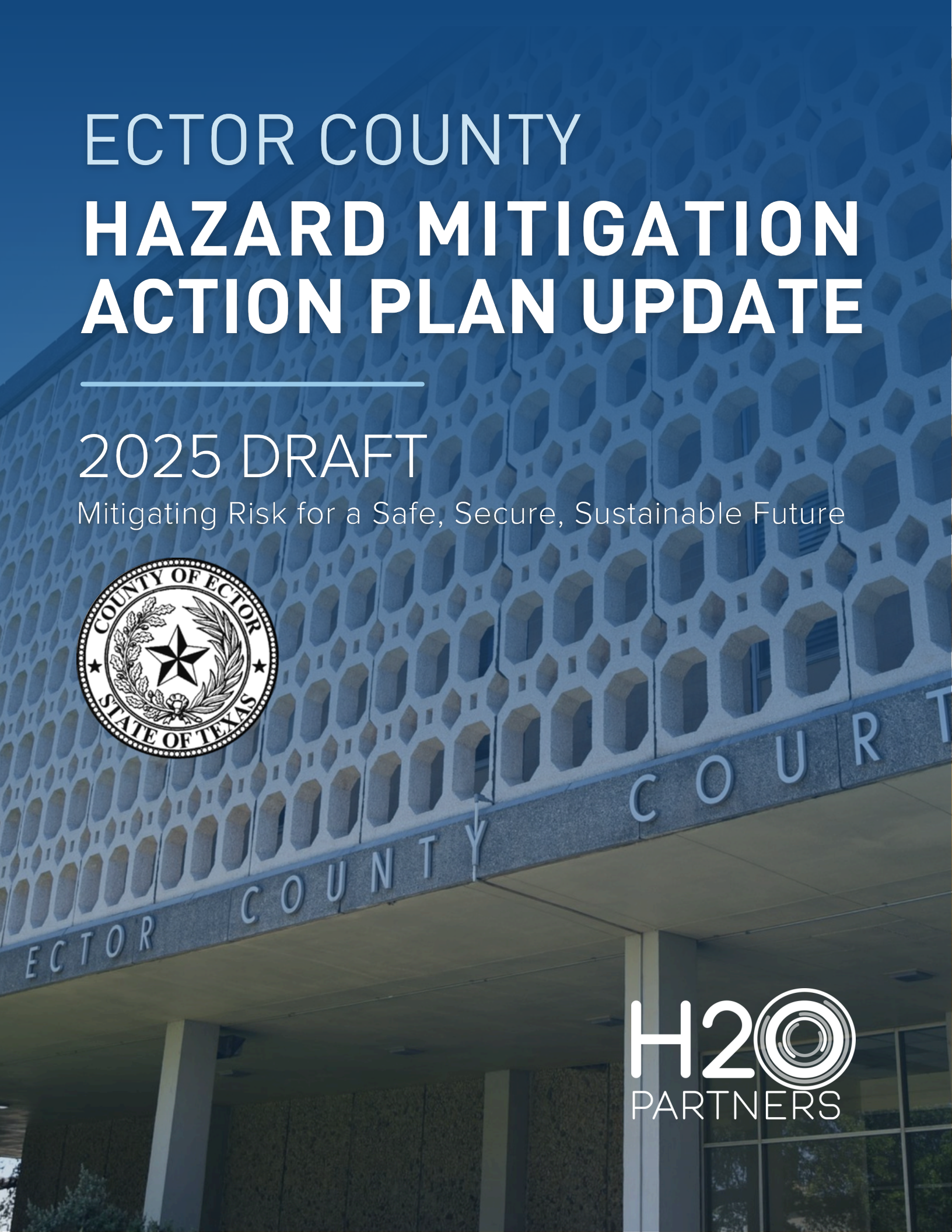
ECTOR COUNTY
HAZARD MITIGATION ACTION PLAN UPDATE

2025 DRAFT

Mitigating Risk for a Safe, Secure, Sustainable Future



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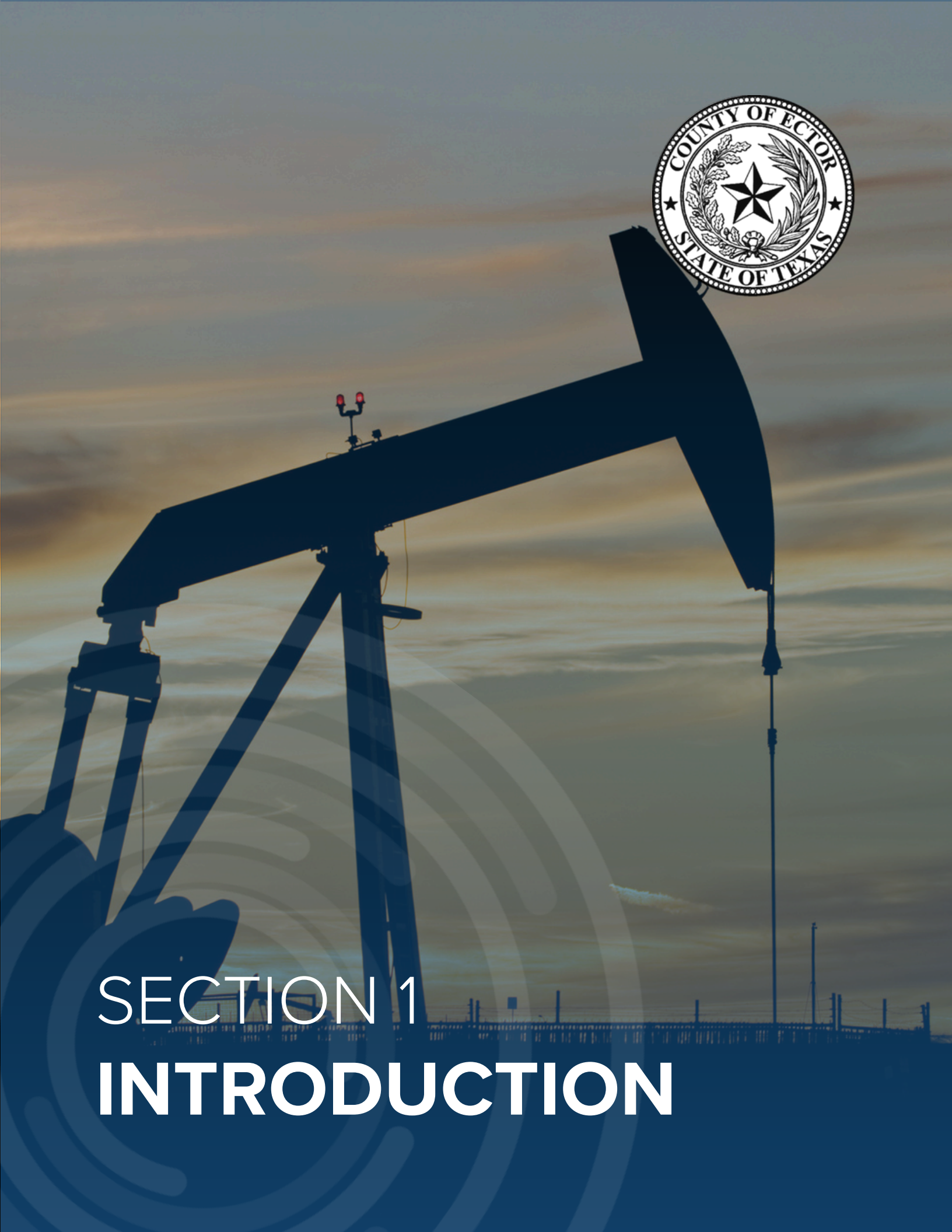


SECTION 1
INTRODUCTION

SECTION 1: INTRODUCTION

BACKGROUND

Ector County is located in west Texas on the northern border of the Edwards Plateau. The largest city and county seat, Odessa, is 23 miles southwest of Midland, Texas. Andrews County is adjacent to the north, Midland County borders the eastern portion of the county, Ward County is to the southwest, Upton County is to the southeast, Winkler County is to the west, and Crane County is to the south.

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

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

The Disaster Mitigation Act requires that hazard mitigation plans be reviewed and revised every five years to maintain eligibility for Hazard Mitigation Assistance (HMA) grant funding. In 2011, Ector County developed their previous Hazard Mitigation Action Plan (HMAP) to be specific to the county, the City of Goldsmith, and the City of Odessa.

FEMA approved the previous Ector County Multi-Jurisdictional HMAP in 2011, which then was set to expire in 2016. Therefore, the county began the process of developing a Hazard Mitigation Plan Update in order to regain eligibility for grant funding. The HMAP Update planning process provided an opportunity for Ector County to evaluate successful mitigation actions and explore opportunities to avoid future disaster loss.

Ector County selected H2O Partners, Inc. to write and develop the 2025 HMAP Update, hereinafter titled: “Ector County Hazard Mitigation Action Plan Update 2025: Maintaining a Safe, Secure, and Sustainable Community” (Plan Update). This is a multi-jurisdictional plan; the participating jurisdictions include Ector County and the City of Odessa. The City of Goldsmith has opted out of participating in the 2025 Plan Update.

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

SECTION 1: INTRODUCTION

Hazard mitigation activities are an investment in a community's safety and sustainability. It is widely accepted that the most effective hazard mitigation measures are implemented at the local government level, where decisions on the regulation and control of development are ultimately made. A comprehensive review of a hazard mitigation plan addresses vulnerabilities to hazards that exist today and in the foreseeable future. Therefore, it is essential that a plan identify projected patterns of how future development will increase or decrease a community's overall hazard vulnerability

SCOPE

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

PURPOSE

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

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

Ector County, the City of Odessa, and planning participants identified 11 natural hazards to be addressed by the Plan Update. The specific goals of the Plan Update are to:

- Provide a comprehensive update to the 2011 HMAP;
- Minimize disruption to Ector County and the City of Odessa following a disaster;
- Streamline disaster recovery by articulating actions to be taken before a disaster strikes to reduce or eliminate future damage;
- Demonstrate a firm local commitment to hazard mitigation principles;
- Serve as a basis for future funding that may become available through grants and technical assistance programs offered by the State or Federal government. The Plan will enable Ector County and the City of Odessa to take advantage of rapidly developing mitigation grant opportunities as they arise; and
- Ensure that Ector County and the City of Odessa maintain eligibility for the full range of future Federal disaster relief.

AUTHORITY

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

SUMMARY OF SECTIONS

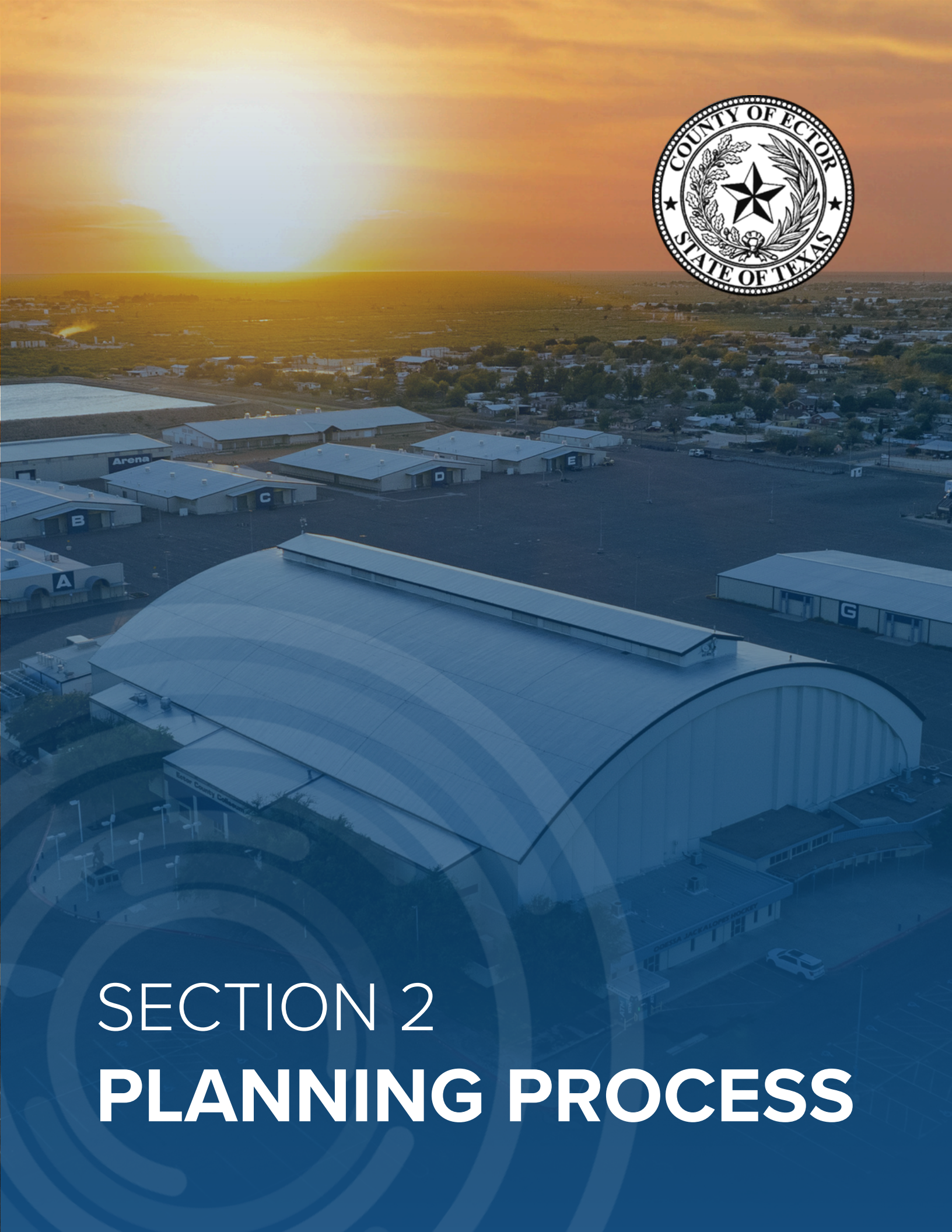
Sections 1 and 2 of the Plan Update outline the Plan's purpose and development, including how Planning Team members, stakeholders, and members of the general public were involved in the planning process. Section 3 profiles the planning area's population and economy.

Sections 4 through 15 present a hazard overview and information on individual natural hazards in the planning area. For each hazard, the Plan Update presents a description of the hazard, a list of historical hazard events, and the results of the vulnerability and risk assessment process.

Section 16 presents hazard mitigation goals and objectives. Section 17 gives an analysis of the previous actions, and Section 18 presents hazard mitigation actions for Ector County and the City of Odessa. Section 19 identifies Plan maintenance mechanisms.

