed to the severe weather hazard. Damage to buildings depends on several factors, including wind speed, storm duration, path of the storm track or tornado, and distance from the tornado funnel. Building construction also plays a major role in the extent of damage resulting from a storm. Due to differences in construction, residential structures are generally more susceptible to storm damage than commercial and industrial structures. Wood and masonry buildings, in general, regardless of their occupancy class, tend to experience more damage than concrete or steel buildings. Lightning can spark wildfires or building fires, especially if structures are not protected by surge protectors on critical electronic, lighting, or information technology systems.

Manufactured housing (i.e., mobiles homes) is particularly vulnerable to high winds and tornadoes. The U.S. Census Bureau defines manufactured homes as "movable dwellings, 8 feet or wider and 40 feet or more long,

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design to be towed on its own chassis, with transportation gear integral to the unit when it leaves the factory, and without need of a permanent foundation (U. S. Census 2020)." They can include multi-wide and expandable manufactured homes but exclude travel trailers, motor homes, and modular housing. Due to their lightweight and often unanchored design, manufactured housing is extremely vulnerable to high winds and will generally sustain the most damage.

Impact on Critical Facilities

Overall, all critical facilities in Llano and San Saba Counties are vulnerable to being affected by severe storm events. Utility infrastructure could suffer damage from lightning, hail and high winds associated with falling tree limbs or other debris, resulting in the loss of power or other utility service. Loss of service can impact residents, critical facilities, and business operations alike. Interruptions in heating or cooling utilities can affect populations, such the young and elderly, who are particularly vulnerable to temperature-related health impacts. Loss of power can impact other public utilities, including potable water, wastewater treatment, and communications. In addition to public water services, property owners with private wells might not have access to potable water until power is restored. Lack of power to emergency facilities, including police, fire, EMS, and hospitals, will inhibit a community's ability to effective respond to an event and maintain the safety of its citizens.

Impact on Economy

Impacts include loss of business function, damage to inventory, relocation costs, wage loss, and rental loss due to the repair or replacement of buildings. Business interruption losses include losses associated with the inability to operate a business because of the damage sustained during a storm or the temporary living expenses for those displaced from their home because of an event. Impacts to transportation lifelines affect both short-term (e.g., evacuation activities) and long-term (e.g., day-today commuting and goods transport) transportation needs. Utility infrastructure (power lines, gas lines, electrical systems) could suffer damage and impacts can result in the loss of power, which can impact business operations and can impact heating or cooling provision to the populations.

The wind's power to erode the land can be detrimental to agriculture. Loess, a sediment that can develop into one of the richest soils for farming, is easily swept up by wind. Even when farmers take precautions to protect it, the wind can erode up to 2.5 kilograms of loess per square meter. (1.6 pound per square foot) every year (Turgeon and Morse 2022).

Wind is a renewable resource that does not directly cause pollution. Wind energy is harnessed through powerful turbines. Wind turbines have a tall tubular tower with two or three propeller-like blades rotating at the top. When the wind turns the blades, the blades turn a generator and create electricity. The economic drawback to wind farms, however, is the wind itself. If it's not blowing, there's no electricity generated. (Turgeon and Morse 2022).

According to NOAA's Technical Paper on *Lightning Fatalities, Injuries, and Damage Reports in the United States from 1959 - 1994*, monetary losses for lightning events range from less than $50 to greater than $5 million (larger losses associated with forest fires with homes destroyed and crop loss) (NOAA 1997).

Hail-producing severe storms impact the economy; impacts include loss of business function, damage to inventory, relocation costs, wage loss, and rental loss due to the repair or replacement of buildings. Additionally, vehicles parked outdoors are vulnerable to hail damage and could increase economic impacts of a storm.

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Impact on the Environment

Wind and hail can knock overpower lines sparking fires which can destroy forests and habitats. Lightning can strike trees and create fires which can take out entire habitats and displace animals.

Wind is needed to disperse seeds to distant and nearby places which increases the spread of plant genetics (Turgeon and Morse 2022). Winds can also carry debris and litter across areas which can negatively impact ecosystems and habitats, including water bodies.

Future Changes That May Impact Vulnerability

Understanding future changes that effect vulnerability in the Planning Area can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The Planning Area considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

Understanding future changes that impact vulnerability in the Counties can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. Areas targeted for potential future growth and development could be potentially impacted by thunderstorms since the entire County is exposed to the lightning hazard. However, due to increased standards and codes, new development can be less vulnerable to the severe weather hazard compared with the aging building stock in the Counties.

Projected Changes in Population

Llano County has experienced an increase in population between the 2010 Census (19,301) and the 2020 Census population of 21,243. The population of the County is expected to increase over the next few years. San Saba County experienced a decrease in population between the 2010 Census (6,131) and the 2020 Census population of 5,730. The Texas Demographic Center has produced population estimates for the region that were last updated in 2018 based on 2010 Census data. The estimates show a slight projected decline for Llano County between 0.14 and 0.25 percent every five years from 2025 to 2035, followed by a projected growth between 0.68 and 3.3 percent every five years from 2035 to 2050. The estimates show projected decline for San Saba County between 1.51 and 4.3 percent every five years from 2025 to 2050 (Texas Demographic Center n.d.). An increase in population will expose more people to the severe weather hazard.

Climate Change

Scientists must attempt to predict how climate change might affect the individual weather “ingredients” that produce storms which produce strong wind events. These weather ingredients are (Geographic n.d.):

- Warm, moist air
- An unstable atmosphere
- Wind at different levels moving in different directions at different speeds, a phenomenon known as wind shear

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As global temperatures rise, the hotter atmosphere can hold more moisture. This increases atmospheric instability, a vital supercell ingredient. On the other hand, as the planet warms, wind shear (another vital ingredient) is likely to decrease. These two forces work against each other, and it is difficult to anticipate which might have a greater impact on tornado formation (Geographic n.d.).

The entire State of Texas is projected to experience an increase in the frequency and severity of extreme storms and rainfall. Major clusters of summertime thunderstorms in North America will grow larger, more intense, and more frequent later this century in a changing climate, unleashing far more rain and posing a greater threat of flooding across wide areas (UCAR 2017).

Climate change may lead to an increase in the number of lightning strikes and lightning-producing storms. Major clusters of summertime thunderstorms in North America will grow larger, more intense, and more frequent later this century in a changing climate, leading to increased rainfall and posing a greater threat of flooding across wide areas (University Corporation for Atmospheric Research [UCAR] 2017). The changing climate may also increase the frequency of lightning flashes could rise by an estimated 50-percent across the continental United States over the next century. A warmer atmosphere can hold more moisture and moisture is one of the key ingredients for triggering a lightning strike (Sanders 2014).

Change of Vulnerability Since 2016 HMP

The population has increased in the Planning Area, increasing the number of people that could be impacted by severe weather hazard. Climate Change is creating stronger storms, making wind hazards more probable than in the previous plan. As existing development and infrastructure continue to age, they can be at increased risk to failed utility and transportation systems if they are not properly maintained and do not adapt to the changing environment.

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Section 4 Risk Assessment

4.3 Hazard Profiles

4.3.9 Winter Weather

The following section provides the hazard profile and vulnerability assessment for the winter weather hazard in the Planning Area. When referring to the Planning Area, it includes both Llano County and San Saba County.

Hazard Profile

Hazard Description

Severe winter weather brings the threat of snow, freezing rain, and ice storms to Llano and San Saba Counties. Winter weather involves weather events in which the main types of precipitation are snow, sleet, or freezing rain. They can be a combination of heavy snow, blowing snow, and dangerous wind chills. According to the National Severe Storms Laboratory, the three basic components needed to make a winter storm include the following:

- Below-freezing temperatures (cold air) in the clouds and near the ground to make snow and ice.
- Lift, something to raise the moist air to form clouds and cause precipitation, such as warm air colliding with cold air and being forced to rise over the cold dome or air flowing up a mountainside (oliographic lifting).
- Moisture to form clouds and precipitation, such as air blowing across a large lake or the ocean.

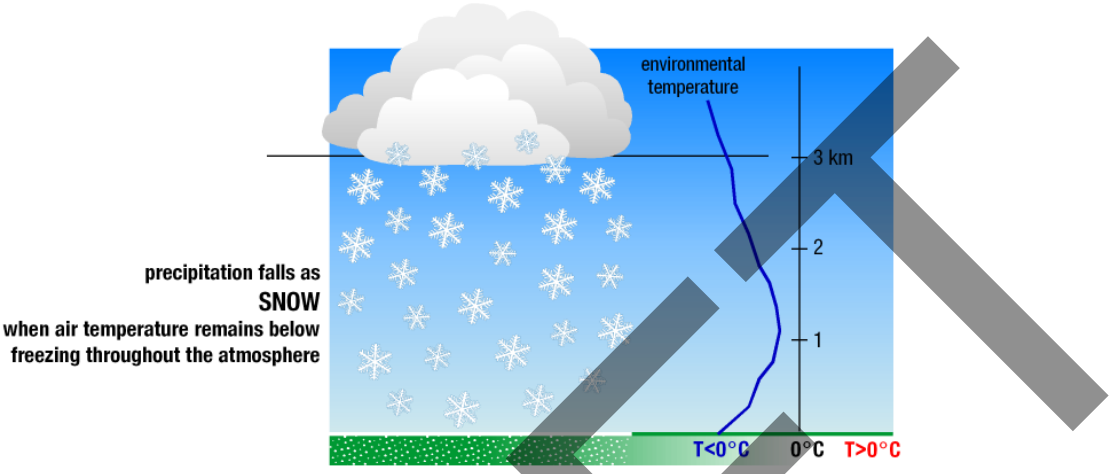
Some winter storms are large enough to immobilize an entire region while others might only affect a single community. Winter storms typically are accompanied by low temperatures, high winds, freezing rain or sleet, and heavy snowfall. The aftermath of a winter storm can have an impact on a community or region for days, weeks, or even months; potentially causing cold temperatures, flooding, storm surge, closed and blocked roadways, downed utility lines, and power outages. In the Planning Area, winter weather includes snowstorms, blizzards, and ice storms. Extreme cold temperatures and wind chills are associated with winter weather; however, they are discussed in Section 4.3.3 (Extreme Temperature).

Heavy Snow

According to the National Snow and Ice Data Center (NSIDC), snow is precipitation in the form of ice crystals. It originates in clouds when temperatures are below the freezing point (32 °F) and water vapor in the atmosphere condenses directly into ice without going through the liquid stage. Once an ice crystal has formed, it absorbs and freezes additional water vapor from the surrounding air, growing into snow crystals or snow pellet, which then falls to the earth. Snow falls in different forms: snowflakes, snow pellets, or sleet. Snowflakes are clusters of ice crystals that form from a cloud. Figure 4.3.9-1 depicts snow creation.

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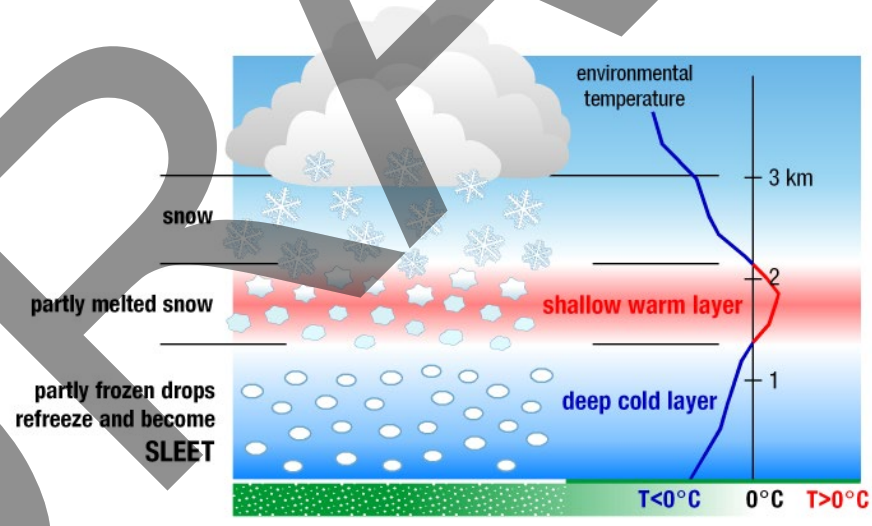
Figure 4.3.9-1.Snow Creation



Source: NOAA NSSL n.d.

Snow pellets are opaque ice particles in the atmosphere. They form as ice crystals fall through super-cooled cloud droplets, which are below freezing but remain a liquid. The cloud droplets then freeze to the crystals. Sleet is made up of drops of rain that freeze into ice as they fall through colder air layers. They are usually smaller than 0.30 inches in diameter (NSIDC 2020).

Figure 4.3.9-2. Sleet Creation



Source: NOAA NSSL n.d.

Blizzards

A blizzard is a winter snowstorm with sustained or frequent wind gusts of 35 miles per hour (mph) or more, accompanied by falling or blowing snow reducing visibility to or below 0.25 mile, as the predominant conditions over a 3-hour period. Extremely cold temperatures often are associated with blizzard conditions but are not a formal part of the definition. The hazard, created by the combination of snow, wind, and low visibility, significantly increases when temperatures are below 20 °F. A severe blizzard is categorized as having temperatures near or below 10 °F, winds exceeding 45 mph, and visibility reduced by snow to near zero. Storm systems powerful enough

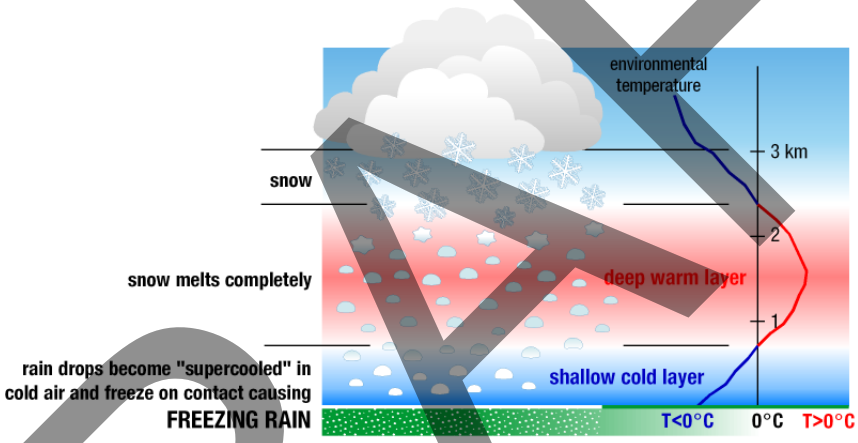
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to cause blizzards usually form when the jet stream dips far to the south, allowing cold air from the north to clash with warm, moister air from the south. Blizzard conditions often develop on the northwest side of an intense storm system. The difference between the lower pressure in the storm and the higher pressure to the west creates a tight pressure gradient, resulting in strong winds and extreme conditions caused by the blowing snow (NWS n.d.).

Ice Storms

An ice storm describes those events when damaging accumulations of ice are expected during freezing rain situations. Significant ice accumulations typically are accumulations of 0.25-inches or greater. Heavy accumulations of ice can bring down trees, power lines, utility poles, and communication towers. Ice can disrupt communications and power for days. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians (NWS 2018).

Figure 4.3.9-3. Freezing Rain Creation



Source: NOAA NSSL n.d.

Location

Winter weather can happen anywhere in the state of Texas. The southern portions of the state are not as likely to incur severe winter weather, but when it does happen, the impacts are much stronger because the communities and governments are not as prepared. Both Llano County and San Saba County average 0 inches of winter-related precipitation per year, making a severe winter weather an unlikely occurrence (Bestplaces 2022).

Extent

The magnitude or severity of a severe winter storm depends on several factors, including a region's climatological susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, time of occurrence during the day and week (e.g., weekday versus weekend), and time of season.

The extent of a severe winter storm can be classified by meteorological measurements and by evaluating its societal impacts. The National Oceanic and Atmospheric Administration's (NOAA's) National Climatic Data Center (NCDC) is currently producing the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two-thirds of the United States. The RSI ranks snowstorm impacts on a scale from 1 to 5 and is based on the spatial extent of the storm, the amount of snowfall, and the interaction of the extent and snowfall totals with population

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(based on the 2000 Census). The NCDC has analyzed and assigned RSI values to over 500 storms since 1900 (NOAA NCEI n.d.). Table 4.3.9-1 presents the five RSI ranking categories.

The maximum winter weather extent that can be expected in Llano County and/or San Saba County is an RSI Category 5 snowfall event. Because the Planning Area is located in the National Centers for Environmental Information's south climate region, the amount of snow that can fall for this category event is up to 15 inches; however, the area will most likely see lower amounts of snow based on history of occurrence. The last major winter weather event to affect the Planning Area were two RSI Category 3 winter storms in February 2021.

Table 4.3.9-1. RSI Ranking Categories for the South Climate Region

Category	Description	RSI Value	Snowfall Thresholds
1	Notable	1–3	<2
2	Significant	3–6	>2
3	Major	6–10	>5
4	Crippling	10–18	>10
5	Extreme	18.0+	>15

Source: *NOAA NCEI n.d.*
Note: *RSI = Regional Snowfall Index*

The NWS operates a widespread network of observing systems, such as geostationary satellites, Doppler radars, and automated surface observing systems that feed into the current state-of-the-art numerical computer models to provide a look into what will happen next, ranging from hours to days. The models are then analyzed by NWS meteorologists who then write and disseminate forecasts (NOAA 2017).

According to the National Weather Service (part of NOAA), the magnitude of a severe winter storm can be qualified into five main categories by event type:

- Heavy Snowstorm – Snowfall accumulating to 4 inches or more in 12 hours or less or snowfall accumulating to 6 inches or more in 24 hours or less.
- Sleet Storm – Significant accumulations of solid pellets that form from the freezing of raindrops or partially melted snowflakes causing slippery surfaces, posing a hazard to pedestrians and motorists.
- Ice Storm – Significant accumulation of rain or drizzle freezing on objects (trees, power lines, roadways) as it strikes them, causing slippery surfaces and damage from sheer weight of ice accumulations; significant ice accumulations are usually ¼" or greater.
- Blizzard – Sustained winds or frequent gusts of 35 mph or more; considerable blowing snow with visibility frequently below one-quarter mile prevailing over an extended period.
- Severe Blizzard – Wind velocity of 45 mph, temperatures of 10°F or lower, a high density of blowing snow with visibility frequently measured in feet prevailing over an extended period.

The NWS uses winter weather watches, warnings, and advisories to ensure that people know what to expect in the coming hours and days.

- Watches
    - Blizzard – Conditions are favorable for blizzard conditions to be met in the next 12 to 48 hours.
    - Winter Storm – Issued when sinter storm conditions, defined above, are possible within 24 to 48 hours.
- Warnings

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- Blizzard – Issued when sustained winds or frequent gusts ≥ 35 mph combined with blowing and or falling snow, reducing visibility below 1/4 mile for 3 hours or more, when imminent or expected within the next 36 hours. Temperatures are assumed below 32°F, and snow should accumulate at least one inch in 12 hours.
- Winter Storm – Issued when the following conditions, capable of producing high impact and potentially life-threatening conditions, are occurring, or expected to occur within the 36 hours: snow - ≥1 inch in 12 hours; sleet - ≥1/2 inch in 12 hours; and or a combination of snow, sleet, ice with snow or sleet meeting warning criteria
- Ice Storm – Issued when ≥1/8 inch of Ice is expected to accrete on trees, power lines, and bridges/overpasses for the entirety of the event. These conditions are capable of producing high impact and potentially life-threatening conditions and are either occurring or expected to occur within the next 36 hours.

- Advisories
  - Winter Weather – Issued when the following conditions, capable of producing significant, but not necessarily life threatening, inconveniences, are occurring or expected to occur within the next 36 hours:
    - Snow: 1/2 to 1 inch in 12 hours
    - Sleet: < 1/2 inch in 12 hours
    - Ice: < 1/8 inch in 12 hours
    - Combination: Snow, sleet, and ice with snow or sleet meeting advisory criteria.

Worst-Case Scenario

A worst-case severe winter storm scenario would be a storm similar to that of the February 2021 ice storms which brought extreme temperature lows, deaths and injuries, significant buildup of ice on structures and infrastructure including highway overpasses. A storm like this could lead to downed trees and power lines, power outages, closed roadways, and overall impact to the planning area. This would lead to disruption in emergency services and limited access to essentials (e.g., water, heat).

Previous Occurrences and Losses

Many sources have provided historical information regarding previous occurrences and losses associated with severe winter storm events in Llano County and/or San Saba County. According to the NOAA-NCEI storm events database, Llano County and San Saba County have been impacted by 24 winter weather events between 1950 and 2022 (NCEI NOAA 2021).

FEMA Disaster Declarations

Between 1954 and 2022, Llano County and San Saba County were each included in two disaster (DR) or emergency (EM) declarations for winter weather-related events. Generally, these disasters cover a wide region of the State; therefore, they can impact many counties. However, not all counties were included in the disaster declarations as determined by FEMA (FEMA 2022). Detailed information about the declared disasters since 1954 is provided in Section 3 (County Profile).

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Table 4.3.9-2. Winter Weather FEMA Disaster Declarations in the Planning Area (2017 to 2022)

Date(s) of Event	Event Type	FEMA Declaration Number	Llano and/or San Saba County included in the Declaration?
February 11 - 21, 2021	Severe Ice Storm	3554-EM-TX	Llano County, San Saba County
February 11 - 21, 2021	Severe Ice Storm	4586-DR-TX	Llano County, San Saba County

Source: FEMA 2022

U.S. Department of Agriculture Disaster Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2017 and 2022, San Saba County was included in one winter weather-related agricultural disaster declaration.

Date(s) of Event	Event Type	USDA Declaration Number	Llano and/or San Saba County included in the Declaration?
February 10 - 19, 2021	winter storm, blizzard, snow, ice, and high winds	S4975	San Saba County

Source: USDA 2022

Previous Events

For this 2023 HMP update, known winter weather events that impacted the Planning Area between 2017 and 2022 are discussed below in Table 4.3.9-3. For events prior to 2017, refer to Appendix I (Supplementary Data).

Table 4.3.9-3. Winter Weather Events in the Planning Area (2017 to 2022)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in the Declaration?	Description
January 16, 2018	Winter Storm	N/A	N/A	A cold front brought a shallow layer of subfreezing air to South Central Texas. Isentropic lift of warm moist air over this shallow cold layer led to wintry precipitation. Most of the precipitation was freezing rain and sleet, but there was some snow toward the end of the event. There were reports of 1/8 inch of ice accumulated in Leon Valley, New Braunfels, and San Geronimo. Icy roads were a problem across the region. Ice closed many roads across the region and caused numerous vehicle accidents. No property or crop damages were reported.
January 2, 2019	Winter Weather	N/A	N/A	Light freezing drizzle and light freezing rain started in West Central Texas mainly around midnight on January 2nd and continued off and on through the morning of January 3. A glaze of ice formed on area roadways as temperatures ranged from 26 degrees in the north near Haskell to 32 degrees in the south along Interstate 10. Sleet and light snow mixed with the precipitation at times especially along and north of a line from Sweetwater to Brownwood. This wintry precipitation made area roadways very hazardous

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in the Declaration?	Description
				and led to many accidents across the area and resulted in the closing of offices on January 2. Another area of freezing rain and sleet moved across West Central during the night of the January 2, and into the early morning hours of January 3. No property or crop damages were reported.
February 5 – 6, 2020	Winter Weather	N/A	N/A	A strong cold front brought freezing temperatures and scattered precipitation. Precipitation was a mix of rain, sleet, and snow. Sleet was reported in Atascosa, Uvalde, Kendall, Llano, and Lavaca Counties with no accumulation. Sleet and snow were reported in Real, Kerr, Bexar, Guadalupe, Hays, Travis, and Williamson. In Williamson County Weir, Taylor, and Georgetown had 1/4 of snow and Round Rock and Serenada had 0.2. In Travis County Pflugerville saw ½ inch of snow, parts of Austin had 1/4 to 0.4 inches, Jollyville, Sunset Valley, Lost Creek, and West Lake Hills had 0.2 inches, and Jollyville and San Leanna had 0.1 inches. There were reports of only snow in Val Verde, Bandera, Gillespie, Comal, Caldwell, and Bastrop Counties. Camp Swift in Bastrop County had 1/4 inches of snow. In Hays County Wimberley had 0.1 inches of snow and in Comal County New Braunfels had 0.1 inches. With the minor accumulations there weren't any impacts from this event. A strong cold front brought freezing temperatures and scattered precipitation. Precipitation was a mix of rain, sleet, and snow. Sleet was reported in Llano County. With the minor accumulations there weren't any impacts from this event. No property or crop damages were reported.
December 31, 2020	Winter Weather	N/A	N/A	A winter storm dumped heavy snow from Roscoe south to Sterling City, Barnhart and Ozona. This storm also produced a mixture of freezing rain, sleet, and snow over the remainder of West Central Texas. The freezing rain that fell before the snow was heavy enough to result in scattered tree limb damage and power outages across the area. However, Coleman County was hardest hit by the ice that left many without power. Most of the snow ended south of Interstate 20 before midnight, but some of the snow continued into New Year's Day mainly along and north of Interstate 20. The ice and snow also made travel difficult across the area. National Weather Service Cooperative Observer in San Saba measured 3 inches of snow. No property or crop damages were reported.

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in the Declaration?	Description
December 31, 2020	Winter Storm	N/A	N/A	A cold front brought cold air to South Central Texas on December 30 and then stalled along the coast. On the 31st an area of low pressure developed along the front as an upper-level trough moved from northern Mexico into Texas. This combination led to the development of snow showers across the northern part of the area. Snow accumulation was reported in Burnet, Edwards, Gillespie, Kerr, Llano, and Real Counties ranging from 0.2 inches to 4.5 inches. No property or crop damages were reported.
January 10, 2021	Winter Storm, Heavy Snow	N/A	N/A	An upper-level low pressure center moved across Texas cooling the atmosphere above the boundary layer leading to precipitation changing from rain to sleet and snow. This upper low blanketed a large part of West Central Texas with snow. This storm system resulted in heavy snow amounts of 4 to 8 inches along and north of a line from Mertzon to San Angelo to San Saba. Many schools and universities closed on January 11. Schools had a two-hour delay in the south where the snow was the lightest. Roads became snow packed across the region, making travel difficult. National Weather Service CoCoRaHS Observer located 0.7 miles south of Cherokee reported 5.5 inches of snow. Llano reported 2 inches of snow. No property or crop damages were reported.
February 10 – 12, 2021	Winter Weather	FEMA: 3554-EM-TX, 4586-DR-TX USDA: S4975	FEMA: Llano County, San Saba County USDA: San Saba County	A series of weather systems brought several rounds of winter weather to South Central Texas from February 11 through February 18. The first episode of winter weather started when a cold front moved through South Central Texas on February 10 and stalled over South Texas. A shallow arctic airmass moved into the West Central Texas on February 9 and continued to slowly move south across the region on February 10. Warm gulf moisture overran the frontal boundary and resulted in periods of widespread freezing drizzle across West Central Texas. Roads became covered with an icy glaze, making travel difficult. Pictures from a trained weather spotter showed ice accumulation from freezing rain of 0.10 inches on trees, vehicles, and elevated surfaces near Llano. Pictures showed at least 0.5 inches of ice accumulation south of Llano. Picture from a trained spotter showed 3/4 inch of ice accumulation on a deck near Llano.

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in the Declaration?	Description
				Hundreds of tractor trailers and motorists became stranded overnight and into the morning of the February 12 on Interstate 10 near Junction and Sonora. Several churches provided shelter and food for these stranded motorists. The thick ice brought down power poles, power lines, two communication towers and lots of tree branches and trees across Kimble County. San Saba Sheriff's Department reported a half inch of sleet on roadways across the town of Cherokee. No property or crop damages were reported.
February 14 – 15, 2021	Winter Storm, Heavy Snow	FEMA: 3554-EM-TX, 4586-DR-TX USDA: S4975	FEMA: Llano County, San Saba County USDA: San Saba County	A series of weather systems brought several rounds of winter weather to South Central Texas from February 11 through February 18. The second round came on the 13th and 14th with cold air still in place in the low levels, another upper-level shortwave trough moved across Texas providing lift for precipitation. The deeper atmosphere had warm air above the cold leading to a second round of freezing rain. The third round of winter weather was initiated by another upper-level shortwave trough on the 14th and 15th. This system brought cooler air above the boundary layer and turned precipitation to snow. Most of the area had only snow, but there were also short periods of freezing rain in a few places. Heavy snow and blowing snow made travel very difficult over most of the area. This snow stayed on the ground through much of the week, before mostly melting on Saturday, February 20. Anywhere from 2 to 8 inches fell across the region. There was a 25-to-35-mile swath of heavier snow that extended from Abilene to San Angelo where about 10 inches of snow fell. This snow was quite dry in water content. San Saba Sheriff's Department estimated 4 inches of snow in San Saba. National Weather Service Cooperative Observer located 7 miles northwest of San Saba measured 3 inches of snow. In addition to the snow, bitterly cold air and breezy winds combined to bring extreme wind chill values on the 15th. With a FOIA (Freedom of Information Act) the state of Texas DSHS has produced some fatality numbers (direct vs indirect) for this event. However, there are no details provided on gender, exact location, or time of death. Direct deaths are

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in the Declaration?	Description
				from hypothermia. Indirect deaths are listed as deaths from falls, carbon monoxide, heating related fire, motor vehicle accidents, drowning, exacerbation of chronic illness, and frostbite. In some cases where fatality information was obtained by emergency managers, some details have been documented. Dates of deaths were placed on Feb 15 as an estimate and to be consistent of when some of the coldest temperatures occurred. In addition, overall monetary losses for individual counties cannot be computed with the substantial number of insured loss claims due to water pipes bursting in homes and businesses along with monetary loss due to rolling power blackouts. Insured loss numbers are not passed onto individual NWS offices. In the more urbanized counties where population is larger, overall uninsured and insured losses likely will total in the 100s of millions of dollars. The state of Texas will likely accumulate Billions in losses with this winter event. Snowfall overnight on the 14th and 15th blanketed the County with as much as 5.0 in. Some snow totals included 3.0 inches in Kingsland, 4.0 inches in Inks Lake, and 5.0 inches in Llano.
February 16 – 18, 2021	Heavy Snow	FEMA: 3554-EM-TX, 4586-DR-TX USDA: S4975	FEMA: Llano County, San Saba County USDA: San Saba County	A series of weather systems brought several rounds of winter weather to South Central Texas from February 11 through February 18. The next round of winter weather came February 16 and 17. A surface trough developed along the Texas coast and an upper-level jet streak moved over the top of it. This created warm advection above the boundary layer and another round of freezing rain over the eastern half of the area. The final episode of winter precipitation came February 17 and 18. The main upper trough axis moved across Texas and cooled the deeper atmosphere. The height falls led to upward motion that produced precipitation. A few spots had a mix of wintry precipitation at the start of this episode, but it all turned quickly to snow. Estimated 0.40 inches of ice accumulation near Long Mountain. No property or crop damages were reported.
January 11, 2022	Winter Weather	N/A	N/A	An upper-level trough moved across Texas producing sufficient lift to generate light precipitation. The vertical temperature profile produced a mixture of rain and sleet over northern parts of South-Central Texas. There was no accumulation or impacts. Light sleet was reported in Llano and the western side of

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in the Declaration?	Description
				Lake Buchanan. The sleet was melting on contact. No property or crop damages were reported.
January 20, 2022	Winter Weather	N/A	N/A	A strong cold front brought cold air to South Central Texas. This was followed by an upper-level trough that generated light precipitation across the region. Precipitation was a mix of sleet, snow, freezing rain, and rain. There was very little accumulation and no significant impacts. No property or crop damages were reported.
February 2 - 3, 2022	Sleet	N/A	N/A	The combination of an arctic airmass, abundant moisture and an upper-level storm system resulted in a winter storm with widespread snow/sleet/freezing rain across much of west central Texas on February 2nd and 3rd. There was 0.8 inches of sleet reported across San Saba County. No property or crop damages were reported.

Sources: FEMA 2022; NCEI NOAA 2021

Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of winter weather events for the County. Information from the NOAA-NCEI storm events database, the 2019 State of Texas HMP, the 2016 Llano County HMP, the San Saba County HMP, and FEMA's Disaster Declarations for States and Counties were used to identify the number of winter weather events that occurred between 1950 and 2022. Table 4.3.9-4 presents the probability of future events for the winter weather hazard in Llano County. Table 4.3.9-5 presents the probability of future events for the winter weather hazard in San Saba County.

Table 4.3.9-4. Probability of Future Winter Weather Events in Llano County

Hazard Type	Number of Occurrences Between 1950 and 2022	% Chance of Occurring in Any Given Year
Blizzard	0	0%
Heavy Snow	1	1.38%
Ice Storm	0	0%
Sleet	0	0%
Winter Storm	15	20.83%
Winter Weather	8	11.11%
Total	**24**	**32**

Sources: NOAA NCEI 2022; FEMA 2022; State of Texas 2018

Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all winter weather events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.

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Table 4.3.9-5. Probability of Future Winter Weather Events in San Saba County

Hazard Type	Number of Occurrences Between 1950 and 2022	% Chance of Occurring in Any Given Year
Blizzard	0	0%
Heavy Snow	3	4.16%
Ice Storm	4	5.55%
Sleet	1	1.38%
Winter Storm	5	6.97%
Winter Weather	9	12.5%
Total	**22**	**3**

Sources: NOAA NCEI 2022; FEMA 2022; State of Texas 2018
Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all winter weather events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.

In Section 4.4, the identified hazards of concern for the Planning Area were ranked (Table 4.4-4 and Table 4.4-5). The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Team, the probability of occurrence for winter weather in the Planning Area is considered 'rare'.

Climate Change Projections

Changes in climate can affect how much snow falls and influence the timing of the winter snow season. Changes in the amount of snow covering the ground, and changes in how the snow melts in the spring, will affect the water supplies that people use for things like farming and making electricity (NSIDC 2010). With these projections, the Planning Area might not experience an increase in winter weather events, but the lack of snow could impact the water supply.

According to the National Climate Assessment, rising air and water temperatures and changes in precipitation are intensifying droughts, increasing heavy downpours, reducing snowpack, and causing declines in surface water quality, with varying impacts across regions. Future warming will add to the stress on water supplies and adversely impact the availability of water in parts of the United States (USGCRP 2018).

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The entire Planning Area is exposed to the winter weather hazard. The following text evaluates and estimates the potential impact of the winter weather hazard in the Planning Area as a whole.

Impact on Life, Health, and Safety

For the purposes of this HMAP, the entire population of the Planning Area (21,243 in Llano County, 5,730 in San Saba County) is exposed to winter weather events. The homeless and elderly are considered most susceptible to this hazard; the homeless due to their lack of shelter and the elderly due to their increased risk of injuries and death from falls and overexertion or hypothermia from attempts to clear snow and ice.

According to the 2020 ACS 5-Year Population Estimate, 37.5-percent of the population in Llano County and 10.3-percent of the population in San Saba County is 65 and over. Winter weather events can reduce the ability of these populations to access emergency services.

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Winter weather can immobilize a region and paralyze a city. Additional impacts include stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse buildings and knock down trees and power lines. The cost of snow removal, repairing damages, and loss of business can have large economic impacts on cities and towns (NOAA NSSL n.d.).

Impact on General Building Stock

The entire general building stock inventory in the Planning Area is exposed and potentially vulnerable to the winter weather hazard; however, properties in poor condition or in particularly vulnerable locations may be at risk to the most damage. In general, structural impacts include damage to roofs and building frames rather than building content. Current modeling tools are not available to estimate specific losses for this hazard. As an alternate approach, the percent damage to structures that could result from winter weather conditions is considered. This allows planners and emergency managers to select a range of potential economic impact based on an estimate of the percent of damage to the general building stock. Given professional knowledge and the currently available information, the potential loss for this hazard is considered to be overestimated because of varying factors (building structure type, age, load distribution, building codes in place). Therefore, the table's data should be used as estimates only for planning purposes with the knowledge that the associated losses for winter weather events vary greatly.

Impact on Critical Facilities

Full functionality of critical facilities, such as police, fire, and medical facilities is essential for response during and after a winter weather event. These critical facility structures are largely constructed of concrete and masonry; therefore, they should only suffer minimal structural damage from winter weather events. Heavy accumulations of ice can bring down trees, electrical wires, telephone poles, utility lines, and communication towers. Communications and power can be disrupted for days while utility companies work to repair the extensive damage. Even small accumulations of ice can cause extreme hazards to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces (NSSL 2006). Winter weather events, such as ice storms, can lead to power outages. Therefore, it is recommended that critical facilities install backup power sources.

Infrastructure at risk for this hazard includes roadways that could be damaged due to salt application and intermittent freezing and warming conditions that can damage roads over time. Severe snowfall requires the clearing roadways and alerting citizens to dangerous conditions; following the winter season, resources for road maintenance and repair might be required.

Impact on Economy

The cost of snow and ice removal and repair of roads from the freeze/thaw process can drain local financial resources. Impacts on the economy also include commuter difficulties into or out of the area for work or school. The loss of power and closure of roads prevent commuters within the Planning Area.

Impact on the Environment

Severe winter weather can have a major impact on the environment. Not only does winter weather create changes in natural processes, the residual impacts of a community's methods to maintain its infrastructure through winter weather maintenance may also have an impact on the environment. For example, an excess amount of snowfall

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and earlier warming periods may affect natural processes such as flow within water resources (USGS 2020). Rain-on-snow events can also exacerbate runoff rates with warming winter weather. Consequentially, these flow rates and excess volumes of water can erode banks, tear apart habitat along the banks and coastline, and disrupt terrestrial plants and animals.

Future Changes That May Impact Vulnerability

Understanding future changes that effect vulnerability in the Planning Area can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The Planning Area considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

Any areas of growth could be potentially impacted by the winter weather hazard because the entire Planning Area is exposed and vulnerable. The ability of new development to withstand winter weather impacts lies in sound land use practices and consistent enforcement of codes and regulations for new construction.

Projected Changes in Population

Llano County has experienced an increase in population between the 2010 Census (19,301) and the 2020 Census population of 21,243. The population of the County is expected to increase over the next few years. San Saba County experienced a decrease in population between the 2010 Census (6,131) and the 2020 Census population of 5,730. The Texas Demographic Center has produced population estimates for the region that were last updated in 2018 based on 2010 Census data. The estimates show a slight projected decline for Llano County between 0.14 and 0.25-percent every five years from 2025 to 2035, followed by a projected growth between 0.68 and 3.3-percent every five years from 2035 to 2050. The estimates show projected decline for San Saba County between 1.51 and 4.3-percent every five years from 2025 to 2050 (Texas Demographic Center n.d.).

With an increase in population, more people will be exposed to winter weather events. Additionally, the age of the population, changes in their geography, and how climate change could alter the winter weather received (rain versus snow) will be important to continue to assess future changes in vulnerability.

Climate Change

Climate is defined not just as average temperature and precipitation, but also by type, frequency, and intensity of weather events. Both globally and at the local level, climate change can potentially alter prevalence and severity of weather extremes, such as winter storms. While predicting changes in winter weather events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating future climate change impacts on human health, society, and the environment (EPA 2022). Based on the projections, the Planning Area can expect to experience more rain than snow during the winter months. In the immediate future, the Planning Area can anticipate continuing to experience the impacts of winter weather events.

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Change of Vulnerability Since 2016 HMP

The Planning Area's population increased since the last plan; increasing the number of people impacted during a winter weather event. Therefore, the entire Planning Area remains vulnerable to winter weather events. While winter storms are a rare occurrence, they can occur and cause impacts.

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Section 4 Risk Assessment

4.3 Hazard Profiles

4.3.10 Wildfire

The following section provides the hazard profile and vulnerability assessment for the wildfire hazard in the Planning Area. When referring to the Planning Area, it includes both Llano County and San Saba County.

Hazard Profile

Hazard Description

Wildfire is defined as a sweeping and destructive burning conflagration and can be further categorized as wildland, wildland urban interface, or intermix fires.

- **Wildland Wildfires** are wildfires encompassing prescribed fire and wildfire. Wildland fires are a natural element of both grassland and forest ecology and historically occurred across the state of Texas (Texas Parks & Wildlife 2022).
- **Wildland Urban Interface (WUI) Wildfires** occur in the transition zone between unoccupied land and human development where structures and other development meets with undeveloped wildland or vegetative fuels (U.S. Fire Administration 2022).
- **Intermix Wildfires** occur in areas where structures are scattered among or mixed with wildland vegetation, without a clearly defined boundary (Law Insider 2022).

Wildfire probability depends on local weather conditions, topographic factors, and existing "fuels" such as natural vegetation. Outdoor activities such as camping, debris burning, and construction can affect the number and the extent of wildfires. Wildfires can result in widespread damage to property and loss of life. Lightning can cause wildfire events. Drought and extreme heat can also increase the wildfire potential.

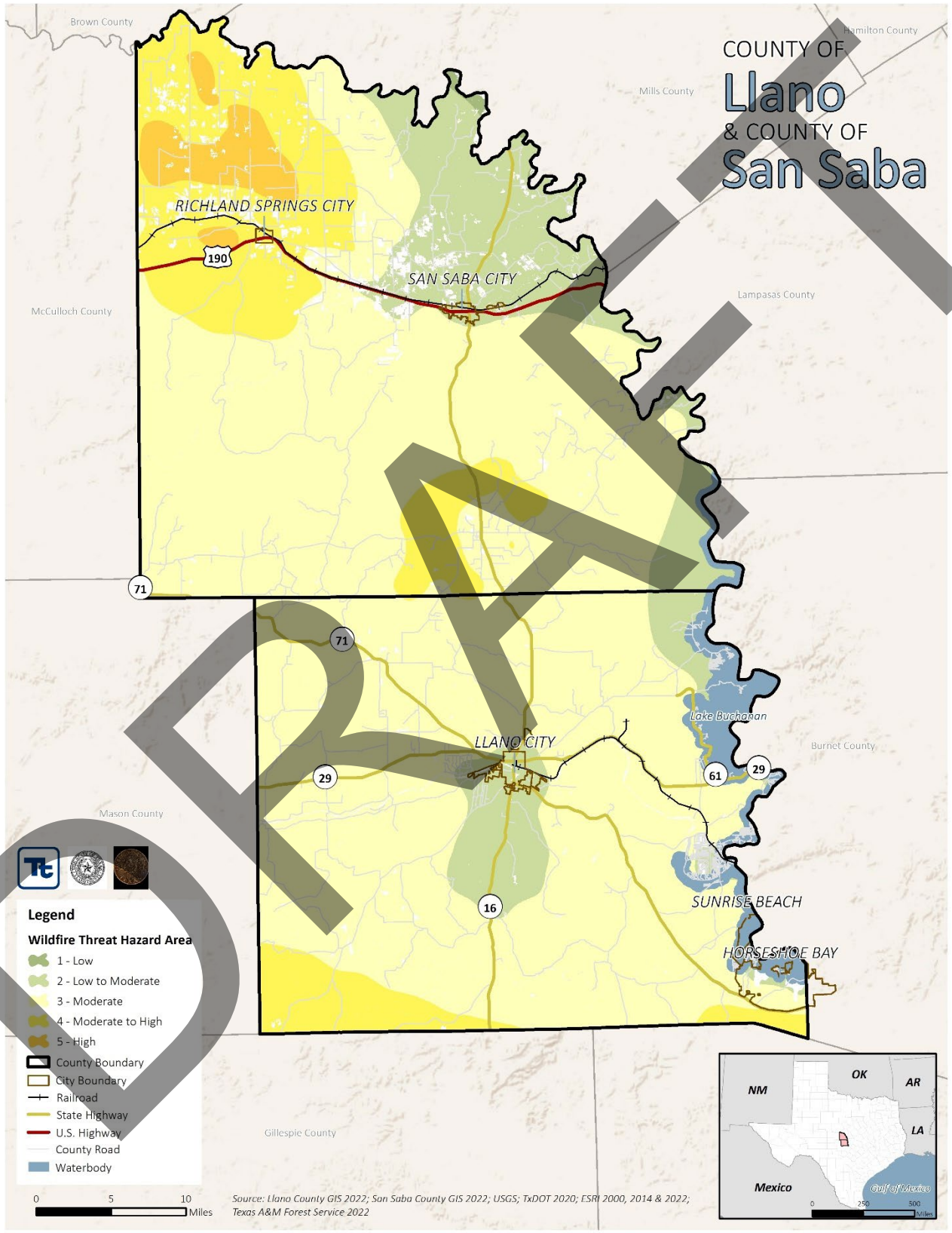
Wildland fires are fueled almost exclusively by natural vegetation. Wildland Urban Interface (WUI) fires are fueled by both vegetation and the built environment. When homes are built adjacent to wildland areas, rural wildfires advance through all available fuels, which can include homes and other structures. Another factor that affects wildfire behavior is fuel to wind exposure (State of Texas 2018).

Location

Wildfires are not confined to any specific geographic area and can vary greatly in size, location, intensity and duration, especially during extended and prolonged drought and high wind conditions. Llano and San Saba Counties have the potential for future wildfires due to a combination of population growth, topography, and densely covered Ashe Juniper trees, which contain a highly flammable resin (State of Texas 2018, Lady Bird Johnson Wildflower Center 2011).

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Figure 4.3.10-1. Wildfire Threat Hazard Area in the Planning Area



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Extent

There appears to be no dominant extent scale for wildfire; however, the Characteristic Fire Intensity Scale is the reported scale on the Texas A&M Forest Service Texas Wildfire Risk Application portal (Texas A&M Forest Service 2022).

Similar to the Richter scale for earthquakes, the Characteristic Fire Intensity Scale (FIS) provides a standard scale to measure potential wildfire intensity. FIS consists of five classes where the order of magnitude between classes is ten-fold. The minimum class, Class 1, represents very low wildfire intensities and the maximum class, Class 5, represents very high wildfire intensities.

Table 4.3.10-1. Characteristic Fire Intensity Scale

FIS Class	Description
CLASS 1 VERY LOW	Very small, discontinuous flames, usually less than one foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.
CLASS 2 LOW	Small flames, usually less than two feet long; small amount of very short-range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
CLASS 3 MODERATE	Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
CLASS 4 HIGH	Large flames, up to 30 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.
CLASS 5 VERY HIGH	Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

Source: Texas A&M Forest Service 2022

Worst-Case Scenario

A worst-case scenario would involve a wildfire during a high wind event, preceded by prolonged elevated temperatures and drought. This type of event would have both short- and long-term effects on the Planning Area. The fire could burn structures and infrastructure creating power and communication outages. Parts of the Planning Area could experience limited ingress and egress as transportation corridors are blocked by fire. Air quality would be affected and could pose serious risks for the elderly and those with compromised respiratory systems.

Previous Occurrences and Losses

The Planning Area is susceptible to regular wildfire events. Most wildfires have occurred in the spring and summer months; however, with intensified drought and extreme heat, fires may occur year-round.

FEMA Disaster Declarations

Between 1954 and 2022, Llano County was included in four disaster (DR), emergency (EM) declarations for wildfire-related events. San Saba County was include in five declarations (FEMA 2022). Detailed information about the declared DR and EM disasters since 1954 is provided in Section 3 (County Profile).

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Table 4.3.9-1. Wildfire FEMA Disaster Declarations in the Planning Area (2017 to 2022)

Date(s) of Event	Event Type	FEMA Declaration Number	Llano and/or San Saba County included in the Declaration?
August 30, 1993 - November 15, 1993	Wildfire	EM-3113-TX	Llano County
February 23, 1996 - September 19, 1996	Wildfire	EM-3117-TX	San Saba County
August 1, 1999 - December 10, 1999	Wildfire	EM-3142-TX	Llano County, San Saba County
November 27, 2005 – May 14, 2006	Wildfire	DR-1624-TX	Llano County, San Saba County
March 14 – September 1, 2008	Wildfire	EM-3284-TX	Llano County, San Saba County
April 6, 2011 – August 29, 2011	Wildfire	DR-1999-TX	San Saba County

Source: FEMA 2022

U.S. Department of Agriculture Disaster Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between 2017 and 2022, Llano and/or San Saba County were not included in any wildfire-related agricultural disaster declarations.

Previous Events

For this 2023 HMP update, known wildfire events that impacted the Planning Area between 2017 and 2022 are listed in Table 4.3.10-2. For events prior to 2017, refer to Appendix I (Supplementary Data).

Table 4.3.10-2. Wildfire Events in the Planning Area (2017 to 2022)

Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
July 18-24, 2018	Wildfire	N/A	N/A	The 308 Wildfire burned 1,200 acres in Llano County.
July 23-24, 2019	Wildfire	N/A	N/A	The Cap Fire started one mile west of CR-413 and three miles north of Hwy-16 in Llano County. The fire burned 351 acres before it was contained.
August 13-16, 2020	Wildfire	N/A	N/A	The Trails Wildfire burned 400 acres in Llano County. Fire officials issued a voluntary evacuation notice for part of Horseshoe Bay. One home was destroyed and another badly damaged by the fire. Damages were estimated at $300,000.
August 2020	Wildfire	N/A	N/A	The Mays Fire, started by an idling vehicle, burned 10,00 acres in San Saba and McCulloch Counties.
May 2022	Wildfire	N/A	N/A	The Sandstone Mountain Fire burned 351 acres southeast of the Town of Llano.
May 2022	Wildfire	N/A	N/A	The Twin Starts Fire burned about 450 acres just off Highway 71 in Llano County.
May 2022	Wildfire	N/A	N/A	The Slab Road Fire burned nearly 60 acres in Llano County.

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Date(s) of Event	Event Type	FEMA and/or USDA Declaration Number (if applicable)	Llano and/or San Saba County included in Declaration?	Description
May 2022	Wildfires	N/A	N/A	11 additional grass fires broke out along a 20-mile stretch of Highway 71 between Marble Falls and Llano. One structure was threatened, but not damaged.
May 2022	Wildfire	N/A	N/A	The Mayfield Fire burned more than 1,500 acres in rural San Saba County, northeast of Fredonia.

Sources: NOAA NCEI 2022; Ramkissoon 2022; KVUE 2022; Clifton 2022; Gravois 2022; Kirkpatrick 2020
Notes: Events recorded by FEMA, the National Climatic Data Center (NOAA NCEI), and major media coverage are listed in this table. Other smaller wildfire events may have occurred in the Planning Area between 2017-2022.

Probability of Future Occurrences

For the 2023 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of wildfire events for the County. Information from NOAA-NCEI storm events database, the 2018 State of Texas HMP, the 2016 Llano and San Saba County HMPs, and major media outlets were used to identify the number of wildfire events that occurred between 1950 and 2022. Table 4.3.10-3 presents the probability of future events for the wildfire hazard in Llano and San Saba Counties.

Table 4.3.10-3. Probability of Future Wildfire Events

Hazard Type	Number of Occurrences Between 1950 and 2022	% Chance of Occurring in Any Given Year
Wildfire	138	100%

Sources: NOAA NCEI 2022; State of Texas 2018; Llano County 2016; San Saba County 2016; Ramkissoon 2022; KVUE 2022; Clifton 2022; Gravois 2022; Kirkpatrick 2020
Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected events since 1968. Due to limitations in data, not all land subsidence events occurring between 1954 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.

In Section 4.4, the identified hazards of concern for the Planning Area were ranked (Table 4.4-3). The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Team, the probability of occurrence for wildfire events in the Planning Area is considered 'occasional'.

Climate Change Projections

The climate of Texas is changing. Most of the State has warmed between one half and one degree Fahrenheit in the past century. Higher temperatures and drought are likely to increase the severity, frequency, and extent of wildfires, which could harm property, livelihoods, and human health. On average, more than 1-percent of the land in Texas has burned each decade since 1984. Wildfire smoke pollutes the air and can increase medical visits for respiratory and heart problems (EPA 2016). Periods of extreme drought increase the risk of wildfire (Centers for Climate and Energy Solutions n.d.).

Vulnerability Assessment

To understand risk, a community must evaluate assets exposed to and vulnerable to the identified hazard. The locations in the Planning Area within the moderate to high wildfire threat hazard area are most vulnerable to the

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wildfire hazard. The following text evaluates and estimates the potential impact of the wildfire hazard in the Planning Area as a whole.

Impact on Life, Health, and Safety

All people exposed to the wildfire hazard are potentially vulnerable to wildfire impacts. Smoke and air pollution from wildfires can be a severe health hazard, especially for sensitive populations, including children, the elderly and those with respiratory and cardiovascular diseases. In addition, wildfire may threaten the health and safety of those fighting the fires. First responders are exposed to dangers from the initial incident and after-effects from smoke inhalation and heat stroke. Persons with access and functional needs, the elderly, and very young may be especially vulnerable to a wildfire if there is not adequate warning time before evacuation is needed.

Table 4.3.10-4. Estimated Population Located Within the Wildfire Threat Hazard Areas in Llano County

Llano Jurisdiction	Total Population (2020 Decennial Census)	Estimated Population Located Within the Wildfire Threat Hazard Areas			
		Number of People in the Moderate to High Wildfire Threat Hazard Area	Percent of Total	Number of People in the High Wildfire Threat Hazard Area	Percent of Total
Horseshoe Bay (C)	4,257	3	0.1%	0	0.0%
Sunrise Beach (C)	739	0	0.0%	0	0.0%
Llano (C)	3,325	0	0.0%	0	0.0%
Unincorporated Llano County	12,922	53	0.4%	0	0.0%
Llano County (Total)	**21,243**	**56**	**0.3%**	**0**	**0.0%**

Source: Texas A&M Forest Service 2022; Census 2020
Notes: (C) = City
**Disclaimer: Horseshoe Bay City statistics are based on both Llano County and Burnet County coverage. Results may be over or underestimated.*

Table 4.3.10-5. Estimated Population Located Within the Wildfire Threat Hazard Areas in San Saba County

San Saba Jurisdiction	Total Population (2020 Decennial Census)	Estimated Population Located Within the Wildfire Threat Hazard Areas			
		Number of People in the Moderate to High Wildfire Threat Hazard Area	Percent of Total	Number of People in the High Wildfire Threat Hazard Area	Percent of Total
Richland Springs (T)	244	242	99.3%	0	0.0%
San Saba (C)	3,117	0	0.0%	0	0.0%
Unincorporated San Saba County	2,369	364	15.4%	85	3.6%
San Saba County (Total)	**5,730**	**606**	**10.6%**	**85**	**1.5%**

Source: Texas A&M Forest Service 2022; Census 2020
Notes: (C) = City, (T) = Town

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Impact on General Building Stock

All property exposed to the wildfire hazard is vulnerable. Structures that were not constructed to standards designed to protect a building from a wildfire may be especially vulnerable. As of 2008, the International Building code requires minimum standards be met for new buildings in fire hazard severity zones. It is unknown how many buildings in the Planning Area were built to these standards. However, there is only a small percentage of buildings in the moderate to high or high wildfire threat hazard area, thus not many are vulnerable to wildfires (Table 4.3.10-6 and Table 4.3.10-7).

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Table 4.3.10-6. Estimated Number and Total Replacement Cost Value of Structures Located in the Wildfire Threat Hazard Areas in Llano County

Llano Jurisdiction	Total Number of Buildings	Total Replacement Cost Value (RCV)	Estimated Number and Total Replacement Cost Value of Structures Located in the Wildfire Threat Hazard Areas							
			Number of Buildings in the Moderate to High Wildfire Threat Hazard Area	Percent of Total	Total Replacement Cost Value of Buildings Located in the Moderate to High Wildfire Threat Hazard Area	Percent of Total	Number of Buildings in the High Wildfire Threat Hazard Area	Percent of Total	Total Replacement Cost Value of Buildings Located in the High Wildfire Threat Hazard Area	Percent of Total
Horseshoe Bay (C)	2,174	$921,317,000	2	0.1%	$795,288	0.1%	0	0.0%	$0	0.0%
Sunrise Beach (C)	909	$345,382,000	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Llano (C)	1,733	$564,332,000	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Unincorporated Llano County	8,788	$2,408,418,000	58	0.7%	$20,929,465	0.9%	0	0.0%	$0	0.0%
Llano County (Total)	**13,604**	**$4,239,449,000**	**60**	**0.4%**	**$21,724,754**	**0.5%**	**0**	**0.0%**	**$0**	**0.0%**

Source: Texas A&M Forest Service 2022; Census 2020
Notes: (C) = City
**Disclaimer: Horseshoe Bay City statistics are based on both Llano County and Burnet County coverage. Results may be over or underestimated.*

Table 4.3.10-7. Estimated Number and Total Replacement Cost Value of Structures Located in the Wildfire Threat Hazard Areas in San Saba County

San Saba Jurisdiction	Total Number of Buildings	Total Replacement Cost Value (RCV)	Estimated Number and Total Replacement Cost Value of Structures Located in the Wildfire Threat Hazard Areas							
			Number of Buildings in the Moderate to High Wildfire Threat Hazard Area	Percent of Total	Total Replacement Cost Value of Buildings Located in the Moderate to High Wildfire Threat Hazard Area	Percent of Total	Number of Buildings in the High Wildfire Threat Hazard Area	Percent of Total	Total Replacement Cost Value of Buildings Located in the High Wildfire Threat Hazard Area	Percent of Total
Richland Springs (T)	213	$66,306,000	212	99.4%	$66,013,884	99.6%	0	0.0%	$0	0.0%
San Saba (C)	1,311	$410,811,000	0	0.0%	$0	0.0%	0	0.0%	$0	0.0%
Unincorporated San Saba County	1,819	$480,386,000	287	15.8%	$77,590,227	16.2%	67	3.7%	$16,334,934	3.4%
San Saba County (Total)	**3,343**	**$957,503,000**	**499**	**14.9%**	**$143,604,111**	**15.0%**	**67**	**2.0%**	**$16,334,934**	**1.7%**

Source: Texas A&M Forest Service 2022; Census 2020
Notes: (C) = City, (T) = Town

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Impact on Critical Facilities

Critical facilities not built to fire protection standards, utility poles and lines, and facilities containing hazardous materials are most vulnerable to the wildfire hazard. Most roads and railroads would not sustain damage except in the worst scenarios, although roads and bridges can be blocked by debris or other wildfire-related conditions and become impassable. Table 4.3.10-8 and Table 4.3.10-9 indicate the number of lifeline facilities located in the wildfire threat hazard areas. If a wildfire reached the following critical facilities, their vulnerability could complicate response and recovery efforts during and following an event:

- **Hazardous Materials and Fuel Storage**—During a wildfire event, these materials could rupture due to excessive heat and act as fuel for the fire, causing rapid spreading and escalating the fire to unmanageable levels. In addition, they could leak into surrounding areas, saturating soils and seeping into surface waters, and have a disastrous effect on the environment.
- **Communication Facilities**—If these facilities are damaged and become inoperable, it would exacerbate already difficult communication in the Planning Area.
- **Fire Stations**—If fire stations were compromised during a wildfire event, it would make fire suppression and support services even more challenging.

Table 4.3.10-8. Estimated Number of Lifeline Facilities Located in Wildfire Threat Hazard Areas in Llano County

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the Moderate to High Wildfire Threat Hazard Area	Number of Lifelines Located in the High Wildfire Threat Hazard Area
Communications	5	0	0
Energy	28	0	0
Food, Water, Shelter	18	0	0
Hazardous Material	7	0	0
Health and Medical	14	0	0
Safety and Security	38	0	0
Transportation	177	6	0
Llano County (Total)	**287**	**6**	**0**

Source: Llano County GIS 2022; Hazus v5.1; Texas A&M 2022; FEMA 2021; Texas A&M Forest Service 2022

Table 4.3.10-9. Estimated Number of Lifeline Facilities Located in Wildfire Threat Hazard Areas in San Saba County

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the Moderate to High Wildfire Threat Hazard Area	Number of Lifelines Located in the High Wildfire Threat Hazard Area
Communications	2	0	0
Energy	0	0	0
Food, Water, Shelter	2	1	0
Hazardous Material	0	0	0
Health and Medical	0	0	0
Safety and Security	15	4	0
Transportation	111	22	3
San Saba County (Total)	**130**	**27**	**3**

Source: Llano County GIS 2022; Hazus v5.1; Texas A&M 2022; FEMA 2021; Texas A&M Forest Service 2022

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Impact on Economy

Wildfire events can have major economic impacts on a community from the initial loss of structures and the subsequent loss of revenue from destroyed business and decrease in tourism. Wildfires can cost thousands of taxpayer dollars to suppress and control and can involve hundreds of operating hours on fire apparatus and thousands of volunteer man hours from the volunteer firefighters. There are also many direct and indirect costs to local businesses that excuse volunteers from working to fight these fires.

Impact on the Environment

Fire is a natural and critical ecosystem process in most terrestrial ecosystems, affecting the types, structure, and spatial extent of native vegetation. However, it also can cause severe environmental impacts:

- **Damaged Fisheries**—Critical fisheries can suffer from increased water temperatures, sedimentation, and changes in water quality.
- **Soil Erosion**—The protective covering provided by foliage and dead organic matter is removed, leaving the soil fully exposed to wind and water erosion. Accelerated soil erosion occurs, causing landslides and threatening aquatic habitats.
- **Spread of Invasive Plant Species**—Non-native woody plant species frequently invade burned areas. When weeds become established, they can dominate the plant cover over broad landscapes, and become difficult and costly to control.
- **Disease and Insect Infestations**—Unless diseased or insect-infested trees are swiftly removed, infestations and disease can spread to healthy forests and private lands. Timely active management actions are needed to remove diseased or infested trees.
- **Destroyed Endangered Species Habitat**—Fire can have negative consequences for endangered species.
- **Soil Sterilization**—Some fires burn so hot that they can sterilize the soil. Topsoil exposed to extreme heat can become water repellant, and soil nutrients may be lost.
- **Reduced Timber Harvesting**—Timber can be destroyed and lead to smaller available timber harvests.
- **Reduced Agricultural Resources**—Wildfire can have disastrous consequences on agricultural resources, removing them from production and necessitating lengthy restoration programs.
- **Damaged Cultural Resources**—Scenic vistas can be damaged, access to recreational areas can be reduced and destruction of cultural resources may occur.

Future Changes That May Impact Vulnerability

Understanding future changes that effect vulnerability in the Planning Area can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The Planning Area considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Projected Development

Urbanization tends to alter the natural fire regime and can create the potential for the expansion of urbanized areas into wildland areas. The expansion of development toward wildfire hazard areas can be managed with

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strong land use and building codes. The International Building Code includes minimum standards related to the design and construction of buildings in fire hazard zones. The Planning Area is well equipped with these tools and this planning process has assessed capabilities with regards to the tools. As the Planning Area experiences future growth, it is anticipated that the exposure to this hazard will remain as assessed or even decrease over time due to these capabilities.

Projected Changes in Population

Llano County has experienced an increase in population between the 2010 Census (19,301) and the 2020 Census population of 21,243. The population of the County is expected to increase over the next few years. San Saba County experienced a decrease in population between the 2010 Census (6,131) and the 2020 Census population of 5,730. The Texas Demographic Center has produced population estimates for the region that were last updated in 2018 based on 2010 Census data. The estimates show a slight projected decline for Llano County between 0.14- and 0.25-percent every five years from 2025 to 2035, followed by a projected growth between 0.68- and 3.3-percent every five years from 2035 to 2050. The estimates show projected decline for San Saba County between 1.51 and 4.3-percent every five years from 2025 to 2050 (Texas Demographic Center n.d.).

An increase in population of the Planning Area will expose more people to the wildfire hazard.

Climate Change

Climate change has the potential to affect multiple elements of the wildfire system: fire behavior, ignitions, fire management, and vegetation fuels. Hot dry spells create the highest fire risk. Increased temperatures may intensify wildfire danger by warming and drying out vegetation. Changes in climate patterns may impact the distribution and perseverance of insect outbreaks that create dead trees (increase fuel). When climate alters fuel loads and fuel moisture, forest susceptibility to wildfires changes. Climate change also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods.

Change of Vulnerability Since 2016 HMP

For this hazard mitigation plan update, the Wildfire Threat Hazard Area from the Texas A&M Forest Service 2022 was referenced to determine areas within the Planning Area that are vulnerable to wildfires. Population statistics have also been updated using the 2020 Census. Overall, this vulnerability assessment uses a more accurate and updated building inventory which provides more accurate estimated exposure and potential losses for the Planning Area.

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4.4 Hazard Ranking

A comprehensive range of hazards that pose a significant risk to Llano and San Saba Counties were selected and considered during the development of this plan; see Section 4.2 (Identification of Hazards of Concern). However, each community has differing levels of exposure and vulnerability to each of these hazards. It is important for each community participating in this plan to recognize those hazards that pose the greatest risk to their community and direct their attention and resources accordingly to most effectively and efficiently manage risk and reduce losses. The hazard ranking for the Planning Area can be found in their jurisdictional annexes in Volume II, Section 9 (Annexes) of this plan.

To this end, a hazard risk ranking process was conducted for the Planning Area using the method described below. This method includes four risk assessment categories—probability of occurrence, impact (population, property and economy), adaptive capacity, and changing future conditions (i.e., climate change). Each was assigned a weighting factor to calculate an overall ranking value for each hazard of concern. Depending on the calculation, each hazard was assigned a high, medium, or low ranking. Details regarding each of these categories is described below.

4.4.1 Hazard Ranking Methodology

Estimates of hazard risk for the Counties were developed using methodologies promoted by FEMA's hazard mitigation planning guidance, generated by FEMA's Hazus risk assessment tool, and input from Llano and San Saba Counties and participating jurisdictions.

As described in Section 4.1 (Methodology and Tools), three different levels of analysis were used to estimate potential impacts: 1) historic loss/qualitative analysis; 2) exposure analysis; and 3) loss estimation. All three levels of analysis are suitable for planning purposes; however, with any risk analysis, there is underlying uncertainty resulting from assumptions used to describe and assess vulnerability and the methodologies available to model impacts. Impacts from any hazard event within the Counties will vary from the analysis presented here based on the factors described for each hazard of concern; namely location, extent, warning time, and mitigation measures in place at the time of an event.

The hazard ranking methodology for some hazards of concern is based on a scenario event, while others are based on their potential risk to the Planning Area as a whole. In order to account for these differences, the quantitative hazard ranking methodology was adjusted using professional judgement and subject-matter input; assumptions are included, as appropriate, in the following subsections. The limitations of this analysis are recognized given the scenarios do not have the same likelihood of occurrence; nonetheless, there is value in summarizing and comparing the hazards using a standardized approach to evaluate relative risk. The following categories were considered when evaluating the relative risk of the hazards of concern.

- Probability of Occurrence - The probability of occurrence of the scenario evaluated was estimated by examining the historic record and/or calculating the likelihood of annual occurrence. When no scenario was assessed, an examination of the historic record and judgement was used to estimate the probability of occurrence of an event that will impact the Counties.
- Impact—The following three hazard impact subcategories were considered: impact to people; impact to buildings; and impact to the economy. The results of the updated risk assessment and/or professional

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judgement were used to assign the numeric values for these three impact subcategories. A factor was applied to each subcategory, giving impact on population the greatest weight.

- Population—Numeric value x 3
- Buildings—Numeric value x 2
- Economy—Numeric value x 1

- Adaptive Capacity - Adaptive capacity describes a jurisdiction's current ability to protect from or withstand a hazard event. This includes capabilities and capacity in the following areas: administrative, technical, planning/regulatory, and financial. Mitigation measures already in place increases a jurisdiction's capacity to withstand and rebound from events (e.g., codes/ordinances with higher standards to withstand hazards due to design or location; deployable resources; or plans and procedures in place to respond to an event). In other words, assigning 'weak' for adaptive capacity means the jurisdiction does not have the capability to effectively respond, which increases vulnerability; whereas 'strong' adaptive capacity means the jurisdiction does have the capability to effectively respond, which decreases vulnerability. These ratings were assigned using the results of the core capability assessment with subject-matter input from each jurisdiction.
- Climate Change (Changing Future Conditions) - Current climate change projections were considered as part of the hazard ranking to ensure the potential for an increase in severity/frequency of the hazard was included. This was important to the Planning Area to include because the hazard ranking helps guide and prioritize the mitigation strategy development, which should have a long-term future vision to mitigate the hazards of concern. The potential impacts climate change may have on each hazard of concern is discussed in Sections 4.3.1 through 4.3.10. The benchmark values in the methodology are similar to confidence levels outlined in the National Climate Assessment 2017.

Hazard Ranking Equation

[Probability of Occurrence x 0.3] + [(Impact on Population x 3) + (Impact on Property x 2) + (Impact on Economy x 1) x 0.3] + [Adaptive Capacity x 0.3] + [Climate Change x 0.1]

Table 4.4-1 summarizes the categories, benchmark values, and weights used to calculate the risk factor for each hazard. Using the weighting applied, the highest possible risk factor value is 6.9. The higher the number, the greater the relative risk. Based on the total for each hazard, a priority ranking is assigned to each hazard of concern (high, medium, or low). The rankings were categorized as follows: Low = Values less than 3.9; Medium = Values between 3.9 and 4.9; High = Values greater than 4.9.

Table 4.4-1. Summary of Hazard Ranking Approach

Category	Level / Category	Degree of Risk / Benchmark Value	Numeric Value	Weighted Value
Probability of Occurrence	Unlikely	A hazard event is not likely to occur or is unlikely to occur with less than a 1% annual chance probability.	0	30%
	Rare	Between 1 and 10% annual probability of a hazard event occurring.	1	
	Occasional	Between 10 and 100% annual probability of a hazard event occurring.	2	
	Frequent	100% annual probability; a hazard event may occur multiple times per year.	3	

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Category		Level / Category	Degree of Risk / Benchmark Value	Numeric Value	Weighted Value
Impact (Sum of all 3)	Population (Numeric Value x 3)	Low	14% or less of your population is exposed to a hazard with potential for measurable life safety impact, due to its extent and location.	1	30%
		Medium	15% to 29% of your population is exposed to a hazard with potential for measurable life safety impact, due to its extent and location.	2	
		High	30% or more of your population is exposed to a hazard with potential for measurable life safety impact, due to its extent and location.	3	
	Property (Numeric Value x 2)	Low	Property exposure is 14% or less of the total number of structures for your community.	1	
		Medium	Property exposure is 15% to 29% of the total number of structures for your community.	2	
		High	Property exposure is 30% or more of the total number of structures for your community.	3	
	Economy (Numeric Value x 1)	Low	Loss estimate is 9% or less of the total replacement cost for your community.	1	
		Medium	Loss estimate is 10% to 19% of the total replacement cost for your community.	2	
		High	Loss estimate is 20% or more of the total replacement cost for your community.	3	
Adaptive Capacity		Weak	Weak/outdated/inconsistent plans, policies, codes/ordinances in place; no redundancies; limited to no deployable resources; limited capabilities to respond; long recovery.	1	30%
		Moderate	Plans, policies, codes/ordinances in place and meet minimum requirements; mitigation strategies identified but not implemented on a widespread scale; county/jurisdiction can recover but needs outside resources; moderate county/Jurisdiction capabilities.	0	
		Strong	Plans, policies, codes/ordinances in place and exceed minimum requirements; mitigation/protective measures in place; county/jurisdiction has ability to recover quickly because resources are readily available, and capabilities are high.	-1	
Climate Change		Low	No local data is available; modeling projections are uncertain on whether there is increased future risk; confidence level is low (inconclusive evidence).	1	10%
		Medium	Studies and modeling projections indicate a potential for exacerbated conditions due to climate change; confidence level is medium to high (suggestive to moderate evidence).	2	
		High	Studies and modeling projections indicate exacerbated conditions/increased future risk due to climate change; very high confidence level (strong evidence, well documented and acceptable methods).	3	

Note: A numerical value of zero is assigned if there is no impact.
**For the purposes of this exercise, "impacted" means exposed for population and property and estimated loss for economy. For non-natural hazards, although they may occur anywhere in the Planning Area, an event will not likely cause countywide impacts; therefore, impact to population was scored using an event-specific scenario.*

In an attempt to summarize the confidence level regarding the input utilized to populate the hazard ranking, a gradient of certainty was developed. A certainty factor of high, medium, or low was selected and assigned to each hazard to provide a level of transparency and increased understanding of the data utilized to support the resulting ranking. The following scale was used to assign a certainty factor to each hazard:

- High—Defined scenario/event to evaluate; probability calculated; evidenced-based/quantitative assessment to estimate potential impacts through hazard modeling.

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- Moderate—Defined scenario/event or only a hazard area to evaluate; estimated probability; combination of quantitative (exposure analysis, no hazard modeling) and qualitative data to estimate potential impacts.
- Low—Scenario or hazard area is undefined; there is a degree of uncertainty regarding event probability; majority of potential impacts are qualitative.

4.4.2 Hazard Ranking Results

Using the process described above, the ranking for the identified hazards of concern was determined for Planning Area (refer to Table 4.4-2 and Table 4.4-3). The hazard ranking is detailed in the subsequent tables that present the stepwise process for the ranking. The ranking includes the entire planning area and may not reflect the highest risk indicated for any of the participating jurisdictions. The resulting ranks of each municipality indicate the differing degrees of risk exposure and vulnerability. The results support the appropriate selection and prioritization of initiatives to reduce the highest levels of risk for each municipality. Both the Counties and the participating jurisdictions have applied the same methodology to develop the countywide risk and local rankings to ensure consistency in the overall ranking of risk; jurisdictions had the ability to alter rankings based on local knowledge and experience in handling each hazard.

This hazard ranking exercise serves four purposes: 1) to describe the probability of occurrence for each hazard; 2) to describe the impact each would have on the people, property, and economy; 3) to evaluate the capabilities a community has with regards to the hazards of concern; and 4) to consider changing future conditions (i.e., climate change) in Llano and San Saba Counties.

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Table 4.4-2. Ranking for Hazards of Concern for Llano County

Hazard of Concern	Probability		Impact										Total Impact Value	Adaptive Capacity	Climate Change
				Population			Property			Economy					
	Category	Numeric Value	Impact	Numeric Value	Weighted Value (x3)	Impact	Numeric Value	Weighted Value (x2)	Impact	Numeric Value	Weighted Value (x1)				
Dam Failure	Rare	1	Low	1	1 x 3 = 3	Low	1	1 x 2 = 2	Low	1	1 x 1 = 1		6	Moderate	Medium
Drought	Occasional	2	High	3	3 x 3 = 9	Low	1	1 x 2 = 2	Low	1	1 x 1 = 1		12	Moderate	High
Extreme Temperature	Frequent	3	High	3	3 x 3 = 9	Low	1	1 x 2 = 2	Low	1	1 x 1 = 1		12	Moderate	High
Flood	Frequent	3	Medium	2	2 x 3 = 6	Low	1	1 x 2 = 2	Medium	2	2 x 1 = 2		10	Moderate	High
Geological Hazards	Rare	1	Low	1	1 x 3 = 3	Low	1	1 x 2 = 2	Low	1	1 x 1 = 1		6	Moderate	Medium
Hurricane/Tropical Storm	Occasional	2	Medium	2	2 x 3 = 6	Medium	2	2 x 2 = 4	Low	1	1 x 1 = 1		11	Moderate	High
Pandemic	Occasional	2	High	3	3 x 3 = 9	Low	1	1 x 2 = 2	Low	1	1 x 1 = 1		12	Moderate	Medium
Severe Weather	Frequent	3	High	3	3 x 3 = 9	Medium	2	2 x 2 = 4	Medium	2	2 x 1 = 2		15	Moderate	High
Tornado	Occasional	2	High	3	3 x 3 = 9	Medium	2	2 x 2 = 4	Medium	2	2 x 1 = 2		15	Moderate	Medium
Wildfire	Occasional	2	Medium	2	2 x 3 = 6	High	3	3 x 2 = 6	Medium	2	2 x 1 = 2		14	Moderate	High
Winter Storm	Rare	1	Medium	2	2 x 3 = 6	Low	1	1 x 2 = 2	Low	1	1 x 1 = 1		9	Moderate	Medium

Table 4.4-3. Ranking for Hazards of Concern for San Saba County

Hazard of Concern	Probability		Impact										Total Impact Value	Adaptive Capacity	Climate Change
				Population			Property			Economy					
	Category	Numeric Value	Impact	Numeric Value	Weighted Value (x3)	Impact	Numeric Value	Weighted Value (x2)	Impact	Numeric Value	Weighted Value (x1)				
Dam Failure	Rare	1	Low	1	1 x 3 = 3	Low	1	1 x 2 = 2	Low	1	1 x 1 = 1		6	Moderate	Medium
Drought	Occasional	2	High	3	3 x 3 = 9	Low	1	1 x 2 = 2	Low	1	1 x 1 = 1		12	Moderate	High
Extreme Temperature	Frequent	3	High	3	3 x 3 = 9	Low	1	1 x 2 = 2	Low	1	1 x 1 = 1		12	Moderate	High
Flood	Frequent	3	Medium	2	2 x 3 = 6	Low	1	1 x 2 = 2	Low	1	1 x 1 = 1		9	Moderate	High
Geological Hazards	Unlikely	1	Low	1	1 x 3 = 3	Medium	2	2 x 2 = 4	High	3	3 x 1 = 3		10	Moderate	Medium
Hurricane/Tropical Storm	Occasional	2	Medium	2	2 x 3 = 6	Medium	2	2 x 2 = 4	Low	1	1 x 1 = 1		11	Moderate	High
Pandemic	Occasional	2	High	3	3 x 3 = 9	Low	1	1 x 2 = 2	Low	1	1 x 1 = 1		12	Moderate	Medium
Severe Weather	Frequent	3	High	3	3 x 3 = 9	Medium	2	2 x 2 = 4	Medium	2	2 x 1 = 2		15	Moderate	High
Tornado	Occasional	2	High	3	3 x 3 = 9	Medium	2	2 x 2 = 4	Medium	2	2 x 1 = 2		15	Moderate	Medium
Wildfire	Occasional	2	Medium	2	2 x 3 = 6	High	3	3 x 2 = 6	Medium	2	2 x 1 = 2		14	Moderate	High
Winter Storm	Rare	1	Medium	2	2 x 3 = 6	Low	1	1 x 2 = 2	Low	1	1 x 1 = 1		9	Moderate	Medium

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Table 4.4-4 and Table 4.4-5 presents the total calculations for each hazard ranking value for the hazards of concern in Llano and San Saba Counties, respectively.

Table 4.4-4. Total Hazard Ranking Values for the Hazards of Concern for Llano County

Hazard of Concern	Probability x 30%	Total Impact x 30%	Adaptive Capacity x 30%	Changing Future Conditions x 10%	Total Hazard Ranking Value
Dam Failure	0.3	1.8	0	0.2	2.3
Drought	0.6	3.6	0	0.3	4.5
Extreme Temperature	0.9	3.6	0	0.3	4.8
Flood	0.9	2.7	0	0.3	4.2
Geological Hazards	0.3	3	0	0.2	2.3
Hurricane/Tropical Storm	0.6	3.3	0	0.3	4.2
Pandemic	0.6	3.6	0	0.2	4.4
Severe Weather	0.9	4.5	0	0.3	5.7
Tornado	0.6	4.5	0	0.2	5.3
Wildfire	0.6	4.2	0	0.3	5.1
Winter Storm	0.3	2.7	0	0.2	3.2

Low = Values less than 3.9; Medium = Values between 3.9 and 4.9; High = Values greater than 4.9

Table 4.4-5. Total Hazard Ranking Values for the Hazards of Concern for San Saba County

Hazard of Concern	Probability x 30%	Total Impact x 30%	Adaptive Capacity x 30%	Changing Future Conditions x 10%	Total Hazard Ranking Value
Dam Failure	0.3	1.8	0	0.2	2.3
Drought	0.6	3.6	0	0.3	4.5
Extreme Temperature	0.9	3.6	0	0.3	4.8
Flood	0.9	2.7	0	0.3	3.9
Geological Hazards	0.3	3	0	0.2	2.3
Hurricane/Tropical Storm	0.6	3.3	0	0.3	4.2
Pandemic	0.6	3.6	0	0.2	4.4
Severe Weather	0.9	4.5	0	0.3	5.7
Tornado	0.6	4.5	0	0.2	5.3
Wildfire	0.6	4.2	0	0.3	5.1
Winter Storm	0.3	2.7	0	0.2	3.2

Low = Values less than 3.9; Medium = Values between 3.9 and 4.9; High = Values greater than 4.9

These rankings have been used as one of the bases for identifying the jurisdictional hazard mitigation strategies included in Section 9 (Annexes) of this plan. The summary rankings for the Counties reflect the results of the vulnerability analysis for each hazard of concern and vary from the specific results of each jurisdiction. For example, the severe storm hazard may be ranked low in one jurisdiction, but due to the exposure and impact the to the Planning Area, it is ranked as a high hazard and is addressed in the Planning Area's mitigation strategy accordingly. Jurisdictional ranking results are presented in each local annex in Section 9 (Annexes) of this plan.

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Section 5 Capability Assessment

According to FEMA's Mitigation Planning How-To Guide #3, a capability assessment is an inventory of a community's missions, programs, and policies and an analysis of its capacity to carry them out. Each jurisdiction has a unique set of capabilities available to accomplish mitigation and reduce long-term vulnerable to future hazard events. Capabilities include authorities, policies, programs, staff, and funding. Reviewing existing capabilities helps identify capabilities that currently implement mitigation and leads to loss reductions or that have the potential to be implemented in the future.

This assessment is an integral part of the planning process. The assessment process enables identification, review, and analysis of current federal, state, and local programs, policies, regulations, funding, and practices that could either facilitate or hinder mitigation.

During the original planning process, Llano County, San Saba County, and all jurisdictions identified and assessed their capabilities in the areas of planning and regulatory, administrative, and technical, and fiscal. By completing this assessment, the Planning Committee and each jurisdiction learned how or whether they would be able to implement certain mitigation actions by determining the following:

- Limitations that could exist on undertaking actions.
- The range of local and state administrative, programmatic, regulatory, financial, and technical resources available to assist in implementing their mitigation actions.
- Actions deemed infeasible, as they are currently outside the scope of capabilities.
- Types of mitigation actions that could be technically, legally (regulatory), administratively, politically, or fiscally challenging or infeasible.
- Opportunities to enhance local capabilities to support long term mitigation and risk reduction.

During the 2022 plan update process, all participating jurisdictions were tasked with developing or updating their capability assessment, paying particular attention to evaluating the effectiveness of these capabilities in supporting hazard mitigation and identifying opportunities to enhance local capabilities to integrate hazard mitigation into their plans, programs, and day-to-day operations.

County and municipal capabilities in the areas of planning and regulatory, administrative, and technical, and fiscal may be found in the Capability Assessment section of their jurisdictional annexes in Section 9 (Jurisdictional Annexes).

5.1 Update Process Summary

The purpose of the capability assessment is to understand the planning, regulatory, administrative, technical, and financial capabilities present in Llano and San Saba Counties. This assessment helps Llano County, San Saba County, and their jurisdictions identify strengths and opportunities that can be used to reduce losses from hazard events and reduce risks throughout Llano County and San Saba County.

To complete the capability assessment, the contracted consultant met with both counties and each jurisdiction virtually to review the capability assessment from the 2016 HMP and update accordingly. In addition to virtual

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meetings, the consultant reviewed plans and codes/ordinances to enhance the information provided by the jurisdictions.

A summary of the various federal and state capabilities available to promote and support mitigation and reduce risk in Llano County and San Saba County are presented below. Information provided by the Counties and municipalities are presented in Volume II, Section 9 (Jurisdictional Annexes) of this plan update.

5.2 Planning and Regulatory Capability

Planning and regulatory capabilities are based on the implementation of ordinances, policies, local laws, and state statutes, and plans and programs that relate to guiding and management growth and development. Planning and regulatory capabilities refer not only to the current plans and regulations, but also to the jurisdiction's ability to change and improve those plans and regulations as needed. The following provides the planning and regulatory capabilities for Llano and San Saba Counties.

5.2.1 Planning and Regulatory Capabilities – Local

The following tables summarize the planning and regulatory capabilities available to Llano County (Table 5-1) and San Saba (Table 5-2) County, at the local level.

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Table 5-1. Planning and Regulatory Capabilities – Llano County

Capability	Details	
Building Code	**Description:**	Town and City Halls in Llano County, Texas provide municipal services for their community, including issuing and enforcing building codes. The Town or City Hall is responsible for ensuring compliance with building codes and investigating possible Llano County building code violations. They keep records on building codes as well as any changes to the building code, and they may also review and approve building and renovation plans. The Town or City Hall typically has records on approved and rejected plans, investigations of Llano County building code violations, and any punishments or abatement plans for code violations. These records can be useful for prospective Llano County property buyers and property owners, and they are typically available through the Town or City Hall websites.
	Responsible Agency:	Texas Department of Insurance
	Provides Funding for Mitigation:	No
	Hazard:	All hazards
Llano County Subdivision Regulations - Rules, Regulations and Requirements relating to the approval and acceptance of Improvements in Subdivisions or Re-Subdivisions – 11/23/2020	**Description:**	An adequate drainage plan shall be designed and prepared by a professional engineer registered in the State of Texas, including the design of drainage facilities, culverts, and/or systems using a minimum ten (10) year storm frequency (unless otherwise directed by the Llano County Commissioner's Court), such that the drainage out of the subdivision does not have a negative drainage impact on neighboring properties. The placement of any structure within the regulatory floodplain shall be in accordance with the Llano County Flood Damage Prevention Order. The following requirements shall apply: (1) Each plat shall include base flood elevation data. (2) All subdivision proposals shall have adequate drainage provided to reduce- exposure to flood hazards. (3) All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize or eliminate flood damage. (4) All subdivision plats shall have the flood hazard area as indicated on the respective flood insurance rate map(s) clearly delineated on the plat and where appropriate, each lot shall be shaped and sized to provide adequate building space. (5) The developer, builder, seller, or agent shall inform in writing, each prospective buyer of subdivision lots located in flood hazard areas that such property is in an identified flood hazard area and that a Floodplain Development Permit will be required before a structure can be placed on the property. The Llano County Flood Damage Prevention Order can be found in the Development Services Department or at www.co.llano.tx.us for further rules and requirements.
	Responsible Agency:	Commissioners Court
	Provides Funding for Mitigation:	No
	Hazard:	Flood
Real Estate Disclosure - Texas Property Code Section § 5.008 - Seller's Disclosure of Property Condition	**Description:**	Real Estate Disclosure ensures that property owners are aware of historical disaster impacts and gives them information necessary to plan for and mitigate future disasters
	Responsible Agency:	Texas Real Estate Commission
	Provides Funding for Mitigation:	No
	Hazard:	Flood

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Capability	Details	
Llano County Flood Damage Prevention Order – 1/29/2021	**Description:**	(1) It restricts or prohibits uses that are dangerous to health, safety, or property in times of flood, or cause excessive increases in flood heights or velocities, (2) It requires that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction, and (3) It controls the alteration of natural floodplains, stream channels, water courses, and natural protective barriers, which are involved in the accommodation of flood waters.
	Responsible Agency:	The Llano County Department of Environmental and Emergency Services Administrator is hereby appointed the Floodplain Administrator (FPA) to administer and implement the provisions of this order.
	Provides Funding for Mitigation:	No
	Hazard:	Flood
Emergency Management - Texas Government Code Chapter 418	**Description:**	Emergency Management requirements provide for the planning, mitigation, preparedness, response, and recovery activities necessary for a high impact coastal community.
	Responsible Agency:	Texas Division of Emergency Management
	Provides Funding for Mitigation:	No
	Hazard:	All hazards
The Economic Impact of the Upper Highland Lakes of the Colorado River – Fall 2012	**Description:**	The economic impact study includes an analysis of demographic, economic, infrastructure and public policy related to the upper Highland Lakes of the Colorado River. It also incorporates public input from a range of stakeholders including residents, landowners, land developers, and elected officials. For Burnet and Llano Counties, lake fluctuations, especially long-term droughts, have tremendous negative consequences for the region. Following the floods of 1900 and 1915 that washed away the first Austin dam and created a floodway one mile wide in Austin, the Texas Legislature created the Lower Colorado River Authority (LCRA) under the Texas Constitution provision Article 16, Section 59. The LCRA was created as a permanent body to effectively manage the Colorado River in Central Texas. It began its operations in 1935, following another flood that washed out the second Austin dam.
	Responsible Agency:	Burnet and Llano Counties formed a partnership to study the economic implications of the Upper Highland Lakes on the two-county region.
	Provides Funding for Mitigation:	No
	Hazard:	Flood, Drought
Llano County Broadband Study - 2022	**Description:**	In 2020 and 2021, Llano County governments, residents, and businesses experienced significant broadband communications challenges with the closures of businesses, schools, and government offices due to both COVID-19 and adverse weather conditions. along with others, the Llano County Commissioners, recognize the critical need for reliable communications to better prepare for future emergencies in and around Llano County. A more vibrant network needs to not only be developed to assist local, state, and federal officials communicate under extreme emergency conditions, but to assist with future and increasing economic development and education needs.
	Responsible Agency:	Llano County Commissioners

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Capability	Details	
	Provides Funding for Mitigation:	No
	Hazard:	All
Llano County Transportation and Economic Development Plan – 12/14/2015	**Description:**	Periodic flooding occurs throughout the County along creeks, reducing roadway connectivity and creating safety hazards. The Federal Emergency Management Agency (FEMA) has identified areas of potential flood hazards. In consultation with the public, TxDOT, and local staff, the Llano County Transportation and Economic Development Plan consider several opportunities to improve existing low-water crossings. Future consideration may be made for low water crossings located on CR 2768 in Castell, CR 103 East of Castell, and CR 102 East of CR 103.
	Responsible Agency:	Llano County, TxDOT, and CAPCOG
	Provides Funding for Mitigation:	No
	Hazard:	Flood
Upper Llano River Watershed Protection Plan – May 2016	**Description:**	The Coordinating Committee selected a collection of management measures and goals to address sources of concern in a holistic manner to improve both the quality and quantity of flows in the watershed. These measures are directed primarily at improved grazing, wildlife, septic systems and, invasive species management as well as implementation of sound upland and riparian management measures and other water quality protection measures. It is the goal of the Upper Llano WPP to ensure that the long-term integrity and sustainability of the watershed, springs and rivers are preserved, and that water quality standards and flows are maintained for present and future generations.
	Responsible Agency:	Llano County Watershed Coordination Committee
	Provides Funding for Mitigation:	No
	Hazard:	Flood, Drought, Invasive Species
Llano County Emergency Operations Plan	**Description:**	Llano County utilizes a basic emergency operations plan that provides guidance to the community in the event of a hazard.
	Responsible Agency:	Llano County Office of Emergency Management.
	Provides Funding for Mitigation:	No
	Hazard:	All Hazards
Disaster Recovery Plan – 11/16/2020	**Description:**	It is the policy of the Llano Central Appraisal District to minimize the effects of disasters or emergencies of any kind to property owners and employees while diligently restoring all services in the shortest amount of time.
	Responsible Agency:	The Chief Appraiser is the designated Emergency Coordinator for the District and is responsible to assure the duties outlined in this document are performed for their respective areas. He will stay in constant communication with the Llano County Judge, Llano City Mayor and/or City Manager and the Emergency Disaster Coordinator of Llano County to identify and implement mitigation measures to reduce damage and risk to human lives to protect the health, safety, and welfare of its residents.
	Provides Funding for Mitigation:	No
	Hazard:	All Hazards
Texas Agri-Life Extension Service	**Description:**	Agricultural planning reduces the risk to the animals and community during times of disaster.
	Responsible Agency:	Llano and San Saba County Agricultural Extension
	Provides Funding for Mitigation:	No
	Hazard:	Flood, Hurricane, Severe Winter Storm

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Table 5-2. Planning and Regulatory Capabilities – San Saba County

Capability	Details	
Building Code	**Description:**	The County is governed by the Texas Administrative Code § 5.4008, the 2018 International Building Code (IBC), the 2018 International Residential Code (IRC), and NFPA. By using the IRC, IBC, and NFPA the highest standards are assured for County construction to reduce the risk of hazards and protect both lives and property.
	Responsible Agency:	Texas Department of Insurance
	Provides Funding for Mitigation:	No
	Hazard:	All hazards
Subdivision Ordinance – San Saba County Subdivision Regulations. Approved 12/13/2021, and as Amended Through 3/12/2022	**Description:**	San Saba County has established subdivision standards and specifications for construction of roads and drainage, private sewage facilities and development within the floodplain. Where the subdivision is traversed by a water course, drainage way, channel or stream, there shall be provided a stormwater drainage easement or drainage right- of-way conforming substantially with the lines for such water course and of sufficient width to convey all storm and flood water flowing through as may be determined by the Commissioners Court through its authorized representative, to accommodate further width or construction and allow access for maintenance.
	Responsible Agency:	San Saba County Commissioners Court
	Provides Funding for Mitigation:	No
	Hazard:	Flood
Real Estate Disclosure - Texas Property Code Section § 5.008 - Seller's Disclosure of Property Condition	**Description:**	Real Estate Disclosure ensures that property owners are aware of historical disaster impacts and gives them information necessary to plan for and mitigate future disasters
	Responsible Agency:	Texas Real Estate Commission
	Provides Funding for Mitigation:	No
	Hazard:	Flood
Flood Damage Prevention – San Saba Floodplain Regulations – 10/26/2015	**Description:**	Floodplain regulations reduce risk to lives and property by ensuring mitigation measures are put into place for repetitive loss properties and new construction. A floodplain development permit has been established for all construction and other development to be undertaken in areas of special flood hazard in this community for the purpose of protecting its citizens from increased flood hazards and ensuring that new development is constructed in a manner that minimizes its exposure to flooding.
	Responsible Agency:	Emergency Management Coordinator
	Provides Funding for Mitigation:	No
	Hazard:	Flood
Emergency Management - Texas Government Code Chapter 418	**Description:**	Emergency Management requirements provide for the planning, mitigation, preparedness, response, and recovery activities necessary for a high impact coastal community.
	Responsible Agency:	Texas Division of Emergency Management
	Provides Funding for Mitigation:	No
	Hazard:	All hazards

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Capability	Details	
Texas Agri-Life Extension Service	**Description:**	Agricultural planning reduces the risk to the animals and community during times of disaster.
	Responsible Agency:	Llano and San Saba County Agricultural Extension
	Provides Funding for Mitigation:	No
	Hazard:	Flood, Hurricane, Severe Winter Storm
San Saba County Emergency Operations Plan	**Description:**	San Saba County utilizes a basic emergency operations plan that provides guidance to the community in the event of a hazard.
	Responsible Agency:	San Saba County Office of Emergency Management.
	Provides Funding for Mitigation:	No
	Hazard:	All Hazards

5.2.2 Planning and Regulatory Capabilities – Federal and State

Table 5-3 summarizes the Federal and State level planning and regulatory capabilities available to Llano and San Saba Counties.

Table 5-3. Planning and Regulatory Capabilities – Federal and State

Capability	Details	
Disaster Mitigation Act (DMA)	**Description:**	The DMA is the current federal legislation addressing hazard mitigation planning. It emphasizes planning for disasters before they occur. It specifically addresses planning at the local level, requiring plans to be in place before Hazard Mitigation Assistance grant funds are available to communities. This plan is designed to meet the requirements of DMA, improving eligibility for future hazard mitigation funds.
	Responsible Agency:	FEMA
	Provides Funding for Mitigation:	HMPs designed to meet the requirements of DMA will remain eligible for future FEMA Hazard Mitigation Assistance funds
	Hazard:	All-natural hazards
National Flood Insurance Program (NFIP)	**Description:**	The NFIP is a federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for state and community floodplain management regulations that reduce future flood damages. The Flood Hazard Profile in Section 4.3.6 (Flood) provides information on recent legislation related to reforms to the NFIP. Just 2 jurisdictions in Llano County and 1 jurisdiction in San Saba County actively participate in the NFIP. As of December 2022, there were 557 policies in Llano and San Saba Counties. There have been 486 claims made, totaling over $13,161,399 for damages to structures and contents.
	Responsible Agency:	FEMA
	Provides Funding for Mitigation:	Full compliance and good standing under the NFIP are application prerequisites for all FEMA grant programs for which participating jurisdictions are eligible under this plan.
	Hazard:	Flood

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Capability	Details	
NFIP Community Rating System (CRS)	**Description:**	As an additional component of the NFIP, CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: (1) reduce flood losses, (2) facilitate accurate insurance rating, and (3) promote the awareness of flood insurance. Llano and San Saba County could expect significant cost savings on premiums if enrolled in the CRS program. As of April 2022, no communities in Llano and San Saba Counties participate in the CRS program. Communities in both Counties have noted they are exploring the possibility of participating in the program in the future.
	Responsible Agency:	FEMA
	Provides Funding for Mitigation:	CRS premium discounts on flood insurance range from 5 percent for Class 9 communities up to 45 percent for Class 1 communities.
	Hazard:	Flood
Local Government Code **Title 7. Regulation Of Land Use, Structures, Businesses, and Related Activities** **Subtitle A. Municipal Regulatory Authority** **Chapter 211. Municipal Zoning Authority** **Subchapter A. General Zoning Regulations**	**Description:**	The powers granted under this subchapter are for the purpose of promoting the public health, safety, morals, or general welfare and protecting and preserving places and areas of historical, cultural, or architectural importance and significance. The governing body of a municipality may regulate the size of buildings and other structures, lot coverage, size of open spaces, population density, the location and use of buildings and groundwater use. Zoning regulations must be adopted in accordance with a comprehensive plan and must be designed to: (1) lessen congestion in the streets. (2) secure safety from fire, panic, and other dangers. (3) promote health and the general welfare. (4) provide adequate light and air. (5) prevent the overcrowding of land. (6) avoid undue concentration of population; or (7) facilitate the adequate provision of transportation, water, sewers, schools, parks, and other public requirements. The governing body of a municipality may divide the municipality into districts of a number, shape, and size the governing body considers best for carrying out this subchapter. Within each district, the governing body may regulate the erection, construction, reconstruction, alteration, repair, or use of buildings, other structures, or land. Zoning regulations must be uniform for each class or kind of building in a district, but the regulations may vary from district to district. The regulations shall be adopted with reasonable consideration, among other things, for the character of each district and its peculiar suitability for uses, with a view of conserving the value of buildings and encouraging the most appropriate use of land in the municipality.
	Responsible Agency:	State of Texas
	Provides Funding for Mitigation:	No
	Hazard:	All Hazards

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Capability	Details	
Texas Silver Jackets	**Description:**	Silver Jackets is a program under National Flood Risk Management Program to support agency collaboration and coordination with interagency, state-led flood risk and multiple hazard management teams. Provides resources and develops tools to support information sharing and networking and promotes implementation of flood risk management efforts that improve flood risk awareness and result in actions to reduce risk. For more information: http://silverjackets.nfrmp.us/
	Responsible Agency:	US Army Corp of Engineers
	Provides Funding for Mitigation:	No
	Hazard:	Flood
Texas General Land Office	**Description:**	The Texas General Land Office (GLO), through the Community Development and Revitalization division, works to rebuild Texas communities by putting Texans back in their homes, restoring critical infrastructure and mitigating future damage through resilient community planning. The GLO is setting a record pace administering both Community Development Block Grant Disaster Recovery (CDBG-DR) and Mitigation (CDBG-MIT) funds from the U.S. Department of Housing and Urban Development (HUD) on behalf of the state of Texas. More than $14 billion have been allocated for recovery and mitigation following Hurricanes Rita, Dolly, and Ike, the 2011 wildfires, the 2015 and 2016 floods, Hurricane Harvey, the 2018 South Texas floods, and the 2019 disasters. These grants can be used for a wide variety of activities including housing redevelopment, infrastructure repair and long-term planning, depending on HUD guidance.
	Responsible Agency:	Texas General Land Office
	Provides Funding for Mitigation:	Yes
	Hazard:	Flood, Hurricane, Wildfire
Coastal Erosion Planning and Response Act (CEPRA)	**Description:**	The average erosion rate for the 367 miles of Texas coast is 4.1 feet per year. Sixty-four percent of the Texas coast is eroding at an average rate of about 6 feet per year, with some locations losing more than 30 feet per year. FEMA estimates that every dollar spent on erosion control and mitigation to preserve wetlands and other natural ecosystems, will provide a return on average of $4 in future cost-savings. Since 2000, the GLO's Coastal Erosion Planning and Response Program has received $111.4 million in state-appropriated funding. Project partners (local governments, non-profits, state, and federal entities) have contributed $52 million in non-federal matching funds and in-kind contributions, along with $165.2 million in federal funds and in-kind contributions that have resulted in more than 355 coastal erosion response projects.
	Responsible Agency:	General Land Office
	Provides Funding for Mitigation:	Yes
	Hazard:	Flood, Hurricane, Land Subsidence
Coastal Management Program (CMP)	**Description:**	Texas receives approximately $2 million annually in grants from National Oceanic and Atmospheric Administration (NOAA) and 90% of the funds are passed through to local governments and entities to address environmental needs and promote sustainable economic development along the coast. Projects must improve the management of the state's coastal resources and ensure long-term ecological and economic productivity. Section 306 administrative funds can be used for non-construction, coastal planning and education, and research. Section 306A improvement funds can be utilized for construction and land acquisition projects and preservation and restoration.

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Capability	Details	
		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.
	Responsible Agency:	Texas General Land Office
	Provides Funding for Mitigation:	Yes
	Hazard:	Flood, Hurricane
Gulf of Mexico Energy Security Act (GOMESA)	**Description:**	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). GOMESA 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. The $500 million cap does not apply to qualified revenues generated in those areas associated with Phase I of the GOMESA program. From 2009 through 2016, the state of Texas received $3,192,269 and its 18 CPSs received $798,036. The goal of GOMESA funding is to conserve, restore, enhance, and protect the diversity, quality, quantity, functions, and values of the state's coastal natural resources. A primary focus for the GLO will be to protect coastal natural resources while facilitating multiple human uses of coastal resources. The GLO's priority for the expenditures of GOMESA funds include: (1) Restoring and enhancing coastal natural resources, (2) Providing hurricane protection for coastal public resources, (3) Improving water quality, (4) Enhancing the balance between the protection of coastal natural resources and public use of those resources. (5) Improving environmental management, and (6) Mitigating coastal erosion and stabilizing shorelines.
	Responsible Agency:	Texas General Land Office
	Provides Funding for Mitigation:	Yes
	Hazard:	Flood, Hurricane, Manmade Disasters
U.S. Army Corps of Engineers – Dam Safety Program	**Description:**	The U.S. Army Corps of Engineers (USACE) is responsible for safety inspections of some federal and non-federal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. USACE has inventoried dams and has surveyed each state and federal agency's capabilities, practices, and regulations regarding design, construction, operation, and maintenance of the dams. USACE has also developed guidelines for inspection and evaluation of dam safety (USACE 1997).
	Responsible Agency:	USACE
	Provides Funding for Mitigation:	Yes
	Hazard:	Flood

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Capability	Details	
Natural Resources Damage Assessment (NRDA)	**Description:**	The natural resource trustees are the designated federal, state, and tribal agencies who are responsible for the natural resources impacted by an oil spill or hazardous substance release. They have common interests in sharing information, ideas, and expertise necessary to compensate the public for harm to natural resources because of oil spills and hazardous substance releases.
	Responsible Agency:	Texas Commission on Environmental Quality
	Provides Funding for Mitigation:	Yes
	Hazard:	Manmade Disasters
Coastal and Estuarine Land Conservation Program (CELCP)	**Description:**	Lands being targeted for protection through TCELCP include coastal and estuarine areas with significant ecologic, conservation, recreation, historic, and aesthetic values. Many of these lands are threatened by conversion from their natural state to other uses. This section describes the geographic extent of the TCELCP boundary, outlines the types of lands and values to be protected, and gives an assessment of their status and trends (when known), functions and values, and potential threats. 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.
	Responsible Agency:	NOAA, Texas General Land Office
	Provides Funding for Mitigation:	Yes
	Hazard:	Flood, Hurricane
Texas Division of Emergency Management	**Description:**	TDEM is charged with carrying out a comprehensive, all-hazard emergency management program for the state and assisting cities, counties, and state agencies in implementing their own emergency management programs.
	Responsible Agency:	
	Provides Funding for Mitigation:	No
	Hazard:	All Hazards
Community Health and Resource Management (CHARM)	**Description:**	CHARM is directed by the Texas Coastal Watershed Program, a part of Texas A&M AgriLife Extension Service. It is a mapping application that gives local officials, stakeholders, and citizens the power to analyze growth with real-time feedback. Using the weTable tool that transforms an ordinary tabletop into an interactive computer interface, CHARM allows participants to engage the public and gather their input regarding the community's future. The mapping application is supported by a library of data about urbanization, storm surge, conservation, public facilities, and coastal resources. The CHARM application can leverage local knowledge for better long-term planning, and is an ideal tool for communities, watersheds, and environmental projects.
	Responsible Agency:	Texas A&M AgriLife Extension Service.
	Provides Funding for Mitigation:	No
	Hazard:	Flood
Home Program	**Description:**	The Texas Department of Housing and Community Affairs (TDHCA) administers the HOME Program on behalf of the state. The purpose of the program is to expand the supply of decent, safe, affordable housing and strengthen public-private housing partnerships between units of local governments, public housing authorities, nonprofits, and for-profit entities. TDHCA has set aside funding for Disaster Relief and Persons with Disabilities, among others.
	Responsible Agency:	TDHCA
	Provides Funding for Mitigation:	Yes

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Capability	Details	
	Hazard:	All Hazards
Texas Water Development Board (TWDB) – Flood Insurance Program	**Description:**	TWDB is the state agency charged with collecting and disseminating water-related data, assisting with regional planning, preparing the State Water Plan, which addresses the development of the state's water resources. The agency also administers cost-effective financial assistance programs for the construction of water supply, wastewater treatment, flood control and agricultural water conservation projects. The TWDB has made great strides in floodplain management since the last update to the 2013 SHMP. Examples include hiring full time staff to manage the State's Cooperating Technical Partner floodplain mapping program, developing a State Flood Plan (see below for information on both), and creating a website to assist citizens and first responders during a flood event (www.TexasFloods.org). The following is a list of programs available which may assist with flooding and the mitigation of Repetitive and Severe Repetitive Loss properties. TWDB's National Flood Insurance Program group conducts Community Assistance Visits (CAV), Community Assistance Contacts (CAC), and floodplain management training to assist communities with maintaining NFIP compliance and sound floodplain management practices. The CAV is a scheduled visit to an NFIP community for the purpose of conducting a comprehensive assessment of the community's floodplain management program and evaluating its knowledge and understanding of the requirements of the NFIP. The purpose of the CAV is also to assist the community in understanding NFIP requirements when program deficiencies are discovered. Floodplain Management 101 workshops are offered to local officials and other interested parties which cover the NFIP and various flood loss reduction techniques and strategies, such as the Community Rating System (CRS). The workshops contain training modules on the Texas Water Code, Elevation Certificates, FEMA requirements, community awareness, map reading, permitting, and ordinance comprehension.
	Responsible Agency:	TWDB
	Provides Funding for Mitigation:	Yes
	Hazard:	Flood
Cooperation Technical Partners (CTP)	**Description:**	TWDB also administers the FEMA Cooperating Technical Partners (CTP) Program, which allows communities, tribal nations, universities, and regional and state agencies to be active partners in FEMA's flood hazard mapping program. The CTP program at the state level aims to produce flood risk information through leveraging state and local funds, updated flood risk products, and coordination between statewide cooperating technical partners.
	Responsible Agency:	TWDB
	Provides Funding for Mitigation:	No
	Hazard:	Flood
Fund Development Program	**Description:**	TWDB also administers the Fund Development Program to provide loans for the planning, design, and construction of water supply, wastewater, and flood control projects. Structural flood protection improvements may include construction of storm water retention basins, the enlargement of stream channels public beach re-nourishment, the control of coastal erosion, and the modification or reconstruction of bridges. Non-structural flood protection improvements may include the acquisition of floodplain properties for use as public

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Capability	Details	
		open space, the acquisition and removal of buildings and residents located within a floodplain, flood warning systems, and the development of floodplain management plans. The agency conducts an environmental review for all construction projects.
	Responsible Agency:	TWBD
	Provides Funding for Mitigation:	Yes
	Hazard:	Flood
Texas Natural Resources Information System (TNRIS)	**Description:**	The Texas Natural Resources Information System (TNRIS) is a division of TWDB, and is responsible for producing, archiving, and distributing geographic data to agencies, businesses, and the public. TNRIS supports hazard mitigation planning and implementation in three ways: (1) Provides data to organizations for planning or response activities. (2) Develops, locates, and prepares data for specific needs and/or projects. (3) Updates the State Critical Facility Database.
	Responsible Agency:	TWDB
	Provides Funding for Mitigation:	No
	Hazard:	All Hazards
Texas Flash Flood Coalition	**Description:**	The TFFC is an organization dedicated to decreasing the number of deaths caused by flash flooding in Texas. More than 30 representatives of higher education, media, private industry, local, state, and federal governments participate in the coalition. Its strategy is to: (1) Brainstorm and share ideas, data, resources, and best practices (2) Include a diversity of folks from all levels of education, the public, private entities, and academia (3) • Attack the flash flood problem with mitigation, research, technology, education, awareness, warning, and communication
	Responsible Agency:	Works with the Texas Floodplain Management Association
	Provides Funding for Mitigation:	No
	Hazard:	Flood, Flash Flood
Community Hazard Analysis and Mitigation Planning Support (CHAMPS)	**Description:**	The CHAMPS reports are summarized descriptions of historical hazard events and future hazard risks for each county in Texas. These have been developed by the Texas Geographic Society in a project funded by FEMA and administered by TDEM. CHAMPS reports have been developed to provide local mitigation planners with data, maps, and other information they can use to support the hazard assessment portion of the mitigation planning process. Each report includes information on county populations and built environments, historical losses from multiple hazards, and expected future likelihood of more hazard events. Also included with every hazard is a comparative display showing how the number of hazard events in that county compares with the number of events in other counties for that hazard over the same timeframe.
	Responsible Agency:	Texas Geographic Society
	Provides Funding for Mitigation:	No
	Hazard:	All Hazards

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Capability	Details	
Urban Tree Canopy Project – Resilient Landscapes Program	**Description:**	TFS has programs and funding opportunities, such as the Urban Tree Canopy Project, that address mitigation by decreasing impact from summer heat, flooding, and erosion. The Fire-Adapted Communities Program provides cost-share funds to assist in informing and preparing citizens to safely co-exist with wildland fire. The Resilient Landscapes Program provides cost-share reimbursement funds to restore healthy, fire-adapted ecosystems. The Firewise USA Program provides cost-share funds in cooperation with the National Fire Protection Administration to encourage homeowners to take individual responsibility for protecting their homes from the risk of wildfire.
	Responsible Agency:	Texas A&M Forest Service
	Provides Funding for Mitigation:	No
	Hazard:	Wildfires
Texas Department of Licensing and Regulation	**Description:**	Licenses and regulates weather modification programs and hosts the Texas Weather Modification and Advisory Committee meetings. Cloud seeding projects designed to increase rainfall from convective cloud towers are conducted in nearly 31 million acres of Texas. In administering the Texas Weather Modification Act, TDLR's weather modification program issues license and permits for projects using specialized aircraft and sophisticated weather radar systems at sites near Amarillo, San Angelo, and Pleasanton. TDLR also issues permit for hail suppression projects.
	Responsible Agency:	TDLR
	Provides Funding for Mitigation:	No
	Hazard:	Drought
Texas Department of Transportation	**Description:**	TXDOT incorporates tornado safe rooms into their Safe Rest Stops program through a federally funded Transportation Enhancement program (See Section 6.3). TXDOT also revises its design manual to include improved guidance on NFIP requirements. The agency supports the effort to certify floodplain managers by encouraging all their personnel to become certified. All engineers in TxDOT's central hydraulics branch are certified.
	Responsible Agency:	TxDOT
	Provides Funding for Mitigation:	No
	Hazard:	Flood
Texas Residential Safe Room Rebate Program	**Description:**	TDEM, through the Hazard Mitigation Assistance (HMA) grants, began offering a rebate incentive for builders and homeowners to build or install residential safe rooms. This program is implemented by local units of government that choose to administer the program through a grant provided through the HMGP or PDM program. TDEM has also published a residential safe room handbook to assist local jurisdictions with the implementation of the program. This program has raised the viability and the visibility of safe rooms in high tornado/windstorm regions of Texas.
	Responsible Agency:	TDEM
	Provides Funding for Mitigation:	Yes
	Hazard:	Tornado, Windstorm

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5.3 Administrative and Technical Capabilities

The tables below summarize the administrative and technical capabilities in Llano (Table 5-4) and San Saba (Table 5-5) Counties. Detailed information regarding administrative and technical capabilities in both Counties and the municipalities can be found in each jurisdictional annex found in Volume II, Section 9 (Annexes).

Table 5-4. Administrative and Technical Capability – Llano County

Capability	Details	
Development Services	**Description:**	Llano County Development Services oversees guidelines, procedures, and permits for all development outside corporate city limits in the County, and they are responsible for floodplain management, construction activity inspections, and regulating subdivisions in unincorporated areas of the County in partnership with other jurisdictions and agencies.
	Responsible Agency:	County
	Provides Funding for Mitigation:	No
	Hazard:	Flood
Environmental Compliance & Enforcement	**Description:**	Environmental Compliance & Enforcement officers investigate crimes such as illegal dumping, illegal burning, and public nuisance as defined by the Texas Health and Safety Code. Complaint forms can be submitted online.
	Responsible Agency:	County
	Provides Funding for Mitigation:	No
	Hazard:	Hazardous Materials
Sheriff's Office	**Description:**	The Llano County Sheriff's Office, located in Llano, Texas, is a law enforcement agency that promotes public safety in Llano County through public policing and the management of county jails and inmates.
	Responsible Agency:	County
	Provides Funding for Mitigation:	No
	Hazard:	None
Office of Emergency Management	**Description:**	Llano County Emergency Services refers to a government agency at the Federal, Texas State, Llano County, or local level that is the lead agency for emergency situations, including preparation, response, and recovery in Llano County, TX. The types of emergencies that fall within the jurisdiction of the Llano County Emergency Management agency include natural disasters, severe weather incidents, civil unrest, and other events that pose a major threat to public safety or a significant disruption to civil society. You may contact Emergency Services for questions about: (1) Llano County emergency preparedness (2) Emergency management services (3) Emergency first response services (4) Natural disasters
	Responsible Agency:	County
	Provides Funding for Mitigation:	No
	Hazard:	All Hazards

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Capability	Details	
Llano County Adopt-A-County Road Program	**Description:**	This program was modeled after the very successful Adopt-A-Highway Program that has been operating in Texas since 1985 and has grown into a national and international litter-prevention effort, saving taxpayers' dollars, and keeping our right of way clean. The Llano County Adopt-A-County Road Program focuses on Llano County roads to support and recognize groups and volunteers who are willing to help pick up litter on our county roads to keep Llano County beautiful. The County will: (1) Work with the participating group to identify the specific section of county road to be adopted. (2) Erect a sign on either end of the adopted section with the participant's name displayed. (3) Provide safety information, trash bags, traffic control signs and safety vests.
	Responsible Agency:	County
	Provides Funding for Mitigation:	No
	Hazard:	All Hazards
Llano County Health Authority	**Description:**	The Llano County Health Authority is tasked with conducting the COVID-19 Vaccination Rollout. The Authority provides weekly updates online, advertises testing sites and waitlists, and provides information on COVID-19, vaccines, vaccine effectiveness, immunity, and safety.
	Responsible Agency:	County
	Provides Funding for Mitigation:	No
	Hazard:	Pandemic/Health and Safety

Table 5-5. Administrative and Technical Capability – San Saba County

Capability	Details	
County Indigent Health Care Program	**Description:**	The County Indigent Health Care Program helps low-income Texas residents who don't qualify for other state or federal health care programs have access to health care services. Benefits are limited to participating administrators who provide primary, preventative and some specialty services. These include: (1) Vaccines (2) Medical screening services (3) Annual physical examinations (4) Inpatient and outpatient hospital visits (5) Laboratory and radiology (6) Skilled nursing facility services The program is available to anyone who: (1) Lives in Texas. (2) Has an income level at or below 21 percent of federal poverty guidelines. (3) Has resources less than $2,000. (4) Isn't eligible for Medicaid.

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Capability	Details	
	Responsible Agency:	County
	Provides Funding for Mitigation:	No
	Hazard:	Pandemic/Health and Safety
Floodplain Management	**Description:**	County Floodplain Management is responsible for floodplain management within San Saba County.
	Responsible Agency:	County
	Provides Funding for Mitigation:	No
	Hazard:	Flood
Guidelines & Permitting	**Description:**	County Guidelines & Permitting oversees guidelines, procedures, and permits for all development outside corporate city limits in the County, and they are responsible for construction activity inspections, and regulating subdivisions in unincorporated areas of the County in partnership with other jurisdictions and agencies
	Responsible Agency:	County
	Provides Funding for Mitigation:	No
	Hazard:	None
Office of Emergency Management	**Description:**	San Saba County Emergency Services refers to a government agency at the Federal, Texas State, San Saba County, or local level that is the lead agency for emergency situations, including preparation, response, and recovery in San Saba County, TX. The types of emergencies that fall within the jurisdiction of the San Saba County Emergency Management agency include natural disasters, severe weather incidents, civil unrest, and other events that pose a major threat to public safety or a significant disruption to civil society. You may contact Emergency Services for questions about: (1) San Saba County emergency preparedness (2) Emergency management services (3) Emergency first response services (4) Natural disasters
	Responsible Agency:	County
	Provides Funding for Mitigation:	No
	Hazard:	All Hazards

5.4 Fiscal Capabilities

Fiscal capabilities are the resources that a jurisdiction has access to or is eligible to use to fund mitigation actions. Table 5-6 provides a list of programs, descriptions, and links for those jurisdictions seeking funding sources. This table is not intended to be a comprehensive list, but rather a tool to help begin identifying potential sources of funding.

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Table 5-6. Fiscal Capabilities

Capability	Details	
Federal		
Hazard Mitigation Grant Program	**Description:**	The HMGP is a post-disaster mitigation program. It is made available to states by FEMA after each Federal disaster declaration. The HMGP can provide up to 75% funding for hazard mitigation measures. The HMGP can be used to fund cost-effective projects that will protect public or private property in an area covered by a federal disaster declaration or that will reduce the likely damage from future disasters. Examples of projects include acquisition and demolition of structures in hazard prone areas, flood-proofing, or elevation to reduce future damage, minor structural improvements, and development of state or local standards. Projects must fit into an overall mitigation strategy for the area identified as part of a local planning effort. All applicants must have a FEMA-approved Hazard Mitigation Plan (this plan). Applicants who are eligible for the HMGP are state and local governments, certain nonprofit organizations or institutions that perform essential government services, and Indian tribes and authorized tribal organizations. Individuals or homeowners cannot apply directly for the HMGP; a local government must apply on their behalf. Applications are submitted to TDEM and placed in rank order for available funding and submitted to FEMA for final approval. Eligible projects not selected for funding are placed in an inactive status and may be considered as additional HMGP funding becomes available. For additional information regarding HMGP, please refer to: https://www.fema.gov/hazard-mitigation-grant-program
	Responsible Agency:	FEMA
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Flood Mitigation Assistance Program	**Description:**	The FMA program combines the previous Repetitive Flood Claims and Severe Repetitive Loss Grants into one grant program. The FMA provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The FMA is funded annually; no federal disaster declaration is required. Only NFIP insured homes and businesses are eligible for mitigation in this program. Funding for FMA is very limited and, as with the HMGP, individuals cannot apply directly for the program. Applications must come from local governments or other eligible organizations. The federal cost share for an FMA project is at least 75 percent. For the nom-federal share, at most 25 percent of the total eligible costs must be provided by a non-federal source; of this 25 percent, no more than half can be provided as in-kind contributions from third parties. At minimum, a FEMA-approved local flood mitigation plan is required before a project can be approved. The FMA funds are distributed from FEMA to the state. TDEM serves as the grantee and program administrator for the FMA program. The FMA program is detailed on the FEMA website: https://www.fema.gov/flood-mitigation-assistance-grant-program.
	Responsible Agency:	FEMA
	Provides Funding for Mitigation:	Yes
	Hazard:	Flood, Severe Weather

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Capability	Details	
Building Resilient Infrastructure and Communities Program	**Description:**	Building Resilient Infrastructure and Communities (BRIC) will support states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. BRIC is a new FEMA pre-disaster hazard mitigation program that replaces the existing Pre-Disaster Mitigation (PDM) program. The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency. For additional information regarding the BRIC program, please refer to: https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities
	Responsible Agency:	FEMA
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Extraordinary Circumstances	**Description:**	For PDM and FMA project subawards, the (FEMA) Region may apply extraordinary circumstances when justification is provided and with concurrence from FEMA Headquarters (Risk Reduction and Risk Analysis Divisions) prior to granting an exception. If this exception is granted, a local mitigation plan must be approved by FEMA within 12 months of the award of the project subaward to that community. For HMGP, PDM, and FMA, extraordinary circumstances exist when a determination is made by the Applicant and FEMA that the proposed project is consistent with the priorities and strategies identified in the State (Standard or Enhanced) Mitigation Plan and that the jurisdiction meets at least one of the criteria below. If the jurisdiction does not meet at least one of these criteria, the Region must coordinate with FEMA Headquarters (Risk Reduction and Risk Analysis Divisions) for HMGP; however, for PDM and FMA the Region must coordinate and seek concurrence prior to granting an exception: (1) The jurisdiction meets the small, impoverished community criteria (see Part VIII, B.2). (2) The jurisdiction has been determined to have had insufficient capacity due to lack of available funding, staffing, or other necessary expertise to satisfy the mitigation planning requirement prior to the current disaster or application deadline. (3) The jurisdiction has been determined to have been at low risk from hazards because of low frequency of occurrence or minimal damage from previous occurrences because of sparse development. (4) The jurisdiction experienced significant disruption from a declared disaster or another event that impacts its ability to complete the mitigation planning process prior to award or final approval of a project award. (5) The jurisdiction does not have a mitigation plan for reasons beyond the control of the State, federally recognized tribe, or local community, such as Disaster Relief Fund restrictions that delay FEMA from granting a subaward prior to the expiration of the local or Tribal Mitigation Plan. For HMGP, PDM, and FMA, the Applicant must provide written justification that identifies the specific criteria or circumstance listed above, explains why there is no longer an impediment to satisfying the mitigation planning requirement, and identifies the specific actions or circumstances that eliminated the deficiency. When an HMGP project funding is awarded under extraordinary circumstances, the Recipient shall acknowledge in writing to the Regional Administrator that a plan will be completed within 12 months of the subaward. The Recipient must provide a

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Capability	Details	
		work plan for completing the local or Tribal Mitigation Plan, including milestones and a timetable, to ensure that the jurisdiction will complete the plan in the required time. This requirement shall be incorporated into the award (both the planning and project subaward agreements, if a planning subaward is also awarded).
	Responsible Agency:	FEMA
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Individual Assistance	**Description:**	Individual Assistance (IA) provides help for homeowners, renters, businesses, and some non-profit entities after disasters occur. This program is largely funded by the U.S. Small Business Administration. For homeowners and renters, those who suffered uninsured or underinsured losses could be eligible for a Home Disaster Loan to repair or replace damaged real estate or personal property. Renters are eligible for loans to cover personal property losses. Individuals are allowed to borrow up to $200,000 to repair or replace real estate, $40,000 to cover losses to personal property, and an additional 20 percent for mitigation. For businesses, loans could be made to repair or replace disaster damages to property owned by the business, including real estate, machinery and equipment, inventory, and supplies. Businesses of any size are eligible. Non-profit organizations, such as charities, churches, and private universities are eligible. An Economic Injury Disaster Loan provides necessary working capital until normal operations resume after a physical disaster but are restricted by law to small businesses only. IA is detailed on the FEMA website: https://www.fema.gov/individual-disaster-assistance.
	Responsible Agency:	FEMA
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Public Assistance	**Description:**	Public Assistance (PA) provides cost reimbursement aid to local governments (state, county, local, municipal authorities, and school districts) and certain non-profit agencies that were involved in disaster response and recovery programs or that suffered loss or damage to facilities or property used to deliver government-like services. This program is largely funded by FEMA with both local and state matching contributions required. PA is detailed on the FEMA website: https://www.fema.gov/public-assistance-local-state-tribal-and-non-profit.
	Responsible Agency:	FEMA
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Department of Homeland Security Grant Program	**Description:**	The Homeland Security Grant Program (HSGP) plays an important role in the implementation of the National Preparedness System by supporting the building, sustainment, and delivery of core capabilities essential to achieving the National Preparedness Goal of a secure and resilient nation. In FY 2019, the total amount of funds available under HSGP was $1.095 billion. HSGP is comprised of three interconnected grant programs including the State Homeland Security Program, Urban Areas Security Initiative (UASI), and the Operation Stonegarden. Together, these grant programs fund a range of preparedness activities, including planning, organization, equipment purchase, training, exercises, and management and administration.

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Capability	Details	
		Additional information regarding HSGP is available on the website: https://www.fema.gov/homeland-security-grant-program.
	Responsible Agency:	FEMA
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Fire Management Assistance Grant Program	**Description:**	Assistance for the mitigation, management, and control of fires on publicly or privately-owned forests or grasslands that threaten such destruction as would constitute a major disaster. Provides a 75% federal cost share and the state pays the remaining 25% for actual cost. Information on this program is available on the website: https://www.fema.gov/fire-management-assistance-grant-program.
	Responsible Agency:	FEMA
	Provides Funding for Mitigation:	Yes
	Hazard:	Wildfire
Assistance to Firefighters Grant Program	**Description:**	The primary goal of the Assistance to Firefighters Grants is to enhance the safety of the public and firefighters with respect to fire-related hazards by providing direct financial assistance to eligible fire departments, nonaffiliated Emergency Medical Services organizations, and State Fire Training Academies. This funding is for critically needed resources to equip and train emergency personnel to recognized standards, enhance operations efficiencies, foster interoperability, and support community resilience. Information regarding this grant program is available on the website: https://www.fema.gov/welcome-assistance-firefighters-grant-program.
	Responsible Agency:	FEMA
	Provides Funding for Mitigation:	Yes
	Hazard:	Wildfire
High Hazard Potential Dams Grant Program	**Description:**	The Rehabilitation of High Hazard Potential Dams Grant Program provides technical, planning, design, and construction assistance in the form of grants to non-Federal governmental organizations or nonprofit organizations for rehabilitation of eligible high hazard potential dams. Information regarding this program is available on the website: https://www.grants.gov/web/grants/view-opportunity.html?oppId=316238.
	Responsible Agency:	FEMA
	Provides Funding for Mitigation:	Yes
	Hazard:	Flood
Small Business Administration Loan	**Description:**	The Small Business Administration (SBA) provides low-interest disaster loans to homeowners, renters, business of all sizes, and most private nonprofit organizations. SBA disaster loans can be used to repair or replace the following items damaged or destroyed in a declared disaster: real estate, personal property, machinery and equipment, and inventory and business assets. Homeowners could apply for up to $200,000 to replace or repair their primary residence. Renters and homeowners could borrow up to $40,000 to replace or repair personal property-such as clothing, furniture, cars, and appliances that were

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Capability	Details	
		damaged or destroyed in a disaster. Physical disaster loans of up to $2 million are available to qualified businesses or most private nonprofit organizations. Additional information regarding SBA loans is available on the SBA website: https://www.sba.gov/managing-business/running-business/emergency-preparedness/disaster-assistance.
	Responsible Agency:	SBA
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Community Development Block Grant Program	**Description:**	CDBG are federal funds intended to provide low and moderate-income households with viable communities, including decent housing, a suitable living environment, and expanded economic opportunities. Eligible activities include community facilities and improvements, roads and infrastructure, housing rehabilitation and preservation, development activities, public services, economic development, and planning and administration. Public improvements could include flood and drainage improvements. In limited instances and during the times of "urgent need" (e.g., post disaster) as defined by the CDBG National Objectives, CDBG funding could be used to acquire a property located in a floodplain that was severely damaged by a recent flood, demolish a structure severely damaged by an earthquake, or repair a public facility severely damaged by a hazard event. Additional information regarding CDBG is available on the website: https://www.hudexchange.info/programs/cdbg-entitlement/.
	Responsible Agency:	HUD
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Federal Highway Administration-Emergency Relief	**Description:**	The Federal Highway Administration (FHWA) Emergency Relief is a grant program through the U.S. Department of Transportation (DOT) that can be used for repair or reconstruction of federal-aid highways and roads on federal lands that have suffered serious damage as a result of a disaster. New Jersey Department of Transportation serves as the liaison between local municipalities and FHWA. Additional information regarding the FHWA Emergency Relief Program is available on the website: https://www.fhwa.dot.gov/programadmin/erelief.cfm.
	Responsible Agency:	U.S. DOT
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Federal Transit Administration - Emergency Relief	**Description:**	The Federal Transit Authority (FTA) Emergency Relief is a grant program that funds capital projects to protect, repair, reconstruct, or replace equipment and facilities of public transportation systems. Administered by the Federal Transit Authority at the U.S. DOT and directly allocated to Metropolitan Transit Authority (MTA) and Port Authority, this transportation-specific fund was created as an alternative to FEMA PA. Currently, a total of $5.2 billion has been allocated to New Jersey-related entities. Additional information regarding the FTA Emergency Relief Program is available on the website: https://www.transit.dot.gov/funding/grant-programs/emergency-relief-program/emergency-relief-program.
	Responsible Agency:	U.S. DOT

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Capability	Details	
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Disaster Housing Program	**Description:**	Emergency assistance for housing, including minor repair of home to establish livable conditions, mortgage, and rental assistance available through the U.S. Department of Housing and Urban Development (HUD). Information on this program is available on the website: https://www.hud.gov/program_offices/public_indian_housing/publications/dhap.
	Responsible Agency:	HUD
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
HOME Investment Partnerships Program	**Description:**	Grants to local and state government and consortia for permanent and transitional housing, (including financial support for property acquisition and rehabilitation for low income persons). Information on this program is available on the website: https://www.hud.gov/program_offices/comm_planning/affordablehousing/programs/home/.
	Responsible Agency:	HUD
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
HUD Disaster Recovery Assistance	**Description:**	Grants to fund gaps in available recovery assistance after disasters (including mitigation). Information on this program is available on the website: https://www.hud.gov/info/disasterresources.
	Responsible Agency:	HUD
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Section 108 Loan Guarantee	**Description:**	Enables states and local governments participating in the CDBG program to obtain federally guaranteed loans for disaster-distressed areas. Information on this program is available on the website: https://www.hudexchange.info/programs/section-108/.
	Responsible Agency:	HUD
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Smart Growth Implementation Assistance program	**Description:**	The Smart Growth Implementation Assistance (SGIA) program through the U.S. Environmental Protection Agency (EPA) focuses on complex or cutting-edge issues, such as stormwater management, code revision, transit-oriented development, affordable housing, infill development, corridor planning, green building, and climate change. Applicants can submit proposals under 4 categories: community resilience to disasters, job creation, the role of manufactured homes in sustainable neighborhood design, or medical and social service facilities siting. Information on this program is available on the website: https://www.epa.gov/smartgrowth.
	Responsible Agency:	EPA
	Provides Funding for Mitigation:	Yes

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Capability	Details	
	Hazard:	All Hazards
Partners for Fish and Wildlife	**Description:**	Financial and technical assistance to private landowners interested in pursuing restoration projects affecting wetlands and riparian habitats. Information on this program is available on the website: https://www.fws.gov/partners/.
	Responsible Agency:	U.S. Fish and Wildlife Service
	Provides Funding for Mitigation:	Yes
	Hazard:	All Natural Hazards
Transportation Investment Generating Economic Recovery (TIGER)	**Description:**	Investing in critical road, rail, transit, and port projects across the nation. Information on this program is available on the website: https://www.transportation.gov/tags/tiger-grants.
	Responsible Agency:	U.S. DOT
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Community Facilities Direct Loan & Grant Program	**Description:**	This program provides affordable funding to develop essential community facilities in rural areas. An essential community facility is defined as a facility that provides an essential service to the local community for the orderly development of the community in a primarily rural area, and does not include private, commercial, or business undertakings. Information on this program is available on the website: https://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program.
	Responsible Agency:	USDA
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Emergency Loan Program	**Description:**	USDA's Farm Service Agency provides emergency loans to help producers recover from production and physical losses due to drought, flooding, other natural disasters, or quarantine. Information on this program is available on the website: https://www.fsa.usda.gov/programs-and-services/farm-loan-programs/emergency-farm-loans/index.
	Responsible Agency:	USDA
	Provides Funding for Mitigation:	Yes
	Hazard:	All Natural Hazards
Emergency Watershed Protection program	**Description:**	The Emergency Watershed Protection (EWP) program provides assistance to relieve imminent hazards to life and property caused by floods, fires, drought, windstorms, and other natural occurrences through the Natural Resources Conservation Service. Information on this program is available on the website: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/.
	Responsible Agency:	USDA
	Provides Funding for Mitigation:	Yes
	Hazard:	All Natural Hazards
Financial Assistance	**Description:**	Financial assistance to help plan and implement conservation practices that address natural resource concerns or opportunities to help save energy, improve soil, water, plant, air, animal and related resources on agricultural lands and non-

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Capability	Details	
		industrial private forest land. Information on this program is available on the website: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/.
	Responsible Agency:	NRCS
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Emergency Management Performance Grants (EMPG) Program	**Description:**	Assist local, tribal, territorial, and state governments in enhancing and sustaining all-hazards emergency management capabilities. Information on this program is available on the website: https://www.fema.gov/emergency-management-performance-grant-program.
	Responsible Agency:	U.S. DHS
	Provides Funding for Mitigation:	Yes
	Hazard:	All Hazards
Reimbursement for Firefighting on Federal Property	**Description:**	Provides reimbursement only for direct costs and losses over and above normal operating costs. Information on this program is available on the website: https://www.usfa.fema.gov/grants/firefighting_federal_property.html.
	Responsible Agency:	U.S. DHS
	Provides Funding for Mitigation:	Yes
	Hazard:	Wildfire
Land & Water Conservation Fund	**Description:**	Matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities (as well as funding for shared federal land acquisition and conservation strategies). Information on this program is available on the website: https://www.nps.gov/subjects/lwcf/index.htm.
	Responsible Agency:	National Park Service
	Provides Funding for Mitigation:	Yes
	Hazard:	All Natural Hazards
State		
Texas Water Development Board Flood Funding	**Description:**	The TWDB offers a variety of cost-effective loan and grant programs that provide for the planning, acquisition, design, and construction of water related infrastructure and other water quality improvements
	Responsible Agency:	Texas Water Development Board
	Provides Funding for Mitigation:	Yes
	Hazard:	Flooding
Texas A&M Forest Service Prescribed Burn Grants	**Description:**	Texas A&M Forest Service offers grants to landowners to complete prescribed fires on private land. Each grant targets landowners in different priority areas across the state.
	Responsible Agency:	Texas A&M Forest Service
	Provides Funding for Mitigation:	Yes

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Capability	Details	
	Hazard:	Wildfire
Flood Control Dam Infrastructure Projects - Supplemental Funding	**Description:**	Projects to repair and rehabilitate flood control structures across Texas will now be funded due to a $150 million appropriations bill legislators passed this session.
	Responsible Agency:	Texas State Soil and Water Conservation Board
	Provides Funding for Mitigation:	Yes
	Hazard:	Flooding, Dam Failure
Flood Infrastructure Fund (FIF)	**Description:**	FIF program provides financial assistance in the form of loans and grants for flood control, flood mitigation, and drainage projects
	Responsible Agency:	Texas Water Development Board
	Provides Funding for Mitigation:	Yes
	Hazard:	Flooding
Texas Coastal Management Program Grant	**Description:**	Funding for projects that address environmental concerns and promote economic development within the Texas coastal zone.
	Responsible Agency:	Texas General Land Office
	Provides Funding for Mitigation:	Yes
	Hazard:	Erosion and Flooding
Texas Farm and Ranch Lands Conservation Program (TFRLCP)	**Description:**	Funding conserves natural resources by protecting working lands from fragmentation and development. TFRLCP maintains and enhances the ecological and agricultural productivity of these lands through Agricultural Conservation Easements.
	Responsible Agency:	Texas Parks and Wildlife
	Provides Funding for Mitigation:	Yes
	Hazard:	Flooding

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5.5 Plan Integration

Described earlier in this section and within each annex, participating jurisdictions identified integration of hazard risk management into their existing planning, regulatory, and operational/administrative framework ("integration capabilities") and intended integration promotion (integration actions). Volume II, Section 9 (Jurisdictional Annexes) provides details on how each jurisdiction integrates hazard mitigation into their existing capabilities.

5.5.1 Integration Process

Hazard mitigation is a sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. Integrating hazard mitigation into a community's existing plans, policies, codes, and programs leads to development patterns that do not increase risk from known hazards or leads to redevelopment that reduces risk from known hazards. The Llano and San Saba County Planning Partnership was tasked with identifying how hazard mitigation is integrated into existing planning mechanisms. Section 9 (Jurisdictional Annexes) details how this is done for each participating municipality and each County. During this process, many municipalities recognized the importance and benefits of incorporating hazard mitigation into future municipal planning and regulatory processes and have added new mitigation actions to support this effort.

The Planning Partnership representatives will continue to incorporate mitigation planning as an integral component of daily government operations. Planning Partnership representatives will continue to work with local government officials to integrate the newly adopted hazard mitigation goals and actions into the general operations of government and partner organizations. Further, the sample adoption resolution presented in Appendix A (Plan Adoption) includes a resolution item stating the intent of the local governing body to incorporate mitigation planning as an integral component of government and partner operations. By doing so, the Planning Partnership anticipates that:

1) Hazard mitigation planning will be formally recognized as an integral part of overall planning and emergency management efforts.
2) The Hazard Mitigation Plan, Master Plans, Emergency Management Plans, and other relevant planning mechanisms will become mutually supportive documents that work in concert to meet the goals and needs of County residents.