Human-caused hazards are included in Appendix A. The list of Planning Team members and stakeholders is located in Appendix B. Public survey results are presented in Appendix C. Appendix D contains a detailed list of critical facilities for the area. Appendix E contains information regarding dam locations within Ector County. Appendix F contains information regarding workshops and meeting documentation. Capability Assessment results for the Plan participants are in Appendix G. Appendix H includes State and Federal Funding Opportunities.[3]

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



SECTION 2
PLANNING PROCESS

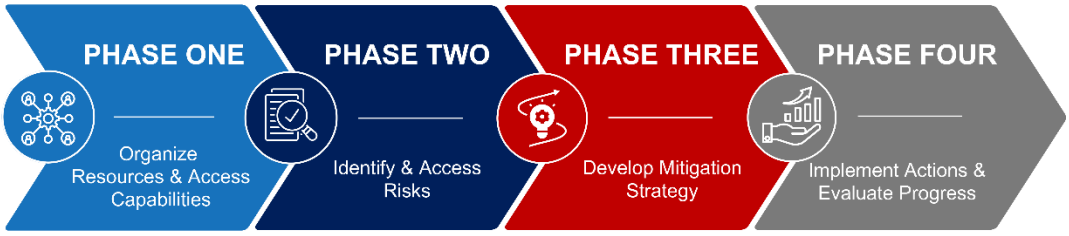
PLAN PREPARATION AND DEVELOPMENT

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

OVERVIEW OF THE PLAN

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

Figure 2-1. Mitigation Planning Process



Ector County and the Consultant Team met in December 2024 to begin organizing resources, identify Planning Team members, and conduct a Capability Assessment.

PLANNING TEAM

Key members of H2O Partners, Inc. developed the Plan Update in conjunction with the Planning Team. The Planning Team was established using a direct representation model. Some of the responsibilities of the Planning Team included completing Capability Assessment surveys, providing input regarding the identification of hazards, identifying mitigation goals, and developing mitigation strategies. An Executive Planning Team consisting of key personnel involved in hazard mitigation activities from Ector County and the City of Odessa, shown in Table 2-1, was formed to coordinate planning efforts and request input and participation in the planning process.

Table 2-2 reflects the Advisory Planning Team, consisting of additional representatives from area organizations and departments from the county and city that participated throughout the planning process. All Executive and Advisory Planning Team members are involved in hazard mitigation activities; those with the authority to regulate development are identified with an asterisk next to their title.

Table 2-1. Executive Planning Team

ORGANIZATION / DEPARTMENT	TITLE
Ector County – Government	Public Information Officer
City of Odessa – Odessa Fire Rescue	Assistant Chief of Emergency Management

Table 2-2. Advisory Planning Team

ORGANIZATION / DEPARTMENT	TITLE
Ector County – Building Maintenance	Director
Ector County – Development Services	Director
Ector County – Emergency Management	Director
Ector County – Government	County Attorney / Grant Writer
Ector County – Government	County Judge*
Ector County – Health Department	Department Coordinator

ORGANIZATION / DEPARTMENT	TITLE
Ector County – Health Department	Director
Ector County – Public Works	County Engineer
Ector County – Public Works	Department Coordinator
Ector County – Public Works	Director
Ector County – Sheriff's Office	County Sheriff
Ector County – Sheriff's Office	County Sheriff Assistant
Ector County – Sheriff's Office	Sergeant
City of Odessa – Government	Mayor*

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

Based on the results of the completed Capability Assessments, Ector County and the City of Odessa described methods for achieving future hazard mitigation measures by expanding existing capabilities. For example, each jurisdiction has the opportunity to identify opportunities for cross-training or increasing the technical expertise of staff by attending free training available through FEMA and the Texas Division of Emergency Management (TDEM) by monitoring classes and availability through TDEM Training Division Learning Management Site (LMS) (https://tdem.texas.gov/preparedness/training). In addition, each jurisdiction can identify Planning Team members with the authority to monitor the Plan and identify grant funding opportunities for expanding staff. Other options for improving capabilities for each jurisdiction include the following:

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

JURISDICTION	OPPORTUNITIES
Ector County	• Develop a **Capital Improvement Plan** based on information in the risk assessment and identified mitigation projects within the HMAP. • Integrate risk information from the HMAP into future updates to the **Comprehensive Plan**. • Develop a **Community Wildfire Protection Plan** based on information in the risk assessment and identified mitigation projects within the HMAP. • Review current **floodplain ordinances** for opportunities to increase resiliency, such as modifying permitting or building codes. • Develop **building and land use ordinances** that will require all new developments to conform to the highest mitigation standards.

JURISDICTION	OPPORTUNITIES
City of Odessa	• Integrate risk information from HMAP into future updates to **Capital Improvement Plan**. • Integrate risk information from the HMAP into future updates to the **Comprehensive Plan**. • Develop a **Community Wildfire Protection Plan** based on information in the risk assessment and identified mitigation projects within the HMAP. • Review current **floodplain ordinances** for opportunities to increase resiliency, such as modifying permitting or building codes. • Review current **building and land use ordinances** that will require all new developments to conform to the highest mitigation standards.

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

The Planning Team developed hazard mitigation actions for mitigating risk from all of the hazards including potential flood, tornado, and wildfire events. These actions include but are not limited to retrofitting critical facilities to hazard-resistant levels, including the installation of vehicle barrier systems, adding bracing, vital equipment, hazard-resistant roofing, and elevating generators.

PLANNING PROCESS

The process used to prepare the Plan Update followed the four major steps included at Figure 2-1. After the Planning Team was organized, a capability assessment was developed and distributed at the Kickoff Workshop. Hazards were identified and assessed, and results associated with each of the hazards were provided at the Risk Assessment Workshop. Based on Ector County's identified vulnerabilities, specific mitigation strategies were discussed and developed at the Mitigation Strategy Workshop. Finally, Plan maintenance and implementation procedures were developed and are included in Section 19. Participation of Planning Team members, stakeholders, and the public at each of the workshops is documented in Appendix F.

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

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

KICKOFF WORKSHOP

The Kickoff Workshop was held on January 22, 2025, at the Ector County Annex Building in the City of Odessa. The initial workshop informed participating officials and key department personnel

about how the planning process pertained to their distinct roles and responsibilities and engaged stakeholder groups that focus on vulnerable populations and underserved communities including, but not limited to public libraries, economic development agencies, local colleges, and surrounding communities. In addition to the kickoff presentation, participants received the following information:

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

A risk ranking exercise was conducted at the Kickoff Workshop to get input from the Planning Team and stakeholders pertaining to various risks from a list of natural hazards affecting the planning area. Each participant at the Kickoff Workshop was provided with a risk ranking sheet that asked participants to rank hazards in terms of the probability or frequency of occurrence, extent of spatial impact, and the magnitude of impact. The results of the ranking sheets identified unique perspectives on varied risks throughout the planning area. The assessments were also used to set priorities for hazard mitigation actions based on potential loss of lives and dollar losses.

HAZARD IDENTIFICATION

At the Kickoff Workshop, and through e-mail and phone correspondence, the Planning Team conducted preliminary hazard identification. The Planning Team, in coordination with the Consultant Team, reviewed and considered a full range of natural hazards. Once identified, the teams narrowed the list to significant hazards by reviewing hazards affecting the area, the 2023 State of Texas Hazard Mitigation Plan, and initial study results from reputable sources such as federal and state agencies. Based on this initial analysis, the teams identified a total of 11 natural hazards which pose a significant threat to the planning area.

RISK ASSESSMENT

An initial risk assessment for Ector County was completed in March 2025 and results were presented to Planning Team members at the Risk Assessment Workshop held on April 10, 2025, in conjunction with the Mitigation Strategy Workshop, at the Ector County Annex Building in the City of Odessa. At the workshop, the characteristics and consequences of each hazard were evaluated to determine the extent to which the planning area would be affected in terms of potential danger to property and citizens.

Property and crop damages were estimated by gathering data from the National Centers for Environmental Information (NCEI) and the National Oceanic and Atmospheric Administration (NOAA). The assessment also examined the impact of various hazards on the built environment, including general building stock, critical facilities, lifelines, and infrastructure. The resulting risk assessment profiled hazard events, provided information on previous occurrences, estimated probability of future events, and detailed the spatial extent and magnitude of impact on people and property. Following the risk assessment workshop past event data from NCEI is provided to the Planning Team for their review and assistance in identifying significant events. A hazard profile and vulnerability analysis for each of the hazards can be found in Sections 4 through 15.

MITIGATION REVIEW AND DEVELOPMENT

Developing the mitigation strategy for the Plan involved identifying mitigation goals and new mitigation actions. A Mitigation Workshop was held on April 10, 2025, in conjunction with the Risk Assessment Workshop, at the Ector County Annex Building in the City of Odessa. In addition to the Planning Team, stakeholder groups were invited to attend the workshop. Regarding hazard mitigation actions, workshop participants emphasized the desire for flood projects. Additionally, the participating jurisdictions were proactive in identifying mitigation actions to lessen the risk of all the identified hazards included in the Plan Update.

An inclusive and structured process was used to develop and prioritize new hazard mitigation actions for the Plan Update. The prioritization method was based on FEMA's STAPLEE criteria and included social, technical, administrative, political, legal, economic, and environmental considerations. As a result, each Planning Team member assigned an overall priority to each hazard mitigation action. The overall priority of each action is reflected in the hazard mitigation actions found in Section 18.

Planning Team members then developed action plans identifying proposed actions, costs and benefits, the responsible organization(s), effects on new and existing buildings, implementation schedules, priorities, and potential funding sources.

Specifically, the process involved:

- Listing optional hazard mitigation actions based on information collected from previous plan reviews, studies, and interviews with federal, state, and local officials. Workshop participants reviewed the optional mitigation actions and selected actions that were most applicable to their area of responsibility, cost-effective in reducing risk, easily implemented, and likely to receive institutional and community support.
- Workshop participants inventoried federal and state funding sources that could assist in implementing the proposed hazard mitigation actions. Information was collected, including the program name, authority, purpose of the program, types of assistance and eligible projects, conditions on funding, types of hazards covered, matching requirements, application deadlines, and a point of contact.
- Planning Team members considered the benefits that would result from implementing the hazard mitigation actions compared to the cost of those projects. Although detailed cost-benefit analyses were beyond the scope of the Plan Update, Planning Team members utilized economic evaluation as a determining factor between hazard mitigation actions.
- Planning Team members then selected and prioritized mitigation actions.

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

REVIEW AND INCORPORATION OF EXISTING PLANS

REVIEW

Background information utilized during the planning process included various studies, plans, reports, and technical information from sources such as FEMA, the United States Army Corps of Engineers (USACE), the U.S. Fire Administration, the National Oceanic and Atmospheric Administration (NOAA), the Texas Water Development Board (TWDB), the Texas Commission

on Environmental Quality (TCEQ), the Texas State Data Center, the Texas A&M Forest Service, the Texas Division of Emergency Management (TDEM), and local hazard assessments and plans. Section 4 and the hazard-specific sections of the Plan (Sections 5-15) summarize the relevant background information.

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

INCORPORATION OF EXISTING PLANS INTO THE HMAP PROCESS

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

Existing projects and studies were utilized as a starting point for discussing hazard mitigation actions among Planning and Consultant Team members. For example, Ector County installed critical facility backup generators, constructed a barn to house county equipment and vehicles, and added minimal residential street width to accommodate sizeable rescue vehicles.

For a comprehensive list of actions from the previous Ector County Multi-jurisdictional HMAP, please refer to Section 17.

The current Flood Insurance Study (FIS) as well as the current effective Digital Flood Insurance Rate Maps (DFIRMs), effective date March 15, 2012, were used in the flood hazard risk assessment (Section 9). The FIRM panels (map ID 48135C panels 25-525) show the areas throughout Ector County at greater risk of flooding. The FIS report contains detailed flood elevation data in flood profiles and data tables and is utilized in determining extent.

Additionally, policies and ordinances were reviewed by participating jurisdictions. Other plans were reviewed, such as Capital Improvement Plans and Emergency Operations Plans, to identify any additional mitigation actions.

Finally, the 2023 State of Texas Hazard Mitigation Plan, developed by TDEM, was discussed in the initial planning meeting in order to develop a specific group of hazards to address in the planning effort. The 2023 State Plan was also used as a guidance document, along with FEMA materials, in the development of the Ector County Hazard Mitigation Action Plan Update 2025.

INCORPORATION OF THE HMAP INTO OTHER PLANNING MECHANISMS

Planning Team members will integrate implementation of the Plan Update with other planning mechanisms for Ector County, such as the Emergency Operations Plan. Existing plans for participating jurisdictions will be reviewed and incorporated into the Plan Update, as appropriate.

This section discusses how the Plan will be implemented by Ector County and the City of Odessa. It also addresses how the Plan will be evaluated and improved over time, and how the public will continue to be involved in the hazard mitigation planning process.

Ector County and the City of Odessa will be responsible for implementing hazard mitigation actions contained in Section 18. Each hazard mitigation action has been assigned to a specific county or city department that is responsible for tracking and implementing the action.

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

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

Upon formal adoption of the Plan Update, Planning Team members will review existing plans along with building codes to guide development and ensure that hazard mitigation actions are implemented. Each of the jurisdictions will be responsible for coordinating periodic reviews of the Plan Update with members of the Advisory Planning Team to ensure integration of hazard mitigation strategies into these planning mechanisms and codes. The Planning Team will also conduct periodic reviews of various existing planning mechanisms and analyze the need for any revisions or updates in light of the approved Plan Update. Ector County and the City of Odessa will ensure that future long-term planning objectives will contribute to the goals of the Plan to reduce the long-term risk to life and property from moderate and high-risk hazards. Within one year of formal adoption of the Plan, existing planning mechanisms will be reviewed and analyzed as they pertain to the Plan Update.

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

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

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

Table 2-4. Examples of Methods of Incorporation

Planning Mechanism	Incorporation of Plan
Annual Budget Review	Various departments and key personnel that participated in the planning process will review the Plan Update and mitigation actions therein when conducting their annual budget review. Allowances will be made in accordance with grant applications sought, and mitigation actions that will be undertaken, according to the implementation schedule of the specific action.

Planning Mechanism	Incorporation of Plan
Capital Improvement Plan	The City of Odessa has a Capital Improvement Plan (CIP) in place. Prior to any revisions to the CIP, city departments will review the risk assessment and mitigation strategy sections of the HMAP, as limiting public spending in hazardous zones is one of the most effective long-term mitigation actions available to local governments.
Comprehensive Plans	Ector County and the City of Odessa have a Comprehensive Land Use Plan in place or under development. Since Comprehensive Plans involve developing a unified vision for a community, the mitigation vision and goals of the Plan will be reviewed in the development or revision of a Comprehensive Plan.
Floodplain Management Plans	Floodplain Management Plans include preventative and corrective actions to address the flood hazard. Therefore, the actions for flooding and information found in Section 9 of this Plan Update discussing the people and property at risk to flood will be reviewed and revised when Ector County and the City of Odessa update their management plans or develop new plans.
Grant Applications	The HMAP will be evaluated when grant funding is sought for mitigation projects. If a project is not in the Plan Update, a Plan Revision may be necessary to include the action in the Plan.
Regulatory Plans	Currently, all participating jurisdictions have regulatory plans in place, such as Emergency Operations Plans, Land Use Plans, and Evacuation Plan. The Plan Update will be consulted when county and city departments review or revise their current regulatory planning mechanisms, or in the development of regulatory plans that are not currently in place.

Appendix G Capability Assessment provides an overview of Planning Team members' existing planning and regulatory capabilities. These existing capabilities provide the mechanisms to implement the mitigation strategy objectives. For example, the adoption of building codes and implementation of land use regulations have been demonstrated to help communities avoid losses from natural hazard events. Currently, the City of Odessa has building codes, zoning ordinances, and land use ordinances in place. Please refer to Appendix G for a complete inventory of the county and city's capabilities.

It should be noted for the purposes of the Plan Update that the HMAP has been used as a reference when reviewing and updating all plans and ordinances for the entire planning area. The Emergency Management Action Plans developed for Ector County and the City of Odessa are updated every 5 years and incorporate goals, objectives and actions identified in the mitigation plan.

PLAN REVIEW AND PLAN UPDATE

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

TIMELINE FOR IMPLEMENTING MITIGATION ACTIONS

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

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

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

PUBLIC AND STAKEHOLDER INVOLVEMENT

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

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

The draft Plan Update was made available to the general public for review and comment on participating jurisdictions' websites. The public was notified at the public meetings that the draft Plan Update would be available for review. No feedback was received on the draft Plan Update, although it was given on the public survey, and all relevant information was incorporated into the

Plan Update. Public input was utilized to assist in identifying hazards that were of most concern to the citizens of the county and what actions they felt should be included and prioritized.

The Plan Update will be advertised and posted on Ector County's and the City of Odessa's websites upon approval from FEMA, and a copy will be kept at the Ector County Courthouse.

UNDERSERVED COMMUNITIES / VULNERABLE POPULATIONS

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

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

All stakeholders and Planning Team members were invited to participate in the development of the Plan during this process, including all public meetings, and surveys. All stakeholders are listed in Table 2-5 below. Some stakeholders have been detailed below along with the agency's mission, including:

- Able Center for Independent Living – Promotes independent living for all people with disabilities by identifying a person's abilities and potentials and removing physical and social barriers.
- Catholic Charities – Serves those most in need within the county via programs such as the Emergency Services Program which provides food, clothing, toiletries, baby essentials, homeless support, school supplies, uniforms, and Christmas gifts. The program also provides funds for prescriptions, medical visits, dental appointments, visions appointments, transportation for work, school and medical appointments as well as assistance with utility bills, rent, funding to obtain vital records, identification cards and driver's licenses. Catholic Charities' Adult Learning Center offers classes in GED Preparation, Adult Basic Education, Computer Education, Financial Literacy, College tutoring, ESL and the Citizenship Test tutoring. Each student receives an individual curriculum to ensure their success in the program.
- West Texas Food Bank – Serves nineteen counties, including the two largest counties in the state. The service area for this organization includes seventeen rural counties with many small communities, which is one-third of the population served, and the metro area of Midland / Odessa, which constitutes two-thirds of the population served. While the West Texas Food Bank does give food directly to those in need, it primarily functions as a distribution center. After receiving donated and surplus food as well as food purchased at low wholesale prices from manufacturers, the West Texas Food Bank serves as a clearinghouse to solicit, store, inspect, and repack food for partner agencies. WTFB's vision is a West Texas without hunger. Therefore, the overall goal is to continually improve the quantity, variety, and nutritional quality of foods offered to agencies for distribution to low-income individuals and families in need.

In addition, public notices were posted on public bulletin boards at the Ector County Courthouse, as well as posted on the participating jurisdictions' websites and social media platforms. For a sample of these postings, please see Appendix F. In addition to public meetings, the Planning and Consultant Teams developed a public survey designed to solicit public input during the planning process from citizens and stakeholders and to obtain input and feedback on the mitigation plan. For each form of engagement, all efforts were made to reach Ector County's underserved communities and vulnerable populations throughout the planning process. Additional survey information is provided at the end of this section.

STAKEHOLDER INVOLVEMENT

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

Table 2-5. Stakeholder Working Group

AGENCY	TITLE	STAKEHOLDER TYPE
Able Center for Independent Living	Executive Director	Community Organization
American Red Cross - Permian Basin	Executive Director	Regional and Local Agency
American Red Cross	Disaster Program Manager	Regional and Local Agency +
American Red Cross	Disaster Volunteer	Regional and Local Agency +
Andrews County	Emergency Management Coordinator	Neighboring Jurisdiction
Catholic Charities	General Representative	Non-profit / Community Organization
ContinueCARE Hospital	Safety Officer	Healthcare Agency
Crane County	County Judge	Neighboring Jurisdiction
Ector County Commissioners	County Commissioner Precinct 1	Local Government
Ector County Commissioners	County Commissioner Precinct 2	Local Government
Ector County Commissioners	County Commissioner Precinct 3	Local Government +
Ector County Commissioners	County Commissioner Precinct 4	Local Government

AGENCY	TITLE	STAKEHOLDER TYPE
Ector County Hospital District	Public Relations	Healthcare Agency
Ector County ISD	Chief of Police	Academia
Ector County ISD	Operations Executive Director	Academia
Ector County ISD	Superintendent	Academia
Ector County Library	General Representative	Community Organization
Ector County Senior Center	Director	Community Organization
Ector County Utility District	General Representative	Utility Provider
Environmental Protection Agency (EPA)	Director of Superfund and Emergency Management Division	Federal Agency
Environmental Protection Agency (EPA)	Regional Administrator	Federal Agency
Gardendale Volunteer Fire Department (VFD)	Fire Chief	Community Organization
Goldsmith Volunteer Fire Department (VFD)	Fire Chief	Community Organization
Goldsmith, City of	Mayor	Neighboring Jurisdiction
Goodwill	Director of Marketing and Communication	Non-Profit / Community Organization
Grand Companions (Animal Shelter)	General Representative	Community Organization
Greater Opportunities of the Permian Basin	Assistant Director of Program Operations	Non-Profit / Community Organization
Keep Odessa Beautiful	Executive Director	Non-Profit / Community Organization
Midland County	Emergency Management Coordinator	Neighboring Jurisdiction
National Weather Service (NWS) – Midland / Odessa	General Representative	Federal Agency
Odessa American	Administrative Assistant	Community Organization
Odessa Fire Rescue	Fire Chief	Community Organization
Odessa Housing Authority	Administrative Assistant	Community Organization
Odessa Housing Finance Corporation	Executive Director	Community Organization
Odessa Junior College	Chief of Police	Academia

AGENCY	TITLE	STAKEHOLDER TYPE
Odessa Regional Medical Center	Emergency Management	Healthcare Agency
Odessa, City of	Mayor	Neighboring Jurisdiction
Permian Basin Mission Center	General Representative	Non-Profit / Community Organization
Permian Basin MPO	Transportation Planner	Community Organization
Permian Basin Petroleum Association	General Representative	Community Organization
Permian Basin Regional Planning Group	Director	Regional and Local Agency
Permian Basin Regional Planning Group	Homeland Security Program Specialist	Regional and Local Agency +
Permian Road Safety Coalition	Administrative Assistant	Community Organization
Sandhills SWCD #241	Field Representative	Utility Provider
South Ector County Volunteer Fire Department (VFD)	Fire Chief	Community Organization
Texas A&M AgriLife Extension	County Extension Agent	State Agency
Texas A&M Forest Service	Resource Specialist II	State Agency
Texas Commission on Environmental Quality, Region 7	Dam Safety Program Representative	State Agency
Texas Commission on Environmental Quality, Region 7	Executive Assistant	State Agency
Texas Commission on Environmental Quality, Region 7	Regional Director	State Agency
Texas Department of Health and Human Services, Region 9 / 10	General Representative	State Agency
Texas Department of Health and Human Services, Region 9 / 10	Preparedness and Response Program Manager	State Agency
Texas Department of Homeland Security	Media Representative	State Agency
Texas Department of Housing and Community Affair	Director of Single Family and Homeless Program	State Agency
Texas Department of Housing and Community Affair	Manager of Single-Family Program	State Agency

AGENCY	TITLE	STAKEHOLDER TYPE
Texas Department of Transportation, Odessa District	Area Engineer	State Agency
Texas Department of Transportation, Odessa District	Director of Operations	State Agency
Texas Department of Transportation, Odessa District	District Engineer	State Agency
Texas Department of Transportation, Odessa District	Maintenance Supervisor	State Agency
Texas Division of Emergency Management (TDEM), Region 7	Assistant Chief	State Agency
Texas Division of Emergency Management (TDEM), Region 7	District 9 Chief	State Agency
Texas Division of Emergency Management (TDEM), Region 7	Recovery & Mitigation Section Chief	State Agency
Texas Floodplain Management Association	Region 3 Director	State Agency
Texas State Representative	Texas House District 81	State Legislature
Texas State Senate	Texas Senate District 31	State Legislature
Texas State Soil & Water Conservation Board	Communications and Outreach Coordinator	State Agency
Texas Water Development Board	Executive Assistant, Planning	State Agency
Texas Water Development Board	Regional Water Planning Group Representative	State Agency
Texas Windstorm Associations	Public Information Officer	State Agency
United Way of Odessa	Community Impact Director	Non-Profit / Community Organization
Upton County	Emergency Management Coordinator	Neighboring Jurisdiction
U.S. Army Corps of Engineers	Fort Worth & Galveston District Representative	Federal Agency
U.S. Fish & Wildlife	Southwest Regional Representative	Federal Agency
Ward County	Emergency Management Coordinator	Neighboring Jurisdiction
West Odessa Volunteer Fire Department (VFD)	Fire Chief	Community Organization

AGENCY	TITLE	STAKEHOLDER TYPE
West Texas Food Bank	Chief Executive Officer	Non-Profit / Community Organization
Winkler County	Administrative Assistant to County Judge	Neighboring Jurisdiction

Stakeholders and participants from neighboring communities that attended the Planning Team and public meetings played a key role in the planning process. For example, thunderstorm wind was a concern to stakeholders, so Ector County included an action to build safe room shelters at manufactured home parks so that all park residents can reach a shelter in less than five minutes.

PUBLIC MEETINGS

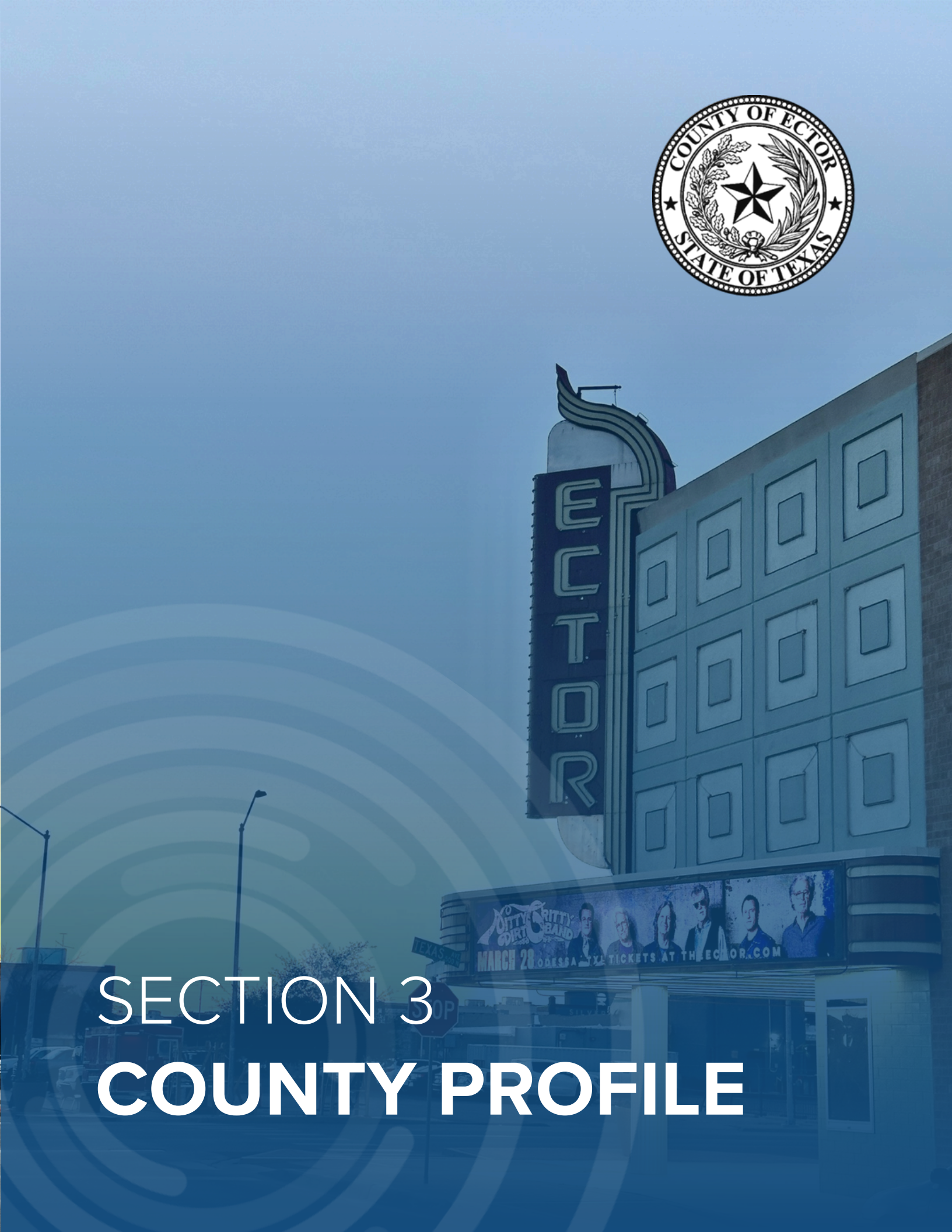
A series of public meetings were held throughout the planning area to collect public and stakeholder input. Topics of discussion included the purpose of hazard mitigation, discussion of the planning process, and types of natural hazards. Ector County released information regarding the public meetings in their area to increase public participation in the Plan Update development process, through posting on their website, on social media sources including Facebook, and/or posting the information on bulletin boards in public facilities. A sampling of these notices can be found in Appendix F, along with the documentation on the public meetings.

Public meetings were held in-person on the following dates:

- January 22, 2025, at the Ector County Annex Building in the City of Odessa
- April 10, 2025, at the Ector County Annex Building in the City of Odessa

PUBLIC PARTICIPATION SURVEY

In addition to public meetings, the Planning and Consultant Teams developed a public survey designed to solicit public input during the planning process from citizens and stakeholders to obtain data regarding the identification of any potential hazard mitigation actions or problem areas. The survey was promoted by local officials and a link to the survey was posted on Ector County's website. A total of 54 surveys were completed online. The survey results are presented in Appendix C. The Planning Team reviewed the input from the surveys and decided which information to incorporate into the Plan as hazard mitigation actions. For example, results indicate that drought and extreme heat are the hazards of highest concern for the public. Protecting and strengthening critical facilities as well as protecting and improving the reliability of utilities were the two main actions indicated that the local government should take to mitigate risk to these hazards. As a result, the Planning Team has included mitigation actions to develop a plan for the use of reclaimed wastewater or greywater and implement projects to develop the necessary infrastructure for these purposes in parks or other identified public locations, acquiring and installing generators with hard-wired quick connections at all critical facilities. Additional actions have been included to provide water conservation education for low-flow plumbing and toilets, efficient washers, and rain harvesting, as well as to develop a Drought Contingency Plan or Water Conservation Action Plan, including public education and outreach to warn citizens about the risks of drought.



SECTION 3
COUNTY PROFILE

SECTION 3: COUNTY PROFILE

OVERVIEW

Ector County is in West Texas on the lower shelf of the Great Plains and on the northern border of the Edwards Plateau, bounded on the north by Andrews County, on the west by Winkler County, on the east by Midland County, and on the south by Crane and Ward Counties. The county was named for Mathew D. Ector, a Confederate general and Texas jurist.