Section 7 (Plan Maintenance) provides for additional information on the implementation of the mitigation plan through existing programs.

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Section 6 Mitigation Strategy

6.1 Introduction

This section presents mitigation actions for Llano County and San Saba County (the Planning Area) to reduce potential exposure and losses identified as concerns in the Risk Assessment (Section 5). The Planning Partnership reviewed the risk assessment to identify and develop these mitigation actions, which are presented herein.

Hazard mitigation reduces the potential impacts of, and costs associated with, emergency and disaster-related events. Mitigation actions address a range of impacts, including impacts on the population, property, the economy, and the environment.

Mitigation actions can include activities such as: revisions to land-use planning, training and education, and structural and nonstructural safety measures.

This section includes:

- Background and Past Mitigation Accomplishments
- General Mitigation Planning Approach
- Strengths, Weaknesses, Obstacles, and Opportunities
- Review and Update of Mitigation Goals and Objectives
- Mitigation Strategy Development and Update

6.2 Background and Past Mitigation Accomplishments

In accordance with DMA 2000 requirements, a discussion regarding past mitigation activities and an overview of past efforts is provided as a foundation for understanding the mitigation goals, objectives, and activities outlined in this HMP. The Planning Area, through previous and ongoing hazard mitigation activities, has demonstrated that it is proactive in protecting its physical assets and citizens against losses from natural and human-caused hazards. Examples of previous and ongoing actions, projects and capabilities include the following:

- Llano County and San Saba County participated in the development of 2016 Mitigation Plans and facilitated the 2023 Update, which included the participation of all municipal governments in the Planning Area. The current planning process represents the regulatory five-year local plan update process.
- All six municipalities in Llano County and San Saba County participate in the National Flood Insurance Program (NFIP), which requires the adoption of FEMA floodplain mapping and certain minimum construction standards for building within the floodplain.
- Currently, none of Llano County and San Saba municipalities are participating in NFIP Community Rating System (CRS) program.
- Many municipalities in Llano County and San Saba County have adopted regulatory standards regarding land use and zoning that exceed minimum requirements and provide the communities with greater capability to manage development without increasing hazard risk and vulnerability.
- Municipalities have participated on a limited basis in available mitigation grant funding opportunities to implement mitigation projects, including the following:
  - Purchasing NOAA "All Hazards" radios
  - Adopting stricter building codes
  - Implementing water conservation measures
  - Installing sirens for early warning for natural hazard events

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- The Counties and municipalities have implemented mitigation actions to protect critical facilities and infrastructure throughout the planning area. These actions and others were identified in each County's Participation in their 2016 Hazard Mitigation Plans.
- TDEM supports Llano County and San Saba County communities reducing their risk and increasing their resilience. They provide a comprehensive program to support local jurisdictions as they assess the risks they face, plan to mitigate them, and fund those plans to implement mitigation projects that reduce risk across the Planning Area.
- In 2020, the Counties and local municipalities responded to and worked to mitigate the impacts of the coronavirus pandemic through education of the public, enforcement of local and state social distancing and masking measures, and establishment of best practices to slow the spread of Covid-19.

These past and ongoing activities have contributed to the Planning Area's understanding of its hazard preparedness and future mitigation activity needs, costs, and benefits. These efforts provide an ongoing foundation for the Planning Partnership to use in developing this HMP update.

6.3 General Mitigation Planning Approach

The overall approach used to update the County and local hazard mitigation strategies are based on FEMA and State of Texas regulations and guidance regarding local mitigation plan development, including:

- DMA 2000 regulations, specifically 44 CFR 201.6 (local mitigation planning).
- FEMA Local Mitigation Planning Handbook, March 2013.
- FEMA Local Mitigation Plan Review Guide, October 1, 2011.
- FEMA Integrating Hazard Mitigation into Local Planning, March 1, 2013.
- FEMA Plan Integration: Linking Local Planning Efforts, July 2015.
- FEMA Mitigation Planning How-To Guide #3, Identifying Mitigation Actions and Implementing Strategies (FEMA 386-3), February 2013.
- FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, January 2013.

The mitigation strategy update approach includes the following steps that are further detailed in later subsections of this section:

- Section 6.4 – Strengths, Weaknesses, Obstacles, and Opportunities (SWOO) exercise
- Section 6.5 – Review and update mitigation goals and objectives.
- Section 6.6 - Develop and prepare a mitigation strategy, including:
  - Review of the 2016 HMP mitigation actions
  - Identification of progress on the previous county and local mitigation strategies
  - 2023 HMP Mitigation Action Plan
  - Mitigation best practices
  - Mitigation strategy evaluation and prioritization; and
  - Benefit/cost review.

6.4 Strengths, Weaknesses, Obstacles, and Opportunities Exercise

A Strengths, Weaknesses, Obstacles, and Opportunities exercise (SWOO) was completed via online survey by the Planning Partnership. Participants were asked to fill out the SWOO for each of the hazards of concern for the 2023

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HMP update. The Planning Partnership was asked to begin the exercise by identifying county, local, and stakeholder strengths to mitigate the risk and potential future impacts of the hazards. Next, the weaknesses, challenges, and obstacles the planning area faces to reduce each hazard's risk were identified. To conclude the discussion of each high-ranked hazard, the meeting attendees were asked to identify potential opportunities for enhanced mitigation. The results were compiled and presented to the Planning Partnership at the risk assessment presentation. The results were also used by the participants to help identify capabilities and potential mitigation actions. Table 6-1 summarizes the strengths, weaknesses, obstacles, and opportunities identified during the exercise:

Table 6-1. Llano and San Saba County SWOO Responses

Hazards	SWOO Responses
Dam/Levee Failure	**Strengths** - LCRA Dam Modernization Program Inundation Mapping Zones Annual training provided by LCRA; This community has a low probability of dam failure, but we do reside on a lake that is created by a dam. Strengths would be that we are well enough upstream from a major flow incident; Good notification system; The local Conservation Committee within the local NRCS is very proactive in this field
	Weaknesses – Board needs youth representation on committee; Little response capability; Dam age; 70% of dams are privately owned; Dam failure can cause flooding
	Obstacles – Funding; 3 high hazard dams and one significant hazard dam
	Opportunities – Board will follow through on opportunities as they open; Grants; Need to be more in touch with the entity that controls the dam to be notified in case of emergency; Oversight and regular inspections; Independent engineering inspections every 5 years; Evaluate project on dams higher than 32'
Drought	**Strengths** – Planning area has survived multiple droughts; resilient area, water availability; drought contingency plan; 100,000-gallon water storage; make use of rainfall to offset drought
	Weaknesses – Multiple droughts in history; population growth straining resources; weak enforcement capacity (drought contingency plan); drought conditions are unpredictable; multi-year drought can impact the region
	Obstacles - Low tax-base county makes proactivity hard; funding; need community buy-in for greater enforcement; reduction in electrical power generation
	Opportunities – Continue infrastructure growth and mitigation efforts; resident education could lead to self and neighborhood enforcement; build additional water supply systems that are flexible and adaptive; active water conservation projects
Extreme Temperature (Cold/Heat)	**Strengths** – County had prior experiences with hazard (notably heat); sent regular communications to the community; generators for water and sewer station
	Weaknesses – Winter storm of 2022 caught County off guard; fewer resources for cold hazards; 65 and older residents are significant part of community demographic; shelter with generator
	Obstacles – Another winter storm could hurt County more given continuing drought; district does not budget for mitigating this hazard
	Opportunities – County can set into place the access necessary to help citizens; improve from lessons learned; implore board members to discuss creating a budget to include mitigation of this hazard; perfect notification systems issues by NWS
Flood (riverine, flash, stormwater)	**Strengths** – Prior experience; community is self-aware of flood possibilities; barricades for roads; Serve as weather ambassadors to promote watches and warnings; Runoff from storms fills area lakes, ponds and replenishes ground water; LCRA operates flood gates to manage flood waters
	Weaknesses – FEMA; few resources; no emergency evacuation plan for flooding; No warning system in place at low water crossings and flooded roadways

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Hazards	SWOO Responses
	Obstacles – Supplies are not as available as they used to be; district does not budget for mitigation of this hazard; Contamination of drinking water; Roads blocked or washed out can cause problems for service to water, gas, sewer and utilities
	Opportunities – Build storm water runoff map; ask board members to institute funding for hazard mitigation; Installation of high-water warning/detection systems; Identify flood plains
Geologic (earthquake, expensive soils, land subsidence)	**Strengths** – Not a typical hazard, little exposure
	Weaknesses – Unprepared for these types of events
	Obstacles – Funding; don't know what is needed; increase in population will affect this hazard category
	Opportunities – Ability to plan for this hazard; increased use of ground water should be evaluated and monitored
Hurricane/Tropical Storm	**Strengths** – Inland distance, little exposure; generators for water and sewer plant
	Weaknesses – Little experience with hazard; community could have to host people from neighboring communities who need refuge from hazard; Volunteers/Manpower to operate evacuation centers/shelters; Little time to prepare should storm move inward toward Llano County; Residual flooding, tornadoes and wind could cause damage
	Obstacles – Can prepare if notified by NWS or contiguous counties; funding; Development of a volunteer base for response to tropical incidents
	Opportunities – Training, development of plan; Llano County could be used as an evacuation center; Have residents prepare homes for high wind which is also necessary preparation for severe storms
Pandemic/Health and Safety	**Strengths** – Experience with hazard; community responded well to typical federal government guidelines; Past experience in dealing with COVID-19; Use of the Public Health Authority to update county of latest impacts; Clinics and pharmaceuticals available for distribution
	Weaknesses – Lost people; limited resources, flawed quarantine system/information flow; majority of the community is 65 and older; medical care in the city; rural environment and isolation
	Obstacles – Not everyone believes that the vaccine is necessary; funding; number of certified caregivers; Lack of public trust; Proper medical advice and treatment to address pandemic
	Opportunities – More people are looking to County for information; ability to practice with current pandemic; Communication with public; Trust building that information being provided is timely and accurate; Monitoring the impact of the pandemic; Tracking the illnesses impacting county
Severe Weather (lightning, hail, wind)	**Strengths** – Experience; majority of events do not cause damage; generators for water and sewer plant; Working with the NWS to provide storm watches and warnings to the public; Outdoor warning sirens have been installed in eight locations throughout the county; Everbridge and IPAWS capability provide needed information
	Weaknesses – Limited resources; shelter with generator to temporarily house people; Power outages; Damage to trees can cause road blockages and downed power lines; Fires can occur as a secondary hazard due to lightning especially during drought conditions; Lightning strikes to communication towers; Generators need to be evaluated for backup power; No safe rooms in county; Damage to manufactured homes
	Obstacles – Getting communications out ahead of the event; limited resources; Power outages; Damage to trees can cause road blockages and downed power lines; Fires can occur as a secondary hazard due to lightning especially during drought conditions; Lightning strikes to communication towers; Generators need to be evaluated for backup power; No safe rooms in county; Damage to manufactured homes

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Hazards	SWOO Responses
	Opportunities – Working our resources; continue to develop plan; inform the community of local weather alert notification systems; More extensive planning using weather forecasts; Take actions during watches and warnings; Use warning sirens to alert recreational users of incoming storms and inclement weather
Tornado	**Strengths** – Rarely have tornadoes, but do have straight-line winds; experience, strong plan; The able community is willing to lend a hand where extensive damage occurs due to natural disaster; early warning sirens
	Weaknesses – Convincing our citizens to NOT go outside and check out the storm with their cameras for documentation; limited resources; majority of community is 65 and older and would have trouble evacuating; siren warning device; buildings with low code standards that are vulnerable to tornadoes; warning time not adequate
	Obstacles – Getting information out beforehand and documenting damages as soon as possible; limited funding; EMS and fire would be inundated, and County is in an area with longer response times; Funds to pay for siren
	Opportunities – Using our resources; continue to build preparedness plan; update building codes and enforcement of codes
Wildfire	**Strengths** – Experience, prior mitigation efforts; community is a FireWise community; local and neighboring fire departments well-equipped and ready to respond; staged assets in place by TFS to assist with ground and air support
	Weaknesses – "Still trying to figure out how to get our citizens to be more aware and conscious of their actions throughout each season;" limited resources; Population growth in wildland urban interface; No way to predict wildfires - fireworks, lightning, chains dragging on concrete, grass cutting equipment
	Obstacles – "Still trying to figure out how to get our citizens to be more aware and conscious of their actions throughout each season;" limited funding
	Opportunities – Hazard keeps volunteer fire department rosters active; continue mitigation efforts; Ensure all firefighters receive training; Increase planning efforts for readiness; Creation of defensible space by public/residents; Create evacuation routes and safe zones; Vegetation Management
Winter Weather	**Strengths** – Learned from 2022 winter storm; generator for water and sewer plant; Member of NWS Storm Ready; Responding to watches and warnings; Notice of storms
	Weaknesses – "We know we didn't learn enough to be totally proactive for this;" Few resources; majority of community is 65 and older; shelter to temporarily house people and care for their needs; Disruption to emergency services - medical and fire; Heavy accumulation of ice on roads and power lines; Loss of power results in loss of communication services/towers
	Obstacles – "If the state's systems fail, we rely on our local 'boots on the ground' resources;" limited funding; the district does not budget to mitigate this hazard; Rural environment produces isolation and life-threatening conditions for vulnerable populations
	Opportunities – Same resources; continue to build plan, operational capability; Implore board members to budget for mitigation of this hazard; County wide exposure to storms; Monitor power outages by providers; Ensure generators are adequate at critical facilities; Create warming centers

6.5 Review and Update of Mitigation Goals and Objectives

This section documents the efforts to update the guiding principles, and hazard mitigation goals and objectives established to reduce or avoid long-term vulnerabilities to the identified hazards.

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6.5.1 Goals and Objectives

FEMA defines ***Goals*** as general guidelines that explain what should be achieved. Goals are usually broad, long-term, policy statements, and represent a global vision.

FEMA defines ***Objectives*** as strategies or implementation steps to attain mitigation goals. Unlike goals, objectives are specific and measurable, where feasible.

FEMA defines ***Mitigation Actions*** as specific actions that help to achieve the mitigation goals and objectives.

According to CFR 201.6(c)(3)(i): "The hazard mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards." Further, FEMA mitigation planning guidance recommends establishing objectives to better tie mitigation goals to specific mitigation strategies (e.g., projects, activities, and initiatives).

The goals established in the 2016 Llano County Hazard Mitigation Plan and the 2016 San Saba Hazard Mitigation Plan were presented to the Steering Committee and Planning Partnership for review and amendment throughout the planning process. This review was made with consideration of the hazard events and losses since the 2016 plans, the updated hazard profiles and vulnerability assessment, and the goals and objectives established in the updated 2018 State HMP.

The Steering Committee met on October 13, 2022, to review the 2016 goals and objectives and provided input on updated goals and objectives. These updates were presented to the Planning Partnership during the December 2022 Mitigation Strategy Workshop. As a result of these efforts, Table 6-2 presents the planning area's updated goals and objectives for the 2023 HMP update. *Italicized* text indicates the updates made to the goals and objectives from the 2016 HMPs.

Table 6-2. Llano and San Saba County 2023 Hazard Mitigation Plan Goals and Objectives

2023 HMP Update Goals	2023 HMP Update Objectives
1. Protect public health and safety for residents, businesses, and visitors.	1.1 Advise the public about health and safety precautions to guard against injury and loss of life from hazards.
	1.2 Maximize the utilization of the latest technology to provide adequate warning, communication, and mitigation of hazard events.
	1.3 Reduce the damage to, and enhance protection of, dangerous areas during hazard events.
	1.4 Protect critical facilities and services.
	1.5 Reduce the abandonment of pets and livestock during critical hazard periods.
2. Protect existing and *new properties, critical facilities, community lifelines, and population*.	2.1 Reduce repetitive losses to the National Flood Insurance Program.
	2.2 Use the most cost-effective approaches to protect existing buildings and public infrastructure from hazards.
	2.3 Enact and enforce regulatory measures to ensure that development will not put people in harm's way or increase threats to existing properties.
3. Increase public understanding, support, and demand for hazard mitigation.	3.1 Heighten public awareness of the full range of natural hazards they face.
	3.2 Educate the public on actions they can take to prevent or reduce the loss of life or property from all natural hazards.
	3.3 Publicize and encourage the adoption of appropriate hazard mitigation measures.
4. Build and support local capacity and commitment to continuously become less vulnerable to hazard	4.1 Build and support local partnerships to continuously become less vulnerable to hazards.
	4.2 Build a cadre of committed volunteers to safeguard the community before, during, and after a disaster.
	4.3 Build hazard mitigation concerns into planning and budgeting processes.

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2023 HMP Update Goals	2023 HMP Update Objectives
	4.4 Build emergency services capabilities to adequately safeguard the community before, during, and after a disaster.
5. Promote growth in a sustainable manner.	5.1 Build and support local partnerships to continuously become less vulnerable to hazards.
	5.2 Build a cadre of committed volunteers to safeguard the community before, during, and after a disaster.
6. Maximize the resources for investment in hazard mitigation.	6.1 Maximize the use of outside sources of funding.
	6.2 Maximize participation of property owners in protecting their properties.
	6.3 Maximize insurance coverage to provide financial protection against hazard events.
	6.4 Prioritize mitigation projects, based on cost-effectiveness and starting with those sites facing the greatest threat to life, health, and property.

6.6 Mitigation Strategy Development and Update

As required by FEMA, the Counties and participating municipalities completed a comprehensive evaluation of the mitigation strategies and actions from the 2016 HMPs and reported on the status of each. Their update may be found in each jurisdictional annex (Section 9). In addition, the Counties and participating municipalities were provided the opportunity to include new strategies or actions to include in the 2023 HMP Update. New actions were prioritized to ensure they are cost-effective, environmentally sound, and technically feasible using the methodology outlined below.

6.6.1 Review of the 2016 HMP Mitigation Action Plans

To evaluate progress on local mitigation actions, the planning consultant met with each participant to discuss the status of the mitigation actions identified in the 2016 plans. For each action, jurisdictions were asked to provide the status of each action (*No Progress, In Progress, Ongoing Capability, Discontinue, or Completed*) and provide review comments on each. Jurisdictions were requested to quantify the extent of progress and provide reasons for the level of progress or why actions were being discontinued. Each jurisdictional annex in Section 9 (Jurisdictional Annexes) provides a table identifying the jurisdiction's prior mitigation strategy, the status of those actions and initiatives, and their disposition within their updated strategy.

Local mitigation actions identified as *Complete*, and those actions identified as *Discontinued*, were removed from the updated strategies. Local mitigation actions identified as an *Ongoing Capability* were incorporated into the capability assessment of each jurisdictional annex. Those actions identified as *No Progress* or *In Progress* that remain a priority for the jurisdiction, have been carried forward into the updated mitigation strategy. Actions identified as *Ongoing Capabilities* which are fully integrated into the normal operational and administrative framework of the community have been identified within the capabilities section of each annex and removed from the updated mitigation strategy.

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At the August kick-off meeting and during subsequent local-level planning meetings (phone, email), all participating jurisdictions were requested to identify mitigation activities completed, ongoing, and potential/proposed. As new potential mitigation actions, projects, or initiatives became evident during the plan update process, including as part of the risk assessment update and as identified through the public and stakeholder outreach process detailed in Section 2 (Planning Process), jurisdictions were made aware of these either through direct communication (local meetings, email, phone), at Steering and Planning Committee meetings, or via their draft jurisdictional annexes.

Throughout the planning process, the planning consultant worked directly with each community (phone, email) to assist with the development and update of their annex and include mitigation strategies, focusing on identifying well-defined, implementable projects with a careful consideration of benefits (risk reduction, losses avoided), costs, and possible funding sources (including mitigation grant programs).

6.6.2 Identification and Analysis of Mitigation Techniques

Concerted efforts were made to assure that municipalities develop updated mitigation strategies that included activities and initiatives covering the range of mitigation action types described in recent FEMA planning guidance (FEMA "Local Mitigation Planning Handbook" March 2013), specifically:

- Local Plans and Regulations - These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.
- Structure and Infrastructure Projects - These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.
- Natural Systems Protection - These are actions that minimize damage and losses and preserve or restore the functions of natural systems.
- Education and Awareness Programs - These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as the National Flood Insurance Program and Community Rating System, StormReady (NOAA), and Firewise (NFPA) Communities.

6.6.3 2023 HMP Mitigation Action Plan

To help support the selection of an appropriate, risk-based mitigation strategy, each annex provides a summary of hazard vulnerabilities identified during the plan update process, either directly by municipal representatives, through a review of the available county and local plans and reports, and through the hazard profiling and vulnerability assessment process.

In December 2022, the Planning Partnership participated in a mitigation strategy development workshop, supplemented by emails and phone calls between jurisdictions and the contract consultant, for all participating jurisdictions to support the development of focused problem statements based on the impacts of natural hazards in the county and their communities. These problem statements were intended to provide a detailed description of the problem area, including its impacts to the municipality/jurisdiction; past damages; loss of service; etc. An effort was made to include the street address of the property/project location, adjacent streets, water bodies, and well-known structures as well as a brief description of existing conditions (topography, terrain, hydrology) of

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the site. These problem statements formed a bridge between the hazard risk assessment which quantifies impacts to each community with the development of actionable mitigation strategies.

As discussed within the hazard profiles in Section 4.3 (Risk Assessment), the long-term effects of climate change are anticipated to exacerbate the impacts of weather-related hazards including flood, hurricanes and tropical storm, severe weather, severe winter weather and wildfire. By way of addressing these climate change-sensitive hazards within their local mitigation strategies and integration actions, communities are working to evaluate and recognize these long-term implications and potential impacts, and to incorporate in planning and capital improvement updates.

To assist with the development of mitigation actions, municipalities were provided with the following:

- 2023 HMP goals and objectives
- 2016 HMP mitigation strategies
- Risk assessment results
- Outcome of the SWOO
- Mitigation catalog
- Stakeholder and public input (e.g. citizen and stakeholder survey results)
- FEMA resources

A strong effort has been made to better focus local mitigation strategies to clearly defined, readily implementable projects and initiatives that meet the definition or characteristics of mitigation. Broadly defined mitigation actions were eliminated from the updated strategy unless accompanied by discrete actions, projects, or initiatives. Certain continuous or ongoing strategies that represent programs that are fully integrated into the normal operational and administrative framework of the community have been identified within the capabilities section of each annex and removed from the updated mitigation strategy.

Overall, a comprehensive range of specific mitigation initiatives were considered by each plan participant to pursue in the future to reduce the effects of hazards. Some of these initiatives may be previous actions carried forward for this plan update. These initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

Throughout the course of the plan update process, additional regional and county-level mitigation actions were identified by the following processes:

- Review of the results and findings of the updated risk assessment.
- Review of available regional and county plans reports and studies;
- Direct input from county departments and other county and regional agencies
- Input received through the public and stakeholder outreach process.

6.6.4 Mitigation Best Practices

Catalogs of hazard mitigation best practices were developed that present a broad range of alternatives to be considered for use in the Planning Area, in compliance with 44 CFR Section 201.6(c)(3)(ii). One catalog was developed for each natural hazard of concern evaluated in this plan; referred to as Appendix F (Mitigation Strategy Supplementary Data). The catalogs present alternatives that are categorized in two ways:

- By whom would have responsibility for implementation:
  - Individuals – personal scale
  - Businesses – corporate scale
  - Government – government scale
- By what each of the alternatives would do:

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- Manipulate the hazard
- Reduce exposure to the hazard
- Reduce vulnerability to the hazard
- Build local capacity to respond to or be prepared for the hazard

The alternatives presented include actions that will mitigate current risk from hazards and actions that will help reduce risk from changes in the impacts of these hazards resulting from climate change. Hazard mitigation actions recommended in this plan were selected from among the alternatives presented in the catalog, as well as other resources made available to all jurisdictions (i.e., FEMA's Mitigation Ideas). The catalog provides a baseline of mitigation alternatives that are backed by a planning process, are consistent with the established goals and objectives, and are within the capabilities of the Planning Partners to implement. Some of these actions may not be feasible based on the selection criteria identified for this plan. The purpose of the catalog was to provide a list of what could be considered to reduce risk from natural hazards within the planning area. Actions in the catalog that are not included for the partnership's action plan were not selected for one or more of the following reasons:

- The action is not feasible
- The action is already being implemented
- There is an apparently more cost-effective alternative
- The action does not have public or political support.

6.6.5 Mitigation Strategy Evaluation and Prioritization

Section 201.c.3.iii of 44 CFR requires an action plan describing how the actions identified will be prioritized. Recent FEMA planning guidance (March 2013) identifies a modified STAPLEE (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) mitigation action evaluation methodology that uses a set of 10 evaluation criteria suited to the purposes of hazard mitigation strategy evaluation. This method provides a systematic approach that considers the opportunities and constraints of implementing a particular mitigation action.

Based on this guidance, the Steering Committee has adopted and applied an action evaluation and prioritization methodology which includes an expanded set of 14 criteria to include the consideration of cost-effectiveness, availability of funding, anticipated timeline, and if the action addresses multiple hazards.

The 14 evaluation/prioritization criteria used in the 2023 update process are:

1) **Life Safety** – How effective will the action be at protecting lives and preventing injuries?
2) **Property Protection** – How significant will the action be at eliminating or reducing damage to structures and infrastructure?
3) **Cost-Effectiveness** – Are the costs to implement the project or initiative commensurate with the benefits achieved?
4) **Technical** – Is the mitigation action technically feasible? Is it a long-term solution? Eliminate actions that, from a technical standpoint, will not meet the goals.
5) **Political** – Is there overall public support for the mitigation action? Is there the political will to support it?
6) **Legal** – Does the municipality have the authority to implement the action?
7) **Fiscal** – Can the project be funded under existing program budgets (i.e., is this initiative currently budgeted for)? Or would it require a new budget authorization or funding from another source such as grants?

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8) **Environmental** – What are the potential environmental impacts of the action? Will it comply with environmental regulations?
9) **Social** – Will the proposed action adversely affect one segment of the population? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?
10) **Administrative** – Does the jurisdiction have the personnel and administrative capabilities to implement the action and maintain it or will outside help be necessary?
11) **Multi-hazard** – Does the action reduce the risk to multiple hazards?
12) **Timeline** – Can the action be completed in less than 5 years (within our planning horizon)?
13) **Local Champion** – Is there a strong advocate for the action or project among the jurisdiction's staff, governing body, or committees that will support the action's implementation?
14) **Other Local Objectives** – Does the action advance other local objectives, such as capital improvements, economic development, environmental quality, or open space preservation? Does it support the policies of other plans and programs?

Specifically, for each mitigation action, the jurisdictions were asked to assign a numeric rank (-1, 0, or 1) for each of the 14 evaluation criteria, defined as follows:

- 1 = Highly effective or feasible
- 0 = Neutral
- -1 = Ineffective or not feasible

Further, jurisdictions were asked to provide a summary of the rationale behind the numeric rankings assigned, as applicable. The numerical results were totaled to assist each jurisdiction in selecting mitigation actions for the updated plan.

As step one in the prioritization process, actions that had a numerical value between 0 and 4 were initially prioritized as low; actions with numerical values between 5 and 9 were initially categorized as medium; and actions with numerical values between 10 and 14 were initially categorized as high. As step two, jurisdictions were then asked to consider the benefits and costs, as well as the desired timeline for implementation and project completion timeline when finalizing each action's priority as high/medium/low. These attributes are included in the mitigation strategy table and for FEMA-eligible projects in the mitigation worksheets (Section 9 – Annexes).

For the plan update there has been an effort to develop more clearly defined and action-oriented mitigation strategies. These local strategies include projects and initiatives that are seen by the community as the most effective approaches to advance their local mitigation goals and objectives within their capabilities. In addition, each jurisdiction was asked to develop problem statements. With this process, participating jurisdictions were able to develop action-oriented and achievable mitigation strategies.

6.6.6 Benefit/Cost Review

Section 201.6.c.3iii of 44CFR requires the prioritization of the action plan to emphasize the extent to which benefits are maximized according to a cost/benefit review of the proposed projects and their associated costs. Stated otherwise, cost-effectiveness is one of the criteria that must be applied during the evaluation and prioritization of all actions comprising the overall mitigation strategy.

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The benefit/cost review applied in for the evaluation and prioritization of projects and initiatives in this HMP update process was qualitative; that is, it does not include the level of detail required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), and Pre-Disaster Mitigation (PDM) grant programs. For all actions identified in the local strategies, jurisdictions have identified both the costs and benefits associated with project, action, or initiative.

Costs are the total cost for the action or project, and may include administrative costs, construction costs (including engineering, design and permitting), and maintenance costs.

Benefits are the savings from losses avoided attributed to the implementation of the project, and may include life-safety, structure and infrastructure damages, loss of service or function, and economic and environmental damage and losses.

When possible, jurisdictions were asked to identify the actual or estimated dollar value for project costs and associated benefits. Having defined costs and benefits allows a direct comparison of benefits versus costs, and a quantitative evaluation of project cost-effectiveness. Often, however, numerical costs and/or benefits have not been identified or may be impossible to quantitatively assess.

For the purposes of this planning process, jurisdictions were tasked with evaluating project cost-effectiveness with both costs and benefits assigned to "High", "Medium" and "Low" ratings. Where quantitative estimates of costs and benefits were available, ratings/ranges were defined as:

- Low = < $10,000
- Medium = $10,000 to $100,000
- High = > $100,000

Where quantitative estimates of costs and/or benefits were not available, qualitative ratings using the following definitions were used:

Table 6-3. Qualitative Cost and Benefit Ratings

Costs	
High	Existing funding levels are not adequate to cover the costs of the proposed project, and implementation would require an increase in revenue through an alternative source (e.g., bonds, grants, and fee increases).
Medium	The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
Low	The project could be funded under the existing budget. The project is part of or can be part of an existing, ongoing program.
Benefits	
High	Project will have an immediate impact on the reduction of risk exposure to life and property.
Medium	Project will have a long-term impact on the reduction of risk exposure to life and property or will provide an immediate reduction in the risk exposure to property.
Low	Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly. For some of the County initiatives identified, the Planning Partnership may seek financial assistance under FEMA's HMGP or Hazard Mitigation Assistance (HMA) programs. These programs require detailed benefit/cost analysis as part of the

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application process. These analyses will be performed when funding applications are prepared, using the FEMA BCA model process. The Planning Partnership is committed to implementing mitigation strategies with benefits that exceed costs. For projects not seeking financial assistance from grant programs that require this sort of analysis, the Planning Partnership reserves the right to define "benefits" according to parameters that meet its needs and the goals and objectives of this HMP.

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Section 7 Plan Maintenance

This section details the formal process that will ensure that the HMP remains an active and relevant document and that the Planning Partnership maintains their eligibility for applicable funding sources. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing an updated plan every five years. In addition, this section describes how public participation will be integrated throughout the plan maintenance and implementation process. It explains how the mitigation strategies outlined in this plan update will be incorporated into existing planning mechanisms and programs, such as comprehensive land use planning processes, capital improvement planning, and building code enforcement and implementation. The plan's format allows sections to be reviewed and updated when new data becomes available, resulting in a plan that will remain current and relevant.

The plan maintenance matrix shown in Table 7-1 provides a synopsis of responsibilities for plan monitoring, evaluation, and update, which are discussed in further detail in the sections below.

Table 7-1. Plan Maintenance Matrix

Task	Approach	Timeline	Lead Responsibility	Support Responsibility
Monitoring	Preparation of status updates and action implementation tracking as part of submission for Annual Progress Report.	Meet annually or upon major update to comprehensive plan or major disaster declaration	Jurisdictional points of contact identified in Section 8 (Planning Partnership) and Section 9 (Annexes)	Jurisdictional implementation lead identified in Section 8 (Planning Partnership) and Section 9 (Annexes)
Integration	For integration of mitigation principles action to become an organic part of the ongoing county and municipal activities, the Counties will incorporate the distribution of the safe growth worksheet for annual review and update by all participating jurisdictions.	September each year with interim email reminders to address integration in county and municipal activities.	HMP Coordinator and jurisdictional points of contact identified in Section 8 (Planning Partnership) and Section 9 (Annexes)	HMP Coordinator
Evaluation	Review the status of previous actions as submitted by the monitoring task lead and support to assess the effectiveness of the plan; compile and finalize the Annual Progress Report	Finalized progress report completed by October 14 of each year	Planning Partnership; Plan Maintenance element	Jurisdictional points of contacts identified in Section 9 (Annexes)
Update	Reconvene the planning partners, at a minimum, every 5 years to guide a comprehensive update to review and revise the plan.	Every 5 years or upon major update to Master Plan or major disaster	Llano County and San Saba County HMP Coordinator	Jurisdictional points of contacts identified in Section 9 (Annexes)

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7.1 Monitoring, Evaluating, and Updating the Plan

The procedures for monitoring, evaluating, and updating the plan are provided below.

The Llano County and San Saba County HMP Coordinator is assigned to manage the maintenance and update of the plan during its performance period. The Llano County and San Saba County HMP Coordinator will chair the Planning Partnership and be the prime point of contact for questions regarding the plan and its implementation as well as to coordinate incorporation of additional information into the plan.

The Planning Partnership shall fulfill the monitoring, evaluation and updating responsibilities identified in this section which is comprised of a representative from each participating jurisdiction. Each jurisdiction is expected to maintain a representative on the Planning Partnership throughout the plan performance period (five years from the date of plan adoption). As of the date of this plan, primary and secondary mitigation planning representatives (points-of-contact) are identified in each jurisdictional annex in Section 9 (Annexes).

Regarding the composition of the committee, it is recognized that individual commitments change over time, and it shall be the responsibility of each jurisdiction and its representatives to inform the Llano County and San Saba County HMP Coordinator of any changes in representation. The Llano County and San Saba County HMP Coordinator will strive to keep the committee makeup as a uniform representation of planning partners and stakeholders within the planning area.

Currently, the Llano County and San Saba County HMP Coordinator is designated as:

Contact Name	Mailing Address	Email Address	Phone Number
Gilbert Bennett, Emergency Management Coordinator	100 W Sandstone St, Ste 200A, Llano, Texas 78643	gbennett@co.llano.tx.us	325-247-2039
Cheryl Kepp, Grant Administrator	801 Ford Street, Llano, Texas 78643	ckepp@co.llano.tx.us	325-247-7756

7.1.1 Monitoring

The Planning Partnership will be responsible for monitoring progress on, and evaluating the effectiveness of, the plan, and documenting annual progress. Each year, beginning one year after plan development, the Llano County and San Saba County and local Planning Partnership representatives will collect and process information from the departments, agencies and organizations involved in implementing mitigation projects or activities identified in their jurisdictional annexes (Section 9) of this plan, by contacting persons responsible for initiating and/or overseeing the mitigation projects.

In the first year of the performance period, this will be accomplished by utilizing an online performance progress reporting system, the BATool[SM] which will enable municipal and county representatives to directly access mitigation initiatives to easily update the status of each project, document successes or obstacles to implementation, add or delete projects to maintain mitigation project implementation. It is anticipated that all participating partners will be prompted by the tool to update progress annually, providing an incentive for participants to refresh their mitigation strategies and to continue implementation of projects. It is expected that this reporting system will support the submittal of an increased number of project grant fund applications due to the functionality of the system which facilitates the sorting and prioritization of projects.

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In addition to progress on the implementation of mitigation actions, including efforts to obtain outside funding; and obstacles or impediments to implementation of actions, the information that Planning Partnership representatives shall be expected to document, as needed and appropriate include:

- Any grant applications filed on behalf of the participating jurisdictions,
- Hazard events and losses occurring in their jurisdiction,
- Additional mitigation actions believed to be appropriate and feasible,
- Public and stakeholder input, and
- Plan monitoring for two years (years two through four) of the plan performance period will be similarly addressed via the BATool[SM] or manually.

7.1.2 Integration Process of the HMP into Municipal Planning Mechanisms

Hazard mitigation is sustained action taken to reduce or eliminate the long-term risk to human life and property from natural hazards. Integrating hazard mitigation into a community's existing plans, policies, codes, and programs leads to development patterns that do not increase risk from known hazards or leads to redevelopment that reduces risk from known hazards. The Llano County and San Saba County HMP Planning Partnership was tasked with identifying how hazard mitigation is integrated into existing planning mechanisms. Refer to Section 9 (Annexes) for how this is done for each participating municipality. During this process, many municipalities recognized the importance and benefits of incorporating hazard mitigation into future municipal planning and regulatory processes.

The Planning Partnership representatives will incorporate mitigation planning as an integral component of daily government operations. They will work with local government officials to integrate the newly adopted hazard mitigation goals and actions into the general operations of government and partner organizations. Further, the sample adoption resolution (Appendix A) includes a resolution item stating the intent of the local governing body to incorporate mitigation planning as an integral component of government and partner operations. By doing so, the Planning Partnership anticipates that:

1. Hazard mitigation planning will be formally recognized as an integral part of overall planning and emergency management efforts
2. The Hazard Mitigation Plan, Comprehensive Plans, Emergency Management/Operations Plans, and other relevant planning mechanisms will become mutually supportive documents that work in concert to meet the goals and needs of County residents.

During the HMP annual review process, each participating municipality will be asked to document how they are utilizing and incorporating the Llano County and San Saba County HMP 2023 update into their day-to-day operations and planning and regulatory processes. Additionally, the Counties will identify additional policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions and include these findings and recommendations in the Annual HMP Progress Report. The following checklist presented in Table 7-2 was adapted from FEMA's Local Mitigation Handbook (2013), Appendix A, Worksheet 4.2. This checklist will help a community analyze how hazard mitigation is integrated into local plans, ordinances, regulations, ordinances, and policies. By completing the checklist, it will helps the Counties identify areas that integrate hazard mitigation currently and where to make improvements and reduce vulnerability to future development. In this manner, the integration of mitigation into jurisdictional activities will evolve into an ongoing culture within the Counties.

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Table 7-2. Safe Growth Check List

Planning Mechanisms	Do you Do This?		Notes: How is it being done or how will this be utilized in the future?
	Yes	No	
Operating, Municipal and Capital Improvement Program Budgets			
• When constructing upcoming budgets, hazard mitigation actions will be funded as budget allows. Construction projects will be evaluated to see if they meet the hazard mitigation goals.			
• Annually, during adoption process, the municipality will review mitigation actions when allocating funding.			
• Do budgets limit expenditures on projects that would encourage development in areas vulnerable to natural hazards?			
• Do infrastructure policies limit extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards?			
• Do budgets provide funding for hazard mitigation projects identified in the HMP?			
Human Resource Manual			
• Do any job descriptions specifically include identifying and/or implementing mitigation projects/actions or other efforts to reduce natural hazard risk?			
Building and Zoning Ordinances			
• Prior to, zoning changes, or development permitting, the municipality will review the hazard mitigation plan and other hazard analyses to ensure consistent and compatible land use.			
• Does the zoning ordinance discourage development or redevelopment within natural areas including wetlands, floodways, and floodplains?			
• Does it contain natural overlay zones that set conditions			
• Does the ordinance require developers to take additional actions to mitigate natural hazard risk?			
• Do rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use?			
• Do the ordinances prohibit development within, of filling of, wetlands, floodways, and floodplains?			
Subdivision Regulations			

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Planning Mechanisms	Do you Do This?		Notes: How is it being done or how will this be utilized in the future?
	Yes	No	
• Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas?			
• Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas?			
• Do the regulations provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources?			
• Do the regulations allow density transfers where hazard areas exist?			
Comprehensive Plan			
• Are the goals and policies of the plan related to those of the HMP?			
• Does the future land use map clearly identify natural hazard areas?			
• Do the land use policies discourage development or redevelopment with natural hazard areas?			
• Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas?			
Land Use			
• Does the future land use map clearly identify natural hazard areas?			
• Do the land use policies discourage development or redevelopment with natural hazard areas?			
• Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas?			
Transportation Plan			
• Does the transportation plan limit access to hazard areas?			
• Is transportation policy used to guide growth to safe locations?			
• Are transportation systems designed to function under disaster conditions (e.g., evacuation)?			
Environmental Management			
• Are environmental systems that protect development from hazards identified and mapped?			
• Do environmental policies maintain and restore protective ecosystems?			

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Planning Mechanisms	Do you Do This?		Notes: How is it being done or how will this be utilized in the future?
	Yes	No	
• Do environmental policies provide incentives to development that is located outside protective ecosystems?			
Grant Applications			
• Data and maps will be used as supporting documentation in grant applications.			
Municipal Ordinances			
• When updating municipal ordinances, hazard mitigation will be a priority			
Economic Development			
• Local economic development group will take into account information regarding identified hazard areas when assisting new businesses in finding a location.			
Public Education and Outreach			
• Does the municipality have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events?			

7.1.3 Evaluating

The evaluation of the mitigation plan is an assessment of whether the planning process and actions have been effective, if the HMP goals are being achieved, and whether changes are needed. The HMP will be evaluated on an annual basis to determine the effectiveness of the programs, and to reflect changes that could affect mitigation priorities or available funding.

The status of the HMP will be discussed and documented at an annual plan review meeting of the Planning Partnership, to be held either in person or via teleconference approximately one year from the date of local adoption of this update, and successively thereafter. At least two weeks before the annual plan review meeting, the Llano County and San Saba County HMP Coordinator will advise Planning Partnership members of the meeting date, agenda, and expectations of the members.

The Llano County and San Saba County HMP Coordinator will be responsible for calling and coordinating the annual plan review meeting and Soliciting input regarding progress toward meeting plan goals and objectives. These evaluations will assess whether:

- Goals and objectives address current and expected conditions.
- The nature or magnitude of the risks has changed.
- Current resources are appropriate for implementing the HMP and if different or additional resources are now available.
- Actions were cost effective.
- Schedules and budgets are feasible.

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- Implementation problems, such as technical, political, legal or coordination issues with other agencies are presents.
- Outcomes have occurred as expected.
- Changes in Planning Area resources impacted plan implementation (e.g., funding, personnel, and equipment)
- New agencies/departments/staff should be included, including other local governments as defined under 44 CFR 201.6.

Specifically, the Planning Partnership will review the mitigation goals, objectives, and activities using performance-based indicators, including:

- New agencies/departments
- Project completion
- Under/over spending
- Achievement of the goals and objectives
- Resource allocation
- Timeframes
- Budgets
- Lead/support agency commitment
- Resources
- Feasibility

Finally, the Planning Partnership will evaluate how other programs and policies have conflicted or augmented planned or implemented measures, and shall identify policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions ("Implementation of Mitigation Plan through Existing Programs" subsection later in this section discusses this process). Other programs and policies can include those that address:

- Economic development
- Environmental preservation
- Historic preservation
- Redevelopment
- Health and/or safety
- Recreation
- Land use/zoning
- Public education and outreach
- Transportation

The Planning Partnership should refer to the evaluation forms, Worksheets #2 and #4 in the FEMA 386-4 guidance document, to assist in the evaluation process (see Appendix F –Maintenance). Further, the Planning Partnership should refer to any process and plan review deliverables developed by the Counties as a part of the plan review processes established for prior or existing local HMPs within the Counties.

The Llano County and San Saba County HMP Coordinator shall be responsible for preparing an Annual HMP Progress Report for each year of the performance period, based on the information provided by the local Planning

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Partnership members, information presented at the annual Planning Partnership meeting, and other information as appropriate and relevant. These annual reports will provide data for the five-year update of this HMP and will assist in pinpointing any implementation challenges. By monitoring the implementation of the HMP on an annual basis, the Planning Partnership will be able to assess which projects are completed, which are no longer feasible, and what projects should require additional funding.

The Annual HMP Progress Report shall be posted on the Llano County's website to keep the public appraised of the plan's implementation (located at https://www.llanocountytxhmp.com/). Additionally, the website provides details on the HMP update planning process.

The HMP will also be evaluated and revised following any major disasters, to determine if the recommended actions remain relevant and appropriate. The risk assessment will also be revisited to see if any changes are necessary based on the pattern of disaster damages or if data listed in the Section 4.3 (Hazard Profiles) of this plan has been collected to facilitate the risk assessment. This is an opportunity to increase the community's disaster resistance and build a better and stronger community.

7.1.4 Updating

To facilitate the update process, the Llano County and San Saba County HMP Coordinator, with support of the Planning Partnership, shall use the second annual meeting to develop and commence the implementation of a detailed plan update program. The Llano County and San Saba County HMP Coordinator shall invite representatives from TDEM to this meeting to provide guidance on plan update procedures. This program shall, at a minimum, establish who shall be responsible for managing and completing the plan update effort, what needs to be included in the updated plan, and a detailed timeline with milestones to assure that the update is completed according to regulatory requirements.

At this meeting, the Planning Partnership shall determine what resources will be needed to complete the update. The Llano and San Saba County HMP Coordinator shall be responsible for assuring that needed resources are secured.

Following each five-year update of the mitigation plan, the updated plan will be distributed for public comment. After all comments are addressed, the HMP will be revised and distributed to all planning group members and the State of Texas State Hazard Mitigation Officer.

7.1.5 Grant Monitoring and Coordination

Llano and San Saba County recognizes the importance of having an annual coordination period that helps each planning partner become aware of upcoming mitigation grant opportunities and identifies multi-jurisdiction projects to pursue. Grant monitoring will be the responsibility of each municipal partner as part of their annual progress reporting. The Llano and San Saba County HMP Coordinator will keep the planning partners apprised of FEMA Hazard Mitigation Assistance grant openings and assist in developing letters of intent for grant opportunities when practicable.

Llano County and San Saba County intend to be resources to the Planning Partnership in the support of project grant writing and development. The degree of this support will depend on the level of assistance requested by the Partnership during open windows for grant applications. As part of grant monitoring and coordination, Llano and San Saba County intend to provide the following:

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- Notification to planning partners about impending grant opportunities.
- A current list of eligible, jurisdiction-specific projects for funding pursuit consideration.
- Notification about mitigation priorities for the fiscal year to assist the planning partners in the selection of appropriate projects.

Grant monitoring and coordination will be integrated into the annual progress report or as needed based on the availability of non-HMA or post-disaster funding opportunities

7.2 Implementation of Mitigation Plan Through EXISTING Programs

Effective mitigation is achieved when hazard awareness and risk management approaches and strategies become an integral part of public activities and decision-making. Within Llano County and San Saba County there are many existing plans and programs that support hazard risk management. Thus, it is critical that this hazard mitigation plan integrate, coordinate, and complement those existing plans and programs.

Section 5 (Capability Assessment) provides a summary and description of the existing plans, programs, and regulatory mechanisms at all levels of government (federal, state, county, and local) that support hazard mitigation within the Counties. Within each jurisdictional annex in Section 9 (Annexes), the Counties and each participating jurisdiction identified how each capability reduces risk and how they are integrating hazard risk management into their existing planning, regulatory, and operational/administrative framework. If they are currently not showing this, they indicate how they intend to promote this integration.

It is the intention of Planning Partnership representatives to continue to incorporate mitigation planning as an integral component of daily government operations. The Planning Partnership representatives will work with local government officials to integrate the newly adopted hazard mitigation goals and actions into the general operations of government and partner organizations. Further, the sample adoption resolution (Appendix A [Adoption Resolutions]) includes a resolution item stating the intent of the local governing body to incorporate mitigation planning as an integral component of government and partner operations. By doing so, the Steering Committee anticipates that:

- Hazard mitigation planning will be formally recognized as an integral part of overall emergency management efforts and
- The Hazard Mitigation Plan, Master Plans, Emergency Operations Plans and other relevant planning mechanisms will become mutually supportive documents that work in concert to meet the goals and needs of County residents.

Other planning processes and programs to be coordinated with the recommendations of the hazard mitigation plan include the following:

- Emergency operations and response plans,
- Training and exercise of emergency response plans,
- Debris management plans,
- Recovery plans,
- Capital improvement programs,
- Municipal codes,
- Community design guidelines,

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- Water-efficient landscape design guidelines,
- Stormwater management programs,
- Water system vulnerability assessments,
- Community Wildfire Protection Plans,
- Comprehensive Flood Hazard Management Plans,
- Resiliency plans,
- Community Development Block Grant-Disaster Recovery action plans, and
- Public information/education plans.

Some action items do not need to be implemented through regulation. Instead, these items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation.

During the annual plan evaluation process, the Planning Partnership representatives will identify additional policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions and include these findings and recommendations in the Annual HMP Progress Report.

7.3 Continued Public Involvement

Llano County, San Saba County, and participating jurisdictions are committed to the continued involvement of the public in the hazard mitigation process. This HMP update will continue to be posted on-line: https://www.llanocountytxhmp.com/.

In addition, public outreach and dissemination of the HMP will include:

- Links to the plan on municipal websites of each jurisdiction with capability.
- Continued utilization of existing social media outlets (Facebook, Twitter) to inform the public of natural hazard events, such as floods and severe storms. Educate the public via the jurisdictional websites on how these applications can be used in an emergency.
- Development of annual articles or workshops on flood hazards to educate the public and keep them aware of the dangers of flooding

The Steering Committee representatives and the Llano County and San Saba County HMP Coordinator will be responsible for receiving, tracking, and filing public comments regarding this HMP. The public will have an opportunity to comment on the plan via the hazard mitigation website at any time. The HMP Coordinator will maintain this website, posting new information and maintaining an active link to collect public comments.

The public can also provide input at the annual review meeting for the HMP and during the next five-year plan update. The Llano County and San Saba County HMP Coordinator is responsible for coordinating the plan evaluation portion of the meeting, soliciting feedback, collecting, and reviewing the comments, and ensuring their incorporation in the five-year plan update as appropriate. Additional meetings might also be held as deemed necessary by the planning group. The purpose of these meeting would be to provide the public an opportunity to express concerns, opinions, and ideas about the mitigation plan.

The Steering Committee representatives shall be responsible to assure that:

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- Public comment and input on the plan, and hazard mitigation in general, are recorded and addressed, as appropriate.
- Copies of the latest approved plan (or draft in the case that the five-year update effort is underway) are available for review, along with instructions to facilitate public input and comment on the HMP.
- Appropriate links to the Llano County and San Saba County Hazard Mitigation Action Plan webpage are included on municipal websites.
- Public notices are made as appropriate to inform the public of the availability of the plan, particularly during HMP update cycles.

The Llano County and San Saba County HMP Coordinator shall be responsible to assure that:

- Public and stakeholder comment and input on the plan, and hazard mitigation in general, are recorded and addressed, as appropriate.
- Copies of the latest approved plan are available for review at appropriate County facilities along with instructions to facilitate public input and comment on the plan.
- Public notices, including media releases, are made as appropriate to inform the public of the availability of the plan, particularly during plan update cycles.

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Llano and San Saba County Hazard Mitigation Action Plan 2023 Update





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Volume II

Draft - March 2023

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Section 8 Planning Partnership

This section provides a description of the Planning Area's HMP update Planning Partnership, their responsibilities throughout the planning process, and the jurisdictional annexes developed as a result of their plan update efforts.

8.1 Plan Maintenance Procedures

The Federal Emergency Management Agency (FEMA) encourages multi-jurisdictional planning for hazard mitigation. All participating jurisdictions must meet the requirements of Chapter 44 of the Code of Federal Regulations (44 CFR):

"Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan" [Section 201.6a(4)]

Members of the Planning Partnership have the expertise to develop the plan and have their jurisdiction's authority to implement the mitigation strategy developed during the planning process. The Planning Partnership is responsible for developing and reviewing draft sections of the plan, updating their respective annex, creating the mitigation strategy for their jurisdiction, and adopting the final plan.

For the Llano County and San Saba County HMP update, a Planning Partnership was formed to leverage resources and to meet requirements for the federal Disaster Mitigation Action of 2000 (DMA) for as many eligible governments as possible. Members of the Planning Partnership consisted of representatives from each jurisdiction. The DMA defines a local government as follows:

Any county, municipality, city, town, township , public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Each participating Planning Partner has prepared an annex to this plan. These annexes, as well as information on the process by which they were created, are contained in this volume.

8.2 Initial Solicitation and Letters of Intent

Llano and San Saba Counties solicited the participation of all municipalities in the Planning Area at the commencement of this project. Llano County, two of its municipalities, the Llano Independent School District, and the Llano Municipal Utility District #1 participated in the update process and have met the minimum requirements of participation as established by the Counties and Steering Committee. San Saba, three of its municipalities, the Cherokee Independent School District, the Richland Springs Independent School District, the San Saba Independent School District, Richard Springs Water Supply, and Richard Springs Special Utility District participated in the update process and have met the minimum requirements of participation as established by the Counties and Steering Committee.

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8.3 Planning Partner Expectations

The Planning Partners agreed to the following Planning Partner expectations, which were outlined in the letter sent by Llano County on August 11, 2022 and confirmed at the kick-off meeting held on August 24, 2022 (see Appendix C [Meeting Documentation] for details):

- Provide representation at regular planning group meetings and workshops.
- Be responsible for providing data and information as requested.
- Review and comment on data and information compiled by the contract consultant relevant to their jurisdiction.
- Be responsible for completing plan documents specific to your municipality, using provided templates with guidance and assistance by the contract consultant.
- Assist with the identification of stakeholders within your community that should be informed and potentially involved with the planning process.
- Facilitate public outreach efforts with residents and local stakeholders within your community using materials provided by the contract consultant.
- Assist with the identification of strengths, weaknesses, opportunities, and obstacles to implementing natural hazard mitigation within your community.
- Assist with the identification of past, ongoing, and appropriate future mitigation strategies and activities within your municipality.
- Review and comment on plan documents, specifically the draft and final plans prior to submission to TDEM and FEMA.

As described in Section 7 (Plan Maintenance), the Planning Partnership is intended to remain active beyond the regulatory update to support plan maintenance. Regarding the composition of the Steering and Planning Committees, it is recognized that individual commitments change over time, and it will be the responsibility of each jurisdiction and its representatives to inform the HMP Coordinator of any changes in representation.

8.4 Jurisdictional Annes Preparation Process

New to the 2023 HMP, jurisdictional annexes were used to provide a unique, stand-alone guide to mitigation planning for each participating jurisdiction. The Llano and San Saba County HMP Update is organized so that there is an annex for Llano and San Saba Counties and for every participating jurisdiction. Section 9 (Annexes) includes an annex for every jurisdiction in the Planning Area.

8.4.1 Data Collection

Each jurisdiction was paired with a contract consultant mitigation planner to work with the mitigation team to update their annexes. Each jurisdiction was asked to participate in a municipal kick-off meeting, held on August 24, 2022 to review participant expectations and the updated information needed to support the annex update. It was made clear that the annexes are sections of the plan that can be enhanced if more information is available to further customize all aspects of mitigation planning.

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8.4.2 Hazard Ranking Exercise

The presentation of the risk assessment and hazard ranking for each jurisdiction was conducted November 10, 2022. At this meeting, the consultant presented the overall risk assessment for the hazards of concern and distributed jurisdiction-specific handouts with risk assessment results relevant to each plan participant. In addition, each Planning Partner was asked to review the ranked hazards specific ~~for~~to its jurisdiction. Refer to Section 4.4 (Hazard Ranking) for the methodology of the hazard ranking process. The calculated ranking was presented to each jurisdiction, and they were asked to review the ranking and revise based on history of events, probability of occurrence, and the potential impact on people, property, and the economy. In addition, each jurisdiction was asked to rank their adaptive capacity for each hazard. Refer to Appendix B (Participation Matrix) for the input submitted by each municipality. The objectives of this exercise were to familiarize the Partnership with how to use the risk assessment as a tool to support other planning and hazard mitigation processes and to help prioritize types of mitigation actions that should be considered. Hazards that were ranked as "high" for each jurisdiction as a result of this exercise were considered to be priorities for identifying appropriate mitigation actions, although jurisdictions also identified actions to mitigate "medium" or "low" ranked hazards as appropriate.

8.4.3 Strengths Weaknesses Obstacles and Opportunities (SWOO) Exercise

After the draft risk assessment results were presented and hazard ranking exercise at the second Steering Committee Meeting on October 11, 2022, attendees participated in a facilitated SWOO session to identify strengths, weakness or challenges, obstacles, and opportunities in hazard mitigation for the Planning Area's hazards of concern. All SWOO results were compiled and provided as a resource to plan participants at the Mitigation Strategy Workshop in December 2022. Refer to Appendix B (Participation Matrix) which provides the information captured by meeting participants during the SWOO session.

8.4.4 Mitigation Strategy Workshop

A mitigation strategy workshop was conducted by the contracted planning consultant on December 6, 2022, for all participating jurisdictions to support the development of the updated mitigation strategy. To assist with the identification of implementable and action-oriented mitigation actions, the participating jurisdictions were provided with tools to help identify mitigation strategies: public survey responses, potential mitigation actions for each jurisdiction, and FEMA Mitigation Ideas. The purpose of this workshop was to guide the Planning Partnership in completing this portion of the planning process and discuss how projects that are well developed and documented are more quickly identifiable for selection when grants become available.

At the workshop, the Planning Partnership focused on developing problem statements based on the impacts of hazards in the Planning Area. The results of the updated risk assessment, challenges and opportunities identified during the capability assessment update and SWOO sessions, and information gathered from the public survey were used to develop mitigation strategies. As a result, a mitigation workbook was compiled with potential mitigation actions for Llano and San Saba Counties and their participating jurisdictions. This workbook helped form a bridge between the hazard risk assessment, which quantifies impacts to each community, with the development of achievable mitigation strategies. Mitigation development worksheets were filled out by each jurisdiction to identify additional problem statements and draft action worksheets were developed.

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8.4.5 Municipal Support Conference Calls

In addition to the municipal kick-off meeting, municipal support conference calls were held throughout the planning process. During these calls, the consultant worked one-on-one with the Planning Partners to complete their jurisdictional annexes. Each section of the annex was discussed to ensure accuracy and completeness. This included, but not limited to, the following:

- Reviewing the calculated hazard ranking for the jurisdiction and provide input to adjust the ranking as necessary.
- Updating information regarding the jurisdiction's capabilities and past integration of hazard mitigation concepts.
- Identify mitigation initiatives that have reasonable potential to be accomplished within the lifespan of the HMP (five years), including both FEMA-eligible projects and those projects using funds from non-FEMA sources.

8.4.6 Jurisdictional Annexes

While the jurisdictional annex format is designed to document and assure local compliance with the DMA 2000 regulations, its greater purpose and function includes:

- Providing a locally relevant synthesis of the overall mitigation plan that can be readily presented, distributed, and maintained;
- Facilitating local understanding of the community's risk to natural hazards;
- Facilitating local understanding of the community's capabilities to manage natural hazard risk, including opportunities to improve those capabilities;
- Facilitating local understanding of the efforts the community has taken, and plans to take, to reduce their natural hazard risk;
- Facilitating the implementation of mitigation strategies, including the development of grant applications;
- Providing a framework by which the community can continue to capture relevant data and information for future plan updates.

It is recognized that each jurisdiction's annex is a "living" document and will continue to be improved as resources permit. As such, its design is intended to promote and accommodate continued efforts to maintain the annex to be current and to improve the effectiveness of the annex as the key tool, reference, and guiding document by which the jurisdiction will implement hazard mitigation locally.

The following provides a description of the various elements of the jurisdictional annex.

Section 9.X.1: Hazard Mitigation Planning Team: Identifies the hazard mitigation planning team who provided input during the planning process. Further detail is provided in Section 2 (Planning Process) and Appendix B (Participation Matrix).

Section 9.X.2: Jurisdictional Profile: Provides an overview and profile of the jurisdiction, including an identification of areas of known and anticipated future development and the vulnerability of those areas to the hazards of concern.

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Section 9.X.3: Jurisdictional Capability Assessment and Integration: This subsection provides an inventory and evaluation of the jurisdiction's tools, mechanisms, and resources available to support hazard mitigation and natural hazard risk reduction. Within the municipal annexes, tables provide an inventory of the municipality's planning and regulatory, administrative, and technical, and fiscal, capabilities, respectively. Further, another table identifies the municipality's level of participation in state and federal programs designed to promote and incentivize local risk reduction efforts. Further information regarding Federal, State, and local capabilities may be found in the Capability Assessment portion of Section 5.

Section 9.X.4: National Flood Insurance Program (NFIP) Compliance: A tabular summary of the specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP.

Section 9.X.5: Growth/Development Trends: Identifies of areas of known and anticipated future development and the vulnerability of those areas to the hazards of concern.

Section 9.X.6: Jurisdictional Risk Assessment:

- ***Hazard Extent and Location:*** Each annex includes a map (or series of maps) illustrating identified hazard zones and critical facilities. Further, these maps show areas of known or anticipated future development, as available and provided by the jurisdiction.
- ***Hazard Event History:*** Identifies hazard events that have caused significant impacts within the jurisdiction, including a summary characterization of those impacts as identified by the jurisdiction. The documentation of events and losses is critical to supporting the identification and justification of appropriate mitigation actions, including providing critical data for benefit-cost analysis. It is recognized that this "inventory" of events and losses is a work-in-progress and may continue to be improved as resources permit. As such, the lack of data or information for a specific event does not necessarily mean that the jurisdiction did not suffer significant losses during that event.
- ***Hazard Ranking and Vulnerabilities:*** This subsection provides information regarding each plan participant's vulnerability to the identified hazards. Full data and information on the hazards of concern, the methodology used to develop the vulnerability assessments, and the results of those assessments that serve as the basis of these local risk rankings may be found in Section 4 (Risk Assessment).

Section 9.X.7: Mitigation Strategy and Prioritization: This section discusses and provides the status of past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritization.

- ***Past Mitigation Initiative Status:*** Where applicable, a review of progress on the jurisdiction's prior mitigation strategy is presented, identifying the disposition of each prior action, project, or initiative in the jurisdiction's updated mitigation strategy. Other completed or on-going mitigation activities that were not specifically part of a prior local mitigation strategy may be included in this sub-section as well.
- ***Additional Mitigation Efforts:*** Other completed or on-going mitigation activities that were not specifically part of a prior local mitigation strategy may be included in this subsection as well.

Proposed Hazard Mitigation Initiatives for the Plan Update: Table 9.X-16 presents the jurisdiction's updated mitigation strategy. As indicated, applicable mitigation actions, projects and initiatives are further documented on an Action Worksheet which provides details on the project identification, evaluation, prioritization, and

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implementation process. Table 9.X-17 provides a summary of the local mitigation strategy prioritization process discussed in Section 6 (Mitigation Strategy).

8.4.7 Annex Review

Workshops and additional meetings (via email and/or teleconference) to complete the jurisdictional annexes were held with the Steering Committee and Planning Partnership throughout the planning process. In preparation for the draft plan public review, each jurisdiction was asked to have their 'mitigation team' review their annex to ensure it was complete and accurate for posting to the Llano County Office of Emergency Management's mitigation website. To demonstrate broad and comprehensive review and input, each jurisdiction collected signatures from these representatives. Refer to Appendix B (Participation Matrix) to review the annex signature pages.

In summary, all participating communities and the Counties completed the Planning Partner expectations and annex-preparation process. Details regarding these meetings are described further in Section 2 (Planning Process) and Section 6 (Mitigation Strategy). Completed jurisdictional annexes are presented in Section 9 (Annexes).

8.5 Coverage Under the Plan

The Llano County, San Saba County, and 12 jurisdictions met the participation requirements specified by the Steering Committee. Any non-participating local jurisdiction within Llano County and San Saba County planning area can "dock" to this plan in the future following the linkage procedures defined in Appendix H (Linkage Procedures).

Table 8-1 lists the status of each participating jurisdiction and their ultimate status in this plan update. Refer to Appendix B (Participation Matrix) and Appendix C (Meeting Documentation) for details on participation and meeting attendance.

Table 8-1. Jurisdictional Status

Municipality	Attended Workshops and/or Meetings and Project Calls	Provided Update on Past Projects	Submitted Mitigation Actions for Current Plan	Seeking Approval for Adoption (meets all previous requirements)
Llano County	X	X	X	X
San Saba County	X	X	X	X
Horsehoe Bay (C)	X	X	X	X
Llano (C)	X	X	X	X
Richland Springs (C)	X	X	X	X
San Saba (C)	X	X	X	X
Sunrise Beach (C)	X	X	X	X
Cherokee ISD	X	X	X	X
Llano ISD	X	X	X	X
Richland Springs ISD	X	X	X	X
San Saba ISD	X	X	X	X
Llano Co MUD #1 Blue Lake	X	X	X	X
Richard Springs Water	X	X	X	X
Richland Springs SUD	X	X	X	X

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Section 9 Jurisdictional Annexes

9.1 Llano County

This section presents the jurisdictional annex for Llano County that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the municipality, who in the County participated in the planning process, an assessment of Llano County's risk and vulnerability, the different capabilities used in the County, and an action plan that will be implemented to achieve a more resilient community.

9.1.1 Hazard Mitigation Planning Team

Llano County identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many County departments, including the Office of Emergency Management. The Emergency Management Coordinator, Floodplain Administrator and the Grant Administrator represented the community on the Llano County Hazard Mitigation Plan Planning Partnership, Steering Committee, and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes municipal officials that participated in the development of the annex and in what capacity. Additional documentation on the municipality's planning process through Planning Partnership meetings is included in Volume 1, Section 2 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.1-1. Hazard Mitigation Planning Team

Primary Point of Contact		Alternate Point of Contact	
Name/Title:	Gilbert Bennett Emergency Management Coordinator	Name/Title:	Cheryl Kepp Grant Administrator
Address:	801 Ford Street, Llano, TX 78643	Address:	801 Ford Street, Llano, TX 78643
Phone Number:	325-247-2039	Phone Number:	325-247-7756
Email:	gbennett@co.llano.tx.us	Email:	ckepp@co.llano.tx.us
Llano County Floodplain Administrator			
Name/Title:	Cristy Vaught – Floodplain Administrator		
Address:	100 West Sandstone St, Llano, TX 78643		
Phone Number:	325-247-2039		
Email:	floodadmin@co.llano.tx.us		
Additional Contributors:			
Name/Title: Linda Raschke – Llano County Commissioner Precinct 2 Method of Participation: Provided data and information			
Name/Title: Tiffany Jones – GIS Mapping Method of Participation: Provided data and information			

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9.1.2 Municipal Profile

Llano County covers approximately 966 square miles and is located in central Texas. The county was named for the Llano River, which crosses through the center of the county. The Llano River and the Colorado River (which flows along the eastern border of the county) contribute to Lake Buchanan, Inks Lake, and Lake Lyndon B. Johnson, which are all partially located within the county. The City of Llano is the largest city and county seat for Llano County. Other incorporated communities include Horseshoe Bay and Sunrise Beach Village. Unincorporated areas include Bluffton, Buchanan Dam, Castell, Kingsland, Tow, and Valley Spring (Llano County HMP, 2016).

According to the U.S. Census, the 2020 population for Llano County was 21,243, a 10 percent increase from the 2010 Census. Data from the 2020 U.S. Census indicate that 5.6 percent of the population is 5 years of age or younger and 16.8 percent is 65 years of age or older. Communities must deploy a support system that enables all populations to safely reach shelters or to quickly evacuate a hazard area.

9.1.3 Jurisdictional Capability Assessment and Integration

Llano County performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section 5 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The community's adaptive capacity to withstand hazard events.

For a community to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day local government operations. As part of the hazard mitigation analysis, planning/policy documents were reviewed, and each jurisdiction was surveyed to obtain a better understanding of their progress toward plan integration. The updated mitigation strategy provided an opportunity for Llano County to identify opportunities for integration of mitigation concepts that can be incorporated into municipal procedures.

Planning, Legal, and Regulatory Capability and Integration

The table below summarizes the regulatory tools that are available to Llano County. The comment field provides information as to how the capability integrates hazard mitigation and risk reduction.

Table 9.1-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	No	-	-	-
How does this reduce risk? Llano County Department of Development Services only regulates buildings within designated floodplains.				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Zoning/Land Use Code	No	-	-	-
How does this reduce risk? The Llano County Subdivision Regulations (2020) establishes no zoning districts in the unincorporated areas of Llano County and regulates the use of buildings, structures, and land use.				
Subdivision Ordinance	Yes	Subdivision Regulations – November 23, 2020	Local	Commissioners Court
How does this reduce risk? The Llano County Subdivision Regulations (2020) establishes no zoning districts in the unincorporated areas of Llano County and regulates the use of buildings, structures, and land use.				
Site Plan Ordinance	No	-	-	-
How does this reduce risk?				
Stormwater Management Ordinance	No	-	-	-
How does this reduce risk?				
Post-Disaster Recovery/ Reconstruction Ordinance	No	-	-	-
How does this reduce risk?				
Real Estate Disclosure	No	-	-	-
How does this reduce risk?				
Growth Management	No	-	-	-
How does this reduce risk?				
Environmental Protection Order	No	-	-	-
How does this reduce risk?				
Flood Damage Prevention Order	Yes	Llano County Flood Damage Prevention Order – January 29, 2021	Local	Department of Development Services
How does this reduce risk? The Llano County Flood Damage Prevention Order minimizes flood losses and promotes the public health, safety, and general welfare of the public. The Order applies to all special flood hazard areas within the County.				
Wellhead Protection	No	-	-	-
How does this reduce risk?				
Emergency Management Order	Yes	Emergency Management Basic Plan – March 2022	State/Local	Office of Emergency Management
How does this reduce risk? The Llano County Basic Plan outlines emergency operations within Llano County and provides guidance in emergency management activities. The Plan was accepted by the Texas Department of Emergency Management (TDEM) in March 2022.				
Climate Change Ordinance	No	-	-	-
How does this reduce risk?				
Other	-	-	-	-
Planning Documents				
Comprehensive/Master Plan	No	-	-	-
How does this reduce risk?				
Capital Improvement Plan	No	-	-	-

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
How does this reduce risk?				
Disaster Debris Management Plan	Yes	Government Code Chapter 418.054 – Catastrophic Debris Management Plan	State / Local	Office of Emergency Management
How does this reduce risk? Identifies contacts and activate debris management cleanup. It is incorporated into the code – managed by Texas Emergency Management plan.				
Floodplain Management or Watershed Plan	No	-	LCRA	-
How does this reduce risk?				
Stormwater Management Plan	No	-	-	-
How does this reduce risk?				
Open Space Plan	No	-	-	-
How does this reduce risk?				
Urban Water Management Plan	No	-	-	-
How does this reduce risk?				
Habitat Conservation Plan	No	-	-	-
How does this reduce risk?				
Economic Development Plan	Yes	Transportation and Economic Development Plan -February 13, 2023	Council of Government (COG), Local	Commissioners Court
How does this reduce risk? The Llano County Transportation and Economic Development Plan capitalizes on the natural resources by adding to the sales tax base and hot revenue. Implementing ongoing maintenance of infrastructure to keep up with tourism, tourism is a main contributor for the economic development of the County.				
Shoreline Management Plan	No	-	-	-
How does this reduce risk?				
Community Wildfire Protection Plan	Yes	Firewise Program; Prescribed Burn Program	State, Local	Office of Emergency Management
How does this reduce risk? Reduces wildfire risks and prepares home and business owners for wildfire events. Several communities in Llano County are part of the Firewise program: Blue Lake Estates (5/4/2021); Tuscan Village Summit Rock (5/18/22); and Trails of Horseshoe Bay (12/28/03).				
Community Forest Management Plan	No	-	-	-
How does this reduce risk?				
Transportation Plan	Yes	Transportation and Economic Development Plan – February 13, 2023	Local, COG	Commissioners Court and Capital Area Council of Governments
How does this reduce risk? The Llano County Transportation and Economic Development Plan identifies transportation priorities and integrates those priorities with strategies for economic growth. The plan recognizes the need for coordination of significant countywide projects and is a blueprint for future transportation facilities.				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Agriculture Plan	Yes	AgriLife Animal Management	Local, State	Texas AgriLife Extension Service Agents
How does this reduce risk? The agents work with area ranchers/farmers to maximize results for the area. This Plan in place to minimize risk to livestock, and identifies guidelines during wildfires to move livestock out of wildfire exposure areas.				
Climate Action/ Resiliency/Sustainability Plan	No	-	-	-
How does this reduce risk?				
Tourism Plan	Yes	Transportation and Economic Development Plan – July 25, 2022	Local, COG	Commissioners Court
How does this reduce risk? Plan strategies recommended enhancing tourism opportunities, beginning to think about expanding jobs with more small and medium sized employers, and expanding broadband services to support telework opportunities as well as entrepreneurial efforts.				
Business/ Downtown Development Plan	No	-	-	-
How does this reduce risk?				
Other	-	-	-	-
Response/Recovery Planning				
Comprehensive Emergency Management Plan	Yes	Local County Basic Emergency Plan – March 2022	Local	Office of Emergency Management
How does this reduce risk? Llano County utilizes a basic emergency operations plan that provides guidance to the community in the event of a hazard.				
Continuity of Operations Plan	Yes	Annex N- Direction -Basic Plan (April 30, 2018; April 23, 2018)	Local, State	Office of Emergency Management
How does this reduce risk? Llano County utilizes a basic emergency operations plan that provides guidance to the community in the event of a hazard. Defines the operational concepts and responsibility to accomplish control and established incident of command and emergency operations center.				
Strategic Recovery Planning Report	Yes	Annex J- Recovery -Basic Plan (April 23, 2018)	Local, State	Office of Emergency Management
How does this reduce risk? Llano County utilizes a basic emergency operations plan that provides guidance to the community in the event of a hazard. Defines the recovery process from any disaster. Annex J is the recovery portion of the Basic Plan.				
Threat & Hazard Identification & Risk Assessment (THIRA)	Yes	Regional Plan CAPCOG	Local, State	Office of Emergency Management
How does this reduce risk? Within the region established and communicate the threats the county may face.				
Post-Disaster Recovery Plan	Yes	Annex J- Recovery Basic Plan (April 23, 2018)	State, Local	Office of Emergency Management
How does this reduce risk? Llano County utilizes a basic emergency operations plan that provides guidance to the community in the event of a hazard. Post-Disaster recovery is a portion of the Basic Plan recovery operations are set in motion after the event.				
Public Health Plan	Yes	Annex H- Public Health – Basic Plan (May 1, 2018)	State, Local	Public Health Authority
How does this reduce risk? Llano County utilizes a basic emergency operations plan that provides guidance to the community in the event of a hazard. In order to reduce death and injury during emergency situations and restore essential health and medical services within the disaster area.				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Other	No	-	-	-
How does this reduce risk?				

Development and Permitting Capability

The table below summarizes the capabilities of Llano County to oversee and track development.

Table 9.1-3. Development and Permitting Capability

Indicate if your jurisdiction implements the following	Yes/No	Comment:
Do you issue development permits? • If yes, what department is responsible?	Yes	Department of Development Services
If you do not issue development permits, what is your process for tracking new development?	N/A	In Non-Floodplain areas applications are required. In Flood plain areas permits are required
Are permits tracked by hazard area? (For example, floodplain development permits.)	Yes	Floodplain permits are required under the Llano County Flood Damage Prevention Order since September 18, 1991
Do you have a buildable land inventory? • If yes, please describe	N/A	-
Describe the level of build-out in your jurisdiction.	N/A	-

Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to Llano County and their current responsibilities that contribute to hazard mitigation.

Table 9.1-4. Administrative and Technical Capabilities

Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	Yes	Precinct Commissioners
Zoning Board of Adjustment	No	-
Planning Department	No	-
Mitigation Planning Committee	No	-
Environmental Board/Commission	Yes	Environmental Enforcement and Compliance – two officer assigned to enforce TCEQ/State regulations.
Open Space Board/Committee	No	-
Economic Development Commission/Committee	No	-
Public Works/Highway Department	Yes	Road and Bridge Department
Construction/Building/Code Enforcement Department	No	-
Emergency Management/Public Safety Department	Yes	The Office of Emergency Management is tasked with maintaining flood disaster, freeze disaster information

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Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
		and county maintenance. Protecting life and property and supporting effective and rapid response.
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	Yes	Warn Central Texas, ten outdoor warning sirens stationed throughout the County. Integrated Public Alert Warning System (IPAWS) notifies by weather alerts, radio and television and messages through wireless/cellphones.
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	Yes	Road & Bridge Department
Mutual aid agreements	Yes	Fire, Police and EMS County Wide.
Human Resources Manual	Yes	HR Department
Other	No	-
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	Yes	Soil and Water Conservation
Engineers or professionals trained in building or infrastructure construction practices	Yes	Individual review floodplain applications
Planners or engineers with an understanding of natural hazards	No	-
Staff with expertise or training in benefit/cost analysis	No	-
Professionals trained in conducting damage assessments	No	-
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	Yes	Sheriff's Department and Department of Department of Development Services
Environmental scientist familiar with natural hazards	No	-
Surveyor(s)	Yes	County Supervisor – Elected Position
Emergency Manager	Yes	Office of Emergency Management
Grant writer(s)	Yes	Grant Administration
Resilience Officer	Yes	Office of Emergency Management
Other (this could include stormwater engineer, environmental specialist, etc.)	No	-

Fiscal Capability

The table below summarizes financial resources available to Llano County.

Table 9.1-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/No)
Community development Block Grants (CDBG, CDBG-DR)	Yes
Capital improvements project funding	Yes

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Financial Resources	Accessible or Eligible to Use? (Yes/No)
Authority to levy taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	Yes
Impact fees for homebuyers or developers of new development/homes	Yes
Stormwater utility fee	No
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	No
Other federal or state Funding Programs	No
Open Space Acquisition funding programs	No
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	No

Education and Outreach Capability

The table below summarizes the education and outreach resources available to Llano County.

Table 9.1-6. Education and Outreach Capabilities

Outreach Resources	Available? (Yes/No)	Comment:
Public information officer or communications office	Yes	Office of Emergency Management
Personnel skilled or trained in website development	Yes	Llano County Judge's Office in coordination with Texas Association of Counties
Hazard mitigation information available on your website	Yes	Office of Emergency Management
Social media for hazard mitigation education and outreach	Yes	Facebook Team –Llano County Judge's Office, Office of Emergency Management and Department of Development Services
Citizen boards or commissions that address issues related to hazard mitigation	No	-
Warning systems for hazard events	Yes	Warn Central Texas, 9-1-1 emergency phone notification, IPAWS, 10 outdoor sirens throughout the County
Natural disaster/safety programs in place for schools	Yes	Emergency Operations Plans at every school
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? • If yes, please describe.	Yes	• Weather Warn Class from the National Weather Service • Facebook social media

Community Classifications

The table below summarizes classifications for community programs available to Llano County.

Table 9.1-7. Community Classifications

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Program	Participating? (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	No	-	-
Building Code Effectiveness Grading Schedule (BCEGS)	No	-	-
Public Protection (ISO Fire Protection Classes 1 to 10)	Yes	Unknown	Unknown
Storm Ready Certification	No	-	-
Firewise Communities classification	Yes – communities within in the County	-	Blue Lake Estates (5/4/2021); Tuscan Village Summit Rock (5/18/22); and Trails of Horseshoe Bay (12/28/03).
Other	Yes	WRN Ambassador	June 2020

Note:
N/A Not applicable
NP Not participating
- Unavailable

Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.
- Moderate: Capacity might exist; but is not used or could use some improvement.
- Weak: Capacity does not exist or could use substantial improvement.

Table 9.1-8. Adaptive Capacity

Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Moderate
Drought	Moderate
Extreme Temperature	Moderate
Flood	Moderate
Geologic Hazards	Moderate
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Moderate
Winter Storm	Moderate
Wildfire	Moderate

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9.1.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information and is listed in the Hazard Mitigation Planning Team table at the beginning of this annex.

National Flood Insurance Program (NFIP) Summary

The following table summarizes the NFIP statistics for Llano County. Refer to Section 4.3.4 (Flood) for on overview of NFIP statistics for Llano County.

Table 9.1-9. NFIP Summary

Municipality	Policies in Force	Number of Paid Claims*	Amount of Paid Claims*	Number of NFIP Repetitive Loss Properties*	Number of NFIP Severe Repetitive Loss Properties*
Unincorporated Llano County	N/A	157	$2,542,183	N/A	N/A
Llano County (all)	**542**	**478**	**$13,054,686**	**14**	**1**

Source: *FEMA 2022*

Notes: *Due to a contractual agreement with FEMA, information at the municipal level was not available to incorporate into the 2023 HMP Update. The information presented here for the municipalities is best available data from the last HMP.*

RL *Repetitive Loss*

SRL *Severe Repetitive Loss*

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in Llano County.

Table 9.1-10. NFIP Summary

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	Yes, the County has permits from properties flooded during the October 2018 flood.
• Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	There is no list of property owners interested in flood mitigation at this time.
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	In 2017 Llano County received a base level engineering study and improved the floodplains in Llano for all unnumbered A Zone tributary.
• How do you make Substantial Damage determinations? • How many were declared for recent flood events in your jurisdiction?	The County uses the cost of improvement to pre-flood condition including the cost of labor and materials and make sure that the cost stays below 50% of the current appraised value of the structure excluding the value of land and other detached structures. If the cost of improvement exceeds 50% the structure is classified as substantially damaged and the structure must meet compliance with the current Llano County Flood Damage Prevention Order.

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NFIP Topic	Comments
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	After the October 2018 flood, there were 12 structures classified as substantially damaged and were brought into compliance by either removing the structures or elevating the structures. In some cases, the cost was covered by flood insurance that was taken care of by the homeowner.
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If not, state why.	The flood maps for Llano County were updated in 2021 and are adequate except in the unnumbered A Zones, therefore, a base level engineering study was preformed and provides better available data.
NFIP Compliance	
What local department is responsible for floodplain management?	Llano County Department of Development Services
Are any certified floodplain managers on staff in your jurisdiction?	Yes, there are 2 Certified Floodplain Managers
Do you have access to resources to determine possible future flooding conditions from climate change?	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	Training in property assessments for substantial damage / substantial improvement costs would be beneficial
Provide an explanation of NFIP administration services you provide (e.g., permit review, GIS, education/outreach, inspections, engineering capability)	Permit and elevation certificate review, GIS mapping, education / outreach in person, meetings and online county website, inspections, Llano Central Appraisal District / Personal appraisal review for Pre-FIRM structure improvements and/or for damaged properties.
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	Cost evaluation of current appraised value vs cost of improvement. Cost of improvement must stay below 50%.
What are the barriers to running an effective NFIP program in the community, if any?	Not being able to explain why FEMA changed the insurance requirements to FEMA 2.0. The change was made with no input from Floodplain Administrators tasked with enforcement of floodplain management rules.
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state the violations.	None at this time.
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	June 9th and 10th, 2009 – By the Texas Water Development Board
• What is the local law number or municipal code of your flood damage prevention ordinance? • What is the date that your flood damage prevention ordinance was last amended?	As approved by Commissioners Court January 29, 2021
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	The Llano County Flood Damage Prevention Order exceeds the minimum requirements by incorporating a freeboard for all development within a special flood hazard area.
Are there other local ordinances, plans or programs (e.g., site plan review) that support floodplain management and meeting	There is no zoning in the unincorporated areas of Llano County. There have been no variances or variance

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NFIP Topic	Comments
the NFIP requirements? For instance, does the planning board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	requests in Llano County for floodplain development since at least prior to 2005.
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	Llano County is not interested in changing the CRS classification.

9.1.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.1-11. Recent and Expected Future Development

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**
Single Family	157	19	284	16	242	10	201	14	256	20	288	28	N/A	N/A
Multi-Family	0	0	0	0	0	0	0	0	1	0	0	0	N/A	N/A
Other (commercial, mixed-use, etc.)	15	4	20	1	22	3	19	2	21	3	12	2	N/A	N/A
Total Permits Issued	172	23	204	17	264	13	220	16	278	23	300	30	N/A	N/A

SFHA Special Flood Hazard Area (1% annual chance flood event)

** Only location-specific hazard zones or vulnerabilities identified.*

9.1.6 Jurisdictional Risk Assessment

The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard Ranking) provide detailed summaries for Llano County's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard Event History

Llano County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

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Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4.3 (Hazard Profiles) of this plan have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes Llano County's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment). The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and community capabilities to address the hazard and changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Refer to Section 4.4 (Hazard Ranking) for the countywide hazard ranking.

Identified Issues

After review of Llano County's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, municipalities identified vulnerable areas throughout the County.

- Tow, Buchanan Lake Village and Paradise Point are unincorporated communities that have one entry and exit point causing severe back up during hazard events*
- The Tow Community Center, VFD, and Llano County Officer do not have emergency/back up power generators*
- There are 14 dams owned and covered by Llano County. The County is currently using temporary and low-level barricades; however, they are not sufficient during hazard events.
- The County experiences periods of severe drought, which results in depleted water supply for crops, soils, and residents drinking water.
- Llano County and participating jurisdictions experience an average of 122 day per year of excessive heat (90° and above) and averaging 2-3 days of extreme cold (32° and below).
- Llano County and surrounding jurisdictions experience flooding when the flow of water is greater than the carrying capacity of the stream channels. Areas located along the streambank do not have sufficient warning systems in place to warn residents of the dangers. This leads to accidents, water rescues, and injuries.
- Llano Bridge in the City of Llano is the only crossing point of Llano River. In the event of a storm the bridge can become inundated, not allowing residents to evacuate the County.
- Geological hazards such as expansive soils, land subsidence, and earthquake can cause damage, injury, and loss of life as well as damage to infrastructure networks such as water, power, communication, and transportation lines. An outreach program is needed to inform those that live and work in the County understand the risks and what they can do to reduce those risks.

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- Damage-causing effects of geologic hazards and flooding include surface rupture, fissuring, settlement, and permanent horizontal and vertical shifting of the ground. Secondary impacts can include landslides, rock falls, liquefaction, fires, dam failure, and hazardous materials incidents.
- The architects, builders and developers in the County do not fully understand the risks to infrastructure during tornado, winter weather, severe storms, and hurricane events.
- Llano County experienced mass shutdowns, school closings, and job losses due to the COVID-19 pandemic.
- Llano County experienced business shutdowns, school closings, and job losses due to the COVID-19 pandemic. With a lack of personal protective equipment, the virus spread more rapidly through hospitals and other health care facilities in the County.
- Llano County experiences periods of hot and dry weather which creates perfect conditions for wildfire wildland urban interface (WUI) areas such as forests, brush, field crops, and heavy grasslands.
- The unincorporated areas of Llano County do not have an established fire code for buildings.
- Llano County does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events.
- The Llano County Law Enforcement Center has an undersized generator that does not provide power to the entire building during hazard events.

**This issue was identified as a specific area of concern based on resident response to the 2023 Hazard Mitigation Citizen survey.*

9.1.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

Past Mitigation Initiative Status

The following table indicates progress on the community's mitigation strategy identified in the 2017 HMP. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.1-12. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, No Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)? Yes/No	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
1	Purchase NOAA "All Hazards" radios for early warning	Emergency Management	In Progress	Yes	Every Office Notification	Emergency Management
2	Emergency Notification System (ENS)	Emergency Management	Ongoing	Yes	Notification System Everbridge	Emergency Management
3	Public information on National Weather Service	Emergency Management	In Progress	Yes	Inclement Weather Notices	Emergency Management
4	Develop a Drought and Expansive Soils Contingency Plan	Emergency Management	No Progress	Yes	Water rights conserved	Emergency Management
5	Develop a monitoring database of the soils near Critical Facilities	Department of Development Services	Ongoing	Yes	--	Department of Development Services
6	Exploring other water source options	Emergency Management	In Progress	Yes	Water availability	Emergency Management
7	Improve drainage ways, culverts, and bridges in the county	Roads & Bridge	In Progress	Yes	Debris Buildup	Road & Bridge
8	Digitize hardcopies of public records and store them in hazard-free offsite locations	County Clerk	In Progress	Yes	Hand written format to digitized	County Clerk
9	Complete requirements of the NWS Program *Storm Ready*	Emergency Management	Ongoing	No	Storm Ready for weather events	Emergency Management
10	Purchase and install outdoor warning sirens	Emergency Management	Complete	No	Weather Events	Emergency Management
11	Conduct public education program on fire risks and wild land fire mitigation, with the assistance of the Texas Forest Service	Emergency Management	In Progress	Yes	Public Education on Wildfires	Emergency Management
12	Place flood insurance materials/mortgage lending mandates in libraries	Department of Development Services	In Progress	Yes	Public Information	Department of Development Services

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Project #	Project	Responsible Party	What is the status? (e.g., In Progress, No Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)? Yes/No	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
13	Increase dimension of drainage culverts or dig up/lower road and install a slab	Roads & Bridges	Complete	No	Installed new slab	Road & Bridge
14	Relocate Kingsland VFD building to outside the 100-year floodplain	Department of Development Services	No Progress	Yes	Fire Station sits within the 100 yr. Flood Plain	Department of Development Services
15	Create Evacuation Plan	Emergency Management	In Progress	Yes	Evacuation Coordination	Emergency Management
16	Require safe rooms to be added when constructing new schools, daycares, rest homes, and critical care facilities	Emergency Management	No Progress	Yes	No safe rooms exist	Emergency Management
17	Address severe flooding created by draining from adjacent lands to Comanche Rancherias Subdivision	Department of Development Services	No Progress	Yes	Area floods due to rain runoff	Department of Development Services

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, Llano County identified the following mitigation efforts completed since the last HMP:

- No additional efforts

Since the adoption of the County's first HMP, Llano County has made significant mitigation progress in the following areas:

- No additional information

Proposed Hazard Mitigation Initiatives for the HMP Update

Llano County participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide range of activities and mitigation measures selected.

Table 9.1-13. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA				CRS					
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure	X	-	-	X	X	-	X	-	-	-
Drought	X	-	X	X	X	-	-	-	-	X
Extreme Temperature	X	-	X	X	X	-	X	-	-	-
Flood	X	X	X	X	X	X	X	-	X	X
Geological Hazards	X	X	X	X	X	X	X	-	-	X
Hurricane	X	X	X	X	X	X	X	-	-	X
Severe Storm	-	X	X	X	-	X	X	-	X	X
Tornado	-	X	X	X	-	X	X	-	-	X
Pandemic	-	-	-	X	X	-	X	-	-	X
Winter Storm	-	X	X	X	-	X	X	-	-	X
Wildfire	X	-	-	-	X	X	X	-	-	-

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives Llano County would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

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Table 9.1-14. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-Llano County-001	Dam Safety Response and Planning	**Problem:** There are 14 dams owned and covered by Llano County. The County is currently using temporary and low-level barricades; however, they are not sufficient during hazard events. **Solution:** The County will work with the Lower Colorado River Association to establish a system to install restrictive barricades during events that could lead to inundation.	New	Dam Failure, Flood, Hurricane	1,2,3,4,6	Within 5 years	Lower Colorado River Authority (LCRA), Llano County Office of Emergency Services, TCEQ, USACE	FEMA HMGP and BRIC, TCEQ, Texas Water Development Board, Texas Colorado River, Texas Colorado River Floodplain Coalition	Decrease damage and loss of dams, maintain consistent water availability, decrease property loss and loss of life	<$10,000	High	LPR, EAP	PR
2023-Llano County-002	Dam Safety Evacuation Education and Outreach	**Problem:** Unincorporated areas located upstream and downstream have only one exit way and are at risk of being stranded during a dam failure/flooding event or other hazard event. **Solution:** The County Office of Emergency Management will work with the LCRA and other agencies to educate surrounding communities about the importance of evacuation plans.	New	Dam Failure, Flood, Hurricane, Severe Weather, Severe Winter Weather	1,2,3,4,6	1 year	Lower Colorado River Authority (LCRA), Llano County Office of Emergency Management, TCEQ, USACE	FEMA HMGP and BRIC, TCEQ, Texas Water Development Board, Texas Colorado River, Texas Colorado River Floodplain Coalition	Decrease loss of life and property, encourage preparedness and education of dam safety	<$10,000	High	EAP	PR, PI
2023-Llano County-003	Drought Contingency Plan	**Problem:** The County experiences periods of severe drought, which results in depleted water supply for crops, soils, and residents drinking water. **Solution:** The County will develop a Drought Contingency Plan to address the different degrees or drought, water shortage, and expansive soil problems.	New	Drought, Extreme Temperature, Geological Hazards	1,2,3,4,5,6	1-3 years	Llano County Office of Emergency Management, Development Services and Administration	FEMA HMGP and BRIC, TCEQ, Texas Water Development Board, Texas Colorado River, Texas Colorado River Floodplain Coalition	Decrease the likelihood of water contamination and supply	<$10,000	High	LPR, EAP, NSP	PR, ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023- Llano County-004	Education and Outreach – Extreme Temperature Events	**Problem:** Llano County and participating jurisdictions experience an average of 122 day per year of excessive heat (90° and above) and averaging 2-3 days of extreme cold (32° and below). **Solution:** The County Office of Emergency Management will work with the surrounding jurisdictions to provide information on how to protect life and property during extreme temperature events.	New and Existing	Extreme Temperature	1,2,3,4,6	1 Year	Llano County Office of Emergency Services	County Budget	Prevent loss of life and property	Staff Time	High	EAP	PI
2023-Llano County-005	High Water Warning Systems	**Problem:** Llano County and surrounding jurisdictions experience flooding when the flow of water is greater than the carrying capacity of the stream channels. Areas located along the streambank do not have sufficient warning systems in place to warn residents of the dangers. This leads to accidents, water rescues, and injuries. **Solution:** The County Office of Emergency Management will work with the Texas Department of Transportation and the Llano County Road and Bridge Department to identify warning systems and water detection systems to install in the County. Once identified, the County will purchase and install these systems that will prevent residents from crossing flooded roadways.	New and Existing	Flood	1,2,3,4	1-3 years	Llano County Office of Emergency Management, Llano County Road and Bridge, Texas Department of Transportation	HMGP, BRIC, CDBG-DR	Decrease risk of loss of life and property	$100,000	High	SIP, NSP, EAP	ES
2023-Llano County-006	Alternate River Crossing	**Problem:** Llano Bridge in the City of Llano is the only crossing point of Llano River. In the event of a storm the bridge can become	New and Existing	Flood, Severe Storm	1,2,3,4	Within 5 years	Llano County Office of Emergency Services, Llano County Road and	HMGP, BRIC, CDBG-DR	Decrease risk of property loss and	High	High	SIP, NSP	SP

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		inundated, not allowing residents to evacuate the County. **Solution:** The County will work with the Office of Emergency Management to do an engineering study to identify a location for a secondary bridge. Implementation of the bridge will begin after the engineering study is complete.					Bridge, Texas Department of Transportation		infrastructure decay				
2023-Llano County-007	Education and Outreach – Geological Hazards	**Problem:** Geological hazards such as expansive soils, land subsidence, and earthquake can cause damage, injury, and loss of life as well as damage to infrastructure networks such as water, power, communication, and transportation lines. An outreach program is needed to inform those that live and work in the County understand the risks and what they can do to reduce those risks. **Solution:** The County will work with Road and Bridge, and Public Works to provide information to the public and private business owners and residents to inform them on the safety of infrastructure in the event of a geological hazard incident. Information will be posted on the County's website and social media pages.	New and Existing	Geological Hazards	1,2,3,4,5,6,	1-3 years	Llano County Office of Emergency Management, Roads and Bridges, Public Works	HMGP, FMA, BRIC	Increase awareness of less likely hazards	Staff Time	High	EAP	PI
2023-Llano County-008	Groundwater Monitoring	**Problem:** Damage-causing effects of geologic hazards and flooding include surface rupture, fissuring, settlement, and permanent horizontal and vertical shifting of the ground. Secondary impacts can	New	Geological Hazards, Flood, Severe Storm	1,3,4,6	3-5 years	Llano County Office of Emergency Management, Texas Water Development Board, TCEQ	HMGP, BRIC, CDBG-DR Funding	Decrease likelihood for loss of life and property	$100,000	High	SIP, NSP	SP, PP

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		include landslides, rock falls, liquefaction, fires, dam failure, and hazardous materials incidents. **Solution:** Llano County Office of Emergency Management will work with Texas Water Development Board, and TCEQ and engineers to install monitoring well sites across the County to collect information on the geological, physical, and hydrological information to prepare for future events.											
2023-Llano County-009	Education and Outreach to Contractors in the County	**Problem:** The architects, builders and developers in the County do not fully understand the risks to infrastructure during tornado, winter weather, severe storms, and hurricane events. **Solution:** Llano County Department of Development Services will develop and implement an education and outreach program to architects, builders and developers who work in the County to understand the hazard risks in the County. This program will include information on wind engineering measures and construction techniques.	New	Tornado, Hurricane, Winter Storm, Severe Storm, Flood	1,2,3,4	Within 1 year	Llano County Department of Development Services, State Building Code Enforcement, Texas Wind Storm	County Budget	Increase awareness of building infrastructure	Low	High	EAP	PI, PP
2023-Llano County-010	Education and Outreach – COVID-19 and Other Diseases	**Problem:** Llano County experienced mass shutdowns, school closings, and job losses due to the COVID-19 pandemic. **Solution:** The County Office of Emergency Management will work with the State of Texas and Public Health Authorities to educate community members about the risk of COVID-19 and other potential widespread diseases and	New	Pandemic	1,2,3,6	1-3 years	Office of Emergency Management, USACE, State of Texas, Public Health Authorities	DR-4480 – COVID Relief, EMPG, FEMA HMGP and BRIC	Prevent loss of life, increase awareness of disease spread	$10,000 or less	High	EAP	PI, ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		provide information for how to best protect yourself and the community. This information will be posted on the County website and social media pages, and be available in county offices.											
2023-Llano County-011	PPE Distribution	**Problem:** Llano County experienced business shutdowns, school closings, and job losses due to the COVID-19 pandemic. With a lack of personal protective equipment, the virus spread more rapidly through hospitals and other health care facilities in the County. **Solution:** Llano County Office of Emergency Management will work with FEMA and other agencies to obtain substantial PPE equipment stockpiles for health and medical centers. This will allow the County to be prepared in the event of another pandemic or disease outbreak.	New	Pandemic	1,2,3,6	1-3 years	Office of Emergency Management, USACE, State of Texas, Public Health Authorities, FEMA	DR-4480 – COVID Relief, EMPG, FEMA HMGP and BRIC	Decrease chances of loss of life, increase awareness of disease spread	$1M	High	EAP, LPR	PR
2023-Llano County-012	Firewise Community Program	**Problem:** Llano County experiences periods of hot and dry weather which creates perfect conditions for wildfire wildland urban interface (WUI) areas such as forests, brush, field crops, and heavy grasslands. **Solutions:** The Office of Emergency Management, and the Texas Forest Service will work with the surrounding communities to identify wildland urban interface (WUI) communities and begin the necessary steps to becoming a Fire Wise Community Program.	New	Wildfire	1,2,3,4,6	1-3 years	Llano County Office of Emergency Management, Forest Services, Volunteer Fire Department	BRIC, CDBG, HMGP, FEMA Assistance to Firefighters	Prevent loss of life and property and lessen future risks of wildfire	Up to $100,000	High	LPR	PR, PP
2023-Llano County-013		**Problems:** The unincorporated areas of Llano County do not have	New	Wildfire	1,2,3,4,6	1-3 years	Llano County Office of Emergency			Up to $10,000	High	LPR	PI

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
	Fire Code for Unincorporated Areas	an established fire code for buildings. **Solution:** Llano County Office of Emergency Management and Texas Forest Service will work with the unincorporated areas to develop a building fire code to assist with property protection against wildfire.					Management, Texas Forest Service, Volunteer Fire Department	CDBG, FEMA Assistance to Firefighters	Prevent loss of life and property				
2023-Llano County-014	Debris Management Plan	**Problem:** The County does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events. **Solution**: The County Planning Board will work with the Llano County Office of Emergency Management to develop a debris management plan as a framework for organizing the rapid, safe, and cost-effective separation, removal, collection, recycling, and disposal of debris after a disaster. This plan will include goals to minimize debris-related threats to public health, safety, and the environment following any hazard event.	New	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Wildfire, Winter Weather	1,2,4	1-2 years	Office of Emergency Management	County Budget	Ensure coordinated plans to safely remove debris from water ways	$10,000	High	LPR	PR, ES
2023-Llano County-015	Backup Generator	**Problem:** The Law Enforcement Center has an undersized generator that does not provide power to the entire building during hazard events. **Solution:** The County Office of Emergency Management will work with the Law Enforcement Center to implement previously completed engineering study to obtain a back up generator	Nex and Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado,	1,2,3,4	1-3 years	Llano County Office of Emergency Management, Law Enforcement Center	HMPG, BRIC, County Budget	Increase continuity of operations during hazard event	High	High	SIP	PP, ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
				Wildfire, Winter Weather									
2023-Llano County-016	Engineering Study to install a dam in the City of Llano	**Problem:** The Llano River is the source of drinking water for the City of Llano. During 2022, the City of Llano was within 45 days of completely exhausting the water supply. **Solution:** The County will work with the Office of Emergency Management to do an engineering study to identify a location for another dam within the City of Llano. Implementation of the dam will begin after the engineering study is complete.	New and Existing	Drought, Extreme Temperature, Flood, Hurricane	1, 2, 3, 4, 6	Within 5 years	Lower Colorado River Authority (LCRA), Llano County Office of Emergency Services, City of Llano, and TCEQ	FEMA HMGP and BRIC, Texas Water Development Board, Texas Colorado River, Texas Colorado River Floodplain Coalition	Increase water availability during periods of drought	<$50,000	High	LPR	PR

Notes: Not all acronyms and abbreviations defined below are included in the table.

Acronyms and Abbreviations:

CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*
FEMA	*Federal Emergency Management Agency*
FPA	*Floodplain Administrator*
HMA	*Hazard Mitigation Assistance*
N/A	*Not applicable*
NFIP	*National Flood Insurance Program*
OEM	*Office of Emergency Management*

Potential FEMA HMA Funding Sources:

FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC	*Building Resilient Infrastructure and Communities Program*

Timeline:

The time required for completion of the project upon implementation.

Cost:

The estimated cost for implementation.

Benefits:

A description of the estimated benefits, either quantitative and/or qualitative.

Critical Facility:

Yes *Critical Facility located in 1% floodplain*

Mitigation Category:

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- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*
- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*
- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.*

The prioritization criteria provided in Volume 1, Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

Table 9.1-15. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-Llano County-001	Dam Safety Response and Planning	1	1	1	1	1	0	0	1	0	1	1	1	1	0	10	High
2023-Llano County-002	Dam Safety Evacuation Education and Outreach	1	1	1	1	1	1	1	1	0	1	1	1	1	0	12	High
2023-Llano County-003	Drought Contingency Plan	1	1	1	1	1	1	0	1	1	1	1	1	1	1	13	High
2023-Llano County-004	Education and Outreach – Extreme Temperature Events	1	1	1	1	1	1	1	1	1	1	0	1	1	0	12	High
2023-Llano County-005	High Water Warning Systems	1	0	1	1	1	1	1	1	1	1	0	1	1	0	11	High

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Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-Llano County-006	Alternate River Crossing	1	1	1	1	1	1	1	1	1	1	0	1	1	0	12	High
2023-Llano County-007	Education and Outreach – Geological Hazards	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-Llano County-008	Groundwater Monitoring	1	1	0	0	1	1	1	1	1	1	1	1	1	1	12	High
2023-Llano County-009	Education and Outreach to Contractors in the County	1	1	1	1	1	1	1	0	1	1	0	1	1	1	12	High
2023-Llano County-010	Education and Outreach – COVID-19	1	1	1	1	1	1	1	0	1	1	0	1	1	1	12	High
2023-Llano County-011	PPE Distribution	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-Llano County-012	Firewise Community Program	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-Llano County-013	Fire Code for Unincorporated Areas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-Llano County-014	Debris Management Plan	1	1	1	1	1	1	1	1	0	1	1	1	1	1	13	High
2023-Llano County-015	Backup Generator	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-Llano County-016	Engineering Study to install a dam in the City of Llano	1	1	1	1	1	1	0	1	0	1	1	1	1	0	11	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).

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Section 9 Jurisdictional Annexes

9.2 San Saba County

This section presents the jurisdictional annex for San Saba County that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the municipality, who in the County participated in the planning process, an assessment of San Saba County's risk and vulnerability, the different capabilities used in the County, and an action plan that will be implemented to achieve a more resilient community.

9.2.1 Hazard Mitigation Planning Team

San Saba County identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many County departments, including the Department of Emergency Management. The Emergency Management Coordinator represented the community on the Planning Partnership and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes municipal officials that participated in the development of the annex and in what capacity. Additional documentation on the municipality's planning process through Planning Partnership meetings is included in Volume 1, Section 2 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.2-1. Hazard Mitigation Planning Team

Primary Point of Contact		Alternate Point of Contact	
Name/Title:	Marsha Hardy – Emergency Management Coordinator	Name/Title:	Judge Jody Fauley - County Judge
Address:	500 E. Wallace, Suite 103, San Saba, TX 76877	Address:	500 E. Wallace, Suite 201, San Saba, TX 76877
Phone Number:	325-372-8570	Phone Number:	325-372-3635
Email:	emergencymgmt@co.san-saba.tx.us	Email:	ssjudge@co.san-saba.tx.us
NFIP Floodplain Administrator			
Name/Title:	Marsha Hardy – Floodplain Administrator		
Address:	500 E. Wallace, Suite 103, San Saba, TX 76877		
Phone Number:	325-372-8570		
Email:	emergencymgmt@co.san-saba.tx.us		
Additional Contributors:			
Name/Title: Marsha Hardy – Emergency Management Coordinator Method of Participation: Provided information on past events, capabilities, NFIP administration, and status of previous actions. Provided input on hazard rankings. Contributed to mitigation strategy.			

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9.2.2 County Profile

For more information on San Saba County, refer to Section 3 (County Profile).

9.2.3 Jurisdictional Capability Assessment and Integration

San Saba County performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section 5 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The community's adaptive capacity to withstand hazard events.

For a community to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day local government operations. As part of the hazard mitigation analysis, planning/policy documents were reviewed, and each jurisdiction was surveyed to obtain a better understanding of their progress toward plan integration. The updated mitigation strategy provided an opportunity for San Saba County to identify opportunities for integration of mitigation concepts that can be incorporated into municipal procedures.

Planning, Legal, and Regulatory Capability and Integration

The table below summarizes the regulatory tools that are available to San Saba County. The comment field provides information as to how the capability integrates hazard mitigation and risk reduction.

Table 9.2-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	No	-	-	-
How does this reduce risk?				
Zoning/Land Use Code	No	-	-	-
How does this reduce risk?				
Subdivision Ordinance	Yes	San Saba County Subdivision Regulations	Local, State	County Commissioners Court
How does this reduce risk? San Saba County adopted subdivision regulations in accordance with Chapter 232 and 233 of the Texas Local Government Code, allowing the County to enact subdivision rules and regulations. The regulations discuss required actions for plat submittal, variances, bond requirements, design standards and lot requirements and water availability regulations.				
Site Plan Ordinance	No	-	-	-
How does this reduce risk?				
Stormwater Management Ordinance	No	-	-	-

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
How does this reduce risk?				
Post-Disaster Recovery/ Reconstruction Ordinance	No	-	-	-
How does this reduce risk?				
Real Estate Disclosure	No	-	-	-
How does this reduce risk?				
Growth Management	Yes	San Saba County Subdivision Regulations	Local	County Commissioner Court
How does this reduce risk? Growth management is accomplished through compliance with the San Saba County Subdivision Ordinance.				
Environmental Protection Ordinance	No	-	-	-
How does this reduce risk?				
Flood Damage Prevention Ordinance	Yes	Order No. 2015-1 Flood Damage Prevention	Local	Department of Emergency Management
How does this reduce risk? San Saba County adopted a flood damage prevention ordinance to promote the health, safety, and general welfare of its citizen's and to minimize potential damages to both public and private infrastructure and to maintain a cost-effective approach to mitigation efforts. The Ordinance identifies the following objectives to mitigate flood damages: • 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 gas and water, electric, telephone, sewer lines, streets and bridges located in special flood hazard areas • Notify developers that properties are in special flood hazard areas				
Wellhead Protection	No	-	-	-
How does this reduce risk?				
Emergency Management Ordinance	No	-	-	-
How does this reduce risk?				
Climate Change Ordinance	No	-	-	-
How does this reduce risk?				
Other	-	-	-	-
Planning Documents				
Comprehensive/Master Plan	No	-	-	-
How does this reduce risk?				
Capital Improvement Plan	No	-	-	-
How does this reduce risk?				
Disaster Debris Management Plan	No	-	-	-
How does this reduce risk?				
Floodplain Management or Watershed Plan	No	-	-	-
How does this reduce risk?				
Stormwater Management Plan	No	-	-	-
How does this reduce risk?				
Open Space Plan	No	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Urban Water Management Plan	No	-	-	-
How does this reduce risk?				
Habitat Conservation Plan	No	-	-	-
How does this reduce risk?				
Economic Development Plan	No	-	-	-
How does this reduce risk?				
Shoreline Management Plan	No	-	-	-
How does this reduce risk?				
Community Wildfire Protection Plan	No	-	-	-
How does this reduce risk?				
Community Forest Management Plan	No	-	-	-
How does this reduce risk?				
Transportation Plan	No	-	-	-
How does this reduce risk?				
Agriculture Plan	No	-	-	-
How does this reduce risk?				
Climate Action/ Resiliency/Sustainability Plan	No	-	-	-
How does this reduce risk?				
Tourism Plan	No	-	-	-
How does this reduce risk?				
Business/ Downtown Development Plan	No	-	-	-
How does this reduce risk?				
Other	No	-	-	-
Response/Recovery Planning				
Comprehensive Emergency Management Plan	Yes	San Saba Basic Emergency Operations Plan	Local	Emergency Management
How does this reduce risk? The County has a Basic Emergency Operations Plan accompanied by annexes that identify the procedures and guidelines to follow leading up to a hazard event. The procedures include planning and training for potential disasters, events, and situations that could result in the loss of life or property. These procedures and guidelines allow for locating problems and errors before a hazard event takes place.				
Continuity of Operations Plan	No	-	-	-
How does this reduce risk?				
Strategic Recovery Planning Report	No	-	-	-
How does this reduce risk?				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	-	-	-
How does this reduce risk?				
Post-Disaster Recovery Plan	No	-	-	-
How does this reduce risk?				
Public Health Plan	No	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Other	No	-	-	-
How does this reduce risk?				

Development and Permitting Capability

The table below summarizes the capabilities of San Saba County to oversee and track development.

Table 9.2-3. Development and Permitting Capability

Indicate if your jurisdiction implements the following	Yes/No	Comment:
Do you issue development permits? • If yes, what department is responsible?	No	-
If you do not issue development permits, what is your process for tracking new development?	N/A	As a County, permits are issued for septic and floodplain.
Are permits tracked by hazard area? (For example, floodplain development permits.)	Yes	-
Do you have a buildable land inventory? • If yes, please describe	No	-
Describe the level of build-out in your jurisdiction.	N/A	-

Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to San Saba County and their current responsibilities that contribute to hazard mitigation.

Table 9.2-4. Administrative and Technical Capabilities

Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	No	-
Zoning Board of Adjustment	No	-
Planning Department	No	-
Mitigation Planning Committee	No	-
Environmental Board/Commission	No	-
Open Space Board/Committee	No	-
Economic Development Commission/Committee	No	-
Public Works/Highway Department	Yes	Each Precinct department is tasked with County road improvement, maintenance, and operation
Construction/Building/Code Enforcement Department	No	-
Emergency Management/Public Safety Department	Yes	Emergency Management
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	Yes	Warning systems are in municipalities where population density is highest
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	No	-
Mutual aid agreements	No	-

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Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Human Resources Manual	No	-
Other	No	-
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	No	-
Engineers or professionals trained in building or infrastructure construction practices	No	-
Planners or engineers with an understanding of natural hazards	No	-
Staff with expertise or training in benefit/cost analysis	No	-
Professionals trained in conducting damage assessments	No	-
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	No	-
Environmental scientist familiar with natural hazards	No	-
Surveyor(s)	Yes	Elected County Surveyor
Emergency Manager	Yes	Office of Emergency Management
Grant writer(s)	No	-
Resilience Officer	No	-
Other (this could include stormwater engineer, environmental specialist, etc.)	No	-

Fiscal Capability

The table below summarizes financial resources available to San Saba County.

Table 9.2-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/No)
Community development Block Grants (CDBG, CDBG-DR)	Yes
Capital improvements project funding	Yes
Authority to levy taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	No
Impact fees for homebuyers or developers of new development/homes	Yes
Stormwater utility fee	No
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	No
Other federal or state Funding Programs	No
Open Space Acquisition funding programs	No
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	No

Education and Outreach Capability

The table below summarizes the education and outreach resources available to San Saba County.

Table 9.2-6. Education and Outreach Capabilities

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Outreach Resources	Available? (Yes/No)	Comment:
Public information officer or communications office	No	-
Personnel skilled or trained in website development	No	-
Hazard mitigation information available on your website	Yes	Located under Emergency Management
Social media for hazard mitigation education and outreach	Yes	Located under Emergency Management
Citizen boards or commissions that address issues related to hazard mitigation	No	-
Warning systems for hazard events	Yes	Warning systems are in municipalities where population density is highest
Natural disaster/safety programs in place for schools	No	-
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? • If yes, please describe.	Yes	Access to Code Red [Reverse 9-1-1 system]

Community Classifications

The table below summarizes classifications for community programs available to San Saba County.

Table 9.2-7. Community Classifications

Program	Participating? (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	No	-	-
Building Code Effectiveness Grading Schedule (BCEGS)	No	-	-
Public Protection (ISO Fire Protection Classes 1 to 10)	No	-	-
Storm Ready Certification	No	-	-
Firewise Communities classification	No	-	-
Other	No	-	-

Note:
N/A Not applicable
NP Not participating
- Unavailable

Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.
- Moderate: Capacity might exist; but is not used or could use some improvement.
- Weak: Capacity does not exist or could use substantial improvement.

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Table 9.2-8. Adaptive Capacity

Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Moderate
Drought	Moderate
Extreme Temperature	Moderate
Flood	Moderate
Geologic Hazards	Moderate
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Moderate
Winter Storm	Moderate
Wildfire	Moderate

9.2.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information and is listed in the Hazard Mitigation Planning Team table at the beginning of this annex.

National Flood Insurance Program (NFIP) Summary

The following table summarizes the NFIP statistics for San Saba County.

Table 9.2-9. NFIP Summary

Municipality	Policies in Force	Number of Paid Claims*	Amount of Paid Claims*	Number of NFIP Repetitive Loss Properties*	Number of NFIP Severe Repetitive Loss Properties*
Unincorporated San Saba County	N/A	5	$44,271	N/A	N/A
San Saba County (total)	**15**	**8**	**$106,713**	**2**	**0**

Source: *FEMA 2022*
Notes: *Due to a contractual agreement with FEMA, information at the municipal level was not available to incorporate into the 2023 HMP Update. The information presented here for the municipalities is best available data from the last HMP.*
RL *Repetitive Loss*
SRL *Severe Repetitive Loss*

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in San Saba County.

Table 9.2-10. NFIP Summary

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	Yes, the Office of Emergency Management has records following each flooding disaster that has been worked on.
• Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	No

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NFIP Topic	Comments
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	No
• How do you make Substantial Damage determinations? • How many were declared for recent flood events in your jurisdiction?	The State/FEMA flooding disasters have only affected San Saba Roads and Bridges. San Saba experienced a bad hailstorm in the Richland Springs area, the Emergency Management Coordinator traveled to all who contacted the office and made determinations.
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	None. There were two several years ago with the HUD program and the properties had to be demolished and moved to different housing through that program [which no longer exists]
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If not, state why.	The County utilizes paper maps from the original 1991 FEMA study [the only thing with BFEs determined are within the city limits of San Saba].
NFIP Compliance	
What local department is responsible for floodplain management?	Emergency Management Coordinator/Floodplain Administrator
Are any certified floodplain managers on staff in your jurisdiction?	Yes, Emergency Management Coordinator
Do you have access to resources to determine possible future flooding conditions from climate change?	Unknown
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	Emergency Management Coordinator attends the Texas Floodplain Management Association technical conferences and the Texas Water Development Board webinars for training and CEUs.
Provide an explanation of NFIP administration services you provide (e.g. permit review, GIS, education/outreach, inspections, engineering capability)	Determinations using the FIRM maps, permit reviews, education/outreach and occasionally inspections during disasters.
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	Using financial records for marketable value and amount of work pending
What are the barriers to running an effective NFIP program in the community, if any?	The Office of Emergency Management is a one-person office with multiple jobs
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state the violations.	No
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	Unknown
• What is the local law number or municipal code of your flood damage prevention ordinance? • What is the date that your flood damage prevention ordinance was last amended?	Order No. 2015-1; October 26, 2015
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Meets
Are there other local ordinances, plans or programs (e.g. site plan review) that support floodplain management and meeting the NFIP requirements? For instance, does the planning board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	No
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	No

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9.2.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.2-11. Recent and Expected Future Development

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**
Single Family	5	0	1	0	3	0	2	0	2	0	0	0	1	0
Multi-Family	0	0	1	0	0	0		0	0	0	0	0	0	0
Other (commercial, mixed-use, etc.)	1	0	3	0	2	0	3	0	3	0	3	0	2	0
Total Permits Issued	**6**	**0**	**5**	**0**	**5**	**0**	**5**	**0**	**5**	**0**	**3**	**0**	**3**	**0**

SFHA Special Flood Hazard Area (1% annual chance flood event)

** Only location-specific hazard zones or vulnerabilities identified.*

9.2.6 Jurisdictional Risk Assessment

The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard Ranking) provide detailed summaries for San Saba County's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard Event History

San Saba County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4.3 (Hazard Profiles) have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes San Saba County's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment). The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and community capabilities to address the hazard and

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changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Refer to Section 4.4 (Hazard Ranking) for the countywide hazard ranking.

Identified Issues

After review of San Saba County's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, San Saba County identified the following vulnerabilities within their community:

- A Countywide effort is needed to identify potential sites for placement of temporary housing for residents displaced by disasters. The County has un-certified shelters that have been identified in the past but updating of the sheltering list and memorandums of understanding for facility use is needed.
- The County does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events.
- While major events that result in substantial damage of structures are rare, municipalities need to have official procedures in place to inspect structures, make determinations, and provide for appeals.
- The County does not have substantial public alert system in place.
- San Saba County and surrounding jurisdictions experience flooding when the flow of water is greater than the carrying capacity of the stream channels. With inadequate warning systems areas located along the streambank have a high chance of flooding.
- The County is prone to drought conditions which impact the infrastructure and landscape, and agriculture causing an increased use of water for irrigation.

9.2.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

Past Mitigation Initiative Status

The following table indicates progress on the community's mitigation strategy identified in the 2017 HMP. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.2-12. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, No Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)? Yes/No	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
1	All-hazards education and awareness programs	Emergency Management Department	Ongoing	Yes	Programs are ongoing	EMC
2	Dam branch clearance	NRCS	Ongoing	Yes	Programs are ongoing	San Saba County Soil & Conservation Committee
3	Encourage construction of safe rooms	Emergency Management Department	Ongoing	Yes	Still receiving requests for information	EMC
4	Reverse 911 System (CodeRED)	Emergency Management Department	Ongoing	Yes	Code RED is accessible to all county	EMC
5	Encourage drought-tolerant landscape design	Emergency Management Department	Ongoing	Yes	Still receiving requests for information	EMC
6	MOUs between VFDs and contiguous counties	OEM & VFDs	In Progress	Yes	Currently it's all verbal requests for mutual aid	VFDs/Dispatch
7	Develop an engineering study of 'Hooten Holler' in the City of Richland Spring	OEM	No Progress	No	-	-

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, San Saba County identified the following mitigation efforts completed since the last HMP:

- None identified

Proposed Hazard Mitigation Initiatives for the HMP Update

San Saba County participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide-range of activities and mitigation measures selected.

Table 9.2-13. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA				CRS					
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure	X	-	-	X	X	X	-	-	-	X
Drought	X	-	-	X	X	X	-	-	-	X
Extreme Temperature	X	-	-	X	X	X	-	-	-	X
Flood	X	-	-	X	X	X	-	-	-	X
Geologic Hazards	X	-	-	X	X	X	-	-	-	X
Hurricane	X	-	-	X	X	X	-	-	-	X
Severe Storm	X	-	-	X	X	X	-	-	-	X
Tornado	X	-	-	X	X	X	-	-	-	X
Pandemic	X	-	-	X	X	X	-	-	-	X
Winter Storm	X	-	-	X	X	X	-	-	-	X
Wildfire	X	-	-	X	X	X	-	-	-	X

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives San Saba County would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

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Table 9.2-14. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-San Saba County-001	Evacuation, Sheltering, Temporary and permanent Housing	**Problem:** A Countywide effort is needed to identify potential sites for placement of temporary housing for residents displaced by disasters. The County has un-certified shelters that have been identified in the past but updating of the sheltering list and memorandums of understanding for facility use is needed. **Solution:** The County will work with Volunteer Fire Department and Red Cross to identify places suitable for shelters and determiner what is needed for those places to be suitable for shelters. As part of the Planning Partnership established by the HMP, key County departments will assist municipalities that have been unable to identify potential sites for the placement of temporary housing units to house residents displaced by disaster. Memorandums of understanding will be updated after.	New and Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Pandemic, Winter Storm, Wildfire	1,2,4,6	Within 5 years	San Saba County Office of Emergency Management, Volunteer Fire Departments, Red Cross	County Budget	Improved sheltering, temporary housing, and permanent housing resources for residents	Staff Time	High	LPR	ES
2023-San Saba County-002	Debris Management Plan	**Problem:** The County does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events. **Solution:** San Saba County Emergency Management to	New	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards,	1,2,4	1-2 years	County Emergency Management	Municipal Budget	Ensure coordinated plans to safely remove debris from water ways	$10,000	High	LPR	PR, ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		develop a debris management plan as a framework for organizing the rapid, safe, and cost-effective separation, removal, collection, recycling, and disposal of debris after a disaster. This plan will include goals to minimize debris-related threats to public health, safety, and the environment following any hazard event.		Hurricane, Pandemic, Severe Storm, Tornado, Wildfire, Winter Weather									
2023-San Saba County-003	Substantial Damage Procedure	**Problem:** While major events that result in substantial damage of structures are rare, municipalities need to have official procedures in place to inspect structures, make determinations, and provide for appeals. **Solution:** The County will develop official procedures for Substantial Damage and Substantial Improvement determinations.	New	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Wildfire, Winter Weather	1,2,3	Within 5 years	Zoning and Planning Commission, Floodplain Administrator	Municipal Budget	Meet NFIP requirements, improved floodplain administration	Staff time	High	LPR	PP, PR
2023-San Saba County-004	Hazard Notification Systems	**Problem:** The County does not have substantial public alert system in place. **Solution:** The County Emergency Management will work with and local police to organize a system to notify the public with important hazard information.	New and Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado,	1,2,3,4	1-3 years	Planning Department, County Emergency Management, Police	Municipal Budget	Increase preparedness for hazard events	Low	High	LPR, EAP	PR

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
				Wildfire, Winter Weather									
2023-San Saba County-005	Warning Systems	**Problem:** San Saba County and surrounding jurisdictions experience flooding when the flow of water is greater than the carrying capacity of the stream channels. With inadequate warning systems areas located along the streambank have a high chance of flooding. **Solution:** The County Office of Emergency Management will work with the Texas Department of Transportation to implement sufficient warning systems and water detection systems throughout the County that will provide timely notification of potential flooding and prevent flooding to the roadways.	New and Existing	Flood	1,2,3,4	1-3 years	San Saba County Office of Emergency Management, Department of Transportation	HMGP, BRIC, CDBG-DR	Decrease risk of loss of life and property	$100,000	High	SIP,NSP, EAP	ES
2023-San Saba County-006	Enhance Landscaping and Design Measures	**Problem:** The County is prone to drought conditions which impact the infrastructure and landscape, and agriculture causing an increased use of water for irrigation. **Solution:** The County work with the Emergency Management Department to incorporate drought tolerant or xeriscape practices into landscape ordinances to	New and Existing	Drought	1,2,5,6	Within 5 years	County Emergency Management	LCRA, HMGP	Reduce use of water supply during drought conditions	Low	High	SIP,NSP	NR

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		reduce dependence on irrigation.											

Notes:
Not all acronyms and abbreviations defined below are included in the table.

Acronyms and Abbreviations:

CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*
FEMA	*Federal Emergency Management Agency*
FPA	*Floodplain Administrator*
HMA	*Hazard Mitigation Assistance*
N/A	*Not applicable*
NFIP	*National Flood Insurance Program*
OEM	*Office of Emergency Management*

Potential FEMA HMA Funding Sources:

FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC Program	*Building Resilient Infrastructure and Communities*

Timeline:
The time required for completion of the project upon implementation.

Cost:
The estimated cost for implementation.

Benefits:
A description of the estimated benefits, either quantitative and/or qualitative.

Critical Facility:
Yes *Critical Facility located in 1% floodplain*

Mitigation Category:

- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*
- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*

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- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities*

The prioritization criteria provided in Volume 1, Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

Table 9.2-15. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-San Saba County-001	Evacuation, Sheltering, Temporary and permanent Housing	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-San Saba County-002	Debris Management Plan	1	1	1	1	1	1	1	1	0	1	1	1	1	1	13	High
2023-San Saba County-003	Substantial Damage Procedure	1	1	1	1	1	1	1	1	1	1	1	0	1	1	13	High
2023-San Saba County-004	Hazard Notification Systems	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-San Saba County-005	Warning Systems	0	1	1	1	1	1	1	1	1	1	0	1	1	1	12	High
2023-San Saba County-006	Enhance Landscaping and Design Measures	0	1	1	1	1	1	1	1	1	1	0	1	1	1	12	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).

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Section 9 Jurisdictional Annexes

9.3 CITY OF HORSESHOE BAY

This section presents the jurisdictional annex for the City of Horseshoe Bay that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the municipality, who in the City participated in the planning process, an assessment of the City of Horseshoe Bay's risk and vulnerability, the different capabilities used in the City, and an action plan that will be implemented to achieve a more resilient community.

9.3.1 Hazard Mitigation Planning Team

The City of Horseshoe Bay identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many City departments, including Department of Emergency Services. The Fire Chief represented the community on the Llano County Hazard Mitigation Plan Planning Partnership and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes municipal officials that participated in the development of the annex and in what capacity. Additional documentation on the municipality's planning process through Planning Partnership meetings is included in Volume 1, Section 2 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.3-1. Hazard Mitigation Planning Team

Primary Point of Contact		Alternate Point of Contact	
Name/Title:	Brent Batla – Fire Chief	Name/Title:	Tim Foran – Public Works Director
Address:	1 Community Drive, Horseshoe Bay, TX 78657	Address:	1 Community Drive, Horseshoe Bay, TX 78657
Phone Number:	830-953-0093	Phone Number:	512-656-1844
Email:	bbatla@horseshoe-bay-tx.gov	Email:	tforan@horseshoe-bay-tx.gov
NFIP Floodplain Administrator			
Name/Title:	Sally McFeron - Development Services Director		
Address:	1 Community Drive, P.O. Box 7765, Horseshoe Bay, TX 78657		
Phone Number:	830-598-9959		
Email:	smcferon@horseshoe-bay-tx.gov		
Additional Contributors:			
Name/Title: Jeff Koska – City Manager Method of Participation:			
Name/Title: Brent Batla – Fire Chief Method of Participation: Provided information on previous events, capabilities, NFIP administration, building permits, and status of previous actions. Reviewed hazard rankings and contributed to mitigation strategies			

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9.3.2 Municipal Profile

The City of Horseshoe Bay is in the southwest corner of Llano County and borders the southern shore of lake Lyndon B. Johnson. Located 50 miles northwest of downtown Austin, the City is known for its scenic golf courses, resorts and hotels. The City has a total area of 11.6 square miles, 11.4 square miles of land and 0.23 square miles of water.

According to the U.S. Census, the 2020 population for the City of Horseshoe Bay was 4,257. Data from the 2020 U.S. Census indicate that 2.2 percent of the population is 5 years of age or younger and 53.5 percent is 65 years of age or older. Communities must deploy a support system that enables all populations to safely reach shelters or to quickly evacuate a hazard area.

9.3.3 Jurisdictional Capability Assessment and Integration

The City of Horseshoe Bay performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section 5 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The community's adaptive capacity to withstand hazard events.

For a community to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day local government operations. As part of the hazard mitigation analysis, planning/policy documents were reviewed, and each jurisdiction was surveyed to obtain a better understanding of their progress toward plan integration. The updated mitigation strategy provided an opportunity for the City of Horseshoe Bay to identify opportunities for integration of mitigation concepts that can be incorporated into municipal procedures.

Planning, Legal, and Regulatory Capability and Integration

The table below summarizes the regulatory tools that are available to the City of Horseshoe Bay. The comment field provides information as to how the capability integrates hazard mitigation and risk reduction.

Table 9.3-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	Yes	International Residential Code and International Building Code	Local	Development Services Department – Code Enforcement
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
The City of Horseshoe Bay adopted the International Residential Code and International Building Code.				
Zoning/Land Use Code	Yes	Chapter 14 – Zoning	Local	Development Services – Code Compliance and Enforcement
How does this reduce risk? The City of Horseshow Bay zoning ordinance was made in accordance with the Comprehensive Plan for the purpose of promoting the public health, safety, morals, and general welfare, and protecting and preserving places and areas of historical, cultural and/or architectural importance and significance within the City of Horseshoe Bay. The Article is designed to do the following: • Lessen congestion in the streets • Secure safety from fire, panic, and other dangers • Ensure adequate light and air • Prevent overcrowding of land • Facilitate adequate transportation, water, wastewater treatment, schools, parks and other public requirements. • Structures on any shoreline lots must be constructed with a minimum one floor above the floodplain elevation, as shown on the FEMA Flood Insurance Rate Map (FIRM)				
Subdivision Ordinance	Yes	Chapter 10 – Subdivision Regulations	Local	Development Services
How does this reduce risk? This article, in conjunction with any other land use control tool provides guidelines and mechanisms to achieve orderly, efficient, and environmentally sound subdivisions. The Article identifies the following guideline: • Provide for the orderly, efficient, and economical development of residential, and commercial land uses, and community facilities, including transportation, water, sewage, drainage, parks, recreation and any other related element or service. • Guide and phase land development to maximize the utilization of existing and proposed public improvements • Guide and regulate the financial impact of land development on municipal facilities, services, and capabilities • Ensure that the comprehensive and coordinated plans affected by the various land use controls of the city are not negated by disorganized, unplanned, and uncoordinated development which would create an undue burden and hardship on the community. • Establish and maintain municipal control over the character of development and the quality of community facilities and services • Enhance the community aesthetically and to preserve and improve the quality of life within the community • Promote the conservation of water resources; and • Promote the health, safety, morals and general welfare of the people, and the safe, orderly, and healthful development of the community. • Any planned development for two or more lots, tracts, or parcels are designed need a floodplain permit of acceptance for public improvements. Final plats should not be within the floodplain limits, if applicable and finished floor elevations of one foot above the one-hundred-year floodplain elevation will be shown where applicable.				
Site Plan Ordinance	Yes	Chapter 3- Building Regulations	Local	Development Services
How does this reduce risk? Approval of an application and issuance by the City of a building permit is required before any construction can be initiated on a project unless specifically exempt.				
Stormwater Management Ordinance	No	-	-	-
How does this reduce risk?				
Post-Disaster Recovery/ Reconstruction Ordinance	No	-	-	-
How does this reduce risk?				
Real Estate Disclosure	No	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Growth Management	No	-	-	-
How does this reduce risk?				
Environmental Protection Ordinance	No	-	-	-
How does this reduce risk?				
Flood Damage Prevention Ordinance	Yes	Chapter 3 – Building Regulations – Article 3.05 Flood Damage Prevention	Local, State	Development Services
How does this reduce risk? The purpose of this Article is to promote the safety, public health and general welfare of the community and to minimize public and private losses due to flood inundation. The Article identifies the following regulations: • 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 floodprone 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				
Wellhead Protection	No	-	-	-
How does this reduce risk?				
Emergency Management Ordinance	No	-	-	-
How does this reduce risk?				
Climate Change Ordinance	No	-	-	-
How does this reduce risk?				
Other	No	-	-	-
Planning Documents				
Comprehensive/Master Plan	Yes	Comprehensive Long-Range Plan - 2016	Local	Development Services
How does this reduce risk? The City of Horseshoe Bay Comprehensive Long-Range plan establishes the following guidelines to serve and protect its citizens while preserving the heritage and planning for the future: • Ensure high quality broadband internet access to support the professional and social needs of all citizens. • Update land use plan for commercial, residential, and open space • Manage economic growth to reflect the unique nature of Horseshoe Bay and the preservation of the resort/retirement character of the community • Protect the Environmental Health and Integrity of the City of Horseshoe Bay and the surrounding areas which impact the quality of life for its citizens • Outline a communication plan for external and internal purposes that inform and showcase the City of Horseshoe Bay's commitment to quality of life • Embrace a proactive advocacy presence with area, regional and state organizations to pursue protection and enrichment of lifestyle needs				
Capital Improvement Plan	No	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Disaster Debris Management Plan	No	-	-	-
How does this reduce risk?				
Floodplain Management or Watershed Plan	Yes – In Progress	Storm Water runoff plan in progress	Local	Development Services
How does this reduce risk? Identifies areas at risk for swift water incidents.				
Stormwater Management Plan	No	-	-	-
How does this reduce risk?				
Open Space Plan	No	-	-	-
How does this reduce risk?				
Urban Water Management Plan	No	-	-	-
How does this reduce risk?				
Habitat Conservation Plan	No	-	-	-
How does this reduce risk?				
Economic Development Plan	No	-	-	-
How does this reduce risk?				
Shoreline Management Plan	No	-	-	-
How does this reduce risk?				
Community Wildfire Protection Plan	Yes	Ready, Set, Go! – Wildland Fire Action Guide	Local	Fire Department
How does this reduce risk? The Ready, Set, Go! guide discusses preparation and safety measures for wildland fire hazards. The guide works in complementary and collaborative fashion with Firewise Communities Program.				
Community Forest Management Plan	No	-	-	-
How does this reduce risk?				
Transportation Plan	No	-	-	-
How does this reduce risk?				
Agriculture Plan	No	-	-	-
How does this reduce risk?				
Climate Action/ Resiliency/Sustainability Plan	No	-	-	-
How does this reduce risk?				
Tourism Plan	No	-	-	-
How does this reduce risk?				
Business/ Downtown Development Plan	No	-	-	-
How does this reduce risk?				
Other	No	-	-	-
Response/Recovery Planning				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Comprehensive Emergency Management Plan	Yes	Horseshoe Bay Emergency Operations Plan	Local	Emergency Management Office
How does this reduce risk? Ensures Jurisdiction is prepared to respond to and recover from disasters. Includes transportation planning.				
Continuity of Operations Plan	No	-	-	-
How does this reduce risk?				
Strategic Recovery Planning Report	No	-	-	-
How does this reduce risk?				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	-	-	-
How does this reduce risk?				
Post-Disaster Recovery Plan	Yes	Horseshoe Bay Emergency Operations Plan	Local	Emergency Management Office
How does this reduce risk? Included in the Horseshoe Bay Emergency Operations Plan				
Public Health Plan	No	-	-	-
How does this reduce risk?				
Other	No	-	-	-
How does this reduce risk?				

Development and Permitting Capability

The table below summarizes the capabilities of the City of Horseshoe Bay to oversee and track development.

Table 9.3-3. Development and Permitting Capability

Indicate if your jurisdiction implements the following	Yes/No	Comment:
Do you issue development permits? • If yes, what department is responsible?	Yes	Development Services
If you do not issue development permits, what is your process for tracking new development?	N/A	-
Are permits tracked by hazard area? (For example, floodplain development permits.)	No	-
Do you have a buildable land inventory?	Yes	There are about 11,000 lots that are not built upon in Horseshoe Bay.
Describe the level of build-out in your jurisdiction.	N/A	Planned developments with many areas left to build out.

Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to the City of Horseshoe Bay and their current responsibilities that contribute to hazard mitigation.

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Table 9.3-4. Administrative and Technical Capabilities

Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	Yes	The Planning and Zoning Commission is responsible for making recommendations to the City Council on the following items: Comprehensive Plan amendments Subdivision plats (not replats or minor plats) Zoning newly annexed areas Zoning Ordinances text Amendments Rezoning
Zoning Board of Adjustment	Yes	See Planning Board
Planning Department	No	
Mitigation Planning Committee	No	
Environmental Board/Commission	No	
Open Space Board/Committee	No	
Economic Development Commission/Committee	No	
Public Works/Highway Department	Yes	The City of Horseshoe Bay's Public Works Department is a multifaceted department responsible for street maintenance and repair, street signs, pavement markings, park maintenance, and facility maintenance.
Construction/Building/Code Enforcement Department	Yes	The mission of Code Compliance & Enforcement Division is to maintain the Health, Safety & welfare for the city residents and property values.
Emergency Management/Public Safety Department	Yes	The City of Horseshoe Bay Emergency Management Office falls under the guidance of the Fire Chief. The Team plans and prepares for emergencies, educates the public about preparedness, develops volunteers and relationships, manages grant funding to improve homeland security and public safety capabilities, coordinates emergency response and recovery, supports planned events, and works with public and partner organizations to protect our whole community when it needs us the most.
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	Yes	Emergency Warning – text, email or phone. CivicReady – communication services to receive emergency related issues. Warn Central Texas – regional notification system for Horseshoe Bay Area. Must sign up at WarnCentralTexas.org
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	No	-
Mutual aid agreements	No	
Human Resources Manual	No	Consider the following: Do any job descriptions specifically include identifying or implementing mitigation projects or other efforts to reduce natural hazard risk?
Other	No	
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	No	
Engineers or professionals trained in building or infrastructure construction practices	No	
Planners or engineers with an understanding of natural hazards	No	
Staff with expertise or training in benefit/cost analysis	No	

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Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Professionals trained in conducting damage assessments	No	
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	Yes	Technology Services – GIS Department
Environmental scientist familiar with natural hazards	No	
Surveyor(s)	No	
Emergency Manager	Yes	Fire Chief
Grant writer(s)	No	Limited to the fire department
Resilience Officer	No	
Other (this could include stormwater engineer, environmental specialist, etc.)	No	

Fiscal Capability

The table below summarizes financial resources available to the City of Horseshoe Bay.