Impressive evidence of prehistoric Indian culture in the area that is now Ector County exists in the Blue Mountain pictographs, which depict various prehistoric hunting scenes. During the eighteenth and nineteenth centuries, the area was within the range of Comanche hunters but was not particularly attractive to them because of the region's limited water resources.

In 1887, Ector County was created from land previously assigned to Tom Green County, and was attached to Midland, Crane, and Upton Counties for judicial purposes. In 1881 promoters of the Texas and Pacific Railway encouraged habitation in the area and offered to haul farm machinery and household goods for prospective settlers at no charge. These promoters opted to ignore the limited rainfall and would promote the agricultural potential of the area. The region was mostly suitable for ranching, and for many years, Ector County was known for its Hereford Cattle. Pointing to the county's supposed resemblance to the steppes of Russia, a railroad official named the first settlement in the county Odessa; in 1882 the town became one of nine stopping places on the railroad's route through West Texas. Much of the land in the county was owned by the University of Texas and was sold for low prices.

During the late 1880s and in the 1890s settlers began to trickle in. In 1890, the census boasted 224 residents, and in 1891, Ector County was formally organized, with Odessa, the largest town, designated as the county seat. By 1900, there were twenty-five farms and ranches in the county, and the population had grown to 381.

Between 1900 and 1930, despite periodic droughts, farmers continued to move into the County in small numbers. A few farmers experimented with cotton production during this period. In 1908, about 800 bales of cotton were ginned in the county. In 1910, cotton was planted on 222 acres in the county; in 1920, when only about 80 acres in the entire County were devoted to cereal crops, cotton culture occupied 363 acres; in 1930, cotton was produced on 1,326 acres of the 2,580 acres of cropland harvested. Local farmers also planted hundreds of fruit trees; by 1910, for example, 588 peach trees were growing in the county.

Local cattle ranchers continued to be noted for their registered Herefords during this period. Almost 24,000 cattle were counted in Ector County in 1910. In 1929, almost 16,000 cattle were counted in the area. Periodic droughts hindered the best efforts to establish farming in the county and the number of farms subsequently fluctuated. In 1910, the United States Agricultural Census found 84 farms and ranches in Ector County, but only 55 in 1920; there were 107 in 1925, but only 69 in 1929. The county's population similarly fluctuated, rising to 1,178 in 1910, for example, before dropping to 760 in 1920. Farming virtually died in Ector County during the Great Depression of the 1930s; in 1940, the 52 farms and ranches in the county harvested only 583 acres of land.

The great oil strike made in 1926 on W. E. Connell's ranch, however, marked the beginning of a tremendous boom that fundamentally changed the character of the county's economy and society. After the Penn field was opened in 1929 and the Cowden field in 1930, Odessa became the shipping and oilfield supply center for the county's burgeoning petroleum boom. Ector County lands produced almost 12,330,000 barrels of oil in 1938, and by the mid-1940s Ector County had over 2,000 producing wells, ranking as one of the leading oil-producing counties in the state. Almost 62,249,000 barrels of oil came from County lands in 1948; more than 57,132,000 barrels in 1956; almost 58,959,000 in 1960; almost 59,228,000 in 1978; and about 45,958,000 in 1982. In the mid-1960s, the nation's largest petrochemical complex was established near Odessa.

The continuing oil and petrochemical boom induced thousands to move to the area in search of work and opportunity, and the population of the county rose almost continuously from the late 1920s into the 1990s.[1]

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

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

Figure 3-1. Location of Ector County

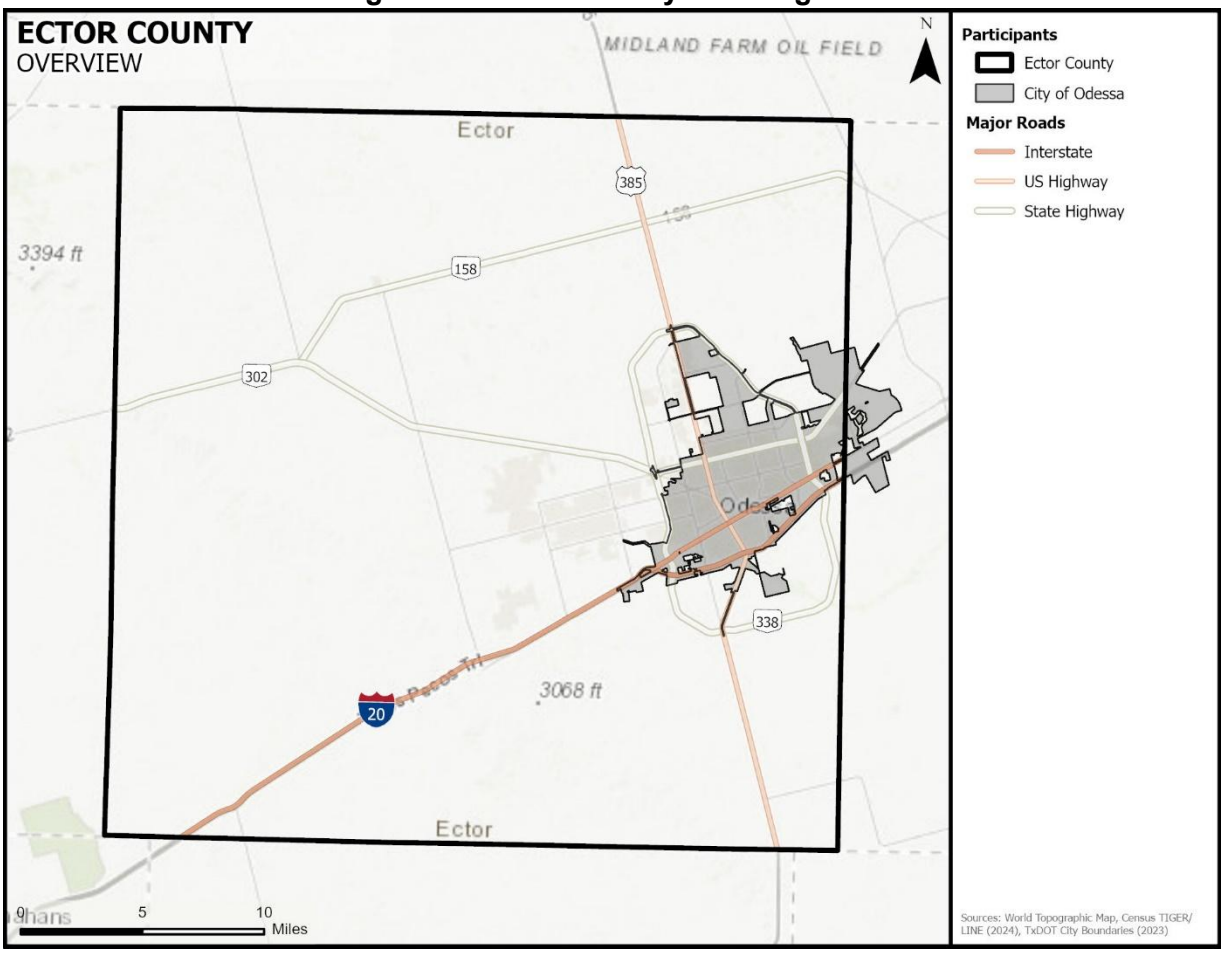
Table 3-1 below lists the jurisdictions in Ector County that participated in the Ector County Hazard Mitigation Action Plan Update 2025.

Table 3-1. Participating Jurisdictions

PARTICIPATING JURISDICTIONS
Ector County
City of Odessa

Figure 3-2 shows the participating jurisdictions within Ector County that are covered in the risk assessment analysis of the Plan Update

Figure 3-2. Ector County Planning Area



POPULATION AND DEMOGRAPHICS

According to the 2020 Census, Ector County has an official population of 165,171 residents, an 20 percent increase since the 2010 census. Table 3-2 shows the population distribution in Ector County and the City of Odessa in 2010, 2020 (Census population count), and 2023 (2023 American Community Survey (ACS) five-year estimates). Note that in some cases, the 2023 ACS estimates may differ from the 2020 census counts: the ACS estimates are used throughout this section for consistency.[2]

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

Table 3-2. Population Distribution by Jurisdiction[3]

JURISDICTION	TOTAL 2010 POPULATION	TOTAL 2020 POPULATION (Census)	PERCENT CHANGE 2010-2020	TOTAL 2023 POPULATION (ACS Estimates)	PERCENT CHANGE 2010-2023
Ector County[4]	137,130	165,171	20%	163,206	19%
City of Odessa	99,940	114,428	14%	114,080	14%

Table 3-3 summarizes select characteristics of vulnerable or sensitive populations in Ector County and the City of Odessa using data from the U.S. Census Bureau 2023 American Community Survey (ACS) five-year estimates. Between official U.S. Census population counts, the estimate uses a formula based on new residential building permits and household size. It is simply an estimate, and many variables are involved in achieving an accurate estimation of the number of people living in a given area at a given time.

Table 3-3. Populations at Greater Risk by Jurisdiction[5]

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Ector County[6]	16,038	14,115	16,785	24,971	22,046
City of Odessa	11,670	10,246	11,536	16,428	13,178

POPULATION GROWTH

The official 2020 Ector County population is 165,171. Overall, Ector County experienced a population increase of 39 percent between 1990 and 2020, or 46,237 residents. The City of Odessa experienced a 14 percent population increase from 2010 and 2020. Table 3-4 provides historical growth rates in Ector County.

[3] Some jurisdictions have boundaries that extend beyond Ector County; data for those jurisdictions represents their total population both inside and outside the Ector County line.
[4] County totals include the entire population within the county lines, including unincorporated areas and non-participating jurisdictions within the County.
[5] Some jurisdictions have boundaries that extend beyond Ector County; data for those jurisdictions represents their total population both inside and outside the Ector County line.
[6] County totals include the entire population within the county lines, including unincorporated areas and non-participating jurisdictions within the County.

Table 3-4. Population Growth by Jurisdictions 1990-2020[7,8]

JURISDICTIONS	1990	2000	2010	2020	POP CHANGE 1990-2020	PERCENT OF CHANGE	POP CHANGE 2010-2020	PERCENT OF CHANGE
Ector County[9]	118,934	121,123	137,130	165,171	46,237	39%	28,041	20%
City of Odessa	89,699	90,943	99,940	114,428	24,729	28%	14,488	14%

ECONOMIC IMPACT

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

Based on the American Community Survey 2023 estimates, 64 percent of the population 16 years and over (118,656) is employed in the labor force. The per capita income is $34,459 and the median household income countywide is $71,031. Families with incomes below the poverty level in 2023 made up 12 percent of all families. Of families that have children under 18 years old, 17.3 percent are below the poverty level.

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

Table 3-5. Occupations of Employed Population in Ector County[10]

OCCUPATION	ESTIMATE	PERCENT
Civilian employed population 16 years and over	75,536	
Management, business, science, and arts occupations	19,670	26.0%
Sales and office occupations	16,467	21.8%
Production, transportation, and material moving occupations	15,644	20.7%
Natural resources, construction, and maintenance occupations	13,752	18.2%
Service occupations	10,003	13.2%

[7] U.S. Census Bureau

[8] Some jurisdictions have boundaries that extend beyond Ector County; data for those jurisdictions represents their total population both inside and outside the Ector County line.

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

[10] 2023 American Community Survey 5-Year Estimates Data Profiles.

Table 3-6. Industries of Employed Population in Ector County[11]

INDUSTRY	ESTIMATE	PERCENT
Civilian employed population 16 years and over	75,536	
Educational services, and health care and social assistance	13,773	18.2%
Agriculture, forestry, fishing and hunting, and mining	10,333	13.7%
Retail trade	9,513	12.6%
Transportation and warehousing, and utilities	7,810	10.3%
Construction	7,027	9.3%
Manufacturing	5,536	7.3%
Arts, entertainment, and recreation, and accommodation and food services	5,242	6.9%
Professional, scientific, and management, and administrative and waste management services	4,878	6.5%
Finance and insurance, and real estate and rental and leasing	3,367	4.5%
Other services, except public administration	3,319	4.4%
Wholesale trade	2,232	3.0%
Public administration	1,705	2.3%
Information	801	1.1%

NATURAL, CULTURAL, AND HISTORIC RESOURCES

Ector County receives an average annual rainfall of 13.77 inches. The average minimum temperature in January is 30°F, while the average maximum in July is 96°F. The county has a growing season of 217 days, although less than 1 percent of the land is considered prime farmland. Ector County's geology plays a crucial role in its status as a major petroleum producer. Oil in the Permian Basin was formed in relatively shallow reservoirs bound by Permian-age limestone, with a large gas cap above the oil, which helps fuel its extraction. In 1990, Ector County produced over 35.8 million barrels of oil, and from 1926, when oil was first discovered, until 1990, the county produced a total of 2,726,524,140 barrels, making it the second most productive oil county in Texas.[12]

[11] 2023 American Community Survey 5-Year Estimates Data Profiles.
[12] Source: https://www.tshaonline.org/handbook/entries/Ector-county

Ector County is home to the Stonehenge Replica on the campus of UT Permian Basin. It was built by students from the college as a replica of Stonehenge, including its precise celestial orientation. The Odessa Meteor Crater is located in the southwestern part of Ector County. This site is one of three meteor locations in Texas. The Odessa Crater Museum is open to the public year-round.[13]

The Ector County Coliseum hosts sports, concerts, and large expos annually in their 42-acre complex. There are also outdoor recreation opportunities ranging from hunting and camping to biking and hiking.

To further understand natural resources that may be vulnerable to a hazard event and those that need consideration when implementing mitigation activities, it is important to identify at-risk species (i.e., endangered species) in the planning area. A federally endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or most of its range. A threatened species is a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Both endangered and threatened species are protected by federal law, and any future hazard mitigation projects are subject to these laws. Candidate species are plants and animals that have been proposed as endangered or threatened but are not currently listed.

According to the U.S. Fish and Wildlife Service, as of June 2025, there are four federally endangered, threatened, or candidate species in Ector County, listed in Table 3-7. Additionally, one species is listed as being in recovery (Bald Eagle).

Table 3-7. Endangered Species in Ector County[14]

TYPE of SPECIES	COMMON NAME	SCIENTIFIC NAME	SPECIES STATUS
Reptiles	Dunes Sagebrush Lizard	Sceloporus arenicolus	Endangered
Birds	Northern Aplomado Falcon	Falco femoralis septentrionalis	Endangered
Birds	Rufa Red Knot	Calidris canutus rufa	Threatened
Insects	Monarch Butterfly	Danaus plexippus	Proposed Threatened

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

[13] Source: https://odessameteorcratermuseum.wordpress.com/
[14] Source: https://ecos.fws.gov/ecp/report/species-listings-by-current-range-county?fips=48135

Table 3-8. Historic Properties on the National Register[15]

PROPERTY NAME	LOCATION	ADDRESS
White-Pool House	City of Odessa	112 East Murphy Street

EXISTING LAND USE AND DEVELOPMENT TRENDS

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

A review of housing can also give a picture of the built environment and the changes in vulnerability to various hazards in a jurisdiction Table 3-9 lists the total housing units for each jurisdiction, where data was available, between 2019 and 2023, utilizing 2020 Decennial Census data and American Community Survey (ACS) five-year estimates. Between official U.S. Census counts, the estimates use a formula based on the applicable Decennial Census Housing Units count, New Residential Construction, New Mobile Homes, and Housing Unit Loss. The census data "residential construction" category calculates building permits issued utilizing permitted construction counts as well as permit completion rates. Estimates of decreasing housing units are computed by applying an annual loss rate to the housing stock. The rate is then added to an estimate of the number of units lost due to natural disasters. Housing loss rates are derived from prior American Housing Survey (AHS) at the regional level. A unit is counted as lost if a survey was completed in the AHS, but it was listed as a non-response (Type C, 30- Demolished) in the subsequent survey, indicating a permanent loss to the housing stock.[16] It is simply an estimate, and many variables are involved in achieving an accurate estimation of the number of housing units in a given area at a given time.