Table 9.3-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/No)
Community development Block Grants (CDBG, CDBG-DR)	No
Capital improvements project funding	Yes
Authority to levy taxes for specific purposes	No
User fees for water, sewer, gas or electric service	Yes (water and gas only)
Impact fees for homebuyers or developers of new development/homes	Yes (only for target areas)
Stormwater utility fee	No
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	No
Other federal or state Funding Programs	No
Open Space Acquisition funding programs	No
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	No

Education and Outreach Capability

The table below summarizes the education and outreach resources available to the City of Horseshoe Bay.

Table 9.3-6. Education and Outreach Capabilities

Outreach Resources	Available? (Yes/No)	Comment:
Public information officer or communications office	No	-
Personnel skilled or trained in website development	Yes	Technology Services
Hazard mitigation information available on your website	Yes	Under Emergency Management Department link the CDC All-Hazards Preparedness Guide, and FEMA Mitigation Guide are available. As well as a local guide for Basic Emergency Supplies List & Contact Sheet

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Social media for hazard mitigation education and outreach	Yes	CivicReady/ WarnCentralTexas.org, Facebook, Twitter, Local radio station
Citizen boards or commissions that address issues related to hazard mitigation	No	-
Warning systems for hazard events	Yes	CivicReady, WarnCentralTexas.org
Natural disaster/safety programs in place for schools	No	-
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? • If yes, please describe.	Yes	Emergency Warning – text, email or phone. • CivicReady – communication services to receive emergency related issues. Warn Central Texas – regional notification system for Horseshoe Bay Area. Must sign up at WarnCentralTexas.org

Community Classifications

The table below summarizes classifications for community programs available to the City of Horseshoe Bay.

Table 9.3-7. Community Classifications

Program	Participating? (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	No	-	-
Building Code Effectiveness Grading Schedule (BCEGS)	No	-	-
Public Protection (ISO Fire Protection Classes 1 to 10)	Yes	4	2022
Storm Ready Certification	No	-	-
Firewise Communities classification	Yes	-	-
Other	No	-	-

Note:
N/A Not applicable
NP Not participating
- Unavailable

Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.
- Moderate: Capacity might exist; but is not used or could use some improvement.
- Weak: Capacity does not exist or could use substantial improvement.

Table 9.3-8. Adaptive Capacity

Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Moderate
Drought	Moderate

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Extreme Temperature	Moderate
Flood	Moderate
Geologic Hazards	Moderate
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Moderate
Winter Storm	Moderate
Wildfire	Moderate

9.3.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information and is listed in the Hazard Mitigation Planning Team table at the beginning of this annex.

National Flood Insurance Program (NFIP) Summary

The following table summarizes the NFIP statistics for the City of Horseshoe Bay. For details on the NFIP program and number of policies, refer to Section 4.3.4 (Flood).

Table 9.3-9. NFIP Summary

Municipality	Policies in Force	Number of Paid Claims*	Amount of Paid Claims*	Number of NFIP RL Properties	Number of NFIP SRL Properties
Horseshoe Bay (C)	N/A	0	$0	N/A	N/A

Source: NFIP 2016
Notes:
**Due to a contractual agreement with FEMA, information at the municipal level was not available to incorporate into the 2023 HMP Update. The information presented here for the municipalities is best available data from the last HMP.*
RL Repetitive Loss
SRL Severe Repetitive Loss

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in the City of Horseshoe Bay.

Table 9.3-10. NFIP Summary

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	No. Stormwater Runoff / Flood Map study has been scheduled
• Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	No
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	N/A
• How do you make Substantial Damage determinations?	Damage Assessment Team

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NFIP Topic	Comments
• How many were declared for recent flood events in your jurisdiction?	
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If not, state why.	No, more accurate data to be gathered
NFIP Compliance	
What local department is responsible for floodplain management?	Development Services
Are any certified floodplain managers on staff in your jurisdiction?	No
Do you have access to resources to determine possible future flooding conditions from climate change?	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	No
Provide an explanation of NFIP administration services you provide (e.g. permit review, GIS, education/outreach, inspections, engineering capability)	Permit Reviews, GIS, Inspections, Engineering reviews
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	Development review
What are the barriers to running an effective NFIP program in the community, if any?	Staffing
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state the violations.	No
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	Unknown
• What is the local law number or municipal code of your flood damage prevention ordinance? • What is the date that your flood damage prevention ordinance was last amended?	-
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Yes
Are there other local ordinances, plans or programs (e.g. site plan review) that support floodplain management and meeting the NFIP requirements? For instance, does the planning board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	Impervious Cover review and runoff calculations, Storm water runoff study in progress.

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NFIP Topic	Comments
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	Not at this time

9.3.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.3-11. Recent and Expected Future Development

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**
Single Family	N/A	N/A	80	0	93	0	92	0	85	0	169	0	216	0
Multi-Family	N/A	N/A	1	0	2	0	1	0	1	0	10	0	2	0
Other (commercial, mixed-use, etc.)	N/A	N/A	3	0	6	0	2	0	7	0	12	0	2	0
Total Permits Issued	N/A	N/A	83	0	101	0	95	0	93	0	191	0	220	0

SFHA Special Flood Hazard Area (1% annual chance flood event)

** Only location-specific hazard zones or vulnerabilities identified.*

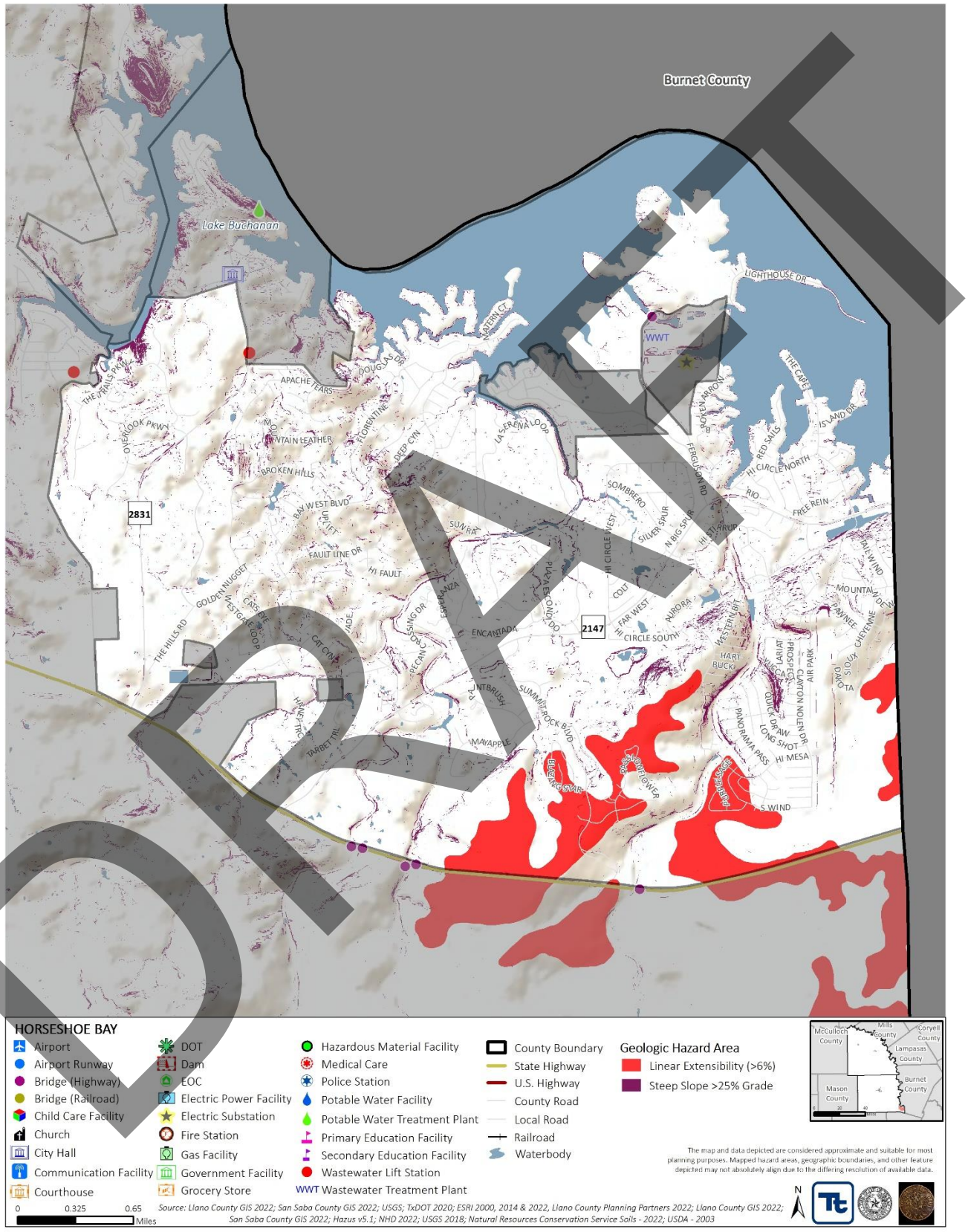
9.3.6 Jurisdictional Risk Assessment

The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard Ranking) provide detailed summaries for the City of Horseshoe Bay's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard area extent and location maps provided below illustrate the probable areas impacted within the jurisdiction based on the best available data at the time of the preparation of this plan and are adequate for planning purposes. Maps were generated only for those hazards that can be identified clearly using mapping techniques and technologies and for which the City of Horseshoe Bay has significant exposure. The maps also show the location of potential new development, where available.

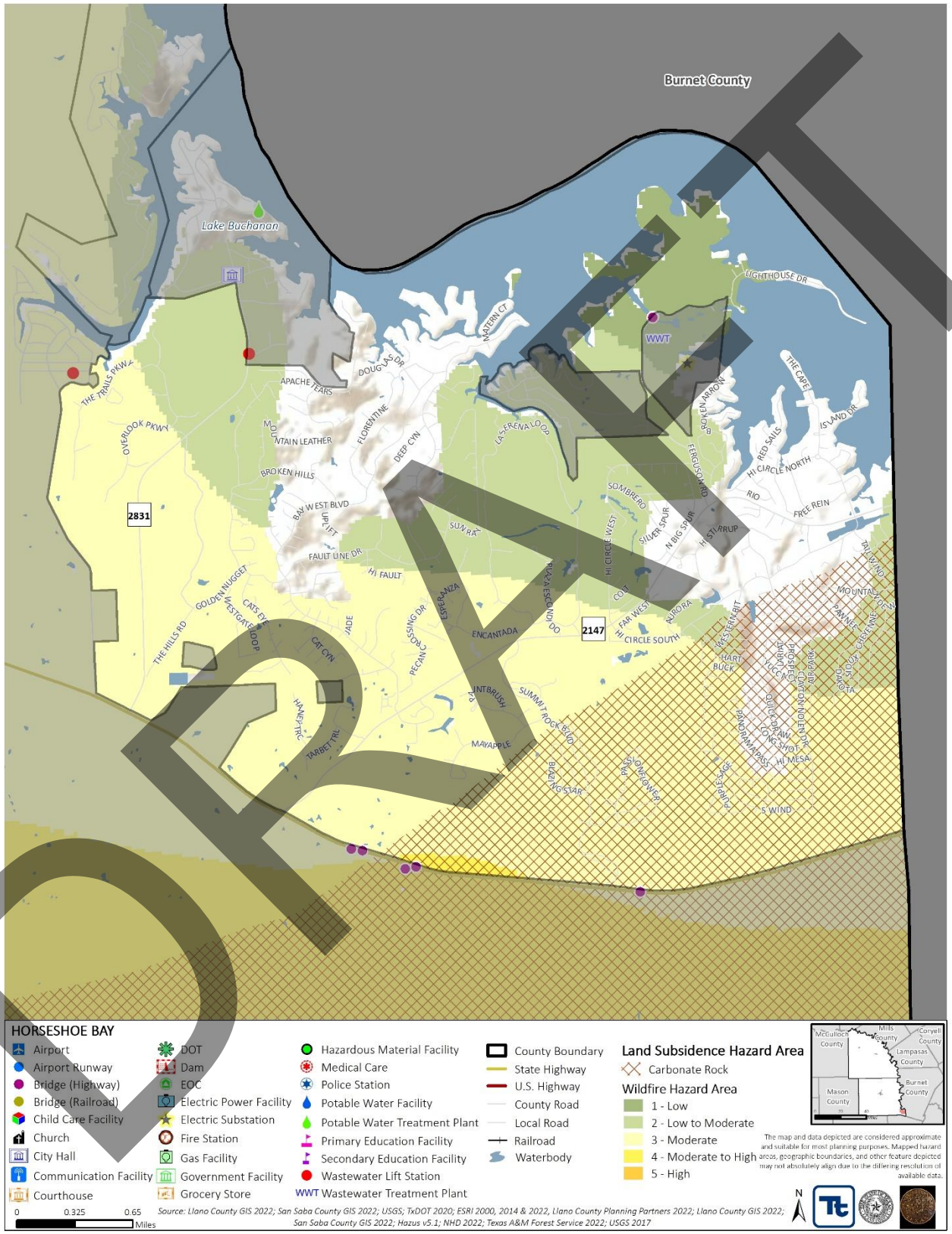
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Figure 9.3-1. City of Horseshoe Bay Geologic Hazard Area Extent and Location Map



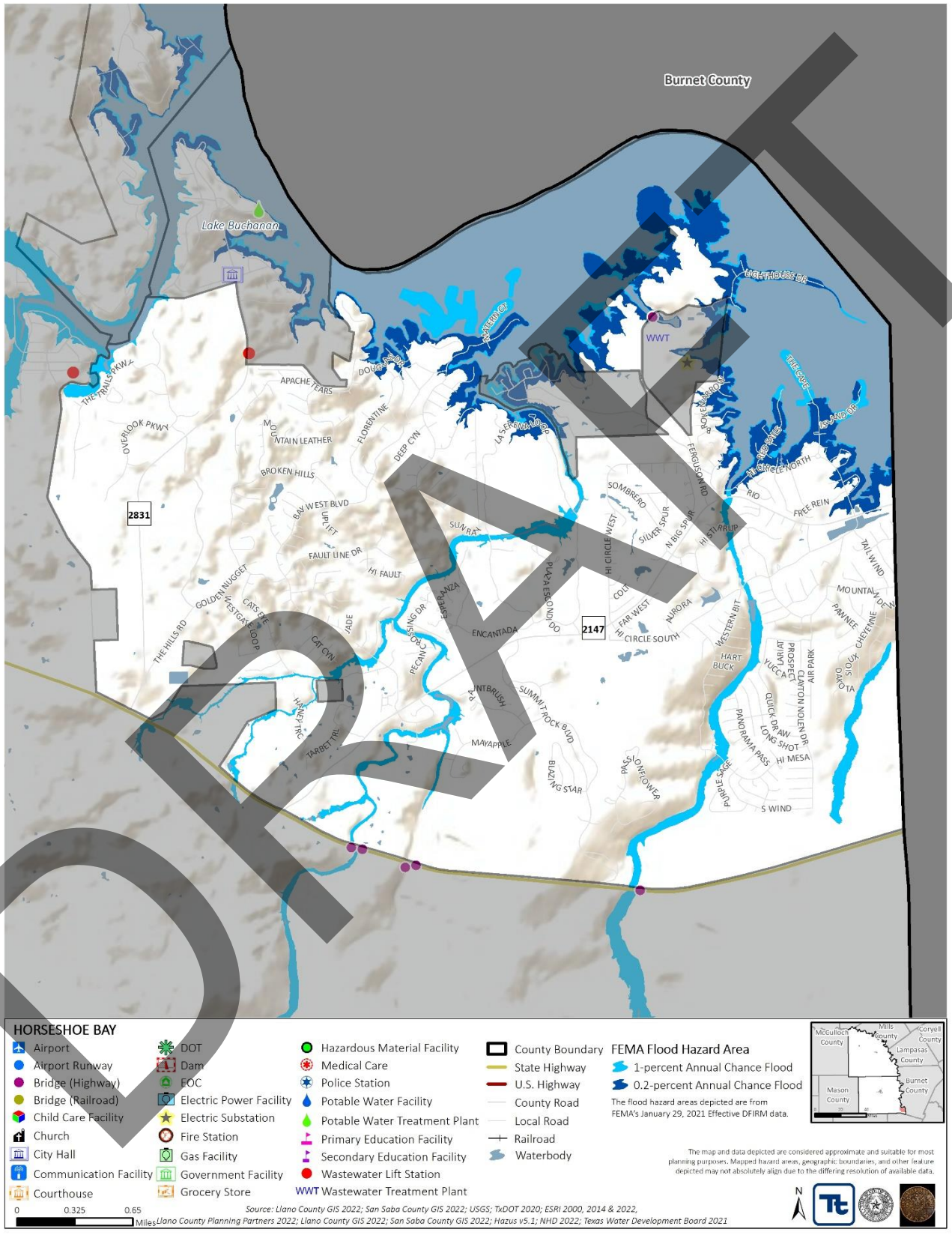
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Figure 9.3-2. City of Horseshoe Bay Land Subsidence Hazard Area Extent and Location Map



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Figure 9.3-3. City of Horseshoe Bay Flood Hazard Area Extent and Location Map



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Hazard Event History

Llano County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

The City of Horseshoe Bay's history of federally declared (as presented by FEMA) and significant hazard events [as presented in NOAA-National Centers for Environmental Information (NCEI)] is consistent with that of the County. The table below provides details regarding municipal-specific loss and damages the City experienced during hazard events since the last hazard mitigation plan update. Information provided in the table below is based on reference material or local sources.

Table 9.3-12. Hazard Event History

Dates of Event	Event Type (Disaster Declaration if applicable)	County Designated?	Summary of Event	Municipal Summary of Damages and Losses
September 10, 2018 – November 2, 2018	DR-4416 – Severe Storms and Flood	Yes	Severe storms and flooding had a severe impact on roads and bridges	Water Pump Station damaged
February 11, 2021 – February 21, 2021	EM-3554 – Severe Winter Storm, DR-4586 – Severe Winter Storms	Yes	Severe ice storm resulted in significant ice coverage of roads, utility lines, buildings and homes causing widespread utility failure	Generator destroyed, ruptured sewer lines

Notes:
EM Emergency Declaration (FEMA)
FEMA Federal Emergency Management Agency
DR Major Disaster Declaration (FEMA)
N/A Not applicable

Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4 (Risk Assessment) have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes the City of Horseshoe Bay's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment). The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and community capabilities to address the hazard and changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Therefore, each municipality ranked the degree of risk to each hazard as it pertains to their community. The table below summarizes the hazard risk/vulnerability rankings of potential natural hazards for the City of Horseshoe Bay. The City of Horseshoe Bay reviewed the County hazard risk/vulnerability risk ranking table and individual results to reflect the relative risk of the hazards of concern to the community.

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During the review of the hazard/vulnerability risk ranking, the City indicated the following:

- The City indicated that the ranking for Hurricane should be low and not medium because there has been no changes in frequency or severity of events.
- The City agreed with the remaining hazard ranking.

Table 9.3-13. Hazard Ranking Input

Dam Failure	Drought	Extreme Temperature	Flood	Geologic Hazards
Low	Medium	Medium	Medium	Low

Hurricane	Severe Storm	Tornado	Pandemic	Winter Weather	Wildfire
Low	High	High	Medium	Low	High

Critical Facilities

The table below identifies critical facilities in the community located in the 1-percent and 0.2-percent floodplain and presents Hazus-MH estimates of the damage and loss of use to critical facilities as a result of a 1-percent annual chance flood event.

Table 9.3-14. Potential Flood Losses to Critical Facilities

Name	Type	Exposure	
		1% Event	0.2% Event
No critical facilities located in the floodplain in the municipality.			

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

Identified Issues

After review of the City of Horseshoe Bay's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, the City of Horseshoe Bay identified the following vulnerabilities within their community:

- The City of Horseshoe Bay has outdated fire hydrants that are beginning to seize up due to lack of maintenance.
- The City of Horseshoe Bay has an outdated water system that creates issues of flooding, breaks, leaks, and inoperable fire hydrants.
- The City does not have a floodplain management plan.
- The City does not have a Stormwater Management Plan.
- The City does not have significant education and outreach initiatives to inform the public of hazard events.
- While major events that result in substantial damage of structures are rare, municipalities need to have official procedures in place to inspect structures, make determinations, and provide for appeals.
- The City does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events.
- Flood hazard maps do not adequately address the flood risk within the City. Better data and mapping is needed.

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- The City lacks an area-wide ENS.

9.3.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

Past Mitigation Initiative Status

The following table indicates progress on the community's mitigation strategy identified in the 2017 HMP. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.3-15. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, No Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)? Yes/No	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
1	Reduce and monitor water usage	Community Services Department	Ongoing	Yes	Ongoing Issue	Water
2	Install drought resistant vegetation	Community Services Department	Ongoing	Yes	Location	Dev Svc
3	Purchase NOAA "All Hazards" radios	Fire Department	Complete	No	-	-
4	Implement an Enhanced Area-wide ENS	Fire Department	No Progress	Yes	-	-
5	Conduct public education program on fire risks and wildland fire mitigation, with the assistance of the Texas Forest Service	Fire Department	Ongoing	Yes	Hazard	Fire
5	Educate homeowners on mitigation for their homes	Community Services Department	Ongoing	Yes	Hazard	Fire

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, the City of Horseshoe Bay identified the following mitigation efforts completed since the last HMP:

- None identified

Proposed Hazard Mitigation Initiatives for the HMP Update

The City of Horseshoe Bay participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide-range of activities and mitigation measures selected.

Table 9.3-16. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA				CRS					
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure	X	-	-	X	X	X	X	-	-	X
Drought	X	X	X	X	X	X	X	X	X	X
Extreme Temperature	X	-	-	X	X	X	X	-	-	X
Flood	X	X	X	X	X	X	X	X	X	X
Geological Hazards	X	X	X	X	X	X	X	X	X	X
Hurricane	X	X	X	X	X	X	X	X	X	X
Pandemic	X	-	-	X	X	X	X	-	-	X
Severe Storm	X	X	X	X	X	X	X	X	X	X
Tornado	X	-	-	X	X	X	X	-	-	X
Winter Weather	X	-	-	X	X	X	X	-	-	X
Wildfire	X	-	-	X	X	X	X	-	-	X

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives the City of Horseshoe Bay would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

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Table 9.3-17. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-City of Horseshoe Bay-001	Install Fire Hydrants	**Problem:** The City of Horseshoe Bay has outdated fire hydrants that are beginning to seize up due to lack of maintenance. **Solution:** The City of Horseshoe Bay will work with the Public Works Department and the Water Department to install new fire hydrants.	New and Existing	Drought, Wildfire	1,2,4	Within 3 years	Public Works Department, Water Department	HMGP; Assistance to Firefighters Grant Program	Increase fire safety measures	$4,000 per hydrant	High	SIP	PR
2023-City of Horseshoe Bay-002	Retrofit Water Systems	**Problem:** The City of Horseshoe Bay has an outdated water system that creates issues of flooding, breaks, leaks, and inoperable fire hydrants. **Solution:** The City of Horseshoe Bay will work with the Public Works Department and the Water Department to retrofit the water supply system by upgrading existing water delivery systems to eliminate breaks, leaks, and impurities in the water systems.	New	Drought, Flood, Geological Hazards, Severe Storm, Hurricane, Wildfire	1,2,4,	Within 5 years	Public Works Department, Water Department	HMGP	Increase open flow of water throughout City	$200,000	High	SIP, NSP	PP, SP
2023-City of Horseshoe Bay-003	Floodplain Management Plan	**Problem:** The City does not have a floodplain management plan. **Solution:** The City will work with the Development Services Department, Fire Department, and Public Works to identify the areas located in the floodplain and to develop a comprehensive floodplain management plan to protect public and private landowners from flooding events.	New	Flood	1,2,3,4	1-2 years	Development Services Department, Public Works, Fire Department	HMGP, BRIC, PDM	Decrease potential of loss of property and life during flooding events	Low	High	LPR	PR

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-City of Horseshoe Bay-004	Stormwater Management Plan	**Problem:** The City does not have a Stormwater Management Plan. **Solution:** The City will work with the Development Services Department, Planning and Zoning Commission to develop a Stormwater Management Plan for the City.	New	Flood	1,2,3,4	1-2 years	Development Services Department, Planning and Zoning Commission	HMGP, BRIC, PDM	Decrease potential for loss of life and property	Low	High	LPR	PR
2023-City of Horseshoe Bay-005	Education and Outreach	**Problem:** The City does not have significant education and outreach initiatives to inform the public of hazard events. **Solution:** The City will work with the Planning and Zoning Commissions, Development Services Department and Fire Departments to develop and implement a multi-hazard public awareness program that provide information on all hazards, preparedness and mitigation measures, and response during hazard events.	New	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Winter Weather, Wildfire	1,3	Within 1 year	Planning and Zoning Commission, Fire Department, Development Services Department	Municipal Budget	Increase public awareness of hazards, increase preparedness for hazard events	Staff Time	High	EAP	PI
2023-City of Horseshoe Bay-006	Substantial Damage Procedure	**Problem:** While major events that result in substantial damage of structures are rare, municipalities need to have official procedures in place to inspect structures, make determinations, and provide for appeals. **Solution:** The municipality will develop official procedures for Substantial Damage and Substantial Improvement determinations.	New	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Wildfire,	1,2,3	Within 5 years	Zoning and Planning Commission, Floodplain Administrator	Municipal Budget	Meet NFIP requirements, improved floodplain administration	Staff time	High	LPR	PP, PR

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
				Winter Weather									
2023-City of Horseshoe Bay-007	Debris Management Plan	**Problem:** The City does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events. **Solution:** The City Planning Board will work with the Llano County Emergency Management to develop a debris management plan as a framework for organizing the rapid, safe, and cost-effective separation, removal, collection, recycling, and disposal of debris after a disaster. This plan will include goals to minimize debris-related threats to public health, safety, and the environment following any hazard event.	New	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Wildfire, Winter Weather	1,2,4	1-2 years	City Planning Board	Municipal Budget	Ensure coordinated plans to safely remove debris from water ways	$10,000	High	LPR	PR, ES
2023-City of Horseshoe Bay-008	Stormwater Runoff / Flood Map Study	**Problem:** Flood hazard maps do not adequately address the flood risk within the City. Better data and mapping is needed. **Solution:** The City will complete a Stormwater Runoff / Flood Map study.	Existing	Flood	1,2,4, 5	Within 5 years	Administration	City budget	Improved flood data for planning and emergency response	Medium	High	LPR	PR
2023-City of Horseshoe Bay-009	Enhanced Area-wide ENS	**Problem:** The City lacks an area-wide ENS. **Solution:** The City will implement an Enhanced Area-wide ENS.	Existing	All Hazards	1,2,4	Within 5 years	Fire Department	City budget	Improved emergency planning	Medium	High	LPR	ES

Notes:
Not all acronyms and abbreviations defined below are included in the table.

Acronyms and Abbreviations:

Potential FEMA HMA Funding Sources:

Timeline:

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CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*
FEMA	*Federal Emergency Management Agency*
FPA	*Floodplain Administrator*
HMA	*Hazard Mitigation Assistance*
N/A	*Not applicable*
NFIP	*National Flood Insurance Program*
OEM	*Office of Emergency Management*
FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC	*Building Resilient Infrastructure and Communities Program*

The time required for completion of the project upon implementation.

Cost:

The estimated cost for implementation.

Benefits:

A description of the estimated benefits, either quantitative and/or qualitative.

Critical Facility:

Yes *Critical Facility located in 1% floodplain*

Mitigation Category:

- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*
- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*
- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.*

The prioritization criteria provided in Volume 1, Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

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Table 9.3-18. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-City of Horseshoe Bay-001	Install Fire Hydrants	0	1	1	1	1	1	-1	0	1	1	0	1	1	1	9	High
2023-City of Horseshoe Bay-002	Retrofit Water Systems	1	1	0	1	1	1	-1	1	1	1	1	1	1	1	11	High
2023-City of Horseshoe Bay-003	Floodplain Management Plan	1	1	1	1	1	1	1	1	1	1	0	1	1	1	13	High
2023-City of Horseshoe Bay-004	Stormwater Management Plan	1	1	1	1	1	1	1	1	1	1	0	1	1	1	13	High
2023-City of Horseshoe Bay-005	Education and Outreach	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-City of Horseshoe Bay-006	Substantial Damage Procedure	1	1	1	1	1	1	1	1	1	1	1	0	1	1	13	High
2023-City of Horseshoe Bay-007	Debris Management Plan	1	1	1	1	1	1	1	1	0	1	1	1	1	1	13	High
2023-City of Horseshoe Bay-008	Stormwater Runoff / Flood Map Study	1	1	1	1	1	1	1	1	1	1	1	0	1	1	13	High
2023-City of Horseshoe Bay-009	Enhanced Area-wide ENS	1	0	1	1	1	1	1	1	1	1	1	0	1	1	12	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).

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Section 9 Jurisdictional Annexes

9.4 City of Llano

This section presents the jurisdictional annex for the City of Llano that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the municipality, who in the City participated in the planning process, an assessment of the City of Llano's risk and vulnerability, the different capabilities used in the City, and an action plan that will be implemented to achieve a more resilient community.

9.4.1 Hazard Mitigation Planning Team

The City of Llano identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many City departments, including the City Administrator and Code Compliance Officer. The City Administrator and Code Compliance represented the community on the Llano County Hazard Mitigation Plan Planning Partnership and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes municipal officials that participated in the development of the annex and in what capacity. Additional documentation on the municipality's planning process through Planning Partnership meetings is included in Volume 1, Section 2 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.4-1. Hazard Mitigation Planning Team

Primary Point of Contact	Alternate Point of Contact
Name/Title: Josh Becker – Interim City Administrator Address: 301 W. Main Street, 1st floor, Llano, TX 78643 Phone Number: 325-247-4158	Name/Title: Donny Carpenter – Code Compliance Officer Address: 301 W. Main, Llano, TX 78643 Phone Number: 325-423-9277
NFIP Floodplain Administrator	
Name/Title: Martin Mangum – City Administrator/NFIP Administrator Address: 301 W. Main Street, 2nd floor, Llano, TX 78643 Phone Number: 325-247-4158 ex.106	
Additional Contributors:	
Name/Title: Kim Wagner – City Secretary Method of Participation: Provided information and data for Hazards of Concern and other worksheets. Contributed to mitigation strategy.	

9.4.2 Municipal Profile

The City of Llano is in central northwest portion of the County. The City is settled on the Llano River and is 65 miles northwest of Austin. The City has a total of 4.7 square miles, of which 0.3 square miles are covered by water.

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According to the U.S. Census, the 2020 population for the City of Llano was 3,490, a 6.0 percent increase from the 2010 Census. Data from the 2020 U.S. Census indicate that 9.0 percent of the population is 5 years of age or younger and 19.8 percent is 65 years of age or older. Communities must deploy a support system that enables all populations to safely reach shelters or to quickly evacuate a hazard area.

9.4.3 Jurisdictional Capability Assessment and Integration

The City of Llano performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section 5 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The community's adaptive capacity to withstand hazard events.

For a community to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day local government operations. As part of the hazard mitigation analysis, planning/policy documents were reviewed, and each jurisdiction was surveyed to obtain a better understanding of their progress toward plan integration. The updated mitigation strategy provided an opportunity for the City of Llano to identify opportunities for integration of mitigation concepts that can be incorporated into municipal procedures.

Planning, Legal, and Regulatory Capability and Integration

The table below summarizes the regulatory tools that are available to the City of Llano. The comment field provides information as to how the capability integrates hazard mitigation and risk reduction.

Table 9.4-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	Yes	Ordinance 1312	Local	Code Enforcement Department
How does this reduce risk? The City of Llano adopted the International Building Code and International Residential Code. The City of Llano Building Official in the Code Enforcement Department are responsible for the following: • Examine the premises for which permits have been issued and make the necessary inspections to see that the provisions of law are complied with, and that construction is safely prosecuted. • Enforce all provisions of the building code. • Make investigations in connection with matters referred to in the building code and render written reports thereon, when requested by the proper authority or when the public interest requires. • Issue such notices or orders as may be necessary to enforce compliance with law, remove illegal or unsafe conditions, secure the necessary safeguards during construction or require adequate exit facilities in buildings and structures.				
Zoning/Land Use Code	Yes	Chapter 110 – Zoning	Local	Code Enforcement Department

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
How does this reduce risk? The zoning regulations and districts in the City of Llano are made in accordance with the Comprehensive Plan for the purpose for promoting the health, safety, morals, and general welfare of the City. The City zoning and land use code is designed to do the following: • Lessen congestion in the streets. • Secure safety from fire, panic, and other dangers. • Ensure adequate light and air. • Prevent overcrowding of land. • Avoid undue concentration of population. • Facilitate the adequate provision of transportation, water, sewerage, schools, parks, and other public requirements .				
Subdivision Ordinance	Yes	Chapter 90 – Subdivisions	Local	Permitting
How does this reduce risk? The City Subdivision Ordinance is the first step in urban development. The Chapter is designed to encourage the development and quality of urban environment by establishing standards for the provision of adequate light, air, open space, stormwater drainage, transportation, public utilities and facilities, and other needs necessary for ensuring the creation and continuance of a healthy, attractive, safe, and efficient community that provides for the conservation, enhancement, and protection of its human and natural resources.				
Site Plan Ordinance	Yes	Chapter 110, Division 7. Site Plan Approval	Local	Planning and Zoning Commission
How does this reduce risk? The article is intended to establish a procedure for coordinating improvements to properties within the Retail (R) district, other than single-family or two-family use. Site plan approval and zoning standards are intended to promote the efficient and cohesive use of land, safe and efficient vehicular and pedestrian circulation, parking and loading, lighting, screening, and landscaping.				
Stormwater Management Ordinance	Yes	Ordinance 754	Local	Permitting
How does this reduce risk? Protection of natural waterway from over development.				
Post-Disaster Recovery/ Reconstruction Ordinance	No	-	-	-
How does this reduce risk?				
Real Estate Disclosure	No	-	-	-
How does this reduce risk?				
Growth Management	No	-	-	-
How does this reduce risk?				
Environmental Protection Ordinance	No	-	-	-
How does this reduce risk?				
Flood Damage Prevention Ordinance	Yes	Ordinance 1208	Local	Permitting
How does this reduce risk? The purpose of the Flood Damage Prevention Ordinance is to protect the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas. The flood hazard areas of City of Llano are subject to periodic inundation, which results 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, all of which adversely affect the public health, safety, and general welfare. These flood losses are created by the cumulative effect of obstructions in floodplains which cause an increase in flood heights and velocities, and by the occupancy of flood hazard areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, floodproofed or otherwise protected from flood damage.				
Wellhead Protection	No	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Emergency Management Ordinance	Yes	Ordinance 502	Local	Permitting
How does this reduce risk? The Emergency Management Ordinance lays out the preparation for carrying out emergency measures and functions for the City of Llano to prevent and reduce risks from hazards. This Ordinance aims to protect life, property, health and promote safety during a hazard event.				
Climate Change Ordinance	No	-	-	-
How does this reduce risk?				
Other	No	-	-	-
Planning Documents				
Comprehensive/Master Plan	Yes	Ordinance 754- 3/2/98	Local	P & Z
How does this reduce risk? Comprehensive land use and thoroughfare plan for future growth and expansion.				
Capital Improvement Plan	Yes	Capital Improvement Program July 2016	Local	City of Llano Water/Wastewater
How does this reduce risk? The Capital Improvement Program identifies and prioritizes aging utility infrastructure for replacement.				
Disaster Debris Management Plan	Yes	Ordinance 634	County	City
How does this reduce risk? Combined city and county resources for emergency operations. It is important that disaster debris be properly managed to protect human health, property, and minimize environmental impacts.				
Floodplain Management or Watershed Plan	Yes	Ordinance 634	County	City
How does this reduce risk? Combined city and county resources for emergency operations.				
Stormwater Management Plan	No	-	-	-
How does this reduce risk?				
Open Space Plan	No	-	-	-
How does this reduce risk?				
Urban Water Management Plan	No	-	-	-
How does this reduce risk?				
Habitat Conservation Plan	No	-	-	-
How does this reduce risk?				
Economic Development Plan	Yes	Llano Economic Development Corporation	Local	Llano Economic Development Corporation
How does this reduce risk? The Llano Economic Development Corporation established key policies and actions to guide the economic development of the city.				
Shoreline Management Plan	No	-	-	-
How does this reduce risk?				
Community Wildfire Protection Plan	No	-	-	-
How does this reduce risk?				
Community Forest Management Plan	No	-	-	-
How does this reduce risk?				
Transportation Plan	Yes	Ordinance 754- 3/2/98	Local	City
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
The transportation ordinance has not been updated since 1998; therefore, the ordinance does not integrate the current hazard mitigation plan. Upon update of the ordinance, the City will incorporate aspects of the mitigation plan where applicable.				
Agriculture Plan	No	-	-	-
How does this reduce risk?				
Climate Action/ Resiliency/Sustainability Plan	No	-	-	-
How does this reduce risk?				
Tourism Plan	No	-	-	-
How does this reduce risk?				
Business/ Downtown Development Plan	No	-	-	-
How does this reduce risk?				
Other	No	-	-	-
Response/Recovery Planning				
Comprehensive Emergency Management Plan	No	-	-	-
How does this reduce risk?				
Continuity of Operations Plan	No	-	-	-
How does this reduce risk?				
Strategic Recovery Planning Report	No	-	-	
How does this reduce risk?				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	-	-	-
How does this reduce risk?				
Post-Disaster Recovery Plan	No	-	-	-
How does this reduce risk?				
Public Health Plan	No	-	-	-
How does this reduce risk?				
Other	No	-	-	-
How does this reduce risk?				

Development and Permitting Capability

The table below summarizes the capabilities of the City of Llano to oversee and track development.

Table 9.4-3. Development and Permitting Capability

Indicate if your jurisdiction implements the following	Yes/No	Comment:
Do you issue development permits? • If yes, what department is responsible?	Yes	Permitting Department

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Indicate if your jurisdiction implements the following	Yes/No	Comment:
If you do not issue development permits, what is your process for tracking new development?	N/A	-
Are permits tracked by hazard area? (For example, floodplain development permits.)	Yes	Floodplain development permits
Do you have a buildable land inventory? • If yes, please describe	No	-
Describe the level of build-out in your jurisdiction.	N/A	

Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to the City of Llano and their current responsibilities that contribute to hazard mitigation.

Table 9.4-4. Administrative and Technical Capabilities

Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Commission	Yes	The Planning and Zoning Commission is charged with the review, investigation, and recommendation of land use within the City of Llano. The Planning and Zoning Commission shall recommend action and deliberate amendments, text, and final copy of the Comprehensive Plan and Zoning and Subdivision Regulations to the City Council.
Zoning Board of Adjustment	Yes	See Planning and Zoning Commission
Planning Department	No	-
Mitigation Planning Committee	No	-
Environmental Board/Commission	No	-
Open Space Board/Committee	No	-
Economic Development Commission/Committee	Yes	The EDC is task with bringing new business to town that will enhance the tax base and/or enhance the technology available to current business and residence.
Public Works/Highway Department	Yes	The City of Llano Public Works is under the supervision of the City Administrator. The City of Llano Public Works provides the following services: • Airport to the Llano community • Citizen's collection station • City elementary • Parks and recreation services • Street and drainage maintenance The Street Department is responsible for all maintenance and repair of city streets, traffic signs, pavement markings, curbs, and drainage within the city. This department also conducts the annual street minor reconstruction program.
Construction/Building/Code Enforcement Department	Yes	The Code Enforcement Department promotes community awareness, encourage compliance regarding City Municipal Codes and to foster civic pride in the community by providing essential requirements to safeguard the public health, safety and the general welfare through the regulation and enforcement of the City of Llano Municipal Codes.
Emergency Management/Public Safety Department	Yes	Llano Volunteer Fire Department and City of Llano Police Department

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Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	Yes	County 9-1-1 based emergency phone notifications and warning sirens within the City.
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	Yes	See Public Works/Highway Department
Mutual aid agreements	Yes	The City of Llano has a interlocal agreement with Llano County for equipment and labor for street maintenance. The Llano Volunteer Fire Department has a mutual aid agreement with the Hill County Fire Chiefs Association for emergency response with all Llano County fire departments.
Human Resources Manual	No	-
Other	No	-
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	Yes	City of Llano has a contract with Steger & Bizzell Engineering Firm.
Engineers or professionals trained in building or infrastructure construction practices	Yes	City of Llano has a contract with Steger & Bizzell Engineering Firm.
Planners or engineers with an understanding of natural hazards	Yes	City of Llano has a contract with Steger & Bizzell Engineering Firm.
Staff with expertise or training in benefit/cost analysis	Yes	See Above, Finance Director and Director of Water & Wastewater Operations.
Professionals trained in conducting damage assessments	Yes	Multiple staff and members of local fire department.
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	Yes	City of Llano has a contract with Steger & Bizzell Engineering Firm along with Director of Water & Wastewater Operations.
Environmental scientist familiar with natural hazards	No	-
Surveyor(s)	No	-
Emergency Manager	Yes	Llano County Emergency Manager, City of Llano Manager
Grant writer(s)	Yes	City of Llano has a contract with Grant Works for writing and administering grants.
Resilience Officer	No	-
Other (this could include stormwater engineer, environmental specialist, etc.)	No	-
How do your administrative/technical capabilities contribute to risk reduction in your community? Allows for proper planning of new development to reduce impact from known hazards.		

Fiscal Capability

The table below summarizes financial resources available to the City of Llano.

Table 9.4-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/No)
Community development Block Grants (CDBG, CDBG-DR)	Yes
Capital improvements project funding	Yes
Authority to levy taxes for specific purposes	Yes

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Financial Resources	Accessible or Eligible to Use? (Yes/No)
User fees for water, sewer, gas, or electric service	Yes
Impact fees for homebuyers or developers of new development/homes	Yes
Stormwater utility fee	No
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	No
Other federal or state Funding Programs	Yes
Open Space Acquisition funding programs	No
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	Yes

Education and Outreach Capability

The table below summarizes the education and outreach resources available to the City of Llano.

Table 9.4-6. Education and Outreach Capabilities

Outreach Resources	Available? (Yes/No)	Comment:
Public information officer or communications office	No	-
Personnel skilled or trained in website development	Yes	Multi staff task with website updates.
Hazard mitigation information available on your website	No	-
Social media for hazard mitigation education and outreach	Yes	Facebook, Twitter, YouTube
Citizen boards or commissions that address issues related to hazard mitigation	No	-
Warning systems for hazard events	Yes	Warning sirens within the City
Natural disaster/safety programs in place for schools	No	-
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? • If yes, please describe.	No	-

Community Classifications

The table below summarizes classifications for community programs available to the City of Llano.

Table 9.4-7. Community Classifications

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Program	Participating? (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	No	-	-
Building Code Effectiveness Grading Schedule (BCEGS)	No	-	-
Public Protection (ISO Fire Protection Classes 1 to 10)	No	5/5X	July 1, 2015
Storm Ready Certification	No	-	-
Firewise Communities classification	No	-	-
Other	No	-	-

Note:
N/A Not applicable
NP Not participating
- Unavailable

Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.
- Moderate: Capacity might exist; but is not used or could use some improvement.
- Weak: Capacity does not exist or could use substantial improvement.

Table 9.4-8. Adaptive Capacity

Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Weak
Drought	Strong
Extreme Temperature	Moderate
Flood	Weak
Geologic Hazards	Weak
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Moderate
Winter Storm	Moderate
Wildfire	Moderate

9.4.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information and is listed in the Hazard Mitigation Planning Team table at the beginning of this annex.

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National Flood Insurance Program (NFIP) Summary

The following table summarizes the NFIP statistics for the City of Llano. For details on the NFIP program and number of policies, refer to Section 4.3.4 (Flood).

Table 9.4-9. NFIP Summary

Municipality	Policies in Force	Number of Paid Claims*	Amount of Paid Claims*	Number of NFIP RL Properties	Number of NFIP SRL Properties
Llano (C)	N/A	8	$108,283	N/A	N/A

Source: NFIP 2016
Notes:
**Due to a contractual agreement with FEMA, information at the municipal level was not available to incorporate into the 2023 HMP Update. The information presented here for the municipalities is best available data from the last HMP.*
RL Repetitive Loss
SRL Severe Repetitive Loss

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in the City of Llano.

Table 9.4-10. NFIP Summary

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	
• Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	
• How do you make Substantial Damage determinations? • How many were declared for recent flood events in your jurisdiction?	
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If not, state why.	Yes
NFIP Compliance	
What local department is responsible for floodplain management?	Code Enforcement Department
Are any certified floodplain managers on staff in your jurisdiction?	Lance Klein, PE, PH, CFM and Charlie Hastings, PE, **CFM**, County Engineer

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NFIP Topic	Comments
Do you have access to resources to determine possible future flooding conditions from climate change?	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	Yes- Training people in various departments as CFM's is useful if there is a flooding issue that needs to be taken care of quickly
Provide an explanation of NFIP administration services you provide (e.g. permit review, GIS, education/outreach, inspections, engineering capability)	The purpose of the Code Enforcement Department is to promote community awareness, encourage compliance regarding City Municipal Codes and to foster civic pride in the community by providing essential requirements to safeguard the public health, safety and the general welfare through the regulation and enforcement of the City of Llano Municipal Codes through permit review and inspections.
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	
What are the barriers to running an effective NFIP program in the community, if any?	Staffing and funding
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state the violations.	
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	
• What is the local law number or municipal code of your flood damage prevention ordinance? • What is the date that your flood damage prevention ordinance was last amended?	Ordinance 1208
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Meets
Are there other local ordinances, plans or programs (e.g., site plan review) that support floodplain management and meeting the NFIP requirements? For instance, does the planning board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	Chapter 46 in the municipal code dictates authority and enforcement of floodplain management. The City Council discusses the floodplain and flood areas in monthly meetings regularly to ensure flood regulations are being followed.
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	No

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9.4.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The

table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.4-11. Recent and Expected Future Development

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**
Single Family	12	1	18	0	13	1	10	0	14	1	20	0	10	0
Multi-Family	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other (commercial, mixed-use, etc.)	0	0	2	0	1	0	4	1	4	0	2	1	1	0
Total Permits Issued	**12**	**1**	**20**	**0**	**14**	**1**	**14**	**1**	**18**	**1**	**22**	**10**	**11**	**0**

SFHA Special Flood Hazard Area (1% annual chance flood event)

** Only location-specific hazard zones or vulnerabilities identified.*

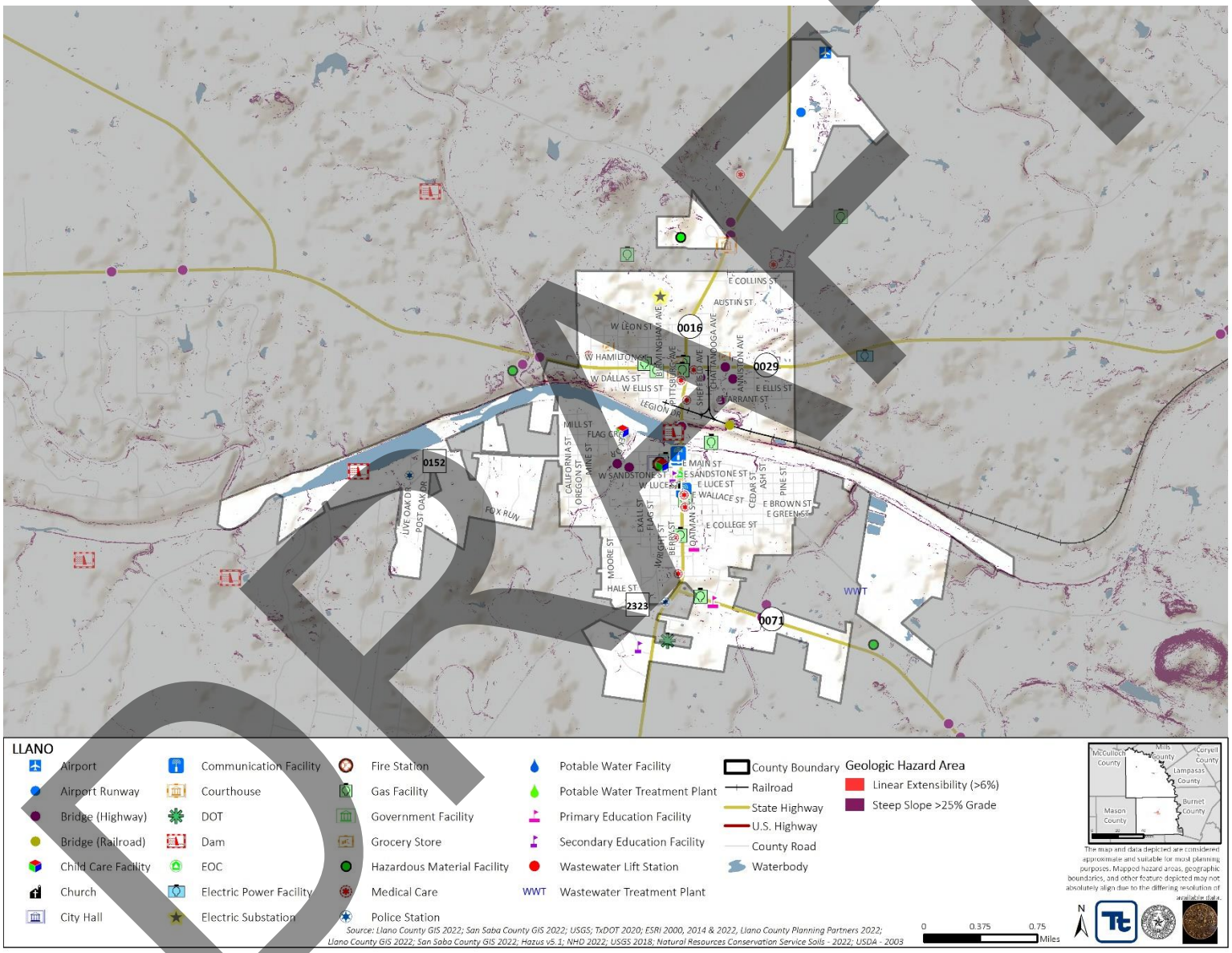
9.4.6 Jurisdictional Risk Assessment

The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard Ranking) provide detailed summaries for the City of Llano's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard area extent and location maps provided below illustrate the probable areas impacted within the jurisdiction based on the best available data at the time of the preparation of this plan and are adequate for planning purposes. Maps were generated only for those hazards that can be identified clearly using mapping techniques and technologies and for which the City of Llano has significant exposure. The maps also show the location of potential new development, where available.

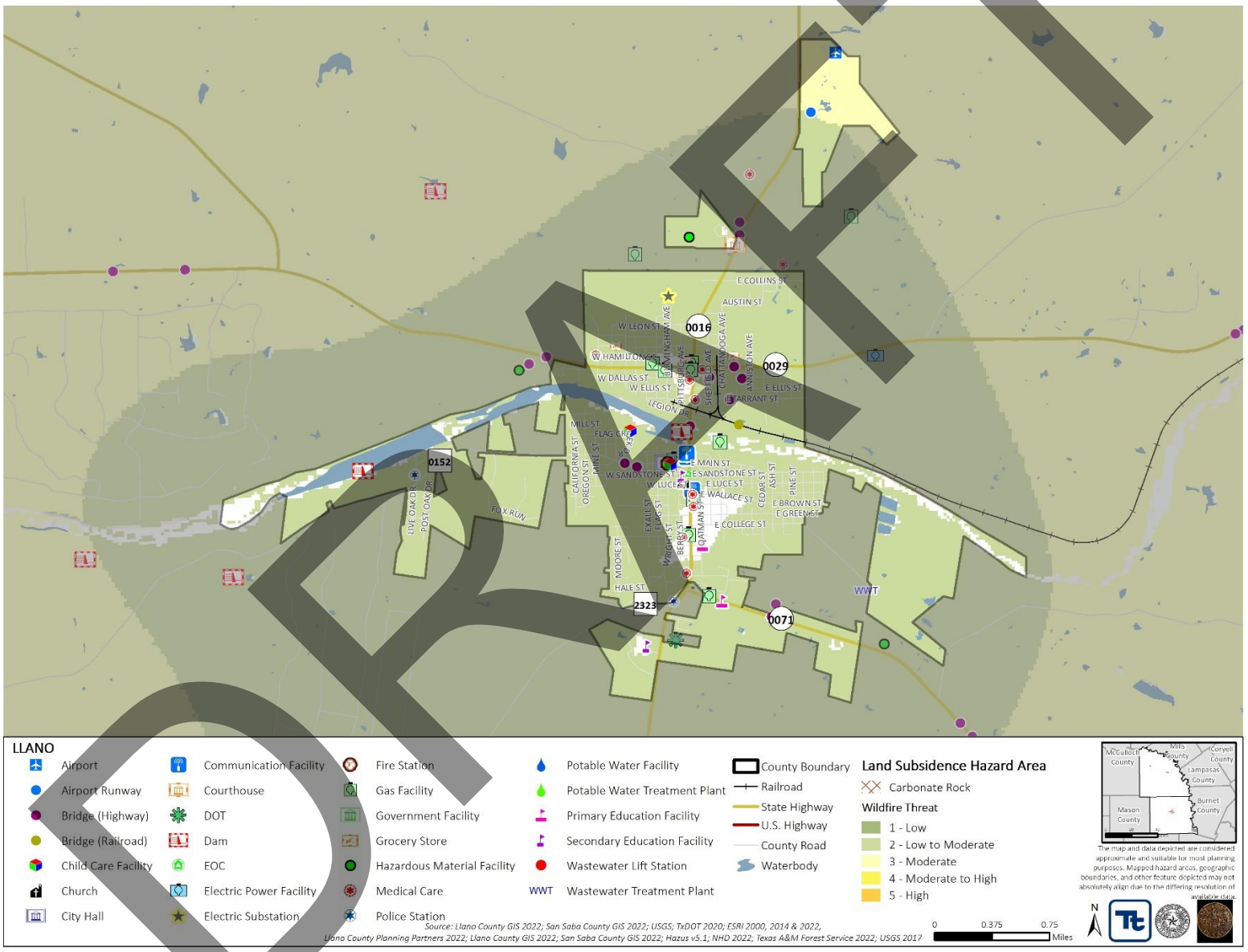
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Figure 9.4-1. City of Llano Geologic Hazard Area Extent and Location Map



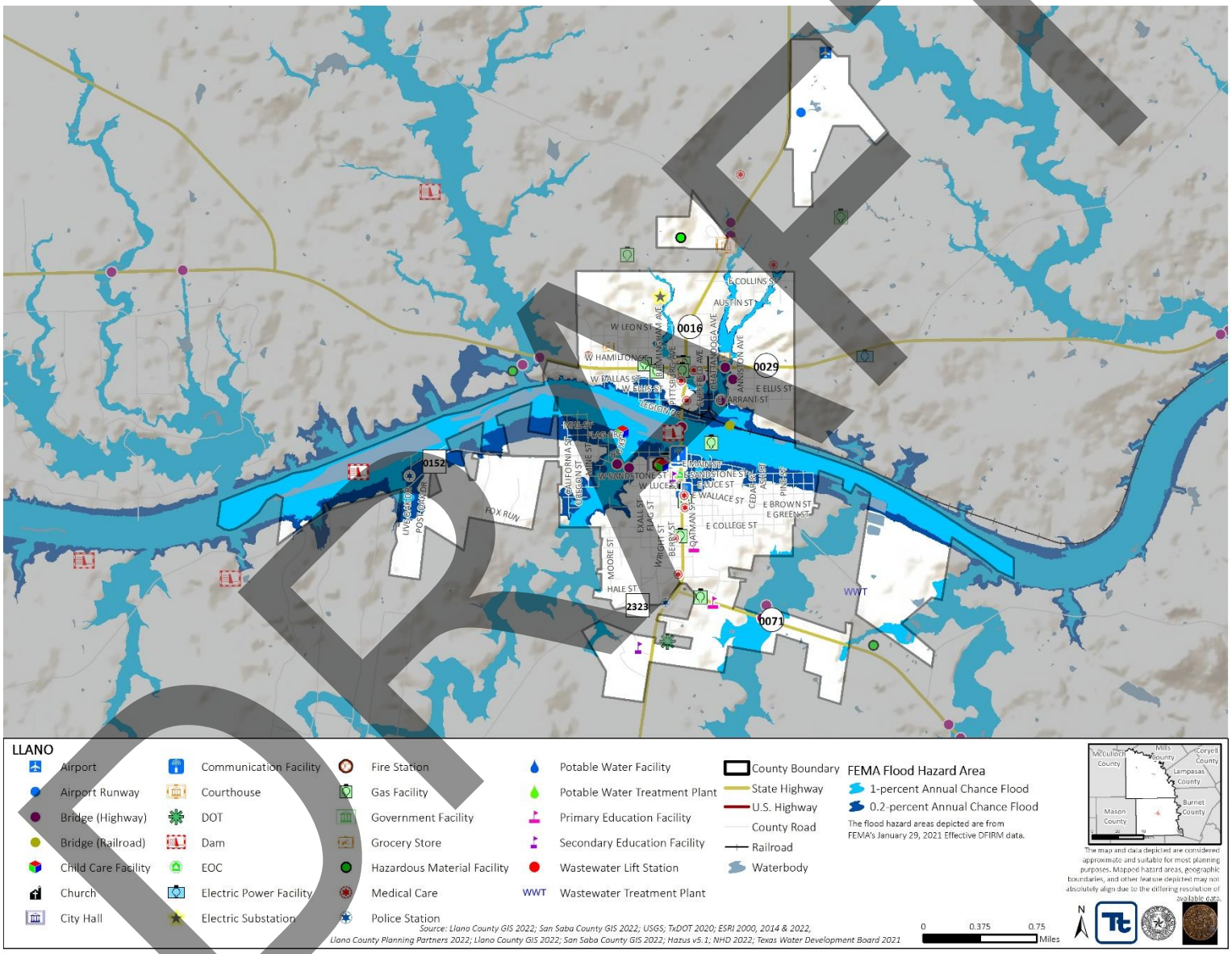
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Figure 9.4-2. City of Llano Land Subsidence Hazard Area Extent and Location Map



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Figure 9.4-3. City of Llano Flood Hazard Area Extent and Location Map



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Hazard Event History

Llano County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

The City of Llano's history of federally declared (as presented by FEMA) and significant hazard events [as presented in NOAA-National Centers for Environmental Information (NCEI)] is consistent with that of the County. The table below provides details regarding municipal-specific loss and damages the City experienced during hazard events since the last hazard mitigation plan update. Information provided in the table below is based on reference material or local sources.

Table 9.4-12. Hazard Event History

Dates of Event	Event Type (Disaster Declaration if applicable)	County Designated?	Summary of Event	Municipal Summary of Damages and Losses
September 10, 2018 – November 2, 2018	DR-4416 – Severe Storms and Flood	Yes	Severe storms and flooding had a severe impact on roads and bridges	Road damage, water plant pump station damage, sewer system flooding with debris
February 11, 2021 – February 21, 2021	EM-3554 – Severe Winter Storm, DR-4586 – Severe Winter Storms	Yes	Severe ice storm resulted in significant ice coverage of roads, utility lines, buildings and homes causing widespread utility failure	Multiple water line breaks, road icing, broken trees causing power outages, road closures

Notes:
EM Emergency Declaration (FEMA)
FEMA Federal Emergency Management Agency
DR Major Disaster Declaration (FEMA)
N/A Not applicable

Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4 (Risk Assessment) have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes the City of Llano's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment). The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and community capabilities to address the hazard and changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Therefore, each municipality ranked the degree of risk to each hazard as it pertains to their community. The table below summarizes the hazard risk/vulnerability rankings of potential natural hazards for the City of Llano. The City of Llano reviewed the County hazard risk/vulnerability risk ranking table and individual results to reflect the relative risk of the hazards of concern to the community.

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During the review of the hazard/vulnerability risk ranking, the City indicated the following:

- The City modified the risk ranking for the following hazards:
  - Dam Failure – Low to medium ranking
  - Drought – medium to high ranking
  - Flood – medium to high ranking
  - Hurricane – medium to low ranking
  - Tornado – high to medium ranking
  - Pandemic – medium to low ranking
  - Winter Storm – low to medium ranking
  - Wildfire – high to medium ranking
- The City agreed with the remaining hazard ranking

Table 9.4-13. Hazard Ranking Input

Dam Failure	Drought	Extreme Temperature	Flood	Geologic Hazards	Hurricane
Medium	High	Medium	High	Low	Low

Severe Storm	Tornado	Pandemic	Winter Storm	Wildfire
High	Medium	Low	Medium	Medium

Critical Facilities

The table below identifies critical facilities in the community located in the 1-percent and 0.2-percent floodplain and presents Hazus-MH estimates of the damage and loss of use to critical facilities as a result of a 1-percent annual chance flood event.

Table 9.4-14. Potential Flood Losses to Critical Facilities

Name	Type	Exposure	
		1% Event	0.2% Event
Sunoco-Stripes	Gas Facility	X	X
Vp Racing Fuels-Hwy 29 Short Stop	Gas Facility	X	X
Tractor Supply	Gas Facility	X	X
Family Dollar	Grocery Store	X	X
Lowe's Market	Grocery Store	X	X
Baylor Scott & White Clinic - Llano	Medical Care	X	X
Llano Head Start	Child Care Facility	X	X

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

In addition to critical facilities that are exposed to flooding, the following high hazard dams are located in or could impact the City of Llano:

- No high hazard dams in the City.

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Identified Issues

After review of the City of Llano's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, the City of Llano identified the following vulnerabilities within their community:

- The City experiences periods of severe drought, which results in depleted water supply for crops, soils, and residents drinking water.
- Problem: The Community Center, City Hall, and First Baptist Church are community lifelines in the City of Llano and do not have backup power and cannot properly operate during power outages.
- The City storm drains overflow during storm events.
- Problem: The City has undersized culverts that overflow and flood during rain events.
- The City experiences mass shutdowns, school closings, and job losses due to the COVID-19 pandemic,
- The City does not have a sufficient and timely warning system for tornado, winter weather, severe storms, and hurricane events.
- The City does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events
- While major events that result in substantial damage of structures are rare, municipalities need to have official procedures in place to inspect structures, make determinations, and provide for appeals.
- Non-native landscaping can be damaged by drought.
- The Llano River bed is overgrown, reducing natural drainage capabilities.
- Additional drought related education on water conservation is needed.

9.4.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

Past Mitigation Initiative Status

The following table indicates progress on the community's mitigation strategy identified in the 2016 HMP. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.4-15. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, No Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)? Yes/No	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
1	Stricter building codes adopted and incorporate into other planning efforts	Code Enforcement Department	Complete	No	-	-
2	Drought Contingency Plan	Water Department	In Progress	Yes	Single Water Source	Water Department
3	Implement monitoring of soil compositions	City Manager	No Progress	No	-	-
4	Landscape requirements	Permitting Department	No Progress	Yes	Native Landscape due to drought history	Permitting Department
5	Install city sirens for early warning for natural hazard events	Public Works Department	Complete	No	-	-
6	Purchase NOAA All Hazard radios	Fire Department	Complete	No	-	-
7	Install new water meters	Utilities Department	Complete	No	-	-
8	Implement a new program to clear and clean creeks/drains and Llano River bed	Public Works Department	In Progress	Yes	Overgrown Natural Drainage Area	Maintenance Department
9	Water conservation education	Main Street Section	In Progress	Yes	Drought	Administration
10	Implement new Reverse 911	City Secretary	Complete	No	-	-
11	Well qualified and equipped volunteer fire department	Fire Department	Complete	No	-	-

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, the City of Llano identified the following mitigation efforts completed since the last HMP:

- None identified

Proposed Hazard Mitigation Initiatives for the HMP Update

The City of Llano participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide-range of activities and mitigation measures selected.

Table 9.4-16. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA				CRS					
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure	X	X	-	-	X	X	-	-	-	X
Drought	X	X	X	X	X	X	-	-	-	X
Extreme Temperature	X	X	-	-	X	X	-	-	-	X
Flood	X	X	X	X	X	X	X	X	-	X
Geologic Hazards	X	X	X	X	X	X	-	-	-	X
Hurricane	X	X	X	X	X	X	X	X	-	X
Severe Storm	X	X	X	X	X	X	X	X	-	X
Tornado	X	X	X	X	X	X	X	-	-	X
Pandemic	X	X	-	X	X	X	X	-	-	X
Winter Weather	X	X	X	X	X	X	X	-	-	X
Wildfire	X	X	-	-	X	X	-	-	-	X

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives the City of Llano would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

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Table 9.4-17. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-City of Llano-001	Drought Contingency Plan	**Problem**: The City experiences periods of severe drought, which results in depleted water supply for crops, soils, and residents drinking water. **Solution**: The City will develop a Drought Contingency Plan to address the different degrees or drought, water shortage, and expansive soil problems.	New	Drought, Geological Hazards,	1,2,3,4,5,6,	1-3 years	City Public Works, Planning and Zoning Commission	FEMA, TCEQ, Texas Water Development Board, Texas Colorado River, Texas Colorado River Floodplain Coalition	Improve accuracy of water supply forecast, Decrease the likelihood of water contamination and supply	<$10,000	High	LPR, EAP, NSP	ES
2023-City of Llano-002	Backup Generators	**Problem**: The Community Center, City Hall, and First Baptist Church are community lifelines in the City of Llano and do not have backup power and cannot properly operate during power outages.	New	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado,	1,2,4	Within 1 year	Planning and Zoning Commission, Emergency Management	FEMA HMGP and BRIC, City Budget, FMA	Maintain continuity of operations during hazard events	$100,000	High	SIP	PP, ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		Solution: The City will obtain backup generators for Community Center, City Hall and Baptist Church to maintain continuity of operations during emergencies.		Wildfire, Winter Weather									
2023-City of Llano-003	Storm Drain Replacement	**Problem**: The City storm drains overflow during storm events. **Solution**: The City Public Works will work the County to replace and upsize the storm drains to reduce the risk of flooding and overflowing during storm event.	New	Flood, Severe Storm, Hurricane	1, 2, 4	1-3 years	City of Public Works, County Emergency Management	National Culvert Removal, Replacement, Restoration Grant Program, BRIC, FMA	Increase direct water flow, reduce risk of flooding and overflow during storm events	High	High	SIP, NSP	NR
2023-City of Llano-004	Culvert Upsizing	**Problem:** The City has undersized culverts that overflow and flood during rain events. **Solution:** The City Public Works Department will work with the Department of Emergency	New	Flood, Severe Storm, Hurricane, Geological Hazards	1,2,4	Within 5 years	City Public Works Department, Department of Emergency Management	FMA, BRIC, HMGP	Decrease likelihood of culvert and drainage area overflow	High	High	SIP, NSP	NR

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		Management to do an engineering study to determine the appropriate length and width to upsize the undersized culverts and complete the necessary improvements.											
2023-City of Llano-005	Education and Outreach – COVID-19	**Problem**: The City experiences mass shutdowns, school closings, and job losses due to the COVID-19 pandemic, **Solution**: The City Emergency Management will work with the County Office of Emergency Management and the State of Texas and Public Health Authorities to educate community members about the risk of COVID-19 infection and provide information for how to best protect yourself and the community.	New	Pandemic	1,2,3,6	Within 1 year	City Emergency Management, Office of Emergency Management, USACE, State of Texas, Public Health Authorities	DR-4480 – COVID Relief, EMPG	Prevent loss of life, increase awareness of disease spread	$10,000 or less	High	EAP	PI,ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-City of Llano-006	Warning System	**Problem**: The City does not have a sufficient and timely warning system for tornado, winter weather, severe storms, and hurricane events. **Solution**: The City Emergency Management will work with the WarnCentralTexas alert system to warn the community of threatening storm events	New	Flood, Hurricane, Severe Storm, Winter Storm, Tornado, Geological Hazards	1, 2, 3,4	1-3 years	City Emergency Management, WarnCentralTexas, Red Cross	CDBG, HMGP, BRIC	Prevent loss of life and property, increase awareness of hazard events	$10,000 - $50,000	High	SIP, EAP, NSP	ES, PI, PP
2023-City of Llano-007	Debris Management Plan	**Problem:** The City does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events **Solution:** The City Planning Board will work with the Llano County Emergency Management to develop a debris management plan as a framework for organizing the rapid, safe, and cost-effective separation,	New and Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Wildfire, Winter Weather	1,2,4	1-2 years	City Planning Board, Llano County Emergency Management	Municipal Budget	Ensure coordinated plans to safely remove debris from water ways	$10,000	High	LPR	PR, ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		removal, collection, recycling, and disposal of debris after a disaster. This plan will include goals to minimize debris-related threats to public health, safety, and the environment following any hazard event.											
2023-City of Llano-008	Substantial Damage Procedure	**Problem:** While major events that result in substantial damage of structures are rare, municipalities need to have official procedures in place to inspect structures, make determinations, and provide for appeals. **Solution:** The municipality will develop official procedures for Substantial Damage and Substantial Improvement determinations.	New	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Wildfire, Winter Weather	1,2,3	Within 5 years	City Planning Board, Floodplain Administration	Municipal Budget	Meet NFIP requirements, improved floodplain administration	Staff Time	High	LPR	PP, PR
2023-City of Llano-009	Landscape Requirements	**Problem:** Non-native landscaping can be damaged by drought.	New	Drought	2	Within 5 years	Permitting Department	Municipal budget	Reduce landscaping damaged by drought	Staff time	High	LPR	PR

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		Solution: The Permitting Department will establish landscape requirements that include native landscaping to better withstand drought.											
2023-City of Llano-010	Llano River Bed Cleaning	**Problem:** The Llano River bed is overgrown, reducing natural drainage capabilities. **Solution:** The Maintenance Department will establish a new program to clear and clean creeks/drains and Llano River bed.	N/A	Flood	1,4	1 year	Maintenance Department	City budget	Improved natural floodplain function	Staff time	High	LPR, NSP	PR, NR
2023-City of Llano-011	Water Conservation Education	**Problem:** Additional drought related education on water conservation is needed. **Solution:** The Main Street Section will develop and carry out a water conservation education.	New and Existing	Drought	1	2 years	Main Street Section	City budget	Improved public awareness	Staff time	High	EAP	PI

Notes:
Not all acronyms and abbreviations defined below are included in the table.

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Acronyms and Abbreviations:

CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*
FEMA	*Federal Emergency Management Agency*
FPA	*Floodplain Administrator*
HMA	*Hazard Mitigation Assistance*
N/A	*Not applicable*
NFIP	*National Flood Insurance Program*
OEM	*Office of Emergency Management*

Potential FEMA HMA Funding Sources:

FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC	*Building Resilient Infrastructure and Communities Program*

Timeline:

The time required for completion of the project upon implementation.

Cost:

The estimated cost for implementation.

Benefits:

A description of the estimated benefits, either quantitative and/or qualitative.

Critical Facility:

Yes *Critical Facility located in 1% floodplain*

Mitigation Category:

- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*
- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*
- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.*

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The prioritization criteria provided in Volume 1, Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

Table 9.4-18. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-City of Llano-001	Drought Contingency Plan	1	1	1	0	1	1	1	1	0	-1	0	1	1	1	9	High
2023-City of Llano-002	Backup Generators	1	0	1	1	1	1	1	1	0	1	1	1	1	0	11	High
2023-City of Llano-003	Storm Drain Replacement	1	1	1	1	1	1	1	1	0	1	1	1	1	0	12	High
2023-City of Llano-004	Culvert Upsizing	1	1	1	1	1	1	1	1	1	1	1	1	1	0	13	High
2023-City of Llano-005	Education and Outreach – COVID-19	1	1	1	1	1	1	1	1	1	1	1	1	1	0	13	High
2023-City of Llano-006	Warning System	1	1	1	1	1	1	1	1	1	1	1	1	1	0	13	High
2023-City of Llano-007	Debris Management Plan	1	1	1	1	1	1	1	1	0	1	1	1	1	1	13	High
2023-City of Llano-008	Substantial Damage Procedure	0	1	1	1	1	1	1	1	1	1	1	0	1	1	12	High
2023-City of Llano-009	Landscape Requirements	0	1	1	1	1	1	1	1	1	1	0	1	1	1	12	High
2023-City of Llano-010	Llano River Bed Cleaning	1	1	1	1	1	1	1	1	1	1	0	1	1	1	13	High

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Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-City of Llano-011	Water Conservation Education	1	0	1	1	1	1	1	1	1	1	0	1	1	1	12	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).

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Section 9 Jurisdictional Annexes

9.5 City of San Saba

This section presents the jurisdictional annex for the City of San Saba that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the municipality, who in the City participated in the planning process, an assessment of the City of San Saba's risk and vulnerability, the different capabilities used in the City, and an action plan that will be implemented to achieve a more resilient community.

9.5.1 Hazard Mitigation Planning Team

The City of San Saba identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many City departments, including Department of Public Works, Code Enforcement Officer, Police, and City Manager. The Code Enforcement Officer represented the community on the Llano County Hazard Mitigation Plan Planning Partnership and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes municipal officials that participated in the development of the annex and in what capacity. Additional documentation on the municipality's planning process through Planning Partnership meetings is included in Volume 1, Section 2 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.5-1. Hazard Mitigation Planning Team

Primary Point of Contact		Alternate Point of Contact	
Name/Title:	Michael Wadsworth – Code Enforcement Officer	Name/Title:	Sabrina Maultsby - City Secretary
Address:	303 S Clear Street, San Saba, TX 76877	Address:	303 S Clear Street, San Saba, TX 76877
Phone Number:	325-372-5133	Phone Number:	325-372-5133
Email:	inspector@centex.net	Email:	sansaba@centex.net
NFIP Floodplain Administrator			
Name/Title:	Sabrina Maultsby - City Secretary		
Address:	303 S Clear Street, San Saba, TX 76877		
Phone Number:	325-372-5133		
Email:	sansaba@centex.net		
Additional Contributors:			
Name/Title: Michael Wadsworth – Code Enforcement Officer Method of Participation: Provided information on previous events, NFIP administration, capabilities, building permits, and the status of previous actions. Contributed to mitigation strategy.			

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9.5.2 Municipal Profile

The City of San Saba is in the center of Texas Hill Country. Known for the views and landscapes, the City of San Saba has a total area of 1.8 square miles consisting of all land.

According to the U.S. Census, the 2020 population for the City of San Saba was 3,490, a 9.0 percent increase from the 2010 Census. Data from the 2020 U.S. Census indicate that 6.0 percent of the population is 5 years of age or younger and 19.8 percent is 65 years of age or older. Communities must deploy a support system that enables all populations to safely reach shelters or to quickly evacuate a hazard area.

9.5.3 Jurisdictional Capability Assessment and Integration

The City of San Saba performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section 5 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The community's adaptive capacity to withstand hazard events.

For a community to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day local government operations. As part of the hazard mitigation analysis, planning/policy documents were reviewed, and each jurisdiction was surveyed to obtain a better understanding of their progress toward plan integration. The updated mitigation strategy provided an opportunity for the City of San Saba to identify opportunities for integration of mitigation concepts that can be incorporated into municipal procedures.

Planning, Legal, and Regulatory Capability and Integration

The table below summarizes the regulatory tools that are available to the City of San Saba. The comment field provides information as to how the capability integrates hazard mitigation and risk reduction.

Table 9.5-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	Yes	Chapter 3 - International Residential Code and Building Code	Local	Code Enforcement Officer
How does this reduce risk? The City of San Saba adopted the International Residential Code and International Building Code.				
Zoning/Land Use Code	Yes	Chapter 14 – Zoning	Local	Planning and Zoning Commission
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
This ordinance is designed to zone the entire area of the City of San Saba in accordance with a comprehensive plan for the purpose of promoting health, safety, morals, and the general welfare of the general public.				
Subdivision Ordinance	Yes	Chapter 10 – Subdivision Regulations. Ordinance 1991-2	Local	City Council
How does this reduce risk? This Ordinance is specifically designed to lessen congestion on streets; promote the orderly layout and use of land; secure safety from fire and other dangers; provide adequate light and air; facilitate adequate provisions for transportation, water, sewage, schools, parks, playgrounds, and other public requirements; and protect neighborhood areas from the hazard of through traffic.				
Site Plan Ordinance	No			
How does this reduce risk?				
Stormwater Management Ordinance	No			
How does this reduce risk?				
Post-Disaster Recovery/ Reconstruction Ordinance	No			
How does this reduce risk?				
Real Estate Disclosure	No			
How does this reduce risk?				
Growth Management	No			
How does this reduce risk?				
Environmental Protection Ordinance	No			
How does this reduce risk?				
Flood Damage Prevention Ordinance	Yes	Chapter 3 – Building Regulations – Article 3.04 Flood Damage Prevention	Local	Public Works Department
How does this reduce risk? It is the purpose of this article to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas by 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 area, and Ensure that potential buyers are notified that property is in a flood area.				
Wellhead Protection	No			
How does this reduce risk?				
Emergency Management Ordinance	No			
How does this reduce risk?				
Climate Change Ordinance	No			
How does this reduce risk?				
Other	No			
Planning Documents				
Comprehensive/Master Plan	Yes	City of San Saba Comprehensive Plan 2001 - 2020	Local	Planning and Zoning Commission
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
The City of San Saba Comprehensive Plan is established to promote the health, safety, and general welfare of the community while maintaining the City character and managing economic growth.				
Capital Improvement Plan	No			
How does this reduce risk?				
Disaster Debris Management Plan	No			
How does this reduce risk?				
Floodplain Management or Watershed Plan	No			
How does this reduce risk?				
Stormwater Management Plan	No			
How does this reduce risk?				
Open Space Plan	No			
How does this reduce risk?				
Urban Water Management Plan	No			
How does this reduce risk?				
Habitat Conservation Plan	No			
How does this reduce risk?				
Economic Development Plan	No			
How does this reduce risk?				
Shoreline Management Plan	No			
How does this reduce risk?				
Community Wildfire Protection Plan	No			
How does this reduce risk?				
Community Forest Management Plan	No			
How does this reduce risk?				
Transportation Plan	No			
How does this reduce risk?				
Agriculture Plan	No			
How does this reduce risk?				
Climate Action/ Resiliency/Sustainability Plan	No			
How does this reduce risk?				
Tourism Plan	No			
How does this reduce risk?				
Business/ Downtown Development Plan	No			
How does this reduce risk?				
Other	No			
Response/Recovery Planning				
Comprehensive Emergency Management Plan	Yes	County Emergency Operations Plan	State, Local	Emergency Management Office
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
The City of San Saba maintains a local Emergency Operations Plan and is covered under the County Emergency Operations Plan.				
Continuity of Operations Plan	No			
How does this reduce risk?				
Strategic Recovery Planning Report	No			
How does this reduce risk?				
Threat & Hazard Identification & Risk Assessment (THIRA)	No			
How does this reduce risk?				
Post-Disaster Recovery Plan	No			
How does this reduce risk?				
Public Health Plan	No			
How does this reduce risk?				
Other	Yes	Fire Marshal Plan	Local	Emergency Management Office

Development and Permitting Capability

The table below summarizes the capabilities of the City of San Saba to oversee and track development.

Table 9.5-3. Development and Permitting Capability

Indicate if your jurisdiction implements the following	Yes/No	Comment:
Do you issue development permits? • If yes, what department is responsible?	No	-
If you do not issue development permits, what is your process for tracking new development?	N/A	-
Are permits tracked by hazard area? (For example, floodplain development permits.)	Yes	All permits identify if the property is in a floodplain.
Do you have a buildable land inventory? • If yes, please describe	No	-
Describe the level of build-out in your jurisdiction.	N/A	-

Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to the City of San Saba and their current responsibilities that contribute to hazard mitigation.

Table 9.5-4. Administrative and Technical Capabilities

Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	Yes	The Planning and Zoning Commission is responsible for making recommendations to the City Council on the following items: • Comprehensive Plan amendments

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Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
		• Subdivision plats (not replats or minor plats) • Zoning newly annexed areas • Zoning Ordinances text Amendments • Rezoning
Zoning Board of Adjustment	Yes	See Planning Board
Planning Department	No	-
Mitigation Planning Committee	No	-
Environmental Board/Commission	No	-
Open Space Board/Committee	No	-
Economic Development Commission/Committee	Yes	The Economic Development Commission is a seven-member board that implements goals and for the community's future.
Public Works/Highway Department	Yes	Public Works Department is responsible for fleet and general maintenance, parks sanitation, street, water, and electrical departments.
Construction/Building/Code Enforcement Department	Yes	The Code Enforcement Officer oversees all matters concerning planning and zoning, building permits, and code enforcement.
Emergency Management/Public Safety Department	Yes	-
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	Yes	The City currently operates outdoor warning sirens and is in the process of acquiring a Reverse 911 system
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	Yes	The City cleans out the drainage ditches and creeks, and the tree trimming for the power lines.
Mutual aid agreements	Yes	The City has a Mutual aid agreement with the county
Human Resources Manual	No	-
Other	No	-
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	No	-
Engineers or professionals trained in building or infrastructure construction practices	No	-
Planners or engineers with an understanding of natural hazards	No	-
Staff with expertise or training in benefit/cost analysis	No	-
Professionals trained in conducting damage assessments	No	-
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	No	-
Environmental scientist familiar with natural hazards	No	-
Surveyor(s)	No	-
Emergency Manager	Yes	Emergency Management Department
Grant writer(s)	No	-
Resilience Officer	No	-
Other (this could include stormwater engineer, environmental specialist, etc.)	No	-

Fiscal Capability

The table below summarizes financial resources available to the City of San Saba.

Table 9.5-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/No)
Community development Block Grants (CDBG, CDBG-DR)	Yes
Capital improvements project funding	Yes
Authority to levy taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	Yes (water, sewer, and electric)
Impact fees for homebuyers or developers of new development/homes	No
Stormwater utility fee	No

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Financial Resources	Accessible or Eligible to Use? (Yes/No)
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	No
Other federal or state Funding Programs	No
Open Space Acquisition funding programs	No
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	No

Education and Outreach Capability

The table below summarizes the education and outreach resources available to the City of San Saba.

Table 9.5-6. Education and Outreach Capabilities

Outreach Resources	Available? (Yes/No)	Comment:
Public information officer or communications office	Yes	City Secretary
Personnel skilled or trained in website development	Yes	City Secretary
Hazard mitigation information available on your website	No	-
Social media for hazard mitigation education and outreach	No	-
Citizen boards or commissions that address issues related to hazard mitigation	Yes	Economic Development, Planning and Zoning Commission
Warning systems for hazard events	Yes	The City currently operates outdoor warning sirens and is in the process of acquiring a Reverse 911 system.
Natural disaster/safety programs in place for schools	No	-
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? • If yes, please describe.	Yes	The City uses the local radio station to communicate to the public.

Community Classifications

The table below summarizes classifications for community programs available to the City of San Saba.

Table 9.5-7. Community Classifications

Program	Participating? (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	No	-	-
Building Code Effectiveness Grading Schedule (BCEGS)	No	-	-
Public Protection (ISO Fire Protection Classes 1 to 10)	No	-	-
Storm Ready Certification	No	-	-
Firewise Communities classification	No	-	-
Other	No	-	-

Note:
N/A Not applicable
NP Not participating
- Unavailable

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Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.
- Moderate: Capacity might exist; but is not used or could use some improvement.
- Weak: Capacity does not exist or could use substantial improvement.

Table 9.5-8. Adaptive Capacity

Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Moderate
Drought	Moderate
Extreme Temperature	Moderate
Flood	Moderate
Geologic Hazards	Moderate
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Moderate
Winter Storm	Moderate
Wildfire	Moderate

9.5.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information and is listed in the Hazard Mitigation Planning Team table at the beginning of this annex.

National Flood Insurance Program (NFIP) Summary

The following table summarizes the NFIP statistics for the City of San Saba.

Municipality	Policies in Force	Number of Paid Claims*	Amount of Paid Claims*	Number of NFIP RL Properties	Number of NFIP SRL Properties
San Saba (C)	N/A	5	$82,267	N/A	N/A

Source: NFIP 2016
Notes:
**Due to a contractual agreement with FEMA, information at the municipal level was not available to incorporate into the 2023 HMP Update. The information presented here for the municipalities is best available data from the last HMP.*
RL Repetitive Loss
SRL Severe Repetitive Loss

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in the City of San Saba.

Table 9.5-9. NFIP Summary

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NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	SFHA, No
• Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	No
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	No
• How do you make Substantial Damage determinations? • How many were declared for recent flood events in your jurisdiction?	The City lacks substantial damage determination procedures.
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If not, state why.	Yes
NFIP Compliance	
What local department is responsible for floodplain management?	The City has a Interlocal Agreement with the County for the Flood Plain Management; the City Secretary is identified as the floodplain administration as per Article 3.04 of city code.
Are any certified floodplain managers on staff in your jurisdiction?	No
Do you have access to resources to determine possible future flooding conditions from climate change?	Yes – state and county
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	Unknown at this time
Provide an explanation of NFIP administration services you provide (e.g. permit review, GIS, education/outreach, inspections, engineering capability)	Permit review, inspections, application reviews
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before "start of construction" of the improvement. This includes structures which have incurred "substantial damage," regardless of the actual repair work performed.
What are the barriers to running an effective NFIP program in the community, if any?	Unknown at this time
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state the violations.	Unknown at this time
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	Unknown at this time
• What is the local law number or municipal code of your flood damage prevention ordinance? • What is the date that your flood damage prevention ordinance was last amended?	Chapter 3 – Building Regulations – Article 3.04 Flood Damage Prevention
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Meets

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NFIP Topic	Comments
Are there other local ordinances, plans or programs (e.g. site plan review) that support floodplain management and meeting the NFIP requirements? For instance, does the planning board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	Not identified at this time
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	No

9.5.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.5-10. Recent and Expected Future Development

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**
Single Family	5	0	1	0	3	0	2	0	2	0	0	0	1	0
Multi-Family	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Other (commercial, mixed-use, etc.)	1	0	3	0	2	0	3	0	3	0	3	0	2	0
Total Permits Issued	**6**	**0**	**5**	**0**	**5**	**0**	**5**	**0**	**5**	**0**	**3**	**0**	**3**	**0**

SFHA Special Flood Hazard Area (1% annual chance flood event)

** Only location-specific hazard zones or vulnerabilities identified.*

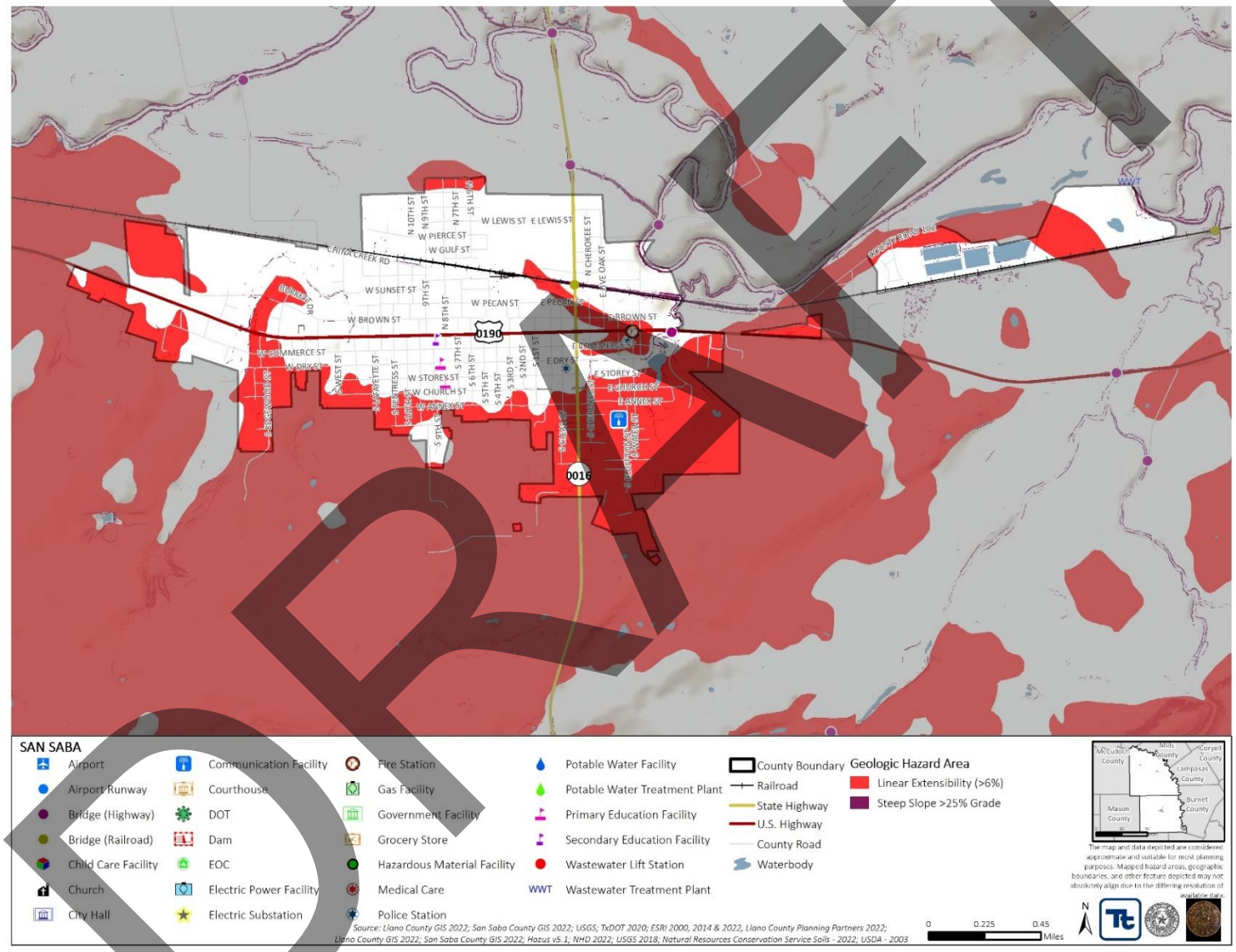
9.5.6 Jurisdictional Risk Assessment

The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard Ranking) provide detailed summaries for the City of San Saba's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard area extent and location maps provided below illustrate the probable areas impacted within the jurisdiction based on the best available data at the time of the preparation of this plan and are adequate for planning purposes. Maps were generated only for those hazards that can be identified clearly using mapping techniques and technologies and for which the City of San Saba has significant exposure. The maps also show the location of potential new development, where available.

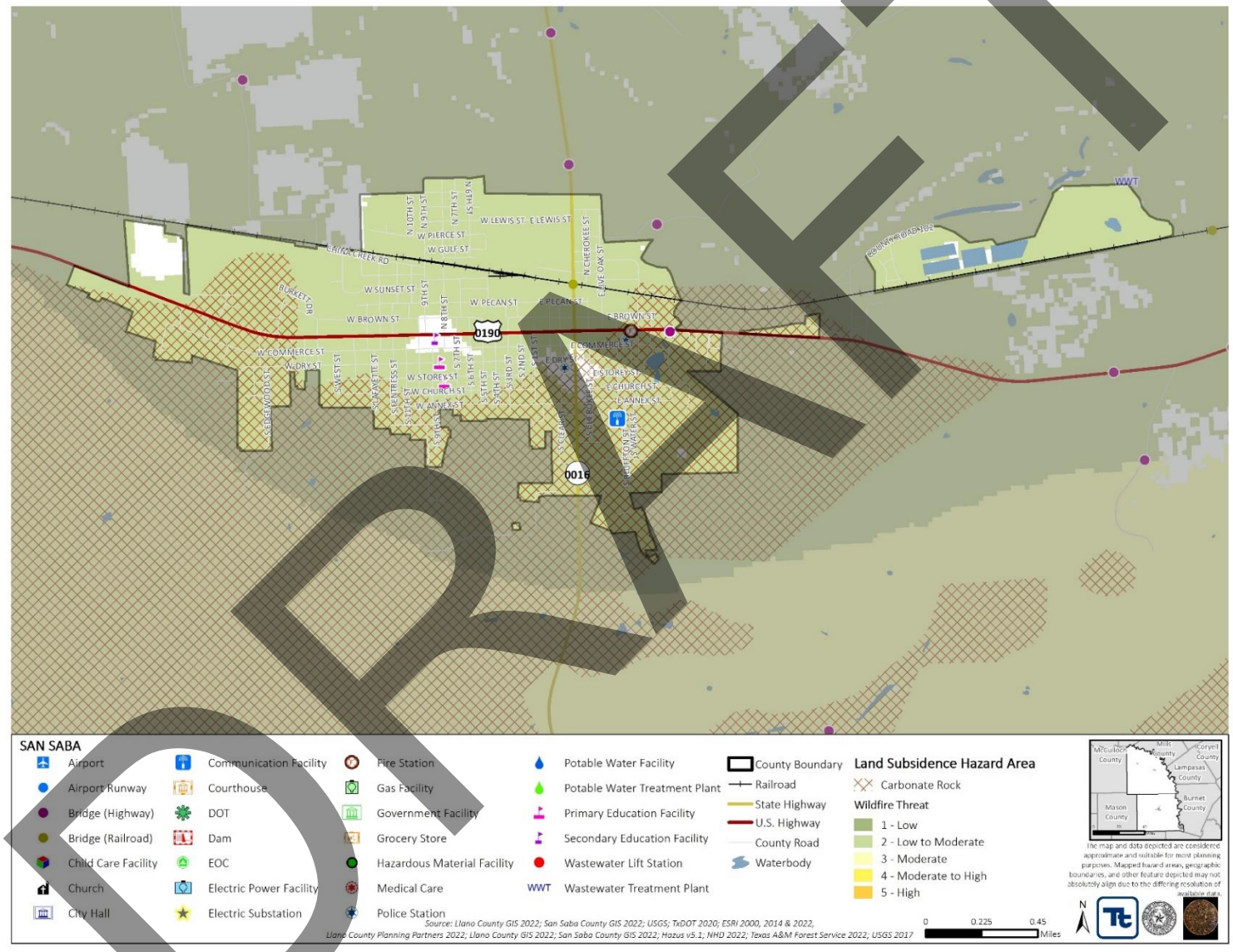
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Figure 9.5-1. City of San Saba Geologic Hazard Area Extent and Location Map



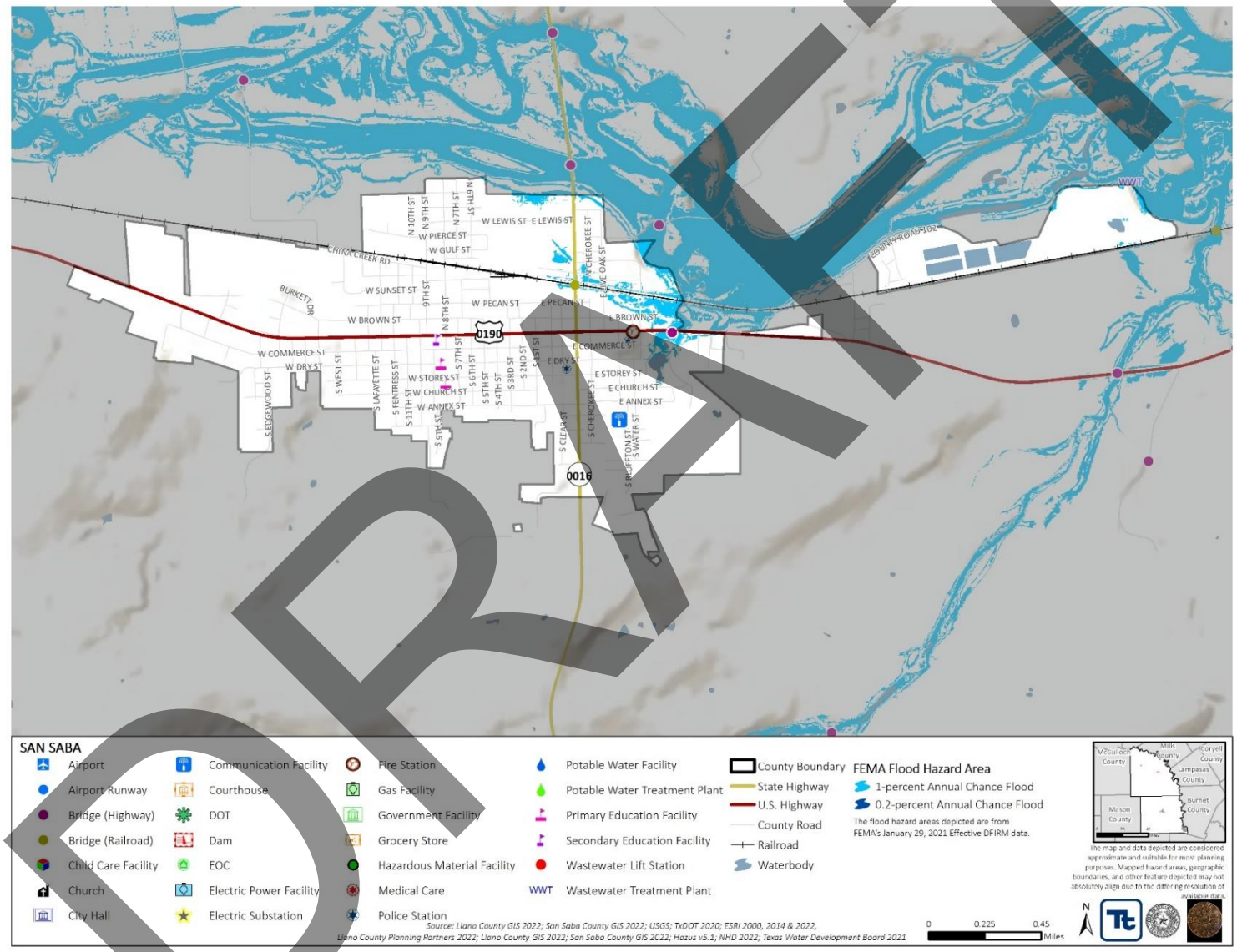
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Figure 9.5-2. City of San Saba Land Subsidence Hazard Area Extent and Location Map



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Figure 9.5-3. City of San Saba Flood Hazard Area Extent and Location Map



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Hazard Event History

Llano County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

The City of San Saba's history of federally declared (as presented by FEMA) and significant hazard events [as presented in NOAA-National Centers for Environmental Information (NCEI)] is consistent with that of the County. The table below provides details regarding municipal-specific loss and damages the City experienced during hazard events since the last hazard mitigation plan update. Information provided in the table below is based on reference material or local sources.

Table 9.5-11. Hazard Event History

Date(s) of Event	Event Type (Disaster Declaration if applicable)	County Included in Declaration?	Summary of Event	Municipal Summary of Damages and Losses
September 10 – November 2, 2018	DR – 4416 – Severe Thunderstorm and Flooding	Yes	Severe storms and flooding had a severe impact on roads and bridges	West Street damaged
February 11 – 21, 2021	EM – 3554 – Severe Winter Storms, DR – 4586 – Severe Winter Storms	Yes	Severe ice storm resulted in significant ice coverage of roads, utility lines, buildings and homes causing widespread utility failure	Roadways and no electricity, frozen water lines

Notes:
EM Emergency Declaration (FEMA)
FEMA Federal Emergency Management Agency
DR Major Disaster Declaration (FEMA)
N/A Not applicable

Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4 (Risk Assessment) have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes the City of San Saba's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment). The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and community capabilities to address the hazard and changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Therefore, each municipality ranked the degree of risk to each hazard as it pertains to their community. The table below summarizes the hazard risk/vulnerability rankings of potential natural hazards for the City of San Saba. The City of San Saba reviewed the County hazard

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risk/vulnerability risk ranking table and individual results to reflect the relative risk of the hazards of concern to the community.

During the review of the hazard/vulnerability risk ranking, the City indicated the following:

- The City agreed with the calculated hazard rankings.

Table 9.5-12. Hazard Ranking Input

Dam Failure	Drought	Extreme Temperature	Flood	Geological Hazards	Hurricane
Low	Medium	Medium	Medium	Low	Medium

Severe Storm	Tornado	Pandemic	Winter Storm	Wildfire
High	High	Medium	Low	High

Critical Facilities

The table below identifies critical facilities in the community located in the 1-percent and 0.2-percent floodplain and presents Hazus-MH estimates of the damage and loss of use to critical facilities as a result of a 1-percent annual chance flood event.

Table 9.5-13. Potential Flood Losses to Critical Facilities

Name	Type	Exposure	
		1% Event	0.2% Event
AT & SF RAILROAD; SH 16	Bridge (railroad)	X	X

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

Identified Issues

After review of the City of San Saba's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, the City of San Saba identified the following vulnerabilities within their community:

- The City does not have significant education and outreach initiatives to inform the public of hazard events.
- The City does not have a Stormwater Management Plan.
- The City is prone to drought conditions which impact the infrastructure and landscape, and agriculture causing an increased use of water for irrigation.
- The City does not have substantial public alert system in place.
- While major events that result in substantial damage of structures are rare, municipalities need to have official procedures in place to inspect structures, make determinations, and provide for appeals.
- The City does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events.

9.5.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

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Past Mitigation Initiative Status

The following table indicates progress on the community's mitigation strategy identified in the 2016 HMP. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.5-14. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, No Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)? Yes/No	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
1	All-hazards education and awareness programs	Emergency Management Department	Ongoing	Yes	The City does not have significant education and outreach initiatives to inform the public of hazard events.	Planning and Zoning Commission, Emergency Management Department
2	Reverse 911 System (CodeRED)	Emergency Management Department	Ongoing	Yes	The City does not have substantial public alert system in place.	Planning Department, County Emergency Management, Police
3	Encourage drought-tolerant landscape design	Planning and Zoning Commission	No Progress	Yes	The City is prone to drought conditions which impact the infrastructure and landscape, and agriculture causing an increased use of water for irrigation.	Planning and Zoning Commission
4	Encourage construction of safe rooms	Emergency Management Department	No Progress	No	-	-
5	Reduce the number of uninhabitable and un-maintained properties in the floodplain	Emergency Management Department	Ongoing	No	-	-
6	National Weather Service's StormReady Program	City Council	Ongoing	No	-	-

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, the City of San Saba identified the following mitigation efforts completed since the last HMP:

- None identified

Proposed Hazard Mitigation Initiatives for the HMP Update

The City of San Saba participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide-range of activities and mitigation measures selected.

Table 9.5-15. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA				CRS					
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure	X	-	-	X	X	X	X	-	-	X
Drought	X	X	X	X	X	X	X	X	-	X
Extreme Temperature	X	-	-	X	X	X	X	-	-	X
Flood	X	-	-	X	X	X	X	-	-	X
Geological Hazards	X	-	-	X	X	X	X	-	-	X
Hurricane	X	-	-	X	X	X	X	-	-	X
Severe Storm	X	-	-	X	X	X	X	-	-	X
Tornado	X	-	-	X	X	X	X	-	-	X
Pandemic	X	-	-	X	X	X	X	-	-	X
Winter Weather	X	-	-	X	X	X	X	-	-	X
Wildfire	X	-	-	X	X	X	X	-	-	X

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives the City of San Saba would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

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Table 9.5-16. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-City of San Sava-001	Education and Outreach	**Problem:** The City does not have significant education and outreach initiatives to inform the public of hazard events. **Solution:** The City will work with the Planning and Zoning Commissions and Emergency Management Department to develop and implement a multi-hazard public awareness program that provide information on all hazards, preparedness and mitigation measures, and response during hazard events.	New and Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Winter Weather, Wildfire	1,3	Within 1 year	Planning and Zoning Commission, Emergency Management Department	Municipal Budget	Increase public awareness of hazards, increase preparedness for hazard events	Staff Time	High	EAP	PI
2023-City of San Saba-002	Stormwater Management Plan	**Problem:** The City does not have a Stormwater Management Plan. **Solution:** The City will work with the Emergency Management Department Planning and Zoning Commission to develop a Stormwater Management Plan for the City.	New and Existing	Flood	1,2,3,4	1-2 years	Emergency Management Department, Planning and Zoning Commission	HMGP, BRIC	Decrease potential for loss of life and property	Low	High	LPR	PR
2023-City of San Saba-003	Enhance Landscaping and Design Measures	**Problem:** The City is prone to drought conditions which impact the infrastructure and landscape, and agriculture causing an increased use of water for irrigation. **Solution:** The City will work with the Planning and Zoning Commission to incorporate drought tolerant or xeriscape practices into landscape ordinances to reduce dependence on irrigation.	New and Existing	Drought	1,2,5,6	Within 5 years	Planning and Zoning Commission	LCRA, HMGP	Reduce use of water supply during drought conditions	Low	High	SIP,NSP	NR

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-City of San Saba-004	Hazard Notification Systems	**Problem:** The City does not have substantial public alert system in place. **Solution:** The City with work with the Planning Department, County Emergency Management and local police to organize a system to notify the public with important hazard information.	New and Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Wildfire, Winter Weather	1,2,3,4	1-3 years	Planning Department, County Emergency Management, Police	Municipal Budget	Increase preparedness for hazard events	Low	High	LPR, EAP	PR
2023-City of San Saba-005	Substantial Damage Procedure	**Problem:** While major events that result in substantial damage of structures are rare, municipalities need to have official procedures in place to inspect structures, make determinations, and provide for appeals. **Solution:** The municipality will develop official procedures for Substantial Damage and Substantial Improvement determinations.	Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Wildfire, Winter Weather	1,2,3	Within 5 years	City Planning Board, Floodplain Administration	Municipal Budget	Meet NFIP requirements, improved floodplain administration	Staff Time	High	LPR	PP, PR
2023-City of San Saba-006	Debris Management Plan	**Problem:** The City does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events. **Solution:** The City Planning Board will work with the San Saba County Emergency Management to develop a debris management plan as a	New and Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe	1,2,4	1-2 years	City Planning Board, San Saba County Emergency Management	Municipal Budget	Ensure coordinated plans to safely remove debris from water ways	$10,000	High	LPR	PR, ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		framework for organizing the rapid, safe, and cost-effective separation, removal, collection, recycling, and disposal of debris after a disaster. This plan will include goals to minimize debris-related threats to public health, safety, and the environment following any hazard event.		Storm, Tornado, Wildfire, Winter Weather									

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).
Notes: Not all acronyms and abbreviations defined below are included in the table.

Acronyms and Abbreviations:

CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*
FEMA	*Federal Emergency Management Agency*
FPA	*Floodplain Administrator*
HMA	*Hazard Mitigation Assistance*
N/A	*Not applicable*
NFIP	*National Flood Insurance Program*
OEM	*Office of Emergency Management*

Potential FEMA HMA Funding Sources:

FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC	*Building Resilient Infrastructure and Communities Program*

Timeline:

The time required for completion of the project upon implementation.

Cost:

The estimated cost for implementation.

Benefits:

A description of the estimated benefits, either quantitative and/or qualitative.

Critical Facility:

Yes *Critical Facility located in 1% floodplain*

Mitigation Category:

- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*

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- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*
- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.*

The prioritization criteria provided in Volume 1, Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

Table 9.5-17. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community	Total	High / Medium / Low
2023-City of San Saba-001	Education and Outreach	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-City of San Saba-002	Stormwater Management Plan	1	1	1	1	1	1	1	1	1	1	0	1	1	1	13	High
2023-City of San Saba-003	Enhance Landscaping and Design Measures	0	1	1	1	1	1	1	1	1	1	0	1	1	1	12	High
2023-City of San Saba-004	Hazard Notification System	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-City of San Saba-005	Substantial Damage Procedure	1	1	1	1	1	1	1	1	1	1	1	0	1	1	13	High
2023-City of San Saba-006	Debris Management Plan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).

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Section 9 Jurisdictional Annexes

9.6 City of Sunrise Beach Village

This section presents the jurisdictional annex for the City of Sunrise Beach Village that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the municipality, who in the City participated in the planning process, an assessment of the City of Sunrise Beach Village's risk and vulnerability, the different capabilities used in the City, and an action plan that will be implemented to achieve a more resilient community.

9.6.1 Hazard Mitigation Planning Team

The City of Sunrise Beach Village identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many City departments, including the Fire Chief and Police Chief. The Fire Chief represented the community on the Llano County Hazard Mitigation Plan Planning Partnership and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes municipal officials that participated in the development of the annex and in what capacity. Additional documentation on the municipality's planning process through Planning Partnership meetings is included in Volume 1, Section 2 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.6-1. Hazard Mitigation Planning Team

Primary Point of Contact		Alternate Point of Contact	
Name/Title:	Dan Gower – Fire Chief	Name/Title:	Laurie Brock – Police Chief
Address:	124 Sunrise Drive, Sunrise Beach Village, Texas 78643-9283	Address:	124 Sunrise Drive, Sunrise Beach Village, Texas 78643-9283
Phone Number:	210-379-3985	Phone Number:	325-388-6438
Email:	chief@sunrisebeachvfd.org	Email:	policechief@cityofsunrisebeach.org
NFIP Floodplain Administrator			
Name/Title:	Danyelle Morgan, City Building Inspector		
Address:	124 Sunrise Drive, Sunrise Beach Village, Texas 78643-9283		
Phone Number:	325-388-6438		
Email:	srbcompliance@cityofsunrisebeach.org		
Additional Contributors:			
Name/Title: Chellie Stewart – Mayor Method of Participation: Provided data and information			

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9.6.2 Municipal Profile

The City of Sunrise Beach Village is on the southern shore of lake Lyndon B. Johnson and 43 miles west of Austin. The City of Sunrise Beach Village has a total area of 2.3 square miles, 1.6 square miles of land and 0.6 square miles of water.

According to the U.S. Census, the 2020 population for the City of Sunrise Beach Village was 994, a 1.0 percent increase from the 2010 Census. Data from the 2020 U.S. Census indicate that 1.6 percent of the population is 5 years of age or younger and 38.5 percent is 65 years of age or older. Communities must deploy a support system that enables all populations to safely reach shelters or to quickly evacuate a hazard area.

9.6.3 Jurisdictional Capability Assessment and Integration

The City of Sunrise Beach Village performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section 5 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The community's adaptive capacity to withstand hazard events.

For a community to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day local government operations. As part of the hazard mitigation analysis, planning/policy documents were reviewed, and each jurisdiction was surveyed to obtain a better understanding of their progress toward plan integration. The updated mitigation strategy provided an opportunity for the City of Sunrise Beach Village to identify opportunities for integration of mitigation concepts that can be incorporated into municipal procedures.

Planning, Legal, and Regulatory Capability and Integration

The table below summarizes the regulatory tools that are available to the City of Sunrise Beach Village. The comment field provides information as to how the capability integrates hazard mitigation and risk reduction.

Table 9.6-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	Yes	International Building Code	Local	Code Enforcement Department
How does this reduce risk? The City of Sunrise Beach Village adopted the International Building Code in 2009.				
Zoning/Land Use Code	Yes	Consolidated Zoning Ordinance – No. 347 – under significant review and rewrite	Local	Planning and Zoning Commission
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
The City of Sunrise Beach zoning ordinance purposes are to promote the health, safety, and the general welfare of the City and its present and future residents; provide reasonable regulations and requirements to protect, preserve, improve and provide for the health, safety and general welfare of the present and future citizens of the City; and to establish a framework of zoning criteria to support the development of a quality living and work environment by requiring all future development and redevelopment within a compatible plan for residential, commercial and industrial uses, while providing reasonable protections for both the public and persons having an ownership interest in property affected by these regulations.				
Subdivision Ordinance	Yes	Subdivision of Land – No. 177	Local	Planning and Zoning Commission
How does this reduce risk? The purpose of this Ordinance is to provide for orderly, safe, and healthful development to promote health, safety, morals and general welfare of the community. The Ordinance discusses improvements for thoroughfares, water and wastewater services, other utilities, drainage, public facilities, and community amenities of all plats within the city limits.				
Site Plan Ordinance	Yes	Consolidated Zoning Ordinance – Section 32 – Planned Unit Development - "PUD" District	Local	Planning and Zoning Commission
How does this reduce risk? The City of Sunrise Beach site plan ordinance discusses requirements for preliminary site plans for planned unit development districts. The requirements include: • Location • Proposed uses • Ingress and egress • Parking spaces • Building locations and height • Lot coverage • Yards and open spaces • Landscaping • Screening for walls or fences • Topography • Other protective measures This ordinance is scheduled to be removed from existence and regulations incorporated in the new planning and zoning ordinance - 347				
Stormwater Management Ordinance	No	-	-	-
How does this reduce risk?				
Post-Disaster Recovery/ Reconstruction Ordinance	No	-	-	-
How does this reduce risk?				
Real Estate Disclosure	No	-	-	-
How does this reduce risk?				
Growth Management	No	-	-	-
How does this reduce risk?				
Environmental Protection Ordinance	No	-	-	-
How does this reduce risk?				
Flood Damage Prevention Ordinance	Yes	Ordinance 299	Local	Compliance Office
How does this reduce risk? The Ordinance promotes the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas. The methods to reduce flood loss include: • Requires buildings be constructed above the flood plain elevation reducing damage from rising water, • Restrict or prohibit uses that are dangerous to health, safety, or property in times of flood, or cause excessive increases in flood heights or velocities, • Require uses vulnerable to floods, including facilities which serve such uses be protected against flood damage at the time of initial construction, • Control the alternation of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of flood waters, • Control filling, grading, dredging and other development which may increase flood damage, and				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
• Prevent or regulate the construction of flood barriers which will unnaturally divert flood waters, or which may increase flood hazards to other lands.				
Wellhead Protection	No	-	-	-
How does this reduce risk?				
Emergency Management Ordinance	No	-	-	-
How does this reduce risk?				
Climate Change Ordinance	No	-	-	-
How does this reduce risk?				
Other	No	-	-	-
Planning Documents				
Comprehensive/Master Plan	Yes	Sunrise Beach Village Comprehensive Plan – 2018	Local	Planning and Zoning Commission
How does this reduce risk? The Sunrise Beach Village Comprehensive Plan promotes the general health, safety and welfare of the community.				
Capital Improvement Plan	No	-	-	-
How does this reduce risk?				
Disaster Debris Management Plan	No	-	-	-
How does this reduce risk?				
Floodplain Management or Watershed Plan	No	-	-	-
How does this reduce risk?				
Stormwater Management Plan	No	-	-	-
How does this reduce risk?				
Open Space Plan	No	-	-	-
How does this reduce risk?				
Urban Water Management Plan	No	-	-	-
How does this reduce risk?				
Habitat Conservation Plan	No	-	-	-
How does this reduce risk?				
Economic Development Plan	No	-	-	-
How does this reduce risk?				
Shoreline Management Plan	No	-	-	-
How does this reduce risk?				
Community Wildfire Protection Plan	Yes	Plan under development	Local	Fire Department
How does this reduce risk? Assists landowners in the Wildland Urban Interface in making their property safer from wildfires.				
Community Forest Management Plan	No	-	-	-
How does this reduce risk?				
Transportation Plan	No	-	-	-
How does this reduce risk?				
Agriculture Plan	No	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Climate Action/ Resiliency/Sustainability Plan	No	-	-	-
How does this reduce risk?				
Tourism Plan	No	-	-	-
How does this reduce risk?				
Business/ Downtown Development Plan	No	-	-	-
How does this reduce risk?				
Other	No	-	-	-
Response/Recovery Planning				
Comprehensive Emergency Management Plan	Yes	Llano County Emergency Management Plan	County	Llano County Emergency Management and local VFD
How does this reduce risk? Guides emergency response for hazard events.				
Continuity of Operations Plan	No	-	-	-
How does this reduce risk?				
Strategic Recovery Planning Report	No	-	-	-
How does this reduce risk?				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	-	-	-
How does this reduce risk?				
Post-Disaster Recovery Plan	No	-	-	-
How does this reduce risk?				
Public Health Plan	No	-	-	-
How does this reduce risk?				
Other	No	-	-	-
How does this reduce risk?				

Development and Permitting Capability

The table below summarizes the capabilities of the City of Sunrise Beach Village to oversee and track development.

Table 9.6-3. Development and Permitting Capability

Indicate if your jurisdiction implements the following	Yes/No	Comment:
Do you issue development permits? • If yes, what department is responsible?	Yes	Building Codes and Compliance Office
If you do not issue development permits, what is your process for tracking new development?	N/A	-
Are permits tracked by hazard area? (For example, floodplain development permits.)	Yes	Building permits are recorded and filed and monitored for compliance with flood plain requirements.

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Indicate if your jurisdiction implements the following	Yes/No	Comment:
Do you have a buildable land inventory? • If yes, please describe	No	-
Describe the level of build-out in your jurisdiction.	N/A	The City is about 67% build out.

Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to the City of Sunrise Beach Village and their current responsibilities that contribute to hazard mitigation.

Table 9.6-4. Administrative and Technical Capabilities

Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	Yes	Planning and Zoning Commission will consider proposed changes to zoning, and changes/amendments to the Consolidates Zoning Ordinance. The Commission will review, and update ordinances as deemed necessary. The Commission oversees appeals, special exceptions and variances.
Zoning Board of Adjustment	Yes	See Planning Board
Planning Department	Yes	See Planning Board
Mitigation Planning Committee	No	-
Environmental Board/Commission	No	-
Open Space Board/Committee	No	-
Economic Development Commission/Committee	No	-
Public Works/Highway Department	No	Rely on County Road and Bridge
Construction/Building/Code Enforcement Department	Yes	Code Enforcement Department oversees maintaining the City code requirements.
Emergency Management/Public Safety Department	Yes	Police Department assisted by VFD
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	No	Outdoor siren site location under review for installation. WarnCentralTexas application for Reverse 911 notifications.
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	No	-
Mutual aid agreements	Yes	VFD participates in Llano County mutual aid with other 8 departments. PD has mutual aid agreements with Llano County Sheriff's Office
Human Resources Manual	Yes	Job descriptions are under development/review.
Other	No	-
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	No	-
Engineers or professionals trained in building or infrastructure construction practices	Yes	Code Enforcement Department
Planners or engineers with an understanding of natural hazards	No	-
Staff with expertise or training in benefit/cost analysis	No	-
Professionals trained in conducting damage assessments	No	-

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Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	No	NOTE: there might be some in the county – but not in this municipality GIS Personnel trained in the following: • Hazard Areas • Critical Facilities • Building Footprints • Land Use • Assessor Data
Environmental scientist familiar with natural hazards	No	-
Surveyor(s)	No	-
Emergency Manager	No	-
Grant writer(s)	No	-
Resilience Officer	No	-
Other (this could include stormwater engineer, environmental specialist, etc.)	No	-

Fiscal Capability

The table below summarizes financial resources available to the City of Sunrise Beach Village.

Table 9.6-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/No)
Community development Block Grants (CDBG, CDBG-DR)	No
Capital improvements project funding	No
Authority to levy taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	Yes (water only)
Impact fees for homebuyers or developers of new development/homes	Yes
Stormwater utility fee	No
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	No
Other federal or state Funding Programs	No
Open Space Acquisition funding programs	No
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	No

Education and Outreach Capability

The table below summarizes the education and outreach resources available to the City of Sunrise Beach Village.

Table 9.6-6. Education and Outreach Capabilities

Outreach Resources	Available? (Yes/No)	Comment:
Public information officer or communications office	Yes	While there is no such officer in the City, the Volunteer Fire Department has initiated education and information services through its website and efforts to become a Fire Wise City.

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Outreach Resources	Available? (Yes/No)	Comment:
Personnel skilled or trained in website development	Yes	While not on staff as a paid position, there are persons who can work with the City internet provider to update websites for the purpose of education.
Hazard mitigation information available on your website	Yes	Wildland Urban Interface fire risk information published on the VFD website.
Social media for hazard mitigation education and outreach	No	-
Citizen boards or commissions that address issues related to hazard mitigation	Yes	Committee chaired by VFD for Fire Wise Community efforts
Warning systems for hazard events	Yes	9-1-1 based emergency phone notifications and potential siren installation through Llano County Emergency Services
Natural disaster/safety programs in place for schools	No	The City has no schools.
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? • If yes, please describe.	Yes	The City uses reverse-911 systems provided by CAPCOG and services provided via the Llano Emergency Services Offices as well as the Llano County Sheriff's dispatch office.

Community Classifications

The table below summarizes classifications for community programs available to the City of Sunrise Beach Village.

Table 9.6-7. Community Classifications

Program	Participating? (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	No	-	-
Building Code Effectiveness Grading Schedule (BCEGS)	No	-	-
Public Protection (ISO Fire Protection Classes 1 to 10)	Yes	ISO 6	2012
Storm Ready Certification	No	-	-
Firewise Communities classification	No	-	Underdevelopment
Other	No	-	-

Note:
N/A Not applicable
NP Not participating
- Unavailable

Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.
- Moderate: Capacity might exist; but is not used or could use some improvement.

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- Weak: Capacity does not exist or could use substantial improvement.

Table 9.6-8. Adaptive Capacity

Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Weak
Drought	Moderate
Extreme Temperature	Moderate
Flood	Moderate
Geologic Hazards	Moderate
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Moderate
Winter Storm	Moderate
Wildfire	Strong

9.6.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information and is listed in the Hazard Mitigation Planning Team table at the beginning of this annex.

National Flood Insurance Program (NFIP) Summary

The following table summarizes the NFIP statistics for the City of Sunrise Beach Village. For details on the NFIP program and number of policies, refer to Section 4.3.4 (Flood).

Table 9.6-9. NFIP Summary

Municipality	Policies in Force	Number of Paid Claims*	Amount of Paid Claims*	Number of NFIP RL Properties	Number of NFIP SRL Properties
Sunrise Beach Village (C)	N/A	12	$134,773	N/A	N/A

Source: NFIP 2016

Notes:

**Due to a contractual agreement with FEMA, information at the municipal level was not available to incorporate into the 2023 HMP Update. The information presented here for the municipalities is best available data from the last HMP.*

RL Repetitive Loss

SRL Severe Repetitive Loss

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in the City of Sunrise Beach Village.

Table 9.6-10. NFIP Summary

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	Yes, records are maintained. The Floodplain is described by FEMA and much of the waterfront properties are within the floodplain.
• Do you maintain a list of property owners interested in flood mitigation?	No

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NFIP Topic	Comments
• How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	No
• How do you make Substantial Damage determinations? • How many were declared for recent flood events in your jurisdiction?	The City use determinations made by homeowner's property insurance and flood insurance.
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	Several houses that were damaged were torn down and rebuilt using FEMA flood insurance funding and built at a higher elevation within the floodplain.
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If not, state why.	There is a solid understanding of areas at risk and means to evacuate residents from those areas.
NFIP Compliance	
What local department is responsible for floodplain management?	Compliance
Are any certified floodplain managers on staff in your jurisdiction?	No – Llano County is relied upon.
Do you have access to resources to determine possible future flooding conditions from climate change?	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	No
Provide an explanation of NFIP administration services you provide (e.g. permit review, GIS, education/outreach, inspections, engineering capability)	None provided
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	Yes
What are the barriers to running an effective NFIP program in the community, if any?	Funding and Staffing and education
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state the violations.	None
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	None
• What is the local law number or municipal code of your flood damage prevention ordinance? • What is the date that your flood damage prevention ordinance was last amended?	Ordinance 299 April 19, 2012

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NFIP Topic	Comments
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Meets
Are there other local ordinances, plans or programs (e.g. site plan review) that support floodplain management and meeting the NFIP requirements? For instance, does the planning board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	Building inspections for plans and building are inspected.
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	Not at this time

9.6.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.6-11. Recent and Expected Future Development

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**
Single Family	12	-	16	-	12	-	17	-	12	-	12	-	9	-
Multi-Family	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Other (commercial, mixed-use, etc.)	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Total Permits Issued	12	-	16	-	12	-	17	-	12	-	12	-	9	-

SFHA Special Flood Hazard Area (1% annual chance flood event)

** Only location-specific hazard zones or vulnerabilities identified.*

Note: Information on permits within the SFHA was not available for this plan update.

9.6.6 Jurisdictional Risk Assessment

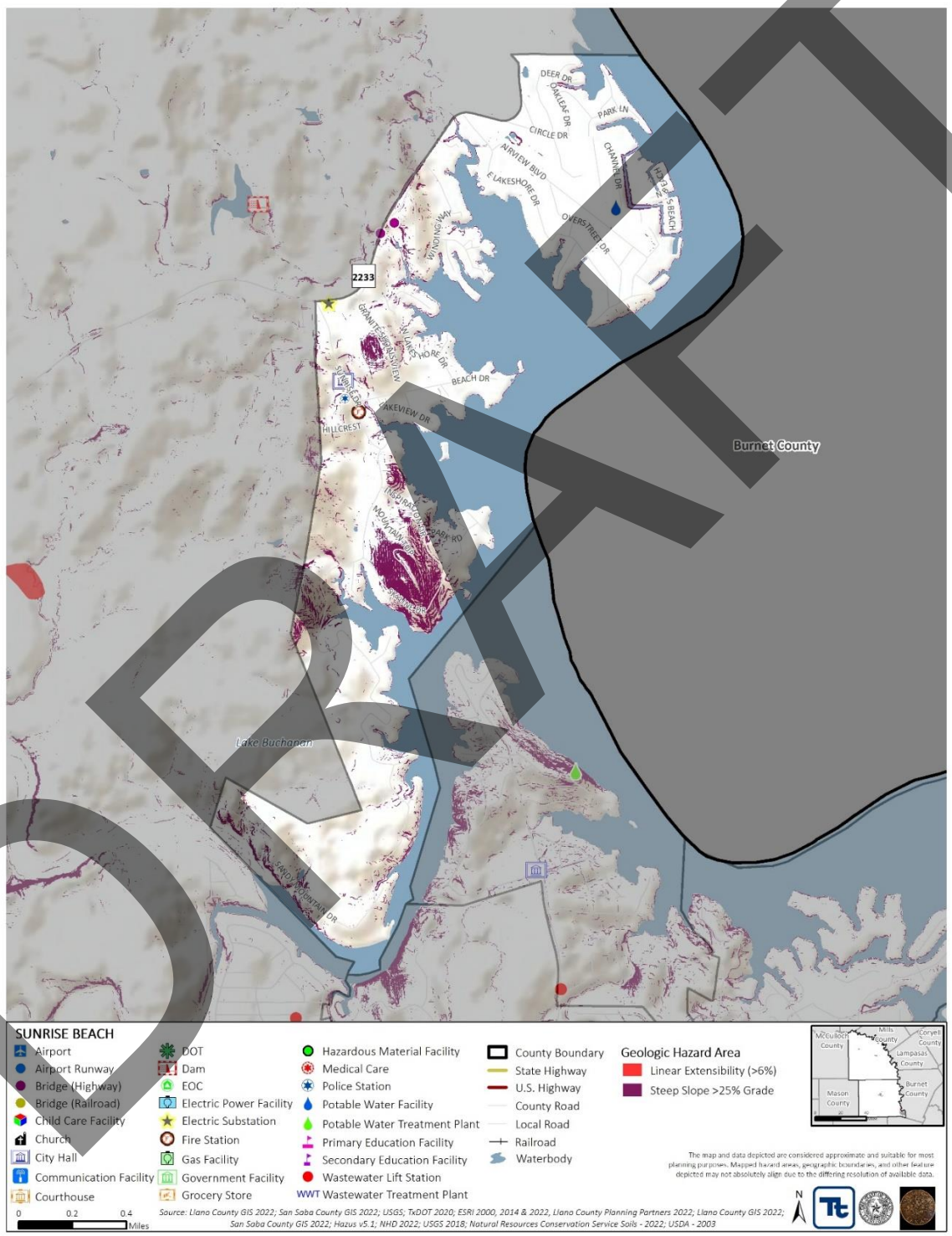
The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard Ranking) provide detailed summaries for the City of Sunrise Beach Village's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard area extent and location maps provided below illustrate the probable areas impacted within the jurisdiction based on the best available data at the time of the preparation of this plan and are adequate for

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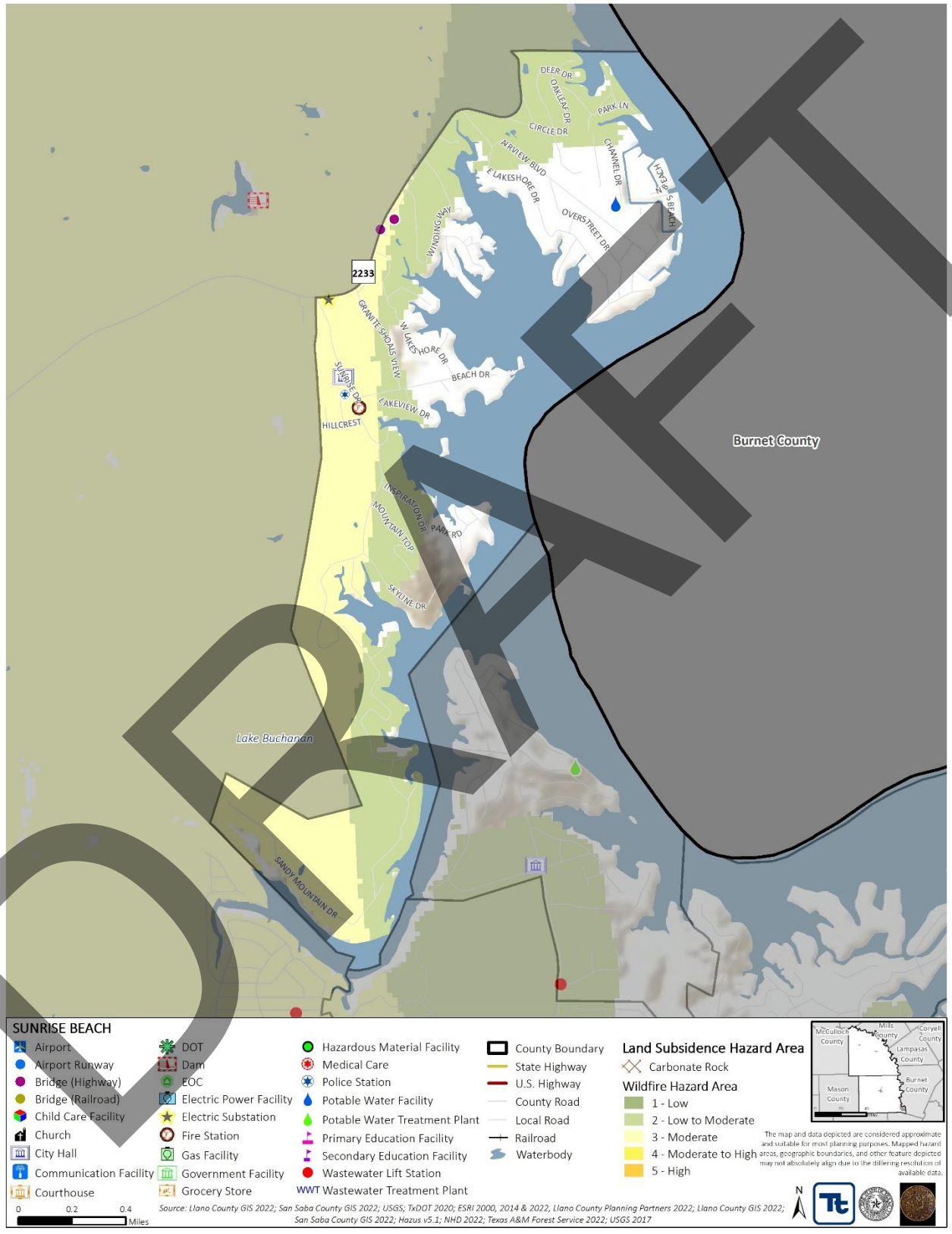
planning purposes. Maps were generated only for those hazards that can be identified clearly using mapping techniques and technologies and for which the City of Sunrise Beach Village has significant exposure. The maps also show the location of potential new development, where available.

Figure 9.6-1. City of Sunrise Beach Village Geologic Hazard Area Extent and Location Map



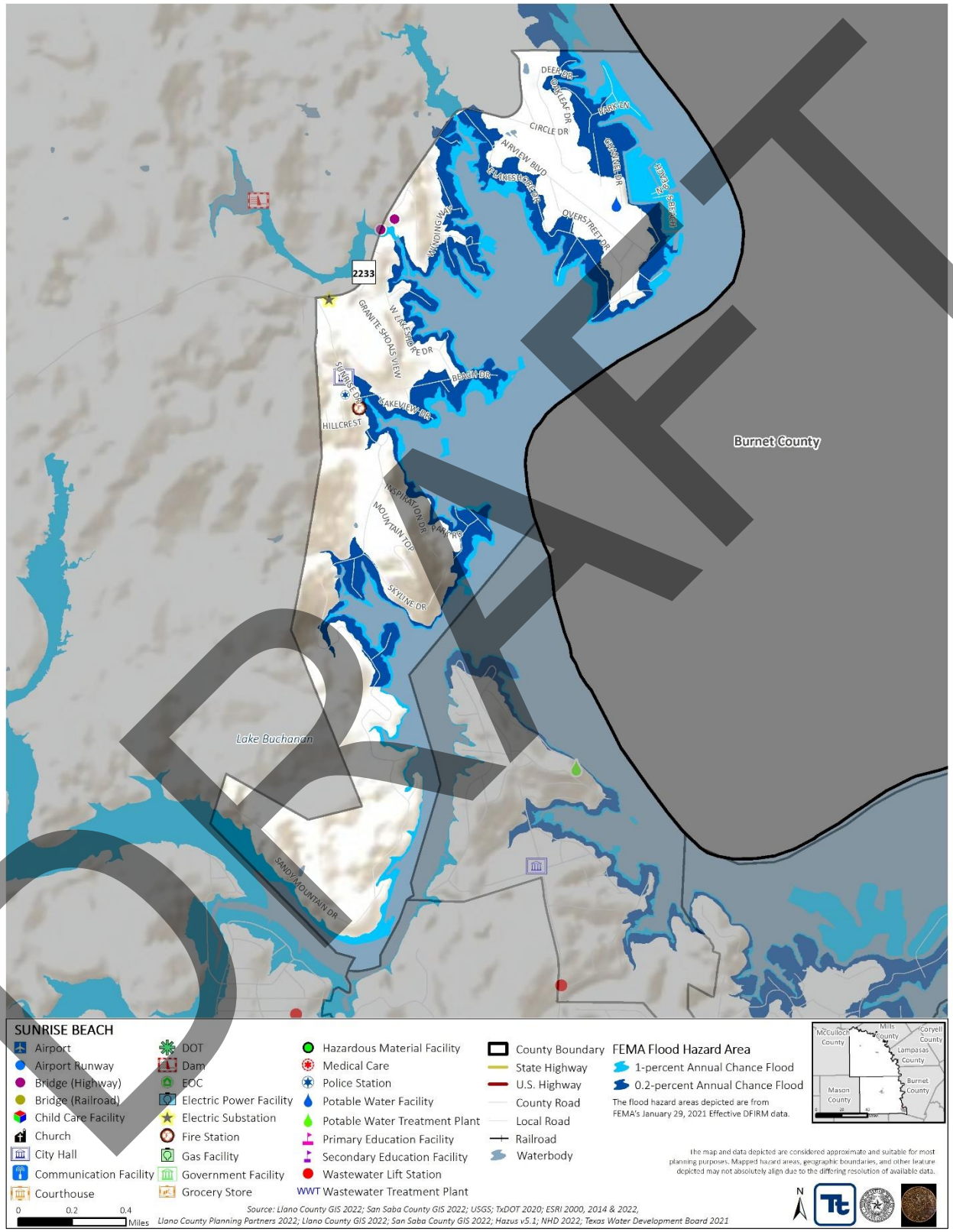
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Figure 9.6-2. City of Sunrise Beach Village Land Subsidence Hazard Area Extent and Location Map



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Figure 9.6-3. City of Sunrise Beach Village Flood Hazard Area Extent and Location Map



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Hazard Event History

Llano County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

The City of Sunrise Beach Village's history of federally declared (as presented by FEMA) and significant hazard events [as presented in NOAA-National Centers for Environmental Information (NCEI)] is consistent with that of the County. The table below provides details regarding municipal-specific loss and damages the City experienced during hazard events since the last hazard mitigation plan update. Information provided in the table below is based on reference material or local sources.

Table 9.6-12. Hazard Event History

Dates of Event	Event Type (Disaster Declaration if applicable)	County Designated?	Summary of Event	Municipal Summary of Damages and Losses
September 10 – November 2, 2018	DR-4416 – Severe Storms and Flood	Yes	Severe storms and flooding had a severe impact on roads and bridges	2018 flood caused damage to homes, and roads and Fire Department dry hydrants.
February 11-21, 2021	EM-3554 – Severe Winter Storm, DR-4586 – Severe Winter Storms	Yes	Severe ice storm resulted in significant ice coverage of roads, utility lines, buildings and homes causing widespread utility failure	Winter Storm URI caused rolling power outages, half of city without power for three + days. City Water Plant was offline for three days.

Notes:
EM Emergency Declaration (FEMA)
FEMA Federal Emergency Management Agency
DR Major Disaster Declaration (FEMA)
N/A Not applicable

Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4 (Risk Assessment) have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes the City of Sunrise Beach Village's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment). The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and community capabilities to address the hazard and changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Therefore, each municipality ranked the degree of risk to each hazard as it pertains to their community. The table below summarizes the hazard risk/vulnerability rankings of potential natural hazards for the City of Sunrise Beach Village. The City of Sunrise Beach Village

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reviewed the County hazard risk/vulnerability risk ranking table and individual results to reflect the relative risk of the hazards of concern to the community.

During the review of the hazard/vulnerability risk ranking, the City indicated the following:

- The City modified the risk ranking for the following hazards:
  - Hurricane – modified from medium to low.
  - Winter Storm – modified from low to medium.
- The City agreed with the remaining hazard rankings.

Table 9.6-13. Hazard Ranking Input

Dam Failure	Drought	Extreme Temperature	Flood	Geological Hazards	Hurricane
Low	Medium	Medium	Medium	Low	Low

Severe Storm	Tornado	Pandemic	Winter Storm	Wildfire
High	High	Medium	Medium	High

Critical Facilities

The table below identifies critical facilities in the community located in the 1-percent and 0.2-percent floodplain and presents Hazus-MH estimates of the damage and loss of use to critical facilities as a result of a 1-percent annual chance flood event.

Table 9.6-14. Potential Flood Losses to Critical Facilities

Name	Type	Exposure	
		1% Event	0.2% Event
No critical facilities identified in the floodplain.			

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

Identified Issues

After review of the City of Sunrise Beach Village's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, the City of Sunrise Beach Village identified the following vulnerabilities within their community:

- With recurring drought conditions, the potential for wildfires in the surrounding ranch land of the City has increased. Local residence lots and vacant land on the perimeter of the City have an increased risk of fire damaging structures and fire progressing into the interior of the City. Clearing vacant lots and removing fuel from the area is necessary but not undertaken in many cases. Vacant lots are in the immediate vicinity of land that has residential structures and the potential for large monetary loss in the event of a wildland fire. Firewise Community designation will allow for better competition for grants to assist homeowners in clearing lots.
- This City has never had fire hydrants. The City water system was never believed to support installation or use of fire hydrants. Dry hydrants were used for many years to draft from the lake. However, the invasion of zebra mussels and flood damage have rendered the dry hydrants inoperable and untenable for use.

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Water supply for both structure and wildland fire fighting is critical to successful containment and extinguishment. Two large (18,000 gallon) water storage/rain-water collection tanks have been purchased and installed using donated funds and grant money from LCRA. Recent research has revealed that within certain limits fire hydrants can be installed at many locations throughout the City.

- There are two significant low-water crossings in the City. When these two crossings are flooded during heavy rains roughly one half of the city is inaccessible from the other half of the City. Evacuation of residents who are South of the intersection of Beach Drive and Sunrise Drive becomes impossible. Access by emergency vehicles (ambulance and fire apparatus) is prevented.
- There are two significant low-water crossings in the City. When these two crossings are flooded during heavy rains roughly one half of the City is inaccessible from the other half of the City. Evacuation of residents who are south of the intersection of Beach Drive and Sunrise Drive becomes impossible. Access by emergency vehicles (ambulance and fire apparatus) is prevented.
- The City does not have mitigation equipment for lighting strikes.
- While major events that result in substantial damage of structures are rare, municipalities need to have official procedures in place to inspect structures, make determinations, and provide for appeals.
- The City building code does not identify standards for high-risk areas.
- The City does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events.
- The City of Sunrise Beach Village does not have an evacuation plan in place.
- Emergency shelters have been designated but are not staffed nor equipped cots, blankets, and MREs on hand.

9.6.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

Past Mitigation Initiative Status

The following table indicates progress on the community's mitigation strategy identified in the 2017 HMP. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.6-15. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, No Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)? Yes/No	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
1	Drought Contingency Plan	Code Enforcement	Complete	No		Code Compliance
2	Implement water conservation measures	Water Department	Complete	No	-	-
3	Develop a Water Supply Protection Plan	Water Department	Complete	No	Storage capacity and back up generation	Water Department
4	Assist at risk population and pet and livestock owners	Maintenance Department	Completed	No	Transfer pets to shelter in Buchanan as apart of an interlocal agreement.	Police and VFD
5	Encourage the use of high "R" factor construction materials	Code Compliance	Complete	No	-	-
6	Lessening the risk to structures due to lightning	Fire Marshal	No Progress	Yes	Install Lightning Rods	VFD
7	Purchase surge protectors – Severe Storms/Weather, flood	Fire Marshal	No Progress	Yes	No surge protection plan – purchase and install communications equipment	County
8	Restrict construction of Land Use Elements (LUE) in high-risk areas	Construction Permitting & Compliance	No Progress	Yes	Minimal High Risk areas do not require code enforcement – update codes to incorporate high risk standards.	Code Compliance
9	Establish shelters for displaced citizens and pets	Maintenance	In Progress	Yes	Shelters designated but not staffed nor equipped Cots, blankets, and MREs on hand. Training being sought through Red Cross	Fire Department
10	Minimize property damage from high winds	Administration	No Progress	No	-	-
11	Adopt building requirements to minimize the risk of property damage or loss	Building Permits ad Inspections	In Progress	Yes	Ordinance being developed	Planning and Zoning
12	Decrease risk of wildfires due to environmental changes	Fire Department	In Progress	Yes	No Wildland Urban Interface Program – that has now been started with assistance from Texas Forest Service	Fire Department
13	Dam failure prevention for Lake LBJ	Administration	No Progress. Responsibility of Llano and LCRA.	No	-	-
14	Encourage Home Evacuation Plans	Fire Department	Ongoing. Education efforts on going with Fire Department	No	-	-
15	Reduce financial losses through mitigation education	Emergency Management	No Progress, responsibility of Llano County.	No	-	-

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Project #	Project	Responsible Party	What is the status? (e.g., In Progress, No Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)? Yes/No	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
16	Reduce risk of property damage due to shifting clay veins	Road Department	No Progress, not applicable to the City.	No	-	-
17	Education to reduce risk of structural damage from hail	Building Permit Department	No Progress	No	-	-
18	Construct bridge over low-lying road area	Maintenance	No Progress	Yes	There are two significant low-water crossings in the City. When these two crossings are flooded during heavy rains roughly one half of the City is inaccessible from the other half of the City. Evacuation of residents who are south of the intersection of Beach Drive and Sunrise Drive becomes impossible. Access by emergency vehicles (ambulance and fire apparatus) is prevented.	City Maintenance
19	Clean out and deepen the stormwater drainage ditches in key flood prone areas	Maintenance	Complete	No		City Maintenance

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, the City of Sunrise Beach Village identified the following mitigation efforts completed since the last HMP:

- None identified

Proposed Hazard Mitigation Initiatives for the HMP Update

The City of Sunrise Beach Village participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide-range of activities and mitigation measures selected.

Table 9.6-16. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA				CRS					
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure	X	X	-	-	X	X	-	-	X	X
Drought	X	X	-	-	X	X	-	-	-	X
Extreme Temperature	X	X	-	-	X	X	-	-	-	X
Flood	X	X	-	-	X	X	-	-	X	X
Geological Hazards	X	X	-	-	X	X	-	-	-	X
Hurricane	X	X	-	-	X	X	-	-	X	X
Severe Storm	X	X	-	-	X	X	-	-	-	X
Tornado	X	X	-	-	X	X	-	-	-	X
Pandemic	X	X	-	-	X	X	-	-	-	X
Winter Weather	X	X	-	-	X	X	-	-	-	X
Wildfire	X	X	X	X	X	X	X	-	-	X

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives the City of Sunrise Beach Village would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

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Table 9.6-17. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-City of Sunrise Beach Village-001	Firewise Community Project	**Problem**: With recurring drought conditions, the potential for wildfires in the surrounding ranch land of the City has increased. Local residence lots and vacant land on the perimeter of the City have an increased risk of fire damaging structures and fire progressing into the interior of the City. Clearing vacant lots and removing fuel from the area is necessary but not undertaken in many cases. Vacant lots are in the immediate vicinity of land that has residential structures and the potential for large monetary loss in the event of a wildland fire. Firewise Community designation will allow for better competition for grants to assist homeowners in clearing lots. **Solution:** The Volunteer Fire Department will work with the City of Sunrise Beach Village to reach a designation of a Firewise City. The Texas Forest Service will conducted a risk assessment to determine best course of action to encourage clearing of high-risk lots and removing fuel from around structures. As part of this effort, the City will also develop a	New and Existing	Wildfire	2,3,4	1-3 years	City of Sunrise Beach Volunteer Fire Department	AFG, TFS	Reduce impact of wildfires on the community, increase awareness of wildfire potential	$100,000 - $200,000	Medium	NSP, EAP, LPR	PI, PP, PR

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		Community Wildfire Protection Plan.											
2023-City of Sunrise Beach-002	Install Fire Hydrants	**Problem:** This City has never had fire hydrants. The City water system was never believed to support installation or use of fire hydrants. Dry hydrants were used for many years to draft from the lake. However, the invasion of zebra mussels and flood damage have rendered the dry hydrants inoperable and untenable for use. Water supply for both structure and wildland fire fighting is critical to successful containment and extinguishment. Two large (18,000 gallon) water storage/rain-water collection tanks have been purchased and installed using donated funds and grant money from LCRA. Recent research has revealed that within certain limits fire hydrants can be installed at many locations throughout the City. **Solution:** Ten or more hydrants will be installed at strategic locations to significantly reduce the time needed to refill tenders or fire trucks/engines during a fire event.	New and Existing	Wildfire	1,2	1 year	Volunteer Fire Department, City Water Department	AFG, LCRA, TFS	Protect existing and new properties, critical facilities, community lifelines, and population	$30,000 - $50,000	High	SIP	PP
2023-City of Sunrise Beach	Culvert Design Study	**Problem:** There are two significant low-water crossings in the City. When these two crossings are flooded during heavy rains	New and Existing	Flood, Hurricane, Dam Failure	1	1-3 years	City Maintenance	LCRA, USACE, BRIC, PDM	Increase the size of the culverts will reduce roadway flooding	$100,000-$200,000	High	SIP	SP

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
Village-003		roughly one half of the city is inaccessible from the other half of the City. Evacuation of residents who are South of the intersection of Beach Drive and Sunrise Drive becomes impossible. Access by emergency vehicles (ambulance and fire apparatus) is prevented. **Solution:** An engineering study will be conducted to identify areas where larger culverts can be implemented. After the study is complete, the implementation phase will begin.											
2023-City of Sunrise Beach Village-004	Roadway Elevation Study	**Problem:** There are two significant low-water crossings in the City. When these two crossings are flooded during heavy rains roughly one half of the City is inaccessible from the other half of the City. Evacuation of residents who are south of the intersection of Beach Drive and Sunrise Drive becomes impossible. Access by emergency vehicles (ambulance and fire apparatus) is prevented. **Solution:** An engineering study will be conducted to identify the areas of the road that can be elevated or raised to reduce roadway flooding and prevent water from crossing the road and preventing traffic flow. Once	New and Existing	Flood, Hurricane, Dam Failure	1,2,	1-3 years	City Maintenance	LRCRA, USACE, BRIC, PDM, CDBG	Reduce roadway flooding and increase traffic flow	$100,000 - $300,000	High	SIP	PP

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		the engineering study is complete an implementation phase will begin.											
2023-City of Sunrise Beach Village-005	Lightning Rod Installment	**Problem:** The City does not have mitigation equipment for lighting strikes. **Solution:** The City will install lightning protection devices and methods, such as lightning rods and grounding on communication infrastructure and critical facilities to ensure the continuity of operations in the event of a lightning strike.	New and Existing	Severe Storm	2,6	1 year	City Maintenance	FEMA EDC, BRIC, USACE, HMGP	Maintain continuity of operations during severe storm events	Low	High	SIP	PP
2023-City of Sunrise Beach Village-006	Substantial Damage Procedure	**Problem:** While major events that result in substantial damage of structures are rare, municipalities need to have official procedures in place to inspect structures, make determinations, and provide for appeals. **Solution:** The municipality will develop official procedures for Substantial Damage and Substantial Improvement determinations.	New	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Wildfire, Winter Weather	1,2,3	Within 5 years	City Planning Board, Floodplain Administration	Municipal Budget	Meet NFIP requirements, improved floodplain administration	Staff Time	High	LPR,	PP, PR
2023-City of Sunrise Beach	Update Building Code	**Problem:** The City building code does not identify standards for high-risk areas.	New and Existing	Flood, Geological Hazards, Wildfire	1,2,5	Within 5 years	City Planning Board, Code Enforcement Officer	Municipal Budget	Increase protection of infrastructure prior to and post hazard events	Staff Time	High	LPR	PR

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
Village-007		**Solution:** The City will update the building code to incorporate high risk standards. During the next building code update, the City will incorporate standards for high risk areas including flood, geological hazards, and wildfire areas.											
2023-City of Sunrise Beach Village-008	Debris Management Plan	**Problem:** The City does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events. **Solution:** The City Planning Board will work with the Llano County Emergency Management to develop a debris management plan as a framework for organizing the rapid, safe, and cost-effective separation, removal, collection, recycling, and disposal of debris after a disaster. This plan will include goals to minimize debris-related threats to public health, safety, and the environment following any hazard event.	New and Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Wildfire, Winter Weather	1,2,4	1-2 years	City Planning Board, Llano County Emergency Management	Municipal Budget	Ensure coordinated plans to safely remove debris from water ways	$10,000	High	LPR	PR, ES
2023-City of Sunrise Beach Village-009	Evacuation Plan	**Problem:** The City of Sunrise Beach Village does not have an evacuation plan in place. **Solution:** The City Planning Board will work with Llano County Emergency Management to establish an evacuation plan prior to a hazard event.	New and Existing	Flood, Hurricane, Severe Storm, Tornado	1,2,4	1-2 years	City Planning Board, Llano Count Emergency Management	Municipal Budget	Decrease potential for loss of life	Low	High	LPR	PR

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-City of Sunrise Beach Village-010	Emergency Sheltering Improvements	**Problem:** Emergency shelters have been designated but are not staffed nor equipped cots, blankets, and MREs on hand. **Solution:** The City will work with the Red Cross to conduct trainings for potential shelter staff. The City will purchase the necessary supplies to support shelters.	Existing	All Hazards	1,4	Within 5 years	Administration, Red Cross, Llano Count Emergency Management	HMGP, Municipal budget	Staffed and stocked emergency shelters	Low	High	LPR, SIP	ES
2023-City of Sunrise Beach Village-010	Purchase and install communications equipment	**Problem:** The City does not have the ability to communicate with each other in the event of an emergency evacuation. **Solution:** The City will purchase and install communication equipment for emergencies.	New	All Hazards	1, 4	3 years	City Administration, Llano County Emergency Management	HMGP, Municipal Budget	More communication with hazard evacuations	High	High	SIP	ES

Notes: Not all acronyms and abbreviations defined below are included in the table.

Acronyms and Abbreviations:

CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*
FEMA	*Federal Emergency Management Agency*
FPA	*Floodplain Administrator*
HMA	*Hazard Mitigation Assistance*
N/A	*Not applicable*
NFIP	*National Flood Insurance Program*
OEM	*Office of Emergency Management*

Potential FEMA HMA Funding Sources:

FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC	*Building Resilient Infrastructure and Communities Program*

Timeline:

The time required for completion of the project upon implementation.

Cost:

The estimated cost for implementation.

Benefits:

A description of the estimated benefits, either quantitative and/or qualitative.

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Critical Facility:

Yes *Critical Facility located in 1% floodplain*

Mitigation Category:

- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*
- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*
- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.*

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The prioritization criteria provided in Volume 1, Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

Table 9.6-18. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-City of Sunrise Beach Village-001	Fire Wise Community	1	1	1	1	1	1	-1	1	0	-1	0	1	1	0	7	Medium
2023-City of Sunrise Beach Village-002	Install Fire Hydrants	1	1	1	1	1	1	0	1	1	1	1	1	1	0	12	High
2023-City of Sunrise Beach Village-003	Culvert Design Study	1	1	1	1	0	1	-1	1	1	1	1	1	1	1	11	High
2023-City of Sunrise Beach Village-004	Road Elevation Study	1	1	1	1	0	1	-1	1	1	1	1	1	1	1	11	High
2023-City of Sunrise Beach Village-005	Lightning Rod Installment	1	1	1	1	1	1	1	0	1	1	0	1	1	0	11	High
2023-City of Sunrise Beach Village-006	Substantial Damage Procedure	1	1	1	1	1	1	1	1	1	1	1	0	1	1	13	High
2023-City of Sunrise Beach Village-007	Update Building Code	1	1	1	1	1	1	1	1	1	1	1	0	1	1	13	High
2023-City of Sunrise Beach Village-008	Debris Management Plan	1	1	1	1	1	1	1	1	0	1	1	1	1	1	13	High
2023-City of Sunrise Beach Village-009	Evacuation Plan	1	0	1	1	1	1	1	1	1	1	1	1	1	1	13	High
2023-City of Sunrise Beach Village-010	Emergency Sheltering Improvements	1	0	1	1	1	1	1	1	1	1	1	0	1	1	12	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).

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Section 9 Jurisdictional Annexes

9.7 Llano County MUD #1

This section presents the jurisdictional annex for the Llano County MUD #1 that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the jurisdiction, who in the District participated in the planning process, an assessment of the Llano County MUD #1's risk and vulnerability, the different capabilities used in the District, and an action plan that will be implemented to achieve a more resilient community.

9.7.1 Hazard Mitigation Planning Team

The Llano County MUD #1 identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many District departments, Board of Directors and Utility Operations. The General Manager represented the community on the Llano County Hazard Mitigation Plan Planning Partnership and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes the officials that participated in the development of the annex and in what capacity. Additional documentation on the jurisdiction's planning process through Planning Partnership meetings is included in Volume 1, Section 2 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.7-1. Hazard Mitigation Planning Team

Primary Point of Contact		Alternate Point of Contact	
Name/Title:	Angela Thomas – General Manager	Name/Title:	Sharon Baty – District Secretary
Address:	2900 Blue Lake Dr, Horseshoe Bay, TX 78657	Address:	2900 Blue Lake Dr, Horseshoe Bay, TX 78657
Phone Number:	830-598-5460	Phone Number:	830-598-5460
Email:	lcmudone@gmail.com	Email:	sharon@lcmud.com
NFIP Floodplain Administrator			
Name/Title:	Christy Vaught – Llano County Floodplain Administrator		
Address:	100 W. Sandstone St, Ste 200-A, Llano, TX 78643		
Phone Number:	325-247-2039		
Email:	floodadmin@co.llano.tx.us		
Additional Contributors:			
Name/Title: Jessica Foran – General Manager Method of Participation: Provided information and data on hazards of concern			
Name/Title: Angela Thomas – General Manager Method of Participation: Provided information on previous events, capabilities, contributed to mitigation strategy			

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9.7.2 Jurisdiction Profile

The Llano County MUD #1, formed around the original Water District in Blue Lake, is a state chartered municipal utility district and operates as a Texas state municipal entity. It is also subject to the rules and regulations of the Texas Commission on Environmental Quality for water quality.

In addition to the operation of the water plant and the distribution lines, it is responsible for six (6) miles of streets in Blue Lake, having assumed that responsibility from the property owners association in 1987. It also contracts for garbage disposal for its residents. In 2000 it assumed the responsibility for streetlights from the property owners association. In 1996 the District contracted with the Lake LBJ Municipal Utility District for waste disposal and treatment and in that connection-built transmission lines, lift stations, and provided grinder pumps to all properties in Blue Lake, Deerhaven and Sandy Harbor that elected to participate in the program. Wastewater disposal is contracted with The City of Horseshoe Bay.

The Llano County MUD #1 Board of Directors consist of five members. The Directors of the MUD Board are authorized to direct the daily operations of the MUD district. Llano County MUD #1 employs a General Manager, an Administrative Assistant, and a contractor for the Water and Wastewater Operations.

Blue Lake Estates consists of 410 lots including lake front and interior type lots. Llano County MUD has 251 active residential water meters, and services 251 sewer connections in-District. Out of district, Llano County MUD services 93 sewer connections in Deerhaven, 90 in Sandy Harbor, and 48 in the Trails of Horseshoe Bay.

9.7.3 Jurisdictional Capability Assessment and Integration

The Llano County MUD #1 performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section 5 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The community's adaptive capacity to withstand hazard events.

Planning, Legal, and Regulatory Capability and Integration

The information provided in this section provides Llano County MUD #1-specific planning, legal, and regulatory capabilities. The table below provides the various plans, codes, and regulatory capabilities provided by Llano County MUD #1. For municipal-related information, refer to the City of Horseshoe Bay (Section 9.3) and Llano County (Section 9.1) annexes.

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Table 9.7-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	Yes	-	Local	Blue Lake
How does this reduce risk? Building permits are issued at the Llano County MUD #1 office. Prior to permit approval, Llano County MUD #1 will determine the need for: culverts between driveway and road; connection between driveway and existing road; and a temporary road surface between construction site and existing road.				
Zoning/Land Use Code	No	-	-	-
How does this reduce risk?				
Subdivision Ordinance	No	-	-	-
How does this reduce risk?				
Site Plan Ordinance	No	-	-	-
How does this reduce risk?				
Stormwater Management Ordinance	No	-	-	-
How does this reduce risk?				
Post-Disaster Recovery/ Reconstruction Ordinance	No	-	-	-
How does this reduce risk?				
Real Estate Disclosure	No	-	-	-
How does this reduce risk?				
Growth Management	No	-	-	-
How does this reduce risk?				
Environmental Protection Ordinance	No	-	-	-
How does this reduce risk?				
Flood Damage Prevention Ordinance	No	-	-	-
How does this reduce risk?				
Wellhead Protection	No	-	-	-
How does this reduce risk?				
Emergency Management Ordinance	No	-	-	-
How does this reduce risk?				
Climate Change Ordinance	No	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Other	Yes	See below	Llano County MUD #1	Llano County MUD #1
How does this reduce risk? • Fire Hazard Ordinance (50-00-01) • Traffic Ordinance (01, 02, 03, and 04) • Off Highway Vehicle Ordinance (04-00-04) • Solid Waste Ordinance (06-00-01)				
Planning Documents				
Comprehensive/Master Plan	No	-	-	-
How does this reduce risk?				
Capital Improvement Plan	No	-	-	-
How does this reduce risk?				
Disaster Debris Management Plan	No	-	-	-
How does this reduce risk?				
Floodplain Management or Watershed Plan	No	-	-	-
How does this reduce risk?				
Stormwater Management Plan	No	-	-	-
How does this reduce risk?				
Open Space Plan	No	-	-	-
How does this reduce risk?				
Urban Water Management Plan	No	-	-	-
How does this reduce risk?				
Habitat Conservation Plan	No	-	-	-
How does this reduce risk?				
Economic Development Plan	No	-	-	-
How does this reduce risk?				
Shoreline Management Plan	No	-	-	-
How does this reduce risk?				
Community Wildfire Protection Plan	No			
How does this reduce risk?				
Community Forest Management Plan	No	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Transportation Plan	No	-	-	-
How does this reduce risk?				
Agriculture Plan	No	-	-	-
How does this reduce risk?				
Climate Action/ Resiliency/Sustainability Plan	No	-	-	-
How does this reduce risk?				
Tourism Plan	No	-	-	-
How does this reduce risk?				
Business/ Downtown Development Plan	No	-	-	-
How does this reduce risk?				
Other	No	-	-	-
Response/Recovery Planning				
Comprehensive Emergency Management Plan	Yes	Horseshoe Bay Emergency Operations Plan	Local	Emergency Management Office
How does this reduce risk? The District has a backup connection with the City of Horseshoe Bay that is reviewed and approved every 5 years. A list of alternative resources and their contact information is included in the Emergency Management Plan. The plan ensures the District is prepared to respond to and recover from disasters. Includes transportation planning.				
Continuity of Operations Plan	No	-	-	-
How does this reduce risk?				
Strategic Recovery Planning Report	No	-	-	-
How does this reduce risk?				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	-	-	-
How does this reduce risk?				
Post-Disaster Recovery Plan	No			
How does this reduce risk?				
Public Health Plan	No	-	-	-
How does this reduce risk?				
Other	No	-	-	-
How does this reduce risk?				

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Development and Permitting Capability

The Blue Lake Estates Property Owner's Association handles the development permits. Llano County MUD #1 tracks by new service applications. The table below summarizes the capabilities of the Llano County MUD #1 to oversee and track development.

Table 9.7-3. Development and Permitting Capability

Indicate if your jurisdiction implements the following	Yes/No	Comment:
Permitting is done at the municipal level for the Llano County MUD #1 coverage area.		

Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to the Llano County MUD #1 and their current responsibilities that contribute to hazard mitigation.

Table 9.7-4. Administrative and Technical Capabilities

Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	No	-
Zoning Board of Adjustment	No	-
Planning Department	No	-
Mitigation Planning Committee	No	-
Environmental Board/Commission	No	-
Open Space Board/Committee	No	-
Economic Development Commission/Committee	No	-
Public Works/Highway Department	No	-
Construction/Building/Code Enforcement Department	Yes	Blue Lake Estates Property Owner's Association, Building Official Mike Light
Emergency Management/Public Safety Department	No	-
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	Yes	An Emergency Outdoor Warning Siren System is an all-hazards siren system used to warn the general population of potential danger. During an emergency, the sirens may be activated for a set amount of time as determined by your community. Alert – a single 3-minute tone signifying an emergency alert. The alert is used to inform the community of an emergency disaster. Attack – a 3-minute up-and-down, rising and falling tone to signify there is a homeland security attack or emergency. WarnCentralTexas.com is also available.
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	Yes	Policy Manual, Road Maintenance, including Street improvements and drainage maintenance.

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Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Mutual aid agreements	Yes	Texas Water/Wastewater Agency Response Network (TXWARN)
Human Resources Manual	No	-
Other	No	-
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	No	-
Engineers or professionals trained in building or infrastructure construction practices	No	-
Planners or engineers with an understanding of natural hazards	No	-
Staff with expertise or training in benefit/cost analysis	No	-
Professionals trained in conducting damage assessments	Yes	Utility Operations Supervisor
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	No	-
Environmental scientist familiar with natural hazards	No	-
Surveyor(s)	No	-
Emergency Manager	Yes	City of Horseshoe Bay Fire Chief through Firefighting Agreement
Grant writer(s)	No	-
Resilience Officer	No	-
Other (this could include stormwater engineer, environmental specialist, etc.)	No	-

Fiscal Capability

The table below summarizes financial resources available to the Llano County MUD #1.

Table 9.7-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/No)
Community development Block Grants (CDBG, CDBG-DR)	No
Capital improvements project funding	Yes
Authority to levy taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	Yes
Impact fees for homebuyers or developers of new development/homes	Yes
Stormwater utility fee	No
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	Yes
Withhold public expenditures in hazard-prone areas	No
Other federal or state Funding Programs	Yes
Open Space Acquisition funding programs	No

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Financial Resources	Accessible or Eligible to Use? (Yes/No)
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	Yes

Education and Outreach Capability

The table below summarizes the education and outreach resources available to the Llano County MUD #1.

Table 9.7-6. Education and Outreach Capabilities

Outreach Resources	Available? (Yes/No)	Comment:
Public information officer or communications office	No	-
Personnel skilled or trained in website development	No	-
Hazard mitigation information available on your website	No	-
Social media for hazard mitigation education and outreach	No	-
Citizen boards or commissions that address issues related to hazard mitigation	Yes	Emergency Response Committee
Warning systems for hazard events	Yes	An Emergency Outdoor Warning Siren System
Natural disaster/safety programs in place for schools	No	-
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? If yes, please describe.	Yes	Constant Contact mass email messaging and messaging through Warn Central Tx by contacting the Emergency Manager or County Emergency Services Coordinator Annual education is provided on Home Evacuation Plans and At Risk Residents and Property Owners in April of each year with brochures from FEMA, Tx Forestry Service, and presentations from the Blue Lake ERC, Fire Chief or County Emergency Coordinator.

Community Classifications

The table below summarizes classifications for community programs available to the Llano County MUD #1.

Table 9.7-7. Community Classifications

Program	Participating? (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	No	-	-
Building Code Effectiveness Grading Schedule (BCEGS)	No	-	-
Public Protection (ISO Fire Protection Classes 1 to 10)	Yes	Assumed Class 9	06/01/2001
Storm Ready Certification	No	-	-
Firewise Communities classification	Yes	N/A	May 2021
Other	No	-	-

Note:
N/A Not applicable
NP Not participating

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- *Unavailable*

Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.
- Moderate: Capacity might exist; but is not used or could use some improvement.
- Weak: Capacity does not exist or could use substantial improvement.

Table 9.7-8. Adaptive Capacity

Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Moderate
Drought	Moderate
Extreme Temperature	Moderate
Flood	Moderate
Geologic Hazards	Moderate
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Moderate
Winter Storm	Weak
Wildfire	Moderate

9.7.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information and is listed in the Hazard Mitigation Planning Team table at the beginning of this annex.

National Flood Insurance Program (NFIP) Summary

Llano County MUD #1 does not participate in the NFIP. Refer to the City of Horseshoe Bay (Section 9.3) for details on the NFIP program in the City.

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in the Llano County MUD #1.

Table 9.7-9. NFIP Summary

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	Not Applicable- see City of Horseshoe Bay Annex

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NFIP Topic	Comments
• Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	
• How do you make Substantial Damage determinations? • How many were declared for recent flood events in your jurisdiction?	
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If not, state why.	
NFIP Compliance	
What local department is responsible for floodplain management?	Not Applicable-See City of Horseshoe Bay Annex
Are any certified floodplain managers on staff in your jurisdiction?	
Do you have access to resources to determine possible future flooding conditions from climate change?	LCRA Lake Level and Flood Information Notifications
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	Not Applicable- See City of Horseshoe Bay Annex
Provide an explanation of NFIP administration services you provide (e.g., permit review, GIS, education/outreach, inspections, engineering capability)	
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	
What are the barriers to running an effective NFIP program in the community, if any?	
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state the violations.	
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	
• What is the local law number or municipal code of your flood damage prevention ordinance? • What is the date that your flood damage prevention ordinance was last amended?	
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	
Are there other local ordinances, plans or programs (e.g., site plan review) that support floodplain management and meeting the NFIP requirements? For instance, does the planning	

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NFIP Topic	Comments
board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	

9.7.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.7-10. Recent and Expected Future Development

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**
Single Family	Permitting is done at the municipal level for the Llano County MUD #1 coverage area. See City of Horseshoe Bay Annex.													
Multi-Family														
Other (commercial, mixed-use, etc.)														
Total Permits Issued														

SFHA Special Flood Hazard Area (1% annual chance flood event)

** Only location-specific hazard zones or vulnerabilities identified.*

9.7.6 Jurisdictional Risk Assessment

The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard Ranking) provide detailed summaries for the Llano County MUD #1's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard Event History

Llano County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

The Llano County MUD #1's history of federally declared (as presented by FEMA) and significant hazard events [as presented in NOAA-National Centers for Environmental Information (NCEI)] is consistent with that of the County. The table below provides details regarding jurisdiction-specific loss and damages the District experienced during hazard events since the last hazard mitigation plan update. Information provided in the table below is based on reference material or local sources.

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Table 9.7-11. Hazard Event History

Date(s) of Event	Event Type (Disaster Declaration if applicable)	County Included in Declaration?	Summary of Event	Jurisdictional Summary of Damages and Losses
September 10 – November 2, 2018	DR-4416 – Severe Storms and Flood	Yes	Severe storms and flooding had a severe impact on roads and bridges	Utility owned residential grinder pumps due to flooding tanks
January 20, 2020 – continuing	EM-3458 – Covid-19, DR-4485 – Covid-19 Pandemic	Yes	Covid-19	District followed protocols enforced by the state and county
February 11-21, 2021	EM-3554 – Severe Winter Storm, DR-4586 – Severe Winter Storms	Yes	Severe ice storm resulted in significant ice coverage of roads, utility lines, buildings and homes causing widespread utility failure	Water Loss and Line Breaks due to freeze

Notes:
EM Emergency Declaration (FEMA)
FEMA Federal Emergency Management Agency
DR Major Disaster Declaration (FEMA)
N/A Not applicable

Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4 (Risk Assessment) have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes the Llano County MUD #1's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment). The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and community capabilities to address the hazard and changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Therefore, each jurisdiction ranked the degree of risk to each hazard as it pertains to their community. The table below summarizes the hazard risk/vulnerability rankings of potential natural hazards for the Llano County MUD #1. The Llano County MUD #1 reviewed the County hazard risk/vulnerability risk ranking table and individual results to reflect the relative risk of the hazards of concern to the community.

During the review of the hazard/vulnerability risk ranking, the District indicated the following:

- The District modified the ranking for the following hazards:
  - Drought – medium to high ranking
  - Flood – medium to high ranking
  - Hurricane – medium to low ranking
  - Winter Storm – low to medium ranking

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- The District agreed with the remaining hazard rankings

Table 9.7-12. Hazard Ranking Input

Dam Failure	Drought	Extreme Temperature	Flood	Geologic Hazards	Hurricane
Low	High	Medium	High	Low	Low

Severe Storm	Tornado	Pandemic	Winter Storm	Wildfire
High	High	Medium	Medium	High

Critical Facilities

The table below identifies critical facilities in the community located in the 1-percent and 0.2-percent floodplain and presents Hazus-MH estimates of the damage and loss of use to critical facilities as a result of a 1-percent annual chance flood event.

Table 9.7-13. Potential Flood Losses to Critical Facilities

Name	Type	Exposure	
		1% Event	0.2% Event
No critical facilities identified within the floodplain.			

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

Identified Issues

After review of the Llano County MUD #1's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, the Llano County MUD #1 identified the following vulnerabilities within their community:

- In the event of power outages, the Llano County MUD cannot proceed with a continuity of operations.*
- Llano County MUD has no storm notification system in place which puts their employees and residents at risk. *
- There are limited or no signs in areas that tend to have slick roadways in the District.*
- Llano County MUD #1 is not in contact with the entities that control the dam located in the District which is an issue relating to potential emergencies.
- The Llano County MUD #1 community's enforcement of the drought contingency plan is weak.
- The community has a large over 65 population which is high risk for extreme temperatures and winter weather and the district does not budget for mitigating these hazards.
- The District does not have funding or an emergency evacuation plan for flooding.
- The District has limited resources, poor information flow and a flawed quarantine system in relation to the pandemic hazard and has a large over 65 high risk population.
- The District has a large over 65 population who would struggle in the event of a tornado or wildfire evacuation.

**This issue was identified as a specific area of concern based on resident response to the 2023 Hazard Mitigation Plan public survey.*

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9.7.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

Past Mitigation Initiative Status

The following table indicates progress on the community's mitigation strategy identified in the 2016 HMPs. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.7-14. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, No Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)? Yes/No	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
Not Applicable- Did not participate in last Plan						

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, the Llano County MUD #1 identified the following mitigation efforts completed since the last HMP:

- An evacuation plan was established with the City of Horseshoe Bay Fire Department and is being implemented by the Blue Lake Emergency Response Committee (ERC).
- The District will use Constant Contact, a mass email program, reverse 911 and Warn Central Texas through the County Emergency Coordinator.
- Become A Firewise Community – The District became a Firewise Community in 2021 through efforts of the Board of Directors, Residents, and the Blue Lake Emergency Response Committee (ERC).
- Establish Backup for Utilities – A manual transfer switch will be installed at the water treatment plant to connect a generator in disasters. This project has been approved but not completed. Estimated completion by the end of 2022. Bypass connections were installed in 2022 at the Sandy Harbor and Deerhaven lift station so a diesel generator can be used in case of an electrical outage. These projects are under direction of the Board of Directors and Utility Personnel.
- The Blue Lake Emergency Response Committee performed a risk assessment in 2018.
- The District has a backup connection with the City of Horseshoe Bay that is reviewed and approved every 5 years. A list of alternative resources and their contact information is included in the Emergency Management Plan.
- The District has its files backed up to Carbonite and is currently working on digitizing hard copies.
- The outdoor warning siren was installed November 2021 and is currently being programmed to be alarmed by Llano County Dispatch. Currently, the alarm works manually, and administrative personnel have access to the key to manual alarm the siren.

Proposed Hazard Mitigation Initiatives for the HMP Update

The Llano County MUD #1 participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide-range of activities and mitigation measures selected.

Table 9.7-15. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA						CRS			
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure		X		X			X			X
Drought	X	X		X	X		X			X
Extreme Temperature	X	X		X			X			X
Flood	X	X		X			X			X
Geologic Hazards		X		X			X			X
Hurricane		X		X			X			X
Severe Storms		X		X			X			X

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Hazard	FEMA						CRS			
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Tornado	X	X		X			X			X
Pandemic		X		X			X			X
Winter Storm	X	X		X			X			X
Wildfire	X	X		X			X			X

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives the Llano County MUD #1 would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in jurisdictional priorities.

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Table 9.7-16. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-Llano County MUD-001	Generators	**Problem**: In the event of power outages, the Llano County MUD cannot proceed with a continuity of operations and many of their facilities cannot provide essential services. **Solution**: Llano County MUD will install, maintain, and run routine tests on generators at their main office, Sandy Harbor Lift Station, Deerhaven Lift Station, water and wastewater stations so that they may continue operating in an extreme hazard event.	Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1,2,4	3 Years	Llano County, MUD #1, Emergency Management	FEMA, BRIC, HMA, PDM County and MUD budget	Llano County MUD will have a continuity operation within their water and wastewater system, even in the event of a power outage.	High	High	SIP	ES
2023-Llano County MUD-002	Hazard Notification System	**Problem**: Llano County MUD has no storm notification system in place which puts their employees and residents at risk. **Solution**: Install and identify a local storm warning program and distribute relevant information to the public. Example: CAPCOG or mass notification system.	N/A	Dam Failure, Drought, Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Pandemic, Winter Storm, Wildfire	1,2,3,4	1 Year	Llano County, MUD #1, Llano County, Emergency Management	FEMA, BRIC, HMA, PDM County budget	The public will be more protected with the notification system in place.	Medium	High	EAP	PI, ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-Llano County MUD-003	Signs	**Problem**: There are limited or no signs in areas that tend to have slick roadways in the District. **Solution**: Install proper signs near roadways that tend to be an issue for the District.	New and Existing	Severe Winter Weather	1,2,4	1 Year	Llano County, MUD #1, Llano County, Emergency Management	BRIC, HMA, PDM, County and MUD budget	The public that drives on District roads will be safer.	Low	High	EAP	PI
2023-Llano County MUD-004	Dam Communication	**Problem:** Llano County MUD #1 is not in contact with the entities that control the dam located in the District which is an issue relating to potential emergencies. **Solution:** Llano County MUD #1 will create a contact stream with the entities that control the dam located in the District in case of detrimental emergencies so that they are better prepared to experience dam failure.	New and Existing	Dam Failure	1,2,3,4	1 Year	Llano County, MUD #1, Llano County, Emergency Management	FEMA, HMA, PDM, County budget	The Llano County MUD #1 will be safer from the dam failure hazard.	Low	High	EAP	ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-Llano County MUD-005	Drought Contingency Plan	**Problem:** The Llano County MUD #1 community's enforcement of the drought contingency plan is weak. **Solution:** Resident education and reevaluation of the plan will be used to encourage self-enforcement and neighbor peer pressure for enforcement.	New and Existing	Drought	1,3,4	1 Year	Llano County, MUD #1, Llano County, Emergency Management	FEMA, HMA, PDM, County budget	The drought contingency plan will be followed and enforced due to educated communities.	Low	High	LPR, EAP	PR, PI
2023-Llano County MUD-006	Extreme Temperature and Winter Weather Plan and Budget	**Problem:** The community has a large over 65 population which is at high risk for extreme temperatures and winter weather and the district does not budget for mitigating these hazards. **Solution:** Involve board members to discuss creating a budget to include mitigation of extreme temperature and the winter weather hazards, such as heating and cooling stations.	New and Existing	Extreme Temperature, Winter Weather	1,2,3,4,6	1 Year	Llano County, MUD #1, Llano County, Emergency Management	FEMA, HMA, PDM, County budget	The community, especially its high-risk population, will be more prepared and safer from extreme temperatures and winter weather.	Medium	High	LPR, SIP	ES, PI

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-Llano County MUD-007	Flood Plan and Budget	**Problem:** The District does not have funding or an emergency evacuation plan for flooding. **Solution:** Involve board members to discuss creating a budget to include running flood tests that will mitigate the flood hazard and implement culverts and flood barriers where needed.	New and Existing	Flood	1,2,4,6	2 Years	Llano County, MUD #1, Llano County, Emergency Management	FEMA, HMA, PDM, County budget	The District will be more prepared and safer from extreme flooding events.	High	High	LPR, SIP	ES, PI
2023-Llano County MUD-009	Wildfire Evacuation Plan	**Problem:** The District has a large over 65 population who would struggle in the event of a wildfire evacuation. **Solution:** The District will develop an evacuation plan for residents to participate in for both wildfire and tornados.	New and Existing	Wildfire	1, 2, 3, 4, 6	1 Year	Llano County, MUD #1, Llano County, Emergency Management	FEMA, HMA, PDM County budget	The over 65 population will be able to evacuate in the event of wildfire.	Low	High	LPR	ES, PI
2023-Llano County MUD-010	Tornado Sheltering Plan	**Problem:** The District has a large over 65 population who would struggle traveling and sheltering in the event of the tornado. **Solution:** The District will develop a sheltering plan that is able to be complete by	Existing	Tornado	1, 2	1 Year	Llano County, MUD #1, Llano County, Emergency Management	FEMA, HMA, PDM County budget	The over 65 population will be able to shelter in the event of tornado.	Low	High	LPR	ES, PI

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		the over 65 population.											

Notes:
Not all acronyms and abbreviations defined below are included in the table.

Acronyms and Abbreviations:

CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*
FEMA	*Federal Emergency Management Agency*
FPA	*Floodplain Administrator*
HMA	*Hazard Mitigation Assistance*
N/A	*Not applicable*
NFIP	*National Flood Insurance Program*
OEM	*Office of Emergency Management*

Potential FEMA HMA Funding Sources:

FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC Program	*Building Resilient Infrastructure and Communities*
PDM	*Pre-Disaster Mitigation Plan*

Timeline:
The time required for completion of the project upon implementation.

Cost:
The estimated cost for implementation.

Benefits:
A description of the estimated benefits, either quantitative and/or qualitative.

Mitigation Category:

- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*
- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*
- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.*

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The prioritization criteria provided in Volume 1, Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

Table 9.7-17. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-Llano County MUD-001	Generators	1	1	1	1	1	1	1	0	1	1	1	1	1	0	12	High
2023-Llano County MUD-002	Hazard Notification System	1	1	1	1	1	1	1	0	1	1	1	1	1	0	12	High
2023-Llano County MUD-003	Signs	1	0	1	1	1	1	1	0	1	1	1	1	1	1	12	High
2023-Llano County MUD-004	Dam Communication	1	1	1	1	1	1	1	0	1	1	0	1	1	0	11	High
2023-Llano County MUD-005	Drought Contingency Plan	1	1	1	1	1	1	1	1	1	1	0	1	1	0	12	High
2023-Llano County MUD-006	Extreme Temperature and Winter Weather Plan and Budget	1	1	1	1	1	1	1	0	1	1	1	1	1	0	12	High
2023-Llano County MUD-007	Flood Plan and Budget	1	1	1	1	1	1	1	0	1	1	0	1	1	0	11	High
2023-Llano County MUD-008	Pandemic Resources and Information	1	0	1	1	1	1	1	0	1	1	0	1	1	0	10	High
2023-Llano County MUD-009	Wildfire Evacuation Plan	1	0	1	1	1	1	1	0	1	1	0	1	1	1	11	High
2023-Llano County MUD-010	Tornado Sheltering Plan	1	0	1	1	1	1	1	0	1	1	0	1	1	1	11	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14)

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Section 9 Jurisdictional Annexes

9.8 San Saba Independent School District

This section presents the jurisdictional annex for the San Saba Independent School District that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the School District, who in the school district participated in the planning process, an assessment of the San Saba Independent School District's risk and vulnerability, the different capabilities used in the school district, and an action plan that will be implemented to achieve a more resilient community.

9.8.1 Hazard Mitigation Planning Team

The San Saba Independent School District identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many school district departments, including the Superintendent and Assistant Superintendent. The Superintendent represented the community on the Llano and San Saba County Hazard Mitigation Plan Planning Partnership and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes the officials that participated in the development of the annex and in what capacity. Additional documentation on the School District's planning process through Planning Partnership meetings is included in Volume 1, Section 3 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.8-1. Hazard Mitigation Planning Team

Primary Point of Contact		Alternate Point of Contact	
Name/Title:	Buck Gilcrease - Superintendent	Name/Title:	Keith Owen-Assistant Superintendent
Address:	808 W Wallace St, San Saba, TX 76877	Address:	808 W Wallace St, San Saba, TX 76877
Phone Number:	325-372-3771	Phone Number:	325-372-3771
Email:	bgilcrease@san-saba.net	Email:	kowens@san-saba.net
Additional Contributors:			
Name/Title: Michelle Perry Method of Participation: Provided input on capabilities, hazard impacts, and mitigation strategy			
Name/Title: Marsha Hardy, San Saba County Method of Participation: Provided input and answered worksheets			

9.8.2 Jurisdictional Profile

The San Saba Independent School District is in West Wallace, in San Saba County. Within the district there is an Elementary School, Middle School, and High School.

According to the Texas Tribune, the 2020-2021 student population for the San Saba Independent School District was 721. Data from the Texas Tribune indicated that 98.2 percent of the students received their high school

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diplomas on time or earlier. The average SAT score was a 1040 and the average ACT score was a 17.4 for the 2019-2020 school year (Texas Tribune 2022).

9.8.3 Jurisdictional Capability Assessment and Integration

The San Saba Independent School District performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section 5 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The community's adaptive capacity to withstand hazard events.

For a community to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day local government operations. As part of the hazard mitigation analysis, planning/policy documents were reviewed, and each jurisdiction was surveyed to obtain a better understanding of their progress toward plan integration. The updated mitigation strategy provided an opportunity for the San Saba Independent School District to identify opportunities for integration of mitigation concepts that can be incorporated into the district's procedures.

Planning, Legal, and Regulatory Capability and Integration

The table below summarizes the regulatory tools that are available to the San Saba Independent School District. The comment field provides information as to how the capability integrates hazard mitigation and risk reduction. Refer to annex of relevant location for more information on planning, legal and regulatory capabilities, and integration.

Table 9.2-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Not Applicable: This is done at the municipal level				

Development and Permitting Capability

The table below summarizes the capabilities of the San Saba Independent School District to oversee and track development. Permitting is primarily done at the municipal and county levels, refer to the relevant annex for more details.

Table 9.2-3. Development and Permitting Capability

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Indicate if your jurisdiction implements the following	Yes/No	Comment:
Do you issue development permits? • If yes, what department is responsible?	N/A	Not Applicable: This is done at the municipal level
If you do not issue development permits, what is your process for tracking new development?	N/A	
Are permits tracked by hazard area? (For example, floodplain development permits.)	N/A	
Do you have a buildable land inventory? • If yes, please describe	N/A	
Describe the level of build-out in your jurisdiction.	N/A	

Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to the San Saba Independent School District and their current responsibilities that contribute to hazard mitigation. More information is available in municipality level annexes.

Table 9.2-4. Administrative and Technical Capabilities

Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	N/A	-
Zoning Board of Adjustment	N/A	-
Planning Department	N/A	-
Mitigation Planning Committee	N/A	-
Environmental Board/Commission	N/A	-
Open Space Board/Committee	N/A	-
Economic Development Commission/Committee	N/A	-
Public Works/Highway Department	N/A	-
Construction/Building/Code Enforcement Department	N/A	-
Emergency Management/Public Safety Department	N/A	-
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	N/A	-
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	Yes	Follow groundskeeping schedule
Mutual aid agreements	N/A	-
Human Resources Manual	No	-
Other	No	-
Technical/Staffing Capability		

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Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Planners or engineers with knowledge of land development and land management practices	N/A	-
Engineers or professionals trained in building or infrastructure construction practices	N/A	-
Planners or engineers with an understanding of natural hazards	N/A	-
Staff with expertise or training in benefit/cost analysis	N/A	-
Professionals trained in conducting damage assessments	N/A	-
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	N/A	-
Environmental scientist familiar with natural hazards	N/A	-
Surveyor(s)	N/A	-
Emergency Manager	N/A	-
Grant writer(s)	N/A	-
Resilience Officer	N/A	-
Other (this could include stormwater engineer, environmental specialist, etc.)	N/A	-

Fiscal Capability

The table below summarizes financial resources available to the San Saba Independent School District.

Table 9.2-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/No)
Community development Block Grants (CDBG, CDBG-DR)	N/A
Capital improvements project funding	N/A
Authority to levy taxes for specific purposes	N/A
User fees for water, sewer, gas, or electric service	N/A
Impact fees for homebuyers or developers of new development/homes	N/A
Stormwater utility fee	N/A
Incur debt through general obligation bonds	N/A
Incur debt through special tax bonds	N/A
Incur debt through private activity bonds	N/A
Withhold public expenditures in hazard-prone areas	N/A
Other federal or state Funding Programs	N/A
Open Space Acquisition funding programs	N/A
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	N/A

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Education and Outreach Capability

The table below summarizes the education and outreach resources available to the San Saba Independent School District.

Table 9.2-6. Education and Outreach Capabilities

Outreach Resources	Available? (Yes/N/A)	Comment:
Public information officer or communications office	N/A	If yes, provide comment
Personnel skilled or trained in website development	Yes	Superintendent and IT Director
Hazard mitigation information available on your website	Yes	IT Director
Social media for hazard mitigation education and outreach	Yes	IT Director
Citizen boards or commissions that address issues related to hazard mitigation	N/A	
Warning systems for hazard events	Yes	PA Systems, School Website, School App
Natural disaster/safety programs in place for schools	Yes	Emergency Operations Plan
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? • If yes, please describe.	Yes	School Website, School App

Community Classifications

The table below summarizes classifications for community programs available to the San Saba Independent School District.

Table 9.2-7. Community Classifications

Program	Participating? (Yes/N/A)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	N/A	Not Applicable: This is done at the municipal level	
Building Code Effectiveness Grading Schedule (BCEGS)	N/A		
Public Protection (ISO Fire Protection Classes 1 to 10)	N/A		
Storm Ready Certification	N/A		
Firewise Communities classification	N/A		
Other	N/A		

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Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.
- Moderate: Capacity might exist; but is not used or could use some improvement.
- Weak: Capacity does not exist or could use substantial improvement.

Table 9.2-8. Adaptive Capacity

Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Moderate
Drought	Moderate
Extreme Temperature	Moderate
Flood	Moderate
Geological Hazards	Moderate
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Moderate
Winter Storm	Moderate
Wildfire	Moderate

9.8.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information. This is performed at the municipal level. Refer to relevant annexes for details on how jurisdictions implement their NFIP program.

National Flood Insurance Program (NFIP) Summary

NFIP administration is performed at the municipal level. Refer to Section 9.5 (City of San Saba) annex for a summary of NFIP statistics.

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in the San Saba Independent School District.

Table 9.8-9. NFIP Summary

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	N/A – NFIP Administration is carried out at the municipal level.

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NFIP Topic	Comments
• Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	
• How do you make Substantial Damage determinations? • How many were declared for recent flood events in your jurisdiction?	
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If not, state why.	
NFIP Compliance	
What local department is responsible for floodplain management?	N/A – NFIP Administration is carried out at the municipal level.
Are any certified floodplain managers on staff in your jurisdiction?	
Do you have access to resources to determine possible future flooding conditions from climate change?	
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	
Provide an explanation of NFIP administration services you provide (e.g. permit review, GIS, education/outreach, inspections, engineering capability)	
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	
What are the barriers to running an effective NFIP program in the community, if any?	
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state the violations.	
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	
• What is the local law number or municipal code of your flood damage prevention ordinance? • What is the date that your flood damage prevention ordinance was last amended?	
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	
Are there other local ordinances, plans or programs (e.g. site plan review) that support floodplain management and meeting the NFIP requirements? For instance, does the planning	

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NFIP Topic	Comments
board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	

9.8.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.8-10. Recent and Expected Future Development

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA
Single Family	Not Applicable: Permitting is completed at the municipal level													
Multi-Family														
Other (commercial, mixed-use, etc.)														
Total Permits Issued														

SFHA Special Flood Hazard Area (1% annual chance flood event)

** Only location-specific hazard zones or vulnerabilities identified.*

9.8.6 Jurisdictional Risk Assessment

The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard Ranking) provide detailed summaries for the San Saba Independent School District's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard Event History

Llano County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

The San Saba Independent School District's history of federally declared (as presented by FEMA) and significant hazard events [as presented in NOAA-National Centers for Environmental Information (NCEI)] is consistent with that of the County. The table below provides details regarding jurisdiction-specific loss and damages the school district experienced during hazard events since the last hazard mitigation plan update. Information provided in the table below is based on reference material or local sources.

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Table 9.8-11. Hazard Event History

Date(s) of Event	Event Type (Disaster Declaration if applicable)	County Included in Declaration?	Summary of Event	Jurisdictional Summary of Damages and Losses
September 10 – November 2, 2018	DR – 4416 – Severe Thunderstorm and Flooding	Yes	Severe storms and flooding had a severe impact on roads and bridges	Although the County was impacted, the School District did not report damages.
January 20, 2020 – continuing	EM-3458 – Covid-19, DR-4485 – Covid-19 Pandemic	Yes	Covid-19	District followed protocols enforced by the state and County
February 11-21, 2021	EM-3554 – Severe Winter Storm, DR-4586 – Severe Winter Storms	Yes	Severe ice storm resulted in significant ice coverage of roads, utility lines, buildings and homes causing widespread utility failure	Although the County was impacted, the School District did not report damages.

Notes:
EM Emergency Declaration (FEMA)
FEMA Federal Emergency Management Agency
DR Major Disaster Declaration (FEMA)
N/A Not applicable

Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4 (Risk Assessment) have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes the San Saba Independent School District's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment). The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and community capabilities to address the hazard and changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Therefore, each jurisdiction ranked the degree of risk to each hazard as it pertains to their community. The table below summarizes the hazard risk/vulnerability rankings of potential natural hazards for the San Saba Independent School District. The San Saba Independent School District reviewed the County hazard risk/vulnerability risk ranking table and individual results to reflect the relative risk of the hazards of concern to the community.

During the review of the hazard/vulnerability risk ranking, the school district agreed with all of the hazard rankings.

Table 9.8-12. Hazard Ranking Input

Dam Failure	Drought	Extreme Temperature	Flood	Geological Hazards
Low	Medium	Medium	Medium	Low

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Hurricane	Severe Storm	Tornado	Pandemic	Winter Storm	Wildfire
Medium	High	High	Medium	Low	High

Critical Facilities

The table below identifies critical facilities in the community located in the 1-percent and 0.2-percent floodplain and presents Hazus-MH estimates of the damage and loss of use to critical facilities as a result of a 1-percent annual chance flood event.

Table 9.8-13. Potential Flood Losses to Critical Facilities

Name	Type	Exposure	
		1% Event	0.2% Event
No critical facilities located within the floodplain.			

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

Identified Issues

After review of the San Saba Independent School District's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, the San Saba Independent School District identified the following vulnerabilities within their community:

- The School lacks sufficient backup power and will not be able to fully function as a heating/cooling station in the event of a power outage.
- The School district relies on one main bus route, which fails to take into account potential hazards that may impact bussing to and from school.
- There is no joint hazard emergency response plan which includes the School District, County, State, and Federal partners.
- Students at Cherokee Independent School District lack knowledge on how to respond to severe hazard events when in a classroom setting.
- Bus Drivers and Student Drivers at Llano Independent School District lack knowledge on how to safely drive to and from school in the event of an extreme hazard event.
- Students and staff are not protected from extreme hazard events that have the potential to destroy or enter through old windows.

9.8.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

Past Mitigation Initiative Status

The following table indicates progress on the community's mitigation strategy identified in the 2016 HMPs. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.8-14. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, N/A Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)?		
				Yes/N/A	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
Not Applicable. The San Saba Independent School District did not participate in the previous hazard mitigation plan.						

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, the San Saba Independent School District identified the following mitigation efforts completed since the last HMP:

- The District has added a Director of Student Safety to the staff

Proposed Hazard Mitigation Initiatives for the HMP Update

The San Saba Independent School District participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide range of activities and mitigation measures selected.

Table 9.8-15. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA					CRS				
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure	X	X				X				X
Drought	X	X				X				X
Extreme Temperature	X	X				X				X
Flood	X	X		X		X	X			X
Geological Hazards	X	X		X		X	X			X
Hurricane	X	X		X		X	X			X
Severe Storm	X	X		X		X	X			X
Tornado	X	X		X		X	X			X
Pandemic	X			X			X			X
Winter Storm	X	X		X		X	X			X
Wildfire	X	X		X		X	X			X

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives the San Saba Independent School District would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in jurisdictional priorities.

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Table 9.8-16. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-San Saba ISD-001	Backup Power	**Problem:** The School lacks sufficient backup power and will not be able to fully function as a heating/cooling emergency shelter station in the event of a power outage. **Solution:** The School will install a backup generator and necessary electrical components and conduct testing and routine maintenance in order for the school/shelter to meet its functional needs.	Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1,2	1 Year	School District, Llano County, Emergency Services	BRIC, HMGP, PDM, School Board	Backup power in the district will provide safety to nearby residents in the event of an emergency and will allow for continuity of operations.	High	High	SIP	PP, ES
2023-San Saba ISD-002	Alternate Bus Route	**Problem:** The School district relies on one main bus route, which fails to take into account potential hazards that may impact bussing to and from school. **Solution:** The School will develop alternate bus routes that will take into account all potential hazards and how they may influence the main bus route.	Existing	Dam Failure, Extreme Temperature, Flood, Geological Hazards, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1,2	1 Year	School District, Bussing Company	School Board, Bus Company	An alternate bus route plan provides multiple secure ways for bus drivers to carry out their route, even in the event of a road closure due to hazards.	Low	High	LPR	ES
2023-San Saba ISD-003	Emergency Response	**Problem:** There is no joint hazard emergency response plan which includes the School District, County, State, and Federal partners. **Solution:** The School District will work with the relevant county/state/federal entities to develop an all-encompassing response plan in relation to environmental	Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Severe Storm, Tornado,	1,2,3,5	1 Year	School District, County, State, Emergency Services, FEMA	School Board, County, FEMA, HMGP, BRIC, PDM	The School District will be fully prepared for natural hazard events.	Low	High	LPR	ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		emergencies, including relevant trainings.		Pandemic, Winter Storm, Wildfire									
2023-San Saba ISD-004	School Hazard Assembly	**Problem:** Students at Cherokee Independent School District lack knowledge on how to respond to severe hazard events when in a classroom setting. **Solution:** The District will provide yearly assemblies which cover how to respond to an extreme hazard event when in school.	Existing	Geologic Hazard, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire, Pandemic	1,2,3	Less than a Year	School District, County, State, Emergency Services, Local Forest Division	School Board, County	Students at Llano will be more prepared on how to respond to severe hazard events in a classroom setting.	Low	High	EAP	PI
2023-San Saba ISD-005	Safe School Transportation	**Problem**: Bus Drivers and student drivers at Llano Independent School District lack knowledge on how to safely drive to and from school in the event of an extreme hazard event, including pandemic conditions. **Solution:** The District will provide informative sessions as well as rules and regulations for school employed transportation for all people that actively drive to and from school on how to drive safely during hazard events, including information on mask wearing and social distancing. The District will also provide information on what constitutes drivable road conditions.	Existing	Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Pandemic, Winter Storm, Wildfire	1,2,3	1 year	School District, County, Emergency Services	County and School Board	Drivers will be more well equipped to drive to and from school in hazardous weather conditions.	Low	High	LPR, EAP	PI, ES
2023-San	Storm Shutter Installation	**Problem:** Students and staff are not protected from	Existing and New	Hurricane,	1,2	1 Year	School District,	County and	Students and staffing will be more	Medium	High	SIP,	ES, PP

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
Saba ISD-006		extreme hazard events that have the potential to destroy or enter through old windows. **Solution:** The District will purchase and install fire resistant storm shutters where they are needed to protect students and staff from extreme hazard events.		Severe Storm, Tornado, Winter Storm, Wildfire			County, Emergency Services	School Board, HMGP, BRIC, PDM	protected from extreme hazard events.				

Notes:
Not all acronyms and abbreviations defined below are included in the table.

Acronyms and Abbreviations:

CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*
FEMA	*Federal Emergency Management Agency*
FPA	*Floodplain Administrator*
HMA	*Hazard Mitigation Assistance*
N/A	*Not applicable*
NFIP	*National Flood Insurance Program*
OEM	*Office of Emergency Management*

Potential FEMA HMA Funding Sources:

FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC	*Building Resilient Infrastructure and Communities Program*
PDM	*Pre-Disaster Mitigation Program*

Timeline:

The time required for completion of the project upon implementation.

Cost:

The estimated cost for implementation.

Benefits:

A description of the estimated benefits, either quantitative and/or qualitative.

Critical Facility:
Yes *Critical Facility located in 1% floodplain*

Mitigation Category:

- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*

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- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*
- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.*

The prioritization criteria provided in Volume 1, Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

Table 9.8-17. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-San Sava ISD-001	Backup Power	1	1	1	1	1	1	0	0	1	1	1	1	1	0	11	High
2023-San Saba ISD-002	Alternate Bus Route	1	1	1	1	1	1	0	0	1	1	1	1	1	1	12	High
2023-San Saba ISD-003	Emergency Response	1	1	1	1	1	1	0	0	1	1	1	1	1	0	11	High
2023-San Saba ISD-004	School Hazard Assembly	1	0	1	1	1	1	0	1	1	1	1	1	1	0	11	High
2023-San Saba ISD-005	Safe School Transportation	1	0	1	1	1	1	0	0	1	1	1	1	1	0	10	High
2023-San Saba ISD-006	Storm shutter Installation	1	1	1	1	1	1	0	0	1	1	1	1	1	1	12	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).

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Section 9 Jurisdictional Annexes

9.9 Cherokee Independent School District

This section presents the jurisdictional annex for the Cherokee Independent School District that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the School District, who in the Cherokee Independent School District participated in the planning process, an assessment of the Cherokee Independent School District's risk and vulnerability, the different capabilities used in the Independent School District, and an action plan that will be implemented to achieve a more resilient community.

9.9.1 Hazard Mitigation Planning Team

The Cherokee Independent School District identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many Independent School District departments, including the Superintendent. The Superintendent represented the community on the Llano County Hazard Mitigation Plan Planning Partnership and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes the officials that participated in the development of the annex and in what capacity. Additional documentation on the jurisdiction's planning process through Planning Partnership meetings is included in Volume 1, Section 2 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.9-1. Hazard Mitigation Planning Team

Primary Point of Contact		Alternate Point of Contact	
Name/Title:	Jennifer Bordner - Superintendent	Name/Title:	Not identified
Address:	305 S Indian Ave, Cherokee, TX 76832	Address:	Not identified
Phone Number:	325-622-4298	Phone Number:	Not identified
Email:	jbordner@cherokeeisd.net	Email:	Not identified
Additional Contributors:			
Name/Title: Jennifer Bordner - Superintendent Method of Participation: Provided input			

9.9.2 Jurisdictional Profile

The Cherokee Independent School District is an independent public school, located in southern San Saba County, which serves the surrounding community of Cherokee.

According to the Texas Tribune the 2020-2021 student population for the Cherokee Independent School District was 129. Data indicated that 100 percent of the studentl population received their diplomas in 2021. The average ACT score for the school district was 21.8 (The Texas Tribune 2022).

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9.9.3 Jurisdictional Capability Assessment and Integration

The Cherokee Independent School District performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section 5 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The community's adaptive capacity to withstand hazard events.

For a community to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day local government operations. As part of the hazard mitigation analysis, planning/policy documents were reviewed, and each jurisdiction was surveyed to obtain a better understanding of their progress toward plan integration. The updated mitigation strategy provided an opportunity for the Cherokee Independent School District to identify opportunities for integration of mitigation concepts that can be incorporated into district procedures.

Planning, Legal, and Regulatory Capability and Integration

The table below summarizes the regulatory tools that are available to the Cherokee Independent School District. The comment field provides information as to how the capability integrates hazard mitigation and risk reduction. Refer to annex of relevant location for more information on planning, legal and regulatory capabilities and integration.

Table 9.9-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	N/A	-	-	-
How does this reduce risk?				
Zoning/Land Use Code	N/A	-	-	-
How does this reduce risk?				
Subdivision Ordinance	N/A	-	-	-
How does this reduce risk?				
Site Plan Ordinance	N/A	-	-	-
How does this reduce risk?				
Stormwater Management Ordinance	N/A	-	-	-

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
How does this reduce risk?				
Post-Disaster Recovery/ Reconstruction Ordinance	N/A	-	-	-
How does this reduce risk?				
Real Estate Disclosure	N/A	-	-	-
How does this reduce risk?				
Growth Management	N/A	-	-	-
How does this reduce risk?				
Environmental Protection Ordinance	N/A	-	-	-
How does this reduce risk?				
Flood Damage Prevention Ordinance	N/A	-	-	-
How does this reduce risk?				
Wellhead Protection	N/A	-	-	-
How does this reduce risk?				
Emergency Management Ordinance	N/A	-	-	-
How does this reduce risk?				
Climate Change Ordinance	N/A	-	-	-
How does this reduce risk?				
Other	No	-	-	
Planning Documents				
Comprehensive/Master Plan	N/A	-	-	-
How does this reduce risk?				
Capital Improvement Plan	N/A	-	-	-
How does this reduce risk?				
Disaster Debris Management Plan	N/A	-	-	-
How does this reduce risk?				
Floodplain Management or Watershed Plan	N/A	-	-	-
How does this reduce risk?				
Stormwater Management Plan	N/A	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Open Space Plan	N/A	-	-	-
How does this reduce risk?				
Urban Water Management Plan	N/A	-	-	-
How does this reduce risk?				
Habitat Conservation Plan	N/A	-	-	-
How does this reduce risk?				
Economic Development Plan	N/A	-	-	-
How does this reduce risk?				
Shoreline Management Plan	N/A	-	-	-
How does this reduce risk?				
Community Wildfire Protection Plan	N/A	-	-	-
How does this reduce risk?				
Community Forest Management Plan	N/A	-	-	-
How does this reduce risk?				
Transportation Plan	Yes	Included in Emergency Operation Plan	-	-
How does this reduce risk? The plan was not available for review at the time of the HMP update; therefore, it could not be determined how the plan reduces risk.				
Agriculture Plan	N/A	-	-	-
How does this reduce risk?				
Climate Action/ Resiliency/Sustainability Plan	N/A	-	-	-
How does this reduce risk?				
Tourism Plan	N/A	-	-	-
How does this reduce risk?				
Business/ Downtown Development Plan	N/A	-	-	-
How does this reduce risk?				
Other	N/A	-	-	-
Response/Recovery Planning				
Comprehensive Emergency Management Plan	Yes	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
The plan was not available for review at the time of the HMP update; therefore, it could not be determined how the plan reduces risk.				
Continuity of Operations Plan	Yes	CISD Continuity Operations	Local	Superintendent
How does this reduce risk? The plan was not available for review at the time of the HMP update; therefore, it could not be determined how the plan reduces risk.				
Strategic Recovery Planning Report	N/A	-	-	-
How does this reduce risk?				
Threat & Hazard Identification & Risk Assessment (THIRA)	N/A	-	-	-
How does this reduce risk?				
Post-Disaster Recovery Plan	N/A	-	-	-
How does this reduce risk?				
Public Health Plan	N/A	-	-	-
How does this reduce risk?				
Other	N/A	-	-	-
How does this reduce risk?				

Development and Permitting Capability

The table below summarizes the capabilities of the Cherokee Independent School District to oversee and track development. Permitting is primarily done at the municipal and county levels, refer to the relevant annex for more details.

Table 9.9-3. Development and Permitting Capability

Indicate if your jurisdiction implements the following	Yes/No	Comment:
Do you issue development permits? • If yes, what department is responsible?		Not Applicable: Permitting is completed at the municipal level
If you do not issue development permits, what is your process for tracking new development?		
Are permits tracked by hazard area? (For example, floodplain development permits.)		
Do you have a buildable land inventory? • If yes, please describe		
Describe the level of build-out in your jurisdiction.		

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Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to the Cherokee Independent School District and their current responsibilities that contribute to hazard mitigation. More information is available in municipal level annexes.

Table 9.9-4. Administrative and Technical Capabilities

Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	N/A	-
Zoning Board of Adjustment	N/A	-
Planning Department	N/A	-
Mitigation Planning Committee	Yes	School Safety Committee
Environmental Board/Commission	N/A	-
Open Space Board/Committee	N/A	-
Economic Development Commission/Committee	N/A	-
Public Works/Highway Department	N/A	-
Construction/Building/Code Enforcement Department	N/A	-
Emergency Management/Public Safety Department	N/A	-
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	Yes	The Cherokee Independent School District has two warning systems: Bell and Intercom System and a School Messenger Blast
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	Yes	Contract with Tree Trimming company to trim every six months
Mutual aid agreements	Yes	Verbal agreements with VFD and local churches
Human Resources Manual	N/A	-
Other	No	-
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	N/A	-
Engineers or professionals trained in building or infrastructure construction practices	N/A	-
Planners or engineers with an understanding of natural hazards	N/A	-
Staff with expertise or training in benefit/cost analysis	N/A	-
Professionals trained in conducting damage assessments	N/A	-
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	N/A	-
Environmental scientist familiar with natural hazards	N/A	-
Surveyor(s)	N/A	-
Emergency Manager	N/A	-
Grant writer(s)	N/A	-

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Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Resilience Officer	N/A	-
Other (this could include stormwater engineer, environmental specialist, etc.)	No	-

Fiscal Capability

The table below summarizes financial resources available to the Cherokee Independent School District.

Table 9.9-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/No)
Community development Block Grants (CDBG, CDBG-DR)	N/A
Capital improvements project funding	N/A
Authority to levy taxes for specific purposes	Yes, School Board eligible through an election
User fees for water, sewer, gas or electric service	N/A
Impact fees for homebuyers or developers of new development/homes	N/A
Stormwater utility fee	N/A
Incur debt through general obligation bonds	N/A
Incur debt through special tax bonds	Yes
Incur debt through private activity bonds	N/A
Withhold public expenditures in hazard-prone areas	N/A
Other federal or state Funding Programs	N/A
Open Space Acquisition funding programs	N/A
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	N/A

Education and Outreach Capability

The table below summarizes the education and outreach resources available to the Cherokee Independent School District.

Table 9.9-6. Education and Outreach Capabilities

Outreach Resources	Available? (Yes/No)	Comment:
Public information officer or communications office	Yes	Superintendent Office handles communications.
Personnel skilled or trained in website development	Yes	The administration can make updates and edits to the district website but did not develop it.
Hazard mitigation information available on your website	No	The School District uses School Messenger and social media to send out information.
Social media for hazard mitigation education and outreach	Yes	The School District shares information on the school's Facebook account.
Citizen boards or commissions that address issues related to hazard mitigation	N/A	-
Warning systems for hazard events	Yes	School Messenger system

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Outreach Resources	Available? (Yes/No)	Comment:
Natural disaster/safety programs in place for schools	Yes	The School District has various programs in place to provide a safety environment. This include distributing health and safety information to students, staff, and stakeholders.
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? • If yes, please describe.	Yes	Information is in student handbook with student enrolls

Community Classifications

The table below summarizes classifications for community programs available to the Cherokee Independent School District.

Table 9.9-7. Community Classifications

Program	Participating? (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	Not Applicable: This is done at the municipal level		
Building Code Effectiveness Grading Schedule (BCEGS)			
Public Protection (ISO Fire Protection Classes 1 to 10)			
Storm Ready Certification			
Firewise Communities classification			
Other			

Note:
N/A Not applicable
NP Not participating
- Unavailable

Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.
- Moderate: Capacity might exist; but is not used or could use some improvement.
- Weak: Capacity does not exist or could use substantial improvement.

Table 9.9-8. Adaptive Capacity

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Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Moderate
Drought	Moderate
Extreme Temperature	Moderate
Flood	Moderate
Geologic Hazards	Moderate
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Moderate
Winter Storm	Moderate
Wildfire	Moderate

9.9.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information. NFIP administration is performed at the municipal level. Refer to relevant annexes for details on how jurisdictions implement their NFIP program.

National Flood Insurance Program (NFIP) Summary

NFIP administration is performed at the municipal level.

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in the Cherokee Independent School District.

Table 9.9-9. NFIP Summary

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	Yes
• Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	N/A and None
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	No
• How do you make Substantial Damage determinations? • How many were declared for recent flood events in your jurisdiction?	Contact County FPA
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	N/A
Do your flood hazard maps adequately address the flood risk within your jurisdiction?	N/A, FIRM maps do not show BFEs for Cherokee area

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NFIP Topic	Comments
• If not, state why.	
NFIP Compliance	
What local department is responsible for floodplain management?	County FPA
Are any certified floodplain managers on staff in your jurisdiction?	N/A
Do you have access to resources to determine possible future flooding conditions from climate change?	N/A
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	N/A
Provide an explanation of NFIP administration services you provide (e.g. permit review, GIS, education/outreach, inspections, engineering capability)	N/A
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	N/A
What are the barriers to running an effective NFIP program in the community, if any?	N/A
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state the violations.	N/A
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	N/A
• What is the local law number or municipal code of your flood damage prevention ordinance? • What is the date that your flood damage prevention ordinance was last amended?	N/A
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	N/A
Are there other local ordinances, plans or programs (e.g. site plan review) that support floodplain management and meeting the NFIP requirements? For instance, does the planning board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	N/A
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	N/A

9.9.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.9-10. Recent and Expected Future Development

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Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**
Single Family	Not Applicable: Permitting is completed at the municipal level													
Multi-Family														
Other (commercial, mixed-use, etc.)														
Total Permits Issued														

9.9.6 Jurisdictional Risk Assessment

The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard Ranking) provide detailed summaries for the Cherokee Independent School District's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard Event History

Llano County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

The Cherokee Independent School District's history of federally declared (as presented by FEMA) and significant hazard events [as presented in NOAA-National Centers for Environmental Information (NCEI)] is consistent with that of the County. The table below provides details regarding jurisdiction-specific loss and damages the Independent School District experienced during hazard events since the last hazard mitigation plan update. Information provided in the table below is based on reference material or local sources.

Table 9.9-11. Hazard Event History

Date(s) of Event	Event Type (Disaster Declaration if applicable)	County Included in Declaration?	Summary of Event	Jurisdictional Summary of Damages and Losses
September 10 – November 2, 2018	DR – 4416 – Severe Thunderstorm and Flooding	Yes	Severe storms and flooding had a severe impact on roads and bridges	Although the County was impacted, the School District did not report damages.
January 20, 2020 – continuing	EM-3458 – Covid-19, DR-4485 – Covid-19 Pandemic	Yes	Covid-19	District followed protocols enforced by the state and County
February 11-21, 2021	EM-3554 – Severe Winter Storm, DR-4586 – Severe Winter Storms	Yes	Severe ice storm resulted in significant ice coverage of roads, utility lines, buildings and homes causing	Although the County was impacted, the School District did not report damages.

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Date(s) of Event	Event Type (Disaster Declaration if applicable)	County Included in Declaration?	Summary of Event	Jurisdictional Summary of Damages and Losses
			widespread utility failure	

Notes:
EM Emergency Declaration (FEMA)
FEMA Federal Emergency Management Agency
DR Major Disaster Declaration (FEMA)
N/A Not applicable

Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4 (Risk Assessment) have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes the Cherokee Independent School District's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment). The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and community capabilities to address the hazard and changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Therefore, each jurisdiction ranked the degree of risk to each hazard as it pertains to their community. The table below summarizes the hazard risk/vulnerability rankings of potential natural hazards for the Cherokee Independent School District. The Cherokee Independent School District reviewed the County hazard risk/vulnerability risk ranking table and individual results to reflect the relative risk of the hazards of concern to the community.

During the review of the hazard/vulnerability risk ranking, the Cherokee Independent School District agreed with the following hazard rankings.

Table 9.9-12. Hazard Ranking Input

Dam Failure	Drought	Extreme Temperature	Flood	Geological Hazards
Low	Medium	Medium	Medium	Low

Hurricane	Severe Storm	Tornado	Pandemic	Winter Storm	Wildfire
Medium	High	High	Medium	Low	High

Critical Facilities

The table below identifies critical facilities in the community located in the 1-percent and 0.2-percent floodplain and presents Hazus-MH estimates of the damage and loss of use to critical facilities as a result of a 1-percent annual chance flood event.

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Table 9.9-13. Potential Flood Losses to Critical Facilities

Name	Type	Exposure 1% Event	Exposure 0.2% Event
No critical facilities located in the floodplain.			

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

Identified Issues

After review of the Cherokee Independent School District's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, the Cherokee Independent School District identified the following vulnerabilities within their community:

- The School lacks sufficient backup power and will not be able to fully function as a heating/cooling station in the event of a power outage.
- The School district relies on one main bus route, which fails to take into account potential hazards that may impact bussing to and from school.
- There is no joint hazard emergency response plan which includes the School District, County, State, and Federal partners.
- Students at Cherokee Independent School District lack knowledge on how to respond to severe hazard events when in a classroom setting.
- Bus Drivers and Student Drivers at Llano Independent School District lack knowledge on how to safely drive to and from school in the event of an extreme hazard event.
- Students and staff are not protected from extreme hazard events that have the potential to destroy or enter through old windows.

**This issue was identified as a specific area of concern based on resident response to the 2022 Hazard Mitigation Citizen survey.*

9.9.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

Past Mitigation Initiative Status

The following table indicates progress on the community's mitigation strategy identified in the 2016 HMPs. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.9-14. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, N/A Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)?		
				Yes/N/A	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
Not Applicable. The Cherokee Independent School District did not participate in the previous hazard mitigation plan.						

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, the Cherokee Independent School District identified the following mitigation efforts completed since the last HMP:

- An active shooter program is carried out by the Administration (TEA & District requirement).

Proposed Hazard Mitigation Initiatives for the HMP Update

The Cherokee Independent School District participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide-range of activities and mitigation measures selected.

Table 9.9-15. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA					CRS				
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure	X	X				X				X
Drought	X	X				X				X
Extreme Temperature	X	X				X				X
Flood	X	X		X		X	X			X
Geologic Hazards	X	X		X		X	X			X
Hurricane	X	X		X		X	X			X
Severe Storm	X	X		X		X	X			X
Tornado	X	X		X		X	X			X
Pandemic	X			X			X			X
Winter Storm	X	X		X		X	X			X
Wildfire	X	X		X		X	X			X

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives the Cherokee Independent School District would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in jurisdictional priorities.

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Table 9.9-16. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-Cherokee ISD-001	Backup Power	**Problem:** The School lacks sufficient backup power and will not be able to fully function as a emergency shelter in the event of a power outage. **Solution:** The School will install a permanent backup generator and necessary electrical components as well as run a testing and maintenance phase in order to meet its functional needs.	Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1,2	1 Year	School District, Llano County, Emergency Services	BRIC, PDM, HMGP, School Board	Backup power in the district will provide safety to nearby residents in the event of an emergency and will allow for continuity of operations.	High	High	SIP	PP, ES
2023-Cherokee ISD-002	Alternate Bus Route	**Problem:** The School district relies on one main bus route, which fails to take into account potential hazards that may impact bussing to and from school. **Solution:** The School must develop alternate bus routes that will take into account all potential hazards and how they may influence the main bus route.	Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Pandemic, Winter Storm, Wildfire	1,2,4	1 Year	School District, Bussing Company	School Board, Bus Company	An alternate bus route plan provides multiple secure ways for bus drivers to carry out their route, even in the event of a road closure due to hazards.	Low	High	LPR	ES
2023-Cherokee ISD-003	Emergency Response	**Problem:** There is no joint hazard emergency response plan which	Existing	Dam Failure, Drought, Extreme	1,2,3,4,6	1 Year	School District, County,	School Board, County,	The School District will be fully prepared	Low	High	LPR	ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		includes the School District, County, State, and Federal partners. **Solution:** The School District will work with the relevant county/state/federal entities to develop an all-encompassing response plan in relation to environmental emergencies, including relevant trainings.		Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Pandemic, Winter Storm, Wildfire			State, Emergency Services, FEMA	FEMA, HMGP	in the event of environmental hazards.				
2023-Cherokee ISD-004	School Hazard Assembly	**Problem:** Students at Cherokee Independent School District lack knowledge on how to respond to severe hazard events when in a classroom setting. **Solution:** The District will provide yearly assemblies which cover how to respond to an extreme hazard event when in school.	Existing	Geologic Hazard, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire, Pandemic	1,2,3	Less than a Year	School District, County, State, Emergency Services, Local Forest Division	School Board, County	Students at Llano will be more prepared on how to respond to severe hazard events in a classroom setting.	Low	High	EAP	PI
2023-Cherokee ISD-005	Safe School Transportation	**Problem**: Bus Drivers and student drivers at Llano Independent School District lack knowledge on how to safely drive to and from school in the event of an extreme hazard event.	Existing	Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Pandemic,	1,2,3	1 year	School District, County, Emergency Services	County and School Board	Drivers will be more well equipped to drive to and from school in hazardous weather conditions.	Low	High	LPR, EAP	PI, ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		Solution: The District will provide informative sessions as well as rules and regulations for school employed transportation for all people that actively drive to and from school on how to drive safely during hazard events. The District will also provide information on what constitutes drivable road conditions.		Winter Storm, Wildfire									
2023-Cherokee ISD-006	Storm Shutter Installation	**Problem:** Students and staff are not protected from extreme hazard events that have the potential to destroy or enter through old windows. **Solution:** The District will purchase and install fireproof storm shutters where they are needed to protect students and staff from extreme hazard events.	Existing and New	Dam Failure, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1,2	1 Year	School District, County, Emergency Services	County and School Board	Students and staffing will be more protected from extreme hazard events.	Medium	High	SIP,	ES, PP

Notes:
Not all acronyms and abbreviations defined below are included in the table.

Acronyms and Abbreviations:

Potential FEMA HMA Funding Sources:

Timeline:

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CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*
FEMA	*Federal Emergency Management Agency*
FPA	*Floodplain Administrator*
HMA	*Hazard Mitigation Assistance*
N/A	*Not applicable*
NFIP	*National Flood Insurance Program*
OEM	*Office of Emergency Management*
FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC	*Building Resilient Infrastructure and Communities Program*
PDM	*Pre-Disaster Mitigation Program*

The time required for completion of the project upon implementation.

Cost:

The estimated cost for implementation.

Benefits:

A description of the estimated benefits, either quantitative and/or qualitative.

Critical Facility:

Yes *Critical Facility located in 1% floodplain*

Mitigation Category:

- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*
- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*
- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.*

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The prioritization criteria provided in Volume 1; Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

Table 9.9-17. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-Cherokee ISD-001	Backup Power	1	1	1	1	1	1	0	0	1	1	1	1	1	0	11	High
2023-Cherokee ISD-002	Alternate Bus Route	1	1	1	1	1	1	0	0	1	1	1	1	1	1	12	High
2023-Cherokee ISD-003	Emergency Response	1	1	1	1	1	1	0	0	1	1	1	1	1	0	11	High
2023-Cherokee ISD-004	School Hazard Assembly	1	0	1	1	1	1	0	1	1	1	1	1	1	0	11	High
2023-Cherokee ISD-005	Safe School Transportation	1	0	1	1	1	1	0	0	1	1	1	1	1	0	10	High
2023-Cherokee ISD-006	Storm Shutter Installation	1	1	1	1	1	1	0	0	1	1	1	1	1	1	12	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).

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Section 9 Jurisdictional Annexes

9.10 LLANO INDEPENDENT SCHOOL DISTRICT

This section presents the jurisdictional annex for the Llano Independent School district that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the school district, who in the school district participated in the planning process, an assessment of the Llano Independent School district's risk and vulnerability, the different capabilities used in the school district, and an action plan that will be implemented to achieve a more resilient community.

9.10.1 Hazard Mitigation Planning Team

The Llano Independent School district identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many school district departments, including the Assistant Superintendent and Director of Operations. The Assistant Superintendent represented the community on the Llano County Hazard Mitigation Plan Planning Partnership and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes the officials that participated in the development of the annex and in what capacity. Additional documentation on the school district's planning process through Planning Partnership meetings is included in Volume 1, Section 2 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.10-1. Hazard Mitigation Planning Team

Primary Point of Contact		Alternate Point of Contact	
Name/Title:	James Payne – Assistant Superintendent	Name/Title:	Philip Zwicke, Director of Operations
Address:	1400 Oatman St, Llano, TX 78643	Address:	1400 Oatman St, Llano, TX 78643
Phone Number:	325-247-4747	Phone Number:	325-248-2289
Email:	jpayne@llanoisd.org	Email:	pzwicke@llanoisd.org
Additional Contributors:			
Name/Title: James Payne, Assistance Superintendent Method of Participation: Provided input			

9.10.2 Jurisdictional Profile

Llano ISD is a public school located in Llano Texas. The school district serves different parts of rural Llano County, as well as Sunrise Beach Village, Kingsland, and some of Horseshoe Bay.

According to the Texas Tribune, the 2020-2021 student population for the Llano Independent School District was 1,727. Data from the Texas Tribune indicated that 97.6 percent of the student population received their high

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school diplomas on time or earlier. The average SAT score at Llano ISD was 1089 and the average ACT score was 20.2 for the 2019-2020 graduates (Texas Tribune 2022).

9.10.3 Jurisdictional Capability Assessment and Integration

The Llano Independent School District performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section 4 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The community's adaptive capacity to withstand hazard events.

For a community to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day local government operations. As part of the hazard mitigation analysis, planning/policy documents were reviewed, and each jurisdiction was surveyed to obtain a better understanding of their progress toward plan integration. The updated mitigation strategy provided an opportunity for the Llano Independent School District to identify opportunities for integration of mitigation concepts that can be incorporated into the district's procedures.

Planning, Legal, and Regulatory Capability and Integration

The table below summarizes regulatory tools that are available to the Llano Independent School District. The comment field provides information as to how the capability integrates hazard mitigation and risk reduction. Refer to annex of relevant location for more information on planning, legal and regulatory capabilities, and integration.

Table 9.10-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	N/A	-	-	-
How does this reduce risk?				
Zoning/Land Use Code	N/A	-	-	-
How does this reduce risk?				
Subdivision Ordinance	N/A	-	-	-
How does this reduce risk?				
Site Plan Ordinance	N/A	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Stormwater Management Ordinance	N/A	-	-	-
How does this reduce risk?				
Post-Disaster Recovery/ Reconstruction Ordinance	N/A	-	-	-
How does this reduce risk?				
Real Estate Disclosure	N/A	-	-	-
How does this reduce risk?				
Growth Management	N/A	-	-	-
How does this reduce risk?				
Environmental Protection Ordinance	N/A	-	-	-
How does this reduce risk?				
Flood Damage Prevention Ordinance	N/A	-	-	-
How does this reduce risk?				
Wellhead Protection	N/A	-	-	-
How does this reduce risk?				
Emergency Management Ordinance	N/A	-	-	-
How does this reduce risk?				
Climate Change Ordinance	N/A	-	-	-
How does this reduce risk?				
Other	N/A	-	-	-
Planning Documents				
Comprehensive/Master Plan	Yes	N/A	Local	LISD Administration
How does this reduce risk? The Comprehensive Plan addresses what is to be done in the event of an emergency. The plan dictates emergency evacuation details as well as shelter in place information.				
Capital Improvement Plan	N/A	-	-	-
How does this reduce risk?				
Disaster Debris Management Plan	N/A	-	-	-
How does this reduce risk?				
Floodplain Management or Watershed Plan	N/A	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Stormwater Management Plan	N/A	-	-	-
How does this reduce risk?				
Open Space Plan	N/A	-	-	-
How does this reduce risk?				
Urban Water Management Plan	N/A	-	-	-
How does this reduce risk?				
Habitat Conservation Plan	N/A	-	-	-
How does this reduce risk?				
Economic Development Plan	N/A	-	-	-
How does this reduce risk?				
Shoreline Management Plan	N/A	-	-	-
How does this reduce risk?				
Community Wildfire Protection Plan	N/A	-	-	-
How does this reduce risk?				
Community Forest Management Plan	N/A	-	-	-
How does this reduce risk?				
Transportation Plan	Yes	N/A	Local	LISD Administration
How does this reduce risk? The transportation plan identifies how the students are handled during an evacuation of each campus.				
Agriculture Plan	N/A	-	-	-
How does this reduce risk?				
Climate Action/ Resiliency/Sustainability Plan	N/A	-	-	-
How does this reduce risk?				
Tourism Plan	N/A	-	-	-
How does this reduce risk?				
Business/ Downtown Development Plan	N/A	-	-	-
How does this reduce risk?				
Other	N/A	-	-	-
Response/Recovery Planning				
Comprehensive Emergency Management Plan	Yes	August 2022	Local	Principal

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
How does this reduce risk? Every Campus has an Emergency Operations Plan. This Multi-Hazard Plan assist in managing any incident efficiently and effectively. It covers a range of topics schools face in today's educational environment.				
Continuity of Operations Plan	Yes	N/A	Local	Principal
How does this reduce risk? Every Campus has an Emergency Operations Plan -Every Principle is the Command. The plan is specific to each campus				
Strategic Recovery Planning Report	N/A	-	-	-
How does this reduce risk?				
Threat & Hazard Identification & Risk Assessment (THIRA)	N/A	-	-	-
How does this reduce risk?				
Post-Disaster Recovery Plan	N/A	-	-	-
How does this reduce risk?				
Public Health Plan	N/A	-	-	-
How does this reduce risk?				
Other	N/A	-	-	-
How does this reduce risk?				

Development and Permitting Capability

The table below summarizes the capabilities of the Llano Independent School District to oversee and track development. Permitting is primarily done at the municipal and county levels, refer to the relevant annex for more details.

Table 9.10-3. Development and Permitting Capability

Indicate if your jurisdiction implements the following	Yes/No	Comment:
Do you issue development permits? • If yes, what department is responsible?	N/A	Not Applicable: This is done at the municipal level
If you do not issue development permits, what is your process for tracking new development?	N/A	
Are permits tracked by hazard area? (For example, floodplain development permits.)	N/A	
Do you have a buildable land inventory? • If yes, please describe	N/A	
Describe the level of build-out in your jurisdiction.	N/A	

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Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to the Llano Independent School District and their current responsibilities that contribute to hazard mitigation. More information is available in municipal level annexes.

Table 9.10-4. Administrative and Technical Capabilities

Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	N/A	-
Zoning Board of Adjustment	N/A	-
Planning Department	N/A	-
Mitigation Planning Committee	N/A	-
Environmental Board/Commission	N/A	-
Open Space Board/Committee	N/A	-
Economic Development Commission/Committee	N/A	-
Public Works/Highway Department	N/A	-
Construction/Building/Code Enforcement Department	N/A	-
Emergency Management/Public Safety Department	Yes	Director of Operations, Police Department, Available staff
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	Yes	Administration, Teachers, School Messenger, Facebook
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	Yes	Maintenance Department
Mutual aid agreements	N/A	-
Human Resources Manual	N/A	-
Other	N/A	-
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	N/A	-
Engineers or professionals trained in building or infrastructure construction practices	N/A	-
Planners or engineers with an understanding of natural hazards	N/A	-
Staff with expertise or training in benefit/cost analysis	N/A	-
Professionals trained in conducting damage assessments	N/A	-
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	N/A	-
Environmental scientist familiar with natural hazards	N/A	-
Surveyor(s)	N/A	-
Emergency Manager	N/A	-

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Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Grant writer(s)	N/A	-
Resilience Officer	N/A	-
Other (this could include stormwater engineer, environmental specialist, etc.)	N/A	-

Fiscal Capability

The table below summarizes financial resources available to the Llano Independent School District.

Table 9.10-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/No)
Community development Block Grants (CDBG, CDBG-DR)	N/A
Capital improvements project funding	N/A
Authority to levy taxes for specific purposes	N/A
User fees for water, sewer, gas or electric service	N/A
Impact fees for homebuyers or developers of new development/homes	N/A
Stormwater utility fee	N/A
Incur debt through general obligation bonds	N/A
Incur debt through special tax bonds	N/A
Incur debt through private activity bonds	N/A
Withhold public expenditures in hazard-prone areas	N/A
Other federal or state Funding Programs	N/A
Open Space Acquisition funding programs	N/A
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	N/A

Education and Outreach Capability

The table below summarizes the education and outreach resources available to the Llano Independent School District.

Table 9.10-6. Education and Outreach Capabilities

Outreach Resources	Available? (Yes/No)	Comment:
Public information officer or communications office	No	-
Personnel skilled or trained in website development	No	-
Hazard mitigation information available on your website	No	-
Social media for hazard mitigation education and outreach	Yes	Each campus has its own website they also use Facebook to reach students and parents during events. Recently used to inform the students the school will be closed due to winter weather. They also use a text program to send messaging to parents.

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Outreach Resources	Available? (Yes/No)	Comment:
Citizen boards or commissions that address issues related to hazard mitigation	N/A	-
Warning systems for hazard events	Yes	Administration, Teachers, School Messenger, Facebook
Natural disaster/safety programs in place for schools	Yes	The District has a Comprehensive Emergency Management Plan that operates as a safety guideline from natural disasters.
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? • If yes, please describe.	No	-
Other	No	-

Community Classifications

The table below summarizes classifications for community programs available to the Llano Independent School District.

Table 9.10-7. Community Classifications

Program	Participating? (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	N/A	Not Applicable: This is done at the municipal level	
Building Code Effectiveness Grading Schedule (BCEGS)	N/A		
Public Protection (ISO Fire Protection Classes 1 to 10)	N/A		
Storm Ready Certification	N/A		
Firewise Communities classification	N/A		
Other	N/A		

Note:
N/A Not applicable
NP Not participating
- Unavailable

Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.
- Moderate: Capacity might exist; but is not used or could use some improvement.

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- Weak: Capacity does not exist or could use substantial improvement.

Table 9.10-8. Adaptive Capacity

Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Moderate
Drought	Moderate
Extreme Temperature	Moderate
Flood	Moderate
Geological Hazards	Moderate
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Moderate
Winter Storm	Moderate
Wildfire	Moderate

9.10.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information. This is performed at the municipal level. Refer to relevant annexes for details on how jurisdictions implement their NFIP program.

National Flood Insurance Program (NFIP) Summary

NFIP administration is performed at the municipal level. Refer to Section 9.4 (City of Llano) annex for a summary of NFIP statistics.

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in the Llano Independent School District.

Table 9.10-9. NFIP Summary

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	N/A – NFIP Administration is carried out at the municipal level.
• Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	
• How do you make Substantial Damage determinations? • How many were declared for recent flood events in your jurisdiction?	

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NFIP Topic	Comments
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If not, state why.	
NFIP Compliance	
What local department is responsible for floodplain management?	N/A – NFIP Administration is carried out at the municipal level.
Are any certified floodplain managers on staff in your jurisdiction?	
Do you have access to resources to determine possible future flooding conditions from climate change?	
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	
Provide an explanation of NFIP administration services you provide (e.g. permit review, GIS, education/outreach, inspections, engineering capability)	
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	
What are the barriers to running an effective NFIP program in the community, if any?	
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state the violations.	
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	
• What is the local law number or municipal code of your flood damage prevention ordinance? • What is the date that your flood damage prevention ordinance was last amended?	
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	
Are there other local ordinances, plans or programs (e.g. site plan review) that support floodplain management and meeting the NFIP requirements? For instance, does the planning board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	

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9.10.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The

table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.10-10. Recent and Expected Future Development

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**
Single Family	Not Applicable: This is done at the municipal level													
Multi-Family														
Other (commercial, mixed-use, etc.)														
Total Permits Issued														

9.10.6 Jurisdictional Risk Assessment

The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard Ranking) provide detailed summaries for the Llano Independent School District's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard Event History

Llano County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

The Llano Independent School District's history of federally declared (as presented by FEMA) and significant hazard events [as presented in NOAA-National Centers for Environmental Information (NCEI)] is consistent with that of the County. The table below provides details regarding jurisdictional-specific loss and damages the School District experienced during hazard events since the last hazard mitigation plan update. Information provided in the table below is based on reference material or local sources.

Table 9.10-11. Hazard Event History

Dates of Event	Event Type (Disaster Declaration if applicable)	County Included in Declaration?	Summary of Event	Jurisdictional Summary of Damages and Losses
September 10 – November 2, 2018	DR-4416 – Severe Storms and Flood	Yes	Severe storms and flooding had a severe impact on roads and bridges	Although the County was impacted, the School District did not report damages.
January 20, 2020 – continuing	EM-3458 – Covid-19, DR-4485 – Covid-19 Pandemic	Yes	Covid-19	The School District followed protocols enforced by the state and County.

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Dates of Event	Event Type (Disaster Declaration if applicable)	County Included in Declaration?	Summary of Event	Jurisdictional Summary of Damages and Losses
February 11-21, 2021	EM-3554 – Severe Winter Storm, DR-4586 – Severe Winter Storms	Yes	Severe ice storm resulted in significant ice coverage of roads, utility lines, buildings and homes causing widespread utility failure	Replaced two gym floors, flooring at North of HS, replace flooring/sheetrock in auditorium due to frozen fire sprinkler damage.

Notes:
EM Emergency Declaration (FEMA)
FEMA Federal Emergency Management Agency
DR Major Disaster Declaration (FEMA)
N/A Not applicable

Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4 (Risk Assessment) have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes the Llano Independent School District's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment). The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and community capabilities to address the hazard and changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Therefore, each jurisdiction ranked the degree of risk to each hazard as it pertains to their community. The table below summarizes the hazard risk/vulnerability rankings of potential natural hazards for the Llano Independent School District. The Llano Independent School District reviewed the County hazard risk/vulnerability risk ranking table and individual results to reflect the relative risk of the hazards of concern to the community.

During the review of the hazard/vulnerability risk ranking, the School District indicated the following:

- The School District modified the risk ranking for the following:
  - Dam failure- the School District adjusted the ranking from low to medium
  - Drought- the School District adjusted the ranking from medium to high
  - Flood- the School District adjusted the ranking from medium to high
  - Hurricane-the School District adjusted the ranking from medium to low
  - Tornado-the School District adjusted the ranking from high to medium
  - Pandemic-the School District adjusted the ranking from medium to low
  - Winter storm-the School District adjusted the ranking from low to high
- The School District agreed with the remainder of the hazard rankings

Table 9.10-12. Hazard Ranking Input

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Dam Failure	Drought	Extreme Temperature	Flood	Geological Hazards
Medium	High	Medium	High	Low

Hurricane	Severe Storm	Tornado	Pandemic	Winter Storm	Wildfire
Low	High	Medium	Low	High	High

Critical Facilities

The table below identifies critical facilities in the community located in the 1-percent and 0.2-percent floodplain and presents Hazus-MH estimates of the damage and loss of use to critical facilities as a result of a 1-percent annual chance flood event.

Table 9.10-13. Potential Flood Losses to Critical Facilities

Name	Type	Exposure	
		1% Event	0.2% Event
No critical facilities located within the floodplain.			

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

Identified Issues

After review of the Llano Independent School District's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, the Llano Independent School District identified the following vulnerabilities within their community:

- The School lacks sufficient backup power and will not be able to fully function as a heating/cooling station in the event of a power outage. *
- The School district relies on one main bus route, which fails to take into account potential hazards that may impact bussing to and from school.
- There is no joint hazard emergency response plan which includes the School District, County, State, and Federal partners.
- Students at Llano Independent School District lack knowledge on how to respond to severe hazard events when in a classroom setting.
- Bus Drivers and Student Drivers at Llano Independent School District lack knowledge on how to safely drive to and from school in the event of an extreme hazard event.
- Students and staff are not protected from extreme hazard events that have the potential to destroy or enter through old windows.

**This issue was identified as a specific area of concern based on resident response to the 2022 Hazard Mitigation Citizen survey.*

9.10.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

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Past Mitigation Initiative Status

The following table indicates progress on the community's mitigation strategy identified in the 2016 HMPs. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.10-14. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, N/A Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)?		
				Yes/N/A	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
Not Applicable. The Llano Independent School District did not participate in the previous hazard mitigation plan.						

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, the Llano Independent School District identified the following mitigation efforts completed since the last HMP:

- None identified

Proposed Hazard Mitigation Initiatives for the HMP Update

The Llano Independent School District participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide-range of activities and mitigation measures selected.

Table 9.10-15. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA					CRS				
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure	X	X				X				X
Drought	X	X				X				X
Extreme Temperature	X	X				X				X
Flood	X	X		X		X	X			X
Geological Hazards	X	X		X		X	X			X
Hurricane	X	X		X		X	X			X
Severe Storm	X	X		X		X	X			X
Tornado	X	X		X		X	X			X
Pandemic	X			X			X			X
Winter Storm	X	X		X		X	X			X
Wildfire	X	X		X		X	X			X

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives the Llano Independent School District would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in jurisdictional priorities.

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Table 9.10-16. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-Llano ISD-001	Backup Power	**Problem:** The School lacks sufficient backup power and will not be able to fully function as an emergency shelter in the event of a power outage. **Solution:** The School will install a permanent backup generator and necessary electrical components as well as routine testing and maintenance in order to meet its functional needs.	Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1, 2	1 Year	School District, Llano County, Emergency Services	FEMA, BRIC, PDM, HMGP, School Board	Backup power in the district will provide safety to nearby residents in the event of an emergency and will allow for continuity of operations.	High	High	SIP	PP, ES
2023-Llano ISD-002	Alternate Bus Route	**Problem:** The School district relies on one main bus route, which fails to take into account potential hazards that may impact bussing to and from school. **Solution:** The School must develop alternate bus routes that will take into account all potential hazards and how they may influence the main bus route.	Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1, 2	1 Year	School District, Bussing Company	School Board, Bus Company	An alternate bus route plan provides multiple secure ways for bus drivers to carry out their route, even in the event of a road closure due to hazards.	Low	High	LPR	ES
2023-Llano	Emergency Response	**Problem:** There is no joint hazard emergency response plan which includes the	Existing	Dam Failure, Drought,	1, 2, 3, 4	1 Year	School District, County,	School Board, County,	The School District will be fully prepared in the	Low	High	LPR	ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
ISD-003		School District, County, State, and Federal partners. **Solution:** The School District will work with the relevant county/state/federal entities to develop an all-encompassing response plan in relation to environmental emergencies, including relevant trainings.		Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Pandemic, Winter Storm, Wildfire			State, Emergency Services, FEMA	FEMA, HMGP, PDM	event of environmental hazards.				
2023-Llano ISD-004	School Hazard Assembly	**Problem:** Students at Llano Independent School District lack knowledge on how to respond to severe hazard events when in a classroom setting. **Solution:** The District will provide yearly assemblies which cover how to respond to an extreme hazard event when in school.	Existing	Geologic Hazard, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire, Pandemic	1, 2	Less than a year	School District, County, State, Emergency Services, Local Forest Division	County and School Board	Students at Llano will be more prepared on how to respond to severe hazard events in a classroom setting.	Low	High	EAP	PI
2023-Llano ISD-005	Safe School Transportation	**Problem**: Bus Drivers and student drivers at Llano Independent School District lack knowledge on how to safely drive to and from school in the event of an extreme hazard event. **Solution:** The District will provide informative sessions as well as rules and	Existing	Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Pandemic, Winter	1, 2	1 year	School District, County, Emergency Services	County and School Board	Drivers will be more well equipped to drive to and from school in hazardous weather conditions.	Low	High	LPR, EAP	PI, ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		regulations for school employed transportation for all people that actively drive to and from school on how to drive safely during hazard events. The District will also provide information on what constitutes drivable road conditions.		Storm, Wildfire									
2023-Llano ISD-006	Storm Shutter Installation	**Problem:** Students and staff are not protected from extreme hazard events that have the potential to destroy or enter through old windows. **Solution:** The District will purchase and install fireproof storm shutters where they are needed to protect students and staff from extreme hazard events.	Existing and New	Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1, 2	1 Year	School District, County, Emergency Services	County and School Board, FMA, BRIC, HMGP, PDM	Students and staffing will be more protected from extreme hazard events.	Medium	High	SIP,	ES, PP

Notes:
Not all acronyms and abbreviations defined below are included in the table.

Acronyms and Abbreviations:

CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*

Potential FEMA HMA Funding Sources:

FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC	*Building Resilient Infrastructure and Communities Program*

Timeline:

The time required for completion of the project upon implementation.

Cost:

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FEMA	*Federal Emergency Management Agency*	*PDM*	*Pre-Disaster Mitigation Program*
FPA	*Floodplain Administrator*		
HMA	*Hazard Mitigation Assistance*		
N/A	*Not applicable*		
NFIP	*National Flood Insurance Program*		
OEM	*Office of Emergency Management*		

The estimated cost for implementation.

Benefits:

A description of the estimated benefits, either quantitative and/or qualitative.

Critical Facility:

Yes *Critical Facility located in 1% floodplain*

Mitigation Category:

- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*
- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*
- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.*

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The prioritization criteria provided in Volume 1; Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

Table 9.10-17. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-Llano ISD-001	Backup Power	1	1	1	1	1	1	0	0	1	1	1	1	1	0	11	High
2023-Llano ISD-002	Alternate Bus Route	1	1	1	1	1	1	0	0	1	1	1	1	1	1	12	High
2023-Llano ISD-003	Emergency Response	1	1	1	1	1	1	0	0	1	1	1	1	1	0	11	High
2023-Llano ISD-004	School Hazard Assembly	1	0	1	1	1	1	0	1	1	1	1	1	1	0	11	High
2023-Llano ISD-005	Safe School Transportation	1	0	1	1	1	1	0	0	1	1	1	1	1	0	10	High
2023-Llano ISD-006	Storm Shutter Installation	1	1	1	1	1	1	0	0	1	1	1	1	1	1	12	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).

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Section 9 Jurisdictional Annexes

9.11 City of Richland Springs

This section presents the jurisdictional annex for the City of Richland Springs that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the municipality, who in the City participated in the planning process, an assessment of the City of Richland Springs's risk and vulnerability, the different capabilities used in the City, and an action plan that will be implemented to achieve a more resilient community.

9.11.1 Hazard Mitigation Planning Team

The City of Richland Springs identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many City departments, including the Mayor and Mayor Pro-Term. The Mayor represented the community on the Llano County Hazard Mitigation Plan Planning Partnership, Steering Committee, and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes municipal officials that participated in the development of the annex and in what capacity. Additional documentation on the municipality's planning process through Planning Partnership meetings is included in Volume 1, Section 2 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.11-1. Hazard Mitigation Planning Team

Primary Point of Contact		Alternate Point of Contact	
Name/Title:	Johnnie Reeves - Mayor	Name/Title:	Frank Pearce – Mayor Pro-Tem
Address:	PO Box 27 Richland Springs, TX 76871-0027	Address:	PO Box 27 Richland Springs, TX 76871-0027
Phone Number:	(325) 452-3549	Phone Number:	(325) 452-3549
Email:	johnielynreeves@gmail.com	Email:	jfpearce@comcast.net
NFIP Floodplain Administrator			
Name/Title:	N/A		
Address:	PO Box 27 Richland Springs, TX 76871-0027		
Phone Number:	(325) 452-3549		
Email:	cityhallrs@yahoo.com		
Additional Contributors:			
Name/Title: Chris Perry – Municipal Court Clerk Method of Participation: Provided data and information on previous events, capabilities, NFIP administration, permitting, past actions. Contributed to mitigation strategy.			
Name/Title: Johnnie Reeves - Mayor Method of Participation: Provided data and information on previous events, capabilities, NFIP administration, permitting, past actions. Contributed to mitigation strategy.			

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9.11.2 Municipal Profile

Richland Springs is a city located in San Saba County with a total area of 1.0 square miles, all of it land. The climate in this area is characterized by hot, humid summers and generally mild to cool winters. Richland Springs developed in the nineteenth century as a supply and processing center for local cotton growers and cattlemen.

According to the U.S. Census, the 2020 population for the City of Richland Springs was 330, a 32 percent decrease from the 2010 Census. Data from the 2020 U.S. Census indicate that 4.2 percent of the population is 5 years of age or younger and 18.5 percent is 65 years of age or older. Communities must deploy a support system that enables all populations to safely reach shelters or to quickly evacuate a hazard area.

9.11.3 Jurisdictional Capability Assessment and Integration

The City of Richland Springs performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section 5 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The community's adaptive capacity to withstand hazard events.

For a community to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day local government operations. As part of the hazard mitigation analysis, planning/policy documents were reviewed, and each jurisdiction was surveyed to obtain a better understanding of their progress toward plan integration. The updated mitigation strategy provided an opportunity for the City of Richland Springs to identify opportunities for integration of mitigation concepts that can be incorporated into municipal procedures.

Planning, Legal, and Regulatory Capability and Integration

The table below summarizes the regulatory tools that are available to the City of Richland Springs. The comment field provides information as to how the capability integrates hazard mitigation and risk reduction.

Table 9.11-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	No	-	-	-
How does this reduce risk?				
Zoning/Land Use Code	No	–	–	–
How does this reduce risk?				
Subdivision Ordinance	No	–	–	–

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
How does this reduce risk?				
Site Plan Ordinance	No	–	–	–
How does this reduce risk?				
Stormwater Management Ordinance	No	–	–	–
How does this reduce risk?				
Post-Disaster Recovery/ Reconstruction Ordinance	No	–	–	–
How does this reduce risk?				
Real Estate Disclosure	No	–	–	–
How does this reduce risk?				
Growth Management	No	–	–	–
How does this reduce risk?				
Environmental Protection Ordinance	No	–	–	–
How does this reduce risk?				
Flood Damage Prevention Ordinance	No	-	-	-
How does this reduce risk?				
Wellhead Protection	No	–	–	–
How does this reduce risk?				
Emergency Management Ordinance	No			
How does this reduce risk?				
Climate Change Ordinance	No	–	–	–
How does this reduce risk?				
Other	No	-	-	-
Planning Documents				
Comprehensive/Master Plan	No	-	-	-
How does this reduce risk?				
Capital Improvement Plan	No	-	-	-
How does this reduce risk?				
Disaster Debris Management Plan	No	-	-	-
How does this reduce risk?				
Floodplain Management or Watershed Plan	No	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Stormwater Management Plan	No	-	-	-
How does this reduce risk?				
Open Space Plan	No	-	-	-
How does this reduce risk?				
Urban Water Management Plan	No	-	-	-
How does this reduce risk?				
Habitat Conservation Plan	No	-	-	-
How does this reduce risk?				
Economic Development Plan	No	-	-	-
How does this reduce risk?				
Shoreline Management Plan	No	-	-	-
How does this reduce risk?				
Community Wildfire Protection Plan	No	-	-	-
How does this reduce risk?				
Community Forest Management Plan	No	-	-	-
How does this reduce risk?				
Transportation Plan	No	-	-	-
How does this reduce risk?				
Agriculture Plan	No	-	-	-
How does this reduce risk?				
Climate Action/ Resiliency/Sustainability Plan	No	-	-	-
How does this reduce risk?				
Tourism Plan	No	-	-	-
How does this reduce risk?				
Business/ Downtown Development Plan	No	-	-	-
How does this reduce risk?				
Other	No	-	-	-
Response/Recovery Planning				
Comprehensive Emergency Management Plan	Yes	City of Richland Springs Emergency Management Plan	Local	Mayor
How does this reduce risk? The plan guides emergency response during hazard events.				
Continuity of Operations Plan	No	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Strategic Recovery Planning Report	No	-	-	-
How does this reduce risk?				
Threat & Hazard Identification & Risk Assessment (THIRA)	No	-	-	-
How does this reduce risk?				
Post-Disaster Recovery Plan	No	-	-	-
How does this reduce risk?				
Public Health Plan	No	-	-	-
How does this reduce risk?				
Other	No			
How does this reduce risk?				

Development and Permitting Capability

The table below summarizes the capabilities of the City of Richland Springs to oversee and track development.

Table 9.11-3. Development and Permitting Capability

Indicate if your jurisdiction implements the following	Yes/No	Comment:
Do you issue development permits? • If yes, what department is responsible?	No	-
If you do not issue development permits, what is your process for tracking new development?	N/A	N/A
Are permits tracked by hazard area? (For example, floodplain development permits.)	N/A	N/A
Do you have a buildable land inventory? • If yes, please describe	No	-
Describe the level of build-out in your jurisdiction.	N/A	N/A

Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to the City of Richland Springs and their current responsibilities that contribute to hazard mitigation.

Table 9.11-4. Administrative and Technical Capabilities

Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	No	-
Zoning Board of Adjustment	No	-
Planning Department	No	-

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Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Mitigation Planning Committee	No	-
Environmental Board/Commission	No	-
Open Space Board/Committee	No	-
Economic Development Commission/Committee	No	-
Public Works/Highway Department	No	-
Construction/Building/Code Enforcement Department	No	-
Emergency Management/Public Safety Department	No	-
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	No	-
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	No	-
Mutual aid agreements	No	-
Human Resources Manual	No	-
Other	No	-
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	No	-
Engineers or professionals trained in building or infrastructure construction practices	No	-
Planners or engineers with an understanding of natural hazards	No	-
Staff with expertise or training in benefit/cost analysis	No	-
Professionals trained in conducting damage assessments	No	-
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	No	-
Environmental scientist familiar with natural hazards	No	-
Surveyor(s)	No	-
Emergency Manager	No	-
Grant writer(s)	No	-
Resilience Officer	No	-

Fiscal Capability

The table below summarizes financial resources available to the City of Richland Springs.

Table 9.11-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/No)
Community development Block Grants (CDBG, CDBG-DR)	No

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Financial Resources	Accessible or Eligible to Use? (Yes/No)
Capital improvements project funding	No
Authority to levy taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	Yes
Impact fees for homebuyers or developers of new development/homes	No
Stormwater utility fee	No
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	No
Incur debt through private activity bonds	No
Withhold public expenditures in hazard-prone areas	No
Other federal or state Funding Programs	No
Open Space Acquisition funding programs	No
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	No

Education and Outreach Capability

The table below summarizes the education and outreach resources available to the City of Richland Springs.

Table 9.11-6. Education and Outreach Capabilities

Outreach Resources	Available? (Yes/No)	Comment:
Public information officer or communications office	No	-
Personnel skilled or trained in website development	No	-
Hazard mitigation information available on your website	No	-
Social media for hazard mitigation education and outreach	No	-
Citizen boards or commissions that address issues related to hazard mitigation	No	-
Warning systems for hazard events	No	-
Natural disaster/safety programs in place for schools	No	-
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? • If yes, please describe.	No	-

Community Classifications

The table below summarizes classifications for community programs available to the City of Richland Springs.

Table 9.11-7. Community Classifications

Program	Participating? (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	No	-	-
Building Code Effectiveness Grading Schedule (BCEGS)	No	-	-

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Program	Participating? (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Public Protection (ISO Fire Protection Classes 1 to 10)	No	-	-
Storm Ready Certification	No	-	-
Firewise Communities classification	No	-	-
Other	No	-	-

Note:
N/A Not applicable
NP Not participating
- Unavailable

Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.
- Moderate: Capacity might exist; but is not used or could use some improvement.
- Weak: Capacity does not exist or could use substantial improvement.

Table 9.11-8. Adaptive Capacity

Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Moderate
Drought	Strong
Extreme Temperature	Moderate
Flood	Moderate
Geologic Hazards	Weak
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Low
Winter Storm	Moderate
Wildfire	Moderate

9.11.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information and is listed in the Hazard Mitigation Planning Team table at the beginning of this annex.

National Flood Insurance Program (NFIP) Summary

The following table summarizes the NFIP statistics for the City of Richland Springs.

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Table 9.11-9. NFIP Summary

Municipality	Policies in Force	Number of Paid Claims*	Amount of Paid Claims*	Number of NFIP Repetitive Loss Properties*	Number of NFIP Severe Repetitive Loss Properties*
Richland Springs (C)	N/A	0	$0	N/A	N/A

Source: NFIP 2016

Notes:

**Due to a contractual agreement with FEMA, information at the municipal level was not available to incorporate into the 2023 HMP Update. The information presented here for the municipalities is best available data from the last HMP.*

RL Repetitive Loss

SRL Severe Repetitive Loss

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in the City of Richland Springs.

Table 9.11-10. NFIP Summary

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	Minimal floodprone areas throughout the City. No
• Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	No
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	No
• How do you make Substantial Damage determinations? • How many were declared for recent flood events in your jurisdiction?	The City does not make declarations.
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	None
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If not, state why.	No; there are no digital FEMA FIRMs for the City.
NFIP Compliance	
What local department is responsible for floodplain management?	County
Are any certified floodplain managers on staff in your jurisdiction?	County
Do you have access to resources to determine possible future flooding conditions from climate change?	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	N/A

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NFIP Topic	Comments
Provide an explanation of NFIP administration services you provide (e.g. permit review, GIS, education/outreach, inspections, engineering capability)	N/A
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	County
What are the barriers to running an effective NFIP program in the community, if any?	No
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state the violations.	No
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	Unknown
• What is the local law number or municipal code of your flood damage prevention ordinance? • What is the date that your flood damage prevention ordinance was last amended?	None
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Unknown
Are there other local ordinances, plans or programs (e.g. site plan review) that support floodplain management and meeting the NFIP requirements? For instance, does the planning board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	No
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	No

9.11.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.11-11. Recent and Expected Future Development

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA
The City does not issue building permits														

9.11.6 Jurisdictional Risk Assessment

The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard

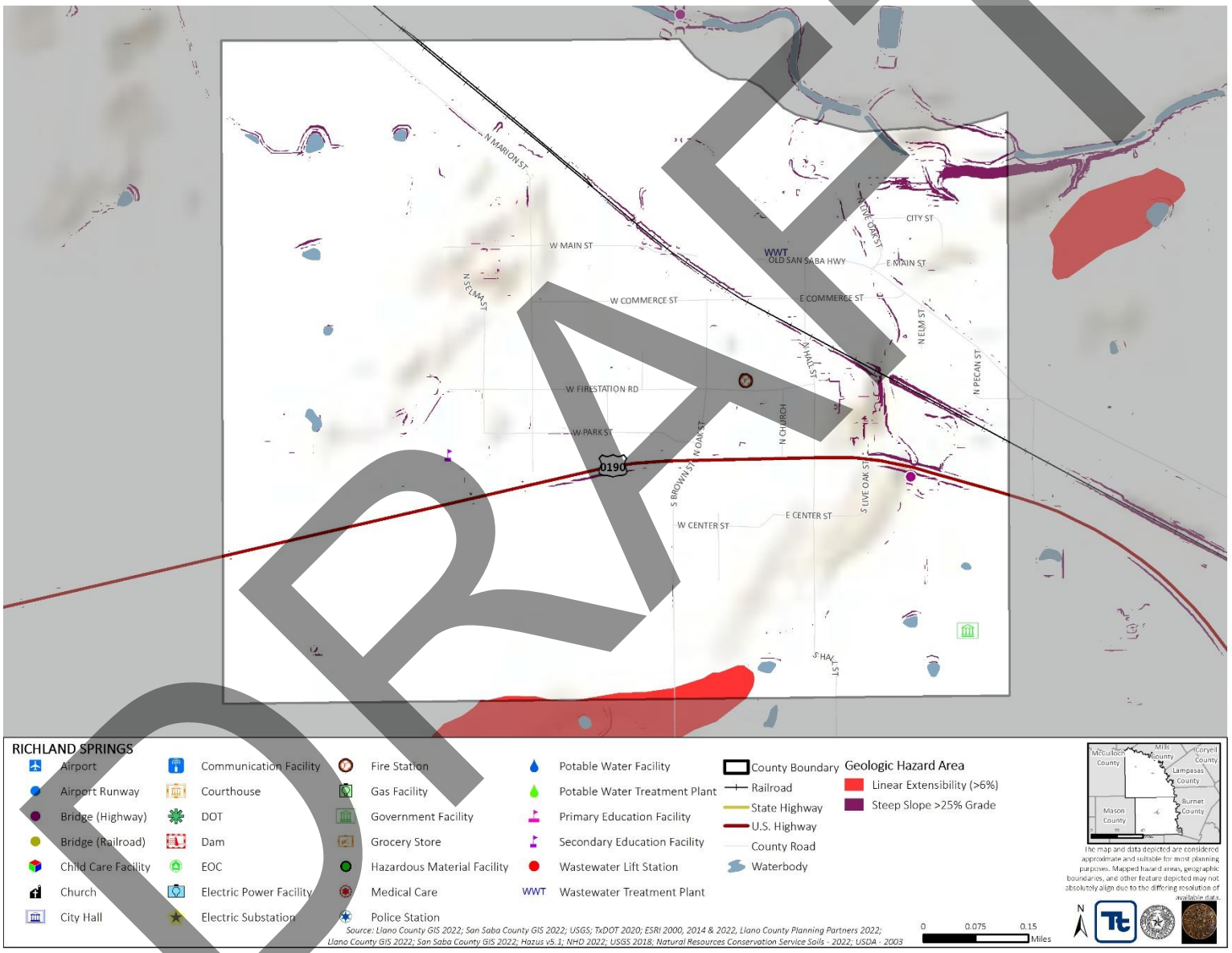
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Ranking) provide detailed summaries for the City of Richland Springs's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard area extent and location maps provided below illustrate the probable areas impacted within the jurisdiction based on the best available data at the time of the preparation of this plan and are adequate for planning purposes. Maps were generated only for those hazards that can be identified clearly using mapping techniques and technologies and for which the City of Richland Springs has significant exposure. The maps also show the location of potential new development, where available.

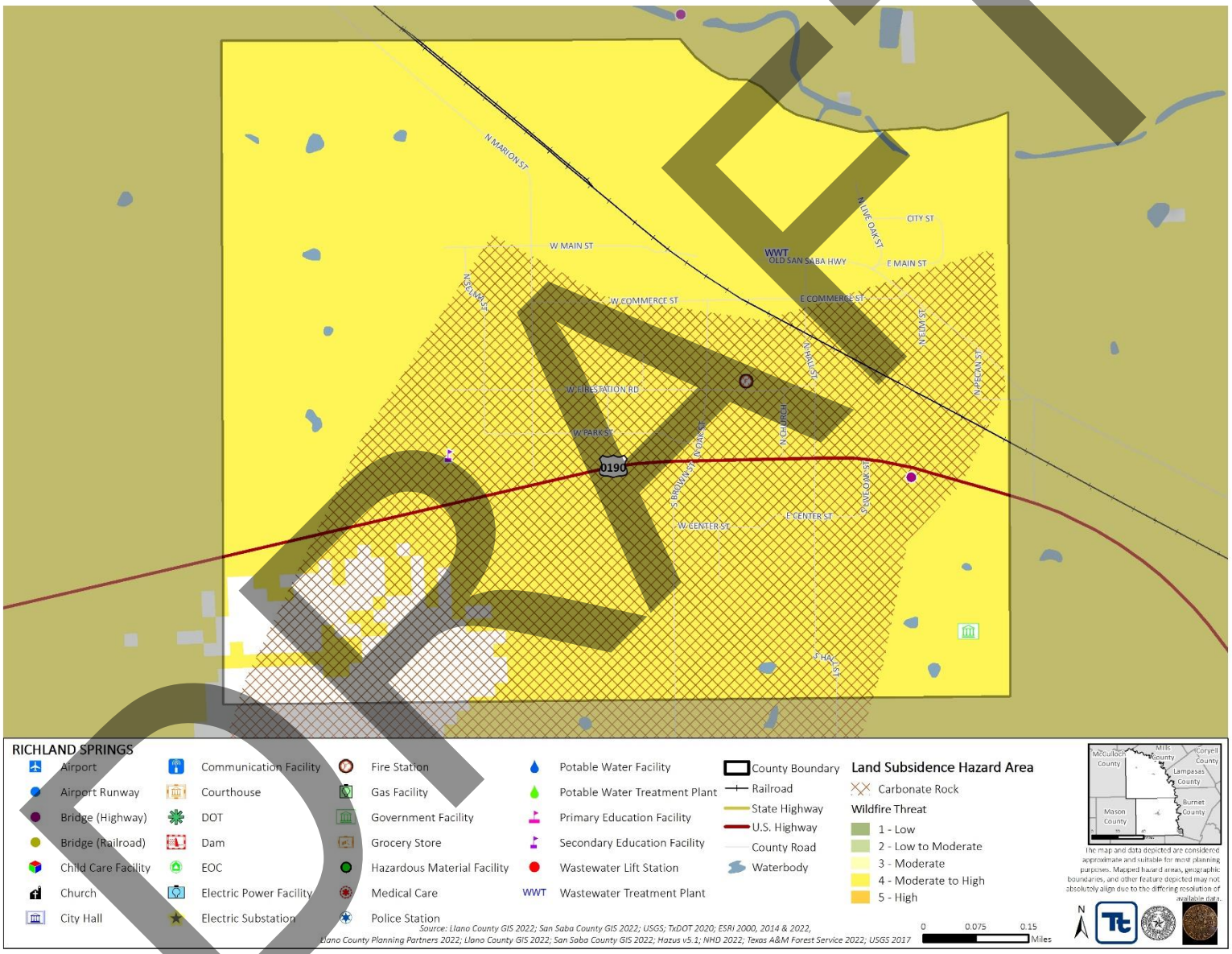
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Figure 9.11-1. City of Richland Springs Geologic Hazard Area Extent and Location Map



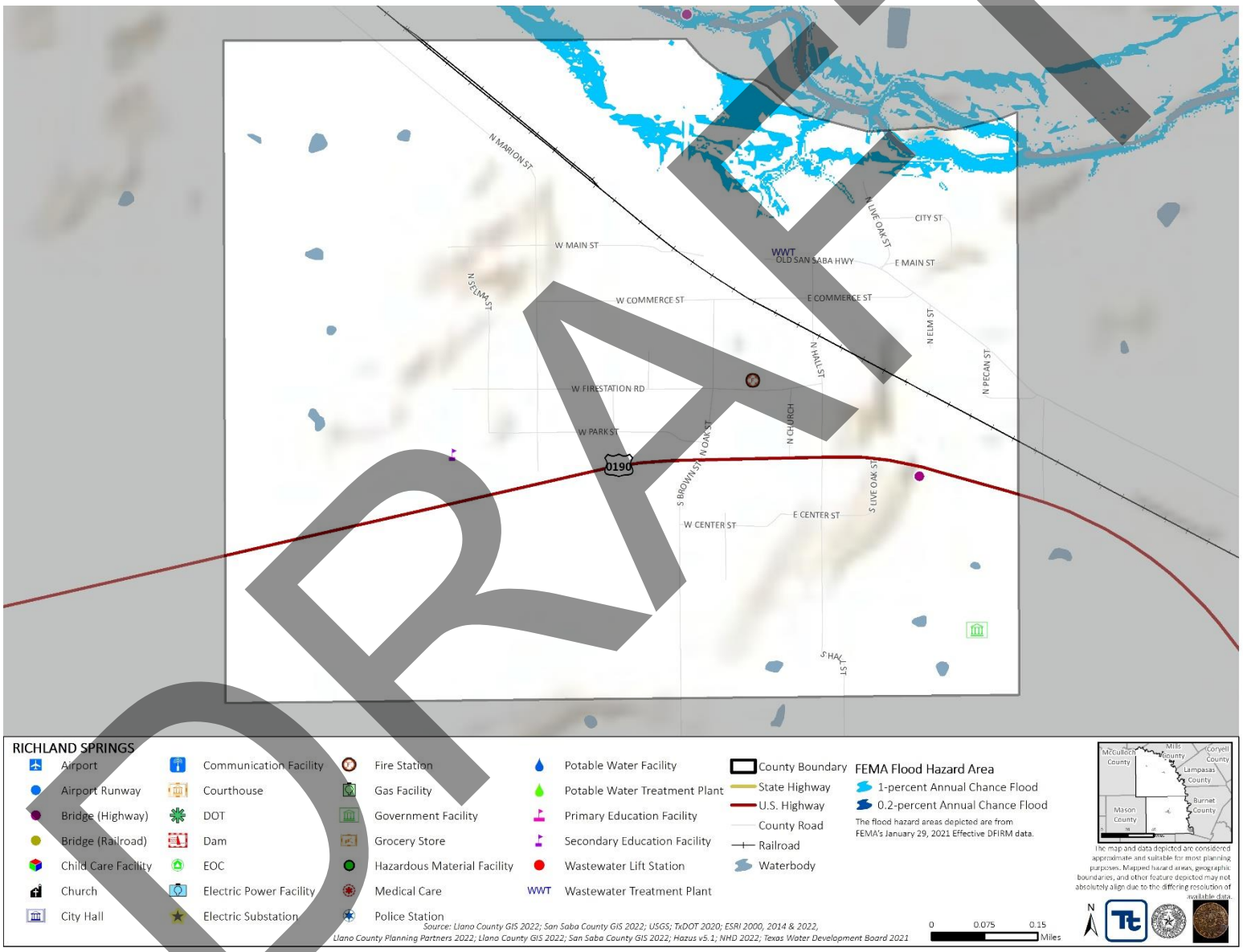
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Figure 9.11-2. City of Richland Springs Land Subsidence Hazard Area Extent and Location Map



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Figure 9.11-3. City of Richland Springs Flood Hazard Area Extent and Location Map



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Hazard Event History

Llano County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

The City of Richland Springs's history of federally declared (as presented by FEMA) and significant hazard events [as presented in NOAA-National Centers for Environmental Information (NCEI) is consistent with that of the County. The table below provides details regarding municipal-specific loss and damages the City experienced during hazard events since the last hazard mitigation plan update. Information provided in the table below is based on reference material or local sources.

Table 9.11-12. Hazard Event History

Date(s) of Event	Event Type (Disaster Declaration if applicable)	County Included in Declaration?	Summary of Event	Municipal Summary of Damages and Losses
September 10 – November 2, 2018	DR-4416 – Severe Storms and Flood	Yes	Severe storms and flooding had a severe impact on roads and bridges	Although the County was included in this event, the jurisdiction did not experience additional damages.
January 20, 2020 - ongoing	EM-3458 – Covid-19 DR-4485 – Covid-19 Pandemic	Yes	Severe winter storm resulted in significant ice coverage of roads, utility lines, and buildings	Although the County was included in this event, the jurisdiction did not experience additional damages.
February 11-21, 2021	EM-3554 – Severe Winter Storm DR-4586 – Severe Winter Storms	Yes	Severe ice storm resulted in significant ice coverage of roads, utility lines, buildings and homes causing widespread utility failure	Although the County was included in this event, the jurisdiction did not experience additional damages.

Notes:
EM Emergency Declaration (FEMA)
FEMA Federal Emergency Management Agency
DR Major Disaster Declaration (FEMA)
N/A Not applicable

Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4 (Risk Assessment) have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes the City of Richland Springs's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment). The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and community capabilities to address the hazard and changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

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As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Therefore, each municipality ranked the degree of risk to each hazard as it pertains to their community. The table below summarizes the hazard risk/vulnerability rankings of potential natural hazards for the City of Richland Springs. The City of Richland Springs reviewed the County hazard risk/vulnerability risk ranking table and individual results to reflect the relative risk of the hazards of concern to the community.

During the review of the hazard/vulnerability risk ranking, the City agreed with the ranking as presented below.

Table 9.11-13. Hazard Ranking Input

Dam Failure	Drought	Extreme Temperature	Flood	Geological Hazards	Hurricane
Low	Medium	Medium	Medium	Low	Medium

Severe Storm	Tornado	Pandemic	Winter Storm	Wildfire
High	High	Medium	Low	High

Critical Facilities

The table below identifies critical facilities in the community located in the 1-percent and 0.2-percent floodplain and presents Hazus-MH estimates of the damage and loss of use to critical facilities as a result of a 1-percent annual chance flood event.

Table 9.11-14. Potential Flood Losses to Critical Facilities

Name	Type	Exposure	
		1% Event	0.2% Event
No critical facilities in the floodplain			

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

Identified Issues

After review of the City of Richland Springs's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, the City of Richland Springs identified the following vulnerabilities within their community:

- While major events that result in substantial damage of structures are rare, municipalities need to have official procedures in place to inspect structures, make determinations, and provide for appeals.
- The City does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events.
- The Sewer Pond is becoming shallow due to excess silt and sludge build up at the City Wastewater Plant.
- There is no Emergency Warning Siren at the City level to warn residents of incoming hazard emergencies.
- City Hall cannot perform continuity of operations during a power outage.

9.11.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

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Past Mitigation Initiative Status

The following table indicates progress on the community's mitigation strategy identified in the 2016 HMP. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.11-15. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, No Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)?		
				Yes/No	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
City did not identify actions in the past plan						

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, the City of Richland Springs identified the following mitigation efforts completed since the last HMP:

- No additional mitigation efforts identified

Proposed Hazard Mitigation Initiatives for the HMP Update

The City of Richland Springs participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide-range of activities and mitigation measures selected.

Table 9.11-16. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA				CRS					
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure	X	X	-	-	X	X	-	-	-	X
Drought	X	X	-	-	X	X	-	-	-	X
Extreme Temperature	X	X	-	-	X	X	-	-	-	X
Flood	X	X	X	-	X	X	-	X	-	X
Geological Hazards	X	X	-	-	X	X	-	-	-	X
Hurricane	X	X	-	-	X	X	-	-	-	X
Severe Storm	X	X	-	-	X	X	-	-	-	X
Tornado	X	X	-	-	X	X	-	-	-	X
Pandemic	X	X	-	-	X	X	-	-	-	X
Winter Weather	X	X	-	-	X	X	-	-	-	X
Wildfire	X	X	-	-	X	X	-	-	-	X

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives the City of Richland Springs would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

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Table 9.11-17. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-City of Richland Springs-001	Substantial Damage Procedure	**Problem:** While major events that result in substantial damage of structures are rare, municipalities need to have official procedures in place to inspect structures, make determinations, and provide for appeals. **Solution:** The municipality will develop official procedures for Substantial Damage and Substantial Improvement determinations.	New and Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Wildfire, Winter Weather	1,2,3	Within 5 years	City Board, Floodplain Administration	Municipal Budget	Meet NFIP requirements, improved floodplain administration	Staff Time	High	LPR	PP, PR
2023-City od Richland Springs-002	Debris Management Plan	**Problem:** The City does not have an overarching Debris Management Plan to coordinate clean-up of debris after hazard events. **Solution:** The City will work with the San Saba County Emergency Management to develop a debris management plan as a framework for organizing the rapid, safe, and cost-effective separation, removal, collection, recycling, and disposal of debris after a disaster. This plan will include goals to minimize	New and Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Wildfire, Winter Weather	1,2,4	1-2 years	City Board, County Emergency Management	Municipal Budget	Ensure coordinated plans to safely remove debris from water ways	$10,000	High	LPR	PR, ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		debris-related threats to public health, safety, and the environment following any hazard event.											
2023-City od Richland Springs-003	Dredge Sewer Pond	**Problem:** The Sewer Pond is becoming shallow due to excess silt and sludge build up at the City Wastewater Plant. **Solution:** The City will obtain usage of a hydraulic dredge to remove sludge by pumping out the excess through a pipeline.	Existing	Flood	1, 2	1 year	Mayor, Facility Owners	City Budget, HMGP	The Plant will have more holding space for waste.	Medium	High	NSP	NR
2023-City od Richland Springs-004	Install Emergency Warning Siren	**Problem:** There is no Emergency Warning Siren at the City level to warn residents of incoming hazard emergencies. **Solution:** The City will install an Emergency Warning Siren to provide warning for inclement weather and health concerns.	Both	Dam Failure, Drought, Extreme Temperature, Flood, Geological Hazards, Hurricane, Pandemic, Severe Storm, Tornado, Wildfire, Winter Weather	1, 2, 4	2 years	Siren Committee, Emergency Management	City Budget, FMA, HMGP, BRIC	Residents will have more time to prepare for emergency hazard situations.	High	High	SIP	ES
2023-City od Richland Springs-005	City Hall Generator Installation	**Problem:** City Hall cannot perform continuity of operations during a power outage. **Solution:** The City will install a backup generator	Existing	Dam Failure, Flood, Geological Hazards, Hurricane, , Severe	1, 2	Within 5 years	Mayor, Emergency Management	City Budget, FMA, HMGP, BRIC	City Hall will be able to operate during power outages.	High	High	SIP	ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		in City Hall and perform routine maintenance to the Generator to allow for power during emergencies to keep city services operating.		Storm, Tornado, Wildfire, Winter Weather									

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).
Notes: Not all acronyms and abbreviations defined below are included in the table.

Acronyms and Abbreviations:

CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*
FEMA	*Federal Emergency Management Agency*
FPA	*Floodplain Administrator*
HMA	*Hazard Mitigation Assistance*
N/A	*Not applicable*
NFIP	*National Flood Insurance Program*
OEM	*Office of Emergency Management*

Potential FEMA HMA Funding Sources:

FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC	*Building Resilient Infrastructure and Communities Program*

Timeline:

The time required for completion of the project upon implementation.

Cost:

The estimated cost for implementation.

Benefits:

A description of the estimated benefits, either quantitative and/or qualitative.

Critical Facility:

Yes 💧 *Critical Facility located in 1% floodplain*

Mitigation Category:

- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*
- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

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- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*
- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.*

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The prioritization criteria provided in Volume 1, Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

Table 9.11-18. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-City of Richland Springs-001	Substantial Damage Procedure	1	1	1	1	1	1	1	1	1	1	1	0	1	1	13	High
2023-City of Richland Springs-002	Debris Management Plan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-City od Richland Springs-003	Dredge Sewer Pond	0	1	1	1	1	1	1	1	1	1	0	1	1	0	11	High
2023-City od Richland Springs-004	Install Emergency Warning Siren	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-City od Richland Springs-005	City Hall Generator Installation	1	0	1	1	1	1	1	0	1	1	1	1	1	1	12	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).