Table 3-9. Total Housing Units by Jurisdiction, 2019-2023[17]

JURISDICTION	TOTAL HOUSING UNITS					CHANGE 2019-2023	PERCENT OF CHANGE
	2019	2020	2021	2022	2023		
Ector County[18]	58,393	66,086	64,563	66,082	67,542	9,149	16%
City of Odessa	45,340	47,309	46,634	47,825	48,834	3,494	8%

Certain types of housing found in the Ector County planning area are more vulnerable than typical site-built, newly constructed residential structures. This includes mobile or manufactured homes, of which 11,009 (16 percent of total housing stock) are in the planning area. Additionally, single-

[15] National Register of Historic Places
[16] U.S. Census Bureau: https://www.census.gov/programs-surveys/popest/technical-documentation/methodology.html
[17] U.S. Census Bureau: https://www.census.gov
[18] County totals include the entire planning area within county lines, including unincorporated areas and non-participating jurisdictions within the county.

family residences (SFR) built before 1980 are typically built to lower or less stringent construction standards than newer construction, making these homes more susceptible to damage during hazard events. These older homes comprise 48 percent (32,678 structures) of housing stock in the planning area. Table 3-10 includes housing inventory data for the participating jurisdictions per the 2023 American Community Survey five-year estimates.

Table 3-10. Housing Inventory and Vulnerable Structures By Jurisdiction[19]

JURISDICTION	TOTAL HOUSING UNITS	BUILT PRIOR TO 1980	MANUFACTURED HOMES
Ector County[20]	67,542	32,678	11,009
City of Odessa	48,834	26,130	1,479

CHANGES IN VULNERABILITY

The Ector County planning area experienced an overall population increase of 20 percent between 2010 and 2020. The American Community Survey estimates the 2023 total housing units for the planning area to be 67,542, or a 16 percent increase from 2019. The overall population increase, combined with increase in housing units, indicates an increase in vulnerability to all hazards in terms of populations and the built environment. Changes in vulnerability vary by jurisdiction based on each jurisdiction's trends in population and development (Table 3-11).

Table 3-11. Changes in Vulnerability by Jurisdiction

JURISDICTION	POPULATION TREND	HOUSING TREND	OVERALL VULNERABILITY CHANGES
Ector County	Increasing	Increasing	Increasing
City of Odessa	Increasing	Increasing	Increasing

Changes in vulnerability are applicable to all natural hazards except when discussing dam failure as vulnerability for this hazard is discussed in relation to changes in the estimated inundation areas for profiled dams. For the one dam profiled in Section 5, there is an increase in vulnerability in the estimated inundation areas. While flood and wildfire hazards feature geographical boundaries, increases in population and building inventory can increase overall vulnerability for these hazards even when the trends occur outside of the known hazard boundary. Development decreases permeable surface areas and increases runoff, increasing flood risk. As population density increases, the Wildland Urban Interface (WUI) typically increases. WUI growth often results in more wildfire ignitions, which puts more houses and lives at risk.

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

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

FUTURE GROWTH AND DEVELOPMENT

To better understand how future growth and development in Ector County might affect hazard vulnerability, it is useful to consider population growth, occupied and vacant land, the potential for future development in hazard areas, and current planning and growth management efforts. This section includes an analysis of the projected population change and economic impacts.

Population projections from 2020 to 2060 are listed in Table 3-12, provided by the Office of the State Demographer, Texas State Data Center, and the Institute for Demographic and Socioeconomic Research. Projections are based on the 0.5 migration scenario, which assumes that future net migration will occur at 50 percent of the rate observed from 2000 to 2010. The total population growth rate accounts for natural increase (births minus deaths) as well as net migration. This information is only available at the county level; however, the population projection shows an increase in population density, which would mean overall growth for the county.

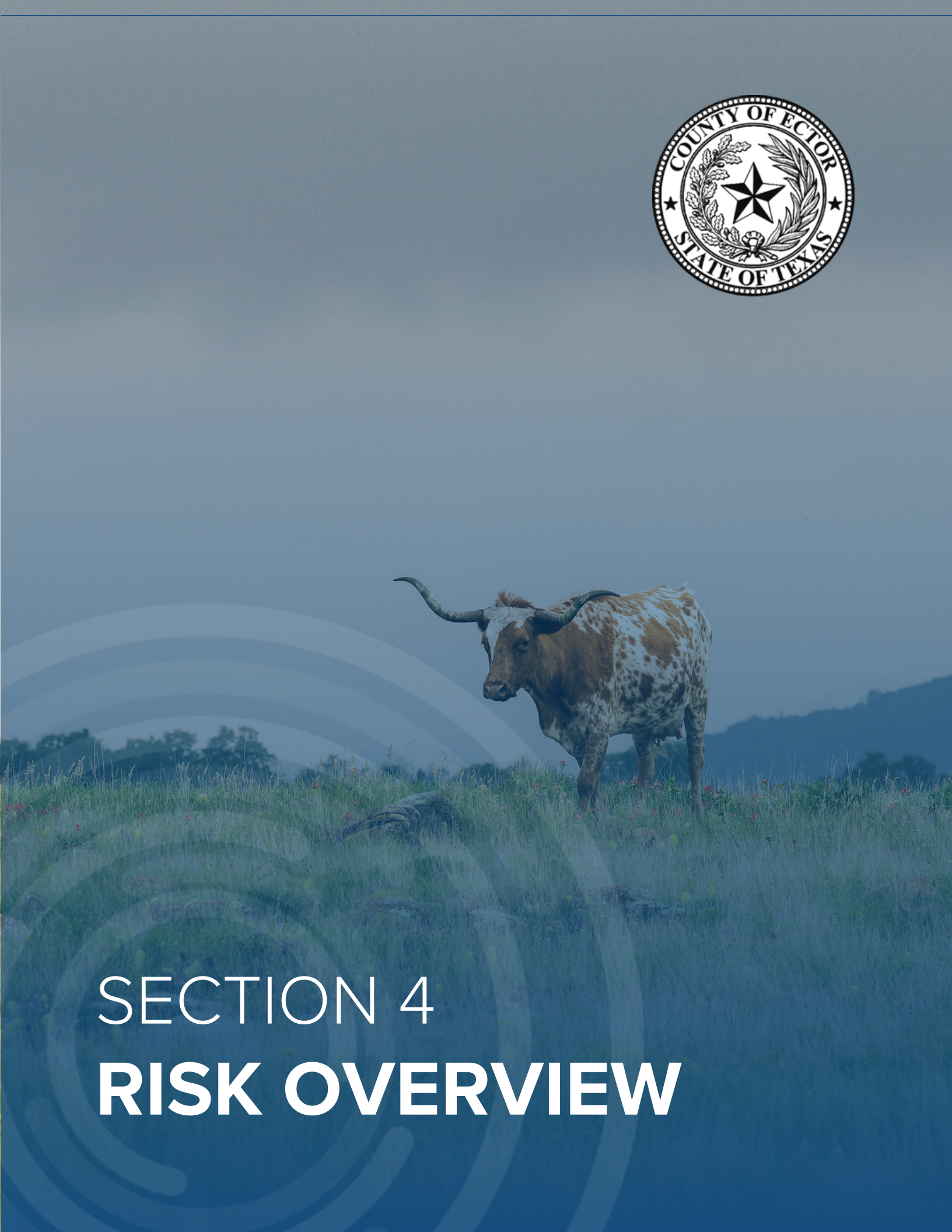
Table 3-12. Ector County Population Projections[21]

LAND AREA (SQ MI)	2020		2030		2040		2050		2060	
	POPULATION									
	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)	Total Number	Density (Land Area, SQ MI)
897.86	165,171	183.95	185,716	206.83	208,075	231.74	228,489	254.47	243,466	271.15

Comprehensive Plans are guiding documents in a community that set forth a vision, goals, policies, and guidelines to direct future physical, social, and economic development within a jurisdiction. They are part of a continuous process to provide an environment for citizens and consider the general desire of the community to conserve, preserve, and protect the natural environment of their jurisdiction. These plans guide staff, decision-makers, and citizens in making decisions that affect the community with an understanding of the long-term effects.

Both Ector County and the City of Odessa have a Comprehensive Plan in place or under development. The City of Odessa has a Parks Master Plan that was adopted in 2022 and Envision Odessa Plan that was adopted in 2016. These plans contain the future vision for each participating jurisdiction and recommendations on areas such as growth and community character, updated infrastructure and critical services, land use and development, economic development, zoning opportunities, mobility, and community facilities and services. Refer to the Capability Assessment in Appendix G for a complete list of the plans, ordinances, and other resources for all participating jurisdictions.

[21] Office of the State Demographer, Texas State Data Center, and the Institute for Demographic and Socioeconomic Research



SECTION 4
RISK OVERVIEW

HAZARD DESCRIPTION

Section 4 is the first phase of the Risk Assessment, providing background information for the hazard identification process and descriptions of the hazards identified. The Risk Assessment continues with Sections 5 through 15 and Appendix A, which include hazard descriptions and vulnerability assessments.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, Ector County and the City of Odessa identified 11 natural hazards that are addressed in the Hazard Mitigation Plan Update, and were identified as significant, as shown in Table 4-1. The hazards were identified through input from Planning Team members and a review of the current 2023 State of Texas Hazard Mitigation Plan (State Plan). Readily available online information from reputable sources such as federal and state agencies was also evaluated and utilized to supplement information as needed.

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

Geologic hazards are events or incidents associated with the earth's crust. The geologic hazard identified as significant for the planning area is earthquake.

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

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

For the Risk Assessment, the wildfire hazard is considered "other" since this hazard is not considered atmospheric, hydrologic, geologic nor technological.

Human-caused hazards are events or incidents caused by human intent, human error, or failed systems. They can be caused or exacerbated by accidental or intentional human actions that result in the loss of life or property. Appendix A will include human-caused hazards along with additional hazards that have a very low risk or no risk to the planning area.

Table 4-1. Hazard Descriptions

HAZARD	DESCRIPTION
ATMOSPHERIC	
Extreme Heat	Extreme heat is the condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period of time.
Hail	Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and subsequent cooling of the air mass.
Lightning	Lightning is a sudden electrostatic discharge that occurs during an electrical storm. This discharge occurs between electrically charged regions of a cloud, between two clouds, or between a cloud and the ground.
High Wind	High winds can occur in the absence of other definable hazard conditions, occurring in forms such as straight-line winds or microbursts. A thunderstorm occurs when an observer hears thunder. Radar observers use the intensity of the radar echo to distinguish between rain showers and thunderstorms. Lightning detection networks routinely track cloud-to-ground flashes, and therefore thunderstorms.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. The destruction caused by tornadoes ranges from light to catastrophic, depending on the location, intensity, size, and duration of the storm.
Winter Storm	Severe winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 mph, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads, and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.
GEOLOGIC	
Earthquake	An earthquake is the sudden, rapid shaking of the earth, caused by the breaking and shifting of subterranean rock as it releases strain that has accumulated over a long time. Initial mild shaking may strengthen and become extremely violent within seconds.

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

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

Table 4-2. Other Hazards Deferred

HAZARD CONSIDERED	REASON FOR DETERMINATION
Coastal Erosion	The planning area is not located on the coast. Therefore, coastal erosion does not pose a risk.
Expansive Soil	The planning area has no historical expansive soil occurrences, and it is in an area where occurrences are considered rare. Expansive soil has not impacted critical structures, systems, populations, or other community assets or vital services in the past, and it is not expected to do so in the future.

HAZARD CONSIDERED	REASON FOR DETERMINATION
Hurricane/Tropical Storm	The planning area is not located within 200 miles of the Gulf Coast and is not subject to direct hurricane wind impacts. The remnants of tropical systems passing across the planning area may cause significant thunderstorm wind, lightning, and excessive rainfall. Impacts associated with these historical events are covered under thunderstorm wind, lightning, or flood hazard profiles.
Land Subsidence	The planning area has no historical land subsidence occurrences, and it is in an area where occurrences are considered rare. Land subsidence has not impacted critical structures, systems, populations, or other community assets or vital services in the past, and it is not expected to do so in the future.

DISASTER DECLARATION HISTORY

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

Between 1953 and 2024, Ector County received 15 federal disaster declarations. The largest share (6) was related to fires, followed by declarations for hurricanes[1] (3), severe storms (2), biological (2), and severe ice storms (2).

Table 4-3. Disaster Declaration History of Ector County, 1953-2024[2]

YEAR	DECLARATION TITLE	HAZARD	DECLARATION TYPE	DISASTER No.
1989	Severe Storms, Tornadoes, and Flooding	Severe Storm	DR	DR-828
1998	Tropical Storm Charley	Severe Storm	DR	DR-1239
1999	Extreme Fire Hazards	Fire	EM	EM-3142
2005	Hurricane Katrina Evacuation	Hurricane	EM	EM-3216
2005	Hurricane Rita	Hurricane	EM	EM-3261
2005	Hurricane Rita	Hurricane	DR	DR-1606

[1] Ector County does not experience direct impacts from hurricanes. Tropical storm and hurricane disaster declarations typically include multiple inland counties due to the excessive precipitation, thunderstorm wind, and lightning associated with the remnants of tropical systems as they track inland before dissipating.
[2] Source:https://www.fema.gov/openfema-data-page/disaster-declarations-summaries-v2

YEAR	DECLARATION TITLE	HAZARD	DECLARATION TYPE	DISASTER No.
2006	Extreme Wildfire Threat	Fire	DR	DR-1624
2008	South Odessa Fire	Fire	FM	FM-2745
2008	Wildfires	Fire	EM	EM-3284
2011	Bates Field Fire	Fire	FM	FM-2881
2011	Pleasant Farms Fire	Fire	FM	FM-2901
2020	Covid-19	Biological	EM	EM-3458
2020	Covid-19 Pandemic	Biological	DR	DR-4485
2021	Severe Winter Storm	Severe Ice Storm	EM	EM-3554
2021	Severe Winter Storms	Severe Ice Storm	DR	DR-4586

In addition to the 15 federally declared disasters, there have been 28 U.S. Department of Agriculture (USDA) Secretarial disaster designations between 2012 and 2024. The Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans available to producers suffering losses in those counties and in counties that are contiguous to a designated county.[3] Of the 28 USDA designations for Ector County, many listed multiple factors as having caused the disaster area designation. The leading cause was drought, which was included in 27 designations. Other factors listed include excessive heat (11 designations), high wind (10), fire / wildfire (10), and insects (10).