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Section 9 Jurisdictional Annexes

9.12 Richland Springs Independent School District

This section presents the jurisdictional annex for the Richland Springs Independent School District that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the School District, who in the School District participated in the planning process, an assessment of the Richland Springs Independent School District's risk and vulnerability, the different capabilities used in the School District, and an action plan that will be implemented to achieve a more resilient School District.

9.12.1 Hazard Mitigation Planning Team

The Richland Springs Independent School District identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many School District departments, including the Superintendent and Principal. The Superintendent represented the School District on the Llano County Hazard Mitigation Plan Planning Partnership and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes municipal officials that participated in the development of the annex and in what capacity. Additional documentation on the School District's planning process through Planning Partnership meetings is included in Volume 1, Section 3 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.12-1. Hazard Mitigation Planning Team

Primary Point of Contact		Alternate Point of Contact	
Name/Title:	Clifton James Womack - Superintendent	Name/Title:	Rhonda Wyatt - Principal
Address:	700 West Coyote Trail, Richland Springs, TX 76871	Address:	700 West Coyote Trail, Richland Springs, TX 76871
Phone Number:	325-240-1040	Phone Number:	325-240-1040
Email:	jwomack@rsisd.org	Email:	rwyatt@rsisd.org
Additional Contributors:			
Name/Title: Clifton James Womack, Superintendent Method of Participation: Provided information and data on past events and capabilities. Contributed to mitigation strategy.			

9.12.2 Jurisdiction Profile

Richland Springs Independent School District is committed to educational excellence that prepares and inspires all students for life-long success by engaging every student in rigorous academic experience and enriching opportunities. The Richland Springs Independent School District is in Richland Springs, Texas. It provides academic classes to students in pre-kindergarten through grade 12.

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According to the Texas Tribune, the 2020-2021 student population for the Richland Springs Independent School District was 112. Data from the 2020-2021 indicated that 100 percent of the student population received their diploma on time or earlier. The average ACT score was a 17.6 (The Texas Tribune 2022).

9.12.3 Jurisdictional Capability Assessment and Integration

The Richland Springs Independent School District performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section 5 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The School District's adaptive capacity to withstand hazard events.

For a jurisdiction to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day local government operations. As part of the hazard mitigation analysis, planning/policy documents were reviewed, and each jurisdiction was surveyed to obtain a better understanding of their progress toward plan integration. The updated mitigation strategy provided an opportunity for the Richland Springs Independent School District to identify opportunities for integration of mitigation concepts that can be incorporated into municipal procedures.

Planning, Legal, and Regulatory Capability and Integration

The table below summarizes the regulatory tools that are available to the Richland Springs Independent School District. The comment field provides information as to how the capability integrates hazard mitigation and risk reduction. Refer to annex of relevant location for more information on planning, legal and regulatory capabilities and integration.

Table 9.12-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	N/A	-	-	-
How does this reduce risk?				
Zoning/Land Use Code	N/A	-	-	-
How does this reduce risk?				
Subdivision Ordinance	N/A	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Site Plan Ordinance	N/A	-	-	-
How does this reduce risk?				
Stormwater Management Ordinance	N/A	-	-	-
How does this reduce risk?				
Post-Disaster Recovery/ Reconstruction Ordinance	N/A	-	-	-
How does this reduce risk?				
Real Estate Disclosure	N/A	-	-	-
How does this reduce risk?				
Growth Management	N/A	-	-	-
How does this reduce risk?				
Environmental Protection Ordinance	N/A	-	-	-
How does this reduce risk?				
Flood Damage Prevention Ordinance	N/A	-	-	-
How does this reduce risk? This is performed at the municipal level. Refer to Section 9.11 (City of Richland Springs) for details on this ordinance.				
Wellhead Protection	N/A	-	-	-
How does this reduce risk?				
Emergency Management Ordinance	N/A	-	-	-
How does this reduce risk? This is performed at the municipal level. Refer to Section 9.11 (City of Richland Springs) for details on this ordinance.				
Climate Change Ordinance	N/A	-	-	-
How does this reduce risk?				
Other	N/A	-	-	-
Planning Documents				
Comprehensive/Master Plan	N/A	-	-	-
How does this reduce risk?				
Capital Improvement Plan	N/A	-	-	-
How does this reduce risk? This is performed at the municipal level. Refer to Section 9.11 (City of Richland Springs) for details on this ordinance.				
Disaster Debris Management Plan	N/A	-	-	-
How does this reduce risk? This is performed at the municipal level. Refer to Section 9.11 (City of Richland Springs) for details on this ordinance.				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Floodplain Management or Watershed Plan	N/A	-	-	-
How does this reduce risk? This is performed at the municipal level. Refer to Section 9.11 (City of Richland Springs) for details on this ordinance.				
Stormwater Management Plan	N/A	-	-	-
How does this reduce risk?				
Open Space Plan	N/A	-	-	-
How does this reduce risk?				
Urban Water Management Plan	N/A	-	-	-
How does this reduce risk?				
Habitat Conservation Plan	N/A	-	-	-
How does this reduce risk?				
Economic Development Plan	N/A	-	-	-
How does this reduce risk?				
Shoreline Management Plan	N/A	-	-	-
How does this reduce risk?				
Community Wildfire Protection Plan	N/A	-	-	-
How does this reduce risk?				
Community Forest Management Plan	N/A	-	-	-
How does this reduce risk?				
Transportation Plan	N/A	-	-	-
How does this reduce risk?				
Agriculture Plan	N/A	-	-	-
How does this reduce risk?				
Climate Action/ Resiliency/Sustainability Plan	N/A	-	-	-
How does this reduce risk?				
Tourism Plan	N/A	-	-	-
How does this reduce risk?				
Business/ Downtown Development Plan	N/A	-	-	-
How does this reduce risk?				
Other				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Response/Recovery Planning				
Comprehensive Emergency Management Plan	N/A	-	-	-
How does this reduce risk? This is performed at the municipal level. Refer to Section 9.11 (City of Richland Springs) for details on this ordinance.				
Continuity of Operations Plan	N/A	-	-	-
How does this reduce risk?				
Strategic Recovery Planning Report	N/A	-	-	-
How does this reduce risk?				
Threat & Hazard Identification & Risk Assessment (THIRA)	N/A	-	-	-
How does this reduce risk?				
Post-Disaster Recovery Plan	N/A	-	-	-
How does this reduce risk?				
Public Health Plan	N/A	-	-	-
How does this reduce risk?				
Other	N/A	-	-	-
How does this reduce risk?				

Development and Permitting Capability

The table below summarizes the capabilities of the Richland Springs Independent School District to oversee and track development. Permitting is primarily done at the municipal and county levels, refer to the relevant annex for more details.

Table 9.12-3. Development and Permitting Capability

Indicate if your jurisdiction implements the following	Yes/No	Comment:
Do you issue development permits? • If yes, what department is responsible?	No	Not Applicable: Development permitting is done at the municipal level
If you do not issue development permits, what is your process for tracking new development?	No	
Are permits tracked by hazard area? (For example, floodplain development permits.)	No	
Do you have a buildable land inventory? • If yes, please describe		

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Indicate if your jurisdiction implements the following	Yes/No	Comment:
Describe the level of build-out in your jurisdiction.	No	

Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to the Richland Springs Independent School District and their current responsibilities that contribute to hazard mitigation. More information is available in municipality level annexes.

Table 9.12-4. Administrative and Technical Capabilities

Resources	Available? (Yes/N/A)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	N/A	-
Zoning Board of Adjustment	N/A	-
Planning Department	N/A	-
Mitigation Planning Committee	No	-
Environmental Board/Commission	N/A	-
Open Space Board/Committee	N/A	-
Economic Development Commission/Committee	No	-
Public Works/Highway Department	Yes	TxDOT – San Saba Co. – 325-372-5325
Construction/Building/Code Enforcement Department	N/A	-
Emergency Management/Public Safety Department	No	-
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	No	-
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	Yes	District works to follow groundskeeping maintenance schedule (Feb., June, Oct.)
Mutual aid agreements	No	-
Human Resources Manual	N/A	
Other	No	-
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	No	-
Engineers or professionals trained in building or infrastructure construction practices	No	-
Planners or engineers with an understanding of natural hazards	No	-
Staff with expertise or training in benefit/cost analysis	No	-
Professionals trained in conducting damage assessments	No	-
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	No	-

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Resources	Available? (Yes/N/A)	Comments (available staff, responsibilities, support of hazard mitigation)
Environmental scientist familiar with natural hazards	No	-
Surveyor(s)	No	-
Emergency Manager	No	-
Grant writer(s)	No	-
Resilience Officer	No	-
Other (this could include stormwater engineer, environmental specialist, etc.)	No	-

Fiscal Capability

The table below summarizes financial resources available to the Richland Springs Independent School District.

Table 9.12-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/N/A)
Community development Block Grants (CDBG, CDBG-DR)	N/A
Capital improvements project funding	N/A
Authority to levy taxes for specific purposes	N/A
User fees for water, sewer, gas, or electric service	N/A
Impact fees for homebuyers or developers of new development/homes	N/A
Stormwater utility fee	N/A
Incur debt through general obligation bonds	N/A
Incur debt through special tax bonds	N/A
Incur debt through private activity bonds	N/A
Withhold public expenditures in hazard-prone areas	N/A
Other federal or state Funding Programs	Yes
Open Space Acquisition funding programs	N/A
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	N/A

Education and Outreach Capability

The table below summarizes the education and outreach resources available to the Richland Springs Independent School District.

Table 9.12-6. Education and Outreach Capabilities

Outreach Resources	Available? (Yes/N/A)	Comment:
Public information officer or communications office	Yes	Superintendent
Personnel skilled or trained in website development	Yes	Superintendent, Technology Director
Hazard mitigation information available on your website	Yes	www.rscoyotes.net

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Outreach Resources	Available? (Yes/N/A)	Comment:
Social media for hazard mitigation education and outreach	N/A	-
Citizen boards or commissions that address issues related to hazard mitigation	Yes	School Safety Committee / SSSP Committee
Warning systems for hazard events	Yes	PA system, School website, School app
Natural disaster/safety programs in place for schools	Yes	Emergency Operations Plan
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? • If yes, please describe.	Yes	School website, School app

Community Classifications

The table below summarizes classifications for community programs available to the Richland Springs Independent School District.

Table 9.12-7. Community Classifications

Program	Participating? (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	No	Not Applicable: This is done at the municipal level	
Building Code Effectiveness Grading Schedule (BCEGS)	No		
Public Protection (ISO Fire Protection Classes 1 to 10)	No		
Storm Ready Certification	No		
Firewise Communities classification	No		
Other	No		

Note:
N/A Not applicable
NP Not participating
- Unavailable

Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.

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- Moderate: Capacity might exist; but is not used or could use some improvement.
- Weak: Capacity does not exist or could use substantial improvement.

Table 9.12-8. Adaptive Capacity

Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Moderate
Drought	Moderate
Extreme Temperature	Moderate
Flood	Moderate
Geological Hazards	Moderate
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Moderate
Winter Storm	Moderate
Wildfire	Moderate

9.12.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information and is listed in the Hazard Mitigation Planning Team table at the beginning of this annex. This is performed at the municipal level. Refer to relevant annexes for details on how jurisdictions implement their NFIP program.

National Flood Insurance Program (NFIP) Summary

NFIP administration is performed at the municipal level. Refer to Section 9.11 (City of Richland Springs) annex for a summary of NFIP statistics.

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in the Richland Springs Independent School District.

Table 9.12-9. NFIP Summary

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	Not Applicable: NFIP administration is done at the municipal level
• Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	
• How do you make Substantial Damage determinations?	

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NFIP Topic	Comments
• How many were declared for recent flood events in your jurisdiction?	
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If not, state why.	
NFIP Compliance	
What local department is responsible for floodplain management?	Not Applicable: NFIP administration is done at the municipal level
Are any certified floodplain managers on staff in your jurisdiction?	
Do you have access to resources to determine possible future flooding conditions from climate change?	
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	
Provide an explanation of NFIP administration services you provide (e.g. permit review, GIS, education/outreach, inspections, engineering capability)	
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	
What are the barriers to running an effective NFIP program in the community, if any?	
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state the violations.	
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	
• What is the local law number or municipal code of your flood damage prevention ordinance? • What is the date that your flood damage prevention ordinance was last amended?	
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	
Are there other local ordinances, plans or programs (e.g. site plan review) that support floodplain management and meeting the NFIP requirements? For instance, does the planning board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	

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9.12.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.12-10. Recent and Expected Future Development

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**
Not Applicable: Development permitting is done at the municipal level														

SFHA Special Flood Hazard Area (1% annual chance flood event)
** Only location-specific hazard zones or vulnerabilities identified.*

9.12.6 Jurisdictional Risk Assessment

The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard Ranking) provide detailed summaries for the Richland Springs Independent School District's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard Event History

Llano County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

The Richland Springs Independent School District's history of federally-declared (as presented by FEMA) and significant hazard events [as presented in NOAA-National Centers for Environmental Information (NCEI)] is consistent with that of the County. The table below provides details regarding municipal-specific loss and damages the School District experienced during hazard events since the last hazard mitigation plan update. Information provided in the table below is based on reference material or local sources.

Table 9.12-11. Hazard Event History

Dates of Event	Event Type (Disaster Declaration if applicable)	County Designated?	Summary of Event	Municipal Summary of Damages and Losses
September 10 – November 2, 2018	DR-4416 – Severe Storms and Flood	Yes	Severe storms and flooding had a severe impact on roads and bridges	Although the County was included in this event, the School District did not experience additional damages.
January 20, 2020 - ongoing	EM-3458 – Covid-19	Yes	Covid-19	District followed protocols enforced by the state and County

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Dates of Event	Event Type (Disaster Declaration if applicable)	County Designated?	Summary of Event	Municipal Summary of Damages and Losses
	DR-4485 – Covid-19 Pandemic			
February 11-21, 2021	EM-3554 – Severe Winter Storm DR-4586 – Severe Winter Storms	Yes	Severe ice storm resulted in significant ice coverage of roads, utility lines, buildings and homes causing widespread utility failure	Although the County was included in this event, the School District did not experience additional damages.

Notes:
EM Emergency Declaration (FEMA)
FEMA Federal Emergency Management Agency
DR Major Disaster Declaration (FEMA)
N/A Not applicable

Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4 (Risk Assessment) have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes the Richland Springs Independent School District's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the School District specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment). The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and School District capabilities to address the hazard and changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Therefore, each jurisdiction ranked the degree of risk to each hazard as it pertains to their jurisdiction. The table below summarizes the hazard risk/vulnerability rankings of potential natural hazards for the Richland Springs Independent School District. The Richland Springs Independent School District reviewed the County hazard risk/vulnerability risk ranking table and individual results to reflect the relative risk of the hazards of concern to the School District.

During the review of the hazard/vulnerability risk ranking:

- The District changed the hazard ranking from medium to high for flood due to consistent water pool and first floor flooding in the building.
- The School District agreed with the remainder of the hazard rankings.

Table 9.12-12. Hazard Ranking Input

Dam Failure	Drought	Extreme Temperature	Flood	Geological Hazards
Low	Medium	Medium	High	Low

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Hurricane	Severe Storm	Tornado	Pandemic	Winter Storm	Wildfire
Medium	High	High	Medium	Low	High

Critical Facilities

The table below identifies critical facilities in the School District located in the 1-percent and 0.2-percent floodplain and presents Hazus-MH estimates of the damage and loss of use to critical facilities as a result of a 1-percent annual chance flood event.

Table 9.12-13. Potential Flood Losses to Critical Facilities

Name	Type	Exposure	
		1% Event	0.2% Event
No critical facilities located within the floodplain.			

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

Identified Issues

After review of the Richland Springs Independent School District's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, the Richland Springs Independent School District identified the following vulnerabilities within the School District:

- The School lacks sufficient backup power and will not be able to fully function as a heating/cooling station in the event of a power outage.
- The School district relies on one main bus route, which fails to take into account potential hazards that may impact bussing to and from school.
- There is no joint hazard emergency response plan which includes the School District, County, State and Federal partners.
- Students at Cherokee Independent School District lack knowledge on how to respond to severe hazard events when in a classroom setting.
- Bus Drivers and Student Drivers at Llano Independent School District lack knowledge on how to safely drive to and from school in the event of an extreme hazard event.
- Students and staff are not protected from extreme hazard events that have the potential to destroy or enter through old windows.
- The District floods every time there is a storm that deposits a lot of water in the area. Water pools and leaks into buildings which has the potential to create mold.
- Water seeps into the district building during an intense precipitation event which occasionally causes mold if not cleaned in a timely fashion.

9.12.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

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Past Mitigation Initiative Status

The following table indicates progress on the School District's mitigation strategy identified in the 2016 HMP. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.12-14. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, N/A Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)? Yes/N/A	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
Richland Springs ISD did not participate in the previous HMP; therefore, there are no previously identified mitigation actions.						

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, the Richland Springs Independent School District identified the following mitigation efforts completed since the last HMP:

- No additional mitigation efforts identified

Proposed Hazard Mitigation Initiatives for the HMP Update

The Richland Springs Independent School District participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide range of activities and mitigation measures selected.

Table 9.12-15. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA					CRS				
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure	X	X				X				X
Drought	X	X				X				X
Extreme Temperature	X	X				X				X
Flood	X	X		X		X	X		X	X
Geological Hazards	X	X		X		X	X			X
Hurricane	X	X		X		X	X		X	X
Severe Storm	X	X		X		X	X		X	X
Tornado	X	X		X		X	X			X
Pandemic	X			X			X			X
Winter Storm	X	X		X		X	X		X	X
Wildfire	X	X		X		X	X			X

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives the Richland Springs Independent School District would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in municipal priorities.

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Table 9.12-16. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-Richland Springs ISD-001	Backup Power	**Problem:** The School lacks sufficient backup power and will not be able to fully function as an emergency shelter in the event of a power outage. **Solution:** The School will install a backup generator and necessary electrical components as well as run routine testing and maintenance in order to meet its functional needs.	Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1, 2, 3	1 Year	School District, Llano County, Emergency Services	BRIC, HMGP, PDM, HMGP, BRIC, PDM, USDA Community Facilities Grant Program, Emergency Management Performance Grants (EMPG) Program, School Board	Backup power in the district will provide safety to nearby residents in the event of an emergency and will allow for continuity of operations.	High	High	SIP	PP, ES
2023-Richland Springs ISD-002	Alternate Bus Route	**Problem:** The School District relies on one main bus route, which fails to take into account potential hazards that may impact bussing to and from school. **Solution:** The School must develop alternate bus routes that will take into account all potential hazards and how they may influence the main bus route.	Existing	Dam Failure, Drought, Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1, 2, 3, 4	1 Year	School District, Bussing Company	School Board, Bus Company	An alternate bus route plan provides multiple secure ways for bus drivers to carry out their route, even in the event of a road closure, or downed tree due to hazards.	Low	High	LPR	ES
2023-Richland Springs ISD-003	Emergency Response	**Problem:** There is no joint hazard emergency response plan which includes the School District, County, State, and Federal partners.	Existing	Dam Failure, Drought, Extreme Temperature, Flood,	1, 2, 3, 4	1 Year	School District, County, State, Emergency	School Board, County, FEMA, HMGP, PDM	The School District will be fully prepared in the event of	Low	High	LPR	ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		Solution: The School District will work with the relevant county/state/federal entities to develop an all-encompassing response plan in relation to environmental emergencies, including relevant trainings.		Geologic Hazards, Hurricane, Severe Storm, Tornado, Pandemic, Winter Storm, Wildfire			Services, FEMA		environmental hazards.				
2023-Richland Springs ISD-004	School Hazard Assembly	**Problem:** Students at Cherokee Independent School District lack knowledge on how to respond to severe hazard events when in a classroom setting. **Solution:** The District will provide yearly assemblies which cover how to respond to an extreme hazard event when in school.	Existing	Geologic Hazard, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire, Pandemic	1,2,3	Less than a Year	School District, County, State, Emergency Services, Local Forest Division	School Board, County	Students at Llano will be more prepared on how to respond to severe hazard events in a classroom setting.	Low	High	EAP	PI
2023-Richland Springs ISD-005	Safe School Transportation	**Problem**: Bus Drivers and student drivers at Llano Independent School District lack knowledge on how to safely drive to and from school in the event of an extreme hazard event. **Solution:** The District will provide informative sessions as well as rules and regulations for school employed transportation for all people that actively drive to and from school on	Existing	Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Pandemic, Winter Storm, Wildfire	1,2,3	1 year	School District, County, Emergency Services	County and School Board	Drivers will be more well equipped to drive to and from school in hazardous weather conditions.	Low	High	LPR, EAP	PI, ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		how to drive safely during hazard events. The District will also provide information on what constitutes drivable road conditions.											
2023-Richland Springs ISD-006	Storm shutter Installation	**Problem:** Students and staff are not protected from extreme hazard events that have the potential to destroy or enter through old windows. **Solution:** The District will purchase and install storm shutters where they are needed to protect students and staff from extreme hazard events.	Existing and New	Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1,2	1 Year	School District, County, Emergency Services	County and School Board	Students and staffing will be more protected from extreme hazard events.	Medium	High	SIP,	ES, PP
2023-Richland Springs ISD-007	Flood Study	**Problem:** The District floods every time there is a storm that deposits a lot of water in the area. Water pools and leaks into buildings which has the potential to create mold. **Solution:** The District needs to do a study and identify and implement the best solution to direct water away from the building.	Existing	Flood Hurricane, Severe Storm, Winter Storm	1,2	1 Year	School District, County, Emergency Services	County and School Board	Students and staff will be less at risk for flooding.	Low	High	SIP	SP
2023-Richland Springs ISD-008	Floodproof District Building	**Problem:** Water seeps into the district building during an intense precipitation event which occasionally	Existing	Flood, Hurricane, Severe Storm, Winter Storm	1,2	3 Years	School District, County,	County and School Board	Reduction in water seepage at ground floor of the building,	High	High	SIP	SP

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		causes mold if not cleaned in a timely fashion. **Solution:** The District will floodproof the building to eliminate water seepage and reduce potential mold.					Emergency Services		reduction of mold.				

Notes:
Not all acronyms and abbreviations defined below are included in the table.

Acronyms and Abbreviations:

CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*
FEMA	*Federal Emergency Management Agency*
FPA	*Floodplain Administrator*
HMA	*Hazard Mitigation Assistance*
N/A	*Not applicable*
NFIP	*National Flood Insurance Program*
OEM	*Office of Emergency Management*

Potential FEMA HMA Funding Sources:

FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC	*Building Resilient Infrastructure and Communities Program*
PDM	*Pre-Disaster Mitigation Program*

Timeline:

The time required for completion of the project upon implementation.

Cost:

The estimated cost for implementation.

Benefits:

A description of the estimated benefits, either quantitative and/or qualitative.

Critical Facility:
Yes *Critical Facility located in 1% floodplain*

Mitigation Category:

- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*
- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

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- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*
- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.*

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The prioritization criteria provided in Volume 1; Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

Table 9.12-17. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community	Total	High / Medium / Low
2023-Richland Springs ISD-001	Backup Power	1	1	1	1	1	1	0	0	1	1	1	1	1	0	11	High
2023-Richland Springs ISD-002	Alternate Bus Route	1	1	1	1	1	1	0	0	1	1	1	1	1	1	12	High
2023-Richland Springs ISD-003	Emergency Response	1	1	1	1	1	1	0	0	1	1	1	1	1	0	11	High
2023-Richland Springs ISD-004	School Hazard Assembly	1	0	1	1	1	1	0	1	1	1	1	1	1	0	11	High
2023-Richland Springs ISD-005	Safe School Transportation	1	0	1	1	1	1	0	0	1	1	1	1	1	0	10	High
2023-Richland Springs ISD-006	Storm shutter Installation	1	1	1	1	1	1	0	0	1	1	1	1	1	1	12	High
2023-Richland Springs ISD-007	Flood Study	1	1	1	1	1	1	0	0	1	1	1	1	1	0	11	High
2023-Richland Springs ISD-008	Floodproof District Building	1	1	1	1	1	1	0	0	1	1	1	1	1	0	11	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).

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Section 9 Jurisdictional Annexes

9.13 Richland Springs Special Utility District (SUD)

This section presents the jurisdictional annex for Richland Springs SUD that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the jurisdiction, who in the Utility District participated in the planning process, an assessment of Richland Springs SUD's risk and vulnerability, the different capabilities used in the Utility District, and an action plan that will be implemented to achieve a more resilient community.

9.13.1 Hazard Mitigation Planning Team

Richland Springs SUD identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many Utility District departments. The SUD represented the community on the Llano County Hazard Mitigation Plan Planning Partnership and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes the officials that participated in the development of the annex and in what capacity. Additional documentation on the jurisdiction's planning process through Planning Partnership meetings is included in Volume 1, Section 2 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.13-1. Hazard Mitigation Planning Team

Primary Point of Contact		Alternate Point of Contact	
Name/Title:	Deana Sealy	Name/Title:	Frank Pearce
Address:	300 Main Street, Richland Springs, TX, 76871	Address:	300 Main Street, Richland Springs, TX, 76871
Phone Number:	325-656-3452	Phone Number:	281-413-2944
Email:	sealy@wcc.net	Email:	rsud@centex.net

9.13.2 Jurisdictional Profile

The Richland SUD was formed in 1981 as a water supply district and later converted to a SUD. It is a rural district that does not serve any urban areas. The meters are all residential and agricultural related. The District serves approximately 1160 meters in northwestern San Saba and northeastern McCulloch counties. Approximately 2,000 permanent residents are supported by the RSUD system.

9.13.3 Jurisdictional Capability Assessment and Integration

Richland Springs SUD performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section5 (Capability Assessment) describes

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the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The community's adaptive capacity to withstand hazard events.

For a community to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day local government operations. As part of the hazard mitigation analysis, planning/policy documents were reviewed, and each jurisdiction was surveyed to obtain a better understanding of their progress toward plan integration. The updated mitigation strategy provided an opportunity for Richland Springs SUD to identify opportunities for integration of mitigation concepts that can be incorporated into jurisdictional procedures.

Planning, Legal, and Regulatory Capability and Integration

The table below summarizes the regulatory tools that are available to Richland Springs SUD. The comment field provides information as to how the capability integrates hazard mitigation and risk reduction.

Table 9.13-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/N/A)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	N/A	-	-	-
How does this reduce risk?				
Zoning/Land Use Code	N/A	-	-	-
How does this reduce risk?				
Subdivision Ordinance	N/A	-	-	-
How does this reduce risk?				
Site Plan Ordinance	N/A	-	-	-
How does this reduce risk?				
Stormwater Management Ordinance	N/A	-	-	-
How does this reduce risk?				
Post-Disaster Recovery/ Reconstruction Ordinance	N/A	-	-	-
How does this reduce risk?				
Real Estate Disclosure	N/A	-	-	-

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	Jurisdiction has this? (Yes/N/A)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
How does this reduce risk?				
Growth Management	N/A	-	-	-
How does this reduce risk?				
Environmental Protection Ordinance	N/A	-	-	-
How does this reduce risk?				
Flood Damage Prevention Ordinance	Yes	Order N/A. 2015-1	County	OEM
How does this reduce risk? San Saba County adopted a flood damage prevention ordinance to promote the health, safety, and general welfare of its citizen's and to minimize potential damages to both public and private infrastructure and to maintain a cost-effective approach to mitigation efforts. The Ordinance identifies the following objectives to mitigate flood damages: • 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 gas and water, electric, telephone, sewer lines, streets and bridges located in special flood hazard areas • Notify developers that properties are in special flood hazard areas				
Wellhead Protection	N/A	-	-	-
How does this reduce risk?				
Emergency Management Ordinance	N/A			
How does this reduce risk?				
Climate Change Ordinance	N/A	-	-	-
How does this reduce risk?				
Other	No	-	-	-
Planning Documents				
Comprehensive/Master Plan	N/A	-	-	-
How does this reduce risk?				
Capital Improvement Plan	N/A	-	-	-
How does this reduce risk?				
Disaster Debris Management Plan	N/A	-	-	-
How does this reduce risk?				
Floodplain Management or Watershed Plan	N/A	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/N/A)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Stormwater Management Plan	N/A	-	-	-
How does this reduce risk?				
Open Space Plan	N/A	-	-	-
How does this reduce risk?				
Urban Water Management Plan	N/A	-	-	-
How does this reduce risk?				
Habitat Conservation Plan	N/A	-	-	-
How does this reduce risk?				
Economic Development Plan	N/A	-	-	-
How does this reduce risk?				
Shoreline Management Plan	N/A	-	-	-
How does this reduce risk?				
Community Wildfire Protection Plan	N/A	-	-	-
How does this reduce risk?				
Community Forest Management Plan	N/A	-	-	-
How does this reduce risk?				
Transportation Plan	N/A	-	-	-
How does this reduce risk?				
Agriculture Plan	N/A	-	-	-
How does this reduce risk?				
Climate Action/ Resiliency/Sustainability Plan	N/A	-	-	-
How does this reduce risk?				
Tourism Plan	N/A	-	-	-
How does this reduce risk?				
Business/ Downtown Development Plan	N/A	-	-	-
How does this reduce risk?				
Other				
Response/Recovery Planning				

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	Jurisdiction has this? (Yes/N/A)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Comprehensive Emergency Management Plan	Yes	San Saba County Emergency Management Plan w/Annexes	County	County OEM
How does this reduce risk? The County has a Basic Emergency Operations Plan accompanied by annexes that identify the procedures and guidelines to follow leading up to a hazard event. The procedures include planning and training for potential disasters, events, and situations that could result in the loss of life or property. These procedures and guidelines allow for locating problems and errors before a hazard event takes place.				
Continuity of Operations Plan	N/A	-	-	-
How does this reduce risk?				
Strategic Recovery Planning Report	N/A	-	-	-
How does this reduce risk?				
Threat & Hazard Identification & Risk Assessment (THIRA)	N/A	-	-	-
How does this reduce risk?				
Post-Disaster Recovery Plan	N/A	-	-	-
How does this reduce risk?				
Public Health Plan	N/A	-	-	-
How does this reduce risk?				
Other	No	-	-	-
How does this reduce risk?				

Development and Permitting Capability

The table below summarizes the capabilities of Richland Springs SUD to oversee and track development.

Table 9.13-3. Development and Permitting Capability

Indicate if your jurisdiction implements the following	Yes/N/A	Comment:
Do you issue development permits? • If yes, what department is responsible?	N/A	Not Applicable: Development permitting is done at the municipal level
If you do not issue development permits, what is your process for tracking new development?	N/A	
Are permits tracked by hazard area? (For example, floodplain development permits.)	N/A	

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Indicate if your jurisdiction implements the following	Yes/N/A	Comment:
Do you have a buildable land inventory? • If yes, please describe	N/A	
Describe the level of build-out in your jurisdiction.	N/A	

Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to Richland Springs SUD and their current responsibilities that contribute to hazard mitigation.

Table 9.13-4. Administrative and Technical Capabilities

Resources	Available? (Yes/N/A)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	No	Not applicable – performed at the municipal level
Zoning Board of Adjustment	No	Not applicable – performed at the municipal level
Planning Department	No	Not applicable – performed at the municipal level
Mitigation Planning Committee	No	Not applicable – performed at the municipal level
Environmental Board/Commission	No	Not applicable – performed at the municipal level
Open Space Board/Committee	No	Not applicable – performed at the municipal level
Economic Development Commission/Committee	No	Not applicable – performed at the municipal level
Public Works/Highway Department	No	Not applicable – performed at the municipal level
Construction/Building/Code Enforcement Department	No	Not applicable – performed at the municipal level
Emergency Management/Public Safety Department	No	Not applicable – performed at the municipal level
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	No	-
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	Yes	ROW Maintenance
Mutual aid agreements	No	-
Human Resources Manual	No	-
Other	No	-
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	No	-
Engineers or professionals trained in building or infrastructure construction practices	No	-
Planners or engineers with an understanding of natural hazards	No	-
Staff with expertise or training in benefit/cost analysis	No	-
Professionals trained in conducting damage assessments	No	-

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Resources	Available? (Yes/N/A)	Comments (available staff, responsibilities, support of hazard mitigation)
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	No	-
Environmental scientist familiar with natural hazards	No	-
Surveyor(s)	No	-
Emergency Manager	No	-
Grant writer(s)	No	-
Resilience Officer	No	-
Other (this could include stormwater engineer, environmental specialist, etc.)	No	-

Fiscal Capability

The table below summarizes financial resources available to Richland Springs SUD.

Table 9.13-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/N/A)
Community development Block Grants (CDBG, CDBG-DR)	N/A
Capital improvements project funding	Pending
Authority to levy taxes for specific purposes	N/A
User fees for water, sewer, gas or electric service	Yes – Water only
Impact fees for homebuyers or developers of new development/homes	N/A
Stormwater utility fee	N/A
Incur debt through general obligation bonds	N/A
Incur debt through special tax bonds	N/A
Incur debt through private activity bonds	N/A
Withhold public expenditures in hazard-prone areas	N/A
Other federal or state Funding Programs	N/A
Open Space Acquisition funding programs	N/A
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	N/A

Education and Outreach Capability

The table below summarizes the education and outreach resources available to Richland Springs SUD.

Table 9.13-6. Education and Outreach Capabilities

Outreach Resources	Available? (Yes/N/A)	Comment:
Public information officer or communications office	Yes	Michael Hobbs
Personnel skilled or trained in website development	Yes	Work in progress

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Outreach Resources	Available? (Yes/N/A)	Comment:
Hazard mitigation information available on your website	Yes	Work in progress
Social media for hazard mitigation education and outreach	Yes	Located on website
Citizen boards or commissions that address issues related to hazard mitigation	N/A	-
Warning systems for hazard events	Yes	Access to Code RED
Natural disaster/safety programs in place for schools	N/A	-
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? If yes, please describe.	N/A	-

Community Classifications

The table below summarizes classifications for community programs available to Richland Springs SUD.

Table 9.13-7. Community Classifications

Program	Participating? (Yes/N/A)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	N/A	Not Applicable: This is done at the municipal level	
Building Code Effectiveness Grading Schedule (BCEGS)	N/A		
Public Protection (ISO Fire Protection Classes 1 to 10)	N/A		
Storm Ready Certification	N/A		
Firewise Communities classification	N/A		
Other	No		

Note:
N/A *Not applicable*
NP *Not participating*
- *Unavailable*

Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.
- Moderate: Capacity might exist; but is not used or could use some improvement.

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- Weak: Capacity does not exist or could use substantial improvement.

Table 9.13-8. Adaptive Capacity

Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Moderate
Drought	Moderate
Extreme Temperature	Moderate
Flood	Moderate
Geologic Hazards	Moderate
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Moderate
Winter Storm	Moderate
Wildfire	Moderate

9.13.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information and is listed in the Hazard Mitigation Planning Team table at the beginning of this annex.

National Flood Insurance Program (NFIP) Summary

NFIP administration is performed at the municipal level. Refer to Section 9.11 (City of Richland Springs) annex for a summary of NFIP statistics.

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in Richland Springs SUD.

Table 9.13-9. NFIP Summary

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	The SUD keeps a list of any damages
• Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	N/A
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	N/A
• How do you make Substantial Damage determinations? • How many were declared for recent flood events in your jurisdiction?	Contact FPA for San Saba County

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NFIP Topic	Comments
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	None
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If not, state why.	N/A, FIRM maps are from 1991 original study and no BFEs are determined for the Richland Springs area
NFIP Compliance	
What local department is responsible for floodplain management?	County FPA
Are any certified floodplain managers on staff in your jurisdiction?	N/A
Do you have access to resources to determine possible future flooding conditions from climate change?	N/A
Does your floodplain management staff need any assistance or training to support its floodplain management program? • If so, what type of assistance/training is needed?	N/A
Provide an explanation of NFIP administration services you provide (e.g. permit review, GIS, education/outreach, inspections, engineering capability)	N/A
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	N/A
What are the barriers to running an effective NFIP program in the community, if any?	N/A
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? • If so, state the violations.	N/A
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	Unknown
• What is the local law number or municipal code of your flood damage prevention ordinance? • What is the date that your flood damage prevention ordinance was last amended?	Order N/A. 2015-1; October 26, 2015
Does your floodplain management program meet or exceed minimum requirements? • If exceeds, in what ways?	Meets
Are there other local ordinances, plans or programs (e.g. site plan review) that support floodplain management and meeting the NFIP requirements? For instance, does the planning board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	N/A

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NFIP Topic	Comments
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	N/A

9.13.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.13-10. Recent and Expected Future Development

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA
Not Applicable: Development permitting is done at the municipal level														

SFHA Special Flood Hazard Area (1% annual chance flood event)

9.13.6 Jurisdictional Risk Assessment

The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard Ranking) provide detailed summaries for Richland Springs SUD's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard Event History

Llano County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

Richland Springs SUD's history of federally-declared (as presented by FEMA) and significant hazard events [as presented in NOAA-National Centers for Environmental Information (NCEI)] is consistent with that of the County. The table below provides details regarding jurisdiction-specific loss and damages the Utility District experienced during hazard events since the last hazard mitigation plan update. Information provided in the table below is based on reference material or local sources.

Table 9.13-11. Hazard Event History

Dates of Event	Event Type (Disaster Declaration if applicable)	County Designated?	Summary of Event	Jurisdictional Summary of Damages and Losses
September 10 – November 2, 2018	DR-4416 – Severe Storms and Flood	Yes	Severe storms and flooding had a severe impact on roads and bridges	Although the County was impacted, the District did not report damages.

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Dates of Event	Event Type (Disaster Declaration if applicable)	County Designated?	Summary of Event	Jurisdictional Summary of Damages and Losses
January 20, 2020 - ongoing	EM-3458 – Covid-19 DR-4485 – Covid-19 Pandemic	Yes	Covid-19	District followed protocols enforced by the state and county
February 11-21, 2021	EM-3554 – Severe Winter Storm DR-4586 – Severe Winter Storms	Yes	Severe winter storm resulted in significant ice coverage of roads, utility lines, and buildings	Check from TML for $66,200.21 for replacing multiple pieces of SUD equipment

Notes:
EM Emergency Declaration (FEMA)
FEMA Federal Emergency Management Agency
DR Major Disaster Declaration (FEMA)
N/A Not applicable

Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4 (Risk Assessment) have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes Richland Springs SUD's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment). The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and community capabilities to address the hazard and changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Therefore, each jurisdiction ranked the degree of risk to each hazard as it pertains to their community. The table below summarizes the hazard risk/vulnerability rankings of potential natural hazards for Richland Springs SUD. Richland Springs SUD reviewed the County hazard risk/vulnerability risk ranking table and individual results to reflect the relative risk of the hazards of concern to the community.

During the review of the hazard/vulnerability risk ranking, the Utility District agreed with the hazard rankings.

Table 9.13-12. Hazard Ranking Input

Dam Failure	Drought	Extreme Temperature	Flood	Geologic Hazards	Hurricane
Low	Medium	Medium	Medium	Low	Medium

Severe Storm	Tornado	Pandemic	Winter Storm	Wildfire
High	High	Medium	Low	High

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Critical Facilities

The table below identifies critical facilities in the community located in the 1-percent and 0.2-percent floodplain and presents Hazus-MH estimates of the damage and loss of use to critical facilities as a result of a 1-percent annual chance flood event.

Table 9.13-13. Potential Flood Losses to Critical Facilities

Name	Type	Exposure	
		1% Event	0.2% Event
No critical facilities located in the floodplain.			

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

Identified Issues

After review of Richland Springs SUD's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, Richland Springs SUD identified the following vulnerabilities within their community:

- The Utility District's infrastructure has become extremely vulnerable to increased hazard events.
- Extreme hazard events threaten the continuity of operations for Richland Springs SUD in the event of a power outage.
- The Utility District is vulnerable to flooding and contamination during a flood event which could cost a significant amount of money to clean up.
- The Utility District does not have a plan put in place on how to operate given a drought event.

9.13.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

Past Mitigation Initiative Status

The following table indicates progress on the Utility District's mitigation strategy identified in the 2016 HMP. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.13-14. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, N/A Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)? Yes/N/A	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
	Generators at all Pump Stations	RSSUD	In Progress	Yes	Due to hailstorm and some flooding issues	RSSUD

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, Richland Springs SUD identified the following mitigation efforts completed since the last HMP:

- No additional mitigation efforts identified

Proposed Hazard Mitigation Initiatives for the HMP Update

Richland Springs SUD participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide-range of activities and mitigation measures selected.

Table 9.13-15. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA					CRS				
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure										X
Drought	X					X			X	X
Extreme Temperature		X				X			X	X
Flood		X				X		X	X	X
Geologic Hazards		X				X			X	X
Hurricane		X				X			X	X
Severe Storm		X				X			X	X
Tornado		X				X			X	X
Pandemic										
Winter Storm		X				X			X	X
Wildfire		X				X			X	X

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives Richland Springs SUD would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in jurisdictional priorities.

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Table 9.13-16. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-Richland Springs SUD-001	Pump and Pipe reinforcement	**Problem:** The Utility District's infrastructure has become extremely vulnerable to degradation and failure due to increased hazard events. **Solution:** The District will reinforce their pumps and pipes so that they can hold up against extreme hazard events and will allow for continuity of operations during hazard events.	Existing	Drought, Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1,2,4,6	5 Years	Richland Springs, County Emergency Management, Richland Springs SUD	SUD budget HMGP, BRIC, PDM	Richland Springs SUD will be able to continue operation even during extreme hazard events.	High	High	SIP	SP, PP
2023-Richland Springs SUD-002	Backup Power	**Problem:** Extreme hazard events threaten the continuity of operations for Richland Springs SUD in the event of a power outage. **Solution:** Richland Springs SUD will install permanent backup generators and necessary electrical components and run routine test and maintenance so that generators can continue operating in the event of an extreme hazard event.	New	Dam Failure, Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1,2,4,6	5 Years	Richland Springs, County Emergency Management, Richland Springs SUD	HMGP, BRIC, PDM, USDA Community Facilities Grant Program, Emergency Management Performance Grants (EMPG) Program, SUD budget	Richland Springs SUD will be able to continue operation in the event of a power outage due to extreme hazard events.	High	High	SIP	ES
2023-Richland Springs	Flood Infrastructure	**Problem:** The Utility District is vulnerable to flooding and contamination during a flood event which could	New and Existing	Flood, Severe Storms	1,2,6	5 Years	Richland Springs, County Emergency	SUD budget FMA, HMGP, BRIC, PDM	Richland Springs SUD will have infrastructure in place to prevent	High	High	SIP	NR, SP, ES

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
SUD-003		cost a significant amount of money to clean up. **Solution:** Richland Springs SUD will elevate infrastructure and create flood walls and levees that prevents contamination from happening in the event of a flood.					Management, Richland Springs SUD		against problems that may occur with flooding.				
2023-Richland Springs SUD-004	Drought Plan	**Problem:** The Utility District does not have a plan put in place on how to operate given a drought event. **Solution:** Richland Springs SUD will communicate with the County and municipality to create and establish an official plan on how the Utility District should operate in the event of a drought.	New and Existing	Drought	1,2,6	1 Years	Richland Springs, County Emergency Management, Richland Springs SUD	SUD budget FMA, HMGP, BRIC, PDM	Richland Springs SUD will be prepared in the event of a drought hazard.	Low	High	LPR	ES

Notes:
Not all acronyms and abbreviations defined below are included in the table.

Acronyms and Abbreviations:

CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*
FEMA	*Federal Emergency Management Agency*
FPA	*Floodplain Administrator*
HMA	*Hazard Mitigation Assistance*
N/A	*Not applicable*

Potential FEMA HMA Funding Sources:

FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC	*Building Resilient Infrastructure and Communities Program*
PDM	*Pre-Disaster Mitigation Program*

Timeline:

The time required for completion of the project upon implementation.

Cost:

The estimated cost for implementation.

Benefits:

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NFIP	*National Flood Insurance Program*	*A description of the estimated benefits, either quantitative and/or qualitative.*
OEM	*Office of Emergency Management*	

Critical Facility:

Yes *Critical Facility located in 1% floodplain*

Mitigation Category:

- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*
- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*
- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.*

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The prioritization criteria provided in Volume 1, Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

Table 9.13-17. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-Richland Springs SUD-001	Pump and Pipe Reinforcement	1	1	1	1	1	1	1	0	1	1	1	0	1	0	11	High
2023-Richland Springs SUD-002	Backup Power	1	1	1	1	1	1	1	0	1	1	1	0	1	1	12	High
2023-Richland Springs SUD-003	Flood Infrastructure	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-Richland Springs SUD-004	Drought Plan	1	1	1	1	1	1	1	1	1	1	0	1	1	0	12	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).

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Section 9 Jurisdictional Annexes

9.14 Richland Springs Water

This section presents the jurisdictional annex for Richland Springs Water that provides resources and information to assist public and private sectors to reduce losses from future hazard events. This annex is not guidance of what to do when a disaster occurs. Rather, this annex concentrates on actions to reduce or eliminate damage to property and people that can be implemented prior to a disaster. Information presented includes a general overview of the jurisdiction, who in the Utility District participated in the planning process, an assessment of Richland Springs Water's risk and vulnerability, the different capabilities used in the Utility District, and an action plan that will be implemented to achieve a more resilient community.

9.14.1 Hazard Mitigation Planning Team

Richland Springs Water identified the hazard mitigation plan primary and alternate points of contact and developed this plan over the course of several months with input from many Utility District departments. The Municipal Clerk and Mayor represented the community on the Llano County Hazard Mitigation Plan Planning Partnership and supported the local planning process requirements by securing input from persons with specific knowledge to enhance the plan. All departments were asked to contribute to the annex development through reviewing and contributing to the capability assessment, reporting on the status of previously identified actions, and participating in action identification and prioritization.

The following table summarizes the officials that participated in the development of the annex and in what capacity. Additional documentation on the municipality's planning process through Planning Partnership meetings is included in Volume 1, Section 3 (Planning Process) and Appendix C (Meeting Documentation).

Table 9.14-1. Hazard Mitigation Planning Team

Primary Point of Contact		Alternate Point of Contact	
Name/Title:	Chris Perry – Municipal Court Clerk	Name/Title:	Johnnie Reeves - Mayor
Address:	300 W Main Street, Richland Springs, TX 76871	Address:	300 W Main Street, Richland Springs, TX 76871
Phone Number:	325-452-3210	Phone Number:	325-452-3210
Email:	richlandspringswater@gmail.com	Email:	johnielynnreeves@gmail.com
Additional Contributors:			
Name/Title: Chris Perry – Municipal Court Clerk Method of Participation: Provided information and input on previous events, capabilities, and the mitigation strategy.			
Name/Title: Johnnie Reeves - Mayor Method of Participation: Provided information and input on previous events, capabilities, and the mitigation strategy			

9.14.2 Jurisdiction Profile

The Richland Water Supply Corporation is a utility company that provides public services for Richland Springs residents. The company ranks 39th out of 1,353 utility companies in Texas according to countyoffice.org.

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9.14.3 Jurisdictional Capability Assessment and Integration

Richland Springs Water performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies. Volume 1, Section 5 (Capability Assessment) describes the components included in the capability assessment and their significance for hazard mitigation planning. The jurisdictional assessment includes the following analyses:

- An assessment of legal and regulatory capabilities.
- Development and permitting capabilities.
- An assessment of administrative and technical capabilities.
- An assessment of fiscal capabilities.
- An assessment of education and outreach capabilities.
- Classification under various community mitigation programs.
- The community's adaptive capacity to withstand hazard events.

For a community to succeed in reducing long-term risk, hazard mitigation must be integrated into the day-to-day local government operations. As part of the hazard mitigation analysis, planning/policy documents were reviewed, and each jurisdiction was surveyed to obtain a better understanding of their progress toward plan integration. The updated mitigation strategy provided an opportunity for Richland Springs Water to identify opportunities for integration of mitigation concepts that can be incorporated into jurisdictional procedures.

Planning, Legal, and Regulatory Capability and Integration

The table below summarizes the regulatory tools that are available to Richland Springs Water. The comment field provides information as to how the capability integrates hazard mitigation and risk reduction.

Table 9.14-2. Planning, Legal, and Regulatory Capability and Integration

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	N/A	-	-	-
How does this reduce risk?				
Zoning/Land Use Code	N/A	–	–	–
How does this reduce risk?				
Subdivision Ordinance	N/A	–	–	–
How does this reduce risk?				
Site Plan Ordinance	N/A	–	–	–
How does this reduce risk?				
Stormwater Management Ordinance	N/A	–	–	–
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Post-Disaster Recovery/ Reconstruction Ordinance	N/A	–	–	–
How does this reduce risk?				
Real Estate Disclosure	N/A	–	–	–
How does this reduce risk?				
Growth Management	N/A	–	–	–
How does this reduce risk?				
Environmental Protection Ordinance	N/A	–	–	–
How does this reduce risk?				
Flood Damage Prevention Ordinance	N/A	-	-	-
How does this reduce risk?				
Wellhead Protection	N/A	–	–	–
How does this reduce risk?				
Emergency Management Ordinance	N/A	-	-	-
How does this reduce risk?				
Climate Change Ordinance	N/A	-	-	-
How does this reduce risk?				
Other	N/A	-	-	-
Planning Documents				
Comprehensive/Master Plan	N/A	-	-	-
How does this reduce risk?				
Capital Improvement Plan	N/A	-	-	-
How does this reduce risk?				
Disaster Debris Management Plan	N/A	-	-	-
How does this reduce risk?				
Floodplain Management or Watershed Plan	N/A	-	-	-
How does this reduce risk?				
Stormwater Management Plan	N/A	-	-	-
How does this reduce risk?				
Open Space Plan	N/A	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Urban Water Management Plan	N/A	-	-	-
How does this reduce risk?				
Habitat Conservation Plan	N/A	-	-	-
How does this reduce risk?				
Economic Development Plan	N/A	-	-	-
How does this reduce risk?				
Shoreline Management Plan	N/A	-	-	-
How does this reduce risk?				
Community Wildfire Protection Plan	N/A	-	-	-
How does this reduce risk?				
Community Forest Management Plan	N/A	-	-	-
How does this reduce risk?				
Transportation Plan	N/A	-	-	-
How does this reduce risk?				
Agriculture Plan	N/A	-	-	-
How does this reduce risk?				
Climate Action/ Resiliency/Sustainability Plan	N/A	-	-	-
How does this reduce risk?				
Tourism Plan	N/A	-	-	-
How does this reduce risk?				
Business/ Downtown Development Plan	N/A	-	-	-
How does this reduce risk?				
Other	N/A	-	-	-
Response/Recovery Planning				
Comprehensive Emergency Management Plan	Yes	City of Richland Springs Emergency Management Plan	Local	City of Richland Springs Mayor
How does this reduce risk? Guides emergency response to hazard events in the City of Richland Springs.				
Continuity of Operations Plan	N/A	-	-	-
How does this reduce risk?				

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	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Strategic Recovery Planning Report	N/A	-	-	-
How does this reduce risk?				
Threat & Hazard Identification & Risk Assessment (THIRA)	N/A	-	-	-
How does this reduce risk?				
Post-Disaster Recovery Plan	N/A	-	-	-
How does this reduce risk?				
Public Health Plan	N/A	-	-	-
How does this reduce risk?				
Other	N/A	-	-	-
How does this reduce risk?				

Development and Permitting Capability

The table below summarizes the capabilities of Richland Springs Water to oversee and track development.

Table 9.14-3. Development and Permitting Capability

Indicate if your jurisdiction implements the following	Yes/No	Comment:
Do you issue development permits? • If yes, what department is responsible?	N/A	Not Applicable: Development permitting is done at the municipal level
If you do not issue development permits, what is your process for tracking new development?	N/A	
Are permits tracked by hazard area? (For example, floodplain development permits.)	N/A	
Do you have a buildable land inventory? • If yes, please describe	N/A	
Describe the level of build-out in your jurisdiction.	N/A	

Administrative and Technical Capability

The table below summarizes potential staff and personnel resources available to Richland Springs Water and their current responsibilities that contribute to hazard mitigation.

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Table 9.14-4. Administrative and Technical Capabilities

Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	N/A	-
Zoning Board of Adjustment	N/A	-
Planning Department	N/A	-
Mitigation Planning Committee	N/A	-
Environmental Board/Commission	N/A	-
Open Space Board/Committee	N/A	-
Economic Development Commission/Committee	N/A	-
Public Works/Highway Department	N/A	-
Construction/Building/Code Enforcement Department	N/A	-
Emergency Management/Public Safety Department	N/A	-
Warning Systems / Services (mass notification system, outdoor warning signals, etc.)	N/A	-
Maintenance programs to reduce risk (stormwater maintenance, tree trimming, etc.)	N/A	-
Mutual aid agreements	N/A	-
Human Resources Manual	N/A	-
Other	N/A	-
Technical/Staffing Capability		
Planners or engineers with knowledge of land development and land management practices	N/A	-
Engineers or professionals trained in building or infrastructure construction practices	N/A	-
Planners or engineers with an understanding of natural hazards	N/A	-
Staff with expertise or training in benefit/cost analysis	N/A	-
Professionals trained in conducting damage assessments	N/A	-
Personnel skilled or trained in GIS and/or Hazards United States (HAZUS) – Multi-Hazards (MH) applications	N/A	-
Environmental scientist familiar with natural hazards	N/A	-
Surveyor(s)	N/A	-
Emergency Manager	N/A	-
Grant writer(s)	N/A	-
Resilience Officer	N/A	-
Other (this could include stormwater engineer, environmental specialist, etc.)	N/A	-

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Fiscal Capability

The table below summarizes financial resources available to Richland Springs Water.

Table 9.14-5. Fiscal Capabilities

Financial Resources	Accessible or Eligible to Use? (Yes/No)
Community development Block Grants (CDBG, CDBG-DR)	N/A
Capital improvements project funding	N/A
Authority to levy taxes for specific purposes	Yes
User fees for water, sewer, gas or electric service	Yes
Impact fees for homebuyers or developers of new development/homes	N/A
Stormwater utility fee	N/A
Incur debt through general obligation bonds	Yes
Incur debt through special tax bonds	N/A
Incur debt through private activity bonds	N/A
Withhold public expenditures in hazard-prone areas	N/A
Other federal or state Funding Programs	N/A
Open Space Acquisition funding programs	N/A
Other (for example, Clean Water Act 319 Grants [Nonpoint Source Pollution])	N/A

Education and Outreach Capability

The table below summarizes the education and outreach resources available to Richland Springs Water.

Table 9.14-6. Education and Outreach Capabilities

Outreach Resources	Available? (Yes/No)	Comment
Public information officer or communications office	N/A	-
Personnel skilled or trained in website development	N/A	-
Hazard mitigation information available on your website	N/A	-
Social media for hazard mitigation education and outreach	N/A	-
Citizen boards or commissions that address issues related to hazard mitigation	N/A	-
Warning systems for hazard events	N/A	-
Natural disaster/safety programs in place for schools	N/A	-
Does the jurisdiction have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? • If yes, please describe.	N/A	-

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Community Classifications

The table below summarizes classifications for community programs available to Richland Springs Water.

Table 9.14-7. Community Classifications

Program	Participating? (Yes/No)	Classification (if applicable)	Date Classified (if applicable)
Community Rating System (CRS)	N/A	Not Applicable: This is done at the municipal level	
Building Code Effectiveness Grading Schedule (BCEGS)	N/A		
Public Protection (ISO Fire Protection Classes 1 to 10)	N/A		
Storm Ready Certification	N/A		
Firewise Communities classification	N/A		
Other	N/A		

Note:
N/A Not applicable
NP Not participating
- Unavailable

Adaptive Capacity

Adaptive capacity is defined as "the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or respond to consequences" (IPCC 2014). Each jurisdiction has a unique combination of capabilities to adjust to, protect from, and withstand a future hazard event, future conditions, and changing risk. The table below summarizes the adaptive capacity for each identified hazard of concern and the jurisdiction's capability to address related actions using the following classifications:

- Strong: Capacity exists and is in use.
- Moderate: Capacity might exist; but is not used or could use some improvement.
- Weak: Capacity does not exist or could use substantial improvement.

Table 9.14-8. Adaptive Capacity

Hazard	Adaptive Capacity – Strong/Moderate/Weak
Dam Failure	Moderate
Drought	Strong
Extreme Temperature	Moderate
Flood	Moderate
Geologic Hazards	Weak
Hurricane	Moderate
Severe Storm	Moderate
Tornado	Moderate
Pandemic	Low
Winter Storm	Moderate
Wildfire	Moderate

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9.14.4 National Flood Insurance Program (NFIP) Compliance

This section provides specific information on the management and regulation of the regulatory floodplain, including current and future compliance with the NFIP. The Floodplain Administrator is responsible for maintaining this information and is listed in the Hazard Mitigation Planning Team table at the beginning of this annex.

National Flood Insurance Program (NFIP) Summary

NFIP administration is performed at the municipal level. Refer to Section 9.11 (City of Richland Springs) annex for a summary of NFIP statistics.

Flood Vulnerability Summary

The following table provides a summary of the NFIP program in Richland Springs Water.

Table 9.14-9. NFIP Summary

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. ● Do you maintain a list of properties that have been damaged by flooding?	Not applicable. NFIP administration is completed at the municipal level.
Are any RiskMAP projects currently underway in your jurisdiction? ● If so, state what projects are underway.	
● How do you make Substantial Damage determinations? ● How many were declared for recent flood events in your jurisdiction?	
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? ● If there are mitigated properties, how were the projects funded?	
Do your flood hazard maps adequately address the flood risk within your jurisdiction? ● If not, state why.	
NFIP Compliance	
What local department is responsible for floodplain management?	County
Are any certified floodplain managers on staff in your jurisdiction?	County
Do you have access to resources to determine possible future flooding conditions from climate change?	N/A
Does your floodplain management staff need any assistance or training to support its floodplain management program? ● If so, what type of assistance/training is needed?	N/A
Provide an explanation of NFIP administration services you provide (e.g. permit review, GIS,	N/A

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NFIP Topic	Comments
education/outreach, inspections, engineering capability)	
How do you determine if proposed development on an existing structure would qualify as a substantial improvement?	N/A
What are the barriers to running an effective NFIP program in the community, if any?	N/A
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? ● If so, state the violations.	N/A
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	N/A
● What is the local law number or municipal code of your flood damage prevention ordinance? ● What is the date that your flood damage prevention ordinance was last amended?	N/A
Does your floodplain management program meet or exceed minimum requirements? ● If exceeds, in what ways?	N/A
Are there other local ordinances, plans or programs (e.g. site plan review) that support floodplain management and meeting the NFIP requirements? For instance, does the planning board or zoning board consider efforts to reduce flood risk when reviewing variances such as height restrictions?	N/A
Does your community plan to join the CRS program or is your community interested in improving your CRS classification?	N/A

9.14.5 Growth/Development Trends

Understanding how past, current, and projected development patterns have or are likely to increase or decrease risk in hazard areas is a key component to appreciating a jurisdiction's overall risk to its hazards of concern. The table below summarizes recent and expected future development trends, including major residential/commercial development and major infrastructure development.

Table 9.14-10. Recent and Expected Future Development

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**	**Total**	**Within SFHA**
Not Applicable: Development permitting is done at the municipal level.														

SFHA Special Flood Hazard Area (1% annual chance flood event)

** Only location-specific hazard zones or vulnerabilities identified.*

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9.14.6 Jurisdictional Risk Assessment

The hazard profiles in Volume 1, Section 4 (Risk Assessment) provide detailed information regarding each plan participant's vulnerability to the identified hazards. Section 4.1 (Methodology and Tools) and Section 4.4 (Hazard Ranking) provide detailed summaries for Richland Springs Water's risk assessment results and data used to determine the hazard ranking discussed later in this section.

Hazard Event History

Llano County has a history of natural and non-natural hazard events, as detailed in Volume I, Section 4 (Risk Assessment). A summary of historical events is provided in each of the hazard profiles and includes a chronology of events that have affected the County and its municipalities.

Richland Springs Water's history of federally-declared (as presented by FEMA) and significant hazard events [as presented in NOAA-National Centers for Environmental Information (NCEI)] is consistent with that of the County. The table below provides details regarding jurisdictional-specific loss and damages the Utility District experienced during hazard events since the last hazard mitigation plan update. Information provided in the table below is based on reference material or local sources.

Table 9.14-11. Hazard Event History

Date(s) of Event	Event Type (Disaster Declaration if applicable)	County Included in Declaration?	Summary of Event	Jurisdictional Summary of Damages and Losses
September 10 – November 2, 2018	DR-4416 – Severe Storms and Flood	Yes	Severe storms and flooding had a severe impact on roads and bridges	Although the County was included in this event, the jurisdiction did not experience additional damages.
January 20, 2020 - ongoing	EM-3458 – Covid-19 DR-4485 – Covid-19 Pandemic	Yes	Covid-19	District followed protocols enforced by the state and County.
February 11-21, 2021	EM-3554 – Severe Winter Storm DR-4586 – Severe Winter Storms	Yes	Severe winter storm resulted in significant ice coverage of roads, utility lines, and buildings	Although the County was included in this event, the jurisdiction did not experience additional damages.

Notes:
EM Emergency Declaration (FEMA)
FEMA Federal Emergency Management Agency
DR Major Disaster Declaration (FEMA)
N/A Not applicable

Hazard Ranking and Vulnerabilities

The hazard profiles in Volume 1, Section 4 (Risk Assessment) have detailed information regarding each plan participant's vulnerability to the identified hazards. The following summarizes Richland Springs Water's risk assessment results and data used to determine the hazard ranking.

Hazard Ranking

This section provides the community specific identification of the primary hazard concerns based on identified problems, impacts and the results of the risk assessment as presented in Volume 1, Section 4 (Risk Assessment).

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The ranking process involves an assessment of the likelihood of occurrence for each hazard; the potential impacts of the hazard on people, property, and the economy; and community capabilities to address the hazard and changing future climate conditions. Mitigation action development uses the inputs from the evaluation to target those hazards with highest level of concern.

As discussed in Volume 1, Section 4.4 (Hazard Ranking), each participating jurisdiction has differing degrees of risk exposure and vulnerability compared with the County as a whole. Therefore, each jurisdiction ranked the degree of risk to each hazard as it pertains to their community. The table below summarizes the hazard risk/vulnerability rankings of potential natural hazards for Richland Springs Water. Richland Springs Water reviewed the County hazard risk/vulnerability risk ranking table and individual results to reflect the relative risk of the hazards of concern to the community.

During the review of the hazard/vulnerability risk ranking, the Utility District indicated the following:

- The District modified the risk ranking for the following hazards:
  - Pandemic – Medium to low ranking
  - Winter Storm – Low to medium ranking
- The District agreed with the remaining hazard rankings

Table 9.14-12. Hazard Ranking Input

Dam Failure	Drought	Extreme Temperature	Flood	Geologic Hazards	Hurricane
Low	Medium	Medium	Medium	Low	Medium

Severe Storm	Tornado	Pandemic	Winter Storm	Wildfire
High	High	Low	Medium	High

Critical Facilities

The table below identifies critical facilities in the community located in the 1-percent and 0.2-percent floodplain and presents Hazus-MH estimates of the damage and loss of use to critical facilities as a result of a 1-percent annual chance flood event.

Table 9.14-13. Potential Flood Losses to Critical Facilities

Name	Type	Exposure	
		1% Event	0.2% Event
No critical facilities located in the floodplain.			

Source: Llano County GIS 2022, Hazus v5.1, Texas A&M 2022

Identified Issues

After review of Richland Springs Water's hazard event history, hazard rankings, jurisdiction specific vulnerabilities, hazard area extent and location, and current capabilities, Richland Springs Water identified the following vulnerabilities within their community:

- Richland Springs Water Company does not have an emergency warning system to warn people of a severe weather event that could impact the company and company infrastructure. *

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- The Water Company cannot continue operations in the event of a power outage relating to hazards. *
- The Water Company does not have a website to keep the public informed and provide information/contact information on how to hook up to the water company. *
- Culverts are undersized and lead to streets flooding which limits emergency vehicle access. *
- Drainage ditches are undersized and overflow into paved and dirt streets, making transportation difficult during heavy precipitation events. *
- The Water Company does not currently have supplies set aside in the event of a pandemic outbreak, nor does it have rules and regulations documented for their employees to follow.

**This issue was identified as a specific area of concern based on resident response to the 2022 Hazard Mitigation Citizen survey.*

9.14.7 Mitigation Strategy and Prioritization

This section discusses past mitigations actions and status, describes proposed hazard mitigation initiatives, and prioritizes actions to address over the next five years.

Past Mitigation Initiative Status

The following table indicates progress on the community's mitigation strategy identified in the 2016 HMPs. Actions that are in progress are carried forward and combined with new actions as part of this plan update and are included in the tables with prioritization. Previous actions that are now on-going programs and capabilities are indicated as such and previously presented in the 'Capability Assessment' earlier in this annex.

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Table 9.14-14. Status of Previous Mitigation Actions

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, N/A Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)? Yes/N/A	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
Richland Springs Water did not participate in the previous HMP; therefore, there are no previously identified mitigation actions.						

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Additional Mitigation Efforts

In addition to the mitigation initiatives completed in the table above, Richland Springs Water identified the following mitigation efforts completed since the last HMP:

- No additional mitigation efforts identified

Proposed Hazard Mitigation Initiatives for the HMP Update

Richland Springs Water participated in a mitigation action workshop in December 2022 and was provided the following FEMA publications to use as a resource as part of their comprehensive review of all possible activities and mitigation measures to address their hazards: FEMA 551 'Selecting Appropriate Mitigation Measures for Floodprone Structures' (March 2007) and FEMA 'Mitigation Ideas – A Resource for Reducing Risk to Natural Hazards' (January 2013).

The table below indicates the range of proposed mitigation action categories. Both the four FEMA mitigation action categories and the six CRS mitigation action categories are listed in the table to further demonstrate the wide-range of activities and mitigation measures selected.

Table 9.14-15. Analysis of Mitigation Actions by Hazard and Category

Hazard	FEMA					CRS				
	LPR	SIP	NSP	EAP	PR	PP	PI	NR	SP	ES
Dam Failure		X		X		X	X			X
Drought		X		X		X	X			X
Extreme Temperature		X		X		X	X			X
Flood		X		X		X	X		X	X
Geologic Hazards		X		X		X	X			X
Hurricane		X		X		X	X			X
Severe Storm		X		X		X	X		X	X
Tornado		X		X		X	X			X
Pandemic	X			X	X		X			X
Winter Storm		X		X		X	X		X	X
Wildfire		X		X		X	X			X

Note: Mitigation categories are described below the Mitigation Initiatives.

The table below summarizes the specific mitigation initiatives Richland Springs Water would like to pursue in the future to reduce the effects of hazards. The initiatives are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in jurisdictional priorities.

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Table 9.14-16. Proposed Hazard Mitigation Initiatives

Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
2023-Richland Springs Water-001	Severe Storm Warning System	**Problem**: Richland Springs Water Company does not have an emergency warning system to warn people of a severe weather event that could impact the company and company infrastructure. **Solution**: The Water Company will install an emergency warning system to better protect their people and assets.	New	Hurricane, Tornado, Severe Storm, Severe Winter Storm	1,2	5 Years	Richland Water Company, City of Richland Springs, Emergency Management	HMGP, BRIC, PDM, Emergency Management Performance Grants (EMPG) Program, City Budget	The Richland Water Company will better protect their people and assets.	Medium	High	EAP	ES, PI
2023-Richland Springs Water-002	Backup Power	**Problem**: The Water Company cannot continue operations in the event of a power outage relating to hazards. **Solution**: Richland Springs Water Company will install permanent backup generators and necessary electrical components so that the Water Company may continue to serve the population, even when power has been knocked out and will ensure proper testing and maintenance is done.	New	Dam Failure, Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Winter Storm, Wildfire	1,2,4	2 Years	Richland Water Company, City of Richland Springs, Emergency Management	HMGP, BRIC, PDM, USDA Community Facilities Grant Program, Emergency Management Performance Grants (EMPG) Program, City Budget	The Richland Water Company will be able to serve their residents even in the event of a power outage.	High	High	SIP	PP, ES
2023-Richland		**Problem:** The Water Company does not have a	New	Dam Failure, Drought,	3	1 Year			The Richland Water Company	Low	High	EAP	PI

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
Springs Water-003	Public Outreach Website	website to keep the public informed and provide information/contact information on how to hook up to the water company. **Solution:** The Water Company will create a website to inform the public of all hazard-related issues as well as how to hook up to their water company.		Extreme Temperature, Flood, Geologic Hazards, Hurricane, Severe Storm, Tornado, Pandemic, Winter Storm, Wildfire			Richland Water Company	City/Water Company Budget	will keep the public informed and provide needed information on their website.				
2023-Richland Springs Water-004	Upgrade Culvert System	**Problem**: Culverts are undersized and lead to streets flooding which limits emergency vehicle access. **Solution**: The Company will survey the culverts to determine which are undersized, then they will increase the size of existing undersized culverts and add additional culverts to limit flooding in the Richland Springs Water District.	New and Existing	Flood, Severe Storm, Severe Winter Storm	1,2	5 Years	Richland Water Company, City of Richland Springs, Emergency Management	City/Water Company Budget, BRIC, PDM, HMGP	The Richland Water Company will experience significantly less flooding.	High	High	SIP	SP, PP
2023-Richland Springs Water-005	Drainage Ditches	**Problem**: Drainage ditches are undersized and overflow into paved and dirt streets, making transportation difficult	New and Existing	Flood, Severe Storm, Severe Winter Storm	1,2	5 Years	Richland Water Company, City of Richland	City/Water Company Budget, BRIC, PDM, HMGP	The Richland Water Company will experience significantly less	High	High	SIP	PP

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Project Number	Mitigation Initiative Name	Description of Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met	Estimated Timeline	Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Costs	Priority	Mitigation Category	CRS Category
		during heavy precipitation events. **Solution**: The Company will survey the drainage ditches to determine which are undersized, then they will upsize drainage ditches to eliminate flooding on roads in the Water District.					Springs, Emergency Management		flooding on their roads.				
2023-Richland Springs Water-006	Pandemic Regulations	**Problem:** The Water Company does not currently have supplies set aside in the event of a pandemic outbreak, nor does it have rules and regulations documented for their employees to follow. **Solution:** The Water Company will work with the City of Richland Springs to ensure that masks, proper cleaning supplies, and documentation of rules and regulations are available so that the Company can carry out its work tasks during a pandemic event.	Existing	Pandemic	1,2,3	1 Year	Richland Water Company, City of Richland Springs, Emergency Management	City/Water Company Budget, BRIC, PDM, HMGP	The Water Company will be well prepared for a pandemic event and will have proper supplies needed to continue operations.	Low	High	LPR	PR, ES

Notes:
Not all acronyms and abbreviations defined below are included in the table.

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Acronyms and Abbreviations:

CAV	*Community Assistance Visit*
CRS	*Community Rating System*
DPW	*Department of Public Works*
EHP	*Environmental Planning and Historic Preservation*
FEMA	*Federal Emergency Management Agency*
FPA	*Floodplain Administrator*
HMA	*Hazard Mitigation Assistance*
N/A	*Not applicable*
NFIP	*National Flood Insurance Program*
OEM	*Office of Emergency Management*

Potential FEMA HMA Funding Sources:

FMA	*Flood Mitigation Assistance Grant Program*
HMGP	*Hazard Mitigation Grant Program*
BRIC	*Building Resilient Infrastructure and Communities Program*
PDM	*Pre-Disaster Mitigation Program*

Timeline:

The time required for completion of the project upon implementation.

Cost:

The estimated cost for implementation.

Benefits:

A description of the estimated benefits, either quantitative and/or qualitative.

Critical Facility:

Yes *Critical Facility located in 1% floodplain*

Mitigation Category:

- *Local Plans and Regulations (LPR)—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.*
- *Structure and Infrastructure Project (SIP)—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures, as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.*
- *Natural Systems Protection (NSP)—These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.*
- *Education and Awareness Programs (EAP)—These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.*

CRS Category:

- *Preventative Measures (PR)—Government, administrative or regulatory actions, or processes that influence the way land and buildings are developed and built. Examples include planning and zoning, floodplain local laws, capital improvement programs, open space preservation, and storm water management regulations.*
- *Property Protection (PP)—These actions include public activities to reduce hazard losses or actions that involve (1) modification of existing buildings or structures to protect them from a hazard or (2) removal of the structures from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.*
- *Public Information (PI)—Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosure, hazard information centers, and educational programs for school-age children and adults.*
- *Natural Resource Protection (NR)—Actions that minimize hazard loss and also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.*
- *Structural Flood Control Projects (SP)—Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, setback levees, floodwalls, retaining walls, and safe rooms.*
- *Emergency Services (ES)—Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and the protection of essential facilities.*

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The prioritization criteria provided in Volume 1, Section 6 (Mitigation Strategy) identify 14 evaluation/prioritization criteria to complete the prioritization of mitigation initiatives. For each new mitigation action, a numeric rank is assigned (-1, 0, or 1) for each of the 14 evaluation criteria to assist with prioritizing actions as 'High', 'Medium', or 'Low.' The table below provides a summary of the prioritization of all proposed mitigation initiatives for the HMP update.

Table 9.14-17. Summary of Prioritization of Actions

Project Number	Project Name	Life Safety	Property Protection	Cost-Effectiveness	Technical	Political	Legal	Fiscal	Environmental	Social	Administrative	Multi-Hazard	Timeline	Agency Champion	Other Community Objectives	Total	High / Medium / Low
2023-Richland Springs Water-001	Severe Storm Warning System	1	1	1	1	1	1	1	0	1	1	1	1	1	1	13	High
2023-Richland Springs Water-002	Backup Power	1	1	1	1	1	1	1	0	1	1	1	1	1	1	13	High
2023-Richland Springs Water-003	Public Outreach Website	1	1	1	1	1	1	1	0	1	1	1	1	1	0	12	High
2023-Richland Springs Water-004	Upgrade Culvert System	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	High
2023-Richland Springs Water-005	Drainage Ditches	1	1	1	1	1	1	1	0	1	1	1	1	1	1	13	High
2023-Richland Springs Water-006	Pandemic Regulations	1	0	1	1	1	1	1	0	1	1	0	1	1	1	11	High

Note: Volume 1, Section 6 (Mitigation Strategy) conveys guidance on prioritizing mitigation actions. Low (0-4), Medium (5-8), High (9-14).

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Llano and San Saba County Hazard Mitigation Action Plan 2023 Update





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Appendices

Draft - March 2023

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Appendix A Adoption Resolutions

Llano and San Saba Counties' adoption resolutions will be included in this appendix upon receipt of the Federal Emergency Management Agency (FEMA) Approval Pending Adoption (APA) status. This appendix also includes an example resolution to be submitted by Llano and San Saba Counties authorizing adoption of the Llano and San Saba Hazard Mitigation Plan Update.

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RESOLUTION NO. XXXX-XX
A RESOLUTION OF THE Governing Body OF THE Jurisdiction Name
AUTHORIZING THE ADOPTION OF THE
2023 LLANO AND SAN SABA HAZARD MITIGATION ACTION PLAN UPDATE

WHEREAS, Llano and San Saba have exposure to natural hazards that increase the risk to life, property, environment, and the County and local economy; and

WHEREAS; pro-active mitigation of known hazards before a disaster event can reduce or eliminate long-term risk to life and property; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390) established new requirements for pre and post disaster hazard mitigation programs; and

WHEREAS; a coalition between Llano County and San Saba County with like planning objectives has been formed to pool resources and create consistent mitigation strategies within the Planning Area; and

WHEREAS, the coalition has completed a planning process that engages the public, assesses the risk and vulnerability to the impacts of natural hazards, develops a mitigation strategy consistent with a set of uniform goals and objectives, and creates a plan for implementing, evaluating and revising this strategy;

NOW, THEREFORE, BE IT RESOLVED that the [**jurisdiction name**]:

1) Adopts in its entirety, the 2023 Llano and San Saba Hazard Mitigation Plan (the "Plan") as the jurisdiction's Hazard Mitigation Plan and resolves to execute the actions identified in the Plan that pertain to this jurisdiction.
2) Will use the adopted and approved portions of the Plan to guide pre- and post-disaster mitigation of the hazards identified.
3) Will coordinate the strategies identified in the Plan with other planning programs and mechanisms under its jurisdictional authority.
4) Will continue its support of the Planning Team as described within the Plan.
5) Will help to promote and support the mitigation successes of all participants in this Plan.
6) Will incorporate mitigation planning as an integral component of government and partner operations.
7) Will provide an update of the Plan in conjunction with the County no less than every five years.

PASSED AND ADOPTED on this Xst, Xnd, Xrd, Xth day of MONTH, YEAR, by the following vote:

AYES:

NOES:

ABSENT:

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ABSTAIN:

_____

Mayor, City/Village of _____

ATTEST: _____

Clerk, City/Village of _____

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Appendix B Participation Matrix

The matrix in Appendix B is intended to give a broad overview of FEMA, the State of Texas, county, municipal and stakeholder personnel that participated in the Llano and San Saba County HMP update planning process. Meeting attendees and input provided are also included. All participants were encouraged to attend the kick-off meeting and mitigation workshop. During the planning process the consultant contacted each participant to offer support, explain the process, and facilitate the submittal and review of critical documents.

Participation is defined as having input to the hazard analysis (providing critical facility, hazard event, vulnerability data), and as having participated in the mitigation workshop or alternate annex meetings as described in the HMP for the purpose of creating a mitigation strategy to be included in each jurisdictional annex in Section 9. A list of participating jurisdictions and representatives is found in Table B-1.

A number of stakeholders were invited to participate in the planning process. Stakeholders were invited to meetings, asked to complete a stakeholder survey, requested to provide input on their involvement in Planning Area, and review and comment on the draft plan. However, due to the limitations on participation posed by the pandemic starting in 2020 and the strains on time and resources for many local governments and other community organizations, participation of stakeholders at the municipal level was limited. In accordance with FEMA guiding principles for inclusive participation at various levels, the planning team will place a high priority on an expanded effort on stakeholder participation with local planning committees in future plan updates. A list of stakeholders and their participation is found in Table B-2.

In preparation for the draft plan public review, each jurisdiction was asked to have their 'mitigation team' review their annex to ensure it was complete and accurate for posting to Llano and San Saba HMP website (https://www.llanocountytxhmp.com/).

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Table B- 1: Participation Matrix

Jurisdiction	Name	Title / Position	Attended Pre-Kick Off Meeting (07/27/22)	Attended SC Mtg #1 (08/19/22)	Municipal Kickoff Mtg (08/24/22)	Attended SC Mtg #2 (10/13/22)	Risk Ranking Mtg (11/10/22)	Attended Mitigation Workshop (12/06/22)	Draft Plan Review (1/26/23)	Feedback Provided	Planning Team Member
Llano County	Cheryl Kepp	Grants Administrator	X	X	X	X	X	X	X	X	X
Llano County	Commissioner Linda Raschke	Commissioner								X	X
Llano County	Cristy Vaught	Flood Plain Administrator		X	X	X		X		X	X
Llano County	Linda Raschke	Commissioner			X					X	X
Llano County	Bryson Theodosis	Judge			X					X	X
Llano County	Gilbert Bennett	EMC	X	X	X	X	X			X	X
San Saba County	Byron Theodosis	Judge								X	X
San Saba County	Lois VanBeck	Treasurer					X			X	X
San Saba County	Marsha Hardy	EMC			X			X	X	X	X
City of Horseshoe Bay	Stephanie Black	Fire Marshal			X					X	X
City of Horsehoe Bay	Brent Batla	Fire Chief						X	X	X	X
City of Llano	Donny Carpenter	Building Inspector								X	X
City of Llano	Josh Becker	Interim City Administrator								X	X
City of Llano	Kelli Tudyk	Mayor								X	X
City of Richland Springs	Chad Ashworth	Chief of Police			X					X	X
City of Richland Springs	Clifton James Womack	Superintendent			X					X	X
City of Richland Springs	Frank Pearce	Mayor Pro-Term								X	X
City of Richland Springs	JF Pearce				X					X	X
City of Richland Springs	Johnie Reeves	Mayor						X	X	X	X
City of San Saba	John Bauer	Police Chief								X	X
City of San Saba	Michael Wadsworth	CEO			X		X			X	X
City of San Saba	Scott Edmonson	Manager								X	X
City of San Saba	Scott Glaze	Public Works								X	X
City of Sunrise Beach	Chellie Stewart	Mayor								X	X
City of Sunrise Beach	Dan Gower	Fire Chief			X		X	X	X	X	X
City of Sunrise Beach	Danyelle Morgan	Compliance Officer								X	X
City of Sunrise Beach	Laurie Brock	Police Chief			X			X	X	X	X
Llano ISD	Jamie Payne	Assistant Superintendent								X	X
Richard Springs Water	Chris Perry							X	X	X	X
Richland Springs SUD	Deana Sealy									X	X

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Jurisdiction	Name	Title / Position	Attended Pre-Kick Off Meeting (07/27/22)	Attended SC Mtg #1 (08/19/22)	Municipal Kickoff Mtg (08/24/22)	Attended SC Mtg #2 (10/13/22)	Risk Ranking Mtg (11/10/22)	Attended Mitigation Workshop (12/06/22)	Draft Plan Review (1/26/23)	Feedback Provided	Planning Team Member
Richland Springs SUD	Michelle Bryant									X	X
Llano Co MUD #1 Blue Lake	Angela Thomas	Manager								X	X
Llano Co MUD #1 Blue Lake	Jessica Foran				X			X	X	X	X
Richland Springs ISD	James Womack	Superintendent								X	X
Richland Springs ISD	Rhonda Wyatt	Principal					X			X	X
San Saba ISD	Buck Gilcrease	Superintendent								X	X
San Saba ISD	Machelle Perry									X	X
Cherokee ISD	Jennifer Bordner	Superintendent								X	X
	Jason Sealy				X					X	X

Table B- 2: Stakeholder Participation Matrix

Organization/Title	Stakeholder Type	Notified of Planning Process	Invited to Meetings	Attended Meetings	Invited to Take Survey	Completed Survey	Notified of Posting of Draft Plan
Texas Division of Emergency Management (TDEM)	State	X	X		X	X	X
Texas DOT	State	X	X		X	X	X
Llano County Indigent Health Care	County	X	X		X		X
Llano County Veteran Services	County	X	X		X		X
Llano County Police Department	County	X	X		X	X	X
Llano County Library	County	X	X		X		X
Llano County Development Services	County	X	X		X	X	X
Llano County	County	X	X		X		X
First Methodist Church	County	X	X		X		X
First Baptist Church – Kingsland	County	X	X		X		X
First Baptist Church – Llano	County	X	X		X		X
Highland Lake Crisis Network	County	X	X		X	X	X
Llano News	County	X	X		X		X
The Picayune	County	X	X		X		X
San Saba County Department of Public Works	County	X	X		X		X
San Saba Department of finance	County	X	X		X		X

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Organization/Title	Stakeholder Type	Notified of Planning Process	Invited to Meetings	Attended Meetings	Invited to Take Survey	Completed Survey	Notified of Posting of Draft Plan
Llano County Attorney's Office	County	X	X		X	X	X
Llano County Building & Maintenance	County	X	X		X	X	X
Llano County IT Department	County	X	X		X	X	X
San Saba Police Department	County	X	X		X		X
San Saba Keep San Saba Beautiful Commission	County	X	X		X		X
San Saba Waste/Wastewater Department	County	X	X		X		X
San Saba Streets Department	County	X	X		X		X
San Saba Sanitation and Recycling	County	X	X		X		X
San Saba Airport Advisory	County	X	X		X		X
San Saba Economic Development Commission	County	X	X		X	X	X
Brown County Emergency Management	Surrounding County	X	X		X		X
Burnet County Office of emergency Management	Surrounding County	X	X		X		X
Gillespie County Floodplain and Sanitation	Surrounding County	X	X		X		X
Lampasas County Office of Emergency Management	Surrounding County	X	X		X		X
Mason County Road and Bridge Department	Surrounding County	X	X		X		X
Mills County Office of Emergency Management	Surrounding County	X	X		X		X
Llano Independent School District	Academic	X	X	X	X	X	X
Central Texas College	Academic	X	X		X		X
Richland Springs Independent School District	Academic	X	X	X	X	X	X
San Saba Independent School District	Academic	X	X	X	X		X
Cherokee Independent School District	Academic	X	X	X	X		X
Llano County Office of Emergency Management	Emergency Services	X	X	X	X		X
San Saba County Office of Emergency Management	Emergency Services	X	X	X	X		X
Horseshoe Bay Office of Emergency Management	Emergency Services	X	X		X		X
Lake Buchanan Fire Department	Emergency Services	X	X		X		X
Llano Police Department	Emergency Services	X	X		X		X
Llano Fire Department	Emergency Services	X	X		X	X	X
Llano Fire Department	Emergency Services	X	X		X		X
Horseshoe Bay Police Department	Emergency Services	X	X		X		X
City of San Saba Police Department	Emergency Services	X	X		X		X
Sunrise Beach Village Police Department	Emergency Services	X	X	X	X		X
Sunrise Beach Village Fire Department	Emergency Services	X	X	X	X		X
Tow Fire Department	Emergency Services	X	X		X		X
Llano County ESD #2 – Lake Buchanan	Emergency Services	X	X		X		X
Llano County ESD #4 - Oakridge	Emergency Services	X	X		X	X	X
Llano County ESD #1 – Horseshoe Bay	Emergency Services	X	X		X	X	X
Llano County ESD #5 – Sunrise Beach	Emergency Services	X	X		X		X
Llano County ESD #1 – Llano	Emergency Services	X	X		X		X
Llano County Hospital Authority Board	Health Care	X	X		X	X	X

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Organization/Title	Stakeholder Type	Notified of Planning Process	Invited to Meetings	Attended Meetings	Invited to Take Survey	Completed Survey	Notified of Posting of Draft Plan
MidCoast Medical Center – Central	Health Care	X	X		X	X	X
Hamilton Hospital	Health Care	X	X		X		X
Hill Country Direct Care	Health Care	X	X		X		X
City of Llano Public Works Department	Public Works	X	X		X		X
City of Horseshoe Bay Public Works Department	Public Works	X	X		X		X
City of San Saba Public Works Department	Public Works	X	X		X		X
Horseshoe Bay Utility Department	Utilities	X	X		X	X	X
Horseshoe Bay Water & Wastewater Plant	Utilities	X	X		X		X
Llano Water/Wastewater Department	Utilities	X	X		X		X
San Saba Water Department	Utilities	X	X		X		X
Deerhaven WCID	Utilities	X	X		X		X
Kingsland MUD	Utilities	X	X		X	X	X
Hickory Underground Water Conservation District No. 1	Utilities	X	X		X		X
Blue Lake MUD	Utilities	X	X	X	X		X
MUD	Utilities	X	X		X		X
Marble Falls Area EMS	Health Care	X	X		X	X	X

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Appendix C Meeting Documentation

Appendix C includes meeting agendas, sign-in sheets, and minutes (where applicable and available) for meetings convened during the development of the Llano and San Saba Hazard Mitigation Plan Update.

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Virtual Meeting
Join by Computer: https://bit.ly/3zeJyR1
Or
Dial-in Number (toll): 832-856-3579 | Conference ID: 984 648 808#

1. **Welcome and Introductions**

2. **In-Kind Services Tracking**

3. **Benefits of Hazard Mitigation and Overview**
   - Purpose and expected outcomes of the Hazard Mitigation Plan
   - 2022 enhancements

4. **Project Organization**
   - Key Agencies
   - Municipal Participants
   - Stakeholders

5. **Steering Committee Roles and Responsibilities**

6. **Public and Stakeholder Outreach**
   - Strategy – press releases, social media posts, capture of miscellaneous outreach, HMP website
   - Tracking

7. **Data Collection Status**

8. **Hazards of Concern Identification**

9. **Critical Facilities and Lifelines**

10. **Goals and Objectives**

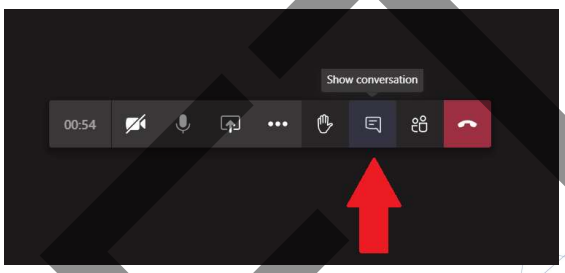
11. **Schedule**
    - Overview and Milestones
    - Meeting Schedule

12. **Questions / Wrap-Up**

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Welcome!

- If you are attending the webinar on your computer, please add your name, title, and organization(s) to the chat box.
  - Bring your mouse to the lower part of the screen until a set of buttons appears. They may also be at the top of your screen.
  - Click "Show Conversation."



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Llano County, Texas
Hazard Mitigation Plan – 2023 Update

Steering Committee Kick-Off Meeting | August 18, 2022

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Agenda

- Welcome and Introductions
- In-Kind Services Tracking
- Benefits of Hazard Mitigation
- Hazard Mitigation Planning Overview
- Project Organization
- Steering Committee Responsibilities
- Public and Stakeholder Outreach
- Update Hazards of Concern and Risk Assessment
- Critical Facilities and Lifelines
- Goals and Objectives
- Schedule
- Questions/Next Steps/Wrap Up



3

Introductions

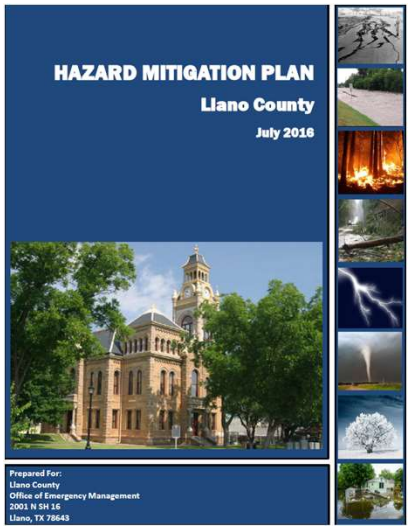
- Tell us…
  - What's your name?
  - Where you are from?
  - What is your mitigation experience?
  - What do you want to focus on during this process or what is your area of expertise?
  - What are your resilience concerns for Llano County?



4

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In-Kind Tracking



Jurisdiction: _____

Name: _____ Title: _____

Date	Start Time	End Time	# hours	Task Description	Hourly Rate $	Total # hours x rate	Comments describe task in more detail

5

Hazard Mitigation – What is it?

Mitigation is a sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event

-or-

Any action taken to reduce future disaster losses

"provides the blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and local ability…" (CFR).



6

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Hazard Mitigation Works!

- According to the January 2019 National Institute of Building Sciences Natural Hazard Mitigation Saves: 2018 Interim Report, federal mitigation grants save $6 for every $1 spent!

National Benefit-Cost Ratio Per Peril *BCR numbers in this study have been rounded	Federally Funded
Overall Hazard Benefit-Cost Ratio	6:1
Riverine Flood	7:1
Hurricane Surge	Too few grants
Wind	5:1
Earthquake	3:1
Wildland-Urban Interface Fire	3:1



7

Why Update?

- The mitigation plan update will:
  - Help the County prepare for and mitigate the effects of disasters
  - Continue to allow the County and participating partners to be eligible for pre- and post-disaster mitigation funding
  - Support CRS participation/rating of municipalities

Hazard	Losses (1950 – May 2021)
Drought	$80 million (property) $160 million (crop)
Excessive Temperature	-
Flood	$78 million(property) $200,000 (crop)
Hail	$81,000 (property) $3,000 (crop)
High Wind	-
Hurricane/Tropical Storm	-
Lightning	-
Thunderstorm	$1.7 million (property)
Tornado/Funnel Cloud	$310,000 (property)
Wildfire	$300,000 (property)
Winter Weather	$1.5 million (property) $50,000 (crop)
TOTAL	**$161.8 million (property) $160.2 million (crop)**

Source: NOAA-NCEI 2022

8

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What's at Risk?

- FEMA Disaster Declarations

3 Fire
3 Flood
3 Hurricane
2 Biological
2 Severe Ice Storm
2 Severe Storm(s)
1 Drought



Year of Declaration Date	Declaration Title	Disaster Number
1991	SEVERE THUNDERSTORMS	930
1993	EXTREME FIRE HAZARD	3113
1997	SEVERE STORMS AND FLOODING	1179
1998	TROPICAL STORM CHARLEY	1239
1999	EXTREME FIRE HAZARDS	3142
2005	HURRICANE KATRINA EVACUATION	3216
	HURRICANE RITA	1606
		3261
2006	EXTREME WILDFIRE THREAT	1624
2007	SEVERE STORMS, TORNADOES, AND FLOODING	1709
2008	WILDFIRES	3284
2019	SEVERE STORMS AND FLOODING	4416
2020	COVID-19	3458
	COVID-19 PANDEMIC	4485
2021	SEVERE WINTER STORM	3554
	SEVERE WINTER STORMS	4586

9

Project Organization

Steering Committee

Planning Partnership

- Steering Committee members
- Llano County
- San Saba County
- Horseshoe Bay (C)
- Llano (C)
- San Saba (C)
- Sunrise Beach (C)
- Llano County MUD #1
- Llano ISD
- San Saba ISD

Core Planning Team
Llano County OEM
Llano County Grant Administrator
Tetra Tech

Stakeholders

Texas Division of Emergency Management (TDEM)

10

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Steering Committee Roles and Responsibilities

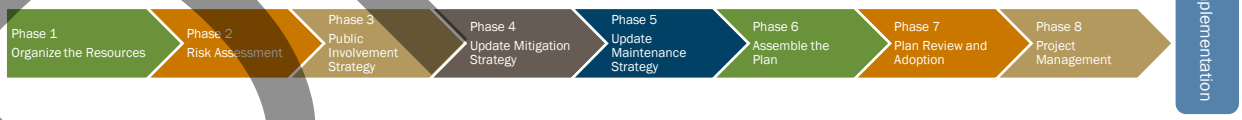
PROVIDE GUIDANCE AND LEADERSHIP THROUGHOUT THE PLANNING PROCESS

OVERSEE THE PLANNING PROCESS

ACT AS THE POINT OF CONTACT FOR ALL PARTNERS AND STAKEHOLDERS

11

Planning Process Overview

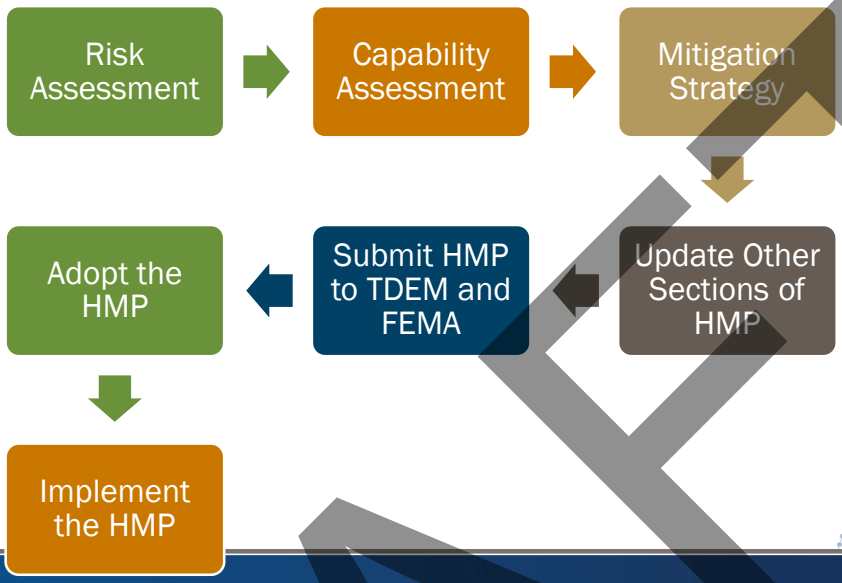


Stakeholder and Public Input

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Project Scope



TETRA TECH 13

13

Update Risk Assessment

- Update assets
- Examine previous impacts
- Analyze risks
- Review with Steering Committee and Planning Partnership
- Risk assessment meeting – open to the public





TETRA TECH 14

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2016 Hazards of Concern

- Dam/Levee Failure
- Drought and Extreme Heat
- Earthquake
- Expansive Soils
- Flood
- Hurricane/Tropical Storm
- Land Subsidence
- Lightning/Hail Wind
- Tornado
- Wildfire
- Winter Weather

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2023 Potential Hazards of Concern

- Dam/Levee Failure
- Drought
- Earthquake?
- Extreme Temperature (heat/cold)
- Expansive Soils
- Flood (Riverine/Flash/Stormwater)
- Hurricane/Tropical Storm
- Land Subsidence
- Pandemic/Health and Safety
- Severe Weather (Lighting/Hail/Wind)
- Tornado
- Wildfire
- Winter Weather

16

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EXERCISE – Identifying Hazards of Concern

- **Looking at the hazards included in the 2016 plan…**
  - Have additional hazards impacted the County since 2016?
  - Have hazard been mitigated and no longer cause damage?
  - Should hazards be regrouped to align with the 2019 State HMP?
  - Should additional hazards be included?
- **How have hazards affected the county? Where are your problem areas?**
- **Quick survey!**
  - We will send around a quick online survey to get your input on the hazards of concern for the 2023 HMP – Stay tuned!

17

Community Lifelines

- Review 2017 critical facility inventory to ensure complete
- Crosswalk and identify lifelines

Lifelines *provide indispensable service that enables the continuous operation of critical business and government functions, and is critical to human health and safety, or economic security*

Critical Facilities *are those facilities considered critical to the health and welfare of the population and that are especially important following a hazard. As defined for this HMP, critical facilities include essential facilities, transportation systems, lifeline utility systems, high-potential loss facilities, and hazardous material facilities.*

Essential facilities *are a subset of critical facilities that include those facilities that are important to ensure a full recovery following the occurrence of a hazard event. For the County risk assessment, this category was defined to include police, fire, EMS, schools/colleges, shelters, senior facilities, and medical facilities.*



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Community Lifelines

- To be reviewed:
  - Critical infrastructure
  - Bus Stops
  - Bus Routes
  - EMS sites
  - Fire departments
  - Police departments
  - Rail lines
  - Roadways
  - Healthcare Facilities
  - Long Term Care Facilities
  - Lakes/streams
  - Trails
  - Open Space
  - Parcels
  - Parks
  - Preserved Farms
  - Schools

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Community Lifelines

- What additional facilities and lifelines should we add? Types to consider:
  - Utility locations – substations, pump stations, treatment plants
  - Critical food establishments – food pantries, grocery stores, senior nutrition
  - COVID-19 locations – testing and vaccination sites
  - Others?

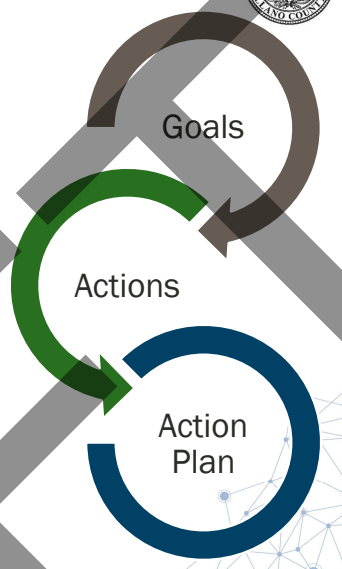


20

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Mitigation Strategy

- Goals
  - What outcomes do you want to achieve?
- Actions
  - What specific actions will be taken to reduce risk from hazards?
- Action Plan
  - How will the actions be prioritized and implemented?



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Goals and Objectives Review and Update

Goal Number	Goal
1	Protect public health and safety for residents, businesses, and visitors.
2	Protect existing and new properties.
3	Increase public understanding, support, and demand for hazard mitigation.
4	Build and support local capacity and commitment to continuously become less vulnerable to hazards
5	Promote growth in a sustainable manner.
6	Maximize the resources for investment in hazard mitigation.

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Public and Stakeholder Outreach

- Social Media Posts
- Press Release
- HMP website – will work with the County to set this up
- Planning Partnership meetings open to the public
- Stakeholder Survey
- Public Survey
- Neighboring County Outreach
  - Notified of planning process
  - Survey



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Next Steps / Upcoming Schedule

- Take online survey to update goals – *to be distributed via email*
- Confirm access to OneDrive – *access to be provided in separate email*
- Planning Partnership Kick-Off (Steering Committee and Municipalities) – August 24th
- Steering Committee Meeting to discuss goals/objectives– late September
- Risk Assessment Meeting – early November (tentatively)
- Mitigation Strategy Workshop – early December (tentatively)

24

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Questions?



25

Llano County Project Contacts

Cheryl Kepp, Grant Administrator
325-247-7756 | ckepp@co.llano.tx.us

Gilbert Bennet, EMC
325-247-2039 | gbennett@co.llano.tx.us

Tetra Tech Project Contacts

Heather Apgar, CFM, Project Manager
(973) 630-8046 | heather.apgar@tetratech.com

Thank You!

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Purpose of Meeting:	Steering Committee Meeting #1
Location of Meeting:	Microsoft Teams
Date/Time of Meeting:	August 18, 2022 – 10:00 am to 11:00 am

Attendees:
☒ Cheryl Kepp, Grant Administrator, County
☒ Gilber Bennett, Emergency Manager, County
☒ Christy Vaught, Development Services Department Administrator, County
☒ Clara Watson, 911 Coordination/GIS, County
☒ Heath Apgar, Project Manager, Tetra Tech
☒ Chris Huch, Project Manager, Tetra Tech
☒ Erika Corsi, Planner, Tetra Tech

Agenda Summary: Introduce Steering Committee to the HMP update process, discuss mitigation planning, project organization, roles and responsibilities, data collection, hazards of concern, and schedule of plan.

Item No.	Description	Action By:
1.	**Welcome and Introductions** • Tetra Tech started the meeting by introducing themselves and asking everyone to document their attendance in the meeting chat and introduce themselves.	N/A
2.	**In-Kind Tracking** • HMP update is not being funded through FEMA • Although project is not being funded through FEMA, keeping track of time spent working on the HMP will benefit workflow and costs • We will provide several tools to use to help you keep track of your time. This includes attending meetings, completing surveys, filling out worksheets, etc.	Steering Committee to keep track of time; Tt will provide tools to do so
3.	**Benefits of Hazard Mitigation and Overview** • Hazard mitigation is part of the emergency management cycle – it's any sustained action(s) taken to reduce or eliminate long-term risk to life and property from hazards. • This is the required 5-year update to the 2017 HMP; participating and adopting the HMP allows you to remain eligible for FEMA pre- and post-disaster mitigation funding such as BRIC and FMA. • 2022 Update enhancements – annex approach and will work with the County and participating municipalities to create/update their chapter of the plan.	N/A
4.	**CRS Integration** • Adopting the County HMP will benefit municipalities looking to participate in the CRS program. • The HMP update will follow both FEMA requirements and the CRS Coordinator's Manual.	N/A
5.	**Project Organization and Overview** • Steering Committee – responsible for providing guidance and leadership throughout the planning process; oversee the planning process and act as points of contact for the municipalities and stakeholders. • Planning Partnership – All participating municipalities + Steering Committee; Participants need to attend meetings to participation 'credits' • Texas Division of Emergency Management – will review the plan and then send to FEMA for final review	Tt to send the list of stakeholders to the Steering Committee for their review and comment

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	• Stakeholders - play an important role in the planning process; help us learn about more specific topics and provide input from their points of view. Stakeholders are not involved in all stages of the planning process,	
6.	Public and Stakeholder Outreach • Public outreach is a key element in the HMP process and one of the requirements of the planning process. • Tetra Tech will be sending social media text and graphics to the Steering Committee to post on their websites and social media accounts. • Other forms of outreach include press releases, HMP website links, stakeholder surveys, public surveys, planning partnership surveys	Tt will provide Steering Committee with surveys
7.	Project Scope • Risk Assessment • Capabilities • Mitigation Strategy • Other Sections of HMP • Submit to TDEM for review/comment • Submit to FEMA for review/comment/approval • Plan adoption • Implement the plan	N/A
8.	Hazards of Concern Identification • The list of hazards from the last plan was presented to the Steering Committee and then the list of suggested hazards for the 2022 update. New or updated hazards of concern are in bold • 2022 proposed hazards: ○ **Flood Riverine/Flash/Stormwater** ○ Drought ○ **Hurricane/Tropical Storm** ○ **Extreme Temperature (Heat and Cold)** ○ Tornado ○ **Dam/Levee Failure** ○ Earthquake ○ **Severe Weather Lightning/Hail/Wind** ○ Land Subsidence ○ **Pandemic/Health Safety**	Tt to develop and send hazard of concern survey to Steering Committee
9.	Critical Facilities and Lifelines • Tetra Tech asked the Steering Committee what types of facilities we should include as critical facilities. • Critical Facilities – essential facilities – transportation networks, hazardous material facilities etc., • Lifelines – critical business and government functions and critical to human health, safety, and economic security – hospitals, grocery stores etc., • Steering Committee specifically mentioned pharmacies as a lifeline	Steering Committee to review critical facility lists after Tt sends out.
10.	Goals and Objectives • The Steering Committee will need to review the goals and objectives from the 2017 HMP and update as needed. Tetra Tech will send out a survey to collect input and finalize the goals and objectives for the 2022 update. • Look at goals and objectives from previous plan – update and edit as needed. • Add in a goal related to the Dams - HHDP	Tt to send goals and objectives survey
8.	Schedule • Take surveys online • Confirm access to OneDrive • Planning partnership kick off – Wednesday 24th • Steering Committee meeting – late September • Risk assessment meeting – early November	N/A

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	• Mitigation strategy workshop – early December	
9.	Questions/Wrap Up	N/A

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Llano and San Saba – 2023 Hazard Mitigation Plan Update
Planning Team Meeting #1 | August 24, 2022|

Virtual Meeting

1. **Welcome and Introductions**

2. **Benefits of Hazard Mitigation and Overview**
   - Purpose and expected outcomes of the Hazard Mitigation Plan
   - 2023 enhancements

3. **Project Organization**
   - Key Agencies
   - Stakeholders

4. **Planning Team Roles and Responsibilities**

5. **Public and Stakeholder Outreach**
   - Strategy – press releases, social media posts, capture of miscellaneous outreach, HMP website
   - Tracking

6. **Data Collection Status**

7. **Hazards of Concern Identification**

8. **Critical Facilities and Lifelines**

9. **Goals and Objectives**

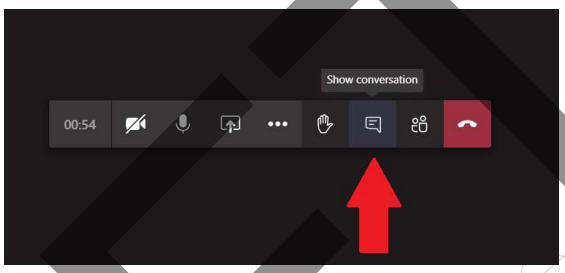
10. **Schedule**
    - Overview and Milestones
    - Meeting Schedule

11. **Questions / Wrap-Up**

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Welcome!

- If you are attending the webinar on your computer, please add your name, title, and organization(s) to the chat box.
  - Bring your mouse to the lower part of the screen until a set of buttons appears. They may also be at the top of your screen.
  - Click "Show Conversation."



TETRA TECH

1

1

TETRA TECH

Llano County, Texas
Hazard Mitigation Plan – 2023 Update

Planning Partnership Kick-Off Meeting | August 24, 2022

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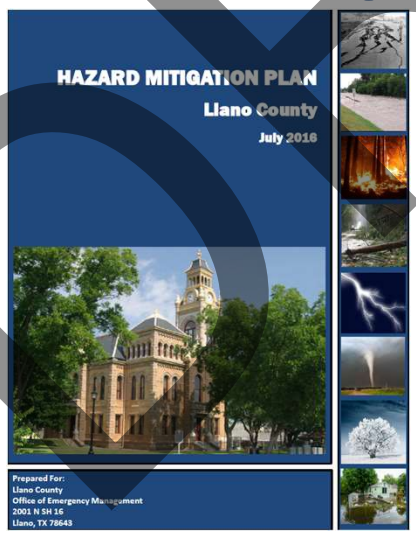
Agenda

- Welcome and Introductions
- In-Kind Services Tracking
- Benefits of Hazard Mitigation
- Hazard Mitigation Planning Overview
- Project Organization
- Planning Partnership Responsibilities
- Public and Stakeholder Outreach
- Completing Worksheets
- Critical Facilities and Lifelines
- Goals and Objectives
- Schedule
- Questions/Next Steps/Wrap Up



3

In-Kind Tracking



Jurisdiction: _____

Name: _____ Title: _____

Date	Start Time	End Time	# hours	Task Description	Hourly Rate	Total *# hours x rate*	Comments *describe task in more detail*
					$		

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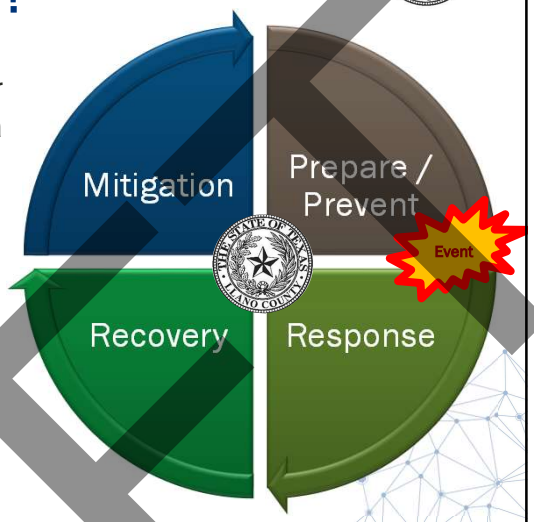
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-or-

Any action taken to reduce future disaster losses

"provides the blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and local ability…" (CFR).



5

Hazard Mitigation Works!

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Overall Hazard Benefit-Cost Ratio	6:1
Riverine Flood	7:1
Hurricane Surge	Too few grants
Wind	5:1
Earthquake	3:1
Wildland-Urban Interface Fire	3:1

More Mitigation Measures, More Savings



One dollar invested in mitigation = six dollars U.S. saves in future costs

6

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Why Update?

- The mitigation plan update will:
  - Help the County prepare for and mitigate the effects of disasters
  - Continue to allow the County and participating partners to be eligible for pre- and post-disaster mitigation funding
  - Support CRS participation/rating of municipalities

Hazard	Losses (1950 – May 2021)
Drought	$80 million (property) $160 million (crop)
Excessive Temperature	-
Flood	$78 million(property) $200,000 (crop)
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Wildfire	$300,000 (property)
Winter Weather	$1.5 million (property) $50,000 (crop)
TOTAL	**$161.8 million (property)** **$160.2 million (crop)**

Source: NOAA-NCEI 2022

TETRA TECH 7

7

What's at Risk?

- FEMA Disaster Declarations

3 Fire
3 Flood
3 Hurricane
2 Biological
2 Severe Ice Storm
2 Severe Storm(s)
1 Drought



Year of Declaration Date	Declaration Title	Disaster Number
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	COVID-19 PANDEMIC	4485
2021	SEVERE WINTER STORM	3554
	SEVERE WINTER STORMS	4586

TETRA TECH 8

8

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Project Organization



9

Planning Partnership Roles and Responsibilities

- As the municipal representative for your community, you need to actively participate throughout the process in order to be included in the plan. This includes:
  - Coordinate and facilitate local efforts
  - Attend meetings
  - Provide information and feedback (e.g., complete municipal worksheets)
  - Involve the public and community stakeholders in the planning process
  - Identify mitigation actions for your community
  - Adopt the plan
  - Implement the plan and monitor its progress
- All participation will be documented in the HMP

10

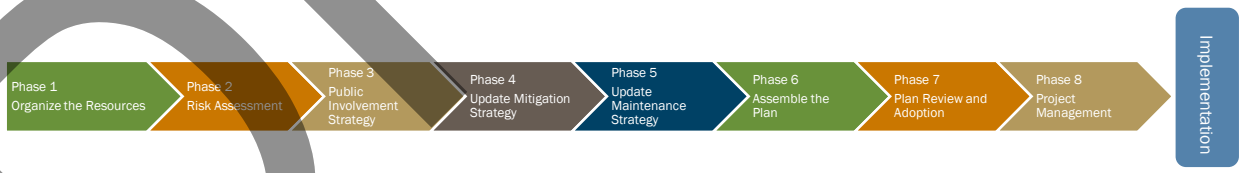
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Participation Tracker

Jurisdiction Name	Requirements Met (Y/N)					
	Planning Process	Hazard Identification and Risk Assessment	Mitigation Strategy	Plan Review, Evaluation, and Implementation	Plan Adoption	State Requirements

11

Planning Process Overview

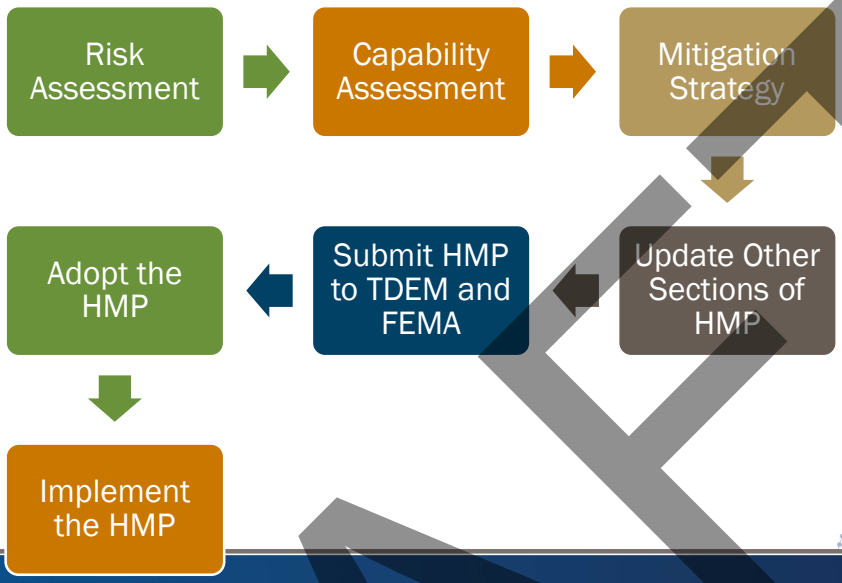


Stakeholder and Public Input

12

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Project Scope



TETRA TECH 13

13

Update Risk Assessment

- Update assets
- Examine previous impacts
- Analyze risks
- Review with Steering Committee and Planning Partnership
- Risk assessment meeting – open to the public





TETRA TECH 14

14

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2016 Hazards of Concern

- Dam/Levee Failure
- Drought and Extreme Heat
- Earthquake
- Expansive Soils
- Flood
- Hurricane/Tropical Storm
- Land Subsidence
- Lightning/Hail Wind
- Tornado
- Wildfire
- Winter Weather

15

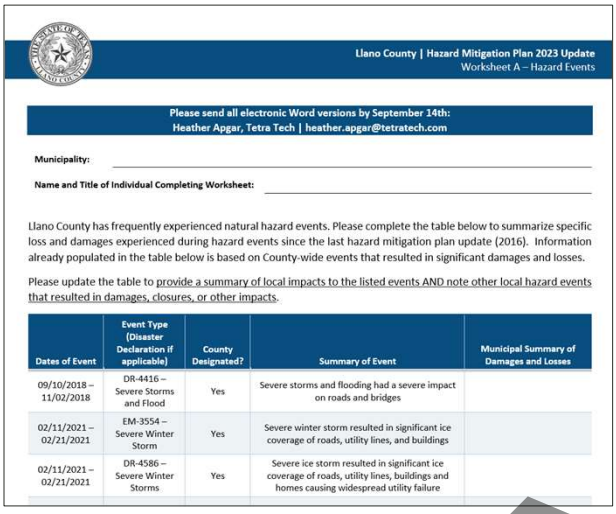
2023 Potential Hazards of Concern

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- Flood (Riverine/Flash/Stormwater)
- Hurricane/Tropical Storm
- Land Subsidence
- Pandemic/Health and Safety
- Severe Weather (Lighting/Hail/Wind)
- Tornado
- Wildfire
- Winter Weather

16

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Worksheet A – Hazard Event History



Llano County | Hazard Mitigation Plan 2023 Update
Worksheet A – Hazard Events

Please send all electronic Word versions by September 14th:
Heather Apgar, Tetra Tech | heather.apgar@tetratech.com

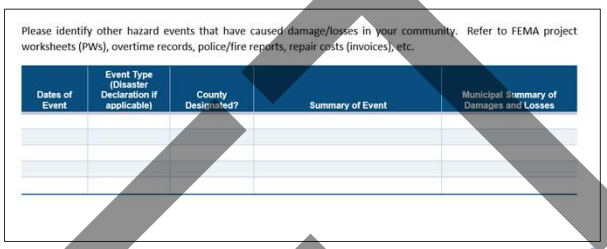
Municipality: _____

Name and Title of Individual Completing Worksheet: _____

Llano County has frequently experienced natural hazard events. Please complete the table below to summarize specific loss and damages experienced during hazard events since the last hazard mitigation plan update (2016). Information already populated in the table below is based on County-wide events that resulted in significant damages and losses.

Please update the table to provide a summary of local impacts to the listed events AND note other local hazard events that resulted in damages, closures, or other impacts.

Dates of Event	Event Type (Disaster Declaration if applicable)	County Designated?	Summary of Event	Municipal Summary of Damages and Losses
09/10/2018 – 11/02/2018	DR-4416 – Severe Storms and Flood	Yes	Severe storms and flooding had a severe impact on roads and bridges	
02/11/2021 – 02/21/2021	EM-3554 – Severe Winter Storm	Yes	Severe winter storm resulted in significant ice coverage of roads, utility lines, and buildings	
02/11/2021 – 02/21/2021	DR-4586 – Severe Winter Storms	Yes	Severe ice storm resulted in significant ice coverage of roads, utility lines, buildings and homes causing widespread utility failure	



Please identify other hazard events that have caused damage/losses in your community. Refer to FEMA project worksheets (PWs), overtime records, police/fire reports, repair costs (invoices), etc.

Dates of Event	Event Type (Disaster Declaration if applicable)	County Designated?	Summary of Event	Municipal Summary of Damages and Losses

TETRA TECH 17

17

Community Lifelines

- Review 2016 critical facility inventory to ensure complete – link will be sent out to review and update
- Crosswalk and identify lifelines

Lifelines *provide indispensable service that enables the continuous operation of critical business and government functions, and is critical to human health and safety, or economic security*

Critical Facilities *are those facilities considered critical to the health and welfare of the population and that are especially important following a hazard. As defined for this HMP, critical facilities include essential facilities, transportation systems, lifeline utility systems, high-potential loss facilities, and hazardous material facilities.*

Essential facilities *are a subset of critical facilities that include those facilities that are important to ensure a full recovery following the occurrence of a hazard event. For the County risk assessment, this category was defined to include police, fire, EMS, schools/colleges, shelters, senior facilities, and medical facilities.*



TETRA TECH 18

18

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Critical Facilities and Community Lifelines

- Essential Services
  - Public safety (police, fire, EOCs)
  - Emergency medical (EMS, hospitals)
  - Emergency shelters
  - Communications
  - Public utility facilities
  - Air transportation
- Hazardous Materials
  - Chemical plants
  - Labs
  - Refineries
  - Hazardous waste storage
  - Gas and propane
- At-Risk Population
  - Nursing homes
  - Assisted living
  - Public/private schools
- Facilities vital to restoring normal services
  - Essential government operations
  - Essential structures for public colleges and universities

19

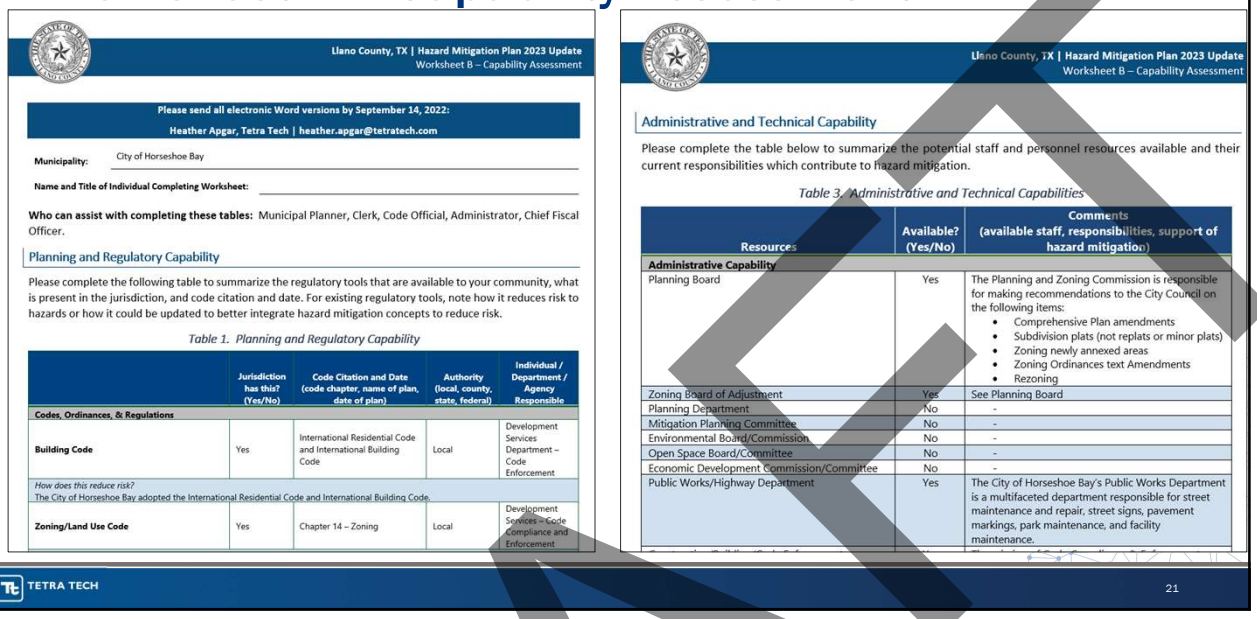
Update the Capability Assessment

- Capabilities
  - Planning and Regulatory Capability
  - Administrative and Technical Capability
  - Financial Capability
  - Education and Outreach

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Worksheet B – Capability Assessment



Llano County, TX | Hazard Mitigation Plan 2023 Update
Worksheet B – Capability Assessment

Please send all electronic Word versions by September 14, 2022:
Heather Apgar, Tetra Tech | heather.apgar@tetratech.com

Municipality: City of Horseshoe Bay

Name and Title of Individual Completing Worksheet:

Who can assist with completing these tables: Municipal Planner, Clerk, Code Official, Administrator, Chief Fiscal Officer.

Planning and Regulatory Capability

Please complete the following table to summarize the regulatory tools that are available to your community, what is present in the jurisdiction, and code citation and date. For existing regulatory tools, note how it reduces risk to hazards or how it could be updated to better integrate hazard mitigation concepts to reduce risk.

Table 1. Planning and Regulatory Capability

	Jurisdiction has this? (Yes/No)	Code Citation and Date (code chapter, name of plan, date of plan)	Authority (local, county, state, federal)	Individual / Department / Agency Responsible
Codes, Ordinances, & Regulations				
Building Code	Yes	International Residential Code and International Building Code	Local	Development Services Department – Code Enforcement
How does this reduce risk? The City of Horseshoe Bay adopted the International Residential Code and International Building Code.				
Zoning/Land Use Code	Yes	Chapter 14 – Zoning	Local	Development Services – Code Compliance and Enforcement

Llano County, TX | Hazard Mitigation Plan 2023 Update
Worksheet B – Capability Assessment

Administrative and Technical Capability

Please complete the table below to summarize the potential staff and personnel resources available and their current responsibilities which contribute to hazard mitigation.

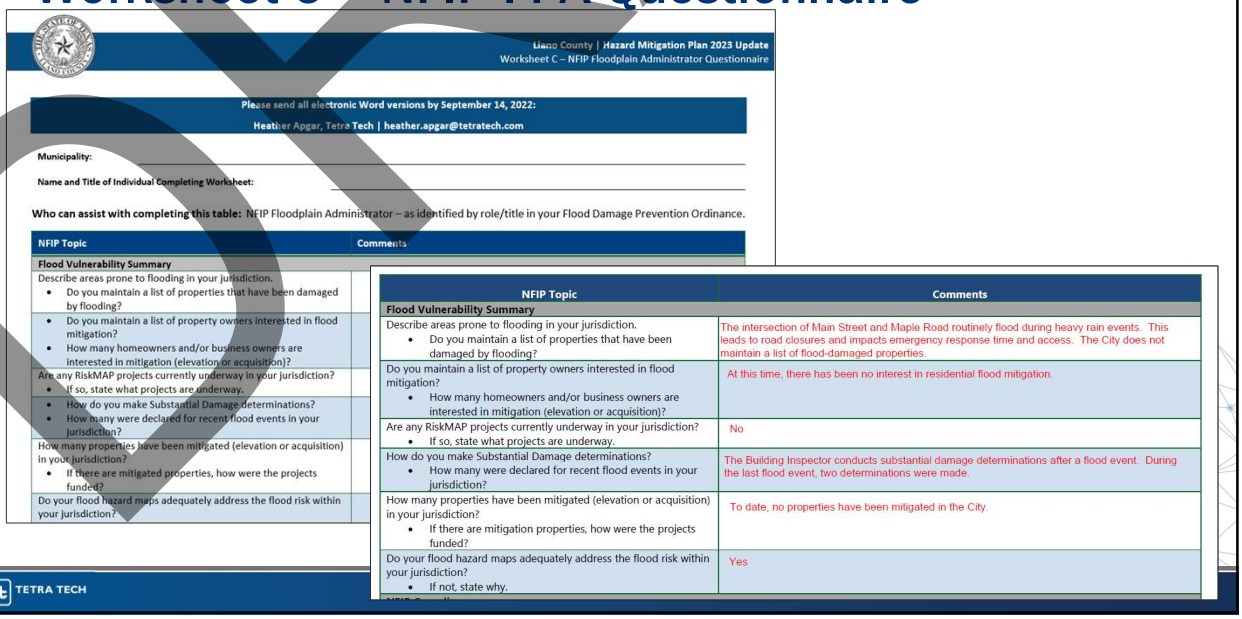
Table 3. Administrative and Technical Capabilities

Resources	Available? (Yes/No)	Comments (available staff, responsibilities, support of hazard mitigation)
Administrative Capability		
Planning Board	Yes	The Planning and Zoning Commission is responsible for making recommendations to the City Council on the following items: • Comprehensive Plan amendments • Subdivision plats (not replats or minor plats) • Zoning newly annexed areas • Zoning Ordinances text Amendments • Rezoning
Zoning Board of Adjustment	Yes	See Planning Board
Planning Department	No	-
Mitigation Planning Committee	No	-
Environmental Board/Commission	No	-
Open Space Board/Committee	No	-
Economic Development Commission/Committee	No	-
Public Works/Highway Department	Yes	The City of Horseshoe Bay's Public Works Department is a multifaceted department responsible for street maintenance and repair, street signs, pavement markings, park maintenance, and facility maintenance.

TETRA TECH 21

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Worksheet C – NFIP FPA Questionnaire



Llano County | Hazard Mitigation Plan 2023 Update
Worksheet C – NFIP Floodplain Administrator Questionnaire

Please send all electronic Word versions by September 14, 2022:
Heather Apgar, Tetra Tech | heather.apgar@tetratech.com

Municipality:

Name and Title of Individual Completing Worksheet:

Who can assist with completing this table: NFIP Floodplain Administrator – as identified by role/title in your Flood Damage Prevention Ordinance.

NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	
• Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	
• How do you make Substantial Damage determinations? • How many were declared for recent flood events in your jurisdiction?	
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigated properties, how were the projects funded?	
Do your flood hazard maps adequately address the flood risk within your jurisdiction?	

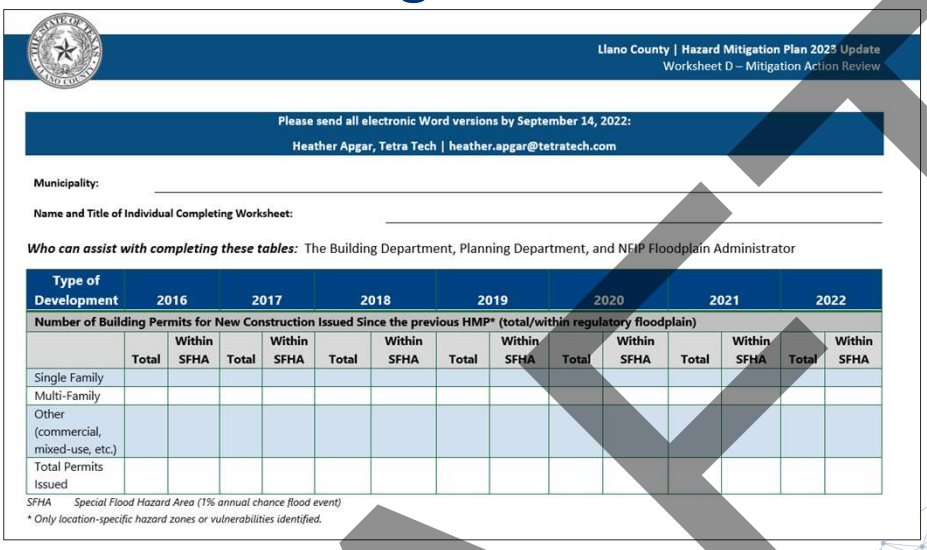
NFIP Topic	Comments
Flood Vulnerability Summary	
Describe areas prone to flooding in your jurisdiction. • Do you maintain a list of properties that have been damaged by flooding?	The intersection of Main Street and Maple Road routinely flood during heavy rain events. This leads to road closures and impacts emergency response time and access. The City does not maintain a list of flood-damaged properties.
Do you maintain a list of property owners interested in flood mitigation? • How many homeowners and/or business owners are interested in mitigation (elevation or acquisition)?	At this time, there has been no interest in residential flood mitigation.
Are any RiskMAP projects currently underway in your jurisdiction? • If so, state what projects are underway.	No
How do you make Substantial Damage determinations? • How many were declared for recent flood events in your jurisdiction?	The Building Inspector conducts substantial damage determinations after a flood event. During the last flood event, two determinations were made.
How many properties have been mitigated (elevation or acquisition) in your jurisdiction? • If there are mitigation properties, how were the projects funded?	To date, no properties have been mitigated in the City.
Do your flood hazard maps adequately address the flood risk within your jurisdiction? • If not, state why.	Yes

TETRA TECH

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Worksheet E – Building Permits



Llano County | Hazard Mitigation Plan 2023 Update
Worksheet D – Mitigation Action Review

Please send all electronic Word versions by September 14, 2022:
Heather Apgar, Tetra Tech | heather.apgar@tetratech.com

Municipality: _____

Name and Title of Individual Completing Worksheet: _____

Who can assist with completing these tables: The Building Department, Planning Department, and NFIP Floodplain Administrator

Type of Development	2016		2017		2018		2019		2020		2021		2022	
Number of Building Permits for New Construction Issued Since the previous HMP* (total/within regulatory floodplain)														
	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA	Total	Within SFHA
Single Family														
Multi-Family														
Other (commercial, mixed-use, etc.)														
Total Permits Issued														

SFHA Special Flood Hazard Area (1% annual chance flood event)
** Only location-specific hazard zones or vulnerabilities identified.*

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Update the Mitigation Strategy

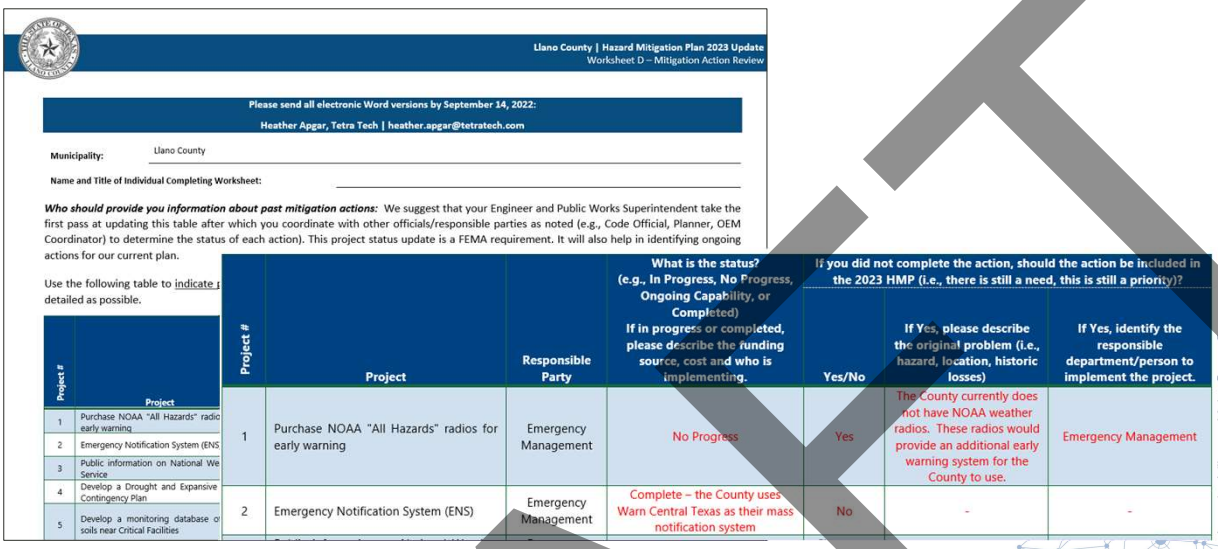
- Review the goals and objectives – we will send out a survey link to provide input
- Determine status of mitigation actions
- Identify new mitigation actions/projects
  - Focus on specific, implementable and achievable actions!
  - Look at your list of critical facilities and lifelines – what do they need to be operational during a disaster?
- Conduct Mitigation Strategy Workshop

Goal #	2023 HMP Goal Statement (Draft)
1	Protect public health and safety for residents, businesses, and visitors.
2	Protect existing and new properties.
3	Increase public understanding, support, and demand for hazard mitigation.
4	Build and support local capacity and commitment to continuously become less vulnerable to hazards
5	Promote growth in a sustainable manner.
6	Maximize the resources for investment in hazard mitigation.

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Worksheet D – Action Review



Llano County | Hazard Mitigation Plan 2023 Update
Worksheet D – Mitigation Action Review

Please send all electronic Word versions by September 14, 2022:
Heather Apgar, Tetra Tech | heather.apgar@tetratech.com

Municipality: Llano County

Name and Title of Individual Completing Worksheet:

Who should provide you information about past mitigation actions: We suggest that your Engineer and Public Works Superintendent take the first pass at updating this table after which you coordinate with other officials/responsible parties as noted (e.g., Code Official, Planner, OEM Coordinator) to determine the status of each action). This project status update is a FEMA requirement. It will also help in identifying ongoing actions for our current plan.

Use the following table to indicate p
detailed as possible.

Project #	Project
1	Purchase NOAA "All Hazards" radio early warning
2	Emergency Notification System (ENS
3	Public information on National We Service
4	Develop a Drought and Expansive Contingency Plan
5	Develop a monitoring database o soils near Critical Facilities

Project #	Project	Responsible Party	What is the status? (e.g., In Progress, No Progress, Ongoing Capability, or Completed) If in progress or completed, please describe the funding source, cost and who is implementing.	If you did not complete the action, should the action be included in the 2023 HMP (i.e., there is still a need, this is still a priority)? Yes/No	If Yes, please describe the original problem (i.e., hazard, location, historic losses)	If Yes, identify the responsible department/person to implement the project.
1	Purchase NOAA "All Hazards" radios for early warning	Emergency Management	No Progress	Yes	The County currently does not have NOAA weather radios. These radios would provide an additional early warning system for the County to use.	Emergency Management
2	Emergency Notification System (ENS)	Emergency Management	Complete – the County uses Warn Central Texas as their mass notification system	No	-	-

TETRA TECH 25

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Update Other Sections of Plan

- County Profile
  - Taking the previous profile from the last plan and updating it accordingly
- Planning Process
  - Documentation of the update process
- Plan Maintenance
  - Incorporation into other plans as well as identifying way to incorporate other plans into the updated HMP
  - Identify a game plan for annually reviewing and updating the HMP

TETRA TECH 26

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Submit HMP for Review

- Review Draft with Planning Team
- 14-day Public Comment Period
- Conduct Public Meeting to Review the Draft
- Submit for Texas Division of Emergency Management (TDEM) Review
  - 30 days
- Submit for Federal Emergency Management Agency (FEMA) Review
  - 45 days
- "Approvable Pending Adoption" Status

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Adopt the HMP

- Llano County and at least one participating municipality need to adopt the HMP
- Once FEMA approves the plan, adoption can begin
- Adoption deadline – TBD

Implement the HMP

- Regular Planning Team meetings
- Stakeholder meetings
- Implement mitigation actions and projects
  - Integrate actions where appropriate

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Public and Stakeholder Outreach

- Social Media Posts
- Press Release
- HMP website – will work with the County to set this up
- Planning Partnership meetings open to the public
- Stakeholder Survey
- Public Survey
- Neighboring County Outreach
  - Notified of planning process
  - Survey



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Next Steps / Upcoming Schedule

- Take online survey to update goals – *to be distributed via email*
- Planning Partnership Kick-Off (Steering Committee and Municipalities) – TODAY!
- Complete Municipal Worksheets
  - Due back to Tetra Tech by **September 14, 2022**
- Steering Committee Meeting to discuss goals/objectives– late September
- Risk Assessment Meeting – early November (tentatively)
- Mitigation Strategy Workshop – early December (tentatively)

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Questions?