NATURAL HAZARDS AND CLIMATE CHANGE

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

Climate change is expected to lead to an increase in average temperatures as well as an increase in the frequency, duration, and intensity of extreme heat events. With no reductions in emissions worldwide, the state of Texas is projected to experience an additional 30 to 60 days per year above 100°F than what is experienced now.[4]

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

[4] Kloesel, K., B. Bartush, J. Banner, D. Brown, J. Lemery, X. Lin, C. Loeffler, G. McManus, E. Mullens, J. Nielsen-Gammon, M. Shafer, C. Sorensen, S. Sperry, D. Wildcat, and J. Ziolkowska, 2018: Southern Great Plains. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W.

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

Table 4-4. Future Trends in Extreme Weather in Texas[5,6]

HAZARDS	EXPECTED TRENDS
Extreme Temperatures	• The average annual surface temperature in 2036 is expected to be 3.0°F warmer than the 1950-1999 average and 1.8°F warmer than the 1991-2020 average. • The number of 100°F days is projected to double by 2036, with urban areas experiencing a higher frequency due to the urban heat island effect. • Fewer cold extremes and warmer minimum temperatures are projected, suggesting a continued decrease in freezing conditions and frost days, as well as a warming trend for the coolest days of summer. • The number of heatwaves per year and number of days per year classified as heatwaves are expected to increase. • Data suggests a recent increase in both the severity and frequency of extreme heat, while extreme cold has decreased in both aspects.
Precipitation	• Precipitation has increased by 10 percent or more in eastern Texas, but no significant trends are evident in western Texas. • Natural variability will substantially influence precipitation trends through 2036. • Extreme precipitation has already intensified by about 7 percent from 1960 to 2020 and is projected to continue increasing statewide—by 6-10 percent in intensity relative to 1950–1999 (2-3 percent relative to 2001–2020), and by 30-50 percent in frequency compared to 1950–1999 (10-15 percent compared to 2001–2020).
Drought	• Projected increases in temperature, rainfall variability, and other factors—such as improved plant water use efficiency—collectively indicate a decrease in water availability; however, the extent of this impact varies significantly across regions and applications. • Sector-based variance in impact trends is expected, with agricultural areas potentially experiencing less impact than surface water supply.

Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 987–1035. doi: 10.7930/NCA4.2018.CH23. https://nca2018.globalchange.gov/chapter/23/

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

[6] University of Texas at Austin, February 2023, Austin Future Climate, Climate Change Predictions for the Ector County 2022, Technical Report.

HAZARDS	EXPECTED TRENDS
Flood	• Observational data suggests no long-term trend in river flooding, and this remains consistent for current projections, barring areas with normally high rainfall or for the most extreme flood events. • Urban flooding is projected to increase due to both population growth and rising precipitation intensity, particularly in areas with fast-response drainage systems. • The climate-driven trend in urban flood frequency should be similar to the climate-driven trend in extreme precipitation frequency: 30-50 percent in 2036 relative to 1950-1999 and 10-15 percent relative to 2001-2020. • Areas already experiencing flooding are likely to see an increase in the frequency and magnitude of events.
Winter Weather	• As the climate warms, the likelihood of winter weather decreases. • Widespread snowfall events in Texas, such as the one in February 2021, remain extremely rare and have not shown an increase in frequency. However, with rising air temperatures, a decrease in both the frequency and intensity of such events is expected—reducing the overall snow hazard. • Extreme cold has become less frequent and less severe overall but is subject to more variation than other temperate extremes, thus, massively cold temperatures will continue to be possible.
Thunderstorms (Wind, Hail, Lightning)	• The evolution of reporting methods and magnitude scales, along with inconsistencies in observational data, has resulted in the absence of reliable, comprehensive records, limiting the ability to project trends and necessitating the use of indirect indicators. • Indirect evidence supports an increase in the number of days capable of producing severe thunderstorms and very large hail; however, a substantial basis to quantify these trends remains lacking.
Wildfire	• Reductions in precipitation, rising temperatures, increased surface dryness, stronger winds, lower humidity, and higher fuel loads are projected to vary in intensity across different regions of Texas, leading to non-uniform increases in wildfire risk. • The geographical boundaries of the area of the state commonly affected may expand.

OVERVIEW OF HAZARD ANALYSIS

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

Records retrieved from the National Centers for Environmental Information (NCEI) and the National Oceanic and Atmospheric Administration (NOAA) were reported for Ector County and

the City of Odessa. The remaining records identifying the occurrence of hazard events in the planning area and the maximum recorded magnitude of each event were also evaluated.

Geographic information system (GIS) technology was used to identify and assess risks for Ector County and evaluate community assets and their vulnerability to hazards.

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

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

Table 4-5. Frequency of Return Statements

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

Table 4-6. Impact Statements

POTENTIAL SEVERITY	DESCRIPTION
Substantial	Multiple deaths. Complete shutdown of facilities for 30 days or more. More than 50 percent of property destroyed or with major damage.
Major	Injuries and illnesses resulting in permanent disability. Complete shutdown of critical facilities between one and four weeks. More than 25 percent of property destroyed or with major damage.
Minor	Injuries and illnesses do not result in permanent disability. Complete shutdown of critical facilities for up to one week. More than 10 percent of property destroyed or with major damage.
Limited	Injuries and illnesses are treatable with first aid. Shutdown of critical facilities and services for 24 hours or less. Less than 10 percent of property destroyed or with major damage.

Each of the hazard profiles includes a description of a general Vulnerability Assessment. Vulnerability is the total of assets that are subject to damage from a hazard based on historic recorded damages. Assets in the region were inventoried and defined in hazard zones where

appropriate. The total amount of damage, including property and crop damages, for each hazard is divided by the total number of assets (building value totals) in that community to determine the percentage of damage that each hazard can cause to the community. Risk and consequences will be addressed and covered within each hazard profile under the Vulnerability and Impact section as well as under the Assessment of Impact sections, where applicable.

To better understand how future growth and development in the Ector County region might affect hazard vulnerability, it is useful to consider population growth, occupied and vacant land, the potential for future development in hazard areas, and current planning and growth management efforts. Hazard vulnerability for Ector County and the City of Odessa was reviewed based on recent development changes that occurred throughout the planning area. The population of Ector County has grown by 20 percent between 2010 and 2020, according to the U.S. Census Bureau. Therefore, the vulnerability to the population, infrastructure, and buildings has increased for hazards that do not have a geographical boundary.

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

HAZARD RANKING

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

Table 4-7. Hazard Risk Ranking

HAZARD	FREQUENCY OF OCCURRING	POTENTIAL SEVERITY	RANKING
Drought	Highly Likely	Limited	High
Extreme Heat	Highly Likely	Limited	High
High Wind	Highly Likely	Minor	High
Earthquake	Unlikely	Limited	Moderate
Flood	Highly Likely	Substantial	Moderate
Hail	Highly Likely	Limited	Moderate
Lightning	Highly Likely	Limited	Moderate
Tornado	Highly Likely	Major	Moderate
Wildfire	Highly Likely	Limited	Moderate
Dam Failure	Unlikely	Limited	Low
Winter Storm	Highly Likely	Limited	Low

RISK ASSESSMENT RESOURCES AND DATA LIMITATIONS

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

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

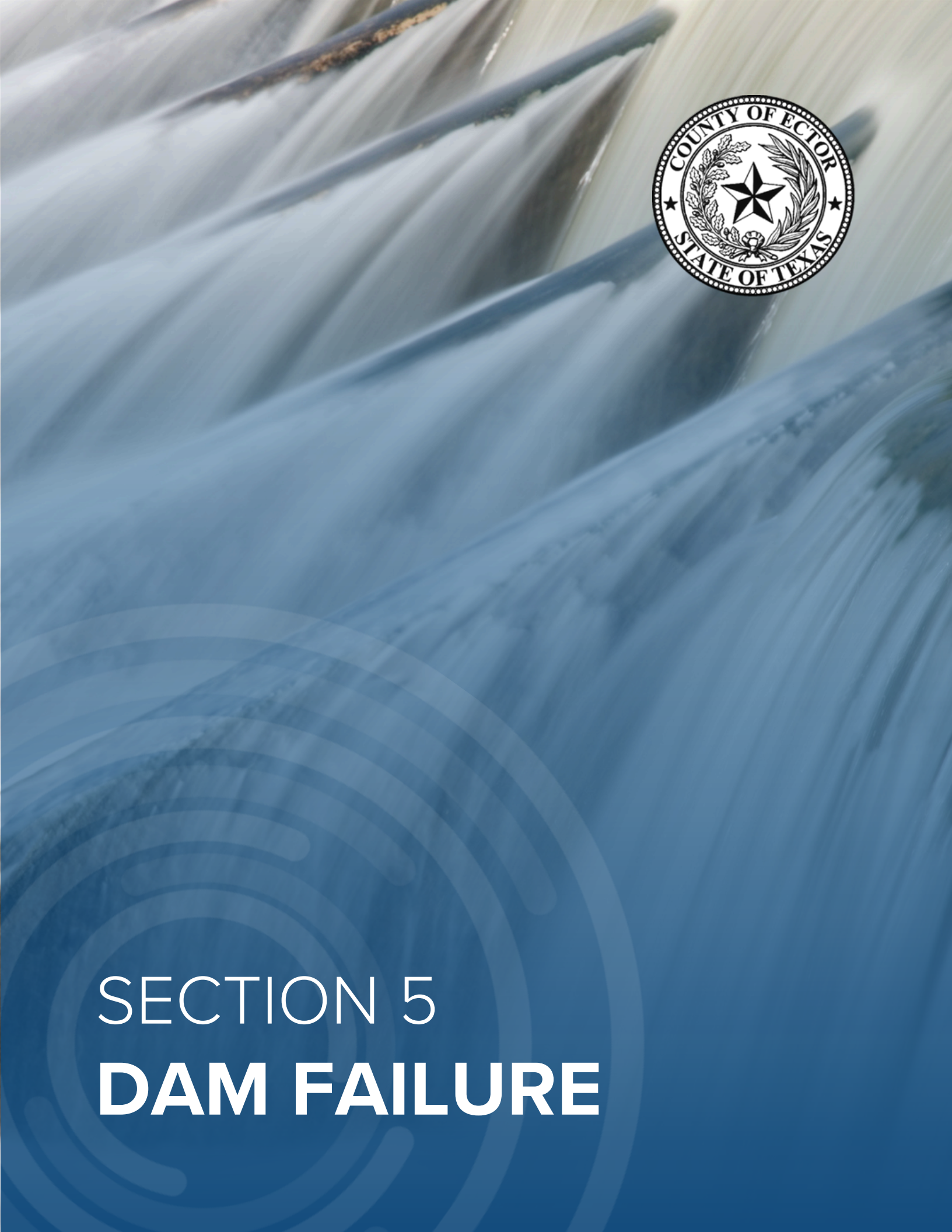
While the NCEI is considered one of the most comprehensive national historical event databases, it is not without limitations. Records of historical occurrences in the state show significant variations in the number of events recorded from one county to the next. Further research shows that the variations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

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

ASSUMPTIONS

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

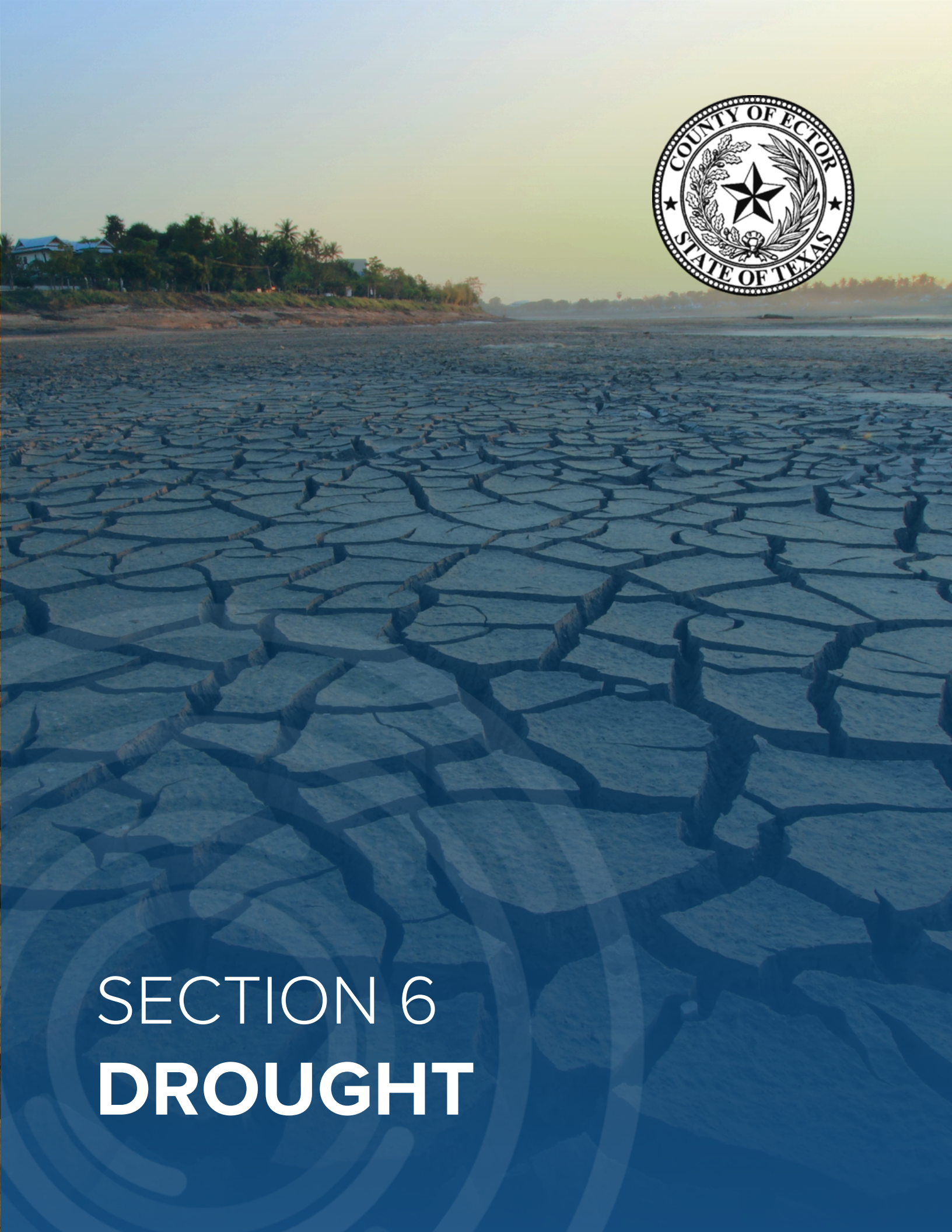
jurisdictions within that county. Therefore, the countywide assessment is considered similar for all participating jurisdictions unless stated otherwise. Future risk and vulnerability assessments at the local, county, and state levels will benefit significantly from increased, detailed event reporting.



SECTION 5
DAM FAILURE

SECTION 5: DAM FAILURE

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



SECTION 6
DROUGHT

SECTION 6: DROUGHT

HAZARD DESCRIPTION

Drought is a period of time without substantial rainfall that persists from one year to the next. Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of anticipated natural precipitation reduction over an extended period of time, usually a season or more in length. Droughts can be classified as meteorological, hydrologic, agricultural, and socioeconomic. Table 6-1 presents definitions for these different types of droughts.