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Llano County Project Contacts

Cheryl Kepp, Grant Administrator
325-247-7756 | ckepp@co.llano.tx.us

Gilbert Bennet, EMC
325-247-2039 | gbennett@co.llano.tx.us

Tetra Tech Project Contacts

Heather Apgar, CFM, Project Manager
(973) 630-8046 | heather.apgar@tetratech.com

Thank You!

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Purpose of Meeting:	Planning Partnership Meeting #1
Location of Meeting:	Microsoft Teams
Date/Time of Meeting:	August 24, 2022 – 10:00 am to 11:00 am

Attendees:

☒ Cheryl Kepp, Grant Administrator, County
☒ Gilbert Bennett, Emergency Manager, County
☒ Christy Vaught, Development Services Department Administrator, County
☒ Clara Watson, 911 Coordination/GIS, County
☒ Chad Ashworth, Chief of Police, Richland Springs
☒Clifton James Womack, Superintendent, Richland Springs ISD
☒Michael Wadsworth, CEO, City of San Saba
☒Dan Gower, Sunrise Beach VFD
☒Laurie Brock, Sunrise Beach Police chief
☒Stephanie Black, Fire Marshal/Deputy EMC, City of Horseshoe Bay
☒JF Pearce, City of Richland Springs
☒Linda Raschke, Llano County
☒Marsha Hardy, San Saba County
☒ Jason Sealy
☒Bryson Theodosis, Judge. Llano County
☒ Heath Apgar, Project Manager, Tetra Tech
☒ Chris Huch, Project Manager, Tetra Tech
☒ Erika Corsi, Planner, Tetra Tech

Agenda Summary: Introduce Steering Committee to the HMP update process, discuss mitigation planning, project organization, roles and responsibilities, data collection, hazards of concern, and schedule of plan.

Item No.	Description	Action By:
1.	**Welcome and Introductions** • Tetra Tech started the meeting by introducing themselves and asking everyone to document their attendance in the meeting chat and introduce themselves.	N/A
2.	**In-Kind Tracking** • HMP update is not being funded through FEMA • Although project is not being funded through FEMA, keeping track of time spent working on the HMP will benefit workflow and costs • We will provide several tools to use to help you keep track of your time. This includes attending meetings, completing surveys, filling out worksheets, etc.	Planning Partnership to keep track of time; Tt will provide tools to do so
3.	**Benefits of Hazard Mitigation and Overview** • Hazard mitigation is part of the emergency management cycle – it's any sustained action(s) taken to reduce or eliminate long-term risk to life and property from hazards. • This is the required 5-year update to the 2016 HMP; participating and adopting the HMP allows you to remain eligible for FEMA pre- and post-disaster mitigation funding such as BRIC and FMA. • 2022 Update enhancements – annex approach and will work with the County and participating municipalities to create/update their chapter of the plan. • Llano County has done some property assessments – which will qualify them for the FEMA funding	N/A
4.	**CRS Integration** • Adopting the County HMP will benefit municipalities looking to participate in the CRS program. • The HMP update will follow both FEMA requirements for HMP updates and the CRS Coordinator's Manual guidance for securing points through Floodplain Management Planning.	N/A
5.	**Project Organization and Overview**	N/A

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	• Steering Committee – responsible for providing guidance and leadership throughout the planning process; oversee the planning process and act as points of contact for the municipalities and stakeholders.
	• Planning Partnership – All participating municipalities + Steering Committee
	  o Coordinate and facilitate local efforts, attend meetings, provide information and feedback, involve the public and community stakeholders, identify mitigation actions for your community, adopt the plan, implement the plan and monitor progress
	  o Participants need to attend meetings to meet participation requirements
	• Texas Division of Emergency Management – will review the plan and then send to FEMA for final review
	• Stakeholders - play an important role in the planning process; help us learn about more specific topics and provide input from their points of view. Stakeholders are not involved in all stages of the planning process,	

6.	Public and Stakeholder Outreach • Public outreach is a key element in the HMP process and one of the requirements of the planning process. • Tetra Tech will be sending social media text and graphics to the Steering Committee to post on their websites and social media accounts. • Other forms of outreach include press releases, HMP website links, stakeholder surveys, public surveys, planning partnership surveys	Tt will provide Steering Committee with surveys
7.	Project Scope • Risk Assessment • Capabilities • Mitigation Strategy • Other Sections of HMP • Submit to TDEM for review/comment • Submit to FEMA for review/comment/approval • Plan adoption • Implement the plan	N/A

8.	Hazards of Concern Identification
	• Location, Extent, previous occurrence, future probability – FEMA Requirements.
	• 2016 hazards: Hazards in bold are 2023 HOC updates
	  o Flood Riverine/Flash/Stormwater
	  o Drought/Extreme Heat
	  o Hurricane/Tropical Storm
	  o Extreme Temperature (Heat and Cold)
	  o Tornado
	  o Expansive soils
	  o Dam/Levee Failure
	  o Earthquake – not a huge concern – will most likely be taken out
	  o Severe Weather Lightning/Hail/Wind
	  o Land Subsidence
	  o Pandemic/Health Safety
	  o Wildfire
	  o Winter Weather	

9.	Worksheets- • Worksheet A – Hazard Event History – dollar amounts incredibly helpful for this • Worksheet B – Capability Assessment	Planning Partnership to review worksheets and edit

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	• **Worksheet C – NFIP FPA Questionnaire –** best person to fill this out is Floodplain Admin – if no Floodplain Admin, person with most knowledge about flooding should fill this worksheet out • **Worksheet D – Action Review** – previous actions, need progress description of those actions for plan update. If no progress – please explain why • **Worksheet E – Building Permits –** need to document how much development has/will occur within the county in the next 5 years	appropriately. Return to Tt with updates
10.	Critical Facilities and Lifelines • Tetra Tech asked the Planning Partnership what types of facilities we should include as critical facilities. • Critical Facilities – essential facilities – transportation networks, hazardous material facilities etc., • Lifelines – critical business and government functions and critical to human health, safety, and economic security – hospitals, grocery stores etc., • Steering Committee specifically mentioned pharmacies as a potential lifeline facility type	Planning Partnership to review critical facility lists after Tt sends out survey.

11.	Update capability assessment –
	• HMP must include plans, codes, ordinances – to get an understanding of what they have and how they can integrate hazard mitigation.
	  ○ Planning and regulatory
	  ○ Administrative and technical
	  ○ Financial
	  ○ Education and Outreach	

12.	Update mitigation strategy • Review Goals and Objectives • Determine status of mitigation actions • Identify new mitigation actions/projects – focus on specific, implementable and achievable actions, look at list of critical facilities and lifelines – what do they need to be operational during a disaster? • Will conduct mitigation strategy workshop	
13.	Goals and Objectives • Update mitigation strategy – sending survey around to review goals and objectives • Planning Partnership will need to review the goals and objectives from the 2017 HMP and update as needed. Tetra Tech will send out a survey to collect input and finalize the goals and objectives for the 2022 update. • Look at goals and objectives from previous plan – update and edit as needed. • Add in a goal related to the Dams – aim to meet requirements of the High Hazard Potential Dam grant program (HHPD)	Tt to send goals and objectives survey
14.	Schedule • Take surveys online and return worksheets • Confirm access to OneDrive • Planning Partnership kick off – Today, Wednesday 24th • Steering Committee meeting – late September • Risk assessment meeting – early November • Mitigation strategy workshop – early December	N/A
15.	Questions/Wrap Up • Cheryl Kepp - Will there be one plan that is Llano/San Saba? There will be on combined – this will be two volumes – Volume 1 is all general information and volume 2 is specific annexes/chapters • Cheryl Kepp - Will adopt the entire plan – not just your section in the plan	N/A

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	• Gilbert Bennett – will San Saba have their own website or will it be combined? – will be combined for now • San Saba needs to be recognized as part of the partnership • Will the public meeting be in person? – if possible, the meeting will be in person	

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Virtual Meeting
Join by Computer: https://bit.ly/3zeJyR1
Or
Dial-in Number (toll): 646-751-8477 | Conference ID: 892 006 318#

1. **Welcome and Introductions**

2. **Project Schedule and Status Review**
   - Municipal Participation Status Update
   - Data Collection Status Update
   - Stakeholder and Public Outreach Strategy

3. **Hazards of Concern Review**
   - Decrease or Remove
     i. Earthquake, Expansive Soils, Hurricane/Tropical Storm, Land Subsidence

4. **Confirmation of Goals and Objectives**

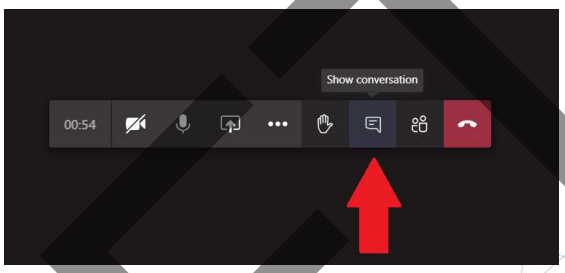
5. **Strengths, Weaknesses, Obstacles, and Opportunities (SWOO) Assessment**
   - Purpose and Examples
   - Discussion

6. **Next Steps**
   - As hazard profiles are complete, we will post them on OneDrive for your review and input
   - Continued public outreach
   - Surveys
   - Risk Assessment meeting – November 10th @ 10am
   - Mitigation Workshop – December 1st, @ 10am

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Welcome!

- If you are attending the webinar on your computer, please add your name, title, and organization(s) to the chat box.
  - Bring your mouse to the lower part of the screen until a set of buttons appears. They may also be at the top of your screen.
  - Click "Show Conversation."



1

TETRA TECH

Llano County, Texas
Hazard Mitigation Plan – 2023 Update

Steering Committee Meeting #2 | October 13, 2022

2

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Agenda

- Participation Status
- Project Schedule and Status
- Review/Finalize Hazards of Concern Review
- Review/Finalize of Goals and Objectives
- Public and Stakeholder Outreach
- Next Steps/Questions



3

Participation Status

- Annex updates are in progress
- Homework Worksheets were sent out to all participating jurisdictions
  - Following jurisdictions have not returned worksheets
    - City of Richland Springs
- Critical Facilities
  - Not everyone provided input – due to the schedule, we will move forward with the input we received to date

Jurisdiction	County	Worksheet A - Hazard Event History	Worksheet B - Cap. Ass.	Worksheet C - NFIP FPA	Worksheet D - Past Action Progress	Worksheet E - Building Permits	Critical Facility Input
Llano County	Llano	X	X	X	X	X	X
San Saba County	San Saba	X	X	X	X	N/A	X
Horsehoe Bay (C)	Llano	X	X	X	X	X	No input
Llano (C)	Llano	X	X	X	X	X	No input
Richland Springs (C)	San Saba						No input
San Saba (C)	San Saba	X	X	X	X	X	No input
Sunrise Beach (C)	San Saba	X	X	X	X	X	X
Cherokee ISD	San Saba	X	X	X	X	N/A	No input
Llano ISD	Llano	X	X	N/A	N/A	N/A	No input
Richland Springs ISD	San Saba	X	X	X	X	X	No input
San Saba ISD	San Saba	X	X	X	X	X	No input
Llano Co MUD #1 Blue Lake	Llano	X	X	X	X	X	X
Richard Springs Water	San Saba	X	X	X	X	X	No input
Richland Springs SUD	San Saba	X	X	X	X	N/A	No input

4

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Schedule

- Overview and Milestones
  - Planning Process - ongoing
  - Steering Committee Meeting #2 – TODAY!
  - Risk Assessment Meeting – **November 10th @ 10am**
    - Does the Steering Committee want a separate meeting to finalize the ranking for the County?
- Update Risk Assessment - ongoing
- Review Hazards of Concern – Today!
- Goals and Objectives – Today!
- Public Involvement – ongoing
  - Inform public of HMP and HMP website via social media and local websites
  - Home - Llano and San Saba County Hazard Mitigation Plan Update (llanocountytxhmp.com)
- Stakeholders – ongoing
  - Need to finalize the list of stakeholders and send out survey
- Mitigation Strategy
  - Mitigation Strategy Workshop – **December 1st @ 10 am**
- Draft Plan to Steering Committee TBD
- Final Draft Plan to TDEM and FEMA TBD

TETRA TECH

5

Project Status

Data Collection – In Progress	Risk Assessment - In Progress	Public Involvement - Ongoing	Mitigation Strategy
• Plan Collection – In progress • General Building Stock – Update in Progress • Critical Facility Inventory – Update In Progress	• Hazard Profile Drafts – In progress • Vulnerability Assessment – In progress • Risk Assessment Meeting – **November 10th**	• HMP website up and running • Public Survey • Stakeholder Surveys • Public Outreach –Tetra Tech to provide materials	• Confirm Goals And Objectives – Today! • Confirm Hazards of Concern – Today! • Municipal Annex Updates - In Progress • Mitigation Workshop – **December 1st** • Develop Mitigation Strategy – Pending • We will need to have a meeting with the SC to identify new actions

Phase 1 Organize the Resources → Phase 2 Risk Assessment → Phase 3 Public Involvement Strategy → Phase 4 Update Mitigation Strategy → Phase 5 Update Maintenance Strategy → Phase 6 Assemble the Plan → Phase 7 Plan Review and Adoption → Phase 8 Project Management

TETRA TECH

6

6

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Update Risk Assessment

- Update assets
- Examine previous impacts
- Analyze risks
- Review with Steering Committee and Planning Partnership
- Risk assessment meeting – open to the public



7

2023 Potential Hazards of Concern

- Dam/Levee Failure
- Drought
- Earthquake
- Extreme Temperature (heat/cold)
- Expansive Soils
- Flood (Riverine/Flash/Stormwater)
- Hurricane/Tropical Storm
- Land Subsidence
- Pandemic/Health and Safety
- Severe Weather (Lighting/Hail/Wind)
- Tornado
- Wildfire
- Winter Weather

8

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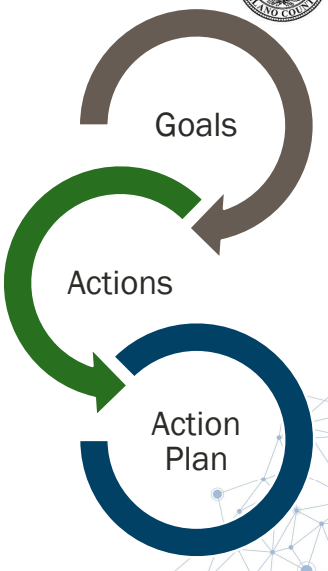
Hazards of Concern

- Drought
  - 42.86% voted increase in frequency/severity/location
- Earthquake
  - 14.29% voted decrease in frequency/severity/location
  - 42.86% voted to remove from the 2023 HMP update
- Extreme Temperature (heat/cold)
  - 42.86% voted increase in frequency/severity/location
  - 71.43% voted to keep in the 2023 HMP update
- Winter Weather
  - 42.86% voted seeing an increase in frequency/severity/location
- Flood (flash, riverine, stormwater/urban)
  - 71.43% voted to keep in the 2023 HMP update
- Disease Outbreak
  - 71.43% voted Yes to add to 2023 HMP update
  - 14.29% voted No

9

Mitigation Strategy

- Goals
  - What outcomes do you want to achieve?
- Actions
  - What specific actions will be taken to reduce risk from hazards?
- Action Plan
  - How will the actions be prioritized and implemented?



10

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Goals and Objectives Review and Update

Goal Number	Goal
1	Protect public health and safety for residents, businesses, and visitors.
2	Protect existing and new properties.
3	Increase public understanding, support, and demand for hazard mitigation.
4	Build and support local capacity and commitment to continuously become less vulnerable to hazards
5	Promote growth in a sustainable manner.
6	Maximize the resources for investment in hazard mitigation.

TETRA TECH

11

Goals and Objectives Review

Goal Number	Goal
1	Keep as is
2	Keep as is
3	Modify Objective 3.3 – Publicize and encourage the adoption of appropriate hazard mitigation measures
4	Keep as is
5	Keep as is
6	Keep as is

TETRA TECH

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Goals and Objectives Review and Update

Goal Number	Goal
1	Protect public health and safety for residents, businesses, and visitors.
2	Protect existing and new properties, critical facilities, community lifelines, and population.
3	Increase public understanding, support, and demand for hazard mitigation.
4	Build and support local capacity and commitment to continuously become less vulnerable to hazards
5	Promote growth in a sustainable manner.
6	Maximize the resources for investment in hazard mitigation.

13

Public and Stakeholder Outreach

- Social Media Posts
- Press Release
- HMP website – https://www.llanocountytxhmp.com/
- Planning Partnership meetings open to the public
- Stakeholder Survey -
- Public Survey
- Neighboring County Outreach
  - Notified of planning process
  - Survey



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Next Steps / Upcoming Schedule

- Review Hazard Profiles – to be sent out after the risk assessment is complete
- Review Risk Assessment Results prior to November 10th
- Risk Assessment Meeting – November 10th
- Develop Mitigation Strategy
- Mitigation Strategy Workshop – December 1st
- Review Draft Plan
- Submit Draft Plan to TDEM/FEMA
- Adopt FEMA – Approved Plan

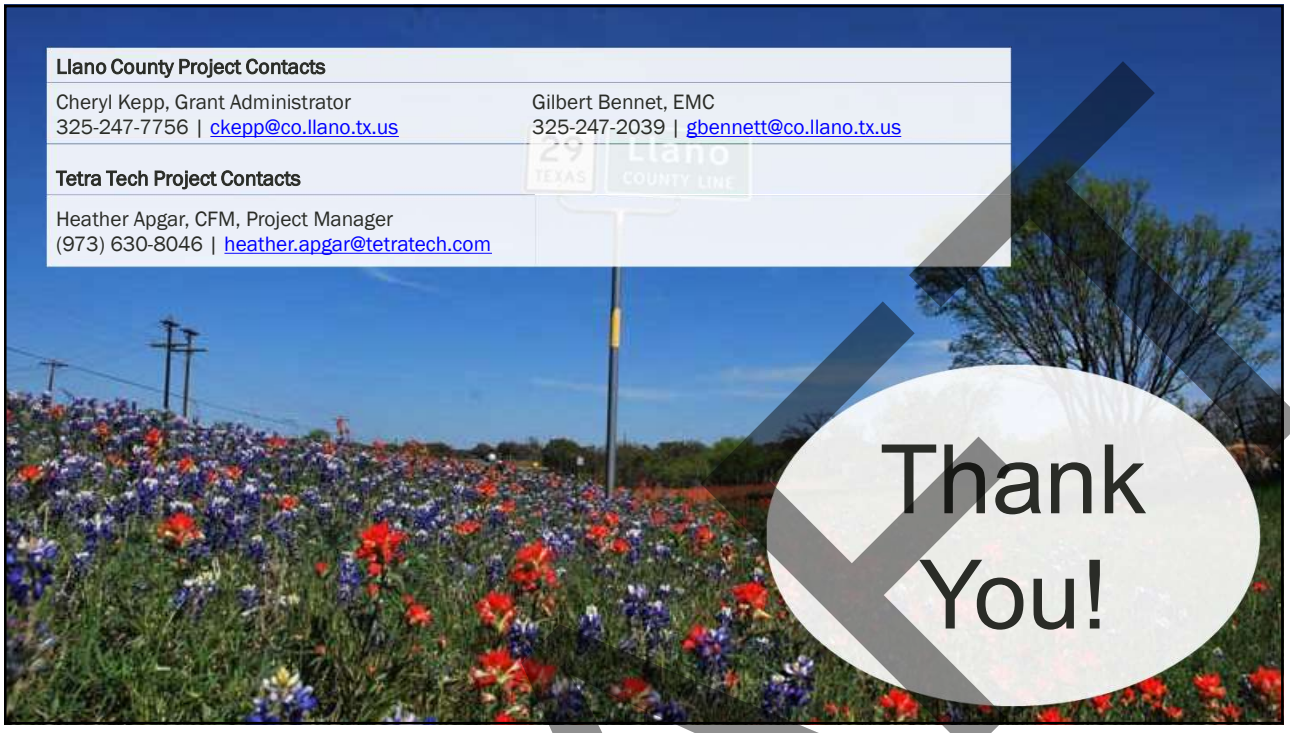
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Questions?



16

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Llano County Project Contacts
Cheryl Kepp, Grant Administrator
325-247-7756 | ckepp@co.llano.tx.us
Gilbert Bennet, EMC
325-247-2039 | gbennett@co.llano.tx.us
Tetra Tech Project Contacts
Heather Apgar, CFM, Project Manager
(973) 630-8046 | heather.apgar@tetratech.com
Thank You!

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Purpose of Meeting:	Steering Committee Meeting #2
Location of Meeting:	Microsoft Teams
Date/Time of Meeting:	October 13, 2022 – 10:00 am to 11:00 am
Attendees:	☒ Cheryl Kepp, Grant Administrator, County ☒ Gilbert Bennett, Emergency Manager, County ☒ Christy Vaught, Development Services Department Administrator, County ☒ Heath Apgar, Project Manager, Tetra Tech ☒ Erika Corsi, Planner, Tetra Tech
Agenda Summary:	Welcome and Introductions, In-Kind Tracking, Project Schedule and Status Review, Hazards of Concern Review, Confirmation of Goals and Objectives, Next Steps

Item No.	Description	Action By:
1.	**Welcome and Introductions** • Tetra Tech started the meeting by introducing themselves and asking everyone to document their attendance in the meeting chat and introduce themselves.	N/A
2.	**Participation Status** • Richland Springs has not submitted HW – Marsha will contact	- County will contact City of Richland Springs to confirm participation
3.	**Project Schedule and Status Review** • Working through planning process • Continue to get the word out about HMP Update • Press Release to be given to Media by County to increase public outreach • Stakeholder list to be provided by Llano County • Mitigation actions should be different for each level i.e., County and municipalities should be different. • FEMA Region 6 and TDEM requirements – need 2 actions per hazard of concern • Steering Committee meeting to identify strategy for the County	- 15 minute call if necessary to finalize ranking. - Tt to send out another round of emails about public participation - Tt provide press release to the County
4.	**Hazards of Concern Review** • Earthquake – review why this HOC was in the previous plan • Geological Hazards – Land Subsidence – potentially move earthquake under this hazard as well • Rabies – big issue in Texas, add into the plan	- Tt check actions for earthquake from previous plan - keep earthquake in and move it under geological hazards - Tt put together a list of potential tik born illnesses
5.	**Confirmation of Goals and Objectives** • Adding in community lifelines, new properties, critical facilities, and population to Goal 2 – vulnerable populations	- Tt to make small changes to goals 2 and 3

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6.	Public and Stakeholder Outreach • HMP website	
7.	Next Steps • Risk assessment meeting is November 10th	N/A
8.	Questions/Wrap Up	N/A

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Llano and San Saba County, Texas Hazard Mitigation Plan – 2023 Update

Risk Assessment Presentation | November 10, 2022

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2

Agenda

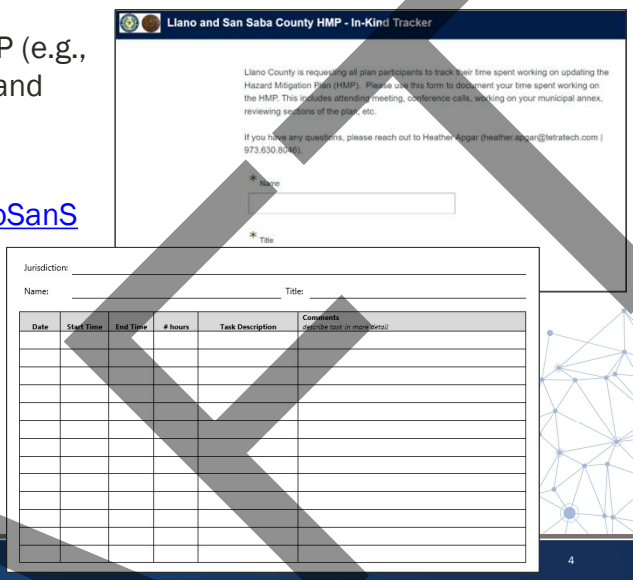
- Welcome
- In-Kind Tracking
- Project Overview and Status – where we are in the process
- Risk Assessment Overview
- Review Calculated Hazard Ranking
- Next Steps



3

In-Kind Tracking Reminder

- Document your time working on the HMP (e.g., attend meetings, complete worksheets and surveys, emails, etc.)
- Use the Word tracker or online tracker - https://www.surveymonkey.com/r/LlanoSanSabaInKind


Llano and San Saba County HMP - In-Kind Tracker

Llano County is requesting all plan participants to track their time spent working on updating the Hazard Mitigation Plan (HMP). Please use this form to document your time spent working on the HMP. This includes attending meeting, conference calls, working on your municipal annex, reviewing sections of the plan, etc.

If you have any questions, please reach out to Heather Apgar (heather.apgar@tetratech.com | 973.630.8048).

* Name

* Title

Jurisdiction:

Name: Title:

Date	Start Time	End Time	# hours	Task Description	Comments describe task in more detail

TETRA TECH 4

4

Annex Progress

- Looking ahead…
  - Confirm hazard ranking by November 18th
  - Identify new mitigation actions for the 2023 update – meeting on December 1st
  - Complete action worksheets
  - Finalize annexes by December 16, 2022
- Green municipalities – annex in good shape; next steps are confirming hazard rankings and identifying mitigation actions

	Status (11/09/22)
Llano County	Annex in progress
San Saba County	Annex in progress
Horseshoe Bay (C)	Annex in progress
Llano (C)	Annex in progress
Richland Springs (C)	Annex in progress
San Saba (C)	Annex in progress
Sunrise Beach (C)	Annex in progress
Cherokee ISD	Annex in progress
Llano ISD	Annex in progress
Richland Springs ISD	Annex in progress
San Saba ISD	Annex in progress
Llano Co MUD #1 Blue Lake	Annex in progress
Richard Springs Water	Annex in progress
Richland Springs SUD	Annex in progress

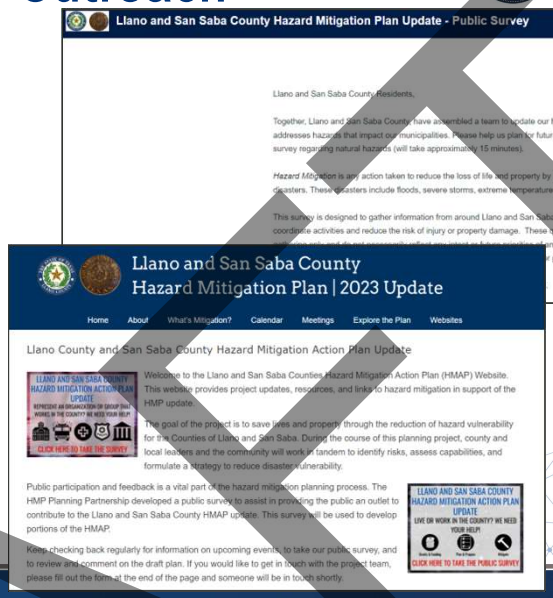
TETRA TECH 5

5

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Public and Stakeholder Outreach

- Surveys are ready to distribute!
- We will send out different tools to use to help with public outreach – please share!
  - Social media – Facebook, Twitter
  - Let Tetra Tech know when you post so we can grab screen shots to include in the plan



6

Risk Assessment Overview



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What is Risk?

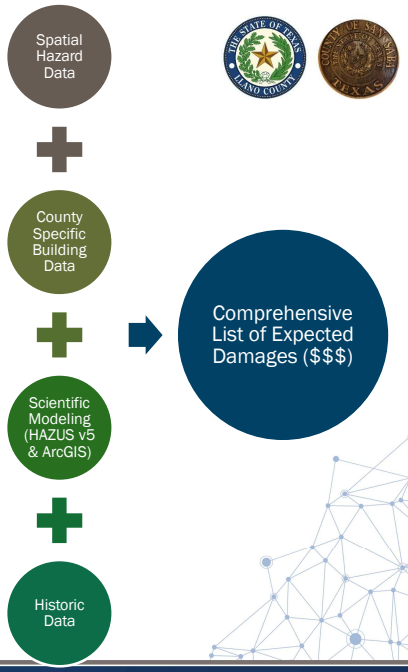
- ✓ Hazard
  - *Something that has the potential to cause damage*
- ✓ Exposure
  - *People, property and infrastructure located in hazard-prone areas*
- ✓ Vulnerability
  - *Characteristics of community assets that make them susceptible to damages from the hazard*
- ✓ Risk
  - *Probability of damages to people, property, and infrastructure*



8

Purpose of the Risk Assessment

- To get a better understanding of the risks you face
- Initial results based on available data
- Quantitative data (population/structures exposed, structural damages within hazard zones) used when available
- Qualitative community input (such as unmapped flood areas) integrated to adjust results
- Local community input to adjust relative rankings



9

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TETRA TECH

Ranking the Hazards of Concern

How are the rankings calculated? What is the preliminary ranking?

10

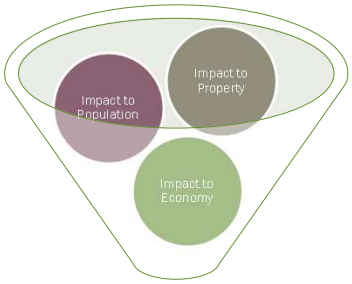
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2023 Hazards of Concern

- Dam/Levee Failure
- Drought
- Earthquake
- Expansive Soils
- Extreme Temperature (Heat and Cold)
- Flood (Riverine/Flash/Stormwater)
- Hurricane/Tropical Storm
- Land Subsidence
- Pandemic/Health and Safety
- Severe Weather (Lightning/Hail/Wind)
- Tornado
- Wildfire
- Winter Weather

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Preliminary Hazard Ranking Formula



Local community input to adjust preliminary rankings

Probability of Occurrence (30%) + Impacts (30%) + Adaptive Capacity (30%) + Climate Change (10%) → Preliminary Hazard Ranking

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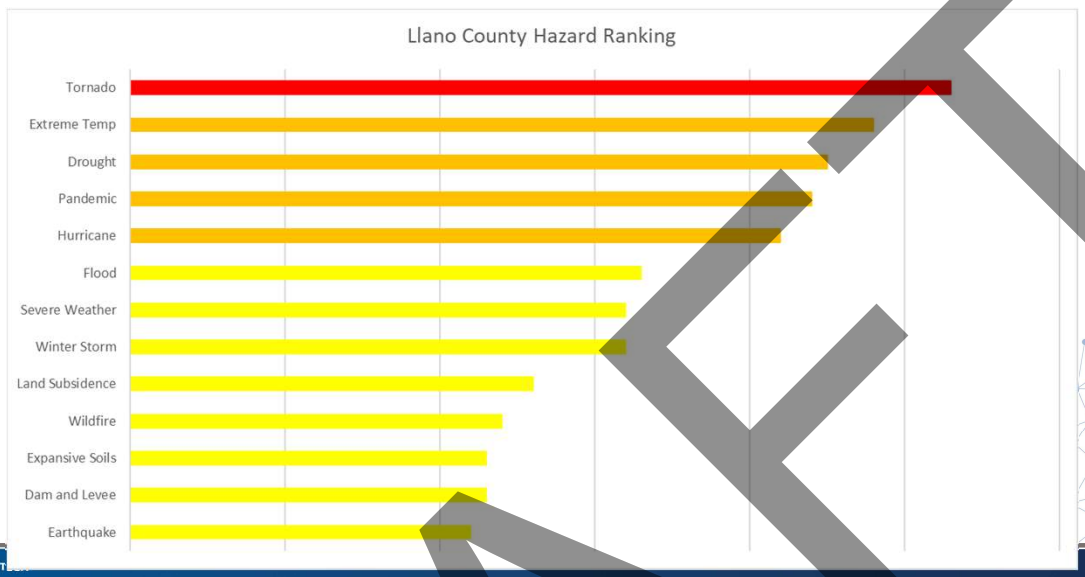
Ranking the Hazards of Concern

What information plays a role in determining the risk rankings?

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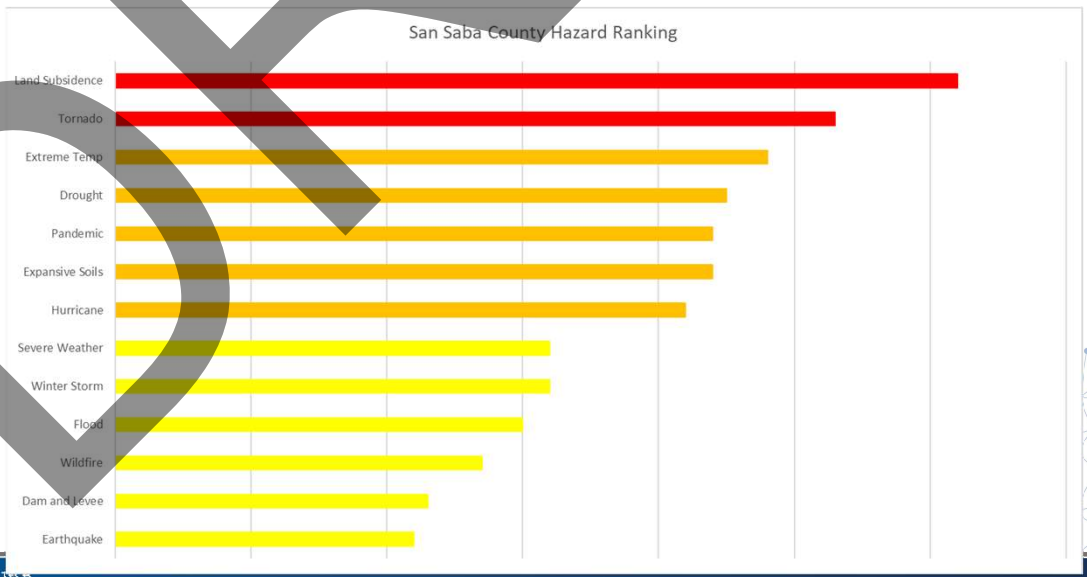
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Preliminary Hazard Ranking – Llano County



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Preliminary Hazard Ranking – San Saba County



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Preliminary Hazard Ranking

Hazard of Concern	Llano	San Saba
Dam and Levee	Low	Low
Drought	Medium	Medium
Earthquake	Low	Low
Extreme Temp	Medium	Medium
Expansive Soils	Low	Medium
Flood	Low	Low
Hurricane	Medium	Medium
Land Subsidence	Low	High
Severe Weather	Medium	Medium
Tornado	High	High
Pandemic	Medium	Medium
Winter Storm	Low	Low
Wildfire	Low	Low

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Municipal Preliminary Rankings

	Horseshoe Bay (C)	Llano (C)	Richland Springs (T)	San Saba (C)	Sunrise Beach (C)
Dam and Levee	Low	Low	Low	Low	Low
Drought	Medium	Medium	Medium	Low	Medium
Earthquake	Low	Low	Low	Low	Low
Extreme Temp	Medium	Medium	Medium	Medium	Medium
Expansive Soils	Low	Low	Low	Low	Low
Flood	Low	Medium	Low	Low	Low
Hurricane	Medium	Medium	Medium	Medium	Medium
Land Subsidence	Low	Low	High	High	Low
Severe Weather	Medium	Medium	Medium	Medium	Medium
Tornado	High	High	High	High	High
Pandemic	Medium	Medium	Medium	Medium	Medium
Winter Storm	Low	Low	Low	Low	Low
Wildfire	Low	Low	High	Low	Low

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Hazard Ranking Input – 2023 HMP

Impact on Population – Function of population exposed

- ✓ Low – 14% or less population exposed
- ✓ Medium – 15%-29% population exposed
- ✓ High – 30%+ population exposed

Impact on property – Function of structures exposed

- ✓ Low – 14% or less structures exposed
- ✓ Medium – 15%-29% structures exposed
- ✓ High – 30%+ structures exposed

Impact on economy – Function of damages to building stock

- ✓ Low – 9% or less loss estimate of total replacement cost
- ✓ Medium – 10%-19% loss estimate of total replacement cost
- ✓ High – 19%+ loss estimate of total replacement cost

Capability – Function of level of planning, policies, enforcement

- ✓ Low – outdated policies; limited to no deployable resources; limited capabilities to respond; long recovery
- ✓ Medium – minimum requirements; mitigation strategies identified but not implemented; moderate county capabilities
- ✓ High – exceed requirements; mitigation/protective measures in place; county/jurisdiction has ability to recover quickly because resources are readily available, and capabilities are high

Climate Change – Function of climate predictions

- ✓ Low - No local data is available; modeling projects are uncertain on whether there is increased future risk; confidence level is low (inconclusive evidence)
- ✓ Medium - Studies and modeling projections indicate a potential for exacerbated conditions due to climate change
- ✓ High - Studies and modeling projections indicate exacerbated conditions/increased future risk due to climate change

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Dam Failure

- Number of Dams
  - Llano County – 10 (none identified as high hazard)
  - San Saba County – 40 (none identified as high hazard)
- No reported failures or incidents in either county
  - Are they any in the last five years we should include?

Llano County Ranking **LOW**

San Saba County Ranking **LOW**

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Drought

Llano County Ranking **MEDIUM**

San Saba County Ranking **MEDIUM**

- Previous Events
  - Between 1996 and 2022, 125 reported drought events in the Planning Area; however, this may not represent all drought events that impacted the area.
  - Property damages totaled $80 million
  - Crop damages totaled $160 million
- Exposure
  - Entire Planning Area is vulnerable
  - Increased vulnerability to populations at higher risk (65+ / <5 years old)
- Potential impacts:
  - Increased wildfire/brush fire risk
  - Impacts to agriculture/farms
  - Drinking water supply (groundwater and surface water)

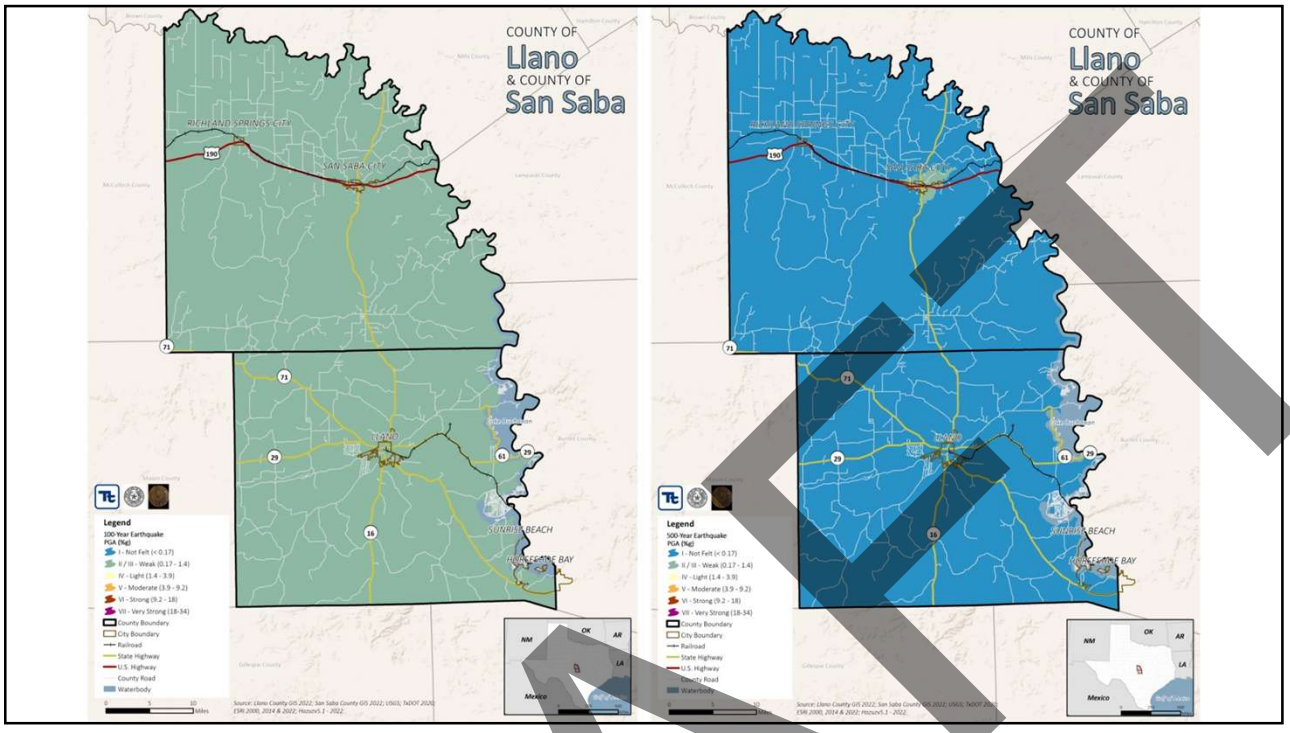
Earthquake

- Number of Events
  - Minimal reports of earthquakes occurring in Planning Area
  - No FEMA declarations for earthquake events.
- Impacts
  - We looked at two earthquake scenarios – 100-yr and 500-yr event
  - People and structures located in areas with soils more susceptible to earthquakes

Llano County Ranking **LOW**

San Saba County Ranking **LOW**

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Expansive Soils

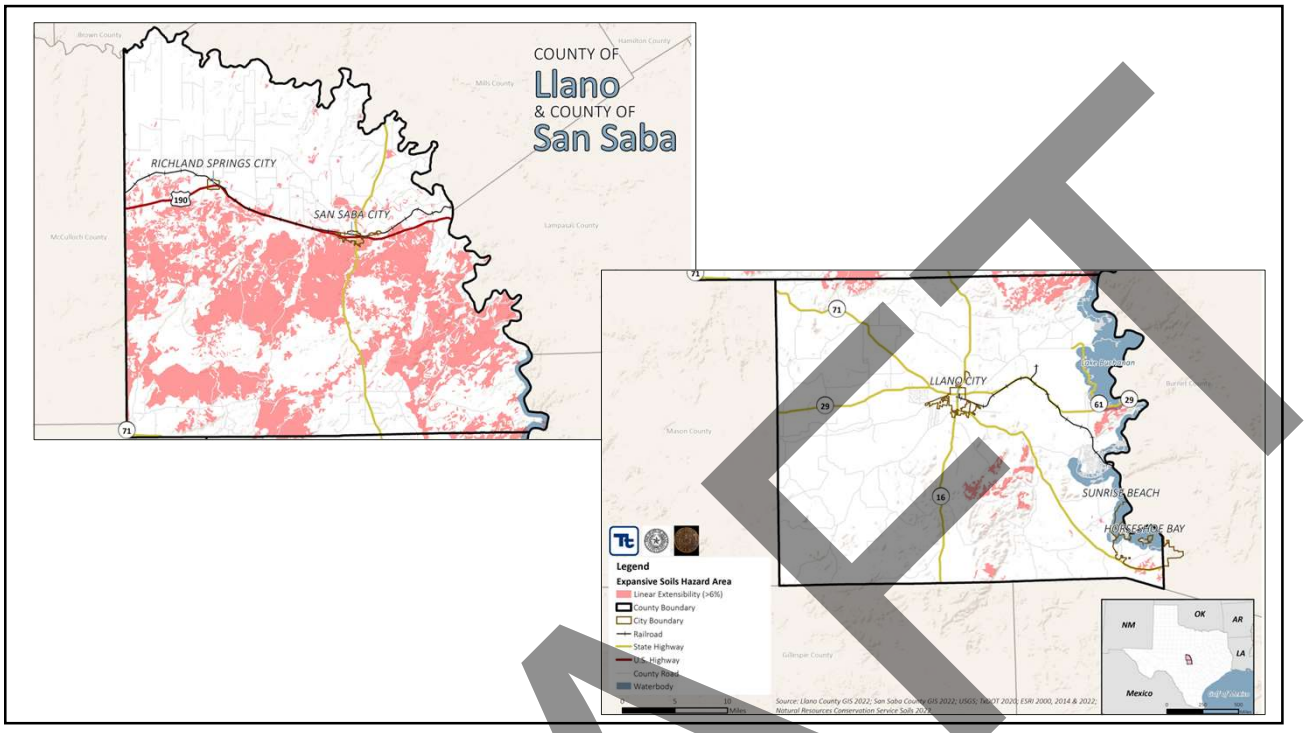
- Little to no information on expansive soil incidents in the Planning Area.
  - Expansive soils cause structures to move unevenly and crack and cause roads and sidewalks to buckle.
- Impacts
  - People and structures located in areas with >6% extensibility (shrink-swell potential of soils) – high is anything over 6%

Llano County Ranking **LOW**

San Saba County Ranking **MEDIUM**

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Extreme Temperature

- Previous Events
  - Looked at both hot and cold events
  - Between 2007 and 2022, the Planning Area had nine events related to heat/cold temperatures.
  - Between 2007 and 2022 –
    - Llano County – over 1,000 days with temperatures >90°F and over 200 days with temperatures <50°F
    - San Saba County – over 1,000 days with temperatures >90°F and over 300 days with <50°F
- Exposure
  - Entire Planning Area is vulnerable
  - Increased vulnerability to populations at higher risk (65+ / <5 years old)
- Potential impacts:
  - Increased wildfire/brush fire risk
  - Impacts to agriculture/farms
  - Long-periods of warm temperatures can lead to drought conditions

Llano County Ranking **MEDIUM**

San Saba County Ranking **MEDIUM**

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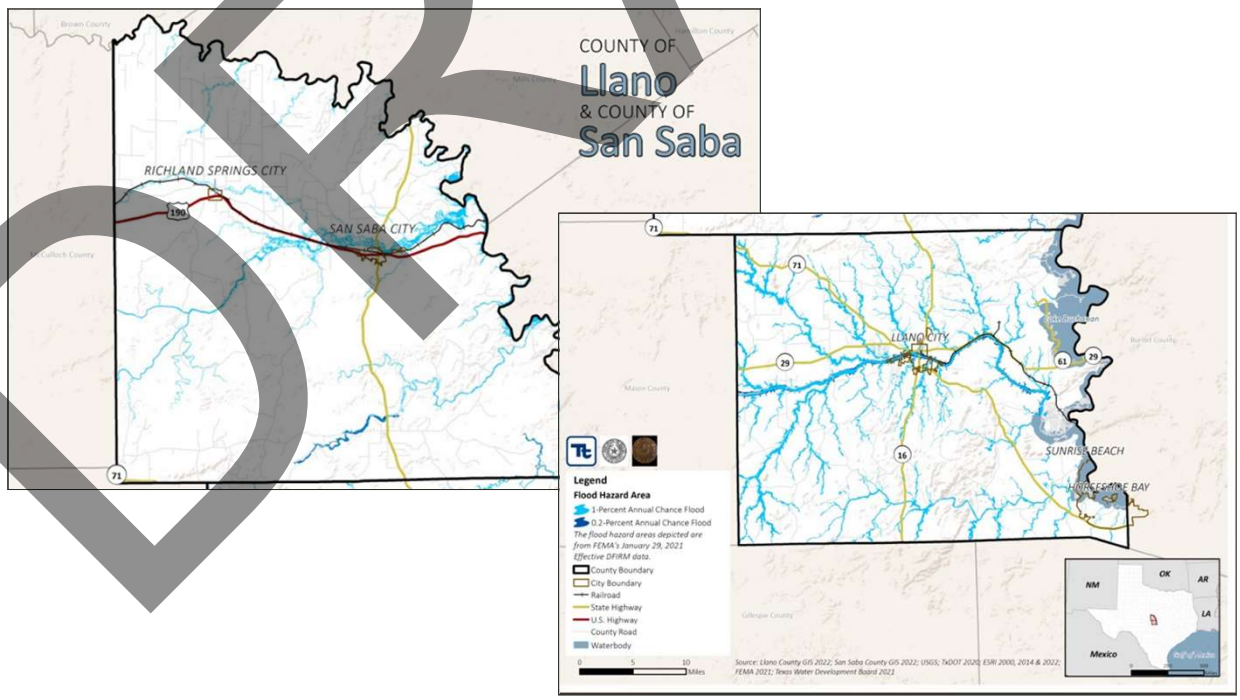
Flood

Llano County Ranking **LOW**

San Saba County Ranking **LOW**

- Previous Events
  - Looked at riverine, flash, and stormwater flooding
  - Between 1996 and 2022, 115 flood events causing over $80 million in property damage and over $700,000 in crop damage
  - FEMA Declarations –
    - Llano County – 3-flood related
    - San Saba County – 4-flood related
- Exposure
  - People and property located in the 1% annual chance flood area

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Hurricane and Tropical Storm

Llano County Ranking
MEDIUM

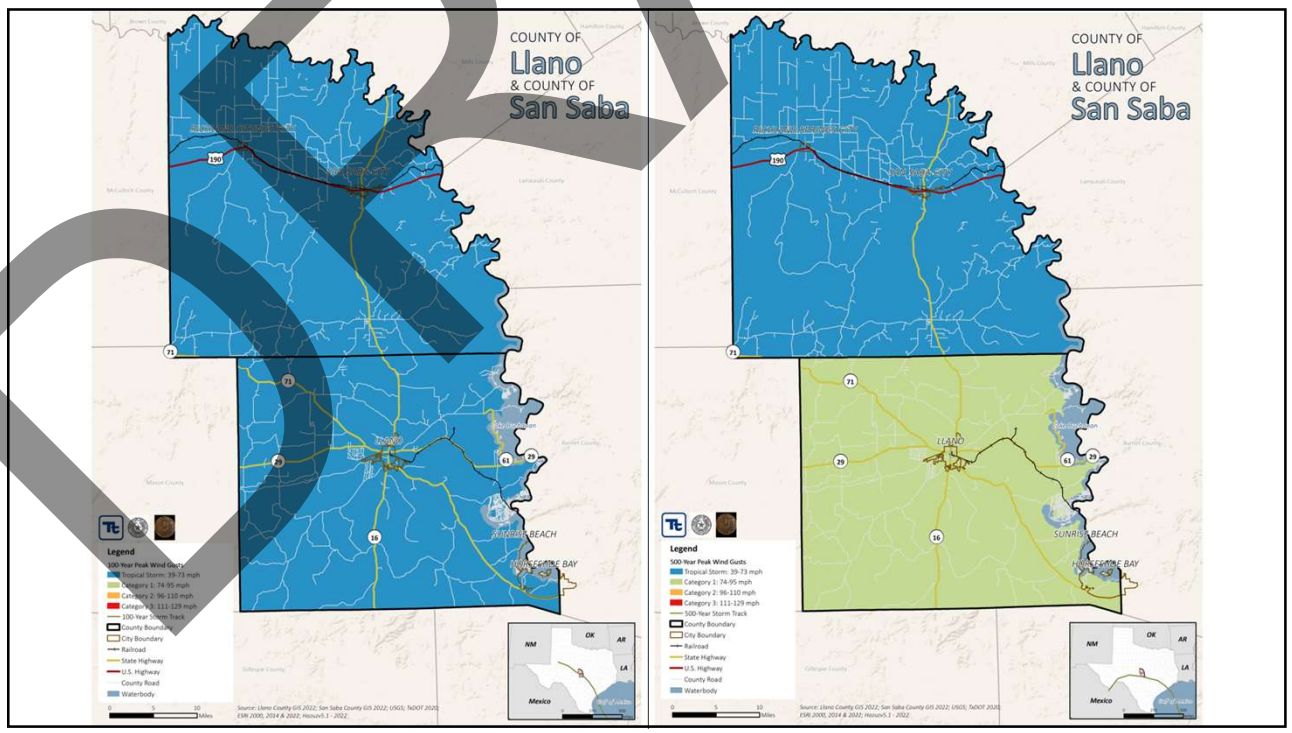
San Saba County Ranking
MEDIUM

- Previous Events
  - FEMA Declarations –
    - Llano County – 4 hurricane-related
    - San Saba County – 4 hurricane-related
- Exposure
  - Population and property exposed to 100-year peak wind gusts (Tropical Storm level winds) and 500-year (Tropical Storm/Category 1)
- Potential Impacts
  - Power outages
  - Critical facility and infrastructure damage

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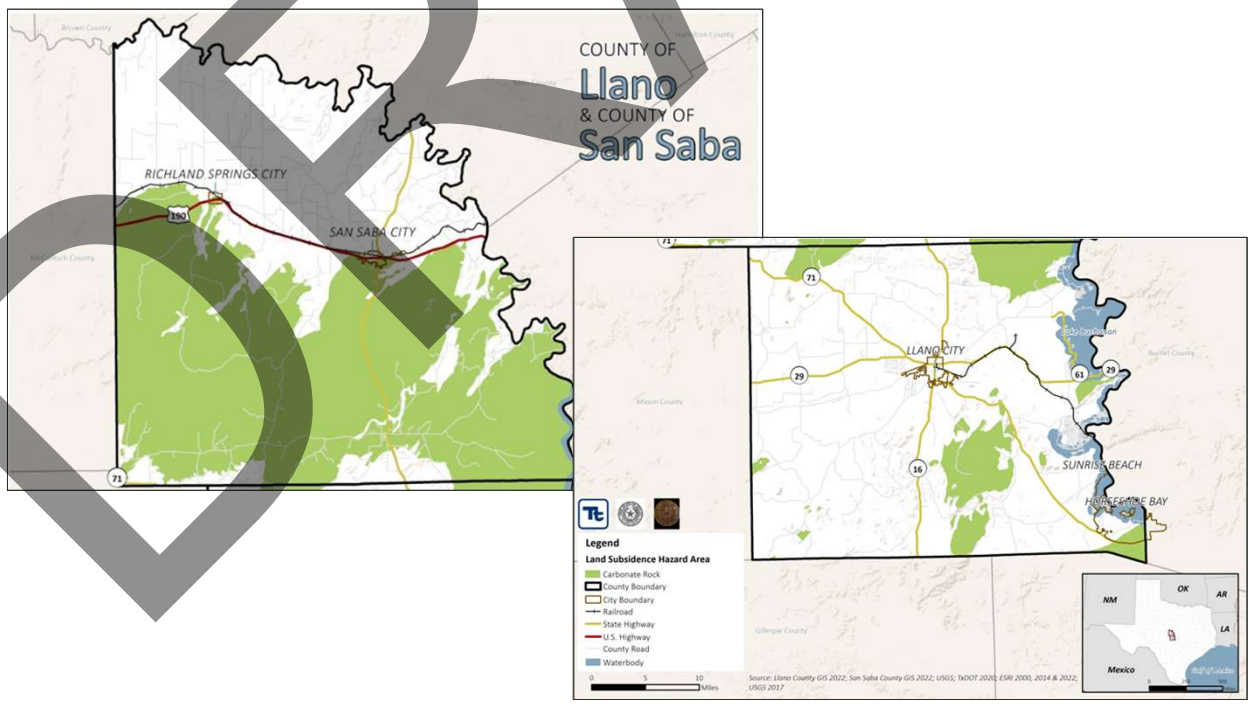
Land Subsidence

- Previous Events
  - No record of subsidence incidents since 2018; however, it is a continuous hazard, and its effects are often combined with other events
  - Rates of decreased over time, but the effects are still a risk
- Exposure
  - Looked at population and buildings located in carbonate karst areas – areas underlain by this type of rock are more susceptible to land subsidence

Llano County Ranking
LOW

San Saba County Ranking
HIGH

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Pandemic

- Previous Events
  - Looked at COVID-19, Flu, and West Nile Virus
  - FEMA Declarations –
    - Llano County – 1 pandemic-related
    - San Saba County – 1 pandemic-related
- Exposure
  - Entire County is exposed and vulnerable; however, not occurring multiple times a year with significant impacts
  - Severe events can lead to staffing and bed shortages in hospitals

Llano County Ranking **MEDIUM**

San Saba County Ranking **MEDIUM**

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Severe Weather

Llano County Ranking **MEDIUM**

San Saba County Ranking **MEDIUM**

- Hazard includes lightning, hail, and windstorms
- Previous Events
  - 500+ events impacting the Planning Area
  - FEMA Declarations
    - Llano County – 4 severe storm-related
    - San Saba County - 4 severe storm-related
- Exposure
  - All people and property exposed and vulnerable; however, majority of events do not cause extensive damage
- Potential Impacts
  - Power outages
  - Critical facility and infrastructure damage

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Tornado

- Previous Events
  - 31 reported tornadoes/funnel clouds since 1956; over $670,000 in property damage
  - FEMA Declarations
    - Llano County – 1 tornado-related
    - San Saba County – 1 tornado-related
- Exposure
  - All people and property in the Planning Area exposed and vulnerable

Llano County Ranking **HIGH**

San Saba County Ranking **HIGH**

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Winter Storm

Llano County Ranking **LOW**

San Saba County Ranking **LOW**

- Previous Events
  - 44 events since 1996 causing over $1.5 million in property damage and $90,000 in crop damage
  - FEMA Declarations –
    - Llano County – 1 winter storm-related
    - San Saba County – 1 winter storm-related
- Exposure
  - All people and property in the Planning Area are vulnerable
  - Populations of 65+ and <5 may be more at risk
- Impacts
  - Power outages
  - Below freezing temperatures can freeze pipes in homes

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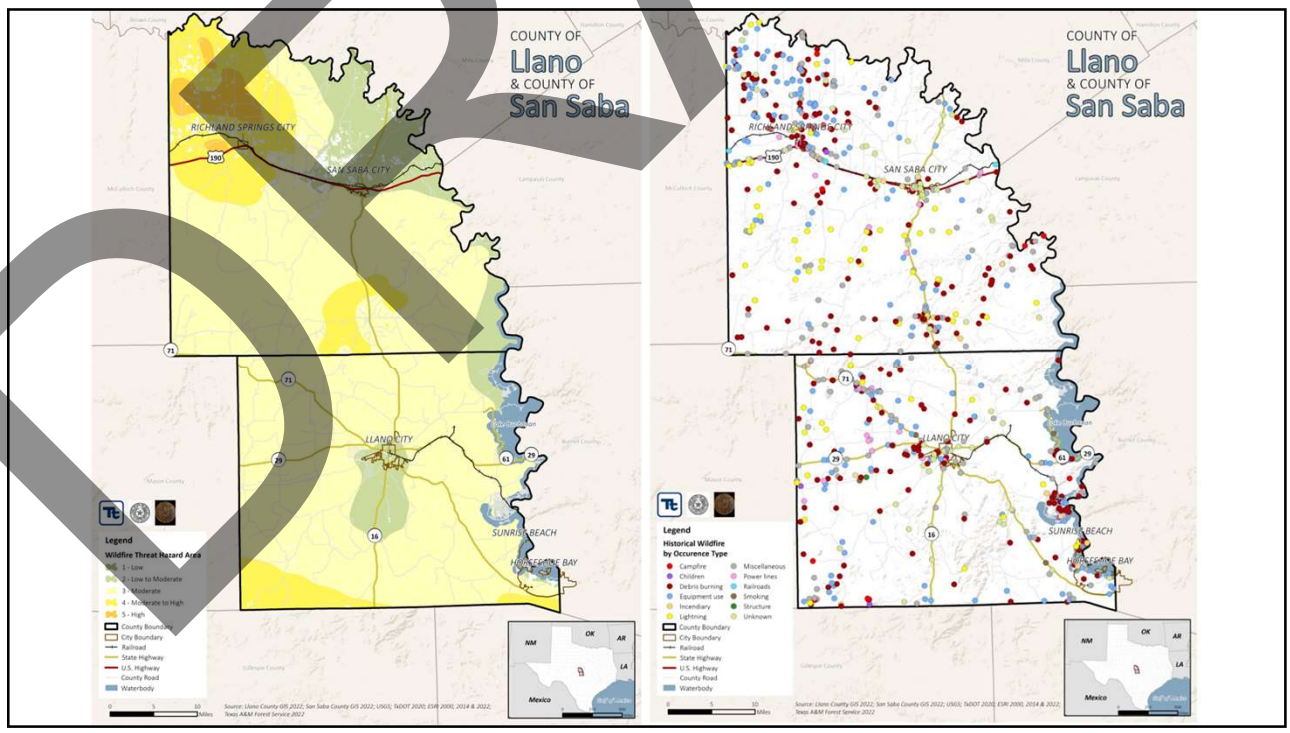
Wildfire

- Previous Events
  - Since 2005, over 800 reported wildfires occurred in the Planning Area, burning over 66,000 acres
  - FEMA Declarations –
    - Llano County – 4 wildfire-related
    - San Saba County – 8 wildfire-related
- Exposure
  - People and property located in Wildfire Threat Hazard Areas, defined by Texas A&M Forest Service
  - Looked at people and buildings in the high hazard areas.

Llano County Ranking **LOW**

San Saba County Ranking **LOW**

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Next Steps

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Next Steps

- Finalize risk assessment – due to Tetra Tech by November 23rd
- Mitigation Strategy Workshop – December 1, 2022
- Mitigation actions due December 16, 2022
- Finalize annexes by December 30, 2022
- Submit Draft Plan for TDEM/FEMA Review by February 2, 2023
- Adopt FEMA - Approved Plan
- Implement Projects and Maintain the Plan → Increase Resilience!

39

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Questions?



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40

40

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Llano County Project Contacts

Cheryl Kepp, Grant Administrator
325-247-7756 | ckepp@co.llano.tx.us

Gilbert Bennet, EMC
325-247-2039 | gbennett@co.llano.tx.us

Tetra Tech Project Contacts

Heather Apgar, CFM, Project Manager
(973) 630-8046 | heather.apgar@tetratech.com

Thank You!

41

Purpose of Meeting:	Mitigation Strategy Workshop
Location of Meeting:	Microsoft Teams
Date/Time of Meeting:	December 6, 2022 – 11:00 am to 12:00 pm

Attendees:
☒ Cheryl Kepp, Grant Administrator, County
☒ Chris Perry, City of Richland Springs Water
☒ Johnnie Reeves, Mayor, City of Richland Springs
☒ Christy Vaught, Development Services Department Administrator, County
☒ Dan Gower, Fire Chief, City of Sunrise Beach
☒ Laurie Brock, Police Chief, City of Sunrise Beach
☒ Brent Batla,, Fire Chief, City of Horseshoe Bay
☒ Marsha Hardy, EMC, San Saba County
☒ Jessica Foran, Llano County MUD #1
☒ Heath Apgar, Project Manager, Tetra Tech
☒ Erika Corsi, Planner, Tetra Tech

Agenda Summary: Welcome and Introductions, In-Kind Tracking, Project Overview and Status Review, Development of Mitigation Strategy/Actions/Projects, Next Steps, Questions

Item No.	Description	Action By:
1.	**Welcome and Introductions** • Tetra Tech started the meeting by introducing themselves and asking everyone to document their attendance in the meeting chat and introduce themselves.	N/A
2.	**Participation Status / Public Outreach** • Missing HOC worksheets from City of Richland Springs, City of San Saba, Cherokee ISD, Richland Springs ISD, San Saba ISD, Richland Springs SUD	- Tt will assist jurisdictions with worksheets if needed.
3.	**Project Schedule and Status Review** • Working through planning process • Continue to get the word out about HMP Update • Press Release to be given to Media by County to increase public outreach • Stakeholder list to be provided by Llano County • Mitigation actions should be different for each level i.e., County and municipalities should be different. • FEMA Region 6 and TDEM requirements – need 2 actions per hazard of concern • Steering Committee meeting to identify strategy for the County	- Tt will send out different tools to use to help with public outreach

4.	**Mitigation Strategy**
	• How to develop mitigation actions – describes how jurisdiction will accomplish the overall purpose of the mitigation plan
	• Mitigation strategies should tie into overall goals/objectives of the plan
	• **Need TWO mitigation actions per hazard of concern**
	• TDEM and FEMA is looking for more creative/big projects that will register under BRIC
	  o Routine maintenance Is not likely to receive funding
	  o On-going capabilities are not likely to receive funding
	• Specific detail needed for mitigation actions – how will this be corrected?
		- N/A

5.	**Update the Mitigation Strategy** • Review goals and objectives	- participating jurisdictions need

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	• Start with problems – things to focus on: o Stormwater/urban flooding areas, RL/SRL properties, vulnerable areas/populations • Can carry over projects from the 2016-2017 plan but these projects to be more detailed and address different aspects of the original problem. • Four mitigation action types include – plans and regulatory, structure and infrastructure projects, natural systems protection projects, education and awareness programs • Proposed actions table worksheet or online form – online form should have high level of detail for problem and solution statement	to complete proposed actions table worksheet or online actions form - Tt will send online actions form via link
6.	Public and Stakeholder Outreach • HMP survey are ready for distribution	- Tt will send out information to use for sharing about the HMP and survey
7.	Next Steps • Mitigation actions due December 28,2022 • Finalize annexes by January 6, 2023 • Submit draft plan to TDEM/FEMA for review by February 2, 2023 • FEMA Approval ~April, 2023 -> begin adoption	N/A
8.	Questions/Wrap Up	N/A

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Llano and San Saba County, Texas Hazard Mitigation Plan – 2023 Update

Mitigation Strategy Workshop | December 6, 2022

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Agenda

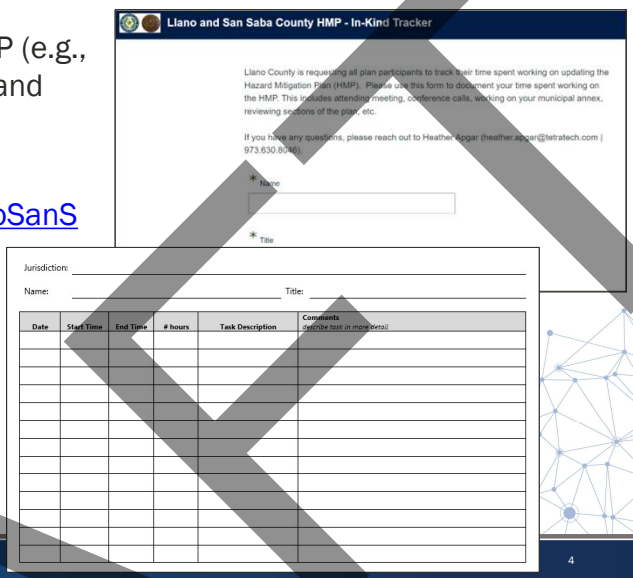
- Welcome
- In-Kind Tracking
- Project Overview and Status – where we are in the process
- Development of:
  - Mitigation Strategy/Actions/Projects
  - Action Worksheets using the Mitigation Action Development Worksheets
- Next Steps
- Questions



3

In-Kind Tracking Reminder

- Document your time working on the HMP (e.g., attend meetings, complete worksheets and surveys, emails, etc.)
- Use the Word tracker or online tracker - https://www.surveymonkey.com/r/LlanoSanSabaInKind


Llano and San Saba County HMP - In-Kind Tracker

Llano County is requesting all plan participants to track their time spent working on updating the Hazard Mitigation Plan (HMP). Please use this form to document your time spent working on the HMP. This includes attending meeting, conference calls, working on your municipal annex, reviewing sections of the plan, etc.

If you have any questions, please reach out to Heather Apgar (heather.apgar@tetratech.com | 973.630.8048).

* Name

* Title

Jurisdiction:

Name: Title:

Date	Start Time	End Time	# hours	Task Description	Comments describe task in more detail

TETRA TECH 4

4

Annex Progress

- Looking ahead…
  - Confirm hazard ranking ASAP (if you haven't done so)
  - Identify new mitigation actions for the 2023 update by December 28th
  - Complete action worksheets - https://forms.office.com/r/nnD3as6PGk
- Annex Status –
  - Green – good shape; returned hazard ranking worksheet; need to identify mitigation actions
  - Orange – good shape but missing hazard ranking worksheet; need to identify mitigation actions

	Status (12/05/22)
Llano County	Annex in progress
San Saba County	Annex in progress
Horseshoe Bay (C)	Annex in progress
Llano (C)	Annex in progress; need hazard ranking worksheet
Richland Springs (C)	Annex in progress; need hazard ranking worksheet
San Saba (C)	Annex in progress; need hazard ranking worksheet
Sunrise Beach (C)	Annex in progress
Cherokee ISD	Annex in progress; need hazard ranking worksheet
Llano ISD	Annex in progress
Richland Springs ISD	Annex in progress; need hazard ranking worksheet
San Saba ISD	Annex in progress; need hazard ranking worksheet
Llano Co MUD #1 Blue Lake	Annex in progress
Richard Springs Water	Annex in progress
Richland Springs SUD	Annex in progress; need hazard ranking worksheet

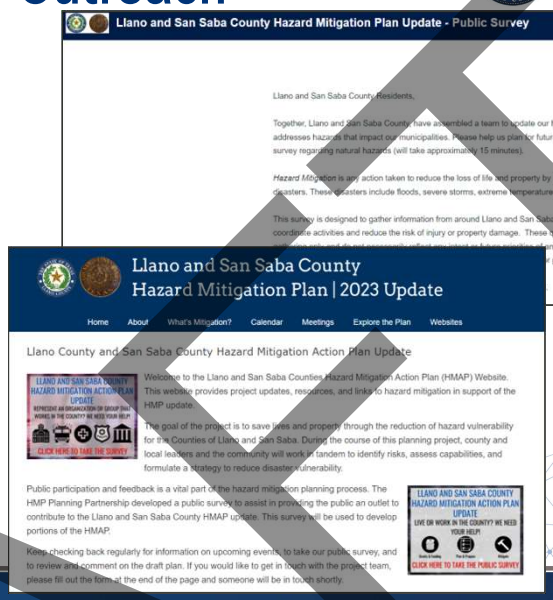
TETRA TECH 5

5

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Public and Stakeholder Outreach

- Keep posting about the HMP!
  - Social media – Facebook, Twitter
  - Let Tetra Tech know when you post so we can grab screenshots to include in the plan



6

TETRA TECH

Mitigation Strategy

7

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2023 Hazards of Concern

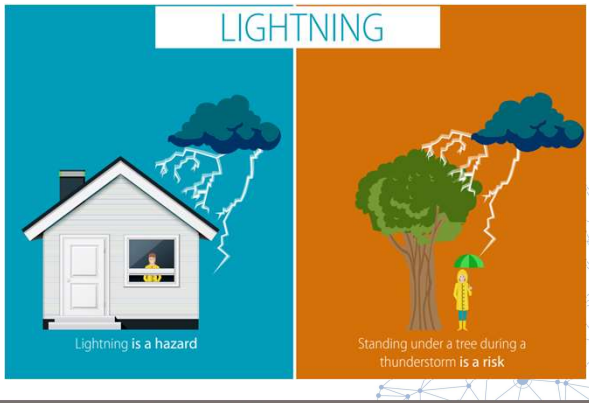
- Dam/Levee Failure
- Drought
- Extreme Temperature (Heat and Cold)
- Flood (Riverine/Flash/Stormwater)
- Geologic Hazards (Earthquake, Expansive Soils, Land Subsidence)
- Hurricane/Tropical Storm
- Pandemic/Health and Safety
- Severe Weather (Lightning/Hail/Wind)
- Tornado
- Wildfire
- Winter Weather

8

What is Risk?

- ✓ Hazard
  - *Something that has the potential to cause damage*
- ✓ Exposure
  - *People, property and infrastructure located in hazard-prone areas*
- ✓ Vulnerability
  - *Characteristics of community assets that make them susceptible to damages from the hazard*
- ✓ Risk
  - *Probability of damages to people, property, and infrastructure*





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How do you reduce risk?

- How do you reduce risk for a hazard?
  - Manipulate the Hazard
    - Structural flood control (e.g., flood walls, levees)
  - Reduce/Eliminate Exposure
    - Acquire floodprone properties
  - Reduce Vulnerability
    - Retrofit (e.g., floodproofing structures)
  - Increase Capability
    - $, preparation, technical assistance, planning enforcement



10

Using Your Mitigation Strategy to Reduce Risk

- What is a *Mitigation Strategy*?
  - A group of projects or actions to reduce the impacts of the hazards of concern on your community
    - Plans and Regulations
    - Structure and Infrastructure Studies and Projects
    - Natural Systems Protection Studies and Projects
    - Education and Awareness Programs
- Terms to describe the Mitigation Strategy include:
  - Mitigation Action Plan or Action Plan
  - Mitigation Projects or Initiatives or Actions

Your Mitigation Strategy table is included in your annex. We will use action worksheets and online forms to collect details on the actions you will include in the 2023 Update.

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Requirements for the Mitigation Strategy Update

- TDEM and FEMA would like to see more creative/big projects that would work well under the BRIC grant program
- 2016/2017 projects
  - If a project is not finished and still a priority, include in 2023 HMP
  - Remove general projects or make more specific
  - Remove routine maintenance
  - Remove ongoing capabilities
- Minimum of 2 mitigation actions for EACH hazard of concern
  - One action can cover multiple hazards and jurisdictions. For example, education program on mitigation technics you can implement – applies to all hazards and all jurisdictions.

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Other Mitigation Actions to Consider



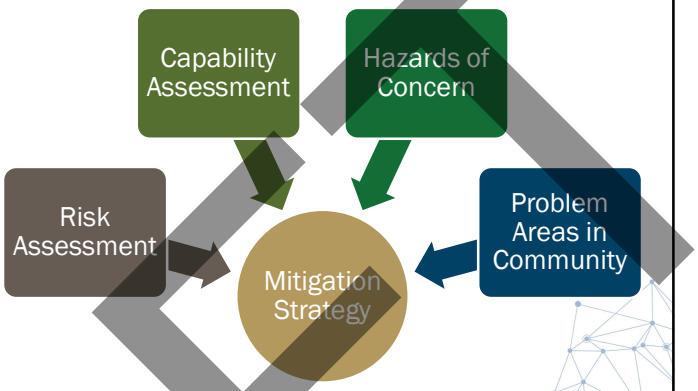
- Local Disaster Debris Management Plans
- Substantial Damage Management Plan
- Actions to address high-hazard or significant-hazard dams
- Public education and outreach programs
- Generators at critical facilities and community lifelines
- Floodproofing critical facilities and community lifelines
- Addressing repetitive and severe repetitive loss properties

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Connecting to the Mitigation Strategy

- Need a clear connection between vulnerability and proposed mitigation actions.
- Capability assessment provides insight into challenges and opportunities for the mitigation strategy.
- Provides the factual basis for activities proposed in the mitigation strategy.



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Where do you need to focus?

- Stronger connection between the risk assessment and mitigation strategy
- More specific, achievable actions
  - Specific projects, in specific locations, in a specific timeframe
- Diverse actions
  - You need at least 2 actions per hazard of concern. Think about actions that can cover multiple hazards.
  - Include a variety of action types (e.g., developing plans, outreach, structural, etc.)

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Update the Mitigation Strategy

Action Types
Initiative Table – actions and projects

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Update the Mitigation Strategy

- Review the Goals and Objectives of the HMP
- Start with problems
  - Turn challenges/obstacles/gaps into mitigation actions
  - Examine historic impacts
  - Review the risk and capability assessment results
  - RL/SRL properties
  - Stormwater/urban flooding areas
  - Critical facilities and lifelines located in a hazard area (if feasible)
  - Additional areas of vulnerability
  - Previous FEMA HMA submitted projects – awarded/unawarded
- Identify new Mitigation Actions/Projects/Strategies
- REMEMBER – 2 actions for every hazard of concern!
- Modify 'carry-over' projects from the 2016/2017 HMP
  - **More specific** or **address different aspects of the original problem**

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Mitigation Action Types

Plans and regulations include government authorities, policies, or codes that encourage risk reduction, such as building codes and state planning regulations. This may also include planning studies.

Structure and infrastructure projects involve modifying existing structures and infrastructure or constructing new structures to reduce the impact of hazards.

Natural systems protection projects minimize losses while also preserving or restoring the function of natural systems.

Education and awareness programs include long-term, sustained programs to inform and educate citizens and stakeholders about hazards and mitigation options. This category could also include training.

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Range of Mitigation Actions

- Primary types of mitigation actions to reduce long-term vulnerabilities include:

Local Plans and Regulations	• Substantial Damage Management Plans • Update comprehensive plans to include hazard mitigation • Open space plan • Debris management plan
Structural Projects	• Structural elevations of flood-prone properties • Drainage improvements • Stormwater improvements • Backup power to critical facilities and community lifelines
Natural Systems Protection	• Stream and wetland restoration • Erosion control • Vegetative management to help with flooding, erosion, etc. • Water quality improvement
Education and Outreach	• Developing and implementing multi-hazard public awareness programs • Enhancing municipal website to include hazard mitigation and preparedness • Real estate disclosure for flooding and other hazards • Working with the private sector to enhance hazard awareness

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Proposed Action Table

- Each municipality will need to complete the *Proposed Hazard Mitigation Initiatives* table in your annex
- Each column needs to be filled in. Tetra Tech will assist you with completing each cell.
- Action Worksheets will need to be completed for all projects.
  - Action Worksheet or
  - Online form (https://forms.office.com/r/nnD3as6PGk)

Initiative Number	Mitigation Initiative Name	Description of the Problem and Solution	New or Existing Assets?	Hazard(s) to be Mitigated	Goals Met
2021-Your Town-001	Repetitive Loss Property Outreach	Problem: There are 100 repetitive loss properties located in the City. According to NFIP claims records, these properties have experienced extensive flood damage through the years. Without proper mitigation, the structures will continue to experience flood damages. Solution: Conduct outreach to the property owners to inform them of their repetitive loss designation and provide mitigation options to protect the structures. If the property owners choose elevation or acquisition, the City will develop a grant application to fund acquisitions or elevations of the properties.	Existing	Flood, Severe Storm, Hurricanes/ Tropical Storms	All

Lead and Support Agencies	Potential Funding Sources	Estimated Benefits	Estimated Cost	Timeline	Priority	Mitigation Category
City Floodplain Administrator, Property Owner	Borough Budget for outreach; FEMA FMA or HMGP for mitigation measures	Increase resilience of structure and City; decrease flood damages	<$10,000 for outreach; mitigation costs vary depending on project	One year for outreach; 5 years for mitigation measures	High	EAP, SIP

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How do you fill in the Action Worksheets?

- The entire worksheet needs to be filled in; however, Tetra Tech will assist with this. We ask that each municipality fill in (at least) the highlighted cells.
- We need one worksheet for each action.
- Focus on providing highly detailed:
  - Description of the Problem
  - Description of the Solution

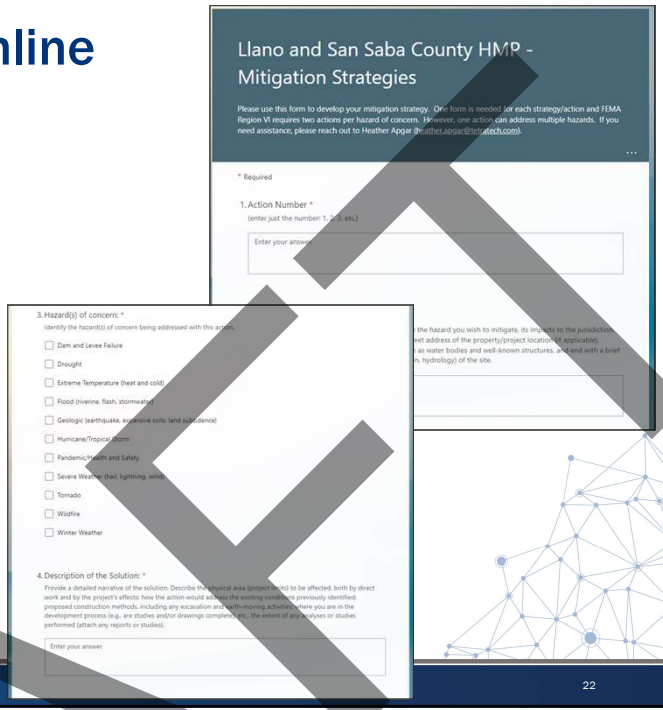
Action Worksheet			
Project Name:			
Project Number:			
Risk / Vulnerability			
Hazard(s) of Concern:			
Description of the Problem:			
Action or Project Intended for Implementation			
Description of the Solution:			
Is this project related to a Critical Facility or Lifeline?	Yes ☐	No ☐	
Estimated Benefits (losses avoided):		Goals Met:	
Estimated Cost:		Mitigation Action Type:	
Plan for Implementation			
Prioritization:		Responsible Organization:	
Estimated Time Required for Project Implementation:		Potential Funding Sources:	

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How do you fill in the Online Form?

- Like the worksheet, you will need to complete each item of the form.
- Focus on providing highly detailed:
  - Description of the Problem
  - Description of the Solution
- Complete a form for every mitigation action.
- The online forms will be automatically sent to Tetra Tech.



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Next Steps

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Next Steps

- Mitigation Strategy Workshop – TODAY!
- Mitigation actions due December 28, 2022
- Finalize annexes by January 6, 2023
- Submit Draft Plan for TDEM/FEMA Review by February 2, 2023
- FEMA approves plan (~April 2023); begin adoption
- Implement Projects and Maintain the Plan ⟹ Increase Resilience!

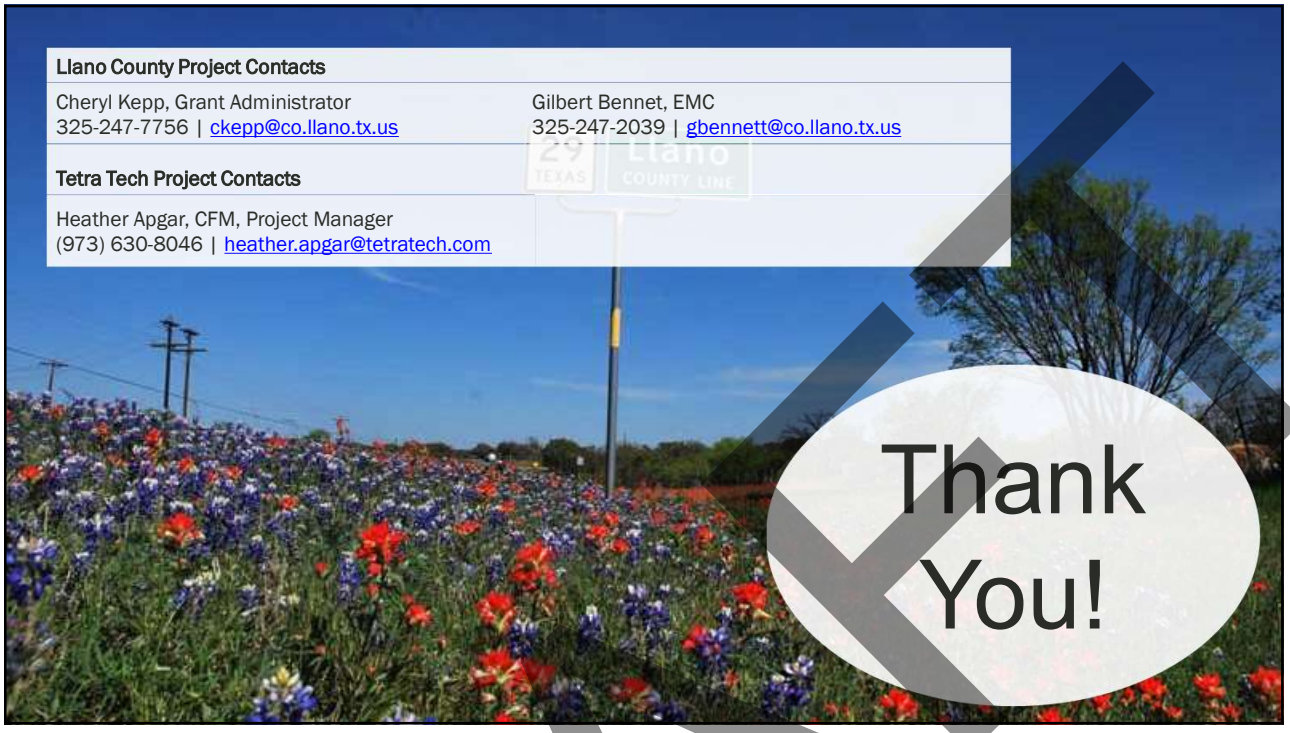
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Questions?



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Llano County Project Contacts
Cheryl Kepp, Grant Administrator
325-247-7756 | ckepp@co.llano.tx.us
Gilbert Bennet, EMC
325-247-2039 | gbennett@co.llano.tx.us
Tetra Tech Project Contacts
Heather Apgar, CFM, Project Manager
(973) 630-8046 | heather.apgar@tetratech.com
Thank You!

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Virtual Meeting
Join by Computer: https://bit.ly/3zeJyR1
Or
Dial-in Number (toll): 832-856-3579 | Conference ID: 984 648 808#

1. **Welcome and Introductions**

2. **In-Kind Services Tracking**
   - Document your time working on the HMP (e.g., attend meetings, complete worksheets and surveys, emails, etc.)
   - Use the Word tracker or online tracker - https://www.surveymonkey.com/r/LlanoSanSabaInKind

3. **Public and Stakeholder Outreach**
   - New graphics and text will be sent out to help advertise the availability of the draft HMP public review

4. **Project Overview and Status**
   - Jurisdictions to keep submitting hazard rankings and new mitigation actions

5. **Project Schedule Review**
   - Review Draft Plan – TODAY!!
   - Deadline for Annex changes – February 2
   - Public review of Draft HMP – February 6 through February 20
   - Plan Submitted to TDEM for review – February 21
   - Plan Submitted to FEMA for review – February 21
   - Plan Approval by FEMA – April 2023

6. **Draft Plan Review**
   - What's New
   - Section-by-section content overview
   - Review guidelines
   - Finalizing the plan

7. **Next Steps**
   - Deadline for Annex changes – February 2
     - This includes the jurisdictional annex! If no input is received by February 2nd, the annex will be posted as-is for the public review period.
   - Public review of Draft HMP – February 6 through February 20
   - Plan Submitted to TDEM for review – February 21
   - Plan Submitted to FEMA for review – February 21
   - Plan Approval by FEMA – April 2023

8. **Questions / Wrap-Up**

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Purpose of Meeting:	Draft Plan Presentation
Location of Meeting:	Microsoft Teams
Date/Time of Meeting:	January 26, 2023 @ 1:00PM CT
Attendees:	Marsha Hardy-EMC San Saba County Jessica Foran-LC MUD#1 Dan Gower-Fire Chief of Sunrise Beach Village Laurie Brock-Police Chief of Sunrise Beach Village Cheryl Keep-Grant Admin for Llano County Brent Batla-Fire Chief of City of Horseshoe Bay Chris Perry-City of Richland Springs Mayor Johnie Reeves-City of Richland Springs Erika Corsi-Tetra Tech Planner Emily Vassallo- Tetra Tech Planner Heather Apgar- Project Manager
Agenda Summary:	Welcome and Introductions, In-Kind Tracking, Public and Stakeholder Outreach, Project Overview and Status, Draft Plan Review, Next Steps, Questions

Item No.	Description	Action By:
1.	**Welcome and Introductions** • Tetra Tech started the meeting by introducing themselves and asking everyone to document their attendance in the meeting chat and introduce themselves.	Tetra Tech: • County: •
2.	**In-Kind Tracking** • Document your time working on the HMP (e.g., attend meetings, complete worksheets and surveys, emails, etc.) • Use the Word tracker or online tracker - https://www.surveymonkey.com/r/LlanoSanSabaInKind	Tetra Tech: • County: •
3.	**Public and Stakeholder Outreach** • New graphics and text will be sent out to help advertise the availability of the draft HMP public review. • Link for website dropped in chat and outreach materials still encouraged to be posted	Tetra Tech: • Send new graphics and text to participants County: • Post outreach
4.	**Project Overview and Status** • Continue to submit hazard rankings • Continue to submit new mitigation actions • All annexes are set; just putting some final tweaks on actions; draft will be sent out for review. • 2/3 is final feedback for annexes before posting for public review Please reach out to Tetra Tech if any assistance is needed	Tetra Tech: • Send Annexes Out County: • Review annex before public review posting
5.	**Project Schedule Review** • Review Draft Plan – TODAY!! • Deadline for Annex changes – February 2 • Public review of Draft HMP – February 6 through February 20 • Plan Submitted to TDEM for review – February 21 • Plan Submitted to FEMA for review – February 21 • Plan Approval by FEMA – April 2023	

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6.	Draft Plan Review
	• Volume I
	  ○ Section 1 – Introduction
	  ○ Section 2 – Planning Process
	  ▪ Plan participants; activities
	  ○ Section 3 – County Profile
	  ▪ Sub sections for both counties
	  ▪ History; Major hazard event history; Land Use and Pop trends; critical facilities; building stock
	  ○ Section 4 – Risk Assessment
	  ▪ ID HOC; Methodology and Tools; Hazard Profiles; Hazard Rankings
	  ○ Section 5 – Capability Assessment
	  ▪ Plans, Programs, Admin, Technical, Friscal, Education, Outreach Capabilities
	  ○ Section 6 – Mitigation Strategies
	  ▪ Goals and Objectives; Past accomplishments
	  ○ Section 7 – Plan Maintenance
	  ▪ Monitoring and Updating
	• Volume II
	  ○ Section 8 – Planning Partnership
	  ○ Section 9 – Annexes
	  ▪ Profile; Capabilities; Risk Assessment; Status of Past actions; current actions
	• Appendices
	  ○ Appendix A – Plan Adoption
	  ○ Appendix B – Participation Documentation
	  ○ Appendix C – Meeting Documentation
	  ○ Appendix D – Public and Stakeholder Outreach Documentation
	  ○ Appendix E – Mitigation Strategy Supplementary Data
	  ○ Appendix F – Plan Maintenance Tools
	  ○ Appendix G – Critical Facilities
	  ○ Appendix H – Linkage Procedures
	• The entire plan will be posted on the Llano County HMP website for a 14-day review period starting Monday, February 6th
	• TDEM will begin their review after the public review period.
	• Public feedback to be incorporated as appropriate prior to submittal to TDEM/FEMA for their review.
		Tetra Tech:
		•
		County:
		•

7.	Next Steps • Review Draft Plan – TODAY!! • Deadline for Annex changes – February 2 ○ This includes the jurisdictional annex! If no input is received by February 2nd, the annex will be posted as-is for the public review period. • Public review of Draft HMP – February 6 through February 20 • Plan Submitted to TDEM for review – February 21 • Plan Submitted to FEMA for review – February 21 • Plan Approval by FEMA – April 2023	Tetra Tech: • County: •
8.	Questions/Wrap Up •	Tetra Tech: • County:

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		•

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Llano and San Saba County, Texas Hazard Mitigation Plan – 2023 Update

Draft Plan Presentation | January 26, 2023

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complex world | CLEAR SOLUTIONS™

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Agenda

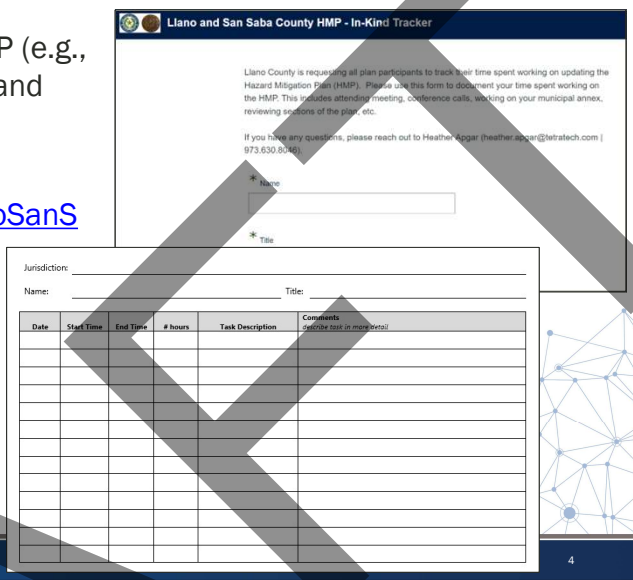
- Welcome
- In-Kind Tracking
- Project Overview and Status – where we are in the process
- Draft Plan Review
  - What's New
  - Section-by-section content overview
  - Review guidelines
  - Finalizing the plan
- Next Steps
- Questions



3

In-Kind Tracking Reminder

- Document your time working on the HMP (e.g., attend meetings, complete worksheets and surveys, emails, etc.)
- Use the Word tracker or online tracker - https://www.surveymonkey.com/r/LlanoSanSabaInKind



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Public and Stakeholder Outreach

- There is still time to post about the HMP on your municipal websites!
  - Let Tetra Tech know if you need the HMP flyer or other posts.
- Next round of public outreach
  - Social media – Facebook, Twitter
  - Tetra Tech will send around some graphics and text to ask the public to review and comment on the draft HMP



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Annex Progress

- Looking ahead…
  - Identify new mitigation actions ASAP (if you haven't done so)
  - Complete action worksheets - https://forms.office.com/r/nnD3as6PGk
  - Tetra Tech will send out your annex by Monday. You have until February 3rd to make revisions before we post for public review.

	Status (01/23/23)
Llano County	Annex ready for jurisdictional review/input
San Saba County	Annex ready for jurisdictional review/input
Horseshoe Bay (C)	Annex ready for jurisdictional review/input
Llano (C)	Annex ready for jurisdictional review/input
Richland Springs (C)	Annex ready for jurisdictional review/input
San Saba (C)	Annex ready for jurisdictional review/input
Sunrise Beach (C)	Annex ready for jurisdictional review/input
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San Saba ISD	Annex ready for jurisdictional review/input
Llano Co MUD #1 Blue Lake	Annex ready for jurisdictional review/input
Richard Springs Water	Annex ready for jurisdictional review/input
Richland Springs SUD	Annex ready for jurisdictional review/input

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Project Schedule Review

✓	August 19, 2022	Kick-Off Meeting
✓	July-September 2022	Data Collection
✓	October 13, 2022	Finalize Goals and Objectives
✓	November 10, 2022	Risk Assessment Presentation
✓	November 2022-January 2023	Update Hazard Profiles – *in progress*
✓	December 06, 2022	Mitigation Strategy Workshop
✓	August 2022-January 2023	Plan Development
✓	January 2023 - TODAY!!	Review Draft Plan – public review starting February 6th!
❑	February 2023	Plan Submitted to TDEM
❑	March 2023	Plan Submitted to FEMA

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What's New in the 2023 Update?

- **Critical facilities** – updated inventory and included community lifelines
  - What's included? Airports, bridges, childcare facilities, churches, municipal buildings, communication facilities, dams, utility facilities and substations, police/fire, gas facilities, grocery stores, hazmat facilities, medical care, potable water, schools, and wastewater facilities



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What's New in the 2023 Update?

- Hazards of Concern –
  - Incorporated new hazards, and concise hazard profiles, including recent events
  - Risk assessments for each hazard
  - Climate change impacts incorporated into the probability of future occurrences
  - Adaptive capacity to reduce vulnerability used in hazard ranking

Dam Failure
Drought
Extreme Temperature
Flood
Geologic Hazards
Hurricane/Tropical Storm
Pandemic
Severe Weather
Wildfire
Winter Weather

9

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What's New in the 2023 Update?

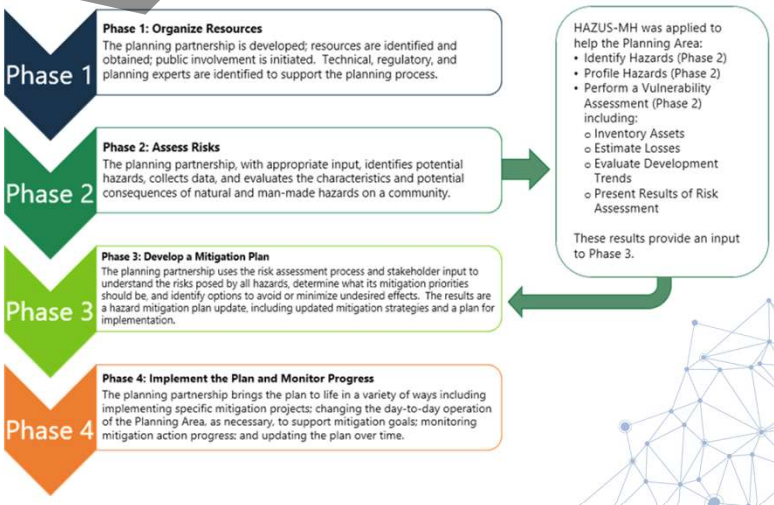
- Jurisdictional Annexes
  - Each jurisdiction has its own 'chapter' of the HMP that focuses on what impacts your jurisdiction and the population you serve.
  - Enhanced capability assessment including how hazard mitigation is integrated
  - Two mitigation actions for every hazard of concern

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Section Contents

Volume I

- Section 1 – Introduction
  - Mitigation planning overview
  - Participating jurisdictions
  - 2023 updates and summary of changes since last plan



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Section Contents

Volume I

- Section 2 – Planning Process
  - Plan participants (committees, stakeholders, etc.)
  - Activities
  - Ongoing process

Date	DMA 2000 Requirement	Description of Activity	Participants
July 27, 2022	2	Pre-Kick Off Meeting with Llano County: Plan timing and administration, data needs and sharing, hazards of concern, dates, and next steps	County EMC, County Grants Administrator, Tetra Tech
August 19, 2022	2	Steering Committee Meeting #1: Introduce Steering Committee to the HMP update process, discuss mitigation planning, project organization, roles and responsibilities, data collection, hazards of concern, and schedule of the plan.	County Grant Administrator, County Emergency Manager, County Development Services Department Administrator, County 911 Coordinator/GIS, Tetra Tech
August 24, 2022	2, 4a	Planning Partnership Meeting #1: Introduce Planning Partnership to the HMP update process, discuss mitigation planning, project organization, roles and responsibilities, data collection, hazards of concern, and schedule of plan.	County Grant Administrator, County Emergency Manager, County Development Services Department Administrator, County 911 Coordinator/GIS, Richland Springs Police Chief, Richland Springs ISD Superintendent, City of San Saba CEO, Sunrise Beach VFD, Sunrise Beach Police Chief, City of Horseshoe Bay Fire Marshal, San Saba County staff, Llano County staff, Llano County Judge, Tetra Tech
October 13, 2022	2, 3a, 3b, 3c, 3d, 3e	Steering Committee Meeting #2: Welcome and Introductions, In-Kind Tracking, Project Schedule and Status Review,	County Grant Administrator, County Emergency Manager, County Development Services Department Administrator, Tetra Tech



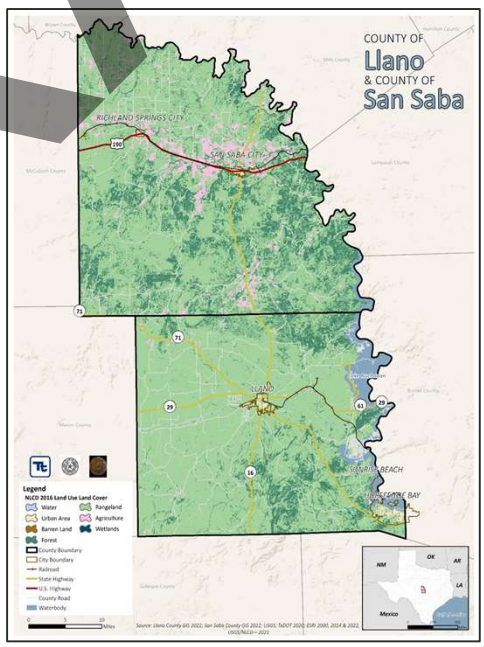
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Section Contents

Volume I

- Section 3 – County Profile
  - History & Physical Setting
  - Major Hazard Event History
  - Population and Demographics
  - General Building Stock
  - Land Use and Population Trends
  - Critical Facilities & Community Lifelines



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Section Contents

Volume I

- Section 4 – Risk Assessment
  - Identification of Hazards of Concern
    - Process to go through all potential hazards and identify the hazards that have the potential to impact the Planning Area
  - Methodology and Tools
    - Describes the various procedures and tools used to complete the risk assessment.
    - Steps to do so included identifying and profiling each hazard of concern; determine exposure to each hazard; and assess the vulnerability of exposed population/buildings/economy.

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Section Contents

Volume I

- Section 4 – Risk Assessment
  - Hazard Profiles
    - Created individual sections for each hazard of concern.
    - Each section includes:
      - Hazard Profile – description, location, extent, worst-case scenario, previous occurrences, climate change projections, and probability of future events
      - Vulnerability Assessment – impact on life/health/safety, impact on building stock and critical facilities, impact on economy, impact on the environment, future changes that may impact vulnerability, and changes in vulnerability since the last plan
  - Hazard Ranking
    - Provides a preliminary ranking (high, medium, low) of each hazard to show the Planning Area's hazards of greatest risk

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Section Contents

Volume I

- Section 5 – Capability Assessment
  - Capability Assessment
    - Available plans, programs, & resources
    - Administrative and technical capabilities
    - Fiscal capabilities
    - Education and outreach



Planning and Regulatory



Administrative and Technical



Financial



Education and Outreach

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Section Contents

Volume I

- Section 6 - Mitigation Strategies
  - Past accomplishments
  - Goals and Objectives
  - Mitigation strategy development and update
    - Action identification
    - Evaluation and prioritization
    - Benefit/cost review

2023 Goals

- Goal 1: Protect public health and safety for residents, businesses, and visitors.
- Goal 2: Protect existing and new properties, critical facilities, community lifelines, and population.
- Goal 3: Increase public understanding, support, and demand for hazard mitigation.
- Goal 4: Build and support local capacity and commitment to continuously become less vulnerable to hazards.
- Goal 5: Promote growth in a sustainable manner.
- Goal 6: Maximize the resources for investment in hazard mitigation.

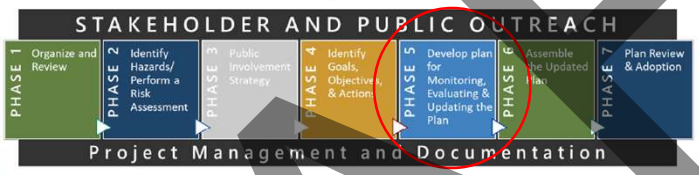
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Section Contents

Volume I

- Section 7 – Plan Maintenance
  - Ongoing Planning Partnership – meet annually to discuss HMP
  - Monitoring
  - Continuous evaluation and progress reports
  - Updating
  - Integrating the HMP with existing and future programs
  - Continued public involvement



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Section Contents

Volume II

- Section 8 – Planning Partnership
  - Participating jurisdictions
  - Introduction to jurisdictional annexes

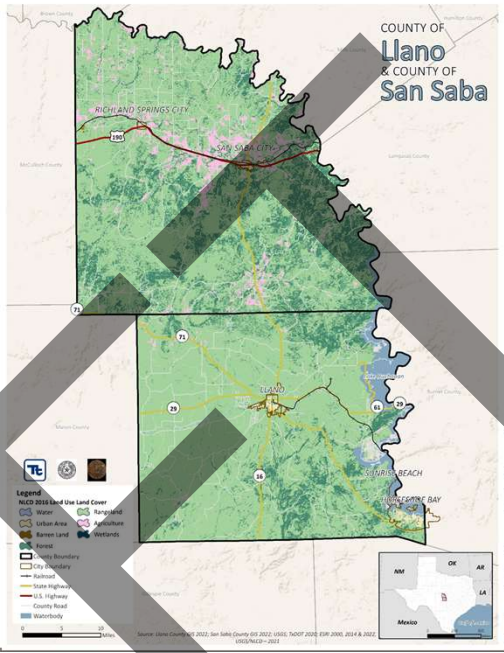
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Section Contents

Volume II

- Section 9 – Annexes
  - Points of Contact and Who Participated
  - Jurisdictional Profile
  - Capabilities
  - Risk Assessment
  - Status of Past Mitigation Actions
  - Current Mitigation Actions



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Section Contents - Appendices

- Appendices
  - Appendix A Plan Adoption
  - Appendix B Participation Documentation
  - Appendix C Meeting Documentation
  - Appendix D Public and Stakeholder Outreach Documentation
  - Appendix E Mitigation Strategy Supplementary Data
  - Appendix F Plan Maintenance Tools
  - Appendix G Critical Facilities
  - Appendix H Linkage Procedures

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Review the Draft Plan

- We will be sharing the draft plan with all of you to review and provide comments. Sections will be posted on OneDrive. Link and instructions will be sent out on Monday!
- The entire plan will be posted on the Llano County HMP website for a 14-day review period (starting Monday, February 6th)
  - You can review sections of the plan during the public review, and we will incorporate any applicable revisions into the final deliverable to the State and FEMA
- TDEM will begin their review after the public review period.
- Public feedback to be incorporated as appropriate prior to submittal to TDEM/FEMA for their review.
  - If needed, we will hold a brief meeting to discuss public comments and how to incorporate – date TBD

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TETRA TECH

Next Steps

23

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Next Steps

- Draft Plan Review Meeting – TODAY!
- Any edits to sections of the plan are due **February 2, 2023**
  - This includes your jurisdictional annex! If we do not have any input by February 2nd, your annex will be posted as-is for the public review period.
- Public Review Period (14 days) - February 6th through February 20th
- Submit Draft Plan for TDEM/FEMA Review by February 21, 2023
- FEMA approves plan (~April 2023); begin adoption
- Implement Projects and Maintain the Plan → Increase Resilience!

TETRA TECH 24

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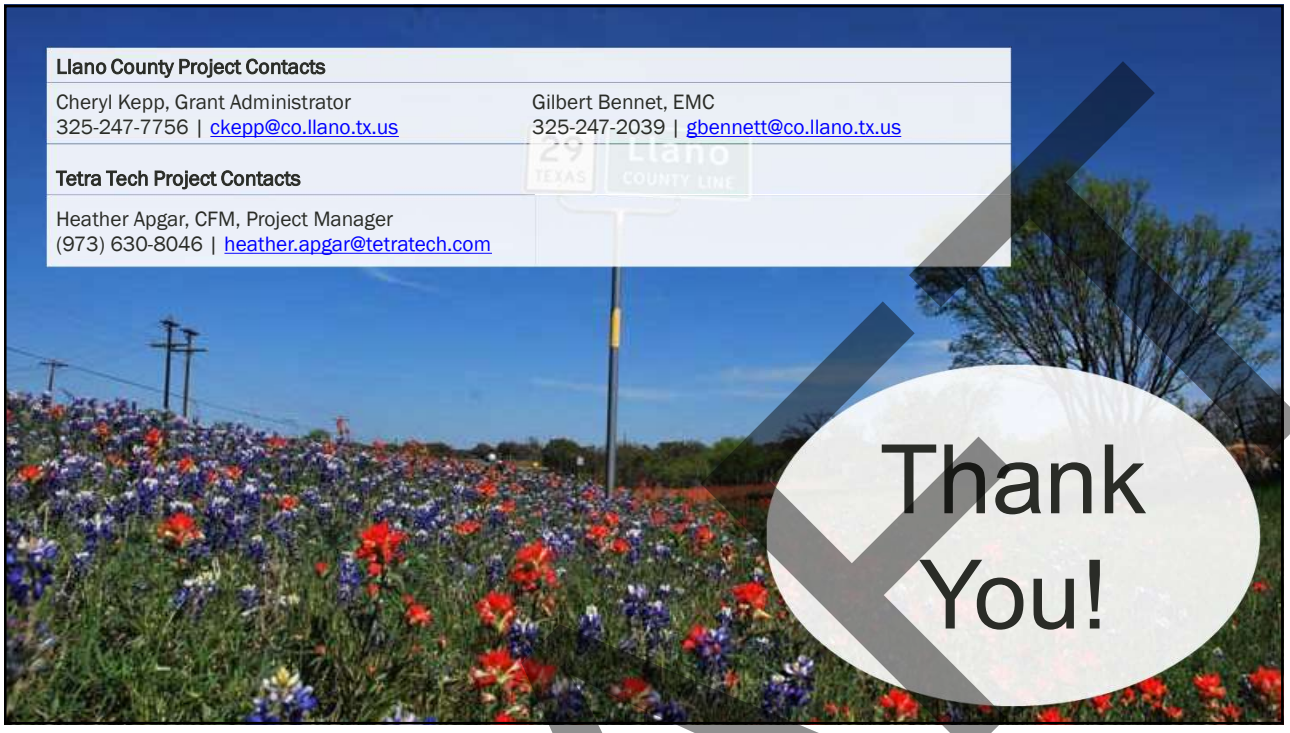
Questions?



TETRA TECH 25

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Llano County Project Contacts
Cheryl Kepp, Grant Administrator
325-247-7756 | ckepp@co.llano.tx.us
Gilbert Bennet, EMC
325-247-2039 | gbennett@co.llano.tx.us
Tetra Tech Project Contacts
Heather Apgar, CFM, Project Manager
(973) 630-8046 | heather.apgar@tetratech.com
Thank You!

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Appendix D Public and Stakeholder Outreach

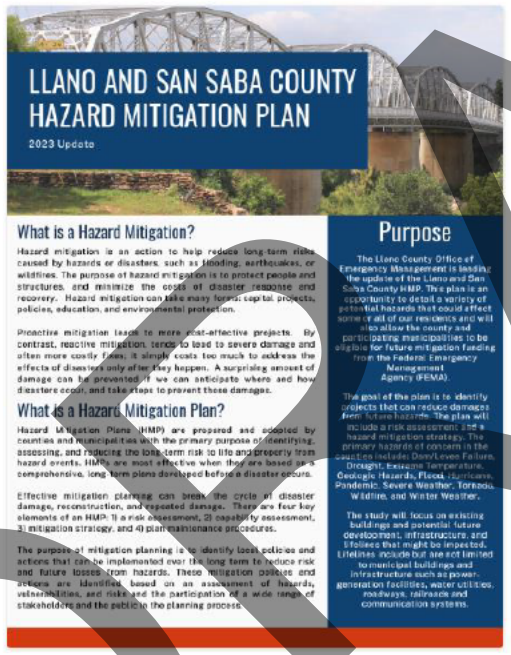
This appendix provides documentation of public and stakeholder outreach. Stakeholder involvement in this planning process was broad and productive as discussed and further documented in Section 2 (Planning Process). Public and stakeholder input has been incorporated throughout this HMP as appropriate, as identified in Section 2 and the References section.

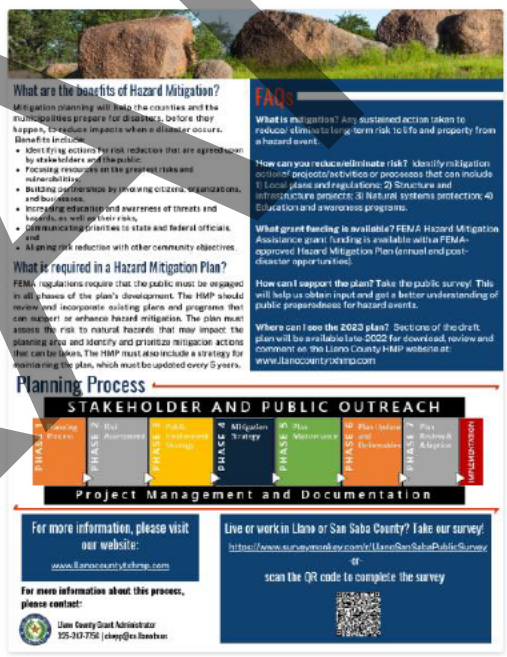
D.1 Website and Social Media Post

The following provides screenshots of websites, news articles, and social media posts.

Figure D-1: City of San Saba Website Post 2022

Public Announcement – Hazard Mitigation Plan Llano and the City of San Saba





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Figure D-2: City of San Saba Facebook Post 11/16/22



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Figure D-3: City of San Saba Facebook 11/18/22

City of San Saba
November 18, 2022 ·

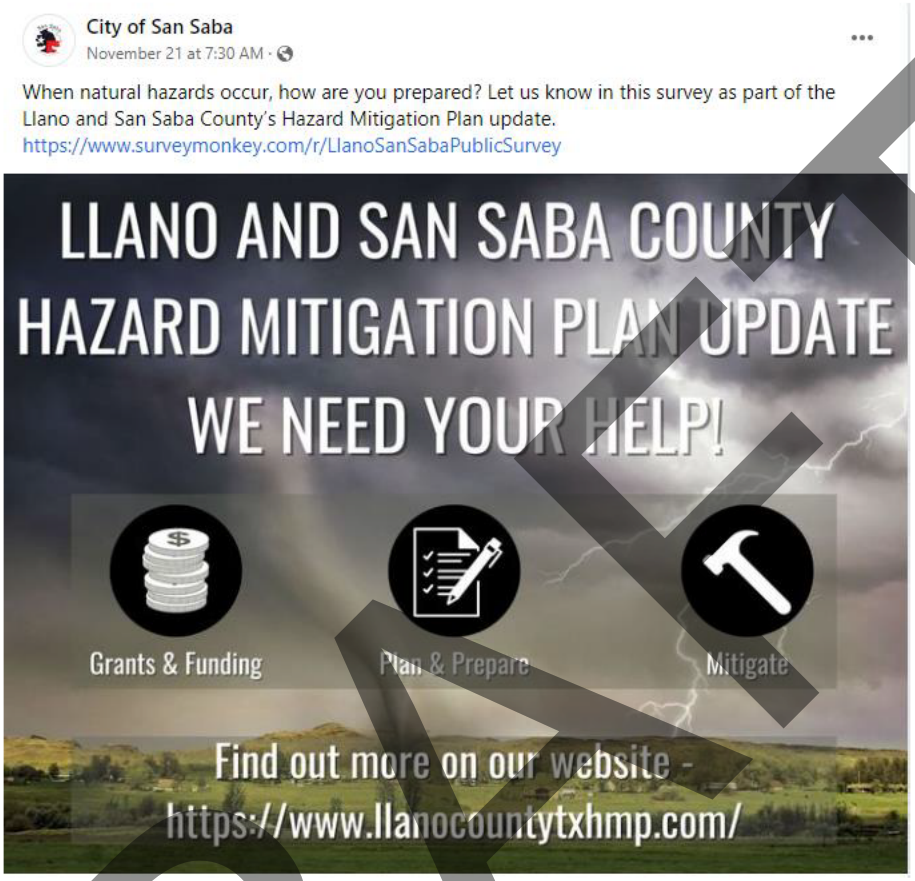
Don't get caught in the rain! Llano and San Saba Counties are updating their Hazard Mitigation Plan to address hazards like flooding in our communities. We need to hear from you to help us make our counties a safer place! Use this link to complete a survey about natural hazards in Llano and San Saba Counties:
https://www.surveymonkey.com/r/LlanoSanSabaPublicSurvey



1 share

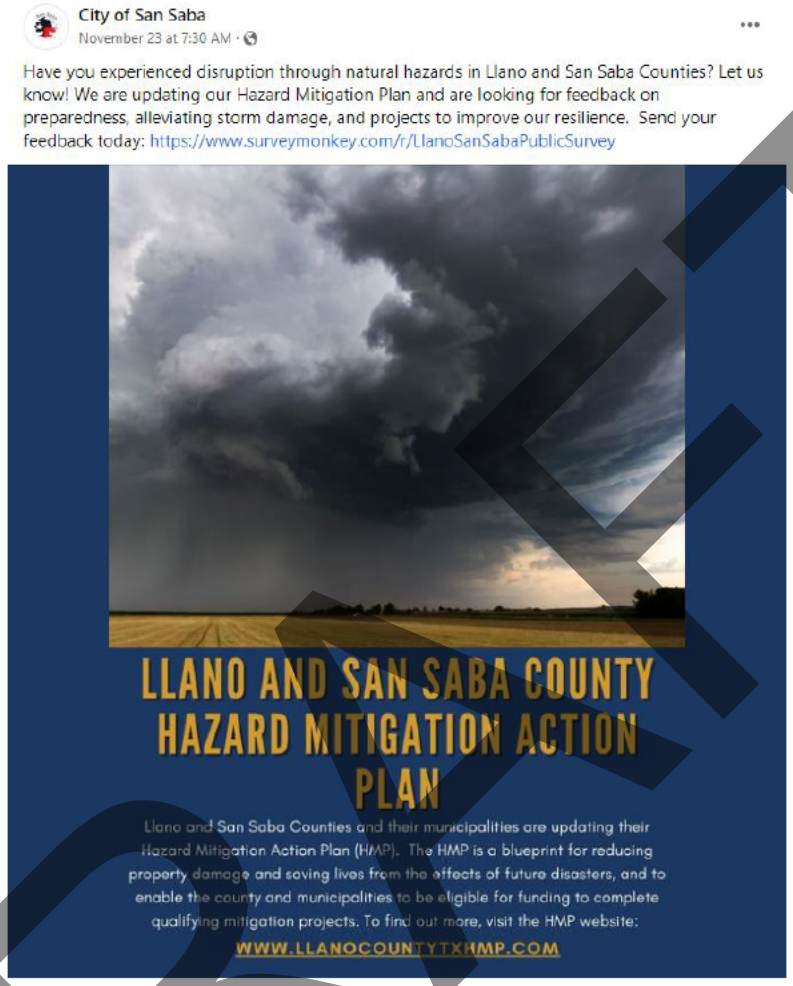
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Figure D-4: City of San Saba Facebook Post 11/21/22



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Figure D-5: City of San Saba Facebook Post 11/23/22



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Figure D-6: City of San Saba Facebook Post 11/25/22

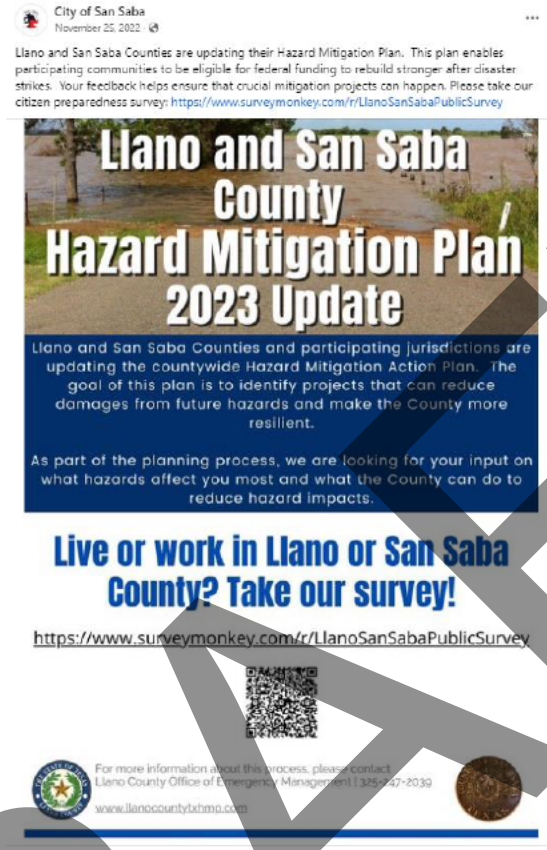


Figure D-7: City of San Saba Facebook Post 12/01/22

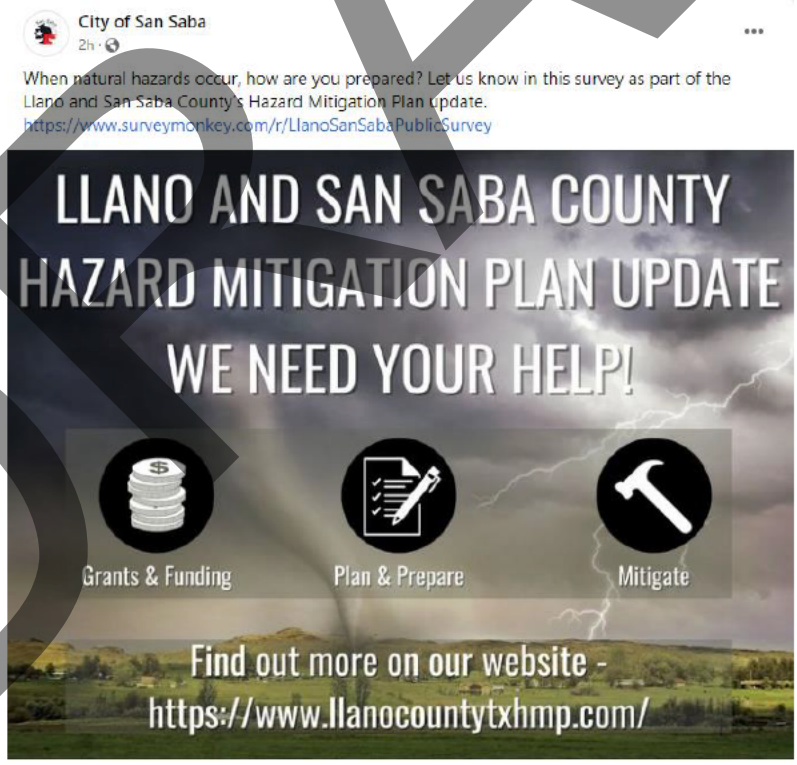


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Figure D-8: City of San Saba Facebook Post 12/03/22



Figure D-9: City of San Saba Facebook Post 12/05/22

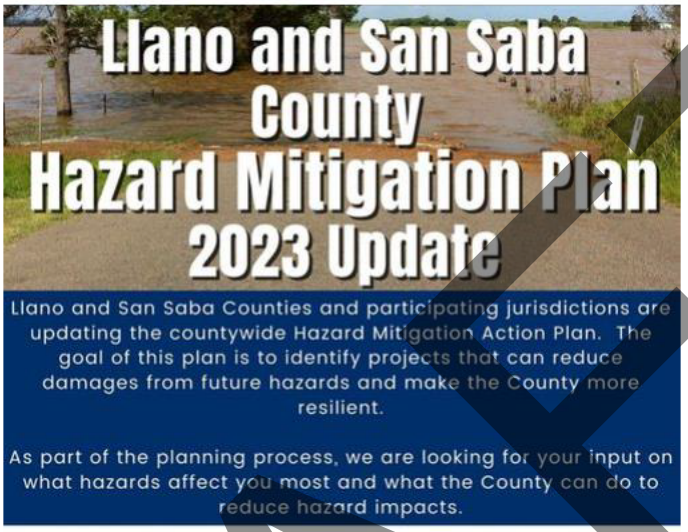


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Figure D-10: City of Llano Facebook Post 12/07/22

City of Llano, Texas - City Hall
December 7, 2022 ·

When natural hazards occur, how are you prepared? Let us know in this survey as part of Llano and San Saba County's Hazard Mitigation Plan update.
https://www.surveymonkey.com/r/LlanoSanSabaPublicSurvey

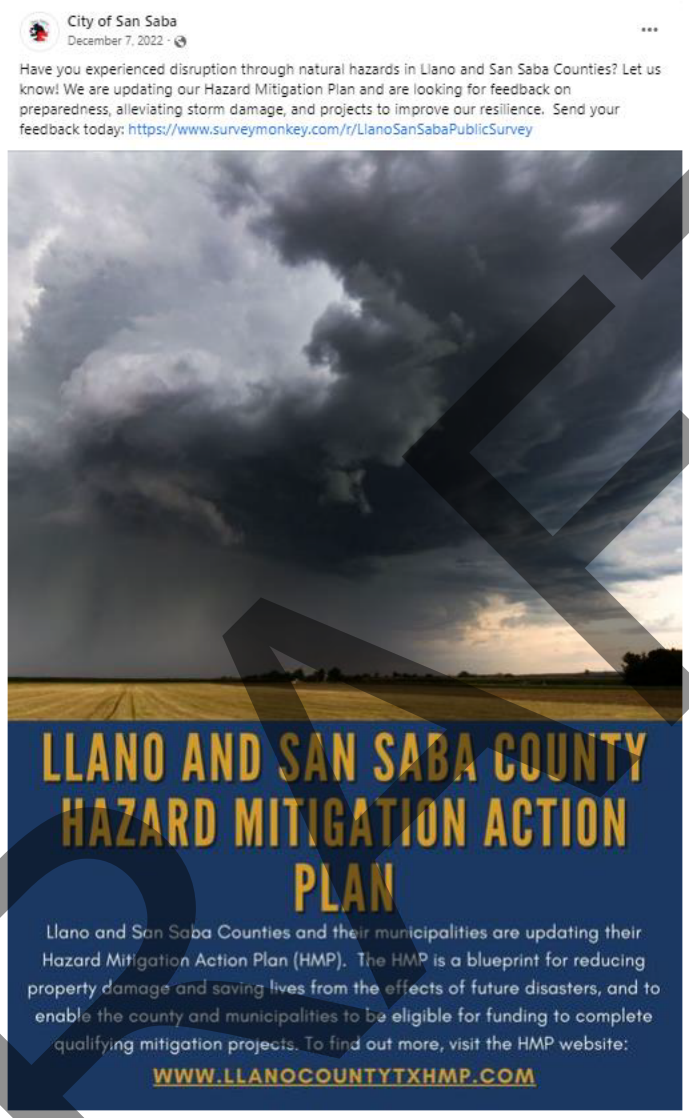


Live or work in Llano or San Saba County? Take our survey!

https://www.surveymonkey.com/r/LlanoSanSabaPublicSurvey

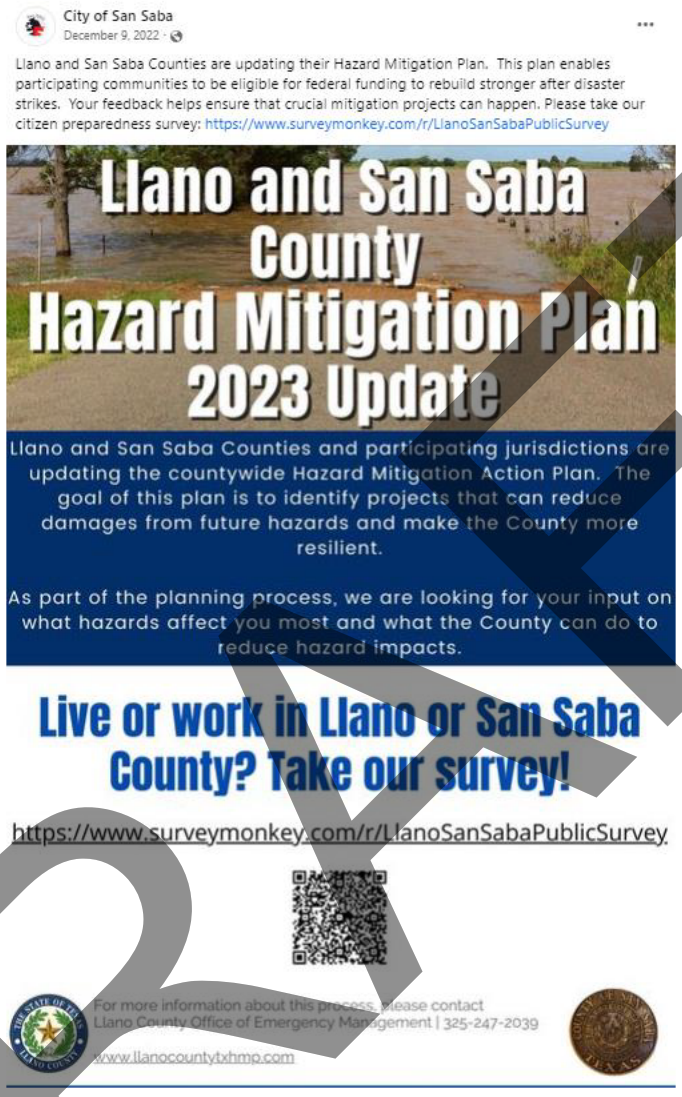
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Figure D-11:City of San Saba Facebook Post 12/07/22



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Figure D-12: City of San Saba Facebook Post 12/09/22



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Figure D-13: City of Llano Facebook Post 12/14/22

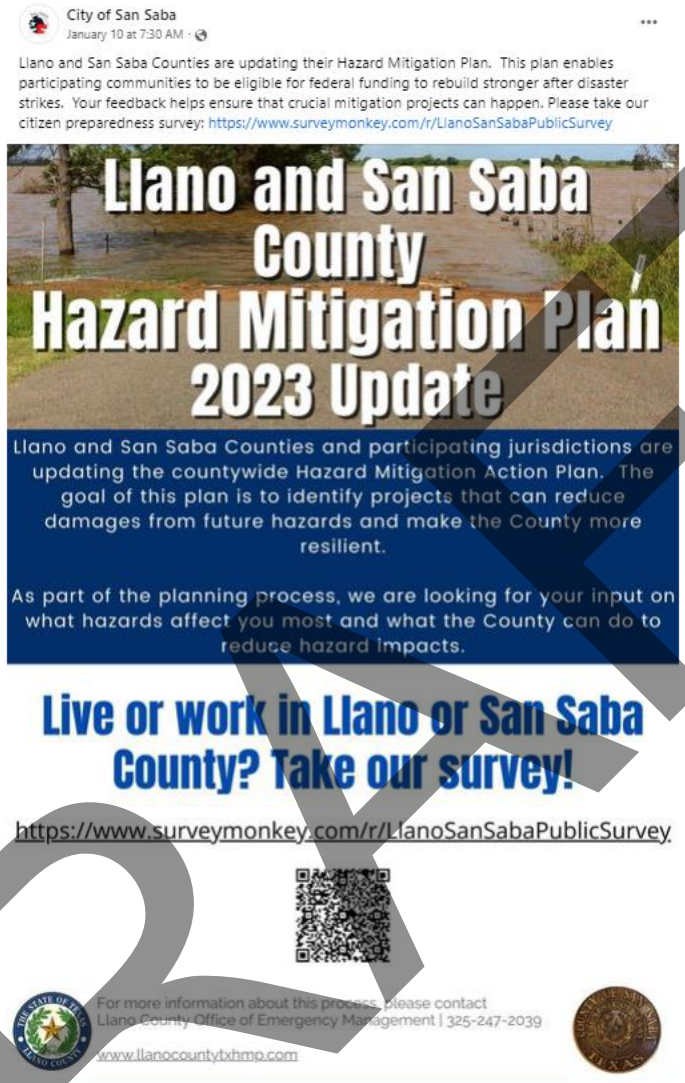


Figure D-14: City of Llano Facebook Post 12/20/23



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Figure D-15: City of San Saba Facebook Post 1/10/23



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Figure D-16: City of San Saba Facebook Post 1/14/23



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Figure D-17: City of San Saba Facebook Post 1/20/23



Figure D-18: Llano County Facebook Post 2/10/23



D.2 Stakeholder Surveys

This section contains information and results gathered from the Llano and San Saba HMP Stakeholder Survey. Unlike steering committee or planning partnership members, stakeholders may not be involved in all stages of the planning process, but they may have information or input to provide. In order to gather that information, the surveys were sent to the following stakeholders that provide various services to the Planning Area (emergency

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services, academic/research, public works, utility providers, business/commerce, hospitals/medical services, and transportation). Results of the surveys are provided below, with personal information redacted.

D.2.1 Stakeholder Survey Results

The stakeholder survey was designed to help identify general needs for hazard mitigation and resiliency within Llano and San Saba Counties from their perspective, as well as to identify specific projects that may be included in the mitigation plan. It was distributed to identified stakeholders, including the various county and municipal departments and agencies in the county. As of January 17, 2023, twenty stakeholders completed the survey, representing the following sectors: academic/research, business/commerce, emergency services, hospitals/medical, transportation, public works, and utilities.

The majority of respondents stated the buildings/facilities/structures they have worked in and/or are responsible for have not been impacted by a hazard (50%). Those that experienced damage stated that the structures damage due to winter weather, heavy rains, and flooding. When asked what areas are most vulnerable to hazards in the Planning Area, answers included low lying area, specifically those near rivers and other bodies of water.

The respondents stated that they have the following plans in place: Emergency Operations Plan (58.82%), Business Continuity Plan (5.88%), and Continuity of Operations Plan (17.65%). 11.76% selected they have no plans in pace while 29.41% said they are unsure if there are any plans.

D.2.2 Neighbor Survey

The neighbor survey was sent to the surrounding municipalities and counties of Llano and San Saba Counties due to their proximity to and because effects of hazard events that impact the Planning Area would be similar to that of their neighbors. As of January 17, 2023, no responses have been received.

D.3 Public Survey Results

This section contains information and results gathered from the Llano and San Saba Public Survey. The main objective of this survey was to gather information from citizens regarding their level of knowledge regarding hazard vulnerability and knowledge of hazard mitigation information for their local communities. Thirty-five respondents completed this survey over a period of four months during the planning process. The survey was available on Llano County HMP website (https://www.llanocountytxhmp.com/) and participants posted a link to the survey through their social media accounts. Full survey responses are provided at the end of the appendix.

D.4.1 Public Survey Results

Demographically, survey respondents were from the City of Horseshoe Bay, City of Llano, City of Richland Springs, City of San Saba, City of Sunrise Beach, Village of Buchanan Lake, among others. The majority of survey participants have lived in their house for over 10 years (63%) and own their house (90%). The most common (53%) age of respondents were over the age of 61; about 26.67% were in the age range of 51 to 60. Residents were asked the ways in which they receive their information concerning a natural disaster. The majority of respondents rely on social media (82.86%) and mass notification systems (74.29%) to receive information concerning natural disasters. Roughly three-quarters of respondents (71.43%) receive information through the internet and just about half (48.57%) receive information through radio news.

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Q1 Name of your department/office/institution

Answered: 20 Skipped: 0

#	RESPONSES	DATE
1	Texas Department of Emergency Management	1/4/2023 7:44 PM
2	Nursing Department at Mid Coast Medical Center Central Hospital	12/28/2022 10:43 AM
3	Highland Lakes Crisis Network	12/27/2022 12:16 PM
4	None	12/25/2022 5:16 PM
5	Richland Springs ISD	12/15/2022 2:47 PM
6	Marble Falls Area EMS	12/12/2022 10:15 AM
7	Llano County ESD #1	12/8/2022 5:36 PM
8	Llano County Sheriff's Office	12/7/2022 6:26 PM
9	Llano County Attorney's Office	12/7/2022 12:32 PM
10	Building maintenance	12/7/2022 12:15 PM
11	TxDot	12/7/2022 11:51 AM
12	Llano County IT Department	12/7/2022 9:12 AM
13	San Saba Economic Development Corporation	12/7/2022 8:44 AM
14	Emergency Services District #4	12/6/2022 5:30 PM
15	City of Horseshoe Bay Utilities Department/Plant Operations	12/6/2022 4:28 PM
16	Llano Volunteer Fire Department	12/6/2022 4:05 PM
17	Kingsland MUD	12/6/2022 3:55 PM
18	Llano Independent School District	12/6/2022 2:44 PM
19	Llano Local Health Authority	12/6/2022 2:20 PM
20	Llano County Development Services	12/6/2022 1:57 PM

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Q2 Name of Respondent

Answered: 20 Sk pped: 0

#	RESPONSES	DATE
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
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[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

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Q3 What is your position/title/role with your department/office/institution?

Answered: 20 Skipped: 0

#	RESPONSES	DATE
1	TDEM County Liaison Officer for Llano County	1/4/2023 7:44 PM
2	Director of Nursing	12/28/2022 10:43 AM
3	executive Director	12/27/2022 12:16 PM
4	Responding as an individual	12/25/2022 5:16 PM
5	Superintendent	12/15/2022 2:47 PM
6	Executive Director, Marble Falls Area EMS	12/12/2022 10:15 AM
7	Business Manager	12/8/2022 5:36 PM
8	Emergency Communications Manager	12/7/2022 6:26 PM
9	Criminal/Environmental Investigator	12/7/2022 12:32 PM
10	Supervisor	12/7/2022 12:15 PM
11	Supervisor	12/7/2022 11:51 AM
12	IT Director	12/7/2022 9:12 AM
13	Secretary/Treasurer	12/7/2022 8:44 AM
14	President of ESD#4 for ten years	12/6/2022 5:30 PM
15	Plant Operations Supervisor	12/6/2022 4:28 PM
16	Fire Chief	12/6/2022 4:05 PM
17	Operations Manager	12/6/2022 3:55 PM
18	Director of Operations	12/6/2022 2:44 PM
19	Local Health Authority	12/6/2022 2:20 PM
20	Development Services Administrator	12/6/2022 1:57 PM

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Q4 Please provide your contact information.

Answered: 20 Sk pped: 0

ANSWER CHOICES	RESPONSES	
Name	0.00%	0
Company	0.00%	0
Add ess	0.00%	0
Add ess 2	0.00%	0
C ty/Town	0.00%	0
State/P ov nce	0.00%	0
ZIP/Posta Code	0.00%	0
Count y	0.00%	0
Ema Add ess	100.00%	20
Phone Numbe	100.00%	20

#	NAME	DATE
	There are no esponses.	

#	COMPANY	DATE
	There are no esponses.	

#	ADDRESS	DATE
	There are no esponses.	

#	ADDRESS 2	DATE
	There are no esponses.	

#	CITY/TOWN	DATE
	There are no esponses.	

#	STATE/PROVINCE	DATE
	There are no esponses.	

#	ZIP/POSTAL CODE	DATE
	There are no esponses.	

#	COUNTRY	DATE
	There are no esponses.	

#	EMAIL ADDRESS	DATE
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

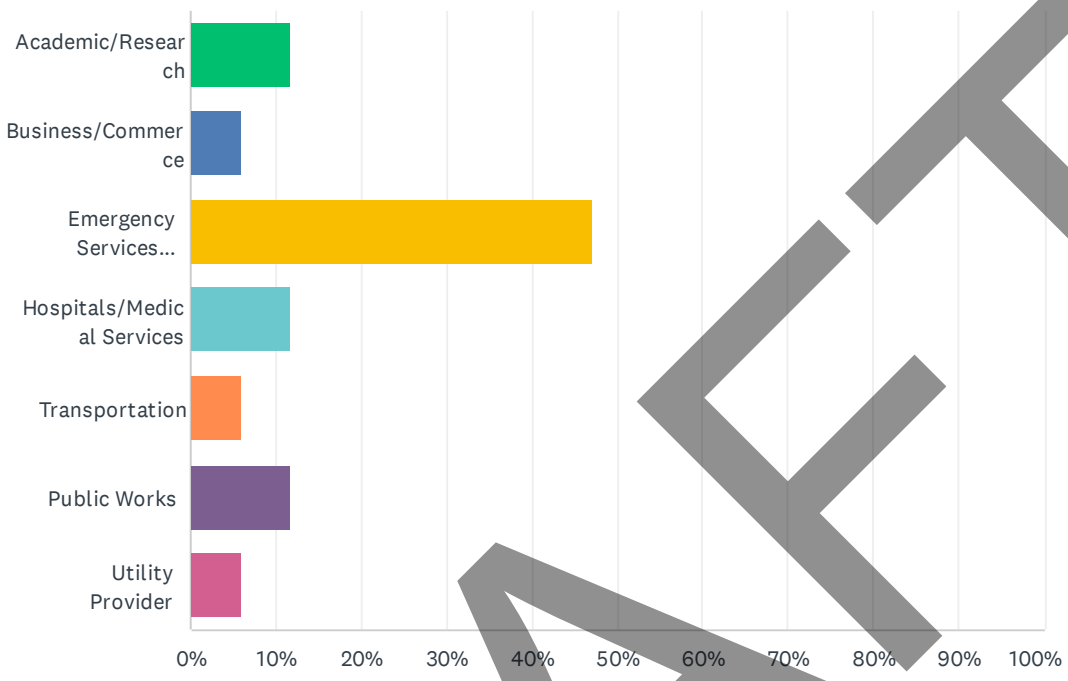
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#	PHONE NUMBER	DATE

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Q5 What category does your facility operation/service fall under?

Answered: 17 Sk pped: 3



ANSWER CHOICES	RESPONSES	
Academ c/Research	11.76%	2
Bus ness/Comme ce	5.88%	1
Eme gency Serv ces (pol ce, f e, EMS)	47.06%	8
Hospita s/Med ca Se v ces	11.76%	2
T anspo tat on	5.88%	1
Pub c Wo ks	11.76%	2
Ut ty P ov de	5.88%	1
TOTAL		17

#	OTHER (PLEASE SPECIFY)	DATE
1	Eme gency P ann ng and Response	1/4/2023 8:05 PM
2	Vo untee / Commun ty Se v ce	12/27/2022 12:18 PM
3	Ma ntenance on county fac t es	12/7/2022 12:20 PM

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Q6 Based on the above category, please provide additional description and information as to what your organization does or offers (please explain)

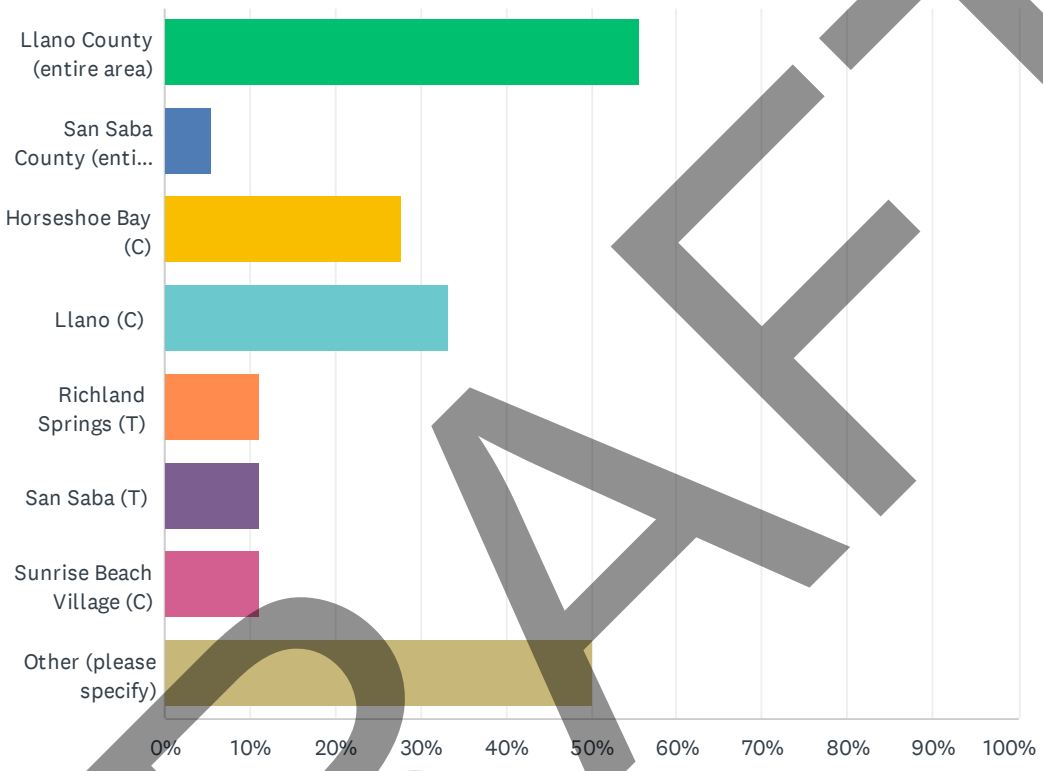
Answered: 18 Skipped: 2

#	RESPONSES	DATE
1	TDEM is an emergency response entity that provides complex consultative services and technical assistance. Our task includes supporting the planning, developing, and implementing of local/county emergency management programs and providing technical assistance to program staff, governmental agencies, community organizations, or the public. TDEM assists with supporting local emergency operations center, (EOCs) or Disaster District Emergency Operations Center (DDEOCs) during planned and unplanned events.	1/4/2023 8:05 PM
2	Currently we offer Level IV Trauma Center, 24/7 ED care, radiology (Xray, CT, Ultra Sound, and MRI (the MRI is once per week), 24/7 Lab (inpatient and outpatient), Physical Therapy (inpatient and outpatient), Med Surg Care Unit with Swing Bed Program, Dietary offers breakfast/lunch Monday thru Friday to public, StarBucks	12/28/2022 10:54 AM
3	We are a network of churches and volunteers to resapond in times of disaster. We also provide some solutions for children/families who are in crisis situations throughout the year, including some housing solutions.	12/27/2022 12:18 PM
4	Public Education - (PK-12)	12/15/2022 2:48 PM
5	Contracted EMS provider for Llano County ESD 1	12/12/2022 10:17 AM
6	EMS service	12/8/2022 5:37 PM
7	We answer all 911 calls and non-emergency calls for Llano County. We dispatch all emergency responders and non-emergency resources for the county as well as coordinate the available resources. We answer all radio traffic for all our first responders, send regional notification alerts, and request outside mutual aid resources when needed.	12/7/2022 7:01 PM
8	We are Law Enforcement, we do Criminal Investigations in the county, as we also investigate all environmental crimes within the county. We are part of the Emergency Response Team as well.	12/7/2022 12:34 PM
9	We do maintenance on all county facilities buildings and emergency tower sites	12/7/2022 12:20 PM
10	Maintain all State owned Highways and rights of way.	12/7/2022 11:52 AM
11	Llano County Sheriff's Office	12/7/2022 9:14 AM
12	to promote economic development/growth within San Saba. To attract new businesses and increase job availability in the community for a better quality of life.	12/7/2022 8:53 AM
13	ESD#4 has a five-person board formed to give Oak Ridge Estates residents an equitable was to pay for fire-fighting services which are provided by the near by City of Horseshoe Bay.	12/6/2022 5:38 PM
14	Provides potable water and treatment of wastewater	12/6/2022 4:30 PM
15	Fire and rescue response for the city of Llano and Llano County ESD#3.	12/6/2022 4:10 PM
16	Sewer company for Kingsland	12/6/2022 3:57 PM
17	School District Pre-K through 12	12/6/2022 2:49 PM
18	I run our health response to public crises. For instance during Covid 19, I coordinated our vaccine response, testing response, and eventually treatment response to the extent that I was able.	12/6/2022 2:23 PM

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Q7 Please identify the location of your facility(ies) and/ or primary service area. You may choose more than one if your service area covers multiple communities, or “Llano County (entire area) or San Saba County (entire area)” if your service area is county-wide:

Answered: 18 Sk pped: 2



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ANSWER CHOICES	RESPONSES	
L ano County (ent e area)	55.56%	10
San Saba County (ent e a ea)	5.56%	1
Ho seshoe Bay (C)	27.78%	5
L ano (C)	33.33%	6
R ch and Sp ings (T)	11.11%	2
San Saba (T)	11.11%	2
Sun ise Beach V age (C)	11.11%	2
Othe (p ease spec fy)	50.00%	9
Tota Respondents: 18		

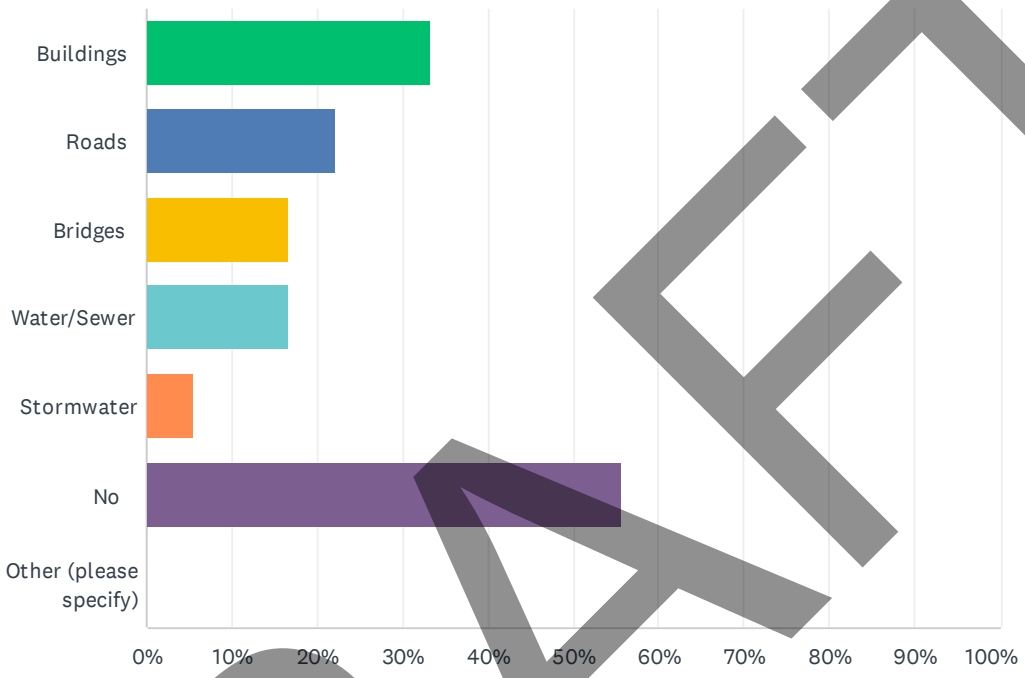
#	OTHER (PLEASE SPECIFY)	DATE
1	Stayed Ope at ons Cente (SOC) Aust n, TX	1/4/2023 8:05 PM

2	Mason County	12/28/2022 10:54 AM
3	Deer Haven, Blue Lake, Sandy Harbor, and Oakridge	12/12/2022 10:17 AM
4	Buchanan Dam and Kingsland	12/7/2022 7:01 PM
5	Kingsland, Buchanan dam	12/7/2022 12:20 PM
6	Oak Ridge Estates	12/6/2022 5:38 PM
7	Burnet County	12/6/2022 4:30 PM
8	Llano County Emergency Services District #3	12/6/2022 4:10 PM
9	Kingsland	12/6/2022 3:57 PM

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Q8 Does your organization maintain or manage any of the following within your designated service area? If not, answer “No” at the bottom, otherwise check all that apply.

Answered: 18 Sk pped: 2



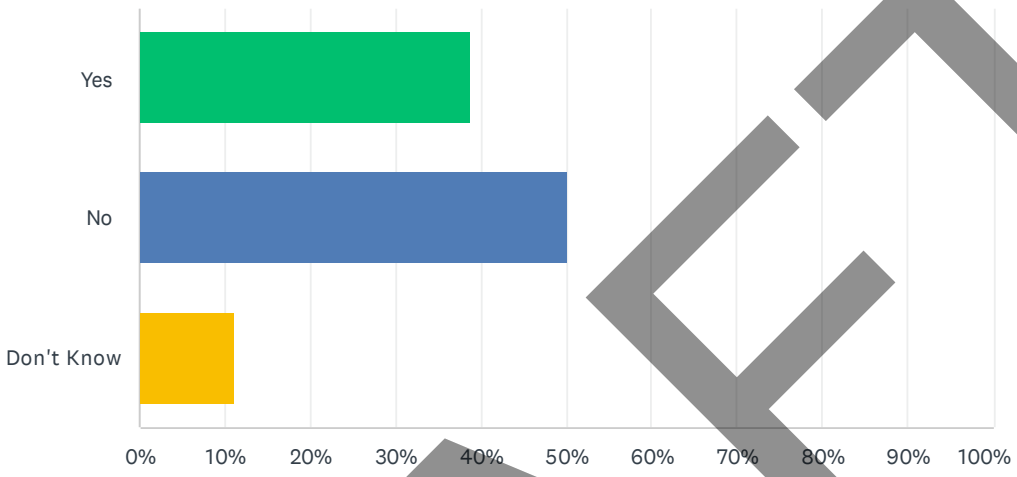
ANSWER CHOICES	RESPONSES	
Bu d ngs	33.33%	6
Roads	22.22%	4
B dges	16.67%	3
Water/Sewe	16.67%	3
Stormwate	5.56%	1
No	55.56%	10
Othe (p ease spec fy)	0.00%	0
Tota Respondents: 18		

#	OTHER (PLEASE SPECIFY)	DATE
	There are no esponses.	

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Q9 Looking back at previous hazard events, have buildings/facilities/structures you have worked in and/ or are responsible for been impacted by a hazard (ex. damage/closures/etc.)?

Answered: 18 Sk pped: 2



ANSWER CHOICES	RESPONSES	
Yes	38.89%	7
No	50.00%	9
Don't Know	11.11%	2
TOTAL		18

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Q10 If you answered “Yes” to the above question, please describe the event that caused or is causing (if recurring) damage and loss of service/ property. If quantifiable data is available, please provide that as well (number of damaged structures, monetary loss, etc.) (please explain)

Answered: 9 Skipped: 11

#	RESPONSES	DATE
1	Llano River flood of 2018 washed out roads that cut off groups of citizens for an extended period. No emergency services could respond to meet the needs in the affected areas. State Blackhawk helicopters were used to evacuate residents with immediate health concerns. Texas Task Force 1 had to utilize a swift water rescue team to exfill one resident affected by the washed out road. Winter storm of 2022 impacted water and electricity to the entire area and created long term damage that had to use stayed resources to support the affected county residents.	1/4/2023 8:15 PM
2	N/A	12/28/2022 10:57 AM
3	Winter Storms (ie., Uri) Hail / Sever Weather	12/15/2022 2:51 PM
4	During the ice storm in Feb 2021, we did lose power due to the generator copper wires breaking in the ground. Our building was still functional for some services, but radio services had to be moved to a mobile unit.	12/7/2022 7:12 PM
5	Bridge washed out during flood.	12/7/2022 11:54 AM
6	Water leaks	12/7/2022 9:15 AM
7	1) Flood of 2018 and the flooding of the Ra Water pump stations. 2) Ice Storm 2021 loss of power, not able to treat water or wastewater.	12/6/2022 4:36 PM
8	Ice/snow storm, flooding	12/6/2022 2:51 PM
9	Our healthcare infrastructure in general was damaged by the pandemic. This was secondary to: loss of income, lack of personal protective equipment, and lack of facilities to transfer critically ill patients during the height of the pandemic. Again, difficult to place a monetary figure on this.	12/6/2022 2:29 PM

DRAFT

Q11 Looking at where your facilities or services are located in Llano County and/or San Saba County, what areas do you believe to be the most vulnerable to hazards? What are these hazards? (please explain).

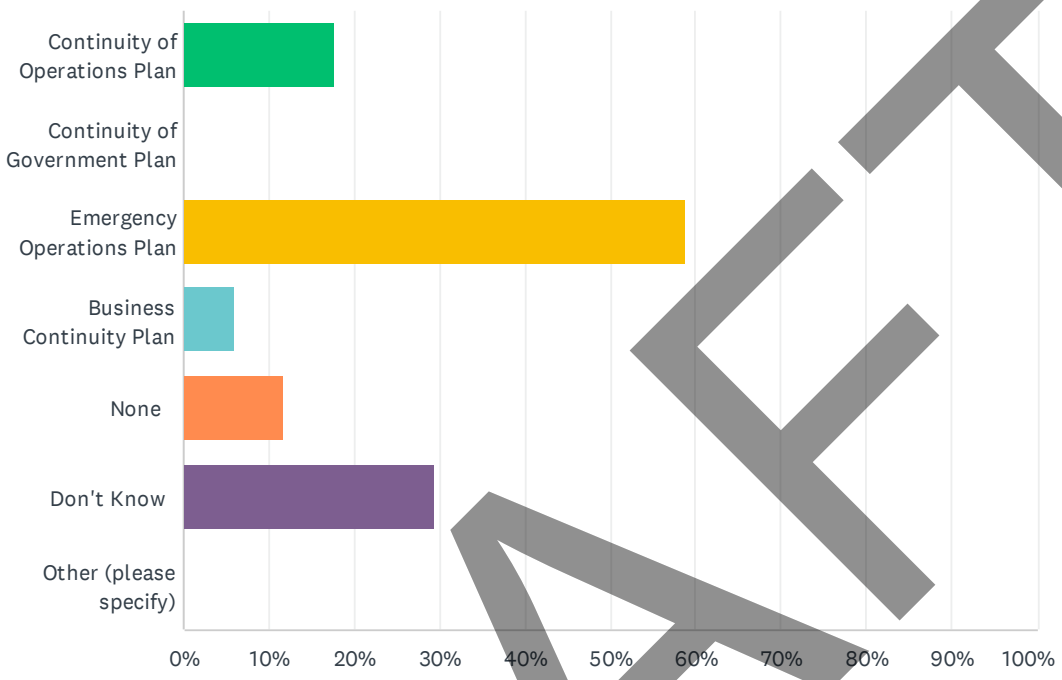
Answered: 12 Skipped: 8

#	RESPONSES	DATE
1	Access R/T no security on site	12/28/2022 10:57 AM
2	RSISD's Physical Facility - Inclement Weather, Hail, Winter Storms, etc.	12/15/2022 2:51 PM
3	Most likely high winds or tornadoes. High tension power lines go directly over our Horseshoe Bay station.	12/12/2022 10:18 AM
4	none that I can think of. Our facility is in a pretty good location.	12/7/2022 7:12 PM
5	Llano emergency tower sites	12/7/2022 12:21 PM
6	any riverside building flooding is an issue	12/7/2022 9:15 AM
7	No emergency shelter. During the Texas winter storm there was no designated building/shelter where a person could go to survive the cold. There are buildings that could serve for this purpose but not system/plan in place. No back up generators/food service/shelter.	12/7/2022 8:59 AM
8	Our area is very vulnerable to fire and flooding of Lake LBJ	12/6/2022 5:40 PM
9	West Water Treatment Plant and Wastewater Treatment Plant. Not being able to operate due to loss of power.	12/6/2022 4:36 PM
10	N/A	12/6/2022 4:11 PM
11	Our campuses in Llano and in Kingsland. Wind, storm, ice/snow damage, and flooding. Any of these natural events can cause closures in our facilities.	12/6/2022 2:51 PM
12	Our vulnerable elderly and vulnerable poor are most at risk to hazards in our community. These individuals had difficulty making it to medical facilities when they were ill, were untrusting of those medical facilities secondary to the perceived and real cost of medical care, and the extreme lack of certain areas of medical care most predominantly psychiatric care. The closest psychiatrist to our county is in Austin. These services are very difficult to obtain, and are now being delivered predominantly by primary care providers.	12/6/2022 2:29 PM

DRAFT

Q12 Is your organization covered by any of the following plans? Check all that apply

Answered: 17 Sk pped: 3



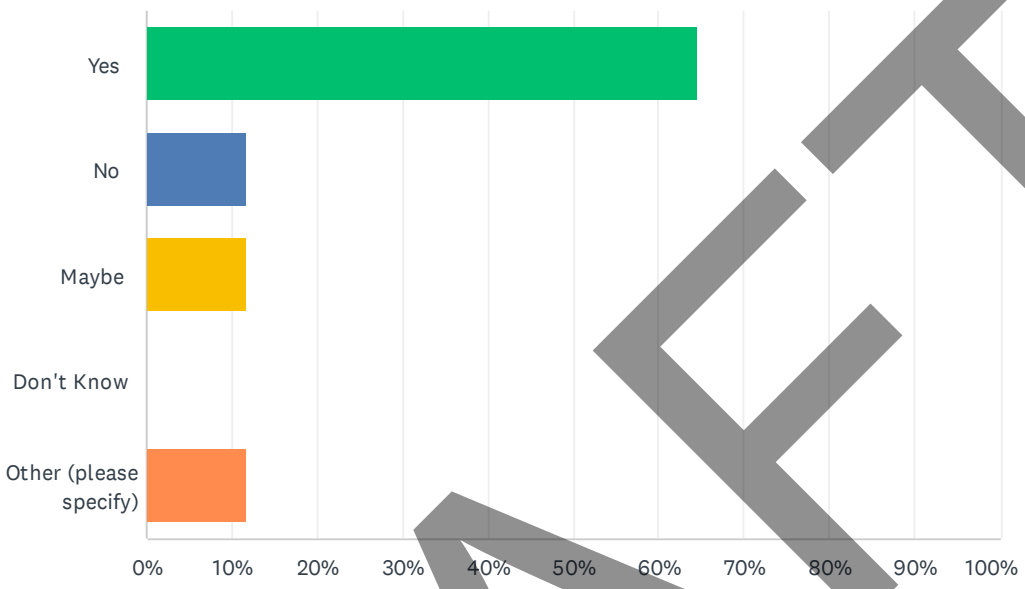
ANSWER CHOICES	RESPONSES	
Cont nu ty of Ope at ons P an	17.65%	3
Cont nu ty of Gove nment P an	0.00%	0
Eme gency Ope at ons P an	58.82%	10
Bus ness Cont nu ty P an	5.88%	1
None	11.76%	2
Don't Know	29.41%	5
Othe (p ease spec fy)	0.00%	0
Tota Respondents: 17		

#	OTHER (PLEASE SPECIFY)	DATE
	There are no esponses.	

DRAFT

Q13 Do you believe the facilities and infrastructure for your organization are equipped to handle a disaster and/or resilient to damages?

Answered: 17 Sk pped: 3



DRAFT

ANSWER CHOICES	RESPONSES	
Yes	64.71%	11
No	11.76%	2
Maybe	11.76%	2
Don't Know	0.00%	0
Othe (p ease spec fy)	11.76%	2
TOTAL		17

#	OTHER (PLEASE SPECIFY)	DATE
1	We do have a ot of g ass so t wou d depend on the d saste	12/28/2022 10:59 AM
2	No, but we a e bette off than most count es n Texas.	12/6/2022 2:31 PM

Q14 Can you identify projects or programs that will reduce your facility/organization's vulnerability to damages and losses, including loss of operation/service, to hazard events? (Please explain)

Answered: 12 Skipped: 8

#	RESPONSES	DATE
1	Active Shooter Training for Staff Evacuation Plan that has safe meeting point/place	12/28/2022 11:01 AM
2	Preventative Maintenance Scheduling re: roof tops, vehicles, windows, etc.	12/15/2022 2:52 PM
3	No	12/12/2022 10:23 AM
4	no	12/8/2022 5:40 PM
5	A new generator for our building and emergency lighting	12/7/2022 7:22 PM
6	Call Tower sites are vulnerable to lightning strikes	12/7/2022 12:24 PM
7	Yes, assistance from Hill Country Community Action Association but needs to be in place not wait until it is over.	12/7/2022 9:01 AM
8	No	12/6/2022 5:41 PM
9	We are trying to secure a grant to help with raising the Raw Water Pump Stations electrical.	12/6/2022 4:38 PM
10	backup gensets backup fuel	12/6/2022 4:00 PM
11	Backup power supply access, ability to keep roads open in the event of flooding and ice/snow	12/6/2022 2:54 PM
12	We need to attract more physicians and mental health services in our area. Though funds would certainly help, our current efforts through the Texas A&M medical school seem most likely at this point to bring more physicians to the area.	12/6/2022 2:32 PM

DRAFT

Q15 Can you identify projects or programs that have been recently been implemented to reduce your facility's/organization's vulnerability, damage and losses, including loss of operation/service, to hazard events? (please explain)

Answered: 13 Skipped: 7

#	RESPONSES	DATE
1	Back up generators Bottled/canned water backup Staffing arrangements for overnight stays	12/28/2022 11:01 AM
2	Generators on hand. We also have a warehouse under construction that will store, among other things, emergency response supplies and will be available to deploy across Burnet and Llano Counties in times of crisis.	12/27/2022 12:20 PM
3	N/A	12/15/2022 2:52 PM
4	No	12/12/2022 10:23 AM
5	no	12/8/2022 5:40 PM
6	We have stocked up on extra battery back up units for our computers and are in the process of getting a new generator	12/7/2022 7:22 PM
7	No	12/7/2022 12:24 PM
8	none known	12/7/2022 9:01 AM
9	No	12/6/2022 5:41 PM
10	Repair of generators and the continued maintenance of the generators. This has been completed.	12/6/2022 4:38 PM
11	none	12/6/2022 4:00 PM
12	Securing the exterior doors/entrances in our campuses to mitigate active threat events	12/6/2022 2:54 PM
13	As above the program through the Texas A&M medical school to try to attract younger doctors to rural America has been promising and in its start	12/6/2022 2:32 PM

DRAFT

Q16 Do you have any questions or comments for Llano County and/or San Saba County?

Answered: 7 Skipped: 13

#	RESPONSES	DATE
1	Not at this time	12/28/2022 11:01 AM
2	No	12/12/2022 10:24 AM
3	no	12/8/2022 5:40 PM
4	No	12/7/2022 12:25 PM
5	This plan is very much needed in this area. We have managed to survive unexpected incidents but because the community cares and takes risks to ensure the elderly and those in need are safe.	12/7/2022 9:04 AM
6	no	12/6/2022 4:01 PM
7	Increasing contact between our emergency operations and are vulnerable populations seems like it would be ideal in preparing us for unknown hazards. The greater the communication we have before the crisis starts, the greater we are able to work together during the crisis. I think this was borne out with our code response nicely.	12/6/2022 2:35 PM

DRAFT

Survey respondents were asked how concerned they were about 17 different hazards, on a scale of not concerned to extremely concerned. Respondents were most concerned (reporting "concerned", "very concerned", or "extremely concerned") about severe winter storms, extreme temperatures (hot/cold), drought, and severe weather.

About 91.43% of respondents' properties are not located in the floodplain, with 8.57% within a floodplain. Of the respondents in the floodplain, 9.09% do not have flood insurance and 6.06% do have flood insurance. Of the residents whose properties are located outside of the floodplain, 14.71% have flood insure and 64.71% do not. Residents were then asked what types of projects they believe local, county, state, or federal government agencies could be doing in order to reduce the damage and disruption of disasters in the Planning Area including:

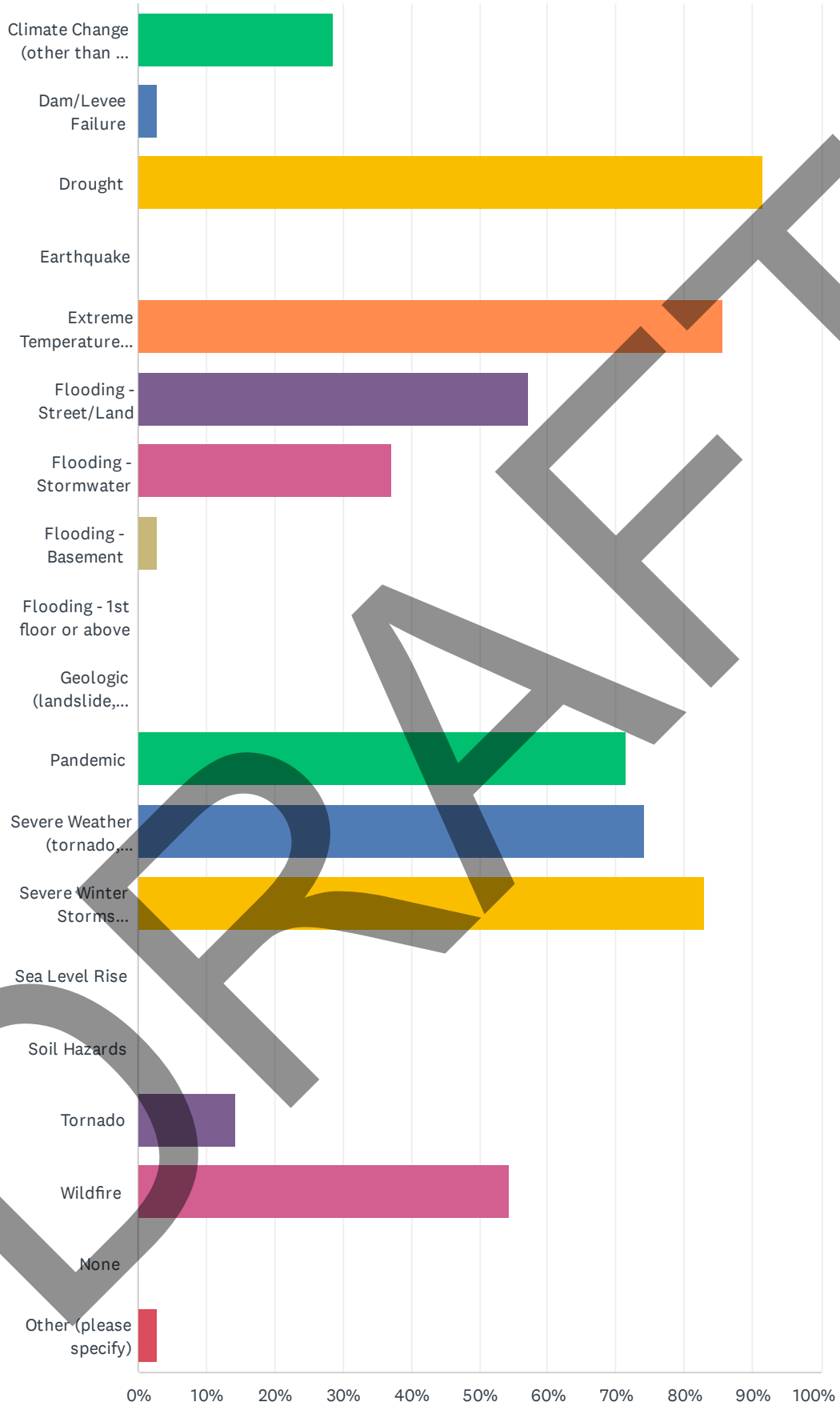
- (33.33%) Retrofit and strengthen essential facilities such as police, schools, and hospitals
- (53.33%) Retrofit infrastructure, such as elevating roadways and improving drainage systems
- (76.67%) Work on improving the damage resistance of utilities (electricity, communications, water/wastewater facilities etc.)
- (20.00%) Install or improve protective structures, such as floodwalls, levees, bulkheads, and firebreaks
- (36.67%) Enhance stream maintenance programs/projects
- (46.67%) Replace inadequate or vulnerable bridges and causeways
- (16.67%) Strengthen codes, ordinances and plans to require higher hazard risk management standards and/or provide greater control over development in high hazard areas
- (16.67%) Buyout flood prone properties and maintain as open space
- (46.67%) Inform property owners of ways they can mitigate damage to their properties
- (40.00%) Improve access to information about hazard risks and high-hazard areas
- (36.67%) Assist vulnerable property owners with securing funding to mitigate their properties
- (30.00%) Create a stream gage and weather monitoring program to provide more accurate data and warnings

DRAFT

Q1 In the past 10 years, which of the following hazard events have you experienced in Llano or San Saba County? Check all that apply.

Answered: 35 Skipped: 0

DRAFT


Climate Change (other than ...
Dam/Levee Failure
Drought
Earthquake
Extreme Temperature...
Flooding - Street/Land
Flooding - Stormwater
Flooding - Basement
Flooding - 1st floor or above
Geologic (landslide,...
Pandemic
Severe Weather (tornado,...
Severe Winter Storms...
Sea Level Rise
Soil Hazards
Tornado
Wildfire
None
Other (please specify)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

DRAFT

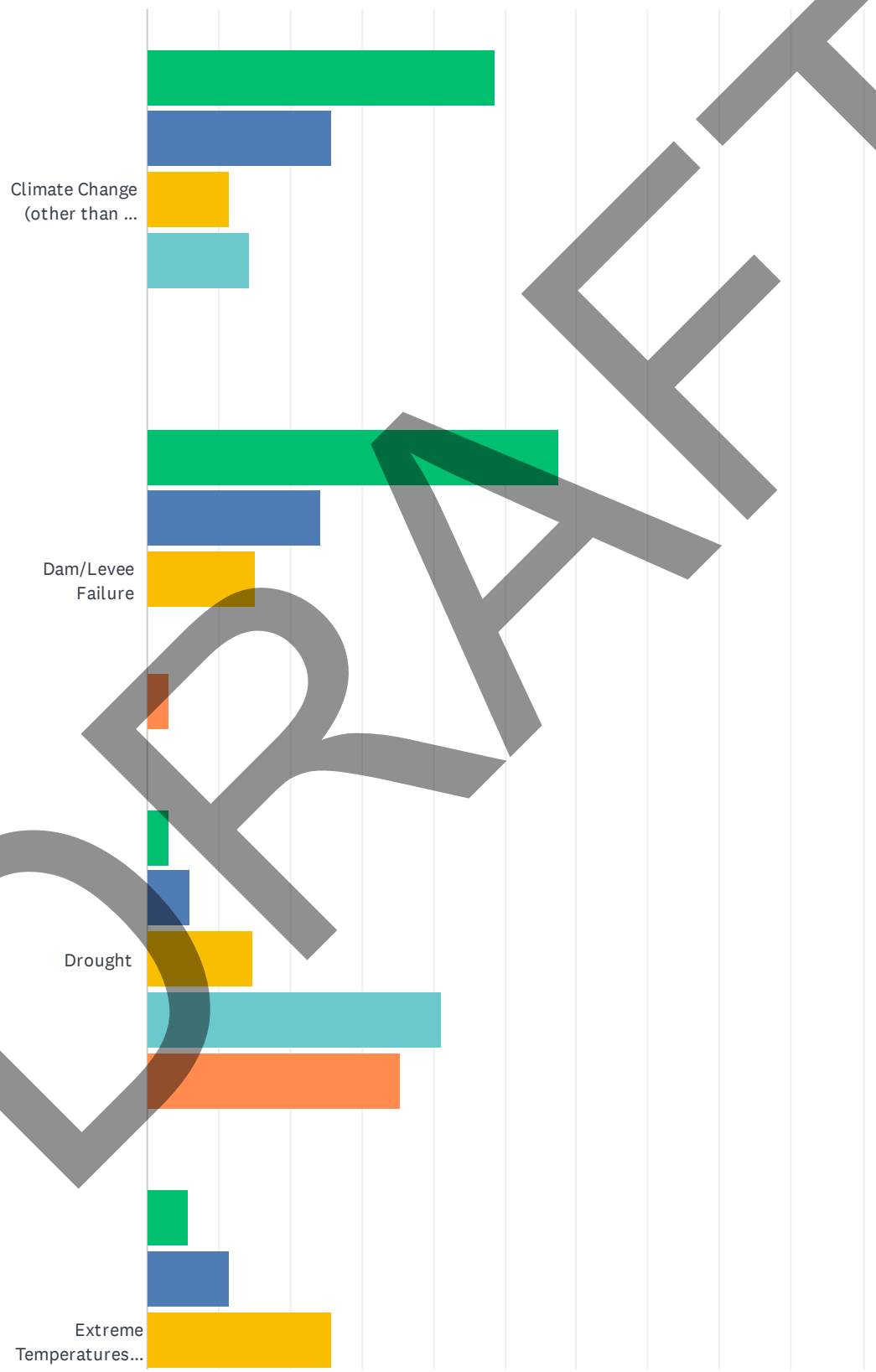
ANSWER CHOICES	RESPONSES	
C mate Change (othe than sea eve ise)	28.57%	10
Dam/Levee Fa u e	2.86%	1
D ought	91.43%	32
Ea thquake	0.00%	0
Ext eme Tempe atu e (heat and co d)	85.71%	30
F ood ng - St eet/Land	57.14%	20
F ood ng - Sto mwate	37.14%	13
F ood ng - Basement	2.86%	1
F ood ng - 1st f oo o above	0.00%	0
Geo og c (ands de, s nkho es, subs dence)	0.00%	0
Pandem c	71.43%	25
Severe Weathe (to nado, thunde sto m, hai)	74.29%	26
Severe W nte Sto ms (bl zza d, heavy snow, ce)	82.86%	29
Sea Level R se	0.00%	0
So Haza ds	0.00%	0
Tornado	14.29%	5
W df e	54.29%	19
None	0.00%	0
Othe (p ease spec fy)	2.86%	1
Tota Respondents: 35		

#	OTHER (PLEASE SPECIFY)	DATE
1	C ty sewer neg gence	11/17/2022 8:10 AM

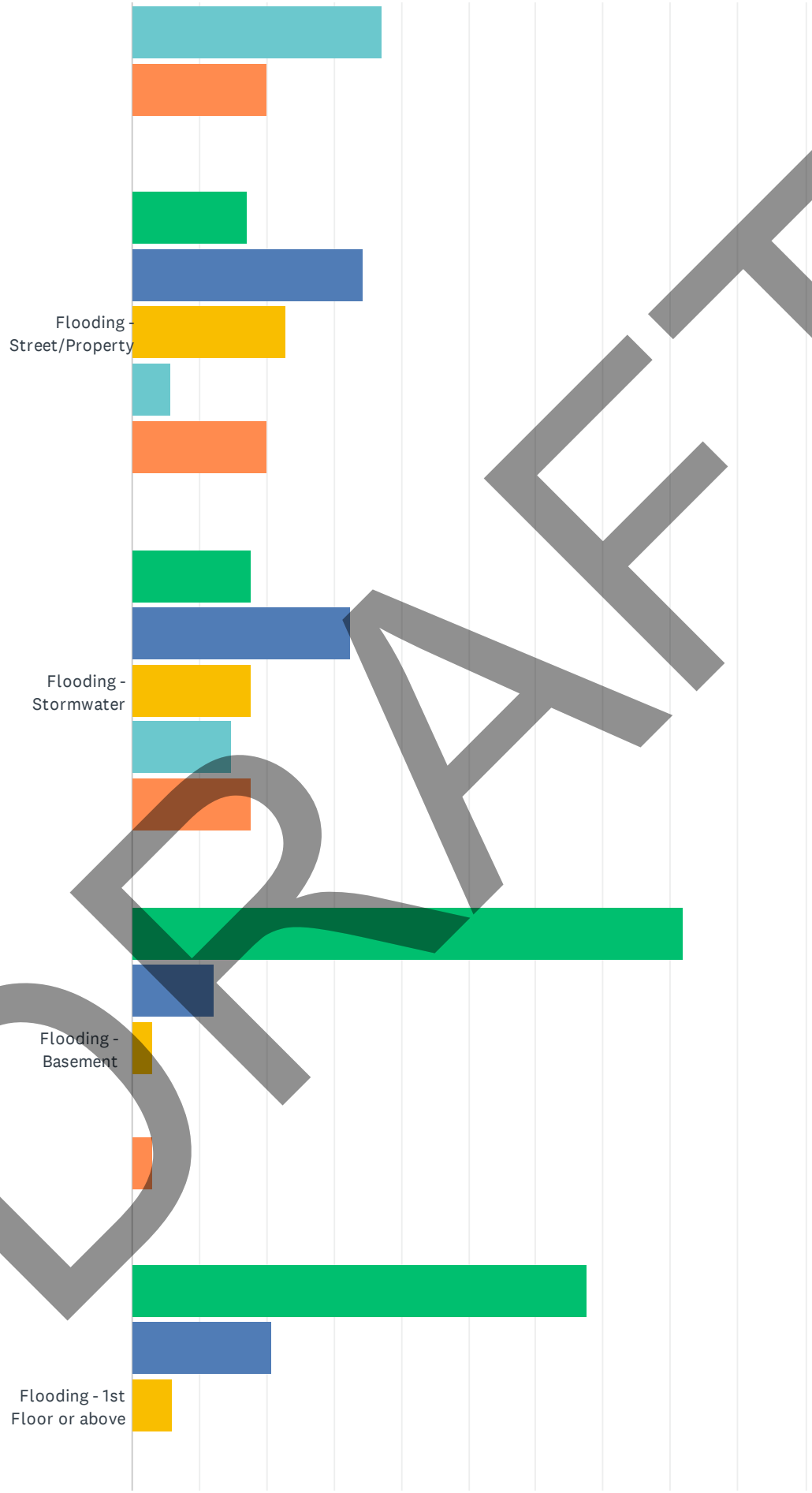
DRAFT

Q2 How concerned are you about the following hazards in Llano and San Saba County? Please check one for each hazard.

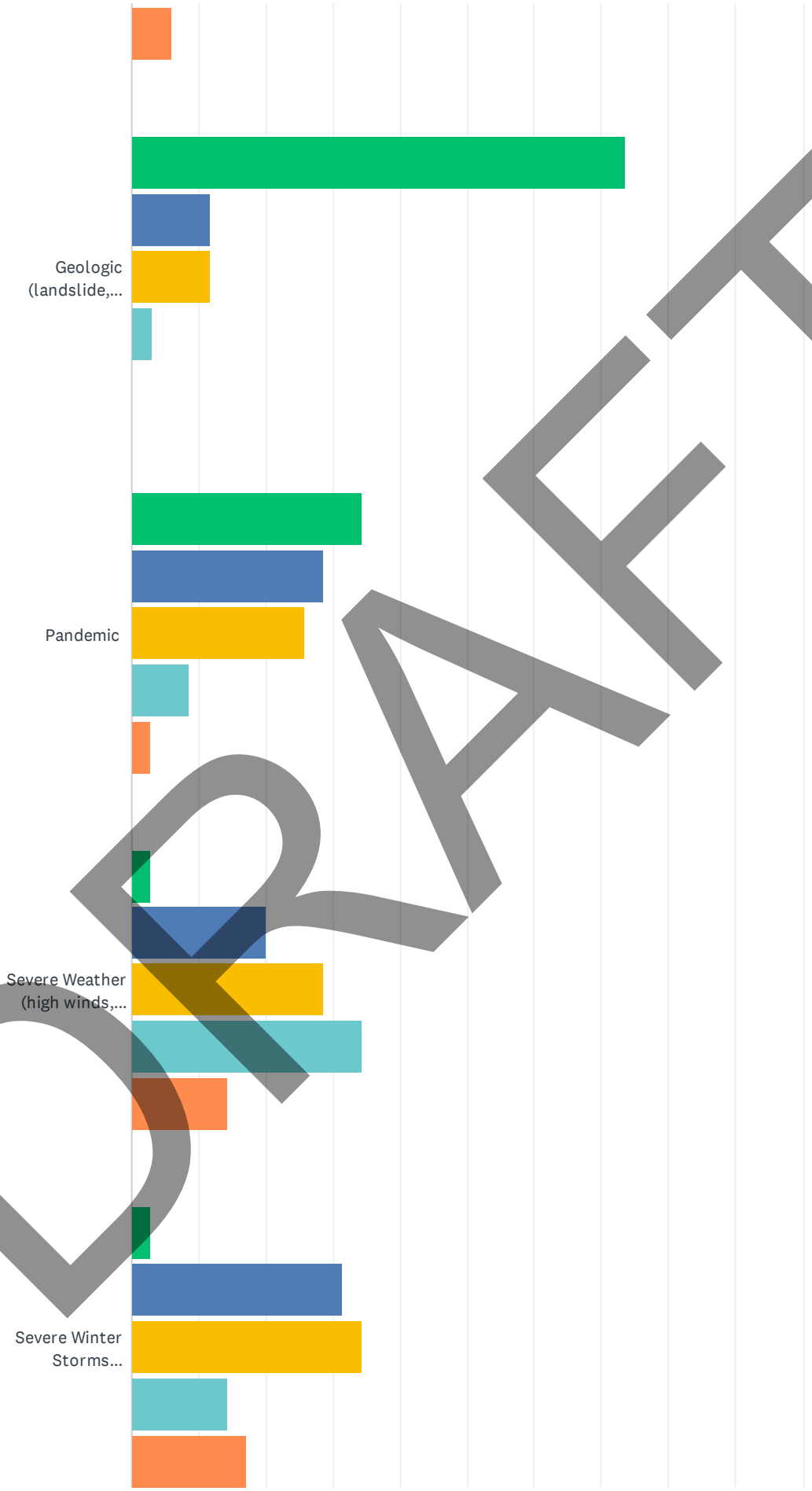
Answered: 35 Skipped: 0



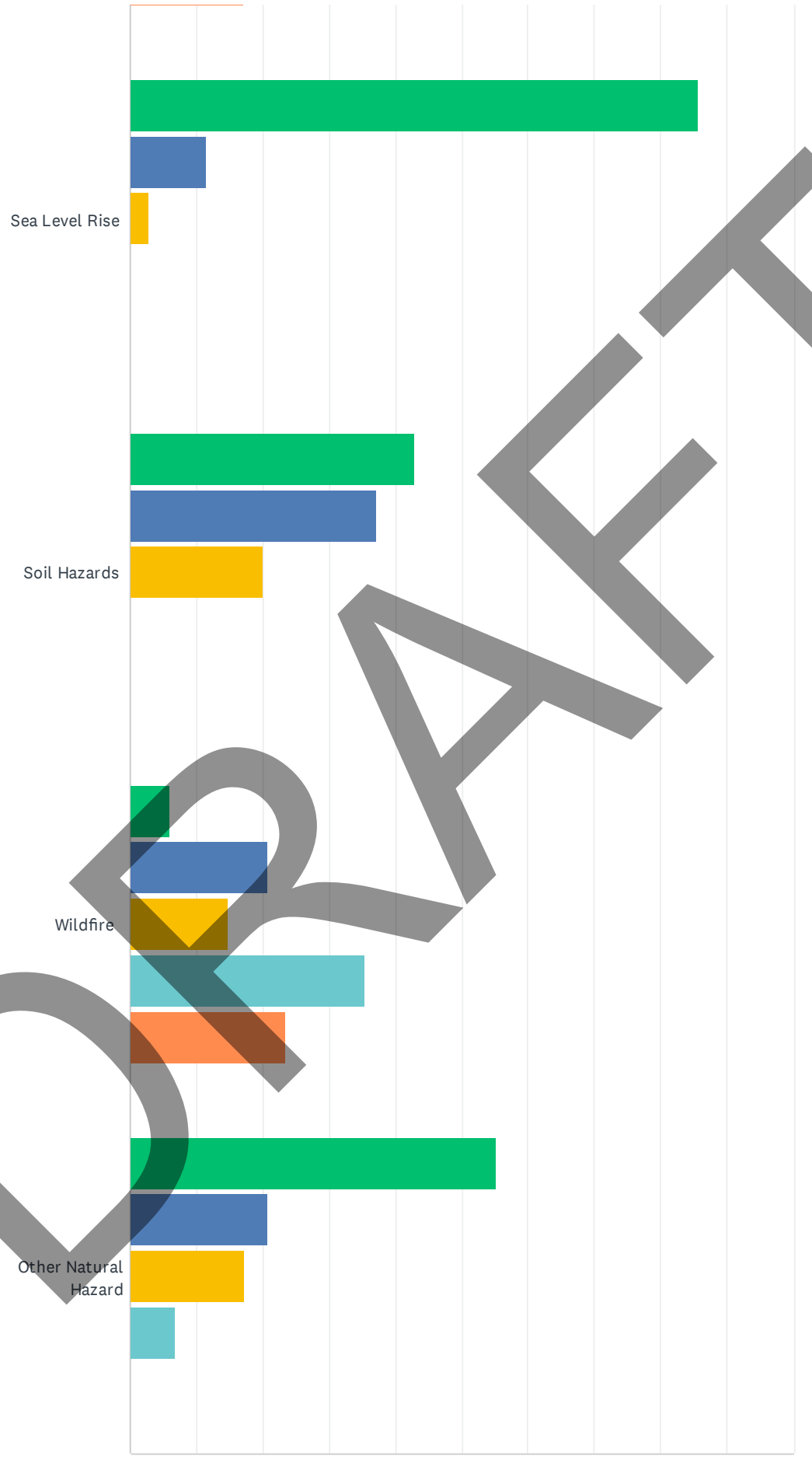
DRAFT


Flooding - Street/Property
Flooding - Stormwater
Flooding - Basement
Flooding - 1st Floor or above

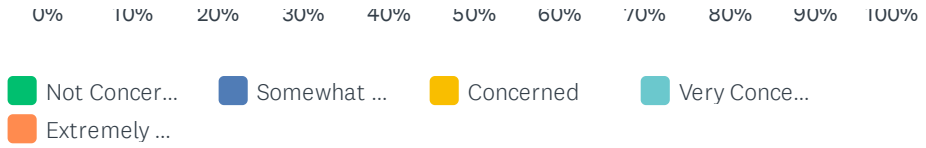
DRAFT


Geologic (landslide,...
Pandemic
Severe Weather (high winds,...
Severe Winter Storms...

DRAFT



DRAFT



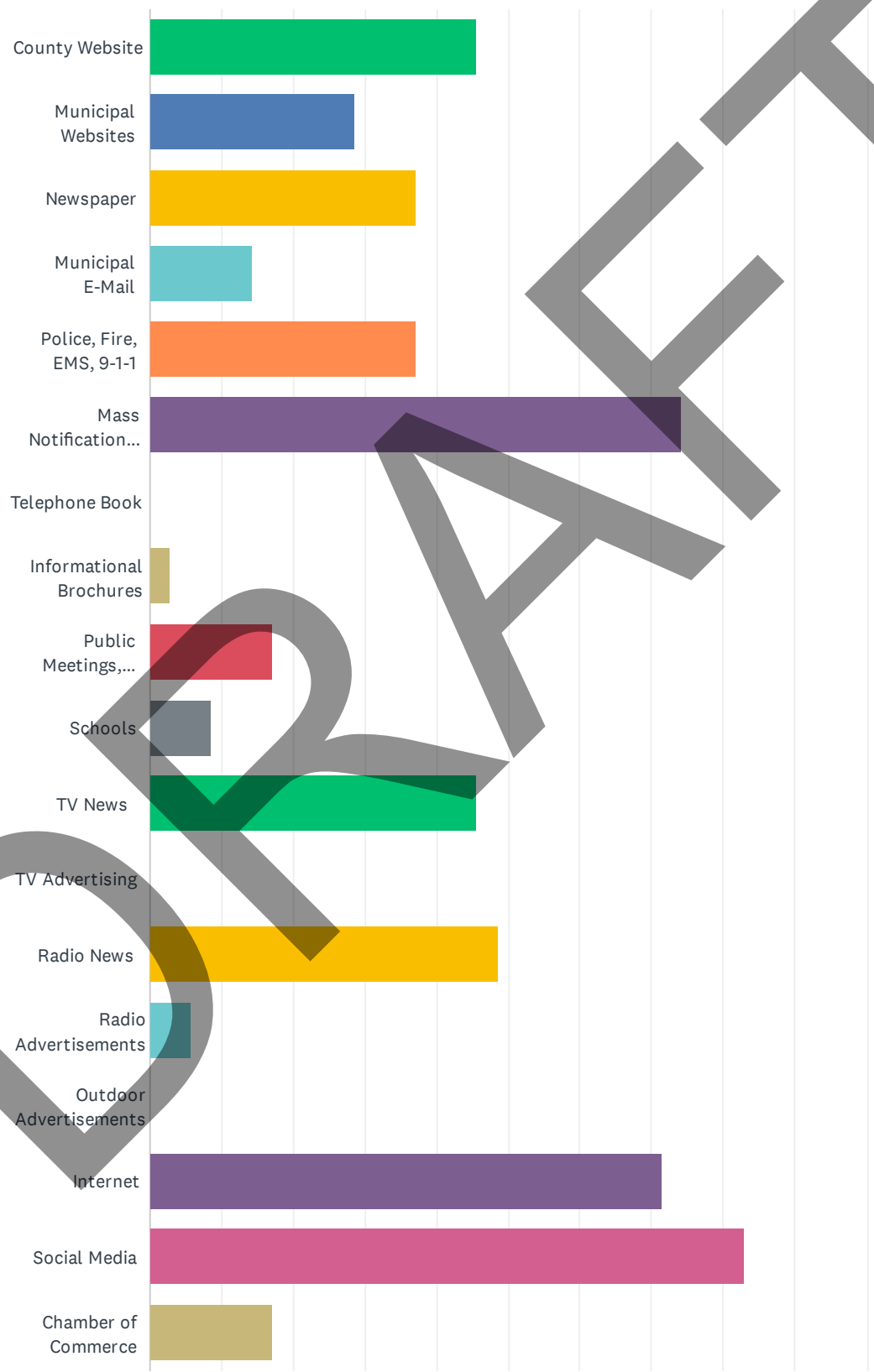
	NOT CONCERNED	SOMEWHAT CONCERNED	CONCERNED	VERY CONCERNED	EXTREMELY CONCERNED	TOTAL RESPONDENTS
C mate Change (othe than sea eve se)	48.57% 17	25.71% 9	11.43% 4	14.29% 5	0.00% 0	35
Dam/Levee Fa u e	57.58% 19	24.24% 8	15.15% 5	0.00% 0	3.03% 1	33
D ought	2.94% 1	5.88% 2	14.71% 5	41.18% 14	35.29% 12	34
Ext eme Tempe atu es (heat and co d)	5.71% 2	11.43% 4	25.71% 9	37.14% 13	20.00% 7	35
F ood ng - St eet/P ope ty	17.14% 6	34.29% 12	22.86% 8	5.71% 2	20.00% 7	35
F ood ng - Sto mwate	17.65% 6	32.35% 11	17.65% 6	14.71% 5	17.65% 6	34
F ood ng - Basement	81.82% 27	12.12% 4	3.03% 1	0.00% 0	3.03% 1	33
F ood ng - 1st F oo o above	67.65% 23	20.59% 7	5.88% 2	0.00% 0	5.88% 2	34
Geo og c (ands de, s nkho es, subs dence)	73.53% 25	11.76% 4	11.76% 4	2.94% 1	0.00% 0	34
Pandem c	34.29% 12	28.57% 10	25.71% 9	8.57% 3	2.86% 1	35
Severe Weathe (h gh winds, ghtn ng, ha)	2.86% 1	20.00% 7	28.57% 10	34.29% 12	14.29% 5	35
Severe W nte Sto ms (bl zza d, heavy snow, ce)	2.86% 1	31.43% 11	34.29% 12	14.29% 5	17.14% 6	35
Sea Level R se	85.71% 30	11.43% 4	2.86% 1	0.00% 0	0.00% 0	35
So Haza ds	42.86% 15	37.14% 13	20.00% 7	0.00% 0	0.00% 0	35
W df e	5.88% 2	20.59% 7	14.71% 5	35.29% 12	23.53% 8	34
Othe Natu al Haza d	55.17% 16	20.69% 6	17.24% 5	6.90% 2	0.00% 0	29

#	OTHER (PLEASE SPECIFY)	DATE
1	L v ng next to someone who's ent e home and p ope ty a e a f e hazard. No code enfo cement	12/23/2022 6:35 AM

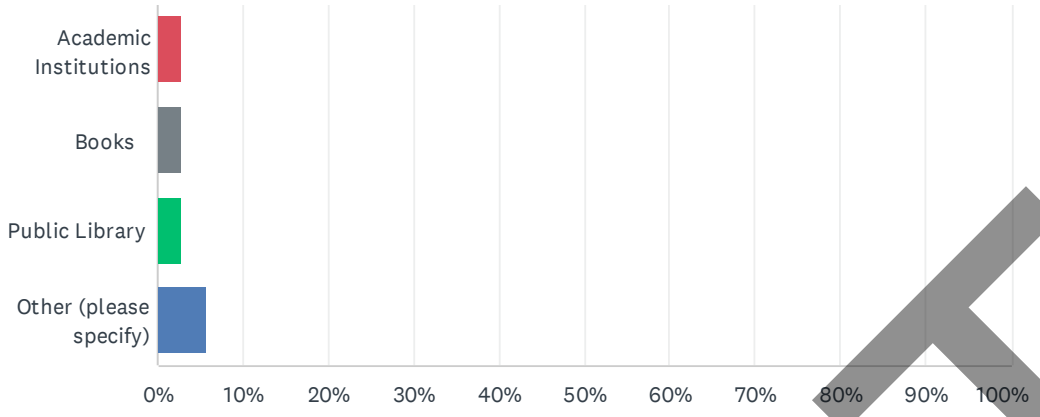
DRAFT

Q3 How do you receive your information concerning a disaster? Check all that apply.

Answered: 35 Skipped: 0



DRAFT



ANSWER CHOICES	RESPONSES	
County Webs te	45.71%	16
Mun c pal Webs tes	28.57%	10
Newspape	37.14%	13
Mun c pal E-Ma	14.29%	5
Po ce, F e, EMS, 9-1-1	37.14%	13
Mass Not f cat on System (e.g. Warn Cent al Texas)	74.29%	26
Telephone Book	0.00%	0
Info mat ona B ochu es	2.86%	1
Pub c Meet ngs, Wo kshops, Pub c Awa eness Events	17.14%	6
Schoo s	8.57%	3
TV News	45.71%	16
TV Adve t s ng	0.00%	0
Rad o News	48.57%	17
Rad o Adve t sements	5.71%	2
Outdoor Advert sements	0.00%	0
Inte net	71.43%	25
Soc al Med a	82.86%	29
Chambe of Comme ce	17.14%	6
Academ c Inst tut ons	2.86%	1
Books	2.86%	1
Pub c L b a y	2.86%	1
Othe (p ease spec fy)	5.71%	2
Tota Respondents: 35		

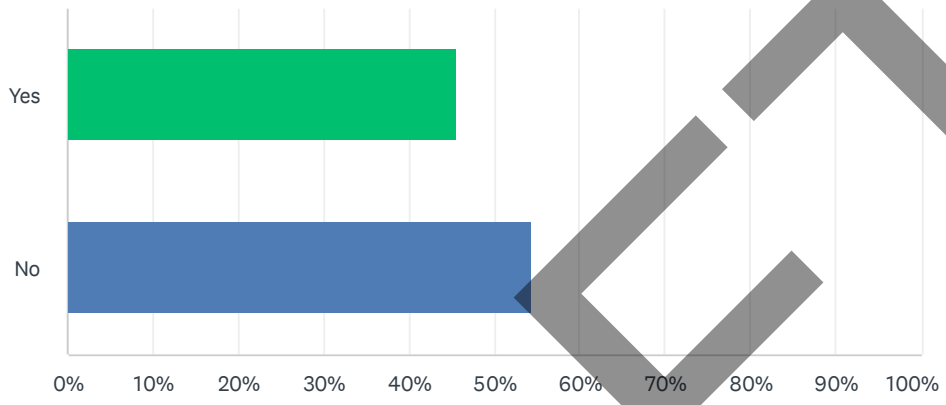
DRAFT

#	OTHER (PLEASE SPECIFY)	DATE
1	Hill country scanner / friends against crime FB	12/23/2022 6:35 AM
2	Weather radio	12/5/2022 9:27 PM

DRAFT

Q4 In the past, has your home been damaged by a hazard event? For example, flood waters entering the first floor of your home or pipes freezing during periods of cold temperatures.

Answered: 35 Sk pped: 0



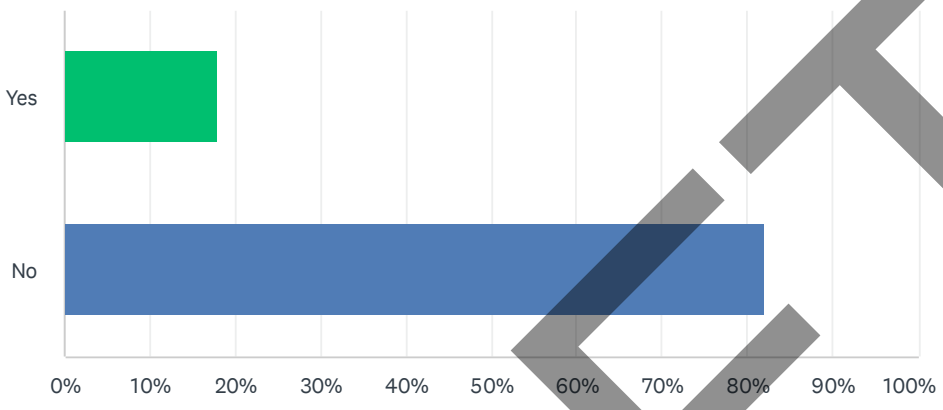
ANSWER CHOICES	RESPONSES	
Yes	45.71%	16
No	54.29%	19
TOTAL		35

#	PLEASE EXPLAIN THE TYPE OF DAMAGE SUSTAINED AND WHEN IT OCCURRED.	DATE
1	Power fa u e caused damage to p pes, ou we and poo equ pment	12/21/2022 4:09 AM
2	F ozen p pes	12/20/2022 3:45 PM
3	P pes freeze, Feb ua y 2020, p pe f eeze Feb uary 2021,	12/10/2022 8:55 AM
4	Hai damage to oof, veh c e.	12/9/2022 1:33 AM
5	P pes freez ng, ha Damage	12/7/2022 1:43 PM
6	Ice p pes.. hai	12/7/2022 1:07 PM
7	P pes busted due to no elect ic ty	12/7/2022 12:21 PM
8	boat house f ooded up to 5 ft	12/5/2022 4:56 PM
9	P pes freez ng n Februa y 2021	12/3/2022 6:08 PM
10	C ty cont acto penet ated my sewe nes and plumb ng exp oded nto my home u n ng p umbing and home nte io	11/17/2022 8:10 AM
11	p pes f eez ng, f ood ng n my basement	11/16/2022 5:41 PM
12	H gh wind and ha , May 2018	10/3/2022 8:53 AM
13	Ou C ty Ha d d not ece ve damage but the homes on wate f onts had damages to the boat docks. Many homes had p pes freeze du ng the winte sto m and we had a ot of wate oss.	9/30/2022 5:19 PM
14	W nd damage	9/29/2022 1:00 PM

DRAFT

Q5 If you answered 'yes' above, did you report the damages to your local police or fire departments or to an emergency management agency?

Answered: 28 Sk pped: 7

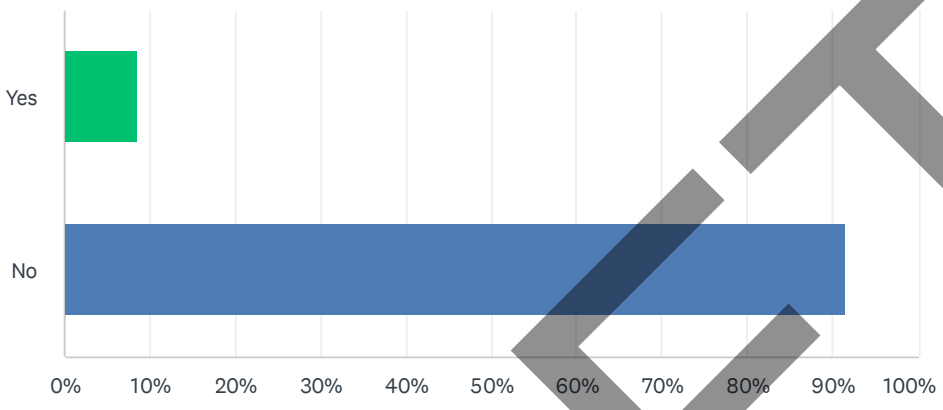


ANSWER CHOICES	RESPONSES	
Yes	17.86%	5
No	82.14%	23
TOTAL		28

DRAFT

Q6 To the best of your knowledge, is your property located in a designated floodplain? If you do not know, click here to find out.

Answered: 35 Sk pped: 0

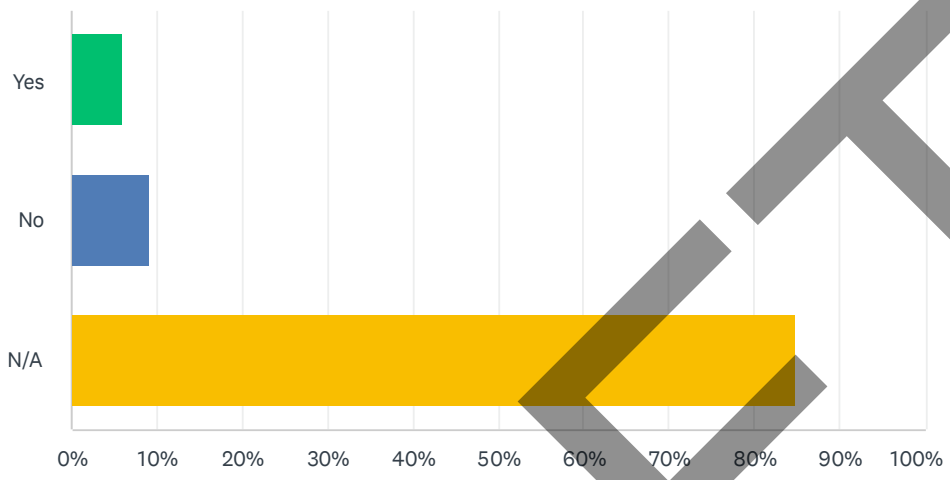


ANSWER CHOICES	RESPONSES	
Yes	8.57%	3
No	91.43%	32
TOTAL		35

DRAFT

Q7 If your property is in the floodplain, do you have flood insurance?

Answered: 33 Sk pped: 2

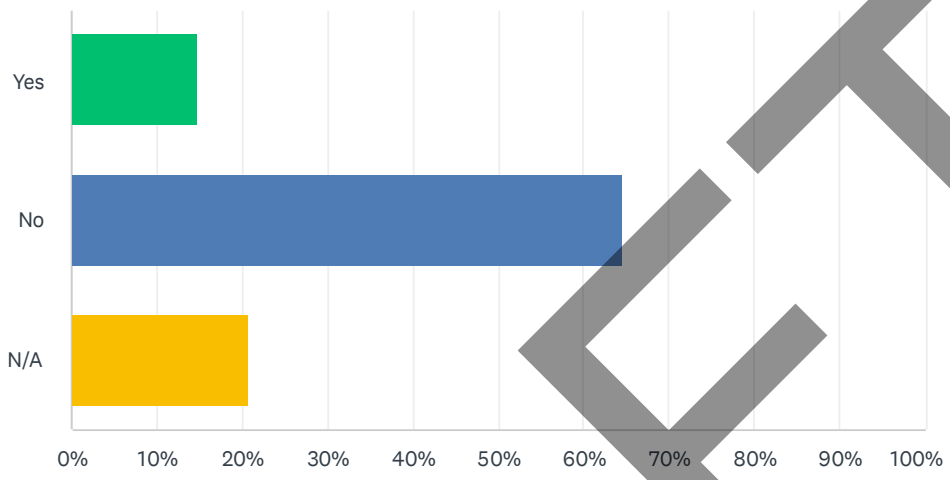


ANSWER CHOICES	RESPONSES	
Yes	6.06%	2
No	9.09%	3
N/A	84.85%	28
TOTAL		33

DRAFT

Q8 If your property is located outside of the floodplain, do you have flood insurance?

Answered: 34 Sk pped: 1



ANSWER CHOICES	RESPONSES	
Yes	14.71%	5
No	64.71%	22
N/A	20.59%	7
TOTAL		34

DRAFT

Q9 Please identify any specific vulnerabilities that you are aware of in your city/town/village (e.g. floodprone areas or specific properties, critical facilities that lack backup power, etc.). Please list street names and other specific identifiers if possible.

Answered: 24 Skipped: 11

#	RESPONSES	DATE
1	The bridge area if river overflows and or dam breaks..	12/23/2022 6:39 AM
2	Power failure, no power no heat No water (wells) some people in the city have wells	12/21/2022 4:16 AM
3	Need another bridge over the river in town. Either another one or new wider one.	12/20/2022 3:48 PM
4	Have sirens tested in town once a month. Let citizens know when tests are conducted. What happens if river is flooded and there is a fire across the bridge? Let citizens know what to do or where to go in event there is a nuclear disaster.	12/16/2022 2:38 PM
5	Warming Shelters, ability to maintain during prolonged power outage! Need generator in public buildings. City of San Saba	12/10/2022 9:00 AM
6	Areas within the 100 year flood zone.	12/9/2022 1:35 AM
7	Llano River banks	12/7/2022 1:45 PM
8	Davis creek crossing/cut off if flooding occurs	12/7/2022 1:09 PM
9	N/A	12/7/2022 10:58 AM
10	Floodprone areas- new building on Siena Creek. Critical facilities prone to freeze due to prolonged cold weather - City water treatment plant.	12/6/2022 2:36 PM
11	Stoney St San Saba,Tx	12/6/2022 11:19 AM
12	Most all drainage ditches inside city of San Saba are overgrown and trash filled	12/5/2022 10:00 PM
13	San Saba River in City of San Saba	12/5/2022 9:29 PM
14	The streets flood	12/5/2022 9:00 PM
15	o water treatment plant and waste water facilities in Blue Lake Estates o properties located on Lake LBJ	12/5/2022 5:02 PM
16	Sandy Creek can flood	12/3/2022 6:10 PM
17	N/A	11/21/2022 7:43 AM
18	South side of San Saba is very vulnerable to a large wildfire	11/21/2022 7:42 AM
19	We have frequent power outages with thunderstorms or high winds.	10/3/2022 8:58 AM
20	RR3014 floods west of Frazier near BLV	9/29/2022 5:28 PM
21	146 Lakeview Drive	9/29/2022 3:22 PM
22	Unknown	9/29/2022 1:04 PM
23	NA	9/29/2022 11:32 AM
24	There is only one way in/out to Paradise Point as well as BLV and Tow.	9/29/2022 11:06 AM

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Q10 Please identify any specific vulnerabilities that you are aware of in Llano or San Saba County outside of your city/town/village (e.g. floodprone areas or specific properties, critical facilities that lack backup power, etc.). Please list the city/town/village, street names, and other specific identifiers if possible.

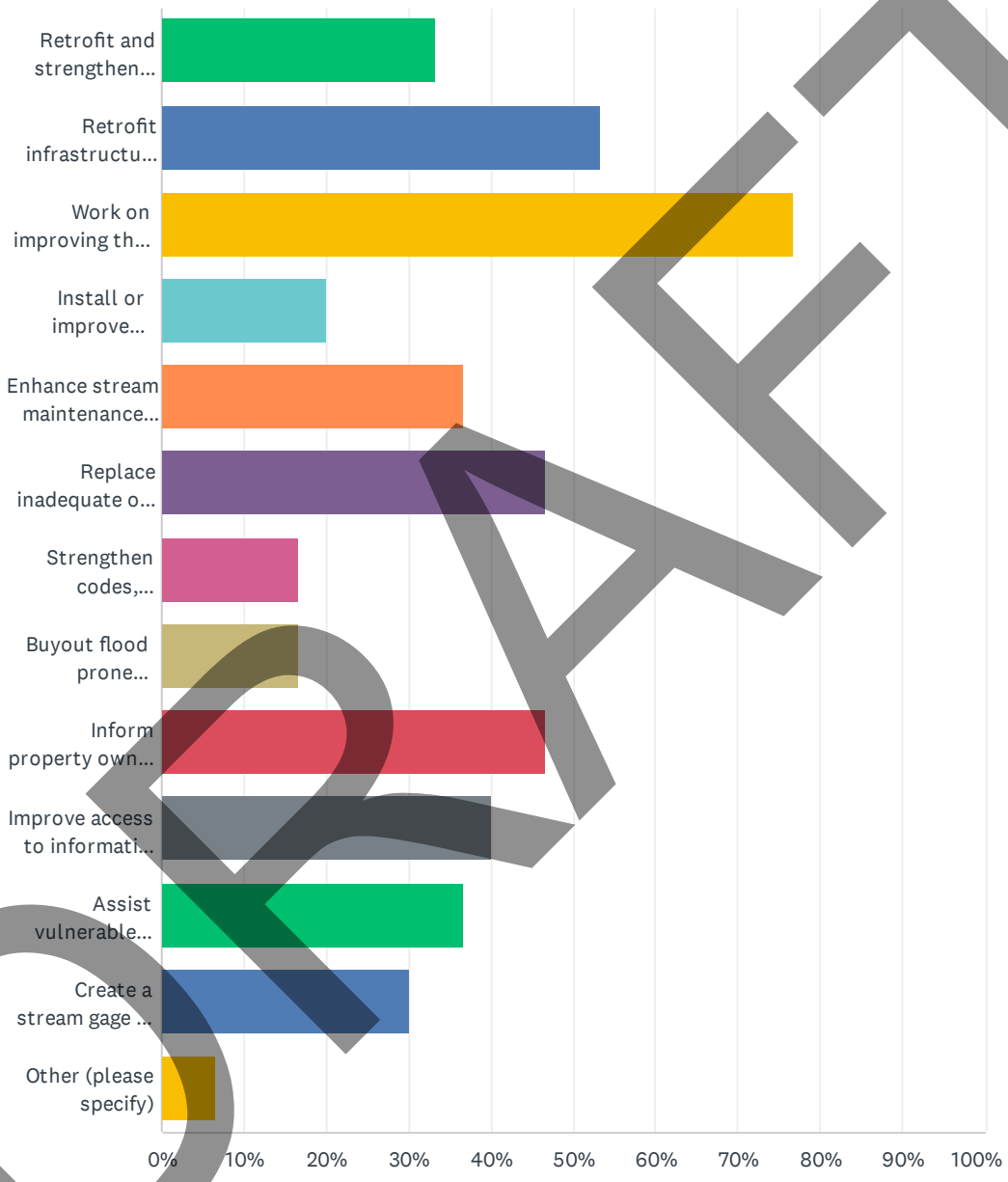
Answered: 15 Skipped: 20

#	RESPONSES	DATE
1	Power failure everyone on wells. No water can't care for animals	12/21/2022 4:16 AM
2	Need another bridge over the river in town. Either another one or new wider one.	12/20/2022 3:48 PM
3	Fire department and hospital only on one side of town in Llano.	12/16/2022 2:38 PM
4	Richland utility district generator power to continue processing.	12/10/2022 9:00 AM
5	Unknown	12/7/2022 1:09 PM
6	N/A	12/7/2022 10:58 AM
7	N/A	12/5/2022 10:00 PM
8	Na	12/5/2022 9:00 PM
9	HSB waste water treatment plant	12/5/2022 5:02 PM
10	Llano River can flood	12/3/2022 6:10 PM
11	N/A	11/21/2022 7:43 AM
12	.	9/29/2022 5:28 PM
13	Unknown	9/29/2022 1:04 PM
14	NA	9/29/2022 11:32 AM
15	The Tow Community Center, Tow VFD and the Llano County offices on 1431 all lack emergency power.	9/29/2022 11:06 AM

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Q11 What types of projects do you believe local, county, state, or federal government agencies could be doing to reduce the damage and disruption of disasters in Llano or San Saba County? Select your top three choices.

Answered: 30 Skipped: 5



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ANSWER CHOICES	RESPONSES	
Ret of t and st engthen essent a fac t es such as po ce, schoo s, and hospita s	33.33%	10
Ret of t nf ast uctu e, such as elevat ng oadways and mprov ng d ainage systems	53.33%	16
Wo k on mp ov ng the damage es stance of ut t es (elect c ty, commun cat ons, water/wastewater fac t es etc.)	76.67%	23
Insta o mp ove p otect ve st uctu es, such as floodwa s, evees, bu kheads, and f eb eaks	20.00%	6
Enhance st eam ma ntenance prog ams/p ojects	36.67%	11
Rep ace nadequate o vu ne ab e br dges and causeways	46.67%	14
St engthen codes, o d nances and plans to equ e h ghe haza d sk management standa ds and/or p ov de g eate cont ol over deve opment n h gh haza d a eas	16.67%	5
Buyout flood p one p ope t es and ma nta n as open space	16.67%	5
Info m p ope ty owne s of ways they can m t gate damage to thei p ope t es	46.67%	14
Imp ove access to nfo mat on about hazard isks and h gh-haza d a eas	40.00%	12
Ass st vu ne ab e p ope ty owne s with secu ng fund ng to m t gate the p ope t es	36.67%	11
C eate a st eam gage and weathe mon to ng p og am to p ov de mo e accu ate data and wa n ngs	30.00%	9
Othe (p ease spec fy)	6.67%	2
Tota Respondents: 30		

#	OTHER (PLEASE SPECIFY)	DATE
1	Power supp y.	12/21/2022 4:16 AM
2	mp ove commun cat ons among the oca sub-d v s ons and the county du ng an event	12/5/2022 5:02 PM

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Q12 Do you have any other comments, questions, or concerns regarding hazard mitigation in Llano or San Saba County?

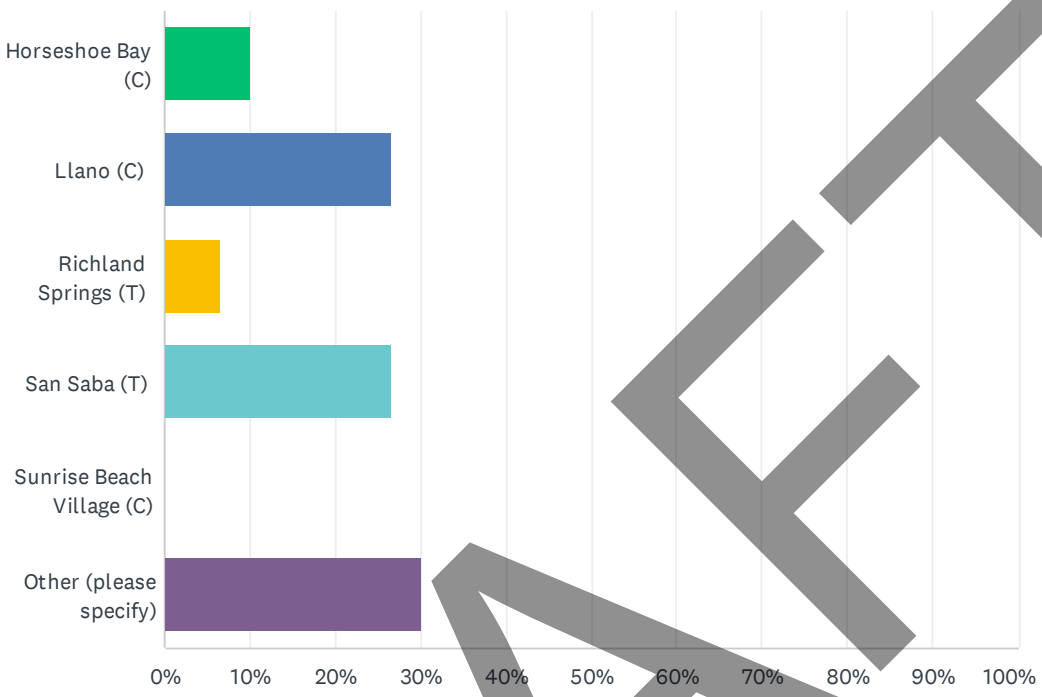
Answered: 13 Skipped: 22

#	RESPONSES	DATE
1	Funding assistance for generators	12/21/2022 4:16 AM
2	Are there any concrete structures or basements or facilities that citizens can go in event of nuclear disaster?	12/16/2022 2:38 PM
3	No	12/9/2022 1:35 AM
4	No	12/5/2022 10:00 PM
5	No	12/5/2022 9:00 PM
6	No	12/5/2022 3:02 PM
7	No	12/3/2022 6:10 PM
8	No	11/21/2022 7:43 AM
9	No	9/29/2022 5:28 PM
10	TX	9/29/2022 3:22 PM
11	None	9/29/2022 1:04 PM
12	NO - Thank You	9/29/2022 11:32 AM
13	No	9/29/2022 11:06 AM

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Q13 Please indicate the municipality in which you live:

Answered: 30 Sk pped: 5



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ANSWER CHOICES	RESPONSES	
Ho seshoe Bay (C)	10.00%	3
L ano (C)	26.67%	8
R ch and Sp ings (T)	6.67%	2
San Saba (T)	26.67%	8
Sun ise Beach V age (C)	0.00%	0
Othe (p ease spec fy)	30.00%	9
Tota Respondents: 30		

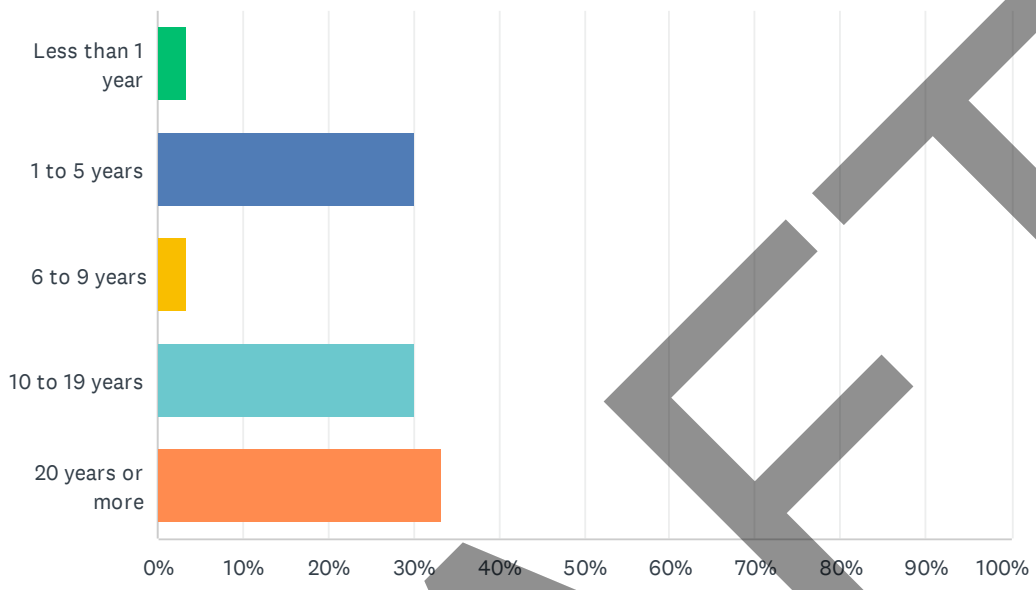
#	OTHER (PLEASE SPECIFY)	DATE
1	Va ey Sp ng	12/21/2022 4:17 AM
2	L ano county	12/7/2022 9:08 PM
3	nea Castel	12/7/2022 4:41 PM
4	B ue Lake Estates	12/5/2022 5:03 PM
5	San Saba County	11/21/2022 7:43 AM
6	Buchanan Lake V age, Llano Cty	9/29/2022 5:30 PM
7	Buchanan Dam	9/29/2022 3:23 PM
8	Tow	9/29/2022 1:05 PM

9	Tow-Paradise Point	9/29/2022 11:07 AM

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Q14 How long have you lived here?

Answered: 30 Sk pped: 5

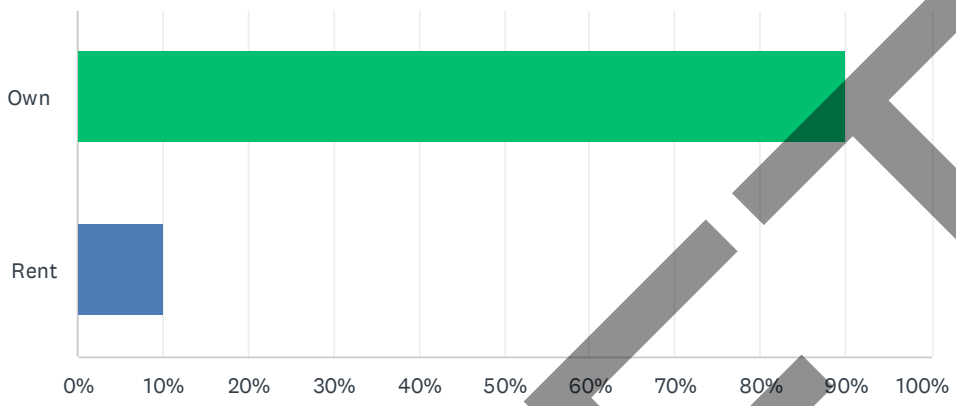


ANSWER CHOICES	RESPONSES	
Less than 1 yea	3.33%	1
1 to 5 years	30.00%	9
6 to 9 years	3.33%	1
10 to 19 yea s	30.00%	9
20 years or mo e	33.33%	10
TOTAL		30

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Q15 Do you own or rent your place of residence?

Answered: 30 Sk pped: 5

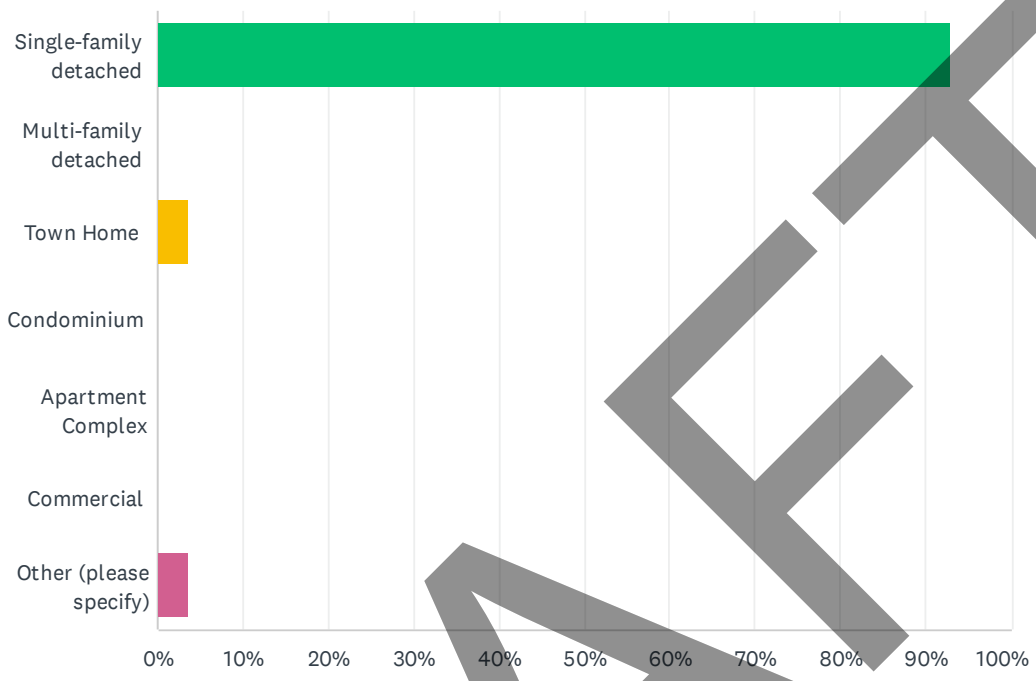


ANSWER CHOICES	RESPONSES	
Own	90.00%	27
Rent	10.00%	3
TOTAL		30

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Q16 What type of residence do you live in?

Answered: 28 Sk pped: 7



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ANSWER CHOICES	RESPONSES	
S ng e-fam y detached	92.86%	26
Mu t -fam y detached	0.00%	0
Town Home	3.57%	1
Condom n um	0.00%	0
Apa tment Comp ex	0.00%	0
Comme c a	0.00%	0
Othe (p ease spec fy)	3.57%	1
TOTAL		28

#	OTHER (PLEASE SPECIFY)	DATE
1	T ny house	12/7/2022 1:09 PM

Q17 What street is your property on? (optional, will be kept confidential - only used to identify hazard areas such as flooding)

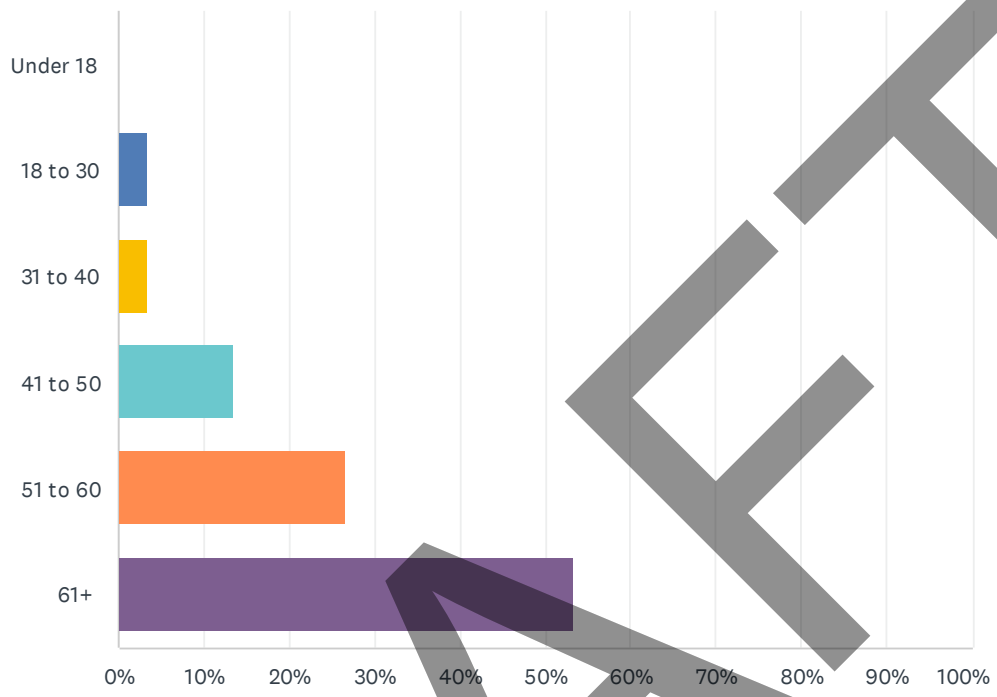
Answe ed: 24 Sk pped: 11

#	RESPONSES	DATE
[redacted]	[redacted]	[redacted]

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Q18 Please indicate your age range:

Answered: 30 Sk pped: 5



ANSWER CHOICES	RESPONSES	
Under 18	0.00%	0
18 to 30	3.33%	1
31 to 40	3.33%	1
41 to 50	13.33%	4
51 to 60	26.67%	8
61+	53.33%	16
TOTAL		30

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Appendix E Mitigation Strategy Supplementary Data

This appendix summarizes additional activities and resources provided to plan participants to support the update of the mitigation strategy.

E.1 2016 Goals and Objectives Review

Llano and San Saba Counties' planning documents and recent policies changes were reviewed and discussed with the Planning Team to help inform the review and update of the goals and objectives. Table E-1 and Table E-2 summarizes the Planning Team review and evaluation of the 2016 HMP goals and objectives. Table E-3 and Table E-4 summarize the goals and objectives for the 2023 HMP update.

Table E-1. 2016 Goals Evaluation

2016 Goal	2022 Goal Evaluation (Keep as is? Change? Add another goal?)
Goal 1: Protect public health and safety for residents, businesses, and visitors.	Keep as is
Goal 2: Protect existing and new properties.	Change
Goal 3: Increase public understanding, support, and demand for hazard mitigation.	Keep as is
Goal 4: Build and support local capacity and commitment to continuously become less vulnerable to hazards.	Keep as is
Goal 5: Promote growth in a sustainable manner.	Keep as is
Goal 6: Maximize the resources for investment in hazard mitigation.	Add another goal

Table E-2. 2016 Objectives Evaluation

2016 Objective	2022 Objective Evaluation (Keep as is? Change? Add another objective?)
Objective 1: Advise the public about health and safety precautions to guard against injury and loss of life from hazards.	Keep as is
Objective 2: Maximize the utilization of the latest technology to provide adequate warning, communication, and mitigation of hazard events.	Keep as is
Objective 3: Reduce the damage to, and enhance protection of, dangerous areas during hazard events.	Keep as is
Objective 4: Protect critical facilities and services.	Keep as is
Objective 5: Reduce the abandonment of pets and livestock during critical hazard periods.	Keep as is
Objective 6: Reduce repetitive losses to the National Flood Insurance Program.	Keep as is
Objective 7: Use the most cost-effective approaches to protect existing buildings and public infrastructure from hazards.	Keep as is
Objective 8: Enact and enforce regulatory measures to ensure that development will not put people in harm's way or increase threats to existing properties.	Keep as is
Objective 9: Heighten public awareness of the full range of natural hazards they face.	Keep as is

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2016 Objective	2022 Objective Evaluation (Keep as is? Change? Add another objective?)
Objective 10: Educate the public on actions they can take to prevent or reduce the loss of life or property from all natural hazards.	Keep as is
Objective 11: Publicize and encourage the adoption of appropriate hazard mitigation measures.	Keep as is
Objective 12: Build and support local partnerships to continuously become less vulnerable to hazards.	Keep as is
Objective 13: Build a cadre of committed volunteers to safeguard the community before, during, and after a disaster.	Keep as is
Objective 14: Build hazard mitigation concerns into planning and budgeting processes.	Keep as is
Objective 15: Build emergency services capabilities to adequately safeguard the community before, during, and after a disaster.	Keep as is
Objective 16: Incorporate hazard mitigation into the long-range planning and development activities.	Add another goal
Objective 17: Utilize regulatory approaches to prevent creation of future hazards to life and property.	Add another goal
Objective 18: Maximize the use of outside sources of funding.	Keep as is
Objective 19: Maximize participation of property owners in protecting their properties.	Keep as is
Objective 20: Maximize insurance coverage to provide financial protection against hazard events.	Keep as is
Objective 21: Prioritize mitigation projects, based on cost-effectiveness and starting with those sites facing the greatest threat to life, health, and property.	Keep as is

Table E-3. 2023 Goals

2023 Goals
Goal 1 - Protect public health and safety for residents, businesses, and visitors.
Goal 2 - Protect existing and *new properties*, *critical facilities, community lifelines, and population*.
Goal 3 - Increase public understanding, support, and demand for hazard mitigation.
Goal 4 - Build and support local capacity and commitment to continuously become less vulnerable to hazard
Goal 5 - Promote growth in a sustainable manner.
Goal 6 - Maximize the resources for investment in hazard mitigation.

Table E-4. 2023 Objectives

2023 Objectives
Objective 1: Advise the public about health and safety precautions to guard against injury and loss of life from hazards.
Objective 2: Maximize the utilization of the latest technology to provide adequate warning, communication, and mitigation of hazard events.
Objective 3: Reduce the damage to, and enhance protection of, dangerous areas during hazard events.
Objective 4: Protect critical facilities and services.
Objective 5: Reduce the abandonment of pets and livestock during critical hazard periods.
Objective 6: Reduce repetitive losses to the National Flood Insurance Program.
Objective 7: Use the most cost-effective approaches to protect existing buildings and public infrastructure from hazards.
Objective 8: Enact and enforce regulatory measures to ensure that development will not put people in harm's way or increase threats to existing properties.
Objective 9: Heighten public awareness of the full range of natural hazards they face.

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2023 Objectives
Objective 10: Educate the public on actions they can take to prevent or reduce the loss of life or property from all natural hazards.
Objective 11: Publicize and encourage the adoption of appropriate hazard mitigation measures.
Objective 12: Build and support local partnerships to continuously become less vulnerable to hazards.
Objective 13: Build a cadre of committed volunteers to safeguard the community before, during, and after a disaster.
Objective 14: Build hazard mitigation concerns into planning and budgeting processes.
Objective 15: Build emergency services capabilities to adequately safeguard the community before, during, and after a disaster.
Objective 16: Maximize the use of outside sources of funding.
Objective 17: Maximize participation of property owners in protecting their properties.
Objective 18: Maximize insurance coverage to provide financial protection against hazard events.
Objective 19: Prioritize mitigation projects, based on cost-effectiveness and starting with those sites facing the greatest threat to life, health, and property.

E.2 MITIGATION STRATEGY WORKSHOP RESOURCES

On December 6, 2022 a Mitigation Strategy Workshop was held for all plan participants. The workshop was held virtually due to coronavirus restrictions and was led by the contract consultant, supplemented by emails and phone calls between Llano County, San Saba County, various jurisdictions and districts and the contract consultant, for all participants to support the development of focused problem statements based on the impacts of natural hazards in the county and their communities. These problem statements were intended to provide a detailed description of the problem area, including its impacts to the municipality/jurisdiction; past damages; loss of service; etc. An effort was made to include the street address of the property/project location, adjacent streets, water bodies, and well-known structures as well as a brief description of existing conditions (topography, terrain, hydrology) of the site. These problem statements formed a bridge between the hazard risk assessment which quantifies impacts to each community with the development of actionable mitigation strategies. Resources available at the workshop and follow up discussions included the following to assist with the identification of mitigation alternatives and the development of the mitigation strategy workshops found in Section 9 (Annexes).

1. FEMA Local Mitigation Handbook
2. Public survey results
3. FEMA Mitigation action types (Table E 5)
4. FEMA Mitigation Ideas
5. FEMA Project Useful Life factsheet
6. Mitigation funding sources at the federal, state, and local levels (Table E 6)
7. FEMA Region 6 Funding Sources for Texas
8. FEMA Ecosystem Services

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E.2.1 Types of Mitigation Actions

A mitigation action is a specific action, project, activity, or process taken to reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementing mitigation actions helps achieve the plan's mission and goals. The actions to reduce vulnerability to threats and hazards form the core of the plan and are a key outcome of the planning process.

The primary types of mitigation actions to reduce long-term vulnerability are:

- Local Plans and Regulations (LPR)
- Structure and Infrastructure Projects (SIP)
- Natural Systems Protection (NSP)
- Education and Awareness Programs (EAP)

Table E-5. FEMA Mitigation Action Types

Mitigation Type	Description	Examples
Local Plans and Regulations	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.	• Comprehensive plans • Land use ordinances • Subdivision regulations • Development review • Building codes and enforcement • NFIP Community Rating System • Capital improvement programs • Open space preservation • Stormwater management regulations and master plans
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards. Many of these types of actions are projects eligible for funding through the FEMA Hazard Mitigation Assistance program.	• Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits • Floodwalls and retaining walls • Detention and retention structures • Culverts • Safe rooms
Natural Systems Protection	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.	• Sediment and erosion control • Stream corridor restoration • Forest management • Conservation easements • Wetland restoration and preservation
Education and Awareness Programs	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding	• Radio or television spots • Websites with maps and information • Real estate disclosure • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas • StormReady

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Mitigation Type	Description	Examples
	and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions.	• Firewise Communities

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E.2.2 Potential Mitigation Funding Sources

While it is important to recognize the mitigation strategies for Llano and San Saba Counties to help achieve the mitigation goals and objectives of the HMP, it is also important to provide sources for funding to implement these strategies. The table below provides a list of programs, descriptions, and links for those seeking funding sources. Please note that this table is not intended to be a comprehensive list, but rather a starting point to help identify potential sources of funding for the identified mitigation strategies.

Table E-6. Texas Mitigation Funding Sources

Program	Description	Lead Agency	Website
Federal			
Hazard Mitigation Assistance (HMA)	Grants to provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages – includes FMA, HMGP, PDM	FEMA	https://www.fema.gov/hazard-mitigation-assistance
Flood Mitigation Assistance (FMA)	Program Grants to States and communities for pre-disaster mitigation planning and projects to help reduce or eliminate the long-term risk of flood damage to structures insurable under the National Flood Insurance Program	FEMA	https://www.fema.gov/flood-mitigation-assistance-grant-program
Hazard Mitigation Grant Program (HMGP)	Grants to States and communities for planning and projects providing long-term hazard mitigation measures following a major disaster declaration	FEMA	https://www.fema.gov/hazard-mitigation-grant-program
Building Resilient Infrastructure and Communities (BRIC)	Supports states, local communities, tribes and territories to undertake hazard mitigation projects by reducing the risks they face from disasters and natural hazards. BRIC is a new FEMA pre-disaster hazard mitigation program that replaces the existing Pre-Disaster Mitigation (PDM) program.	FEMA	https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities
Public Assistance: Hazard Mitigation Funding Under Section 406	Hazard mitigation discretionary funding available under Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act following a Presidentially declared disaster	FEMA	https://www.fema.gov/press-release/20220328/fema-hazard-mitigation-grants-404-and-406
Assistance to Firefighters Grant Program	The primary goal of the Assistance to Firefighters Grants (AFG) is to enhance the safety of the public and firefighters with respect to fire-related hazards by providing direct financial assistance to eligible fire departments, nonaffiliated Emergency Medical Services organizations, and State Fire Training Academies. This funding is for critically needed resources to equip and train emergency personnel to recognized standards, enhance	FEMA	https://www.fema.gov/welcome-assistance-firefighters-grant-program

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Program	Description	Lead Agency	Website
	operations efficiencies, foster interoperability, and support community resilience.		
High Hazard Potential Dams (HHPD) Rehabilitation Grant	The Rehabilitation of High Hazard Potential Dams Grant Program (HHPD provides technical, planning, design, and construction assistance in the form of grants to non-Federal governmental organizations or nonprofit organizations for rehabilitation of eligible high hazard potential dams.	FEMA	https://www.grants.gov/web/grants/view-opportunity.html?oppId=316238
Fire Management Assistance Grant Program	Assistance for the mitigation, management, and control of fires on publicly or privately-owned forests or grasslands that threaten such destruction as would constitute a major disaster. Provides a 75% Federal cost share and the State pay the remaining 25% for actual cost.	FEMA	https://www.fema.gov/fire-management-assistance-grant-program
Disaster Housing Program	Emergency assistance for housing, including minor repair of home to establish livable conditions, mortgage and rental assistance	HUD	https://www.hud.gov/program_offices/public_indian_housing/publications/dhap
HOME Investment Partnerships Program	Grants to local and state government and consortia for permanent and transitional housing, (including financial support for property acquisition and rehabilitation for low income persons)	HUD	https://www.hud.gov/program_offices/comm_planning/affordablehousing/programs/home/
HUD Disaster Recovery Assistance	Grants to fund gaps in available recovery assistance after disasters (including mitigation)	HUD	https://www.hud.gov/info/disasterresources
Section 108 Loan Guarantee	Enables states and local governments participating in the Community Development Block Grant (CDBG) program to obtain federally guaranteed loans for disaster-distressed areas	HUD	https://www.hudexchange.info/programs/section-108/
Smart Growth Implementation Assistance (SGIA) program	The SGIA program focuses on complex or cutting-edge issues, such as stormwater management, code revision, transit-oriented development, affordable housing, infill development, corridor planning, green building, and climate change. Applicants can submit proposals under 4 categories: community resilience to disasters, job creation, the role of manufactured homes in sustainable neighborhood design or medical and social service facilities siting.	EPA	https://www.epa.gov/smartgrowth
Partners for Fish and Wildlife	Financial and technical assistance to private landowners interested in pursuing restoration projects affecting wetlands and riparian habitats	U.S. Fish and Wildlife Service	https://www.fws.gov/partners/

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Program	Description	Lead Agency	Website
FHWA Emergency Relief Program	Fund for the repair or reconstruction of Federal-aid highways that have suffered serious damage as a result of (1) natural disasters or (2) catastrophic failures from an external cause	U.S. Department of Transportation (DOT)	https://www.fhwa.dot.gov/programadmin/erelief.cfm
Transportation Investment Generating Economic Recovery (TIGER)	Investing in critical road, rail, transit and port projects across the nation	U.S. DOT	https://www.transportation.gov/tags/tiger-grants
Community Facilities Direct Loan & Grant Program	This program provides affordable funding to develop essential community facilities in rural areas. An essential community facility is defined as a facility that provides an essential service to the local community for the orderly development of the community in a primarily rural area, and does not include private, commercial or business undertakings.	USDA	https://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program
Emergency Loan Program	USDA's Farm Service Agency (FSA) provides emergency loans to help producers recover from production and physical losses due to drought, flooding, other natural disasters or quarantine	USDA	https://www.fsa.usda.gov/programs-and-services/farm-loan-programs/emergency-farm-loans/index
Emergency Watershed Protection (EWP) Program	Provide assistance to relieve imminent hazards to life and property caused by floods, fires, drought, windstorms, and other natural occurrences	NRCS	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/
Financial Assistance	Financial assistance to help plan and implement conservation practices that address natural resource concerns or opportunities to help save energy, improve soil, water, plant, air, animal and related resources on agricultural lands and non-industrial private forest land	NRCS	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/
Emergency Management Performance Grants (EMPG) Program	Assist local, tribal, territorial, and state governments in enhancing and sustaining all-hazards emergency management capabilities	FEMA, U.S. DHS	https://www.fema.gov/emergency-management-performance-grant-program
Reimbursement for Firefighting on Federal Property	Provides reimbursement only for direct costs and losses over and above normal operating costs.	U.S. DHS	https://www.usfa.fema.gov/grants/firefighting_federal_property.html
Department of Homeland Security Grant Program (HSGP)	HSGP is composed of three interconnected grant programs including the State Homeland Security Program (SHSP), Urban Areas Security Initiative (UASI), and the Operation Stonegarden (OPSG). Together, these competitive grant programs fund a	U.S. DHS	https://www.dhs.gov/homeland-security-grant-program-hsgp

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Program	Description	Lead Agency	Website
	range of preparedness activities, including planning, organization, equipment purchase, training, exercises, and management and administration.		
Land & Water Conservation Fund	Matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities (as well as funding for shared federal land acquisition and conservation strategies)	National Park Service	https://www.nps.gov/subjects/lwcf/index.htm
Land and Water Conservation Fund	Funding to states, local and conservation organizations for outdoor recreational development, renovation, land acquisition, and planning.	U.S. Department of the Interior	https://www.doi.gov/lwcf
USSBA	Small Business Administration (SBA) provides low-interest disaster loans to homeowners, renters, business of all sizes, and most private nonprofit organizations. SBA disaster loans can be used to repair or replace the following items damaged or destroyed in a declared disaster: real estate, personal property, machinery and equipment, and inventory and business assets.	Small Business Administration (SBA)	https://www.sba.gov/funding-programs/disaster-assistance
State			
Clean Water State Revolving Fund (CWSRF) Loan Program	The Clean Water State Revolving Fund, authorized by the Clean Water Act, provides low-cost financial assistance for planning, acquisition, design, and construction of wastewater, reuse, and stormwater infrastructure	Texas Water Development Board	http://www.twdb.texas.gov/financial/programs/CWSRF/index.asp
Drinking Water State Revolving Fund (DWSRF) Loan Program	The Drinking Water State Revolving Fund, authorized by the Safe Drinking Water Act, provides low-cost financial assistance for planning, acquisition, design, and construction of water infrastructure.	Texas Water Development Board	http://www.twdb.texas.gov/financial/programs/DWSRF/index.asp
Rural Water Assistance Fund (RWAF) Program	The Rural Water Assistance Fund (RWAF) is 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.	Texas Water Development Board	http://www.twdb.texas.gov/financial/programs/RWAF/index.asp
State Participation-Regional Water and Wastewater Facilities	The State Participation Program enables the TWDB to provide funding and assume 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	Texas Water Development Board	http://www.twdb.texas.gov/financial/programs/SPP/index.asp

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Program	Description	Lead Agency	Website
	such development is unaffordable without state participation. The goal is to allow for the "right sizing" of projects in consideration of future needs.		
Flood Infrastructure Fund (FIF)	FIF rules allow for a wide range of flood projects, including structural and nonstructural projects as well as nature-based solutions.	Texas Water Development Board	https://www.twdb.texas.gov/financial/programs/FIF/index.asp#:~:text=Passed%20by%20the%20Legislature%20and,flood%20mitigation%2C%20and%20drainage%20projects.
Texas Water Development Fund (DFund)	The Water Development Fund (DFund) is a state funded loan program that does not receive federal subsidies and is not subject to federal crosscutters. The DFund enables the Board to fund multiple eligible components in one loan to our borrowers, e.g. an application for funding of water and wastewater components can be processed in a single loan.	Texas Water Development Board	http://www.twdb.texas.gov/financial/programs/TWDF/index.asp
Economically Distressed Areas Program (EDAP)	The Economically Distressed Areas Program (EDAP) 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.	Texas Water Development Board	http://www.twdb.texas.gov/financial/programs/EDAP/index.asp
Agricultural Water Conservation Grants Program	The Agricultural Water Conservation Grants Program offers grants to state agencies and political subdivisions – a county, city, or other body politic or corporate of the state, including any district or authority created under Article III, Section 52 or Article XVI, Section 59 of the Texas Constitution and including any interstate compact commission to which the state is a party and any nonprofit water supply corporation created and operating under Chapter 67 – for projects that: • support agricultural irrigation conservation strategies in alignment with the state water plan, and • demonstrate agricultural water conservation best management practices	Texas Water Development Board	http://www.twdb.texas.gov/financial/programs/AWCG/index.asp
Agricultural Water Conservation Loan Program	Conservation projects that 1) improve water use efficiency of water delivery and application, or 2) prepare irrigated land for conversion to dry land farming, or 3) prepare dry land for more efficient use of natural precipitation, or 4) purchase and install on public or private property devices designed to indicate the amount of water withdrawn for irrigation use, or 5) brush control	Texas Water Development Board	http://www.twdb.texas.gov/financial/programs/AWCL/index.asp

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Program	Description	Lead Agency	Website
	activities conducted under Chapter 203 of Agriculture Code, or 6) other conservation projects defined by TWDB rules.		
Groundwater Conservation District Loan Program (GDLP)	The GDLP provides loans to finance the start-up costs of Groundwater Conservation Districts. The program is authorized under Water Code Chapter 36, Subchapter L, and governed by TWDB rules Chapter 363 Subchapter H	Texas Water Development Board	http://www.twdb.texas.gov/financial/programs/GDLP/index.asp
State Water Implementation Fund for Texas (SWIFT)	Affordable, ongoing financial assistance for projects in the state water plan. Passed by the Legislature and approved by Texas voters through a constitutional amendment, 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.	Texas Water Development Board	http://www.twdb.texas.gov/financial/programs/SWIFT/index.asp
Regional Flood Planning Grants	Studies to evaluate and recommend the most feasible alternatives to meet regional (two or more participating entities or service areas) water supply and wastewater facility needs, estimate the costs associated with implementing the recommendations, and identify any institutional arrangements that may be necessary to provide regional water supply and wastewater services. Regional systems often have inherent operational advantages or economies of scale over stand-alone systems.	Texas Water Development Board	http://www.twdb.texas.gov/flood/planning/index.asp
Coastal Erosion Planning and Response Act (CEPRA)	Since 2000, the Texas General Land Office's Coastal Erosion Planning and Response Program has received $62 million in state funding and another $62 million in matching funds from federal and local governments, funding more than 200 coastal erosion projects.	Texas General Land Office	https://www.glo.texas.gov/coast/grant-projects/funding/index.html
Coastal Impact Assistance Program (CIAP)	Will provide more than $168 million to Texas. Funding comes from the federal government as compensation for damages caused by drilling in federal waters in the Gulf of Mexico.	Texas General Land Office	https://www.glo.texas.gov/coast/grant-projects/funding/index.html
Coastal Management Program (CMP)	Awards approximately $2.2 million annually in grants. CMP goal is to ensure the long-term environmental and economic health of the Texas coast.	Texas General Land Office	https://www.glo.texas.gov/coast/grant-projects/funding/index.html

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Program	Description	Lead Agency	Website
Beach Maintenance Reimbursement Fund	Administered by the Texas General Land Office, typically allocates $750,000 per year to help communities maintain beaches.	Texas General Land Office	https://www.glo.texas.gov/coast/grant-projects/funding/index.html
The Agricultural Management Assistance (AMA)	The Agricultural Management Assistance (AMA) helps agricultural producers manage financial risk through diversification, marketing or natural resource conservation practices. NRCS administers the conservation provisions while Agricultural Marketing Service and Risk Management Agency implement the production diversification and marketing provisions.	Natural Resources Conservation Service (NRCS)	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/ama/#
The Agricultural Water Enhancement Program (AWEP)	The Agricultural Water Enhancement Program (AWEP) is a voluntary conservation initiative that provides financial and technical assistance to agricultural producers to implement agricultural water enhancement activities on agricultural land to conserve surface and ground water and improve water quality.	Natural Resources Conservation Service (NRCS)	https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/awep/?cid=nrcs143_008334
Conservation Innovation Grants (CIG)	Conservation Innovation Grants (CIG) is a competitive program that supports the development of new tools, approaches, practices, and technologies to further natural resource conservation on private lands. Through creative problem solving and innovation, CIG partners work to address our nation's water quality, air quality, soil health and wildlife habitat challenges, all while improving agricultural operations.	Natural Resources Conservation Service (NRCS)	https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/cig/?cid=nrcs143_008205
The Environmental Quality Incentives Program (EQIP)	The Environmental Quality Incentives Program (EQIP) provides financial and technical assistance to agricultural producers and non-industrial forest managers to address natural resource concerns and deliver environmental benefits such as improved water and air quality, conserved ground and surface water, increased soil health and reduced soil erosion and sedimentation, improved or created wildlife habitat, and mitigation against drought and increasing weather volatility.	Natural Resources Conservation Service (NRCS)	https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/
Community Development Block Grant (TxCDBG) Program for Rural Texas	The primary objective of the Community Development Block Grant program 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.	Texas Department of Agriculture (TDA)	https://www.texasagriculture.gov/GrantsServices/RuralEconomicDevelopment/RuralCommunityDevelopmentBlockGrant(CDBG).aspx

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Program	Description	Lead Agency	Website
HOME	The HOME and Homelessness Programs Division awards funds to assist units of general local governments, public housing authorities, nonprofits, and local agencies in the provision of assistance to low-income Texans with a focus on housing and housing-related assistance and service	Texas Department Housing and Community Affairs (TDHCA)	http://www.tdhca.state.tx.us/home-division/
Nonpoint Source Grant Program		Texas Center for Environmental Quality (TCEQ)	https://www.tceq.texas.gov/waterquality/nonpoint-source/grants/grant-pgm.html
Nonpoint Source Management Program	The TCEQ and the Texas State Soil and Water Conservation Board (TSSWCB) administer federal grants for activities that prevent or reduce nonpoint source pollution. Grants are awarded annually and fund projects for up to three years. The TCEQ usually solicits grants in the summer of each year. Opportunities to apply are published on this Web page and Electronic State Business Daily The grants are made available through a federal program authorized under Section 319 of the Clean Water Act. See descriptions of active projects funded through the TCEQ's Nonpoint Source Program (NPS). Congress enacted CWA §319(h) in 1987, establishing a national program to control NPS water pollution. Through §319(h), federal funds are provided annually through the EPA to states for the implementation of each state's NPS Management Program. Based on Congressional appropriations, EPA allocates 319(h) funds by formula to the states. The §319(h) funding in Texas is divided equally between the TCEQ and the TSSWCB. Each agency independently administers its portion of the grant. Each agency annually solicits projects from collaborating entities across the state. Each agency identifies priority areas and activities and ranking criteria for each funding cycle based on this Management Program, the most recent IR, and the WAP process.	Texas Center for Environmental Quality (TCEQ)	https://www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/068_12.pdf

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Appendix F Plan Maintenance

This appendix includes tools and worksheets to facilitate plan maintenance and review by the Llano and San Saba Steering and Planning Committees.

In the first year of the performance period, an online performance progress reporting system, the BATool[SM] will provide representatives direct access to their mitigation initiatives to easily update the status of each project, document successes or obstacles to implementation, add or delete projects to maintain mitigation project implementation. This online program will capture information and roll all input into a report to summarize mitigation strategy progress.

The FEMA 386-4 guidance worksheets are also available to assist with progress reporting. These worksheets are provided below for ease of access to the HMP Coordinator and Planning Partnership to maintain the 2023 HMP throughout its period of performance.

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Mitigation Action Progress Report Form

Progress Report Period	From Date:	To Date:
Action/Project Title		
Responsible Agency		
Contact Name		
Contact Phone/Email		
Project Status	❑ Project completed ❑ Project canceled ❑ Project on schedule ❑ Anticipated completion date:_____ ❑ Project delayed Explain _____	

Summary of Project Progress for this Report Period

1. What was accomplished for this project during this reporting period?

_____

_____

2. What obstacles, problems, or delays did the project encounter?

_____

_____

3. If uncompleted, is the project still relevant? Should the project be changed or revised?

_____

_____

4. Other comments

_____

_____

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Worksheet 7.1
Mitigation Action Progress Report Form

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Plan Update Evaluation Worksheet

Plan Section	Considerations	Explanation
Planning Process	Should new jurisdictions and/or districts be invited to participate in future plan updates?	
	Have any internal or external agencies been invaluable to the mitigation strategy?	
	Can any procedures (e.g., meeting announcements, plan updates) be done differently or more efficiently?	
	Has the Planning Team undertaken any public outreach activities?	
	How can public participation be improved?	
	Have there been any changes in public support and/or decision- maker priorities related to hazard mitigation?	
Capability Assessment	Have jurisdictions adopted new policies, plans, regulations, or reports that could be incorporated into this plan?	
	Are there different or additional administrative, human, technical, and financial resources available for mitigation planning?	
	Are there different or new education and outreach programs and resources available for mitigation activities?	
	Has NFIP participation changed in the participating jurisdictions?	
Risk Assessment	Has a natural and/or technical or human-caused disaster occurred?	
	Should the list of hazards addressed in the plan be modified?	
	Are there new data sources and/or additional maps and studies available? If so, what are they and what have they revealed? Should the information be incorporated into future plan updates?	
	Do any new critical facilities or infrastructure need to be added to the asset lists?	
	Have any changes in development trends occurred that could create additional risks?	
	Are there repetitive losses and/or severe repetitive losses to document?	

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Worksheet 7.2
Plan Update Evaluation Worksheet

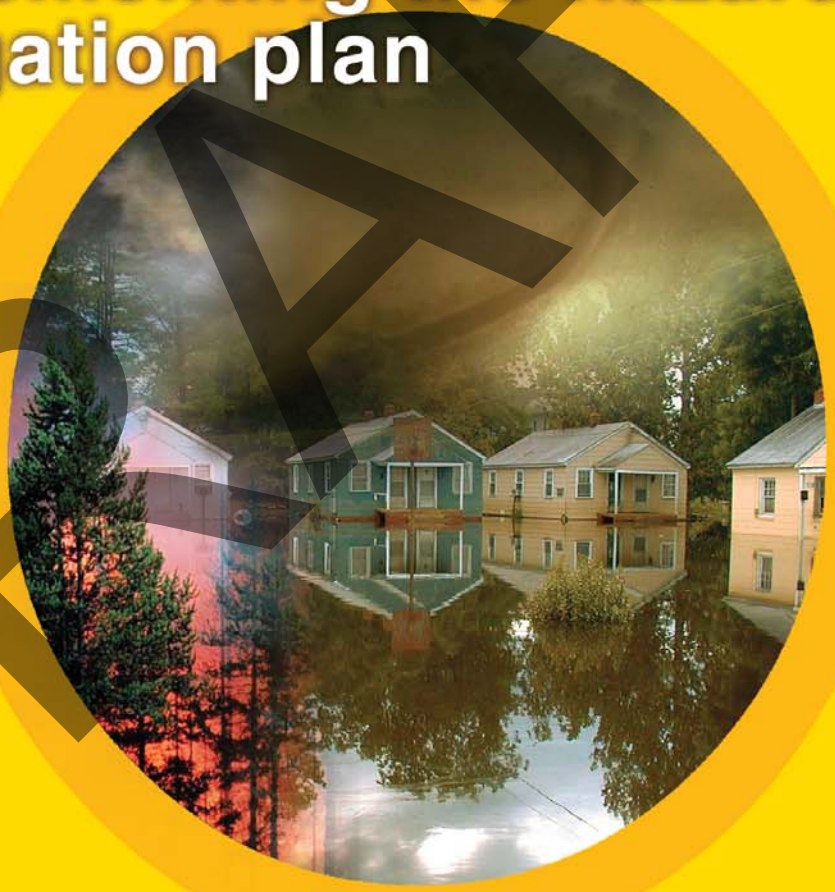
Plan Section	Considerations	Explanation
Mitigation Strategy	Is the mitigation strategy being implemented as anticipated? Were the cost and timeline estimates accurate?	
	Should new mitigation actions be added to the Action Plan? Should existing mitigation actions be revised or eliminated from the plan?	
	Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update?	
	Are there new funding sources to consider?	
	Have elements of the plan been incorporated into other planning mechanisms?	
Plan Maintenance Procedures	Was the plan monitored and evaluated as anticipated?	
	What are needed improvements to the procedures?	

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STATE AND LOCAL MITIGATION PLANNING
how-to guide

Bringing the Plan to Life

implementing the hazard mitigation plan



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FEMA

August 2003
FEMA 386-4

BRINGING THE PLAN TO LIFE
implementing the hazard mitigation plan

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STATE AND LOCAL MITIGATION PLANNING
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hazard mitigation plan

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the hazard mitigation planning process

Hazard mitigation planning is the process of determining how to reduce or eliminate the loss of life and property damage resulting from natural and manmade hazards. As shown in this diagram, the hazard mitigation planning process consists of four basic phases.

For illustration purposes, this diagram portrays a process that appears to proceed sequentially. However, the mitigation planning process is rarely a linear process. It is not unusual that ideas developed while assessing risks should need revision and additional information while developing the mitigation plan, or that implementing the plan may result in new goals or additional risk assessment.

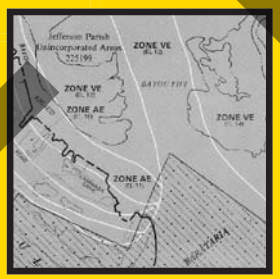
organize resources

From the start, communities should focus on the resources needed for a successful mitigation planning process. Essential steps include identifying and organizing interested members of the community as well as the technical expertise required during the planning process.



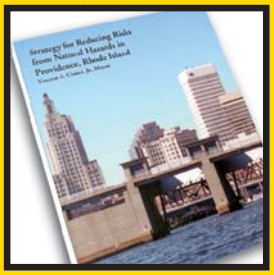
assess risks

Next, communities need to identify the characteristics and potential consequences of hazards. It is important to understand how much of the community can be affected by specific hazards and what the impacts would be on important community assets.



develop a mitigation plan

Armed with an understanding of the risks posed by hazards, communities need to determine what their priorities should be and then look at possible ways to avoid or minimize the undesired effects. The result is a hazard mitigation plan and strategy for implementation.



implement the plan and monitor progress

Communities can bring the plan to life in a variety of ways ranging from implementing specific mitigation projects to changes in the day-to-cay operation of the local government. To ensure the success of an on-going program, it is critical that the plan remains relevant. Thus, it is important to conduct periodic evaluations and make revisions as needed.



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foreword

foreword

The Federal Emergency Management Agency (FEMA) has developed this series of mitigation planning "how-to" guides to assist states, tribes, and communities in enhancing their hazard mitigation planning capabilities.

These guides are designed to provide the type of information states, tribes, and communities need to initiate and maintain a planning process that will result in safer and more disaster-resistant communities. These guides are applicable to states, tribes, and communities of various sizes and varying ranges of financial and technical resources.

This how-to series is not intended to be the last word on any of the subject matter covered; rather, it is meant to provide easy to understand guidance for the field practitioner. In practice, these guides may be supplemented with more extensive technical data and the use of experts when necessary.



mit-i-gate\ 1: to cause to become less harsh or hostile; **2:** to make less severe or painful.

As defined by DMA 2000—

hazard mitigation\ : any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.

plan-ning\ : the act or process of making or carrying out plans; *specif:* the establishment of goals, policies and procedures for a social or economic unit.

DMA

The Disaster Mitigation Act of 2000

In the past, federal legislation has provided funding for disaster relief, recovery, and some hazard mitigation planning. The Disaster Mitigation Act of 2000 (DMA 2000) is the latest legislation to improve the hazard mitigation planning process. DMA 2000 (Public Law 106-390) was signed by the President on October 30, 2000. The new legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. As such, DMA 2000 establishes a pre-disaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP).

Section 322 of DMA 2000 specifically addresses mitigation planning at the state and local levels. This section identifies new requirements that allow HMGP funds to be used for planning actions, and increases the amount of HMGP funds available to states that have developed a comprehensive, enhanced mitigation plan prior to a disaster. States, tribes, and communities must have an approved mitigation plan in place before receiving HMGP funds. Local and tribal mitigation plans must demonstrate that their proposed mitigation actions are based on a sound planning process that accounts for the risk to and the capabilities of the individual communities.

State governments have certain responsibilities for implementing Section 322, including:

- Preparing and submitting a standard or enhanced state mitigation plan;
- Reviewing and updating the state mitigation plan every three years;
- Providing technical assistance and training to local governments to assist them in developing local mitigation plans and applying for HMGP grants; and
- Reviewing and approving local plans if the state has an approved enhanced plan and is designated a managing state.

DMA 2000 is intended to facilitate cooperation between state and local authorities. It encourages and rewards local, tribal, and state pre-disaster planning and promotes sustainability as a strategy for disaster resistance. This enhanced planning network will better enable local, tribal, and state governments to articulate their needs for mitigation, resulting in faster allocation of funding and more effective risk reduction projects. To implement the new DMA 2000 requirements, FEMA prepared an Interim Final Rule, published in the Federal Register on February 26, 2002, at 44 CFR Parts 201 and 206, which establishes planning and funding criteria for states, tribes, and local communities.

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The how-to guides cover the following topics:

- Getting started with the mitigation planning process, including important considerations for how you can organize your efforts to develop an effective mitigation plan (FEMA 386-1);
- Identifying hazards and assessing losses to your community, tribe, or state (FEMA 386-2);
- Setting mitigation priorities and goals for your community, tribe, or state and writing the plan (FEMA 386-3);
- Implementing the mitigation plan, including project funding and maintaining a dynamic plan that changes to meet new developments (FEMA 386-4);
- Evaluating and prioritizing potential mitigation actions through the use of benefit-cost analysis and other techniques (FEMA 386-5);
- Incorporating special considerations into hazard mitigation planning for historic structures and cultural resources (FEMA 386-6);
- Incorporating mitigation considerations for manmade hazards into hazard mitigation planning (FEMA 386-7);
- Using multi-jurisdictional approaches to mitigation planning (FEMA 386-8); and
- Finding and securing technical and financial resources for mitigation planning (FEMA 386-9).

Why should you spend the time to read these guides?

- It simply costs too much to address the effects of disasters only after they happen;
- State and federal aid is usually insufficient to cover the extent of physical and economic damages resulting from disasters;
- You can prevent a surprising amount of damage from hazards if you take the time to anticipate where and how they occur, and then take the appropriate action to minimize damages;
- You can lessen the impact of disasters and speed the response and recovery process for both natural and manmade hazards; and

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- The most meaningful steps in avoiding the impacts of hazards are taken at the state, tribal, and local levels by officials and community members who have a personal stake in the outcome and the ability to follow through on a sustained process of planning and implementation.

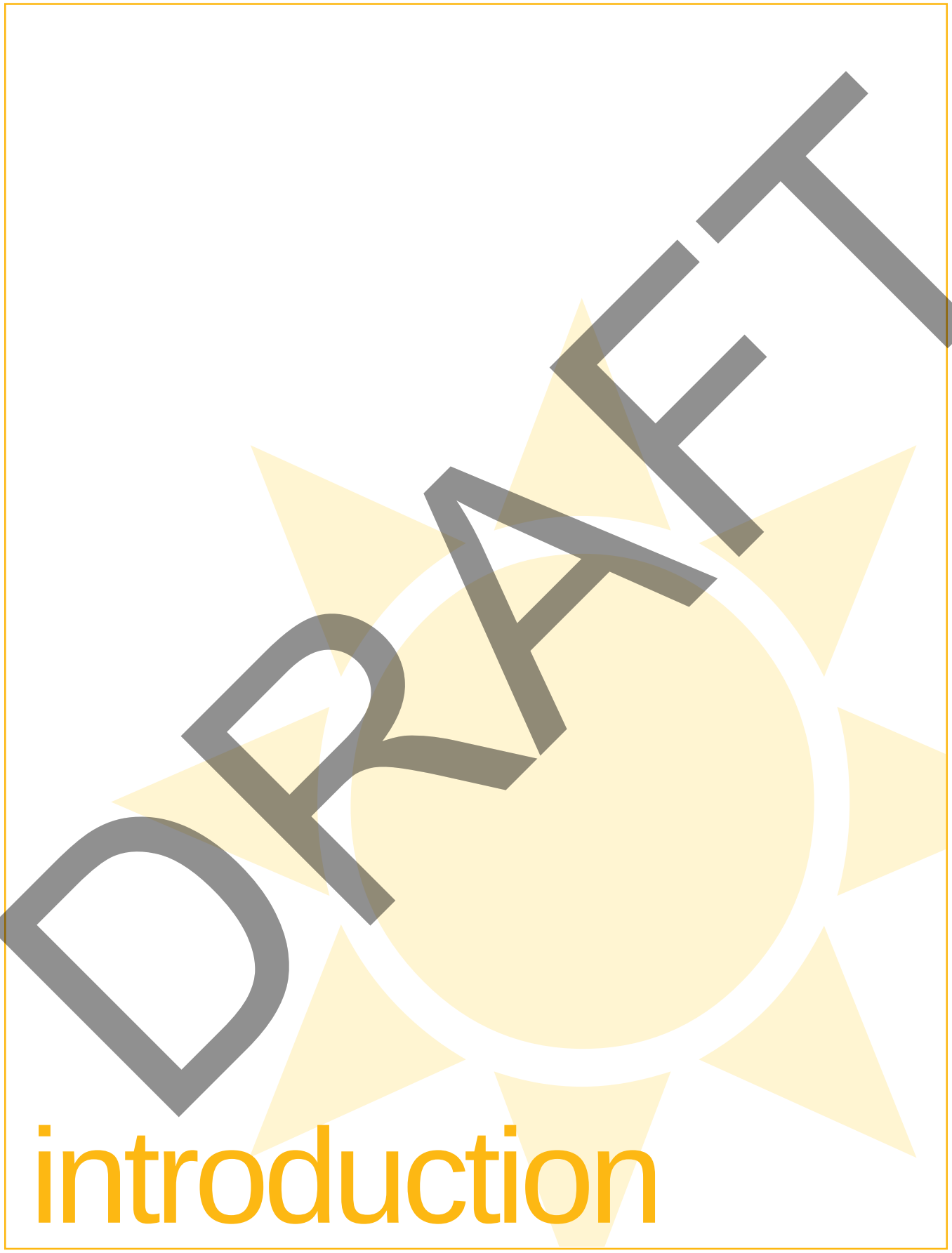
The guides show how mitigation planning:

- Can help your community become more *sustainable and disaster resistant* through selecting the most appropriate mitigation actions, based on the knowledge you gained in the hazard identification and loss estimation process;
- Can be incorporated as an *integral component* of daily government business;
- Allows you to *focus your efforts on the hazard areas most important to you* by determining and setting priorities for mitigation planning efforts; and
- Can *save you money* by providing a forum for engaging in partnerships that provide the technical, financial, and staff resources in your effort to reduce the effects, and hence the costs, of natural and manmade hazards.

These guides present a range of approaches to preparing a hazard mitigation plan. There is no one right planning process; however, there are certain central themes to planning, such as engaging citizens, developing goals and objectives, and monitoring progress. Select the approach that works best for your state, tribe, or community.

The process used to develop a successful hazard mitigation plan is just as important as the plan itself. This how-to guide focuses on the fourth phase of the hazard mitigation planning process and will help you develop a mitigation plan that meets DMA 2000 requirements.

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introduction

introduction

Your community now has a plan that is a result of the planning team's effort and work with stakeholders concerned about reducing losses from hazards in your community. This plan resulted from a process that included a risk assessment, capability assessment, and the development of a mitigation strategy that features prioritized mitigation actions based upon your goals and objectives. The **implementation process** puts your planning team's hard work into motion and focuses on the actions necessary to establish and maintain the effectiveness of the plan as a fundamental tool for risk reduction.

An added benefit of having a plan is that its printed form is familiar, even reassuring, to citizens who have been part of a comprehensive planning process or, even more importantly, have suffered losses due to a hazard. In addition, those new to the community, as well as non-residents, will have easy access to this information as well. The text and accompanying graphics concisely and coherently document the hazards faced by the community, their location and extent, previous losses, actions to mitigate future hazards, and goals for a sustainable future. The development of the plan by community members increases the likelihood of hazard mitigation becoming, like transportation and education, one of the standard considerations in the evolution and growth of the community.

Once the plan has been adopted and the recommendations implemented, your accomplishments, issues, programs, policies, and project results should be accurately documented. This documentation will be very useful when it is time to evaluate, update, or revise the plan. Plans are living documents that require adjustments to maintain their relevance. You and the planning team prepared the mitigation plan to articulate your community's values and strategies at a particular point in time, but like every other plan, it must be reviewed periodically to remain a useful tool to guide growth and change in your community.

Updates and revisions may be necessary to incorporate changes in your community or tribe, new hazard information, new tribal, community, or state priorities, or lessons learned as mitigation projects are completed. It is recommended, but not required, that you com-

This series of guides shows how to identify, plan, and implement cost-effective actions through a comprehensive approach known as **Hazard Mitigation Planning.**



The process consists of four basic phases:

- **Organize resources** involves organizing resources, mobilizing the community, and getting started with the planning process;
- **Assess risks** identifies hazards and estimates the losses associated with these hazards;
- **Develop a mitigation plan** describes how to identify, plan, and initiate cost-effective actions; and
- **Implement the plan and monitor progress,** the topic of this guide—*Bringing the Plan to Life: Implementing the Hazard Mitigation Plan* (FEMA 386-4)—leads communities and states through the formal adoption of the plan and discusses how to implement, monitor, and evaluate the results of mitigation actions to keep the mitigation plan relevant over time.

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The implementation and evaluation processes ensure that you accomplish the mitigation actions in a timely way and provide the foundation for an ongoing mitigation program. This allows you to:

- Ensure that the mitigation strategy is implemented in an effective manner;
- Provide for the long-term institutionalization and monitoring of hazard mitigation practices so that the plan remains relevant in the face of change;
- Establish new protocols. The planning process educates community officials on their roles (and those of their departments) in reducing risks. Local officials will need to develop protocols for integrating mitigation principles into their daily job responsibilities; and
- Maintain momentum. The implementation phase is a good time to renew the spirit of cooperation among all partners in the planning process, particularly now that actions to reduce risk are imminent.

States should continually work with local jurisdictions to ensure that local plans are in conformance with state guidelines and complement the goals and strategies outlined in the state hazard mitigation plan, particularly as state priorities change.

plete an internal review of the plan annually and revisit your plan after all hazard events. DMA 2000 regulations require updates every three years for state plans, and every five years for local plans, in order for states, tribes, and communities to remain eligible for disaster-related grants and assistance. This guide will help you determine when and how to review and revise your mitigation plan.

How do you use this how-to guide?

This guide will help you address the following questions:

1. How can we make sure the plan is officially recognized?

Proof of formal adoption is required under DMA 2000 regulations. Getting the plan adopted ensures the support and approval of the governing authority in your jurisdiction. Step 1, *Adopt the Mitigation Plan*, discusses ways of securing the adoption of the plan by your governing body.

2. What is the most effective mechanism to implement each recommendation? What resources are available? How can we keep the public informed and actively involved now that initiatives are underway?

Your mitigation strategy probably contains various short- and long-term recommendations. While you identified potential sources of funding in the plan, the actual sources of funding, staff time, and staffing needs may change before project implementation gets underway. The planning team always must be on the lookout for alternative sources of funding, new opportunities, and new partnerships through which to carry out the recommendations.

Determining who will bear responsibility for implementing planned actions is key to getting the implementation phase off to a successful start. Ensuring that there are appropriate authorities to implement actions is covered in Step 2, *Implement the Plan Recommendations*.

3. How will we know if our mitigation strategy is working?

Monitoring and evaluating the outcomes of the mitigation actions are essential to knowing whether to stay the course or change it. Step 3, *Evaluate Your Planning Results,* discusses how to determine whether or not the planned course of action has had the desired effect. The successes and limitations of your efforts should be documented as part of the evaluation process.

Celebrating successes, and keeping citizens actively involved and informed of the progress of the hazard mitigation initiatives, are

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just as important in the adoption, implementation, and revision phases as in any other phase. Keeping everyone up to date on progress also will help sustain support for mitigation as a local, tribal, or state priority. During the implementation phase, the media will become an especially important tool in communicating the progress of the mitigation plan.

4. When should we reexamine the plan?

As has been noted throughout the how-to series, the community and its assets are constantly changing, requiring the mitigation plan to be updated periodically. While DMA 2000 regulations require a formal review and revision of the community plan once every five years for local jurisdictions and every three years for states, the planning team should reevaluate its implementation strategy as new opportunities, unforeseen challenges, and disasters arise. Additionally, as mitigation issues are resolved, the plan should be reexamined to determine whether there is a need to reprioritize, add, or reconfigure actions in light of what has been accomplished. Step 4, *Revise the Plan*, addresses how to incorporate new knowledge about the community, tribe, or state and ongoing mitigation efforts into your strategy.



Be sure to allow sufficient time to complete Phase 4. If you decide to revise the plan, or if you are required to revise it as described under DMA 2000, consider the time it will take to do the following:

- Include the public and identify any new stakeholders in the evaluation process;
- Gather and evaluate data;
- Brief the public and political leadership;
- Incorporate changes into planning documents; and
- Adopt the new plan.

Type of information found in the how-to series

The how-to series contains a wide variety of information, some of which is highlighted with icons. Additional information can be found in Appendix B, *Library*. To illustrate how the guide can be used, newspaper articles from the fictional Town of Hazardville are provided.

Icons



Guidance focused solely on the role of **states and tribes** that serve as grantees under HMGP is identified as a sidebar with the **"States"** icon. Tribes that choose to serve as grantees under HMGP should follow the state icons. Although much of the information will be the same for local, tribal, and state governments, there are different requirements for state and local mitigation plans. Furthermore, states have additional responsibilities to assist local entities in their planning efforts. For tribes that choose to serve as subgrantees under HMGP, guidance focusing on local governments applies to these entities as well.