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

Table 6-1. Drought Classification Definitions[1]

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

LOCATION

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

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

Center at the University of Nebraska-Lincoln, U.S. Department of Agriculture and the National Oceanic and Atmospheric Administration, shows the planning area is currently experiencing severe drought conditions (Figure 6-1) but has experienced a range of conditions from normal (none) to exceptional drought conditions over the last decade (Figure 6-2). There is no distinct geographic boundary to drought; therefore, it can occur anywhere throughout the Ector County planning area.

Figure 6-1. U.S. Drought Monitor, April 2025

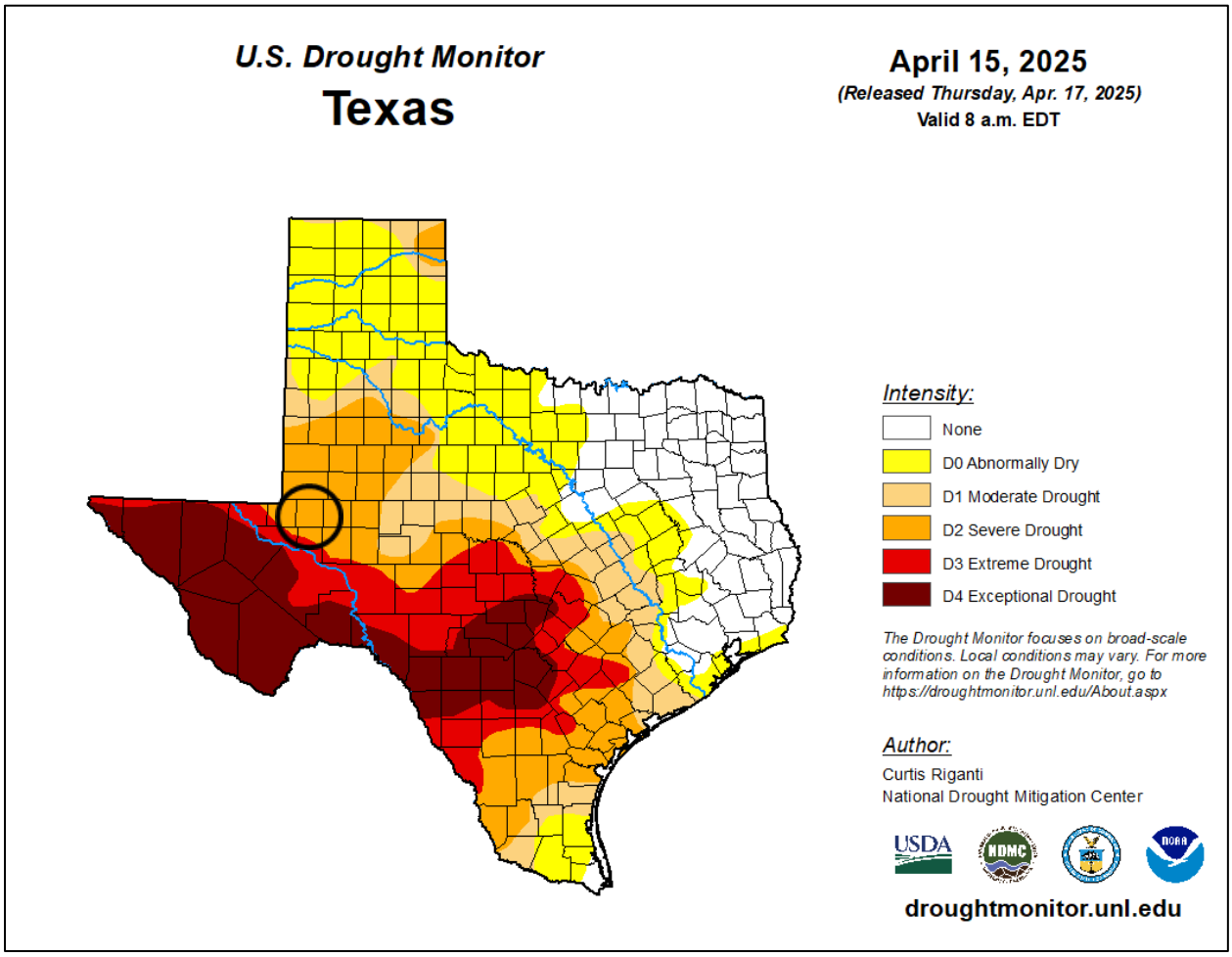
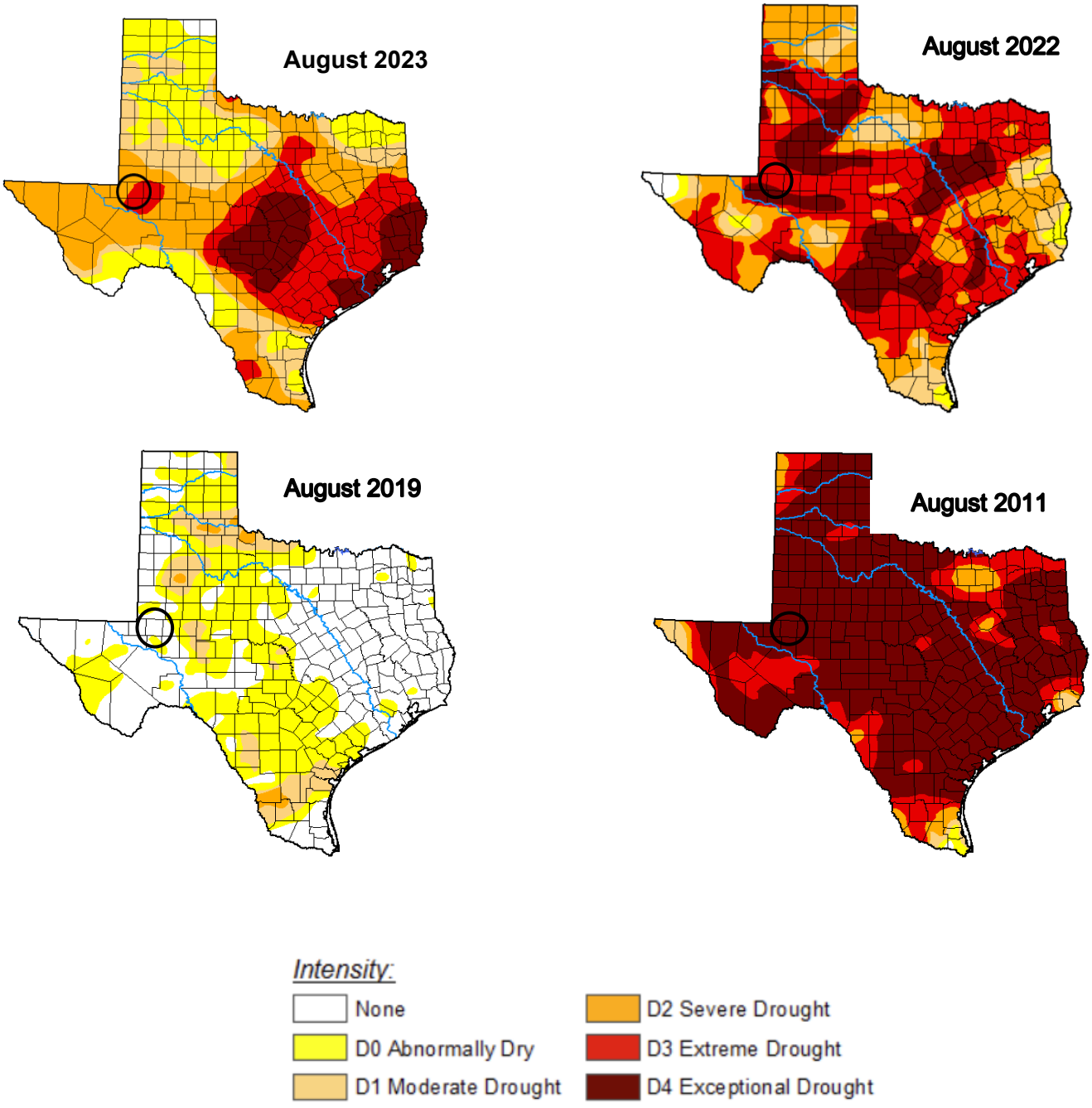


Figure 6-2. U.S. Drought Monitor, August 2011, August 2019, August 2022, August 2023



EXTENT

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

Table 6-2. Palmer Drought Index

DROUGHT INDEX	DROUGHT CONDITION CLASSIFICATIONS						
	Extreme	Severe	Moderate	Normal	Moderately Moist	Very Moist	Extremely Moist
Z Index	-2.75 and below	-2.00 to -2.74	-1.25 to -1.99	-1.24 to +.99	+1.00 to +2.49	+2.50 to +3.49	n/a
Meteorological	-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above
Hydrological	-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above

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

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

[2] Source: National Drought Mitigation Center

SECTION 6: DROUGHT

Drought is monitored nationwide by the National Drought Mitigation Center (NDMC). Indicators are used to describe broad scale drought conditions across the U.S. and correspond to the intensity of drought.

Based on the historical occurrences for drought and the location of the Ector County planning area, the area can anticipate the full range of drought from abnormally dry to exceptional drought, or D0 to D4, based on the Palmer Drought Category. The entire planning area has experienced exceptional drought conditions. This is the highest level of drought severity and the most extreme drought conditions the planning area can anticipate in the future.

HISTORICAL OCCURRENCES

The Ector County planning area may experience an extreme drought in any given year. According to the U.S. Drought Monitor, between 2000 and 2024, the Ector County planning area spent 881 weeks (68%) in some level of drought as defined as Abnormally Dry (D0) or worse conditions. The longest drought during this period lasted for just over 4.5 years. Ector County has received 27 USDA disaster designations for drought from 2012 through 2024.

Figure 6-3. Ector County Drought Intensity, 2000-2024[3]

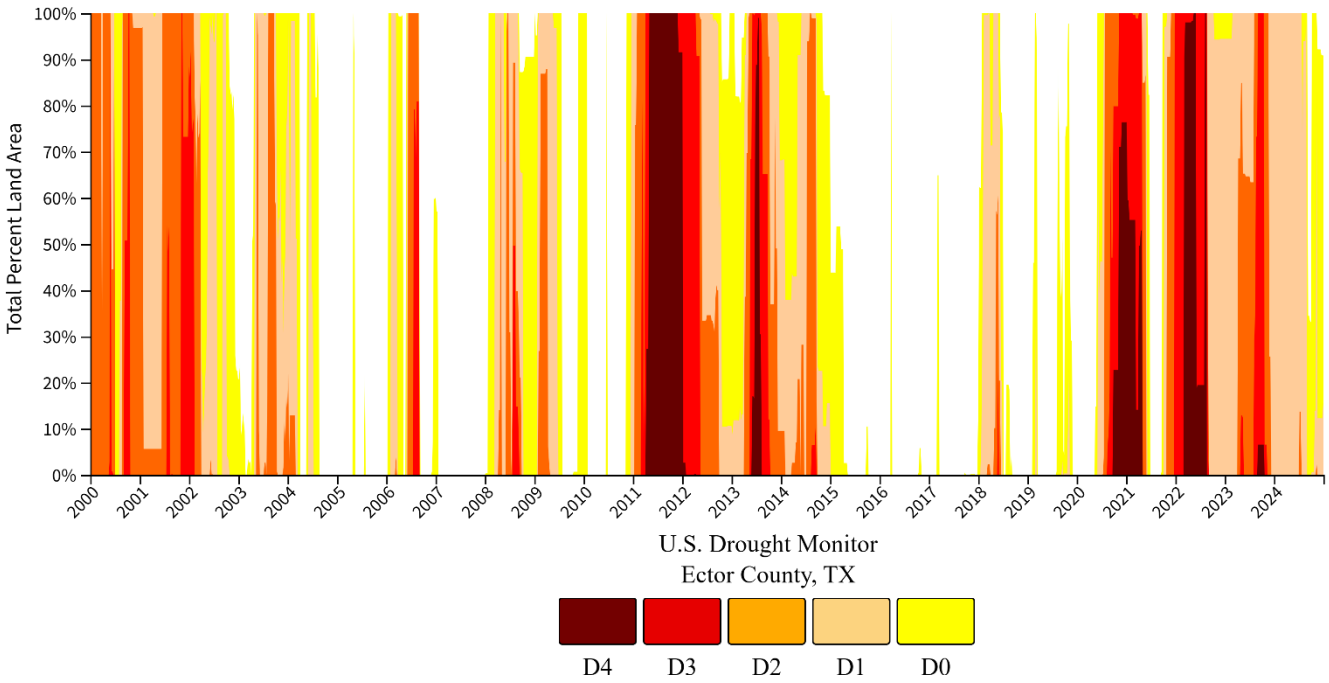


Table 6-4 lists historical events that have occurred in Ector County as reported in the National Centers for Environmental Information Storm Events Database (NCEI). A total of 16 drought impacts were reported in the NCEI over 16 unique drought periods in Ector County from 1996 through 2024. Historical drought impacts reported in the NCEI database for the Ector County planning area over the 29-year reporting period has resulted in $484,700 (2025 dollars) in crop damages.

[3] U.S. Drought Monitor

Historical drought information shows drought activity across a multi-county forecast area for each event, the appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event. Historical drought data is provided on a county-wide basis per the NCEI Storm Events database. Only those events with reported damage are provided in Table 6-4. A summary of historical drought events is provided in Table 6-5.

Table 6-4. Historical Drought Events 1996 – 2024[4]

JURISDICTION	DATE	INJURIES	DEATHS	PROPERTY DAMAGE	CROP DAMAGE
Ector County	8/1/1996	0	0	$0	$484,700

Table 6-5. Historical Drought Events Summary, 1996 – 2024

JURISDICTION	DROUGHT IMPACTS	INJURIES	DEATHS	PROPERTY DAMAGE	CROP DAMAGE
Ector County	16	0	0	$0	$484,700

Based on the list of historical drought events for the Ector County planning area, five drought impacts have been reported since the 2011 Plan.

SIGNIFICANT EVENTS

May – August 1996

Dry conditions that developed in the year prior started to take their toll during May through August of 1996. Up through May of 1996, not only were the conditions dry, but temperatures and winds were above normal adding to the effects. As August approached, extreme failure of crops was reported. Due to the lack of grass for the cattle, nearly half of the cattle in the region had to be sold early. Because of this, the prices of cattle began to plummet. Additionally, wells in a few locations dried up, making irrigation impossible. Crop damages from this drought were estimated to be $484,700 (2025 dollars).

PROBABILITY OF FUTURE EVENTS

Based on available records of historic events, there have been 16 reported drought impacts in the NCEI over 16 unique drought periods (ranging from one month to just over four and a half years) within a 29-year reporting period, which provides a probability of approximately one event every year. This frequency supports a “Highly Likely” probability of future events for the Ector County planning area.

CLIMATE CHANGE CONSIDERATIONS

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

[4] Only those events with reported injuries, fatalities, or damages were included in this table.

affecting drought impacts, such as increased temperatures and improved plant water use efficiency, can affect water availability. These impacts could cause drought impact trends to be highly sector-specific, with the impacts possibly smaller for agriculture than for surface water supply.[5]

It is projected that future changes to Ector County will include increased temperatures, which according to the U.S. Climate Explorer, the planning area may experience a 6°F increase in average extreme heat temperatures. Historically, extreme temperatures averaged 101°F in Ector County, but between 2035 and 2064 the average will be 107°F, increasing the severity and frequency of drought events. Some projections show an even higher increase; however, the severity will be dependent on overall future emissions and is subject to change.