Under DMA 2000 regulations, local governments may be defined in many different ways. A local government may be defined by a political boundary, such as an incorporated city, county, parish, or township, or it may not have a distinct political boundary, for example, a watershed or metropolitan region. "Local government" is formally defined in 44 CFR §201.2 of DMA regulations.

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The **"Advanced"** icon indicates an additional step you can take or when specialists may be needed.

The **"Caution"** icon alerts you to important information and ways to avoid sticky situations later in the planning process.

The **"DMA"** icon provides information relating to the mitigation planning requirements outlined in the Disaster Mitigation Act of 2000 (DMA 2000).

The **"Glossary"** icon identifies terms and concepts for which a detailed explanation is provided in the Glossary included in Appendix A.

The **"Tips"** icon identifies helpful hints and useful information that can be used in the planning process.

Library

A mitigation planning **"Library"** has been included in Appendix B. This library has a wealth of information, including Web addresses, reference books, and other contact information to help get you started. All of the Web sites and references listed in the how-to guide are included in the library.

Town of Hazardville articles

Applications of the various steps in the mitigation planning process are illustrated through a fictional community, the Town of Hazardville, located in the State of Emergency. Hazardville, a small community with limited resources and multiple hazards, is in the process of developing a multi-hazard mitigation plan. Newspaper accounts illustrate the various steps in the mitigation planning process.

Worksheets

Finally, to help track your progress, worksheets have been developed that correspond with the structure of this guide. Worksheets have been completed with Hazardville examples to illustrate the

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type of information to include. Blank worksheets are included in Appendix C. You can photocopy the worksheets to record your progress as you undertake the processes of implementing and evaluating the mitigation plan.

The Hazardville Post

Vol. CXIII No. 28 Tuesday, January 28, 2003

Public Responds to Hazardville Mitigation Plan

[Hazardville, EM] The Town of Hazardville Organization for Risk Reduction (THORR) has received over 50 comments regarding the Hazardville Mitigation Plan. The plan was created to help reduce the community's risk to hazards such as flooding, earthquakes, and other natural hazards.

Joe Norris, lead planner for THORR, said the team has been working closely with citizens, businesses, and other community representatives to develop a plan that would create a safer, more resilient Hazardville. THORR was committed to having community input throughout the planning process. "At first, we had a hard time getting the community interested. The citizens didn't know what to expect," Norris said.

Many in the community were skeptical of exactly what the plan was supposed to accomplish. Riley Howard, an advocate for the town's less privileged citizens in the Raging River Views Park was perhaps the most outspoken opponent of the plan. At first, Howard worried that the benefits of this plan might not help the people he felt needed it the most.

"I have tried for years to get the community to help the poor residents in the low-income neighborhood who get flooded out every spring when the snow begins to melt. The town never knew how they could help the residents other than to assist in clean-up and debris removal. The residents could not afford to relocate on their own. All of the houses that are affected year after year were identified in the hazard identification and risk assessment as being in a 10-year flood zone, and are very vulnerable to any sort of flash floods or even a heavy rain." (A 10-year flood has a 10 percent chance of occurring in any one year.)

"While I was deeply saddened by this information," Howard said, "I was relieved to see that it turned out to be a good thing after all. Once the town and the Council learned what a dangerous area that was, the entire neighborhood was prioritized for buyouts, which will allow these residents to get fair market value for their home and help them move out of harm's way."

In an interview, THORR's outreach coordinator, Charity Jones, who works for the Hazardville Department of Health and Human Services, said, "The citizens of Hazardville should feel good about what they did to develop this plan. I know I am proud of all the work that THORR and Hazardville community members have put into its creation. This is truly a plan driven by the community's concerns and needs."

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step 1 adopt the mitigation plan



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1 adopt the mitigation plan

Overview

Congratulations! You have reached Phase 4 of the planning process. After organizing resources, assessing risks, and developing a mitigation plan, you are now ready to take the first step in Phase 4—guiding the plan through a formal adoption process. Completion of this step will establish the plan's authority and legitimacy. In order to meet DMA 2000 regulations, your jurisdiction's governing body must formally adopt the plan in accordance with state and local laws. Their involvement and support of the process all along should help gain approval, as you will see below. Local plans are adopted by the lead governing body (City Council, Board of Supervisors, etc.) and state plans are usually submitted to the state director of emergency management for approval and signature. Adopting the mitigation plan is the final challenge for the planning team before plan implementation can begin. The relationships you have already established with stakeholders, elected officials, and government agencies, as well as the thorough nature of your work thus far, will be important assets during the adoption process.

In addition to being required by DMA 2000, adoption of the plan is necessary because:

- It lends authority to the plan to serve as a guiding document for all local and state government officials;
- It gives legal status to the plan in the event it is challenged in court;
- It certifies to program and grant administrators that the plan's recommendations have been properly considered and approved by the governing authority and the jurisdiction's citizens; and
- It helps ensure the continuity of mitigation programs and policies over time because elected officials, staff, and other community decision-makers can refer to the official document when making decisions about the community's future.



Linking the plan's policies to those in other land development tools ensures that development decisions are made in consideration of the loss reduction goals of the community. Formal adoption of the plan lets public or private funding sources know that the plan has the support of citizens, elected officials, and business owners. For example, land developers should use the adopted plan to make informed decisions about their ventures with respect to mitigation policies and potential hazards.



Before you seek adoption of the plan, check with your State Hazard Mitigation Officer (SHMO) on administrative procedures for reviewing plans under DMA 2000 requirements. The SHMO may have established a procedure with the FEMA Regional Office to review the draft plan to make sure you included all elements for meeting the DMA 2000 or other program requirements. This may include reviewing the planning process and your documentation before you ask the governing body to adopt the plan, a step to ensure that you have to submit the plan only once to the governing body for formal adoption. A tribal jurisdiction that submits a plan as a state-level entity works directly with the appropriate FEMA Regional Office.

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Ensuring Plan Adoption

The planning team has already performed activities that will help ease passage of the plan:

Recognizing the Committee. As described in *Getting Started* (FEMA 386-1), the team is formally recognized by the community's governing body as the local authority on mitigation, and has been entrusted to make recommendations about mitigation on behalf of the community. This formal recognition by elected officials extends to the planning team's scope of work as well.

Garnering Public Input. As covered in *Getting Started* (FEMA 386-1) and *Developing the Mitigation Plan* (FEMA 386-3), the planning team identified stakeholders to join the planning team, briefed elected officials, informed the public of the team's progress and findings, and involved the public in its work. By including the citizens of the community throughout the planning process, you can expect that the adoption and implementation of the plan will be broadly supported by the public and elected officials.

Communicating Information. By keeping citizens involved in the planning process and informed of progress, the planning team can maintain the community's interest in mitigation. The community now knows and understands that there is a significant risk of losing assets because of hazards, that several alternatives are being considered, and that projects and initiatives will soon be underway.

Partners in Mitigation

Citizens, businesses, and technical experts in southwest Tulsa are partnering with the City of Tulsa and the National Park Service in the development of a greenway plan for a local creek (Mooser Creek). Flood mitigation, preservation of natural resources, recreation, and sustainable development are part of a community vision shared by both citizens and government. Community leaders got involved by forming committees and identifying issues important to them. The Mooser Creek Greenway Citizens and Technical Committees agreed upon a vision statement in an effort to preserve the natural functions and beauty of Mooser Creek and to create recreational and educational opportunities.

Procedures & Techniques

Task A. Brief local leadership.

An excellent way to facilitate adoption of the plan is to periodically brief community decision makers and elected officials on the progress of your planning efforts. This is a great opportunity to demonstrate to the governing body that the plan is sound and has broad support. Plan adoption should not be difficult if the planning team has conducted activities throughout the planning process that have lent credibility to the team, the plan, and the planning process. The briefings will also allow you to address any concerns of elected officials, and to obtain their input. Having the planning team recognized, garnering public input, and communicating the progress and successes of the team will help get the plan adopted.

Task B. Demonstrate the support of partner organizations.

One way to ensure the credibility and eventual passage of the mitigation plan is to present the adopting body with letters of support from organizations and agencies on the planning team, as well as those not on the team. The community's governing body may view the plan more favorably if it has the support of neighborhood and civic organizations. Some organizations may show their commitment to implementing the plan by passing a resolution supporting it and outlining specific responsibilities that they will assume. Furthermore, supporting organizations should be encouraged to provide testimony if the plan will be adopted at a public hearing. This testimony should provide specific information on the benefits that the mitigation plan will bring to the organization's constituencies. Such testimony becomes part of the public record of the hearing.

For example, if a member of a community watershed advocacy group was part of the planning team, that group might review the plan and give its full support to the plan by outlining the group's commitment to sponsor an annual watershed clean-up day or to plant native vegetation in the open space that resulted from the acquisition of flood-prone structures. See *Getting Started* (FEMA 386-1) for more details on garnering community support.

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Task C. Have the plan adopted by the proper legislative or executive authorities.

The mitigation plan will be adopted through your government's normal legal process. Depending on the laws in your state and jurisdiction, adoption of the plan will give the jurisdiction legal authority to enact ordinances, policies, or programs to reduce hazard losses and to implement other mitigation actions. Generally, most local governing bodies will adopt a hazard mitigation plan by resolution.

Build time into your planning schedule to meet federal and state deadlines for submitting the plan. Make sure you allow sufficient time for formal adoption procedures. Your local governing body may meet only once a month and may require agenda items to be submitted well ahead of time.

Task D. Submit your plan for approval.

Once your local governing body has approved the plan, it must be submitted to the State Hazard Mitigation Officer (SHMO). The SHMO should already be familiar with your plan because he or she should have reviewed a draft to determine if the plan meets DMA 2000 and other state program requirements. Someone should be designated as the point of contact with the state to answer any questions about the plan. For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted by its respective governing body. The SHMO is responsible for forwarding the plan to the FEMA Regional Office for review.

Task E. Publicize the adoption and approval of the plan.

Once the plan has been approved, stakeholders should be informed of your success. You may want to package the message differently to reach various audiences. This can be accomplished by sending a press release to your local newspaper, holding a press conference with important civic leaders, sending a mailing, or posting a notice on the community's Web site. You may also want to celebrate your success by beginning a project immediately. For example, after the plan is approved, you may request that the governing body vote on a resolution or ordinance that is important to accomplishing your mitigation goals, or to authorize funding to undertake a highly visible project, such as flood-proofing City Hall or some other important public facility.

DMA

44 CFR §201.4(c)(6) and §201.6(c)(5) of the Interim Final Rule require plans to be adopted before being submitted to FEMA for formal review and final approval. A copy of the resolution of adoption must be included with the plan.

Resolutions are expressions of a governing body's opinion, will, or intention and can be legally binding or not. Most planning documents must undergo a legally binding council resolution, which, in order to be adopted, must be supported by an official vote of the majority of members.

Formal adoption of the state plan will vary according to state protocols. Generally, states should obtain the signature of the state emergency management director as approval of the plan. The plan also can be distributed to members of the state legislature to broaden support for the plan and to potentially pave the way for any new legislation or budget items that may be necessary to carry out the plan recommendations. States must submit plans to their FEMA Regional Office for review and approval. Depending upon regional procedures, states also may opt to submit the results of the risk assessment or draft plan to FEMA for an informal review before officially adopting it and sending it to FEMA for official review and approval. Once any necessary changes have been made, the state can proceed with formal adoption and final FEMA review. If a tribal organization has developed a state-level plan, it should be submitted directly to the FEMA Regional Office.

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Consider developing an executive summary of the plan for use in publicizing it with other government agencies or partners. A brochure may be appropriate for citizens while you also make the executive summary or entire plan available to them.



Summary

By the time you finish Step 1, you will have a plan that has the support of the community, state, tribe, and elected officials. Adoption of the plan gives the plan greater authority, fulfills certain FEMA program eligibility requirements, and will ease implementation of your mitigation actions. Once the mitigation plan has been adopted, your state, tribe, or community is ready to begin implementing the mitigation strategy.

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The Hazardville Post

Vol. CXIII No. 45 Friday, February 14, 2003

Town of Hazardville Adopts THORR's Plan

(Part 1 of a 4-Part Series on the Hazard Mitigation Implementation Process)

[Hazardville, EM] The Hazardville Town Council adopted the Hazardville Hazard Mitigation Plan on Thursday by resolution (included below) to serve as the town's guide in reducing risks to citizens and property. Marion Jackson, Chairperson of the Town Council, announced that "in light of the community's involvement and obvious support for the plan, indicated by citizen turnout at the hearing and letters of support submitted for the record by respected community organizations, the Council unanimously voted to adopt the Hazardville Hazard Mitigation Plan as an official plan of the Town of Hazardville." The plan will take effect immediately.

The Town of Hazardville Organization for Risk Reduction (THORR) was instrumental in developing the plan and marshaled its forces to support adoption of the plan through written support from the community. "This plan is one of the few community initiatives that is relatively unopposed, no doubt due to THORR's diligent public outreach efforts," Jackson said.

Resolution #2003-53

WHEREAS the Town of Hazardville has experienced severe damage from hurricanes, flooding, earthquakes, wildfires, landslides, and tornadoes on many occasions in the past century, resulting in property loss, loss of life, economic hardship, and threats to public health and safety;

WHEREAS a *Hazard Mitigation Plan* (the Plan) has been developed after more than one year of research and work by the Town of Hazardville Organization for Risk Reduction and the people of the Hazardville community;

WHEREAS the Plan recommends many hazard mitigation actions that will protect the people and property affected by the natural hazards that face Hazardville;

WHEREAS a public meeting was held to review the Plan as required by law;

NOW THEREFORE BE IT RESOLVED by the Mayor and Town Council of the Town of Hazardville that:

1. The *Hazard Mitigation Plan* is hereby adopted as an official plan of Hazardville.
2. The respective town officials identified in the strategy of the Plan are hereby directed to implement the recommended actions assigned to them. These officials will report quarterly on their activities, accomplishments, and progress to the Town of Hazardville Organization for Risk Reduction.
3. The Town of Hazardville Organization for Risk Reduction will provide annual progress reports on the status of implementation of the plan to the Mayor and Town Council. This report shall be submitted to the Town Council by February 28th of each year.

PASSED by the Town Council of Hazardville, this 13th day of February 2003.

Marion Jackson
Council Chairperson

APPROVED by me this 13th day of February 2003.

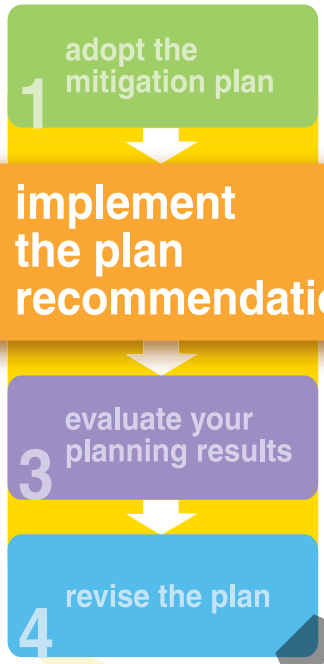
Mayor

ATTESTED and FILED in my office this 13th day of February 2003.

Mary Landers
Clerk

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step 2


1
adopt the mitigation plan
implement the plan recommendations
3
evaluate your planning results
4
revise the plan

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2

implement the plan recommendations

Overview

Citizens and officials who participated in creating the plan will expect to see results from their hard work and effort. This step describes how to place the recommendations of the plan within the administrative framework of your state, tribe, or community. The section presents ideas on how the planning team can get the recommendations implemented on schedule and, over time, integrate mitigation actions into the day-to-day operations of government agencies. It will also show how to bring action items within the mitigation strategy to fruition through creative use of available resources.

When implementing the plan, various stakeholders will have distinct roles and responsibilities:

The Planning Team. During the implementation of the mitigation strategy, the planning team's role may change to one of overseer. As the developers of the mitigation plan, the planning team should also regularly monitor its progress. The planning team can help ensure that the spirit of the plan is not sidetracked by political or personal concerns, and keep the community energized so citizens can hold the government accountable for the legitimate performance of the plan. The team can also alert officials to issues that may affect emergency management and hazard mitigation.

Elected Officials and Local Administrators. The executive or delegated administrator may be a likely candidate for keeping all participating local agencies or departments on track. Elected officials play a unique role in the implementation of the plan. They will be pressured by those opposed to the plan as well as those who expect to see it enacted as intended. Furthermore, elected officials have the capacity and responsibility to distribute resources among competing interests. The planning team will have identified supportive elected officials not only when organizing to prepare the plan (Phase 1, *Getting Started*, FEMA 386-1), but also when evaluating the relevant political factors of potential mitigation actions (see *Developing the Mitigation Plan*, FEMA 386-3, Step 2).

Elected officials and local administrators should provide:

- **Oversight.** Officials not only can assign staff and provide incentives to implement planning initiatives, they also can support the hard work of the professional staff and volunteers.
- **Visibility.** Community leaders must keep the spotlight on the identified hazard-related problems and opportunities and make sure that problems are not overlooked by any relevant department or office—community planning, emergency services, zoning, public service, and economic development, for example.
- **Budgets.** Elected officials and local administrators must ensure that the community's annual budget includes funding to implement previously adopted long-term actions. This includes commitments that the community has made to cost-share, maintain, operate, repair, or otherwise bear the burden for activities that may have been undertaken with outside assistance.

(continued on page 2-2)

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(continued from page 2-1)

Partners–Nonprofit Organizations and Businesses. Throughout implementation of the plan, the planning team should consider innovative ways for its partners to facilitate the implementation of projects. The nonprofit and private sectors can help in a number of ways, including lending expertise, discounted materials, staff or volunteer time, or meeting space. The planning team can, in turn, offer the private organizations an opportunity for greater public exposure, and thus greater name recognition. The planning team can also offer tips and expertise in mitigation; businesses often do not realize the danger that their property or sources of income face from hazards. The planning team can inform partners about the hazards they potentially face, the ways they can mitigate these hazards, and how their staff can mitigate hazards at home.

Citizens. Citizens have an ongoing role to play in project implementation. The planning team should actively seek volunteers to help implement programs and activities. Knowledgeable citizens also can be recruited to provide expertise in specific subject areas. The more you involve people in implementing the plan, the greater the support it will receive.

State Agencies. State agencies can lend their time, expertise, and funds to the implementation of hazard mitigation projects. Make sure your list of state contacts is very broad, as the resources of one state agency may be unknown to another.

Academic Institutions. Colleges and universities can provide technical expertise to projects that may require Geographic Information System (GIS), engineering, planning, or other technical assistance. They can also provide meeting space, laboratories, and other logistical support.

In the third phase of the planning process, the planning team identified mitigation actions and implementation strategies that included target dates for the completion of projects and assigned responsibilities to agencies, departments, organizations, or specific people (see Steps 2 and 3 of *Developing the Mitigation Plan,* FEMA 386-3). This information should help the planning team meet the objectives of the plan on time and provide indicators by which the implementation will be monitored and evaluated.

It is important to decide how success will be determined before implementation and evaluation occur. From an administrative standpoint, success may be simply a measure of whether the project was finished on time, and within budget. On the other hand, even projects that are well thought out and executed may not be completed for a long period of time due to the nature of the project, the lack of available funding, or other reasons beyond the control of the community. In this case, it is important to identify successes in the short-term, even if completion is not in sight. For example, if a community decides to pursue zoning changes in flood hazard areas, the actual changes may not occur for years due to administrative procedures that must be followed within the context of local and state zoning and land use law. However, successes (in the form of completion of milestones) can and should be identified along the timeline that is appropriate for that type of mitigation action. In this zoning example, short-term successes can include key meetings or briefings held to present risk information to support zoning changes.

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In Step 3, you will also measure the effectiveness of your mitigation actions. It will be therefore important in Step 2 to establish indicators of effectiveness.

The planning team should also determine the manner in which plan implementation will be monitored. In any incorporated community, there are elected or appointed officials who have the ultimate responsibility for carrying out specific community policies and programs. The planning team should continue to serve as a resource to the community by helping its leaders identify, measure, and publicize successes, and mobilize community members to contribute and participate where appropriate. The planning team can also work to secure funding to implement the plan.

Your team may decide that frequent meetings are no longer practical. It may consider an alternative, such as periodically issuing a memorandum to keep team members informed of progress in implementing the plan. An annual internal review of progress by the planning team is also a good monitoring method. Keep in mind that the need for maintaining sustained communication is more important than the form of communication selected.

Procedures & Techniques

Task A. Confirm and clarify responsibilities.

In Step 3 of *Developing the Mitigation Plan* (FEMA 386-3), the planning team identified who would be involved in implementation of the mitigation actions. Now is the time to revisit those assignments and confirm that the responsible parties understand their duties. One way to communicate your expectations to public agencies and other organizations with specific responsibilities is to draw up a Memorandum of Agreement (MOA) among the different agencies and organizations. An MOA is a non-binding statement that defines the duties, responsibilities, and commitment of the different parties or individuals as established by the hazard mitigation strategy developed in Phase 3. It provides a clear statement of values, principles, and community hazard mitigation goals, and establishes an organizational structure to assist in measuring and evaluating the plan's progress.

The MOA should include:

- A vision or goal statement;
- An organizational structure to maintain the effort over time;

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- A statement that specifies the duration of the MOA and how it will be reviewed or revised;
- A statement indicating how decisions will be made to continue the MOA;
- A statement describing the circumstances under which partners should consult each other;
- A statement requiring the organization to submit periodic or annual reports on the progress of its projects or programs;
- A statement regarding responsibility for actions; and
- A resource commitment statement on the staffing, technical resources, and funding that the department, agency, or organization is expected to provide.



Example of a Memorandum of Agreement

Agreement is made this 4th day of March 2003 by these parties:

The Town of Hazardville (the Town) and its local corporate and nonprofit partners, and the State of Emergency and its partners

WHEREAS the parties:

Strive to create sustainable communities that are resistant to the human and economic costs of disasters;

Recognize that actions taken in advance of disasters are effective in reducing losses; that partnerships among government agencies, private companies, voluntary and professional associations, educational institutions, and community organizations are essential for the success of these efforts;

Recognize that vulnerable conditions exist in public and private facilities, and the utility and transportation systems that serve them; that increasing population growth and diversity, escalating disaster costs, and other factors increase the Town's vulnerability to disaster;

Recognize that financial support is necessary to enable the expansion and integration of public and private mitigation efforts;

Agree to continue to receive and encourage the input of stakeholders with the State, Town, businesses and nonprofit organizations in Hazardville, neighboring communities, citizens, and other appropriate partners;

NOW, THEREFORE, it is mutually agreed that the parties voluntarily enter into this non-binding Agreement to establish the Town of Hazardville Partnership for Disaster Mitigation (the Partnership).

The principal objective of this Agreement is to further develop private, volunteer, and public-sector capabilities (people, policies, resources, working relationships, long-term plans, and a schedule for accomplishments) necessary to carry out projects that will reduce vulnerability to risk and minimize losses.

1. **MEMBERSHIP.** Membership in the Partnership is open and can be expanded to include new (additional) partners in the future. The Partnership will work together to advise the Town and participate in the implementation of the Town of Hazardville Hazard Mitigation Plan to further mutual loss-reduction goals subject to the terms and conditions recited below.
2. **TERM.** The respective duties, responsibilities, and commitments of the parties hereto shall commence on the date this Agreement is signed by the parties and may be periodically renewed or revised at the option of the parties.

(continued on page 2-5)

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3. **CONSULTATIONS.** The Partners shall make their representatives available to consult with the Town of Hazardville on ways in which the Hazard Mitigation Initiative (see Appendix A below) can be improved and applied successfully. The Partners, in consultation and conjunction with other public-sector entities and related community-wide initiatives, shall consult with each other on:
   - Identification and delineation of natural and manmade hazards within the Town;
   - Assessment of risk to and vulnerability of buildings, facilities, utilities, communications, and transportation systems in the public and private sectors;
   - Techniques to plan for, reduce, and manage expected losses; and
   - Technical and financial assistance and incentives to facilitate loss reduction projects.
4. **ANNUAL EVALUATION.** The parties shall annually review the Partnership created by this Agreement to determine and document successes achieved over the past year and discuss actions to be undertaken in the following year. The Partnership will prepare an Annual Report describing accomplishments resulting from the Hazardville Hazard Mitigation Initiative and implementation of the Hazardville Hazard Mitigation Plan. The Partnership shall also make recommendations for improving this Agreement and other disaster mitigation/recovery strategies.
5. **RESOURCE COMMITMENT.** The parties will consider committing human, technical, and financial resources, coordinate with current and future partners, and carry out the fundamental actions of this voluntary, non-binding Agreement.
6. **THE HAZARD MITIGATION INITIATIVE.** This Agreement includes two Appendices. Appendix A offers an overview of the Hazardville Hazard Mitigation Initiative. Appendix B lists commitments made by the parties to be included as part of the Hazardville Hazard Mitigation Plan that will be acted upon after execution of this Agreement. These actions will constitute steps toward accomplishing the loss-reduction goal. The period of time for completing defined actions will be set and reported by the Partnership.

IN WITNESS WHEREOF, each party has caused this Agreement to be executed by its duly authorized representatives on the date first mentioned above.

Appendix A – Hazardville Hazard Mitigation Initiative – Proposed Actions:

The Hazardville Hazard Mitigation Initiative is an element of this Memorandum of Agreement. In summary, the Initiative addresses the following:

A. **Reducing flood hazards to low-income, residential structures.** The Town of Hazardville Emergency Management Agency, the Hazardville Department of Planning, and the Hazardville Habitat for Humanity are working to acquire flood-prone, low-income housing in the manufactured-housing park and other low-income areas in the floodplain, and to find appropriate, affordable housing for displaced residents.

B. **Establishing public education and outreach projects.** The Partnership will cooperate to inform the public about the accomplishments of the Hazardville Hazard Mitigation Initiative, progress of projects, and upcoming public planning efforts. Working with Hazardville Hardware, the Partnership will also educate the public on insurance, family disaster preparedness planning, and other safety tips to protect houses from natural and technological hazards.

C. **Strengthening the community's resistance to seismic and landslide hazards by retrofitting vulnerable structures.** This project component will strengthen the community's housing stock to resist damage from earthquakes by (1) developing a consistent, sustainable retrofit capability among local builders, contractors, and homeowners; (2) seismically retrofitting vulnerable structures in the downtown business district; and (3) incorporating standardized retrofit practices into home and downtown commercial rehabilitation programs.

   Under this component, the Partnership will also strive to find additional funding to complete the retrofit of the Town's lighthouse, threatened by coastal erosion.

Appendix B – Hazardville Hazard Mitigation Initiative – Resource Commitments:

The Town of Hazardville will:

1. Provide leadership for the Partnership and serve as the point of contact for the Hazardville Hazard Mitigation Initiative.

(continued on page 2-6)

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(continued from page 2-5)

2. Provide financial management of the grant funds provided to the Town for hazard mitigation projects, including Hazard Mitigation Grant Program funds, Flood Mitigation Assistance funds, Pre-Disaster Mitigation funds, etc.
3. Procure the support and assistance of appropriate Town departments and agencies to further the objectives of the Hazardville Hazard Mitigation Initiative.
4. Supply meeting space and other logistical support for Partnership meetings.

The State of Emergency will:

1. Supply peer review of plans, planning processes, and project implementation to identify potential problems, recommend solutions, or procure appropriate State support.
2. Attend project review meetings to meet with partners implementing the projects.
3. Facilitate Federal grants applied for by the Town and the Partnership.

Hazardville Department of Planning will:

1. Supervise the acquisition and demolition of vulnerable structures in the floodplain.
2. Designate the resultant publicly owned open space as an area precluded from future development.

Hazardville Department of Housing will:

1. Support the acquisition and demolition of the flood-prone houses of low-income residents by providing additional funding for replacement housing in non-hazardous areas.

Hazardville Habitat for Humanity will:

1. Solicit its corporate and other partners to supply building materials for new, affordable housing.
2. Organize volunteers to build new, affordable housing in non-hazard areas for current residents of the manufactured home park and other low income areas in the floodplain.

Hazardville Hardware will:

1. Design and fund public education brochures advising the public about hazard mitigation for homeowners, safety during hazard events, and the importance of purchasing insurance.
2. Develop a marketing display for the Hazardville Hardware store advertising hazard mitigation for homeowners and related products that can be purchased at the store.

Capability Assessment Results

In completing your capability assessment in Phase 3 of the planning process, you identified policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions. Consider developing an implementation strategy that addresses recommendations that can be easily implemented first, followed by those that need to be modified, and last, those that require the adoption of new regulations or policies or infusion of outside funding sources for implementation.

Task B. Begin to integrate mitigation actions throughout government operations.

The planning team should work with chief administrative officials to begin to integrate the newly adopted hazard mitigation goals and actions into the general operations of its government and partner organizations. By initially working within existing administrative mechanisms, communities and states can quickly and efficiently implement and finance their hazard mitigation projects and programs, and incorporate them into their governing systems. The following sections discuss several options to consider.

1. Use processes that already exist.

A good initial strategy is to take advantage of tools and procedures that were identified in your capability assessment in Step 2 of

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Developing the Mitigation Plan, FEMA 386-3. Your research of Social, Technical, Administrative, Legal, Economic, and Environmental (STAPLEE) criteria for mitigation activity should have uncovered information on the administrative, financial, or legal mechanisms in your state, tribe, or community. These mechanisms are already in use and familiar to the governmental departments and organizations. This will give the planning implementation phase a strong initial boost, especially if your plan calls for expanding existing agency mandates or departmental funds, or creating new programs later on.

Administrative

- **Departmental or organizational work plans, policy, and procedural changes.** Updating the work plans, policies, or procedures to include hazard mitigation concepts and activities can help integrate the plan into daily operations. These changes can include how major development projects and subdivision reviews are addressed in hazard-prone areas or ensure that hazard mitigation concerns are considered in the approval of major capital improvement projects.
- **Job descriptions.** Working with department or agency heads to revise job descriptions of government staff to include mitigation-related duties could further institutionalize hazard mitigation. This change would not necessarily result in great financial expenditures or programmatic changes.

Budgetary

- **Capital and operational budgets.** Instead of solely relying on funding from hazard mitigation programs or other external sources of grant monies, states, tribes, and communities might consider a line item for mitigation project funding in their capital or operational budgets. Having a line item in these budgets may not guarantee funding every year, but it is certainly easier to get the money allocated if it is already there. Examples include a revolving fund to finance a buyout program or a low-interest program to fund retrofits.

Examples of using existing resources to accomplish mitigation:

- The Department of Public Works could adopt more rigorous procedures for inspecting and cleaning debris from streams and ditches. Instead of cleaning only after storms or complaints from citizens, the Department could require inspections of streams and ditches at least semi-annually.
- The Planning Department could add hazard vulnerability to subdivision and site plan review criteria and incorporate any necessary actions at the planning stage.
- A community conservation society or other interested voluntary organization could perform inventories of historic sites in hazard areas that might require special treatment to protect them from specific hazards.

You may want to add

some or all of the following language into job descriptions for a community planner, floodplain manager, emergency manager, building code official, or water resources engineer in the Public Works Department:

Knowledge, Skills, and Abilities

Knowledge. Knowledge of the principles of emergency management, specifically hazard mitigation. Knowledge of the principles and practices of sustainable development and how it is incorporated into hazard mitigation planning. Knowledge of FEMA's pre- and post-disaster mitigation programs, as well as other federal agency programs (HUD, EPA, SBA) that provide technical and/or financial assistance for implementing pre- or post-disaster mitigation planning. Knowledge of private/non-governmental programs that can support reconstruction and mitigation strategies.

Skills. Consensus building and team building, communication (verbal and written)/interpersonal skills.

Abilities. Ability to apply planning principles and tools to the goals of hazard loss reduction.

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See *Developing the Mitigation Plan* (FEMA 386-3) for more information on using the following implementation tools for hazard mitigation:

- Building Codes
- Zoning Ordinances
- Subdivision Ordinances
- Special Hazard Area Regulations

Integrating Hazard Elements into Comprehensive Planning

- For guidance on what to include in a local hazard element, see the American Planning Association's *Growing Smart Legislative Guidebook* at www.planning.org/growingsmart.
- In July 2002, the Institute for Business & Home Safety (IBHS) published a report entitled *Summary of State Land Use and Natural Hazards Planning Laws*. This report focused on the relationship between state planning laws and other statutes that addressed natural hazards and their effect on local-level comprehensive planning and land-use regulations. More information about the results of this report is available at http://www.ibhs.org/research_library/view.asp?id=302.
- Oregon has long been recognized as a pioneer in local planning for natural hazards. In 1969, Oregon adopted Senate Bill 10, which required every city and county in the state to have comprehensive land use plans that met state requirements. This mandate, however, did not grant any authority to enforce the requirement or provide for any technical support or training to the communities. Subsequently, Senate Bill 100 was passed to address these issues, creating the Land Conservation and Development Commission (LCDC). Among its responsibilities, the LCDC was charged with establishing statewide planning goals that were to be congruent with regional, county, and city concerns; preparing statewide planning guidelines, model ordinances, and regulations; and ensuring widespread citizen involvement and input throughout all phases of the planning process.

  One of the state planning goals requires Oregon communities to inventory known natural hazards and to implement appropriate safeguards for development in hazard areas. On behalf of the LCDC, the Department of Land Conservation and Development (DLCD) developed *Planning for Natural Hazards: Oregon Technical Resource Guide* to help communities appraise and potentially improve the effectiveness of the natural hazard planning element in their comprehensive plans. The guide also provides useful information on how to identify and plan for a variety of natural hazards, and implement programs to address them. The publication is available online at http://www.lcd.state.or.us/hazhtml/Guidehome.htm.

Regulatory

- **Executive Orders, ordinances, and other directives.** The governing body or local executive often has the authority to issue directives to require departments and agencies to carry out certain hazard mitigation actions. Using one of these mechanisms, the governing body or executive can direct department heads to provide progress reports to the planning team on the hazard mitigation initiatives that the departments are responsible for carrying out.
- **Comprehensive planning.** Adding a hazard element to the comprehensive plan is one of the most effective mechanisms to institutionalize hazard mitigation for new construction. For communities with a comprehensive plan, *Getting Started* (FEMA 386-1) listed several reasons why a community should integrate mitigation planning and comprehensive planning. A primary benefit of combining these processes is that they both influence the location, type, and characteristics of physical growth, specifically buildings and infrastructure. While planning in and of itself may not be regulatory, it uses regulatory mechanisms (zoning, development ordinances, etc.) for implementing goals and objectives. Additionally, in many parts of the country, the comprehensive planning process is an established activity that is already familiar to the public, and it usually generates a great deal of interest and public participation.

2. Secure traditional sources of financing.

In Phase 3 of the planning process, potential sources of funding to implement the priorities in your mitigation strategy were identified. Now that the plan has been adopted, you have a strong basis for obtaining these resources. Communities and states have a range of tools to finance projects. Use of fees, taxes, bonds, and loans to finance projects are options if there is proper state enabling legislation, local author-

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ity, and enough political will. Once the plan has been adopted, there is a legitimate basis for initiating the process required to use these financial tools.

All of your plan's mitigation recommendations probably cannot be implemented using local funding sources. Furthermore, it may take some time to work through the legal and administrative processes to use proceeds from bond issues and similar vehicles. To supplement local funds, communities can apply for grants from federal or state governments, nonprofit organizations, and foundations, as well as seek funding from other private sources. The advantage of applying for grants is that they do not have to be paid back or generate long-term debt; however, most federal grants require state and/or local governments to provide some matching funds.

State and federal grants are a logical source of funding for some of the larger, more costly mitigation initiatives. Many federal grant mechanisms allow local "in-kind services" as a match for federal dollars, as well as the possibility of using state grant funds to meet the local match requirements. Review your capability assessment from Phase 3 and consider looking to regional planning agencies, universities, or economic development districts, if present and active in your state, for research or grant-writing technical assistance. The adjacent sidebar describes three major FEMA mitigation grant programs. Don't forget the potential of other federal grant programs for community development, even if they are not specifically disaster or mitigation related—the U.S. Department of Housing and Urban Development's Community Development Block Grant (CDBG), for example. For more on funding sources, see *Planning for a Sustainable Future: The Link Between Hazard Mitigation and Sustainability* (FEMA 364), and the *Mitigation Resources for Success CD* (FEMA 372).

3. Develop creative partnerships, funding, and incentives.

Incentives that minimize financial or administrative burden can stimulate momentum to undertake mitigation initiatives. For example, states and communities can provide tax rebates for code upgrades, offer reduced property taxes and insurance premiums for citizens and businesses that take steps to lower their exposure to hazards, or provide low interest loans for retrofit projects.

Some states, tribes, and communities have developed creative ways to get things done without spending a lot of their money. These



Three FEMA programs that provide funding for hazard mitigation actions are the **Pre-Disaster Mitigation Program (PDM), Flood Mitigation Assistance Program (FMA), and the Hazard Mitigation Grant Program (HMGP).** Web access to information on these programs is available at www.fema.gov/fima/.

- PDM, authorized under DMA 2000, provides pre-disaster funding to states, tribal, and local governments, and tribal organizations for mitigation planning and projects through a competitive process. A FEMA- approved mitigation plan is required to receive project funding. Check with your FEMA Regional Office or SHMO for the latest information on availability of funds.
- FMA provides annual grants to communities, tribes, and states to reduce the risk of flood damage to structures with flood insurance coverage. This funding is available for mitigation planning, implementation of mitigation actions, and technical assistance. An approved flood mitigation plan is required to receive project grants, but is not required for planning or technical assistance grants. Interim final regulations implementing this program can be found at 44 CFR Part 78.
- HMGP provides post-disaster grants to states, tribes, and local governments to implement long-term hazard mitigation actions after a major disaster declaration. FEMA can fund up to 75% of the eligible costs of each project, and up to 7% of HMGP funds available per state may be used for planning. An approved mitigation plan is required to receive project funding. See Interim Final Rules at 44 CFR §201 and §206.

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governments have engaged untapped resources by developing relationships with businesses, nonprofit organizations, and volunteers. Time spent earlier in the planning process developing relationships with citizens, businesses, and other communities can really pay off at this point in the process (see *Getting Started*, FEMA



Some examples of different types of partnerships that can provide funding or other resources to implement hazard mitigation actions are provided below. See *Mitigation Resources for Success* (FEMA 372) for additional examples and a more detailed discussion of funding mitigation actions.

Public-Private Partnerships. Partnership agreements between local governments and businesses or organizations can be advantageous for all parties involved. Private organizations and businesses routinely offer discounted or free goods and services to local governments in exchange for publicity or other benefits. In the end, the governments, organizations, businesses, and the public can all benefit from working together. Examples of successful public/private partnerships include the following:

- In Houston, Texas, FEMA and two prominent home improvement stores teamed up to provide information and advice on cleaning up and rebuilding after flooding caused by Tropical Storm Allison. FEMA Hazard Mitigation Teams staffed booths at both stores for three days, providing information on mitigation methods and techniques and the importance of flood insurance. By providing space, the stores played an important role in promoting community awareness of flooding hazards and helped foster public involvement in recovery.
- In Kinston, North Carolina, affordable housing was disproportionately affected by Hurricanes Fran and Floyd. The Permanent Housing Initiative, a partnership between the North Carolina Division of Emergency Management, the North Carolina Department of Corrections, and private sector home improvement companies, was formed to help address the housing shortage and subsequent housing acquisitions. Using a Habitat for Humanity housing model, energy efficient and hazard-resistant affordable housing was constructed in already established neighborhoods. Homes were constructed by volunteers using prefabricated wall panels (made by prison labor experienced in construction) and other donated tools and materials. The foundation, electrical system, and ductwork were done by certified professionals.
- In an effort to promote awareness of hurricanes and flooding in the coastal community of Virginia Beach, Virginia, the city held a Home Safety and Preparedness Exposition that included a section devoted to building disaster-resistant communities. More than 20 local businesses and organizations and the Virginia Department of Emergency Management sponsored the event. In return, sponsors were given display booths at the event to promote their goods and services.

Community Volunteers. State and local governments rely upon their citizens to perform work that might otherwise have to be paid for by money from government coffers. Some governments have institutionalized volunteerism by requiring students to contribute volunteer hours to local and regional initiatives. Others have partnered with nonprofit agencies, organizations, schools, and businesses to give their time and energy to help further community goals.

- Citizen Corps is a program within the USA Freedom Corps that promotes several initiatives to engage volunteers in Homeland Security efforts, including mitigation actions, across the country. These community-based efforts include Community Emergency Response Teams (CERTs), Neighborhood Watch, Volunteers in Police Service, Operation TIPS, and the Medical Reserve Corps.
- Following flooding in 1993, the City of Petersburg, Illinois, bought out riverfront property that had been flooded and engaged a group of high school students, the Community Problem Solvers (CmPS), to formulate a creative solution for rehabilitating the area as perpetual open space. The CmPS developed a garden and a preschool playground, a solution that was responsive to the needs of the neighborhood, city government requests, and federal government requirements. To fund the project, the CmPS team applied the same initiative and creativity that they had used to design it. The team organized a "Decorate an Abe" contest in honor of former Petersburg resident Abraham Lincoln. Area businesses sponsored and decorated Abe silhouettes, and residents paid to vote for their favorites. The "Abes" were later auctioned off to raise additional funds. In addition, the team designed and sold Historic Petersburg placemats. Volunteers from civic organizations donated funds to sponsor specific pieces of playground equipment, and a local business donated Lincoln Bears to be sold. Preschool children participated in a clean-up day at the site. Overall, many Petersburg residents

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contributed their funds, talents, and energy to make the project successful. The CmPS members not only helped minimize its community's vulnerability to flooding, they did it in a way that promoted community pride and civic involvement.

- Oakland, California, developed a community partnership called Safety and Future Empowerment (SAFE). Two initiatives, the Week of Caring and Spring Break, brought together city firefighters, corporate employees, students, the California Office of Emergency Services, and AmeriCorps members to make homes in the community safer and less vulnerable to earthquakes and fire. Four volunteer teams spread out across the city for a week to make the homes of elderly and low-income residents more disaster resistant. The teams installed smoke alarms and cupboard latches, strapped water heaters and free-standing cabinets to house frames, and rigged safety releases on window security bars. Local businesses donated or provided supplies at reduced costs in support of the effort.

State cooperation. Local governments often underestimate the wealth of resources that their states can provide. States are excellent sources of funding, support, and technical assistance. State geological surveys, water resources agencies, and departments of planning or natural resources often have useful data related to hazard identification and risk assessments. Your state may also have a GIS department that can provide data and support.

Unfortunately, localities sometimes pay for studies that have already been conducted by the state. You can avoid these duplications by inviting your state officials to participate in the planning process to help ensure that studies or reports can be compiled from readily available sources.

State fairs and other state-sponsored events can be great places for displays on hazard reduction techniques and hazard awareness campaigns. States can further help publicize awareness and generate interest by declaring a Hazard Awareness Week and promoting related local events on their Web sites.

In-kind resources. Federal or state grants often require the awarded locality to provide matching funds to cover a percentage of hazard mitigation project costs. In-kind resources, however, substitute monetary outlay with services that the community can perform. For example, HMGP pays up to 75% of the eligible costs of a hazard mitigation project, but the remaining amount must also be contributed to the project by non-federal sources. A municipality without sufficient resources can ask the state to help fund the match through state or Community Development Block Grant funds, or it can use in-kind resources. In-kind resources can be labor or salaries contributed toward the implementation of the project (such as technical or administrative support from community officials and personnel). The dollar value of the resource must be calculated, and those costs must be allowable under the grant. Communities can have quite a bit of leeway in developing sources of in-kind resources; however, your state's specific program requirements must be verified first. Federal regulations regarding in-kind matches for FEMA's grant programs can be found at 44 CFR §13.24.

386-1). For more details on funding and creatively using planning resources, see FEMA 372, *Mitigation Resources for Success.*

Task C. Monitor and document the implementation of your projects and actions.

As mentioned earlier, the planning team must continuously monitor and document the progress of the plan's recommended actions. This documentation is essential for determining the progress made on the hazard mitigation initiatives.

The planning team may decide to ask the agencies, departments, organizations, or people with duties identified in the mitigation strategy to periodically submit a work progress report on those projects being implemented. This report will come in handy at evaluation time. If there is a problem with the project or program, the planning team will be better able to pinpoint where the prob-

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lem lies. An example of the report agencies could use should include the following information:

- The hazard mitigation action's objectives;
- Who the lead and supporting agencies responsible for implementation are;
- How long the project should take, including a delineation of the various stages of work along with timelines (milestones should be included);
- Whether the resources needed for implementation, funding, staff time, and technical assistance are available, or if other arrangements must be made to obtain them;
- The types of permits or approvals necessary to implement the action;
- Details on the ways the actions will be accomplished within the organization, and whether the duties will be assigned to agency staff or contracted out; and
- Current status of the project, identifying any issues that may hinder implementation.

Requiring the responsible parties to explain exactly how and when the project or programs will be carried out helps determine the extent of the project's progress. It also helps break the implementation process into smaller, more manageable tasks. The responsible agency, department, or organization can decide the particulars of incorporating these additional considerations into their daily operations, while the planning team will know what to expect and when to expect it. See **Worksheet #1: Progress Report** to help you monitor progress.

Task D. Establish indicators of effectiveness or success.

In Step 3, you will measure or evaluate the effectiveness of your mitigation project and initiatives. It will be important to establish measurable indicators of effectiveness now so that those involved in the projects understand how their actions contribute to the success of the projects. Indicators should be tied to the goals and objectives of the plan and its projects. They are often expressed as numerical representations of planning objectives.

For example, if an objective of the planning process is to increase community participation in risk reduction, and a related initiative includes an outreach program to introduce new partners to

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Worksheet #1 Progress Report step 2

Progress Report Period: October 1, 2003 (date) to December 31, 2003 (date)

Project Title: Raging River Views Park Flood Acquisition Project Project ID#: HVMP-2003-01

Responsible Agency: Hazardville Department of Planning

Address: 1909 Burnham Way

City/County: Hazardville, Emergency

Contact Person: Eunice Euclid Title: Grants Administrator

Phone #(s): (555) 555-8473 email address: eeuclid@town.hazardville.em

List Supporting Agencies and Contacts:

Hazardville Department of Housing: Noah Hudson (555) 555-8465

Hazardville Habitat for Humanity: Carter Goodman (555) 555-9432

Total Project Cost: $360,000

Anticipated Cost Overrun/Underrun: $N/A

Date of Project Approval: July 21, 2003 Start date of the project: November 15, 2003

Anticipated completion date: Summer 2005

Description of the Project (include a description of each phase, if applicable, and the time frame for completing each phase):

Acquire and demolish 14 structures located at the Raging River Views Park. Work with Habitat for Humanity and the Department of Housing to construct new housing or rehabilitate existing housing for displaced low-income residents. The Department of Housing will also provide funds for temporary housing to displaced residents.

Milestones	Complete	Projected Date of Completion
Conduct surveys of ground and first-floor elevations	✓	
Obtain Notices of Intent by owners	✓	
Conduct structure appraisals	✓	
Send letters of offer to homeowners		1/31/04
Perform title work		3/30/04
Acquire structures		6/30/04
Begin construction of new housing or reconstruction of existing housing for relocated residents		6/30/04
Send payment for relocation to renters		9/30/04
Finalize contract for demolition		1/12/05
Demolish structures		4/26/05
Landscape open parcels		6/30/05

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Plan Goal(s)/Objective(s) Addressed:

Goal: Minimize losses to existing and future structures within hazard areas.

Objective: Reduce potential damages to the manufactured home park in the floodplain.

Indicator of Success (e.g., losses avoided as a result of the acquisition program):

In most cases, you will list losses avoided as the indicator. In cases where it is difficult to quantify the benefits in dollar amounts, you will use other indicators, such as the number of people who now know about mitigation or who are taking mitigation actions to reduce their vulnerability to hazards.

Losses Avoided. After a major flood (100-year), the Department of Economic Development will assist the Planning Department in calculating the losses avoided.

Status (Please check pertinent information and provide explanations for items with an asterisk. For completed or canceled projects, see Worksheet #2 — to complete a project evaluation):

Project Status

- [x] Project on schedule
- [ ] Project completed
- [ ] Project delayed*

*explain: _____

- [ ] Project canceled

Project Cost Status

- [x] Cost unchanged
- [ ] Cost overrun*

*explain: _____

- [ ] Cost underrun*

*explain: _____

Summary of progress on project for this report:

A. What was accomplished during this reporting period?

The Department of Planning contacted the owners of the properties vulnerable to floods to determine their willingness to sell their properties. Of the 14 property owners contacted, 10 agreed to have their homes acquired. An appraiser contracted by the Department of Planning estimated the value of the 10 properties.

B. What obstacles, problems, or delays did you encounter, if any?

The owners of four properties refused to sell. There has been some limited neighborhood opposition to various suggestions for the community open space created by the acquisitions.

C. How was each problem resolved?

The Department of Planning has proposed to the residents a design charrette to develop alternatives for the open space that would be created, with the understanding that no permanent structures can be constructed on the open parcels after acquisition and demolition has been completed. Recreational activities will be limited to passive uses such as trails and bike paths.

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Next Steps: What is/are the next step(s) to be accomplished over the next reporting period?

1. Send offer letters to homeowners.
2. Do title work.
3. Work with the Department of Housing and Habitat for Humanity to identify existing housing for rehabilitation and viable vacant parcels to construct new housing for the displaced residents.

Other comments:

None

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Adapted from the North Carolina HMGP Progress Report Form at http://www.dem.dcc.state.nc.us/mitigation/document_index.htm.

mitigation, an indicator could be the number of organizations that are on the planning team.

Task E. Celebrate success.

It is important to maintain community support throughout the implementation process. One particularly effective technique is to simply keep the community informed about the incremental progress and success of the program. Sharing the findings of progress reports with interested organizations, neighborhood groups, elected officials, and citizens keeps stakeholders up-to-date on your accomplishments and possible setbacks. Posting these findings on your local Web site or including them in your newsletter will help everyone stay informed of your progress. Consider holding events to recognize key milestones to keep the public interested. Step 3 contains more information about how to maintain this important part of the overall effort.

Summary

Implementation is the culmination of the initial planning process. Monitoring progress and maintaining momentum is key to ensuring success of the planning process. Through the implementation of your plan, you will draw upon the diverse resources of your state, tribe, or community. While many of the tools you use already exist in one form or another, your team should try to use as much creativity and resourcefulness as possible to advance your plan's goals and objectives.

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The Hazardville Post

Vol. CXV No. 252 Friday, September 9, 2005

Hazardville Partnership Completes First Home

(Part 2 of a 4-Part Series on the Hazard Mitigation Implementation Process)

[Hazardville, EM] "Yep, that's my new house," Susan Harris grinned. "I can't believe how great it looks!" As Mrs. Harris showed off the interior of the nearly completed house, she noted where her furniture would go. "I would have put my mother's sideboard over here," frowning as she pointed to a spot in the dining room, "but it was ruined in the flood in 2002. It had been passed down from her mother, and I had wanted to pass it down to my daughter."

Mrs. Harris is just one of the residents of Hazardville affected by flooding in 2002. She and nine of her neighbors have had their homes bought by the town and are working with town, state, and federal officials to build new homes out of the floodplain. "My house really wasn't worth very much, and I don't have enough income to handle a big mortgage payment," Mrs. Harris said, "but the town has been working with the Hazardville Habitat for Humanity to help me build a new one."

Habitat for Humanity requires contributions of "sweat equity" in order to be eligible for participation in their program. Mrs. Harris claims that thanks to her contribution she is now quite capable of fixing just about everything in her new home. "Since my husband passed away almost 10 years ago, I have had to rely on my friends to help out with even simple repairs. Now that I have helped with the construction of several of my neighbor's houses I am very comfortable using all kinds of tools!" Mrs. Harris is so comfortable with her new skills that she is thinking about building her own shed after she gets settled.

"The process is working!" beamed Joe Norris, lead planner for Hazardville. Norris, referring to the hazard mitigation plan adopted by the town in 2003, pointed to the emphasis the Town of Hazardville Organization for Risk Reduction (THORR) had placed on reducing flooding and disaster-related damages to existing structures while recognizing the needs of residents with limited resources. Part of that emphasis was on creating and following through with community partnerships.

The Town of Hazardville Partnership for Disaster Mitigation is a partnership of nonprofits, businesses, and local, state, and federal agencies. The Partnership is an initiative that Hazardville established in 2003, following adoption of the hazard mitigation plan. Each partner contributed something to the effort. Funding from the FMA program was used to purchase ten repetitive loss structures. Local businesses contributed to the project by donating building materials and supplies. Community volunteers worked throughout the summer to make this a reality for Mrs. Harris and the other homeowners.

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1
adopt the mitigation plan
2
implement the plan recommendations
step 3
evaluate your planning results
4
revise the plan

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3 evaluate your planning results

Overview

The evaluation step of the planning process allows the planning team to review the plan, the planning process, and the results of implemented actions. The evaluation assesses whether the planning process and actions have been effective, if the community's goals are being reached, and whether changes are needed. The planning team should periodically evaluate the community's progress in implementing the plan. Regular evaluation keeps the community informed of the plan's status and, ideally, keeps those responsible for implementing the mitigation actions motivated. These periodic evaluations may reveal the need for small changes that may not be necessary to incorporate into the plan annually, but that accumulate over time until large-scale revision to the plan is needed (see Step 4, *Revise the Plan*).

Communities that commit to conducting periodic evaluations give themselves the opportunity to determine the effectiveness of their procedures and recommendations, identify new areas of concern, and renew enthusiasm for the cause of hazard mitigation. This step will show you how to keep the planning team, the planning process, and the implementation actions effective. The result is a hazard mitigation process that people have confidence in, and are willing to support.

What you learn in this evaluation will be used to determine whether or not to revise the plan document, to be described in Step 4. By looking impartially at what took place the previous year, the planning team will create a foundation on which to base its revision of the plan and a trigger to re-invigorate the cause for hazard mitigation in the community.



DMA 2000 requires communities to evaluate their hazard mitigation plan at least every five years. The way in which this is to be done must also be documented in the plan. By including a provision in the adoption mechanism to evaluate the plan and the implementation process, you have a built-in mechanism to institutionalize and sustain the mitigation initiative beyond the creation of the original document.



Communities that want credit for their hazard mitigation plan under the Community Rating System (CRS) must evaluate their plan annually.



The plan should also be evaluated and revised following disasters, to determine if the recommended actions are appropriate given the impact of the event. The risk assessment should also be revisited to see if any changes are necessary based on the pattern of disaster damages.



According to DMA 2000 requirements, states that want to be eligible for the 20% share of HMGP funds must develop a process to assess the effectiveness of a mitigation activity after its completion.

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The evaluation phase should not be anticipated with anxiety. If the planning team, citizens, government, and other stakeholders have diligently implemented the recommendations, the evaluation phase will give the community reasons to celebrate the success of its mitigation efforts.

Procedures & Techniques

Task A. Evaluate the effectiveness of the planning process.

To evaluate the results of your planning efforts, begin by stepping back and looking at the big picture. Governments must be highly accountable to their citizens and able to defend their decisions. Evaluating the planning process is a good way to discover if the plan is working for the good of your state, tribe, or community. A review of the planning process will give you an idea of how successfully mitigation has been integrated into your normal administrative processes so far, and what procedural areas may need to be refined or changed.

DMA 2000 regulations do not require annual evaluations. The recommendations presented here will help you to meet the five-year local update requirements.

The first year of the planning process is the most critical because you are beginning to implement the plan. While the energy and momentum generated during this phase of planning are still present, your state, tribe, or community may have established an annual review process at the time of adoption to address the unanticipated problems that may affect the success of your planning efforts. An annual review is also a good opportunity to reflect on whether certain relationships developed during the process should be enhanced, and to initiate new partnerships based on experiences from developing and implementing the plan. The planning team should take this opportunity to reflect on the processes used so far to engage partners and the public, to develop loss reduction priorities, and to finance projects.

1. Reconvene the planning team.

The first step in evaluating the plan is to reconvene the planning team. Ideally, the planning team was established as a permanent working group within your state, tribe, or community to oversee the development and implementation of the mitigation strategy. Even after the plan is adopted, the planning team should meet at least semi-annually to review the progress of the mitigation planning efforts.

At this point, however, your team may want to think about inviting new stakeholders to join during the evaluation. These meetings are a good opportunity to bring new members up to speed on the planning team's history, mitigation strategy, and planning process. Use **Worksheet #2: Evaluate Your Planning Team** to assist you in this task.

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Worksheet #2 Evaluate Your Planning Team step 3

When gearing up for the plan evaluation, the planning team should reassess its composition and ask the following questions:	YES	NO
Have there been local staffing changes that would warrant inviting different members to the planning team?		✓
Comments/Proposed Action: NA		
Are there organizations that have been invaluable to the planning process or to project implementation that should be represented on the planning team?	✓	
Comments/Proposed Action: Hazardville Habitat for Humanity has been invaluable in assisting the relocation of former Raging River Views Park residents. The organization should be invited to participate in THORR.		
Are there any representatives of essential organizations who have not fully participated in the planning and implementation of actions? If so, can someone else from this organization commit to the planning team?	✓	
Comments/Proposed Action: It is essential that the Department of Public Works be represented at each meeting because so many mitigation actions involve them. However, representatives from the department have been unable to attend meetings consistently since the development of the plan. THORR will work with the departments director to find consistent, active representation.		
Are there procedures (e.g., signing of MOAs, commenting on submitted progress reports, distributing meeting minutes, etc.) that can be done more efficiently?	✓	
Comments/Proposed Action: Again, the Department of Public Works has been unable to provide timely progress reports of its mitigation actions. Administrative duties and paperwork have fallen through the cracks since the department has been assigned numerous new duties in Hazardville's mitigation efforts. Perhaps the department, in partnership with THORR, should approach the Town Council for funding for more department staff.		
Are there ways to gain more diverse and widespread cooperation?	✓	
Comments/Proposed Action: THORR members believe that better publicity about mitigation actions will garner more interest from the public, affected/interested organizations, and state agencies.		
Are there different or additional resources (financial, technical, and human) that are now available for mitigation planning?	✓	
Comments/Proposed Action: THORR has learned about new PDM funding. The state has asked that local jurisdictions submit applications for brick and mortar projects and risk assessments studies.		

If the planning team determines the answer to any of these questions is "yes," some changes may be necessary.

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2. Review your planning process.

One of the first areas for the planning team to assess is the planning process itself. With a year of hindsight, you can now step back and see what you would have done differently had you known what you know today. Look at each of the key elements of your planning process, such as building the planning team, engaging the public, gathering data to conduct your risk and capability assessments, and coordinating with other agencies, and determine how well they worked. The following are some suggested questions to ask:

a. Building the Planning Team. In continually building your planning team, have you left anyone out? Are there roles that need to be clarified or better defined? Has the planning team met as agreed upon? Have meetings been productive? Are procedures for implementing, monitoring, and evaluating the plan being followed? Are the lead agency and staff still able to play the lead? Again, Worksheet #2 will help with this task.

b. Engaging the Public. When looking at public involvement, you may need to conduct a survey to gauge how the public perceived your planning effort. Determine whether stakeholders and citizens felt that they had enough opportunities to provide input; the extent to which they are now aware of their hazards and are willing to support your efforts; what they think of the progress you are making; and whether outreach efforts—public meetings, workshops, Web site, newspaper notices, etc. were effective. Ask them what they would like to see done differently to involve them or keep them informed. In many cases, this may be a matter of simply asking residents if they now understand what hazards they are susceptible to, and what "hazard mitigation" means to them.

c. Data Gathering and Analysis. Are data gathering procedures working? Did someone follow up with the local university or other agencies to obtain research findings or reports that were not available during the planning process? Have team members provided copies of studies that their agencies or organizations completed? Are there more efficient methods of collecting data and maintaining up-to-date information from established sources?

Evaluating Public Involvement in Hazard Mitigation

Surveys are a good tool to assess how well your public education and outreach projects are working, how the community perceives your hazard mitigation planning efforts, and to obtain feedback on proposed mitigation actions. Following are a few sample questions to ask:

- Do you have a greater understanding of the hazards to which you are susceptible? On a scale of 1-5 (1=very little; 5=a great deal), how much more do you know than you knew before planning efforts began?
- Do you now have a greater understanding of what you and your community can do to lessen the effects of natural hazards? (1=very little; 5=a great deal)

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d. Coordinating with other Agencies. How well did coordination work? Did agencies have sufficient notice for meetings? Did they have enough time to review the draft plan? Have agreements been followed? Do MOAs need to be revised, due to changes in funding, priorities, staffing, or other events?

Look at what worked and what didn't as you prepared and implemented the plan, and identify ways to improve the process.

Task B. Evaluate the effectiveness of your actions.

Measuring the effectiveness of your programs, policies, practices, and projects is another important element of your evaluation. If your plan called for strategies with a relatively short implementation time frame, their overall success can be evaluated if they have been completed. Additionally, you can assess actual losses avoided as a result of projects implemented following a disaster. Most mitigation projects, however, are done gradually, as resources and conditions allow. The progress to date of these projects can therefore be evaluated by reviewing whether the project is on time, in line with the budget, and moving ahead as planned. Now is the time to gather data to assess your progress toward meeting your objectives, and ultimately meeting your plan goals. This is also a good time to pull together the progress reports agencies submitted to you periodically. These will enable you to answer the questions that follow and help your planning team evaluate how effective the mitigation projects and actions have been. Use **Worksheet #3: Evaluate Your Project Results** to assist you in completing this task.

1. What were the results of the implemented actions? Did the results achieve the goals/objectives outlined in the plan? Did the actions have the intended results?

Review the goals and objectives of your plan. Be able to show how (or whether) the project met the objective it was designed to achieve. This is where you can measure the results of the project against the identified indicator of success.

Sometimes projects have unintended results, which can be good if they provide an extra benefit to the state or community, or not as good if they did not achieve or protect everything to the extent planned. Examples of unintended results can extend to environmental, social, or economic impacts.



If you received federal funds for the project, you have been submitting quarterly reports to the responsible agency on its progress. These quarterly reports will be very helpful in showing the project's current status, such as percentage complete, total project costs obligated versus amount spent, problems with implementation, and anticipated completion date.

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Worksheet #3 Evaluate Your Project Results step 3

Project Name and Number:

Raging River Views Park Flood Acquisition Project (HVMP-2003-01)

Project Budget:

$360,000

Project Description:

Acquisition and demolition of 14 flood-prone structures

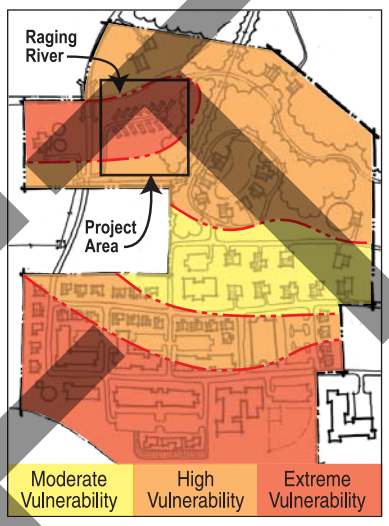
Associated Goal and Objective(s):

Goal: Minimize losses to existing and future structures within hazard areas

Objective: Reduce potential damages to the manufactured home park in the floodplain

Indicator of Success (e.g., losses avoided):

Losses avoided by acquisition and demolition of flood-prone structures



Town of Hazardville Composite Loss Map developed previously during risk assessment (see FEMA 386-2).

Was the action implemented? ☑ YES ☐ NO

IF NO

Why not?

	YES	NO
Was there political support for the action?	☐	☐
Were enough funds available?	☐	☐
Were workloads equitably or realistically distributed?	☐	☐
Was new information discovered about the risks or community that made implementation difficult or no longer sensible?	☐	☐
Was the estimated time of implementation reasonable?	☐	☐
Were sufficient resources (for example staff and technical assistance) available?	☐	☐

IF YES

What were the results of the implemented action?

Of the 14 proposed properties, 10 were acquired. The benefit-cost ratio is 2.19, based on project benefits of $789,000 and costs of $360,274. Benefits are based on the net present value of the avoided damages over the project life. Furthermore, about 40 people are no longer in the path of a potential flood, making emergency rescue operations in that area less likely and evacuation easier.

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	YES	NO
Were the outcomes as expected? If No, please explain:		✔
The project originally set out to acquire 14 properties. Four of the 14 owners did not want to participate in the buyout program.		
Did the results achieve the goal and objective(s)? Explain how:	✔	
Despite four properties still in harm's way, the objective has been largely met. See additional comments.		
Was the action cost-effective? Explain how or how not:	✔	
The FEMA Limited Data module was used to perform the benefit-cost analysis. Data for the analysis was collected from historical flood data and used as benchmarks in the before mitigation section of the analysis. The damages after mitigation section was left blank, due to the properties being permanently acquired, and the economic risk removed completely. The analysis resulted in a benefit-cost ratio of 2.19, with benefits totaling $789,000 for 10 properties.		
What were the losses avoided after having completed the project?		
Total avoided losses are $789,000 over the lifetime of the project (estimated at 100 years).		
If it was a structural project, how did it change the hazard profile?		
N/A		
Additional comments or other outcomes:		
The Planning Department has agreed to work with the remaining four homeowners in evaluating other flood-proofing options.		

Date: October 12, 2005

Prepared by: Hazardville Department of Economic Development

Hazardville Department of Planning

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Sample Indicators to Measure Progress in Reducing Risk

There are a variety of ways to measure effectiveness of mitigation actions. You can look at dollar amounts in losses avoided, both expected (prior to implementing a project) and actual (following a disaster). You can also look at how the mitigation actions have changed the number of households, businesses, critical facilities, and environmental assets that are at risk. Some other indicators are listed below.

For more on indicators, see the publication *Hazard Mitigation in North Carolina: Measuring Success*, Chapter 6 available online at http://www.dem.dcc.state.nc.us/Mitigation/Library/Success_Stories/Measuring_Success_Vol2/Chapter6.pdf.

Housing	**Business**
Number of households living in unsafe areas.	Number of businesses in unsafe areas.
Number of households living in structures that are vulnerable to natural hazards.	Number of businesses in unsafe structures.
Number of repetitively damaged houses.	Number or percentage of businesses that have purchased adequate insurance to cover property casualty, fire, liability, loss of revenue, and flood damage.
Losses avoided as a result of the implementation of acquisitions.	
Losses avoided as a result of the implementation of elevations-in-place.	Number or percent of businesses that have conducted a business impact analysis, and have developed and implemented a business risk reduction plan.
Infrastructure and Critical Facilities	**Environment**
Number of infrastructure elements – water supply, roads, bridges, sewerage, telecommunications, port facilities – that are located in areas that are hazard-prone.	Number of unsafe land use activities that take place in the 100-year floodplain or in environmentally sensitive areas.
Number of repetitively damaged infrastructure elements.	
Number of critical facilities – hospitals, emergency operations centers, police and fire stations, schools – that are located in areas that are hazard-prone.	Number of commercial or industrial facilities in the 100-year floodplain that have undertaken structural or non-structural mitigation measures.
Number of repetitively damaged critical facilities.	

Source: Hazard Mitigation in North Carolina: Measuring Success, February 2000.

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2. Were the actions cost-effective? Did (or would) the project result in the reduction of potential losses?

It is not always enough to say whether an action was generally effective or not, especially when considering publicly funded projects. This is particularly true for mitigation actions that may require a subsequent hazard event to truly determine effectiveness. Absent an event, the potential losses avoided can be estimated for most "brick and mortar" mitigation projects. The term "brick and mortar" mitigation actions in this context refers to projects such as retrofit, acquisition, demolition, or relocation, and flood works such as levees, dams, and floodwalls.

One of the most important indicators to evaluate the effectiveness of mitigation actions undertaken by the state, tribe, or community is **Losses Avoided**. This indicator provides a dollar value estimate of the structural, content, and displacement costs that would have occurred if the mitigation action were not taken. The losses avoided are most easily estimated for structural mitigation actions. Surveys and qualitative statements may have to suffice as indicators for educational or regulatory actions and to address other objectives that may be associated with specific mitigation actions.

If the cost-effectiveness of the hazard mitigation projects implemented was originally determined by benefit-cost analyses (BCA), the planning team may consider reviewing the old BCA to determine whether the costs and benefits were close to what was estimated, or whether there were unforeseen costs or benefits. The point of revisiting the BCA is to re-calculate what losses would actually be reduced if the event were to occur. If possible, repeat relevant portions of the risk assessment to see if the project reduced potential losses. If HAZUS was used to develop the initial loss estimate, you may want to re-run it using the post-project results.

An initiative that did not have a BCA performed still can be objectively evaluated for its cost-effectiveness. Projects that do not lend themselves to benefit-cost analyses (e.g., education and outreach campaigns) or those projects where public values and ethical considerations ended up weighing more heavily on the final selection of an action than the results of a BCA, may require other methods, such as surveys, to gauge their effectiveness.

Whether you used BCA or other defensible methods to determine the cost-effectiveness of your actions, remember to document your results. Citizens, as well as state, local, and federal officials, will want to know of the losses avoided or benefits gained from your



Displacement Costs

The dollar amount it would cost for a function (business or service) to be relocated to another structure because of a hazard event. In the case of residents, this would be the cost to relocate individuals or families to temporary housing.



Cost-effectiveness is a key evaluation criterion for federal grant programs. Cost-effectiveness has several possible definitions, although for grant-making purposes FEMA defines a cost-effective project as one whose long-term benefits exceed its costs. An easier way to say this is that a project should prevent more expected damages over the course of its effective "life" than it costs to fund the effort. This is done to ensure that limited public funds are used in the most efficient manner possible. Benefit-cost analysis is one way to illustrate that a project is meritorious and deserves funding.



Be sure to stay in touch with your state on a regular basis to ensure that you remain aware of any changes to state mitigation goals or priorities. Similarly, states must communicate such changes to all localities.

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implemented actions. Let them know that their tax dollars are being well spent.

3. Document actions that were slow to get started or not implemented.

It is important to include a discussion of why certain actions were slow in getting underway, never finished, or didn't get started at all. The project may have been delayed or removed from the list of actions because of an unforeseen problem with the implementation. In the case of an elevation, acquisition, or relocation project, for example, the voluntary nature of the program gives the homeowner or business the right to change their minds *at any time*, all the way up to just before the physical work on the project begins or any financial compensation has been received.

Task C. Determine why the actions worked (or did not work).

After verifying that an action was or was not implemented and its overall results, the planning team should try to document why the action worked or did not work. If a mitigation activity or project was unsuccessful, it is important to ascertain why so that more appropriate alternatives can be developed next time. If a mitigation project ends up being only partially implemented, it is important to get to the root cause, such as exceeding the budget. On the other hand, be sure to evaluate and document what did work successfully, and why. Understanding the factors that contributed to the success of a project, program, or policy is particularly important when you want to replicate or expand it. Use **Worksheet #3** to complete this task.

Several considerations to examine include:

- Availability of resources;
- The political or popular support for or against the action;
- The availability of funds;
- The workloads of the responsible parties; and
- The actual time necessary to implement the actions.

Be sure to publicize this information to other communities within the state. Don't be shy about it, either—let other states and FEMA know about your successes! If possible, also communicate caveats and warnings as a result of less positive outcomes. Everyone will benefit from lessons learned.

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After a Disaster Strikes

If a disaster strikes after you have completed your hazard mitigation plan, don't let the document sit on the shelf—it is a valuable resource for the long-term recovery and reconstruction of your community. The initial period following a disaster can be very chaotic. So many issues require attention that any thoughts of long-term recovery are crowded out by immediate recovery efforts. Critical life and safety issues come first: search and rescue operations, treating the injured, re-establishing vital public services, and providing emergency shelter. But once the task of clearing debris is well underway, community decision-makers need to shift their attention to long-term recovery. This is the opportunity to reconvene the mitigation planning team and evaluate the list of hazard mitigation priorities in light of the recent disaster.

Critical policy issues that emerge following disasters require local governments to make difficult decisions about how best to rebuild. Disaster victims have an inherent desire to rebuild rapidly and return to normal—to the way things were before the disaster. Communities, however, must balance this need against the objective of building back better and stronger, and use the opportunity of the disaster to improve the community's disaster resilience. Pressure to restore normalcy can be so strong that safety, hazard mitigation, and community improvement goals can be compromised or abandoned. Communities have a very short period of time to introduce, and gain acceptance of, new approaches to reconstruction. The mitigation plan will provide an excellent foundation for introducing these new approaches.

The diagram on the following page shows how a disaster triggers the need to re-evaluate all aspects of the mitigation planning process to determine if changes are now warranted.

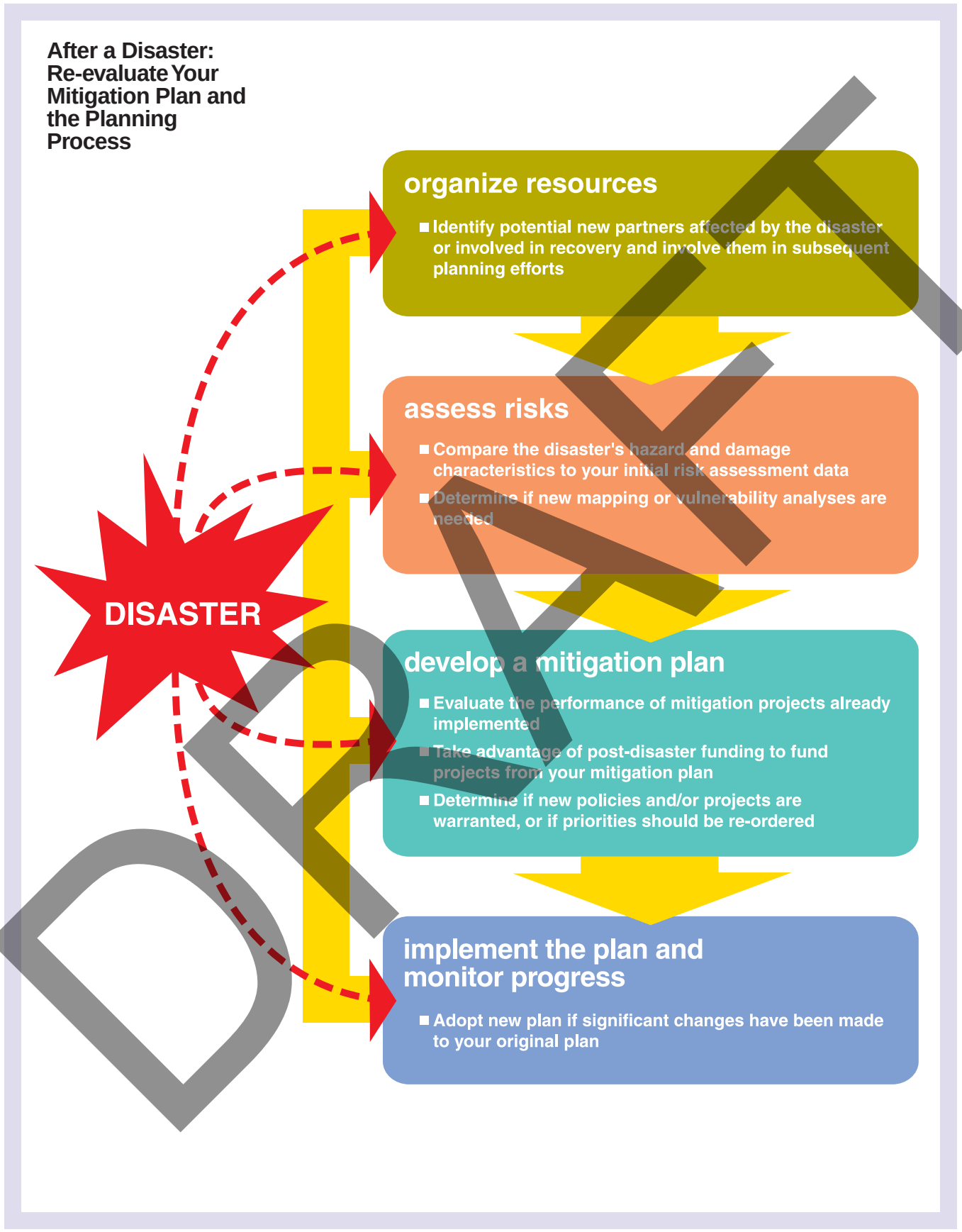
1. What opportunities for hazard mitigation are presented in light of the disaster damages?

If the hazard mitigation plan included a post-disaster recovery and reconstruction component to the implementation strategy, this section of the plan should be the initial focus for the recovery task force. Did the plan anticipate the type and intensity of disaster damages that actually occurred? Are there "off-the-shelf" mitigation actions that are relevant for this recovery effort? Are there other priority hazard mitigation actions that have not been implemented due to a lack of available resources?

(continued on page 3-13)

Identifying potential mitigation projects in a post-disaster scenario is the highest priority task for the planning team or recovery task force and the most time sensitive one. In a major disaster that has a presidential declaration, make sure that the SHMO and FEMA mitigation staff working out of the Disaster Field Office (DFO) have a copy of the hazard mitigation plan and have a clear understanding of community priorities for potential mitigation actions. State and federal mitigation planning staff can provide technical assistance to your community if necessary.

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After a Disaster:
Re-evaluate Your Mitigation Plan and the Planning Process
DISASTER
organize resources
Identify potential new partners affected by the disaster or involved in recovery and involve them in subsequent planning efforts
assess risks
Compare the disaster's hazard and damage characteristics to your initial risk assessment data
Determine if new mapping or vulnerability analyses are needed
develop a mitigation plan
Evaluate the performance of mitigation projects already implemented
Take advantage of post-disaster funding to fund projects from your mitigation plan
Determine if new policies and/or projects are warranted, or if priorities should be re-ordered
implement the plan and monitor progress
Adopt new plan if significant changes have been made to your original plan

Applying for HMGP Funding

The purpose of the HMGP is to reduce the loss of life and property from natural disasters and enable mitigation actions to be implemented during the recovery process following a presidential disaster declaration.

Eligibility. Individual homeowners and businesses are not eligible, but a community may apply on their behalf. State governments, tribes and other tribal organizations, and certain nonprofit organizations are eligible, in addition to local governments.

Project possibilities. All eligible projects must provide a long-term mitigation solution. Additionally, a project's potential savings must be more than the cost of implementation. Funds may be used to protect either public or private property. Examples of possible projects include, but are not limited to: property acquisition and relocation/demolition, retrofitting of structures to minimize damage from natural hazards, elevation of flood-prone structures, and development and initial implementation of vegetative management programs. In addition, hazard mitigation planning initiatives are also eligible.

States prioritize and select project applications; however, all potential projects must meet certain minimum criteria addressing five issues:

1. Does the project conform to your State's Hazard Mitigation Plan?
2. Will the project beneficially impact the disaster area?
3. Does the application meet federal environmental requirements?
4. Does the project solve a problem independently?
5. Is the project cost-effective?

After a disaster declaration, the state will advertise the availability of HMGP funding and provide guidance on eligibility criteria. If you are interested in applying, you should contact the SHMO to find out about the application deadline and about the state's funding priorities.

Choosing a project and submitting your application. Consider your list of potential projects, and then choose the project that conforms to the state's priorities, meets all of the minimum criteria, and can be adequately funded (25% of the total cost). For additional information, contact your SHMO or the FEMA Mitigation Division in your Region, or visit FEMA's Web site at http://www.fema.gov/fima/hmgp. FEMA 345 (*Hazard Mitigation Grant Program Desk Reference*) contains more information as well.

Federal and state agencies may have collected enough information from various sources to determine the reoccurrence interval for the recent event. This indicates the severity or degree of magnitude of the event. Technical assistance may be available to survey high-water marks (in the case of flooding) or to conduct a building performance assessment. Knowing the reoccurrence interval for the hazard will help you reevaluate the accuracy of the hazard information in the current plan. To do this for a flood, for example, you would compare the extent of the actual flooding to existing flood maps to determine whether the maps accurately portray the true hazard scenario.

(continued from page 3-11)

2. Following the initial recovery phase, re-evaluate the hazard profiles and vulnerability assessment.

Did the hazard information presented in the plan reflect the location, intensity, and duration of the recent event? There may be a need to collect additional data regarding the event and incorporate that information into the vulnerability assessment.

3. Following a disaster is a good time to evaluate the results of implemented projects.

How well did your mitigation actions perform? The best time to measure losses avoided is in the aftermath of a recent disaster, when you can actually see the difference that mitigation actions made. For example, if a house was protected from a flood because it was elevated above the Base Flood Elevation (BFE) before a disaster occurred, it should be relatively easy to obtain the actual flood height and determine what kind of damages would have occurred if the house had not been raised. Louisa County, Iowa, and Long Beach, Mississippi, illustrate the losses avoided due to flood mitigation actions implemented after floods in 1993 and 1998, respectively.

(continued on page 3-15)

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Louisa County, Iowa

In 1993, a severe flood occurred in Louisa County, located along the Mississippi River, resulting in damage to more than 275 homes and the evacuation of nearly 200 families. Following this flood event, the County used both acquisition and relocation of affected properties to mitigate future flooding problems. In May 2001, the flood pattern of 1993 repeated itself, and the Mississippi River and its tributaries flooded Louisa County yet again. By comparing calculated damages from the 1993 flood to the 2001 flood, the effectiveness of the acquisition and relocation program could be measured. As shown in Tables 1 and 2 below, significant reductions in emergency shelter, family assistance, and public assistance expenditures were realized in 2001 as a result of the acquisitions and housing relocations that occurred in the aftermath of the 1993 flooding.

Furthermore, Table 3 shows the losses avoided as a result of the housing acquisitions that occurred. If Louisa County had chosen not to take any action following the 1993 flood, potential property damage to these structures in the 2001 flood would have exceeded one million dollars. Calculation of reduction in public assistance expenditures and losses avoided as a result of proactive mitigation can further highlight the value of hazard mitigation planning efforts to concerned citizens, local and federal governments, and potential funding agencies.

Table 1. Emergency Shelter and Family Assistance in Louisa County

	1993	2001
Number of families evacuated and temporarily sheltered due to displacement	200	11
Number of Red Cross cases (individuals requesting post-disaster assistance)	800	3
Disaster Housing Assistance (FEMA)	**$742,500**	**$0**

Source: Hazard Mitigation in Iowa: Measuring Success, FEMA 2003 (unpublished)

Table 2. Public Assistance Expenditures, 1993 and 2001 (2001 values)

		1993	2001
A	**Debris Clearance**	$542,215	$0
B	**Emergency Protective Measures**	$44,367	$0
C	**Roads and Bridges, Culverts, Ditches**	$2,941	$0
D	**Water Control Facilities & Levees**	$0	$0
E	**Public Buildings & Contents**	$0	$0
F	**Utility Distribution Systems**	$0	$0
G	**Public Parks**	$0	$0
H	**Total Public Assistance**	**$589,523**	**$0**

Source: Hazard Mitigation in Iowa: Measuring Success, FEMA 2003 (unpublished)

Table 3. Losses Avoided from Acquisition of Flood-Prone Properties in Louisa County, Aggregated by Building, Contents, Displacement, and Total for the Spring, 2001 Flood (DR-1367)

Depth of Flooding (Feet)	Avoided Losses to Buildings	Avoided Losses to Contents	Avoided Displacement Costs	Total
0	$24,672	$11,103	$0	$35,775
1	$319,533	$143,790	$82,500	$545,823
2	$386,880	$174,096	$126,500	$687,476
Total	**$731,085**	**$328,989**	**$209,000**	**$1,269,074**

Source: Hazard Mitigation in Iowa: Measuring Success, FEMA 2003 (unpublished)

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Long Beach, Mississippi

Located along the Gulf of Mexico, the coastal city of Long Beach, Mississippi, has been affected by seven hurricanes and repetitive flooding, often as a result of spring storms. In addition to its vulnerability to flooding because of its coastal location, the City also suffered from poor drainage, resulting from three poorly maintained drainage channels. While these channels were better managed in the 1980s, the City, and particularly the areas around the canals, is still plagued by poor drainage. Following Hurricane Georges in 1998, the City began to take a proactive approach to flood damages, and identified 95 properties, many of them repetitive loss properties located adjacent to the canals, for an acquisition and demolition program. This long-term acquisition project had an estimated cost of $7.7 million (see Table 1), with a portion of the funding coming from the Hazard Mitigation Grant Program. In 2001, midway through the acquisition and demolition project, Tropical Storm Allison struck the Gulf Coast. The storm caused an overflow from the drainage system, which flooded the neighborhoods located near the canals. Because 44 homes had already been purchased and demolished prior to the storm, the losses avoided from this single flood event were estimated to be $690,033 (see Table 2). This figure only represents the losses avoided to houses, their contents, and displacement costs. It does not include the additional savings to the local government in emergency services and disaster assistance costs that would have been incurred had families remained in the floodplain. By combining much-needed improvements to its drainage system with the acquisition of many repetitive loss properties, the City of Long Beach shows that mitigation projects can lead to substantial savings for the local government and affected communities.

Table 1: Estimated Costs for Acquisition of 95 Properties in the City of Long Beach for the Master Watershed Plan

Item	Total Cost
Acquisition of Properties	$6,578,924
Relocation Pay to Tenants	$ 52,000
Demolition of Properties	$ 918,065
Fees for Appraisals and Legal Assistance	$ 171,000
Total	**$7,719,989**

Source: Hazard Mitigation in Mississippi: Measuring Success, FEMA 2003 (unpublished)

Table 2: Losses Avoided during Tropical Storm Allison from Acquisition of 44 Flood-Prone Properties in the City of Long Beach, MS

Item	Total Cost
Estimated Avoided Losses to Buildings	$502,917
Estimated Avoided Losses to Contents	$ 85,826
Estimated Avoided Displacement Costs	$101,290
Total	**$690,033**

Source: Hazard Mitigation in Mississippi: Measuring Success, FEMA 2003 (unpublished)

(continued from page 3-13)

4. Depending upon the severity of the recent disaster, it may be necessary to re-evaluate the range and priority given to specific hazard mitigation actions.

Should the priority ranking of mitigation actions be re-evaluated given the type and intensity of the recent event? If the hazard event was not anticipated or given a low priority as a goal or objective, there may be a need to go through another round of identifying and prioritizing hazard mitigation actions for your community.

5. Consider including a special section in your mitigation plan devoted to post-disaster issues.

Many mitigation policies or projects are not politically or economically viable until after a disaster. Thinking through post-disaster operational and policy issues in the pre-disaster time frame enables your community to delve into these often emotional subjects in the relative luxury of a non-disaster scenario. FEMA 321, *Planning for Post-Disaster Recovery and Reconstruction*, provides more details.

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Task D. Keep the community updated and involved, and celebrate your successes.

Project implementation brings the community's hard work to fruition. The planning team should be sure to keep all stakeholders in the community informed of the progress of the projects. Ways to engage the community may include staging events to showcase your accomplishments or taking advantage of media opportunities to publicize the completion or significant steps of specific projects. Refer to *Getting Started* (FEMA 386-1) for additional ways to communicate your success to the community.



Local and state agencies should keep in contact with each other about the progress of their mitigation actions. Each entity should update its risk assessment data using this information. Agencies responsible for maintaining the state and local plans should update their plans accordingly, as well.

Methods of communicating with constituents during implementation of the recommended projects and programs include:

- Write a newsletter to provide details on projects;
- Create 15- or 30-second public service announcements and send them to local broadcasters;
- Work with your local news or public access cable station feature a news story about your efforts;
- Hold an annual event honoring local people who have contributed to hazard mitigation projects;
- Develop a Web site to post news articles, meeting notices, and event notices; and
- Establish a speaker's bureau to talk to schools, business groups, and other organizations about mitigation.

Summary

The evaluation phase of the planning process helps your planning team determine whether its planning process and recommendations have been effective, and if your community's goals are being reached. Systematically evaluating the plan keeps your community informed and hopefully motivates those responsible for implementing the mitigation actions.

After you have evaluated your actions to determine what worked and did not work, go to Step 4, *Revise the Plan,* in which you will use the evaluation results to revise the hazard mitigation plan.

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The Hazardville Post

Vol. CXVI No. 272 Friday, September 29, 2006

Town Hall Retrofit Called a "Money Pit"

(Part 3 of a 4-Part Series on the Hazard Mitigation Implementation Process)

[Hazardville, EM] In response to a complaint about the progress of the seismic retrofit project of the historic Hazardville Town Hall, the Hazardville Board of Supervisors recently held an informal hearing on the matter. The retrofit, begun under Hazardville's initiative to become more disaster resistant and overseen by the Town of Hazardville Organization for Risk Reduction (THORR), is now estimated to have cost taxpayers about double the original projected cost.

When asked about the escalating costs, Joe Norris, lead planner of THORR, commented that the overruns could be attributed to misjudgments THORR had made about the extent of repairs that the building needed. "We didn't realize the extent of work that would have to be done to bring the building up to current code, much less to be seismically resistant." Norris explained that much of the work had nothing to do with seismic standards. "Not only did the contractor discover asbestos-based insulation and ceiling tiles on the first floor where most of the work was to be done, but he also found lead-based paint on pipes that had not been removed during renovation in the late 1960s. These factors were not considered in our original project estimates, but they had to be addressed in the retrofit in order to comply with local, state, and federal laws," Norris said.

Board of Supervisors Chairperson Seymour Hale likened the building retrofit to a "money pit," saying that THORR should have done its homework. Norris agreed, "As soon as we found out about these unexpected costs for the project, we began to re-evaluate all of our other projects to keep this from happening again. It seems that we placed a huge amount of work on our local building inspector. He had a tremendous work load, and did not have enough time to do in-depth investigation into some of the buildings before work began." When asked how THORR planned to remedy this problem, Norris replied, "We are still in the process of evaluating our other hazard mitigation projects and will submit our findings to the Board by the end of the month."

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step **4** **revise the plan**

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4

revise the plan

Overview

The final step in the mitigation planning process is to determine whether you need to make changes to the planning process or the mitigation plan. You will start with an evaluation of the factual underpinnings of the mitigation strategy: the risk assessment and the capability assessment. Using the results of the evaluations of the process and projects completed in Step 3, and taking into consideration the factors to be discussed under Task A below, you will determine whether you need to revise or update your mitigation plan or planning process.

The frequency of conducting a plan evaluation depends upon the speed and the intensity at which changes are occurring. For example, if your community is experiencing significant growth, or if you have experienced recent or frequent hazard or disaster events, this evaluation may have to be conducted more frequently. *Keep in mind, however, that DMA 2000 regulations require that local plans be reviewed and updated at least every five years, and state plans at least every three years, for a state or jurisdiction to remain eligible for assistance.*

Procedures & Techniques

Planning is an ongoing process, and your plan should be treated as a living document that must grow and adapt in order to keep pace with the community's growth and change as these issues affect hazard vulnerability, and with changes that may be external to the community but that affect the planning process. An annual "scan of the horizon" should be done, so that emerging trends in data availability or collection, land use and development, technology, and other factors can be documented. Just prior to the three- or five-year point, these annual observations should be evaluated to determine what types of changes should be made to your planning process and to the plan document. The results of your evaluations should be re-programmed back into each phase of the planning process and should yield decisions on how (or whether) to update each section of your plan.

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Task A. Review those factors that affect your community's planning context.

Evaluating the following factors will help you determine what changes to the plan document are warranted. Extensive or widespread changes in any one of these categories may signal a need to reconsider some or all of your plan's fundamental assumptions.

1. Revisit the risk assessment to incorporate updated estimates of cost of living and replacement costs, new scientific data on hazard areas, the effect of hazards on the community, changes in growth patterns, and, particularly, reductions in vulnerability due to completion of projects.

Use **Worksheet #4: Revisit Your Risk Assessment** to complete this task. See *Understanding Your Risks* (FEMA 386-2) to review information on hazards and estimating losses.

- **Shifts in development.** The planning team should determine whether there are changes in development patterns that could influence the effects of hazards in your community or create additional risks. One common example of this is when upstream growth in a given watershed affects flood characteristics downstream in your community. For example, in Hazardville, coastal development caused the Planning Department to undertake a coastal development plan. The effects of erosion, wave action, and tidal surge hazards will be considered in this development plan, and corresponding policies and/or mitigation projects should be considered.
- **Areas affected by recent disasters.** Recent hazard events or disasters can provide new information about the ways in which your community can be affected. Compare the effects of the event against what the loss estimation analysis led you to expect.
- **New studies or technologies.** What have recent hydrologic, watershed, traffic, or demographic studies revealed about your community? Studies such as these may provide additional information about your community. You already should be continually researching mitigation techniques to discover whether new technologies or methods are being used.

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- **Re-estimate losses.** For projects that have not yet been implemented, any new information the planning team has gathered should be used to recalculate losses or revise the benefit-cost analysis originally prepared. See *Understanding Your Risks* (FEMA 386-2) for the methodologies and considerations used to estimate losses.

2. Revisit your capability assessment to determine changes in laws, authorities, community and state resources, and availability of financial and technical tools that may affect what you can do.

Additionally, political will and priorities can change with the election cycle. See *Developing the Mitigation Plan* (FEMA 386-3) for more information on how to update your capability assessment.

- **Changes in community, state, or federal laws, policies, plans, or funding.** The strengthening, relaxing, or addition of land use, environmental, or other government regulations may present additional challenges or opportunities to the community.
- **Changes in the socioeconomic fabric of the community.** Broad social transformations often have repercussions on the community's sequence of mitigation priorities and the implementation of projects. Recessions, booming economies, cost of living increases, changes in the political climate, demographic shifts, or environmental justice issues may have some influence on the way mitigation is executed in your community. On a smaller scale, changes within the community, such as the departure of a large employer, may alter the socioeconomic balance.
- **Other changing conditions.** Have the successes achieved over the past few years created a political environment that may allow the planning team to propose a new mitigation initiative that would not have had the political support necessary earlier?



The review process can be easier if you keep up with annual reports.

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Worksheet #4 Revisit Your Risk Assessment step 4

Risk Assessment Steps	Questions	YES	NO	COMMENTS
Identify hazards	Are there new hazards that can affect your community?		✓	
Profile hazard events	Are new historical records available?		✓	
	Are additional maps or new hazard studies available?	✓		Recently completed maps and studies showing vulnerability of the new coastal development to erosion and tidal surge are available.
	Have chances of future events (along with their magnitude, extent, etc.) changed?		✓	
	Have recent and future development in the community been checked for their effect on hazard areas?	✓		
Inventory assets	Have inventories of existing structures in hazard areas been updated?	✓		
	Is future land development accounted for in the inventories?	✓		The Planning Department is preparing a coastal development plan to ensure that any future development is set back far enough to be outside the erosion zones and the coastal high hazard areas. Current and future road configurations will also be studied to ensure adequate evacuation times before hurricane events.
	Are there any new special high-risk populations?	✓		Coastal residents and business owners.
Estimate losses	Have loss estimates been updated to account for recent changes?	✓		

If you answered "Yes" to any of the above questions, review your data and update your risk assessment information accordingly.

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Task B. Analyze your findings and determine whether to revise your planning process or mitigation strategy.

The planning team should use its new knowledge to identify the areas of the plan or planning process that should be changed. Some aspects of the planning process may warrant a briefer treatment the second time around, while others, because of additional knowledge or more readily available technical assistance, may warrant a more in-depth treatment.

Consider updating the goals, objectives, and actions in the plan. One of the most important steps in plan revision is to update or refine the community's goals, objectives, and actions, particularly in light of experiences gained from implementing mitigation actions in the current plan. The planning team has undoubtedly learned something new about the state or community, the administration of government, or the value that the community places on certain objectives—all of which need to be included in a reevaluation of the strategies. As with every step in the planning process, updating goals and strategies should use consensus building and community-driven prioritization methods, which are explained in *Getting Started* (FEMA 386-1) and *Developing the Mitigation Plan* (FEMA 386-3).

Using the information gleaned in Step 3, and your results from Task B, the planning team should discuss what actions should be undertaken, reconsidered, or even eliminated, to further the plan's goals. This discussion should result in a preliminary list of alternative mitigation actions to incorporate into the update of the plan. As in any other step of the planning process, the community should be engaged in reviewing these alternatives. The planning team may choose to present these alternatives in a public forum at this stage or as part of the plan review process discussed in Task C. For more details on researching alternatives, see Phase 3, Step 2 of *Developing the Mitigation Plan* (FEMA 386-3).

Important questions to discuss with the team include the following:

1. Are the goals and objectives still applicable? Have any changes in the state or community made the goals or objectives obsolete or irrelevant?

Review the findings of changes in the community, including changes that your mitigation initiatives have brought, to determine whether you have met your goals and if they remain consistent with current conditions. If you determine that you need to add new

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goals to the plan, see Phase 3, Step 1 of *Developing the Mitigation Plan* (FEMA 386-3) for formulating goal statements.

2. Do the plan's priorities correspond with state priorities?

Where applicable, make sure your actions are consistent with any changes to state priorities. You will continue to be aligned with state goals and priorities by doing this.

3. Do existing actions need to be reprioritized for implementation?

Now that you have implemented some of the actions, learned what works and doesn't, developed new actions, and discovered that some aspects of your community may have changed, you may need to reprioritize your actions. See *Developing the Mitigation Plan* (FEMA 386-3) for prioritizing methods.

4. Are actions appropriate for available resources?

Make sure that the community or state has enough resources to carry out the actions. You probably will have to research to find out what is currently available. Are past sources of funds still available? Are there new sources of funding that can be tapped? Are there new partnerships with nonprofit organizations or businesses that can be developed? What creative ways of implementing similar actions have other communities used? *Securing Resources for Mitigation Planning* (FEMA 386-9) covers these topics in greater detail.

Task C. Incorporate your findings into the plan.

Include your most recent findings about the community, tribe, or state, your hazards and vulnerabilities, as well as the applicable original actions of the plan, into a revised plan. Update your description of the planning process to include the steps you took to revise the plan document and how you involved the public. Update the implementation strategy to identify who will be responsible for the new or revised actions, the time frame, and funding sources.

The revised plan must be reviewed by all stakeholders in the community for its validity, and proceed through a formal adoption process as required by local or state laws.

Use **Worksheet #5: Revise the Plan** to help you keep track of where the plan document may require revisions.

In order to remain eligible for disaster related funding, your updated local plan must be re-submitted to your state and/or FEMA Regional Office for review and approval every five years. State plans must be re-submitted to the FEMA Regional Office for review and approval every three years.

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Worksheet #5 Revise the Plan step 4

Prepare to update the plan.

When preparing to update the plan:	*Check the box when addressed:*
1. Gather information, including project evaluation worksheets, progress reports, studies, related plans, etc.	✔
Comments: THORR must work with the Department of Public Works to update their progress reports and stream maintenance plans. While the department has been effectively conducting their new duties, it has been unable to attend to administrative paperwork such as preparing progress reports and formally updating its standard operating procedures.	
2. Reconvene the planning team, making changes to the team composition as necessary (see results from Worksheet #2).	✔
Comments: Invited Habitat for Humanity to participate in THORR.	

Consider the results of the evaluation and new strategies for the future.

When examining the community consider:	*Check the box when addressed:*
1. The results of the planning and outreach efforts.	✔
Comments: All but one of the the Raging River Views Park residents attended the design charette put on by the Department of Planning. *[Note: The information here only pertains to the one project highlighted in this guide. When actually completing the worksheet, you will reflect on all projects.]*	
2. The results of the mitigation efforts.	✔
Comments: The mitigation efforts have gone as planned, except the team was unable to obtain the cooperation of the remaining Raging River Views Park residents. *[Note: The information here only pertains to the one project highlighted in this guide. When actually completing the worksheet, you will reflect on all projects.]*	

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3. Shifts in development trends.	✓
Comments: The continued unwillingness of the Council to adopt hazard-based zoning will continue to be an issue. The reauthorization and funding of the economic development program encourages development in hazard areas. Recent development along the coast has not taken into account coastal storm hazards.	
4. Areas affected by recent disasters.	✓
Comments: Coastal windstorms have continued to erode the hillside surrounding the lighthouse.	
5. The recent magnitude, location, and type of the most recent hazard or disaster.	✓
Comments: The spring coastal storm of 2002 was estimated by NOAA to have a 25-year recurrence interval and accelerated beach erosion in several areas.	
6. New studies or technologies.	✓
Comments: THORR is currently conducting a study to determine best mitigation methods for retrofitting historic structures in the downtown district.	
7. Changes in local, state, or federal laws, policies, plans, priorities, or funding.	✓
Comments: See #3.	

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8. Changes in the socioeconomic fabric of the community.	✔
Comments: Most new residents along the coast are retired professionals and are new to the area.	
9. Other changing conditions.	✔
Comments: None	

Incorporate your findings into the plan.

When examining the plan consider: *Check the box when addressed:*

1. Revisit the risk assessment. *(See Worksheet #4)*	✔
Comments: Acquisition of structures in the Raging River Views Park decreases the potential flood losses. Vulnerability assessment and loss data will be incorporated into the plan.	
2. Update your goals and strategies.	✔
Comments: N/A	
3. Recalculate benefit-cost analyses of projects to prioritize action items.	✔
Comments: N/A	

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Use the following criteria to evaluate the plan:

Criteria	YES	NO	Solution
Are the goals still applicable?	✓		
Have any changes in the state or community made the goals obsolete or irrelevant?		✓	
Do existing actions need to be reprioritized for implementation?	✓		Staffing at the Department of Public Works is a high priority.
Do the plan's priorities correspond with state priorities?	✓		
Can actions be implemented with available resources?		✓	Need to identify funding for additional staff at the Department of Public Works.

Comments:

None

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Summary

In order for the plan to remain a viable tool for your state, tribe, or community, you must regularly review your planning process and mitigation strategy. Communities are rarely static and new challenges will arise during every revision of the plan. Disasters also present a window of opportunity to evaluate the relative success of the mitigation plan. States, tribes, and communities should take advantage of funding that becomes available as a result of these events.

Revising the plan ensures it remains up-to-date and relevant, providing a good return on the time and resources invested in developing it.

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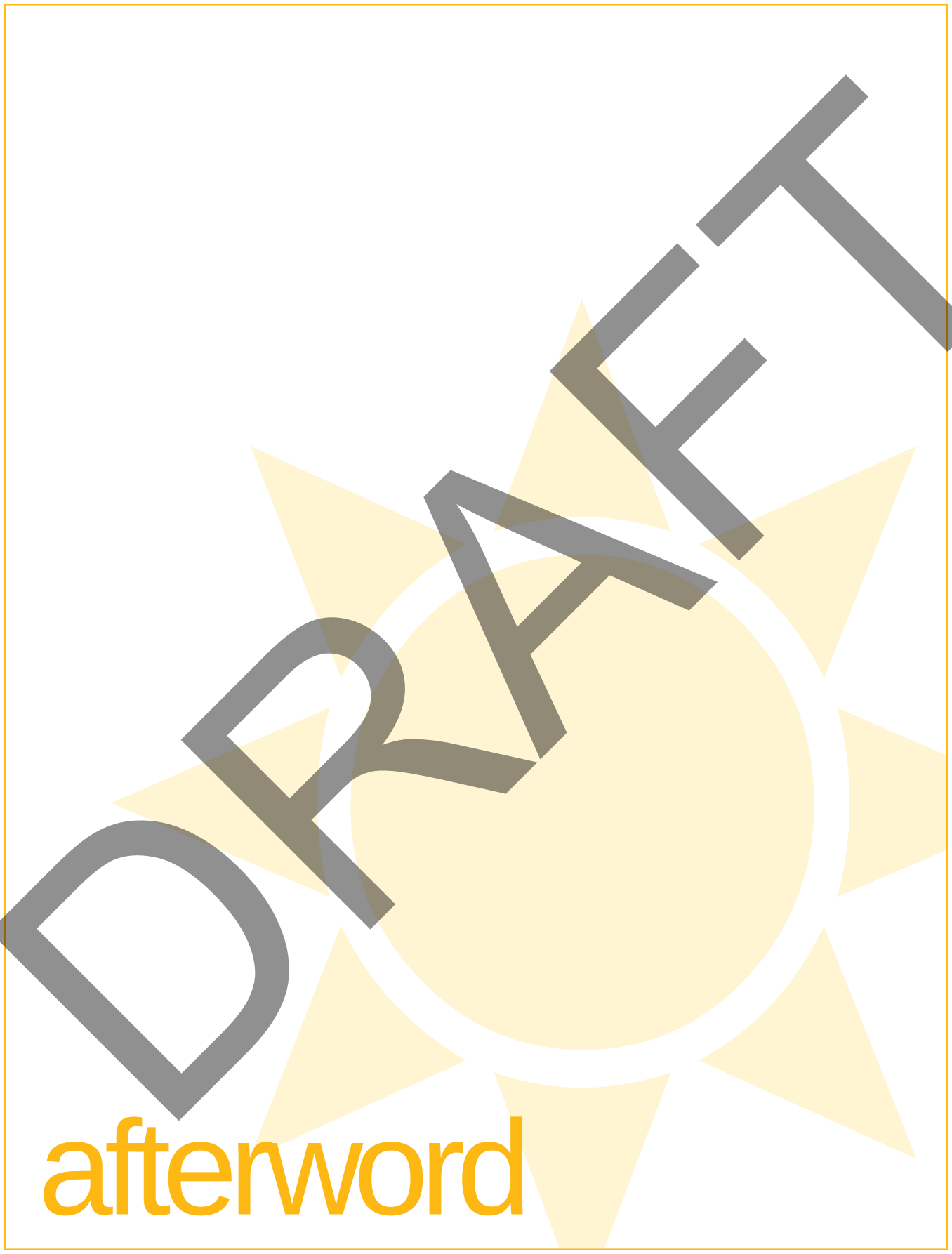
The Hazard Mitigation Planning Cycle Set to Begin Again

(Part 4 of a 4-Part Series on the Hazard Mitigation Implementation Process)

[Hazardville, EM] A strategic planning meeting to update the Hazardville Hazard Mitigation Plan was held Wednesday at the Town Hall. The Town of Hazardville Organization for Risk Reduction (THORR), continuing in its planning capacity, led the strategy session by explaining to the community the changes the town has undergone since the initial adoption of the plan in 2003.

The first meeting was to review the results of the community perception survey and to discuss the status of the mitigation actions that were prioritized in the town's mitigation plan. "Overall, our residents now seem to be more aware of the hazards to which the town is vulnerable, and a large majority of the survey respondents knew what they could do to reduce their own vulnerability," said Joe Norris, lead planner for THORR. "With the exception of the Town Hall seismic retrofit project, we are proud to inform the community that our projects are all progressing as scheduled and under budget."

"We promised to make this community a safer place to live and work, and we will continue to strive to achieve this for our community," Mayor McDonald said at a press briefing yesterday. "That promise means we must diligently prepare for and mitigate against the many hazards our community is vulnerable to. Accountability and diligence are key to making this a reality."



afterword

You have a mitigation plan. Now what?

The first plan your state, tribe, or community adopts establishes a baseline from which to measure progress. As you implement and evaluate actions, your knowledge of hazards and how to best reduce your vulnerabilities increases tremendously. In order to effectively monitor your progress, it is important to take advantage of the worksheets provided in the how-to series. Over time, new partners will become involved in the planning process, providing additional reservoirs of experience and support. Since the political and social arenas, as well as the natural environment, are continually changing, you must periodically revisit and update your plan. As your plan evolves over time, you should see a corresponding improvement in your state, tribe, or community's resilience to the damaging effects of disasters.

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appendices

appendix a
glossary

Acquisition of hazard-prone structures — Local governments can acquire lands in high hazard areas through conservation easements, purchase of development rights, or outright purchase of property.

Base Flood Elevation (BFE) — Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as a standard for the National Flood Insurance Program.

Benefit — Net project outcomes, usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of conducting a benefit-cost analysis of proposed mitigation measures, benefits are limited to specific, measurable risk reduction factors, including a reduction in expected property losses (building, contents, and function) and protection of human life.

Benefit-Cost Analysis (BCA) — A systematic, quantitative method of comparing the projected benefits to projected costs of a project or policy. It is used as a measure of cost-effectiveness.

Building — A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheel and axles carry no weight.

Capability assessment — An assessment that provides a description and analysis of a community or state's current capacity to address the threats associated with hazards. The capability assessment attempts to identify and evaluate existing policies, regulations, programs, and practices that positively or negatively affect the community or state's vulnerability to hazards or specific threats.

Coastal zone — The area along the shore where the ocean meets the land as the surface of the land rises above the ocean. This land/water interface includes barrier islands, estuaries, beaches, coastal wetlands, and land areas with direct drainage to the ocean.

Community Emergency Response Team (CERT) — CERT is the mechanism to establish, train and maintain a local cadre of residents to act as first responders in the event of an emergency. A CERT team is especially critical in the first three days following a disaster when conditions may prevent access by emergency response personnel.

Community Rating System (CRS) — CRS is a program that provides incentives for National Flood Insurance Program communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of these policyholders in communities are reduced.

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Comprehensive plan A document, also known as a "general plan," covering the entire geographic area of a community and expressing community goals and objectives. The plan lays out the vision, policies, and strategies for the future of the community, including all of the physical elements that will determine the community's future development. This plan can discuss the community's desired physical development, desired rate and quantity of growth, community character, transportation services, location of growth, and siting of public facilities and transportation. In most states, the comprehensive plan has no authority in and of itself, but serves as a guide for community decision-making.

Cost-effectiveness Cost-effectiveness is a key evaluation criterion for federal grant programs. Cost- effectiveness has several possible definitions, although for grant-making purposes FEMA defines a cost-effective project as one whose long-term benefits exceed its costs. That is, a project should prevent more expected damages than it costs initially to fund the effort. This is done to ensure that limited public funds are used in the most efficient manner possible. Benefit-cost analysis is one way to illustrate that a project is cost-effective.

Critical facilities Facilities vital to the health, safety, and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals.

Debris The scattered remains of assets broken or destroyed in a hazard event. Debris transported by a wind or water hazard event can cause additional damage to other assets.

Disaster Mitigation Act of 2000 (DMA 2000) DMA 2000 (Public Law 106-390) is the latest legislation to improve the planning process. Signed into law on October 30, 2000, this legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur.

Earthquake A sudden motion or trembling caused by a release of strain accumulated within or along the edge of the earth's tectonic plates.

Elevation of structures Raising structures above the base flood elevation to protect structures located in areas prone to flooding.

Emergency response services The actions of first responders such as firefighters, police, and other emergency services personnel at the scene of a hazard event. The first responders take appropriate action to contain the hazard, protect property, conduct search and rescue operations, provide mass care, and ensure public safety.

Federal Emergency Management Agency (FEMA) Agency created in 1979 to provide a single point of accountability for all federal activities related to disaster mitigation and emergency preparedness, response, and recovery. FEMA is now part of the Department of Homeland Security.

Flood Hazard Area The area on a map shown to be inundated by a flood of a given magnitude.

Flood Insurance Rate Map (FIRM) Map of a community, prepared by FEMA, which shows both the special flood hazard areas and the risk premium zones applicable to the community under the National Flood insurance Program.

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Flood Mitigation Assistance (FMA) Program — A program created as part of the National Flood Insurance Reform Act of 1994. FMA provides funding to assist communities and states in implementing actions that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other NFIP insurable structures, with a focus on repetitive loss properties.

Floodplain — Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.

Flood-proofing — Actions that prevent or minimize future flood damage. Making the areas below the anticipated flood level watertight or intentionally allowing floodwaters to enter the interior to equalize flood pressures are examples of flood-proofing.

Flood Zone — A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.

Goals — General guidelines that explain what you want to achieve. They are usually broad policy-type statements, long term in nature, and represent global visions.

Hazard — A source of potential danger or adverse condition.

Hazard event — A specific occurrence of a particular type of hazard.

Hazard identification — The process of identifying hazards that threaten an area.

Hazard information center — Information booth, publication kiosk, exhibit, etc. that displays information to educate the public about hazards that affect the jurisdiction and hazard mitigation activities people can undertake.

Hazard mitigation — Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.

Hazard Mitigation Grant Program (HMGP) — Authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.

Hazard profile — A description of the physical characteristics of hazards and a determination of various descriptors, including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.

HAZUS, HAZUS-MH — A GIS-based, nationally standardized, loss estimation tool developed by FEMA. HAZUS-MH is the new multi-hazard version that includes earthquake, wind, hurricane, and flood loss estimate components.

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Hurricane An intense tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds reach 74 miles per hour or more and blow in a large spiral around a relatively calm center or "eye." Hurricanes develop over the north Atlantic Ocean, northeast Pacific Ocean, or the south Pacific Ocean east of 160°E longitude. Hurricane circulation is counter-clockwise in the northern hemisphere and clockwise in the southern hemisphere.

Infrastructure Refers to the public facilities of a community that have a direct impact on the quality of life. Infrastructure includes communication technology, such as phone lines or Internet access; vital services, such as public water supplies and sewer treatment facilities; and an area's transportation system: airports, heliports, highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, drydocks, piers, and regional dams.

Landslide Downward movement of a slope and materials under the force of gravity.

Loss estimation Forecasts of human and economic impacts and property damage from future hazard events, based on current scientific and engineering knowledge.

Memorandum of Agreement (MOA) A non-binding statement that defines the duties, responsibilities, and commitment of the different parties or individuals; provides a clear statement of values, principles, and goals; and establishes an organizational structure to assist in measuring and evaluating progress.

Mitigate To cause something to become less harsh or hostile; to make less severe or painful.

Mitigation actions Activities or projects that help achieve the goals and objectives of a mitigation plan.

Mitigation plan The document that articulates results from the systematic process of identifying hazards and evaluating vulnerability, identifying goals, objectives, and actions to reduce or eliminate the effects of identified hazards, and an implementation plan for carrying out the actions.

National Flood Insurance Program (NFIP) Federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations found in 44 CFR §60.3.

Objectives Objectives define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific and measurable.

Open space preservation Preserving undeveloped areas from development through any number of methods, including low-density zoning, open space zoning, easements, or public or private acquisition. Open space preservation is a technique that can be used to prevent flood damage in flood-prone areas, land failures on steep slopes or liquefaction-prone soils, and can enhance the natural and beneficial functions of floodplains.

Ordinance A term for a law or regulation adopted by a local government.

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Planning The act or process of making or carrying out plans; the establishment of goals, policies, and procedures for a social or economic unit.

Policy A course of action or specific rule of conduct to be followed in achieving goals and objectives.

Post-disaster mitigation Mitigation actions taken after a disaster has occurred, usually during recovery and reconstruction.

Post-disaster recovery ordinance An ordinance authorizing certain governmental actions to be taken during the immediate aftermath of a hazard event to expedite implementation of recovery and reconstruction actions identified in a pre-event plan.

Post-disaster recovery planning The process of planning those steps the jurisdiction will take to implement long-term reconstruction with a primary goal of mitigating its exposure to future hazards. The post-disaster recovery planning process can also involve coordination with other types of plans and agencies, but it is distinct from planning for emergency operations.

Preparedness Actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Probability A statistical measure of the likelihood that a hazard event will occur.

Public education and outreach programs Any campaign to make the public more aware of hazard mitigation and mitigation programs, including hazard information centers, mailings, public meetings, etc.

Recovery The actions taken by an individual or community after a catastrophic event to restore order and lifelines in a community.

Regulation Most states have granted local jurisdictions broad regulatory powers to enable the enactment and enforcement of ordinances that deal with public health, safety, and welfare. These include building codes, building inspections, zoning, floodplain and subdivision ordinances, and growth management initiatives.

Regulatory power Local jurisdictions have the authority to regulate certain activities in their jurisdiction. With respect to mitigation planning, the focus is on such things as regulating land use development and construction through zoning, building codes, subdivision regulations, design standards, and floodplain regulations.

Relocation out of hazard areas A mitigation technique that features the process of demolishing or moving a building to a new location outside the hazard area.

Resources Resources include the people, materials, technologies, money, etc., required to implement strategies or processes. The costs of these resources are often included in a budget.

Response The actions taken during and immediately after an event to address immediate life and safety needs and to minimize further damage to properties.

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Resolutions Expressions of a governing body's opinion, will, or intention that can be executive or administrative in nature. Most planning documents must undergo a council resolution, which must be supported in an official vote by a majority of representatives to be adopted. Other methods of making a statement or announcement about a particular issue or topic include proclamations and declarations.

Risk The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Stafford Act The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-107 was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974, PL 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

Stakeholder Stakeholders are individuals or groups, including businesses, private organizations, and citizens, that will be affected in any way by an action or policy.

State Hazard Mitigation Officer (SHMO) The state government representative who is the primary point of contact with FEMA, other state and federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities.

Structural retrofitting Modifying existing buildings and infrastructure to protect them from hazards.

Subdivision The division of a tract of land into two or more lots for sale or development.

Subdivision and development regulations Regulations and standards governing the division of land for development or sale. Subdivision regulations can control the configuration of parcels, set standards for developer-built infrastructure, and set standards for minimizing runoff, impervious surfaces, and sediment during development. They can be used to minimize exposure of buildings and infrastructure to hazards.

Tornado A violently rotating column of air extending from a thunderstorm to the ground.

Vulnerability Describes how exposed or susceptible an asset is to damage. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power—if an electric substation is flooded, it not only affects the substation but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones.

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Vulnerability assessment The extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability assessment should address the effects of hazard events on the existing and future built environment.

Wildfire An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.

Zoning The division of land within a local jurisdiction by local legislative regulation into zones of allowable types and intensities of land uses.

Zoning ordinance Designation of allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

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appendix b
library

General Contact Information

Federal Emergency Management Agency (FEMA)	http://www.fema.gov FEMA Headquarters: 500 C Street, SW, Washington, D.C. 20472 202-646-4600
FEMA Publications Warehouse	800-480-2520
FEMA Mitigation Publications Library	http://www.fema.gov/library/prepandprev.shtm

Web sites

American Planning Association (APA)	http://www.planning.org
APA, *Growing Smart Legislative Guidebook,* 2002	http://www.planning.org/growingsmart
Catalog of Federal Domestic Assistance Programs	http://www.cfda.gov
Community Rating System	http://www.fema.gov/nfip/crs.shtm
Developing the Implementation Strategy	http://www.pro.gov.uk/recordsmanagement/eros/framework.pdf
	http://www.allhandsconsulting.com/ERI_books.htm
	http://www.esri.com/news/arcuser/0100/firetools.html
	http://www.atlantahighered.org/memberservices/shelter/literature.asp
	http://www.pmel.noaa.gov/~bernard/hazard3.pdf
Emergency Management Institute	http://training.fema.gov/EMIWeb
Federal Emergency Management Agency Individual Assistance Program	http://www.fema.gov/rrr/inassist.shtm
FEMA Mitigation Planning	http://www.fema.gov/fima/planning.shtm
FEMA Public Assistance Program	http://www.fema.gov/rrr/pa

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Flood Mitigation Assistance Program	http://www.fema.gov/fima/planfma.shtm
Habitat for Humanity	http://www.habitat.org/
Hazard Mitigation Grant Program	http://www.fema.gov/fima/hmgp
Hazard Mitigation in North Carolina: Measuring Success	http://www.dem.dcc.state.nc.us/Mitigation/Library/Success_Stories/Measuring_Success_Vol2/Chapter6.pdf
HAZUS and HAZUS-MH	http://www.fema.gov/hazus/index.shtm
HMGP Progress Report Form	http://www.dem.dcc.state.nc.us/mitigation/document_index.htm
Institute for Business & Home Safety (IBHS), Summary of State Land Use and Natural Hazards Planning Laws	http://www.ibhs.org/research_library/view.asp?id=302
Institute for Local Self Government	http://www.ilsg.org/
Mitigation Success Stories	http://www.fema.gov/fima/success.shtm
Multi-hazard Mapping Initiative	http://www.hazardmaps.gov/atlas.php
National Association of Regional Councils	http://www.narc.org
National Flood Insurance Program	http://www.fema.gov/nfip
National League of Cities	http://www.nlc.org
North Carolina Division of Emergency Management, Tools and Techniques for Mitigating the Effects of Natural Hazards	http://www.dem.dcc.state.nc.us/mitigation/Library/Full_Tools_and_Tech.pdf
Oregon Department of Land Conservation and Development (DLCD), Planning for Natural Hazards—Oregon Technical Resource Guide	http://www.lcd.state.or.us/hazhtml/Guidehome.htm
Pre-Disaster Mitigation Program	http://www.fema.gov/fima/pdm
Small Business Administration	http://www.sba.gov/disaster_recov/index.html
State Guidebook for Developing Partnerships	http://www.ibhs.org/research_library/downloads/280.pdf
U.S. Army Corps of Engineers	http://www.usace.army.mil
U.S. Department of Agriculture	http://disaster.fsa.usda.gov
U.S. Department of Agriculture, Natural Resources Conservation Service	http://www.nrcs.usda.gov

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U.S. Department of Housing and Urban Development	http://www.hud.gov/offices/cpd/communitydevelopment/programs/dri/driquickfacts.cfm
U.S. Department of Transportation	http://www.fhwa.dot.gov/programadmin/erelief.html
U.S. Environmental Protection Agency	http://www.epa.gov
U.S. State and Local Government Gateway	http://www.firstgov.gov/Government/State_Local.shtml

NOTE: The World Wide Web is an ever-changing source of information. Web addresses and the information they contain can change over time.

Publications

American Planning Association

Capital Improvement Programming, PAS Report No. 151, 1961.

Capital Improvements Programs: Linking Budgeting and Planning, PAS Report No. 442, 1993.

Selecting and Retaining a Planning Consultant: RFPs, RFQs, Contracts, and Project Management, PAS Report No. 443, 1993.

Federal Register

44 CFR Parts 201 and 206 (The Disaster Mitigation Act of 2000), February 26, 2002.

FEMA

Developing the Mitigation Plan: Identifying mitigation actions and implementation strategies (FEMA 386-3), 2003.

Getting Started: Building support for mitigation planning (FEMA 386-1), 2002.

Hazard Mitigation Grant Program Desk Reference (FEMA 345), 1999.

Hazard Mitigation in Iowa: Measuring Success, 2003, unpublished to date.

Hazard Mitigation in Mississippi: Measuring Success, 2003, unpublished to date.

Integrating Historic Property and Cultural Resource Considerations into Mitigation Planning (FEMA 386-6), unpublished to date.

Integrating Human-Caused Hazards into Mitigation Planning (FEMA 386-7), 2002.

Mitigation Resources for Success (FEMA 372), 2000.

Multi-jurisdictional Approaches to Mitigation Planning (FEMA 386-8), unpublished to date.

Planning for a Sustainable Future: The Link Between Hazard Mitigation and Livability (FEMA 364), 2003.

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Rebuilding for a More Sustainable Future: An Operational Framework (FEMA 365), 2000.

Securing Resources for Mitigation Planning (FEMA 386-9), unpublished to date.

*Understanding Your Risks: Identifying hazards and estimating losses (*FEMA 386-2), 2001.

Using Benefit-Cost Analysis in Mitigation Planning (FEMA 386-5), unpublished to date.

Gianakis, Gerasimos A. and McCue, Clifford P., 1999 — *Local Government Budgeting: A Managerial Approach.*

Schwab, Jim et al., 1998 — *Planning for Post-Disaster Recovery and Reconstruction,* PAS Report Nos. 483/484.

Tyler Norris Associates, 1997 — *Community Indicators Handbook: Measuring Progress Toward Healthy and Sustainable Communities.*

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appendix c
worksheets

Worksheet #1 Progress Report

Worksheet #2 Evaluate Your Planning Team

Worksheet #3 Evaluate Your Project Results

Worksheet #4 Revisit Your Risk Assessment

Worksheet #5 Revise the Plan

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Worksheet #1 Progress Report step 2

Progress Report Period: _____ (date) to _____ (date)

Project Title: _____ Project ID#: _____

Responsible Agency: _____

Address: _____

City/County: _____

Contact Person: _____ Title: _____

Phone #(s): _____ email address: _____

List Supporting Agencies and Contacts:

_____

_____

_____

Total Project Cost: _____

Anticipated Cost Overrun/Underrun: _____

Date of Project Approval: _____ Start date of the project: _____

Anticipated completion date: _____

Description of the Project (include a description of each phase, if applicable, and the time frame for completing each phase): _____

_____

_____

Milestones	Complete	Projected Date of Completion

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Plan Goal(s)/Objective(s) Addressed:

Goal: _____

Objective: _____

Indicator of Success (e.g., losses avoided as a result of the acquisition program):

In most cases, you will list losses avoided as the indicator. In cases where it is difficult to quantify the benefits in dollar amounts, you will use other indicators, such as the number of people who now know about mitigation or who are taking mitigation actions to reduce their vulnerability to hazards.

_____

_____

Status (Please check pertinent information and provide explanations for items with an asterisk. For completed or canceled projects, see Worksheet #2 — to complete a project evaluation):

Project Status

☐ Project on schedule

☐ Project completed

☐ Project delayed*

*explain: _____

_____

☐ Project canceled

Project Cost Status

☐ Cost unchanged

☐ Cost overrun*

*explain: _____

_____

☐ Cost underrun*

*explain: _____

_____

Summary of progress on project for this report:

A. What was accomplished during this reporting period?

_____

_____

_____

_____

B. What obstacles, problems, or delays did you encounter, if any?

_____

_____

_____

C. How was each problem resolved?

_____

_____

_____

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Next Steps: What is/are the next step(s) to be accomplished over the next reporting period?

Other comments:

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Adapted from the North Carolina HMGP Progress Report Form at http://www.dem.dcc.state.nc.us/mitigation/document_index.htm.

Worksheet #2 Evaluate Your Planning Team step 3

When gearing up for the plan evaluation, the planning team should reassess its composition and ask the following questions:	YES	NO
Have there been local staffing changes that would warrant inviting different members to the planning team?		
Comments/Proposed Action:		
Are there organizations that have been invaluable to the planning process or to project implementation that should be represented on the planning team?		
Comments/Proposed Action:		
Are there any representatives of essential organizations who have not fully participated in the planning and implementation of actions? If so, can someone else from this organization commit to the planning team?		
Comments/Proposed Action:		
Are there procedures (e.g., signing of MOAs, commenting on submitted progress reports, distributing meeting minutes, etc.) that can be done more efficiently?		
Comments/Proposed Action:		
Are there ways to gain more diverse and widespread cooperation?		
Comments/Proposed Action:		
Are there different or additional resources (financial, technical, and human) that are now available for mitigation planning?		
Comments/Proposed Action:		

If the planning team determines the answer to any of these questions is "yes," some changes may be necessary.

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Worksheet #3 Evaluate Your Project Results step 3

Project Name and Number: _____

_____

Project Budget: _____

_____

Project Description: _____

_____

_____

Associated Goal and Objective(s): _____

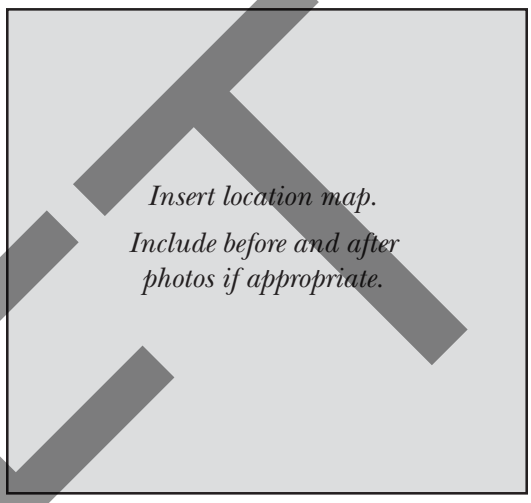
_____

_____

Indicator of Success (e.g., losses avoided): _____

_____

_____



Was the action implemented? ☐ **YES** ☐ **NO**

IF NO

Why not?	**YES**	**NO**
Was there political support for the action?	☐	☐
Were enough funds available?	☐	☐
Were workloads equitably or realistically distributed?	☐	☐
Was new information discovered about the risks or community that made implementation difficult or no longer sensible?	☐	☐
Was the estimated time of implementation reasonable?	☐	☐
Were sufficient resources (for example staff and technical assistance) available?	☐	☐

IF YES

What were the results of the implemented action? _____

_____

_____

_____

_____

_____

_____

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	YES	NO
Were the outcomes as expected? If No, please explain:		
Did the results achieve the goal and objective(s)? Explain how:		
Was the action cost-effective? Explain how or how not:		
What were the losses avoided after having completed the project?		
If it was a structural project, how did it change the hazard profile?		
Additional comments or other outcomes:		

Date: _____

Prepared by: _____

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Worksheet #4 Revisit Your Risk Assessment step 4

Risk Assessment Steps	Questions	YES	NO	COMMENTS
Identify hazards	Are there new hazards that can affect your community?			
Profile hazard events	Are new historical records available?			
	Are additional maps or new hazard studies available?			
	Have chances of future events (along with their magnitude, extent, etc.) changed?			
	Have recent and future development in the community been checked for their effect on hazard areas?			
Inventory assets	Have inventories of existing structures in hazard areas been updated?			
	Is future land development accounted for in the inventories?			
	Are there any new special high-risk populations?			
Estimate losses	Have loss estimates been updated to account for recent changes?			

If you answered "Yes" to any of the above questions, review your data and update your risk assessment information accordingly.

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Prepare to update the plan.

When preparing to update the plan:	*Check the box when addressed:*
1. Gather information, including project evaluation worksheets, progress reports, studies, related plans, etc.	
Comments:	
2. Reconvene the planning team, making changes to the team composition as necessary (see results from Worksheet #2).	
Comments:	

Consider the results of the evaluation and new strategies for the future.

When examining the community consider:	*Check the box when addressed:*
1. The results of the planning and outreach efforts.	
Comments:	
2. The results of the mitigation efforts.	
Comments:	

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3. Shifts in development trends.	
Comments:	
4. Areas affected by recent disasters.	
Comments:	
5. The recent magnitude, location, and type of the most recent hazard or disaster.	
Comments:	
6. New studies or technologies.	
Comments:	
7. Changes in local, state, or federal laws, policies, plans, priorities, or funding.	
Comments:	

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8. Changes in the socioeconomic fabric of the community.	
Comments:	
9. Other changing conditions.	
Comments:	

Incorporate your findings into the plan.

When examining the plan consider:	*Check the box when addressed:*
1. Revisit the risk assessment. *(See Worksheet #4)*	
Comments:	
2. Update your goals and strategies.	
Comments:	
3. Recalculate benefit-cost analyses of projects to prioritize action items.	
Comments:	

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Use the following criteria to evaluate the plan:

Criteria	YES	NO	Solution
Are the goals still applicable?			
Have any changes in the state or community made the goals obsolete or irrelevant?			
Do existing actions need to be reprioritized for implementation?			
Do the plan's priorities correspond with state priorities?			
Can actions be implemented with available resources?			

Comments:

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Those who cannot remember the past are condemned to repeat it

George Santayana



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FEMA

August 2003
FEMA 386-4

Appendix G Critical Facilities

Due to the sensitive nature of this information, details of each have been redacted for the public document. A full list of critical facilities identified for the vulnerability analysis is available at Llano County offices. Contact the Grant Administrator, Cheryl Kepp, to view the list.

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Appendix H Linkage Procedures

This Appendix contains the linkage procedures for the Llano and San Saba Hazard Mitigation Action Plan 2023 Update.

H.1 Administrative Process for "Linkage" to the Llano and San Saba Hazard Mitigation Action Plan

The 2023 Llano and San Saba Hazard Mitigation Action Plan (HMAP) update (the Plan) included Llano and San Saba Counties, City of Horseshoe Bay, City of Llano, City of San Saba, City of Sunrise Beach Village, City of Richland Springs, Llano County MUD #1, San Saba ISD, Cherokee ISD, Llano ISD, Richland ISD, Richland SUD, and Richland Springs Water District and not all eligible local governments within the defined planning area are included in this plan. Completed jurisdictional annexes are presented in Section 9. Any non-participating local governments and other local jurisdictions such as Fire Districts, Utility Districts, School Districts, and any other eligible local government as defined in 44 CFR 201.2 within the Llano and San Saba planning area can join this plan as a participating jurisdiction and to ultimately achieve approved status by following the linkage procedures defined in this appendix.

It is assumed that some or all these non-participating local governments may choose to "link" to the Plan at some point in time to gain eligibility for programs under the DMA. In addition, some of the current partnership may not continue to meet eligibility requirements due to the lack of active participation as prescribed by the plan. These "linkage" procedures will define the requirements established by the Llano and San Saba HMAP Planning Team for dealing with the increase or decrease in planning partners linked to this plan. It should be noted that currently non-participating jurisdictions within the defined planning area are not obligated to link to this plan. These jurisdictions can choose to do their own "complete" plan that addresses all required elements of section 201.6 of 44CFR.

H.1.1 Increasing the Partnership Through Linkage

Eligibility

Eligible jurisdictions located in the planning area may link to this plan at any point during the plan's performance period. Eligible jurisdictions located in the planning area may link to this plan at any point during the plan's performance period (5 years after final approval). Eligibility will be determined by the following factors:

- The linking jurisdiction is a local government as defined by the Disaster Mitigation Act.
- The boundaries or service area of the linking jurisdiction is completely contained within the boundaries of the planning area established during the 2023 Hazard Mitigation Action Plan development process.
- The linking jurisdiction's critical facilities were included in the critical facility and infrastructure risk assessment completed during the 2023 Plan development process.

Requirements

It is expected that linking jurisdictions will complete the requirements outlined below and submit their completed template to the lead agency for review within six months of beginning the linkage process:

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1. The Llano and San Saba HMP Planning Team has established an annual window for which linkage to the plan can occur. Linking jurisdictions are instructed to complete the following procedures during this time frame.
2. The current non-participating jurisdiction contacts the Llano and San Saba Hazard Mitigation Planning Coordinator for the Plan and requests a "Linkage Package". The Llano and San Saba Hazard Mitigation Project Contact is:

   Cheryl Keep, Grant Administrator
   Llano County
   325-247-7756 | ckepp@co.llano.tx.us

3. The Llano and San Saba Hazard Mitigation Planning Coordinator will provide a linkage packages that includes:
   - Copy of Volume 1 and 2 of the Plan (CD-ROM or flash drive).
   - Planning Partner's Expectations Sheet.
   - A Sample "Letter of Intent" to Link to the Plan.
   - A Jurisdictional Annex Template and Instructions.
   - Catalog of Hazard Mitigation Alternatives or the Mitigation Catalog.
   - A copy of Section 201.6 of Chapter 44, the Code of Federal Regulations (44CFR), which defines the federal requirements for a local hazard mitigation plan.

4. The new jurisdiction will be required to review both volumes of the Plan which includes the following key components for the planning area:
   - The Llano and San Saba HMP risk assessment;
   - The plan's goals and objectives;
   - Plan implementation and maintenance procedures; and
   - Catalog of potential mitigation actions

Once this review is complete, the jurisdiction will complete its specific jurisdictional annex by following the template and its instructions for completion provided by the Llano and San Saba Hazard Mitigation Planning Coordinator. Technical assistance can be provided upon request by completing the request for technical assistance (TA) form provided in the linkage package. This TA may be provided by the Llano and San Saba Hazard Mitigation Planning Coordinator or any other resource within the Planning Team. The Llano and San Saba Hazard Mitigation Planning Coordinator will determine who will provide the TA and the possible level of TA based on resources available at the time of the request.

5. The new jurisdiction will also be required to develop a public involvement strategy that ensures their public's ability to participate in the plan development process. At a minimum, the new jurisdiction must try to solicit public opinion on hazard mitigation at the onset of this linkage process and a minimum of one public meeting to present their draft jurisdiction specific annex for comment, prior to adoption by the governing body. The Planning Partnership will have available resources to aid in the public involvement strategy such as the Plan website. However, it will be the new jurisdiction's responsibility to implement and document this strategy for incorporation into their annex.

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It should be noted that the Jurisdictional Annex templates do not include a section for the description of the public process. This is because the original partnership was covered under a uniform public involvement strategy that covered the operational area that is described in volume 1 of the plan. Since the new partner was not addressed by that strategy, they will have to initiate a new strategy, and add a description of that strategy to their annex. For consistency, new partners are encouraged to follow the public involvement format utilized by the initial planning effort as described in Volume I of the Plan.

6. Once their public involvement strategy is completed and they have completed their template, the new jurisdiction will submit the completed package to the Llano and San Saba Hazard Mitigation Planning Coordinator for a pre-adoption review to ensure conformance with the regional plan format.
7. The Llano and San Saba Hazard Mitigation Planning Coordinator will review for the following:
    - Documentation of public involvement and mitigation action development strategies.
    - Conformance of template entries with guidelines outlined in instructions.
    - Chosen actions are consistent with goals, objectives, and mitigation catalog of Llano and San Saba Hazard Mitigation Plan; and
    - Designated point of contact.

The Llano and San Saba Hazard Mitigation Planning Coordinator may utilize members of the HMP Planning Team or other resources to complete this review. All proposed linked annexes will be submitted to the HMP Planning Team for their review and comment prior to submittal to the TDEM.

8. Plans approved and accepted by the HMP Planning Committee will then be forwarded to TDEM for review with cover letter stating the forwarded plan meets local approved plan standards and whether the plan is submitted with local adoption or for criteria met/plan not adopted review.
9. The TDEM will review plans for state and federal compliance. Non-compliant plans are returned to the jurisdiction for correction. Compliant plans are forwarded to FEMA Region VI office for review with annotation as to the adoption status.
10. FEMA Region VI reviews the new jurisdiction's plan in association with the approved plan to ensure DMA compliance. Region VI notifies new jurisdiction of results of review with copies to the TDEM and approved planning authority.
11. New jurisdiction corrects plan’s shortfalls (if necessary) and resubmits to the TDEM through the approved plan lead agency.
12. Region VI Director notifies new jurisdiction governing authority of plan approval.

The new jurisdiction plan is then included with the Llano and San Saba HMAP 2023 update, and the linking jurisdiction is committed to participate in the ongoing plan implementation and maintenance identified in Volume 1 of the HMP.

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