VULNERABILITY AND IMPACT

Loss estimates were based on 29 years of statistical data from the NCEI and the U.S. Drought Monitor. A drought event frequency-impact was then developed to determine an impact profile on agriculture products and estimate potential losses due to drought in the area. All existing and future buildings, facilities, and populations are exposed to this hazard and could potentially be impacted. However, drought impacts are mostly experienced in water shortages or crop and livestock losses on agricultural lands and typically have minimal impact on buildings.

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

Table 6-6. Critical Facilities Vulnerable to Drought Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS, Hospitals)	• Increased law enforcement activities may be required to enforce water restrictions. • Firefighters may have limited water resources to aid in firefighting and suppression activities, increasing risk to lives and property. • Potential for increased number of emergency calls as drought events can lead to cascading hazard events such as wildfires and flash flooding.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters, Governmental Facilities	• Strain on staff as drought may cause health problems related to low water flows and poor water quality. • Operations dependent on water supply may be adversely impacted.

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

CRITICAL FACILITIES	POTENTIAL IMPACTS
Commercial Suppliers (food, gas, etc.)	• Operations dependent on water supply may be adversely impacted.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Potential for increased number of emergency calls as drought events can lead to cascading hazard events such as wildfires and flash flooding. • Operations dependent on water supply may be adversely impacted.

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

The average person will survive only a few days without potable water, and this timeframe can be drastically shortened for those people with more fragile health – typically children, the elderly, and people with disabilities. During summer drought, or hot and dry conditions, elderly persons, small children, infants, those with disabilities, or who do not have adequate cooling units in their homes may become more vulnerable to injury and/or death. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

The population over 65 in the Ector County planning area is estimated at 10 percent of the total population and children under the age of 5 are estimated at 9 percent. The population with a disability is estimated at 10 percent of the total population. An estimated 15 percent of the planning area population live below the poverty level and 14 percent of the populations speak English 'less than very well' (Table 6-7).

Table 6-7. Populations at Greater Risk in Ector County

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Ector County	16,038	14,115	16,785	24,971	22,046
City of Odessa	11,670	10,246	11,536	16,428	13,178

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

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

Ector County has a prominent agricultural sector and features 178 farms over 417,245 acres of land including cotton, fruits, poultry and eggs, pigs, sheep, and horses. Ector County's annual market value of agricultural products sold is over $3,822,000.[6] Crop production can also suffer greatly during extreme drought conditions, limiting fresh local food supplies, driving up costs, and negatively impacting the local economy. Drought conditions could adversely affect the agricultural industry throughout the Ector County planning area.

Impacts of past droughts experienced in the Ector County planning area have not resulted in injuries or fatalities supporting a "Limited" severity of impact meaning injuries and/or illnesses are treatable with first aid, shutdown of facilities and services for 24 hours or less, and less than 10 percent of property is impacted. The annualized estimated losses due to drought over the 29-year reporting period in the Ector County planning area are limited with an annual loss estimate of $16,700. Table 6-8 shows annualized exposure.

Table 6-8. Estimated Annualized Losses for Ector County

JURISDICTION	TOTAL PROPERTY & CROP LOSS (2025 dollars)	ANNUAL LOSS ESTIMATES (2025 dollars)
Ector County	$484,700	$16,700

ASSESSMENT OF IMPACTS

The Drought Impact Reporter was developed in 2005 by the University of Nebraska-Lincoln to provide a national database of drought impacts. Droughts can have an impact on agriculture, business and industry; energy; fire; plants and wildlife; relief, response, and restrictions; society and public health; tourism and recreation; and water supply and quality. The reports are submitted from individuals to Federal, State, and local agencies, as well as the general public. Table 6-9 lists the drought impacts to Ector County from 2005 to 2024 based on reports received by the Drought Impact Reporter.

Table 6-9. Drought Impacts, 2005-2024

DROUGHT IMPACTS	
Agriculture	107
Business & Industry	2
Energy	0
Fire	38

[6] Census of Agriculture. Ector County, Texas County Profile. 2022.

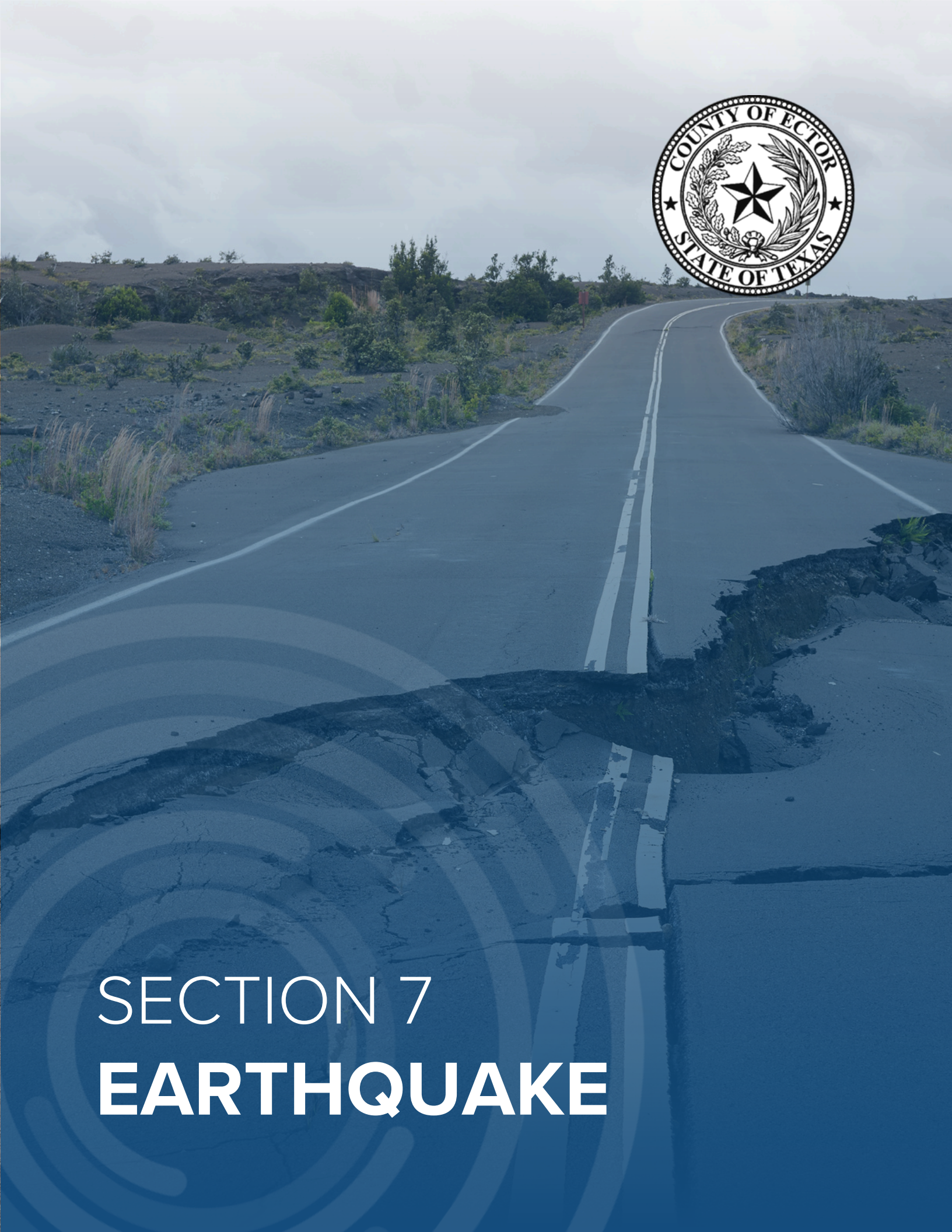
DROUGHT IMPACTS	
Plants & Wildlife	76
Relief, Response & Restrictions	31
Society & Public Health	12
Tourism & Recreation	1
Water Supply & Quality	16

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

- The number of health-related low-flow issues (e.g., diminished sewage flows, increased pollution concentrations, reduced firefighting capacity, and cross-connection contamination) will increase as the drought intensifies.
- Public safety from forest/range/wildfires will increase as water availability and/or pressure decreases.
- Respiratory ailments may increase as the air quality decreases.
- There may be an increase in disease due to wildlife concentrations (e.g., rabies, Rocky Mountain spotted fever, Lyme disease).
- Residents may disagree with the County or City over water use / water rights, creating conflict.
- Political conflicts may increase between municipalities, counties, states, and regions.
- Water management conflicts may arise between competing interests.
- Increased law enforcement activities may be required to enforce water restrictions.
- Severe water shortages could result in inadequate supply for human needs as well as lower quality of water for consumption.
- Firefighters may have limited water resources to aid in firefighting and suppression activities, increasing risk to lives and property.
- During drought there is an increased risk for wildfires and dust storms.
- The community may need increased operational costs to enforce water restriction or rationing.
- Prolonged drought can lead to increases in illness and disease related to drought.
- Utility providers can see decreases in revenue as water supplies diminish.
- Utilities providers may cut back energy generation and service to their customers to prioritize critical service needs.
- Hydroelectric power generation facilities and infrastructure would have significantly diminished generation capability. Dams simply cannot produce as much electricity from low water levels as they can from high water levels.
- Fish and wildlife food and habitat will be reduced or degraded over time during a drought and disease will increase, especially for aquatic life.

- Wildlife will move to more sustainable locations creating higher concentrations of wildlife in smaller areas, increasing vulnerability, and further depleting limited natural resources.
- There are four federally endangered, threatened or candidate species in Ector County. Severe and prolonged drought can result in the reduction of a species or cause the extinction of a species altogether.
- Plant life will suffer from long-term drought. Wind and erosion will also pose a threat to plant life as soil quality will decline. The urban tree canopy, including county and city parks, are vulnerable to the impacts of prolonged drought.
- Dry and dead vegetation will increase the risk of wildfire.
- Drought poses a significant risk to annual and perennial crop production and overall crop quality leading to higher food costs.
- Drought-related declines in production may lead to an increase in unemployment.
- Drought may limit livestock grazing resulting in decreased livestock weight, potential increased livestock mortality, and increased cost for feed.
- Negatively impacted water suppliers may face increased costs resulting from the transport water or developing supplemental water resources.
- Long term drought may negatively impact future economic development.

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



SECTION 7
EARTHQUAKE

SECTION 7: EARTHQUAKE

HAZARD DESCRIPTION

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

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

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

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

HAZARD	DESCRIPTION
Surface Faulting	Displacement that reaches the earth's surface during slip along a fault. Commonly occurs with shallow earthquakes, those with an epicenter less than 20 kilometers.
Ground Motion (shaking)	The movement of the earth's surface from earthquakes or explosions. Ground motion or shaking is produced by waves that are generated by sudden slip on a fault or sudden pressure at the explosive source and travel through the earth and along its surface.
Landslide	A movement of surface material down a slope.

[1] Source: USGS, 2012

HAZARD	DESCRIPTION
Liquefaction	A process by which water-saturated sediment temporarily loses strength and acts as a fluid, like when you wiggle your toes in the wet sand near the water at the beach. This effect can be caused by earthquake shaking.
Tectonic Deformation	A change in the original shape of a material due to stress and strain.
Tsunami	A sea wave of local or distant origin that results from large-scale seafloor displacements associated with large earthquakes, major submarine slides, or exploding volcanic islands.
Seiche	The sloshing of a closed body of water from earthquake shaking.

LOCATION

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

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

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

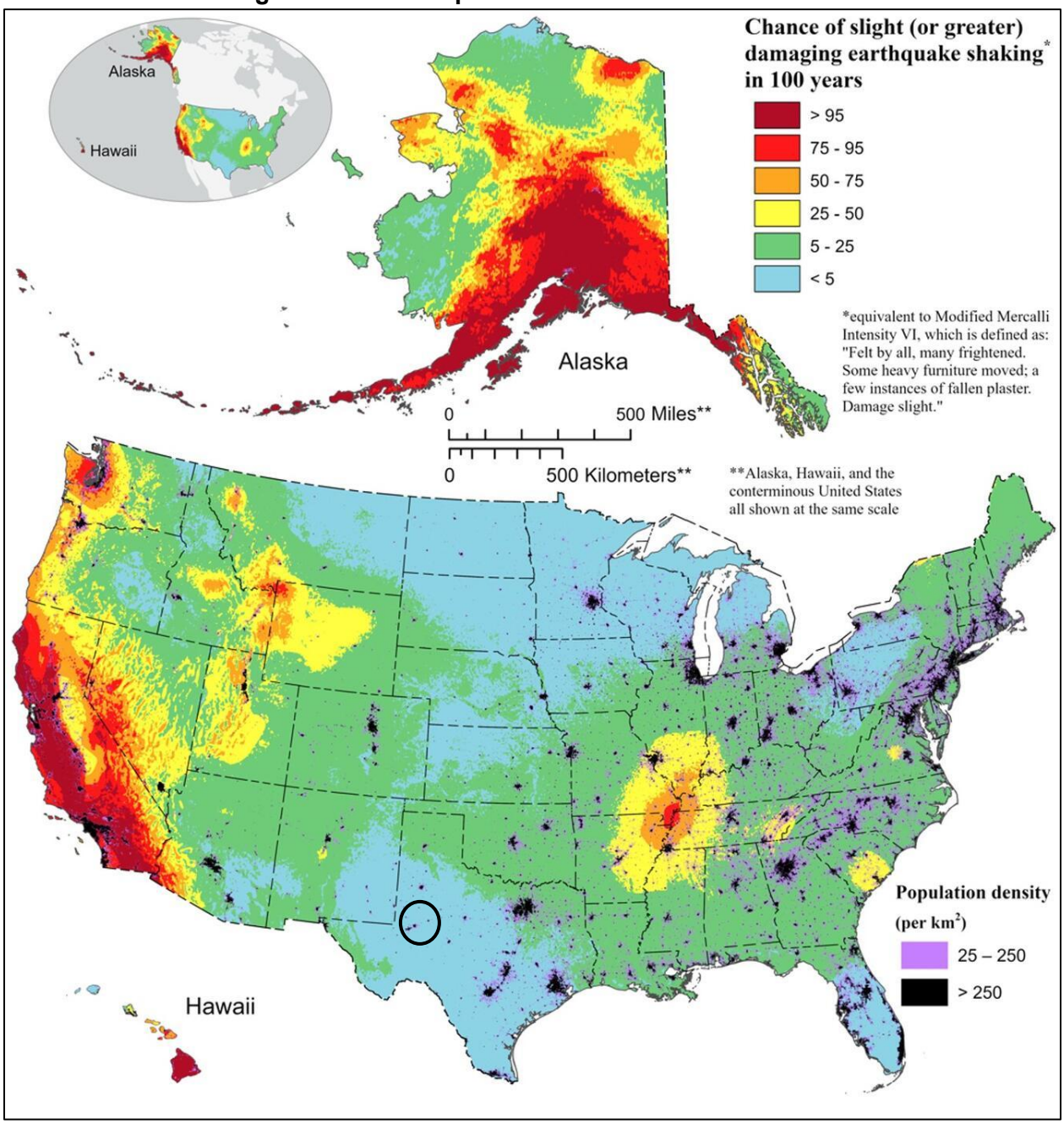
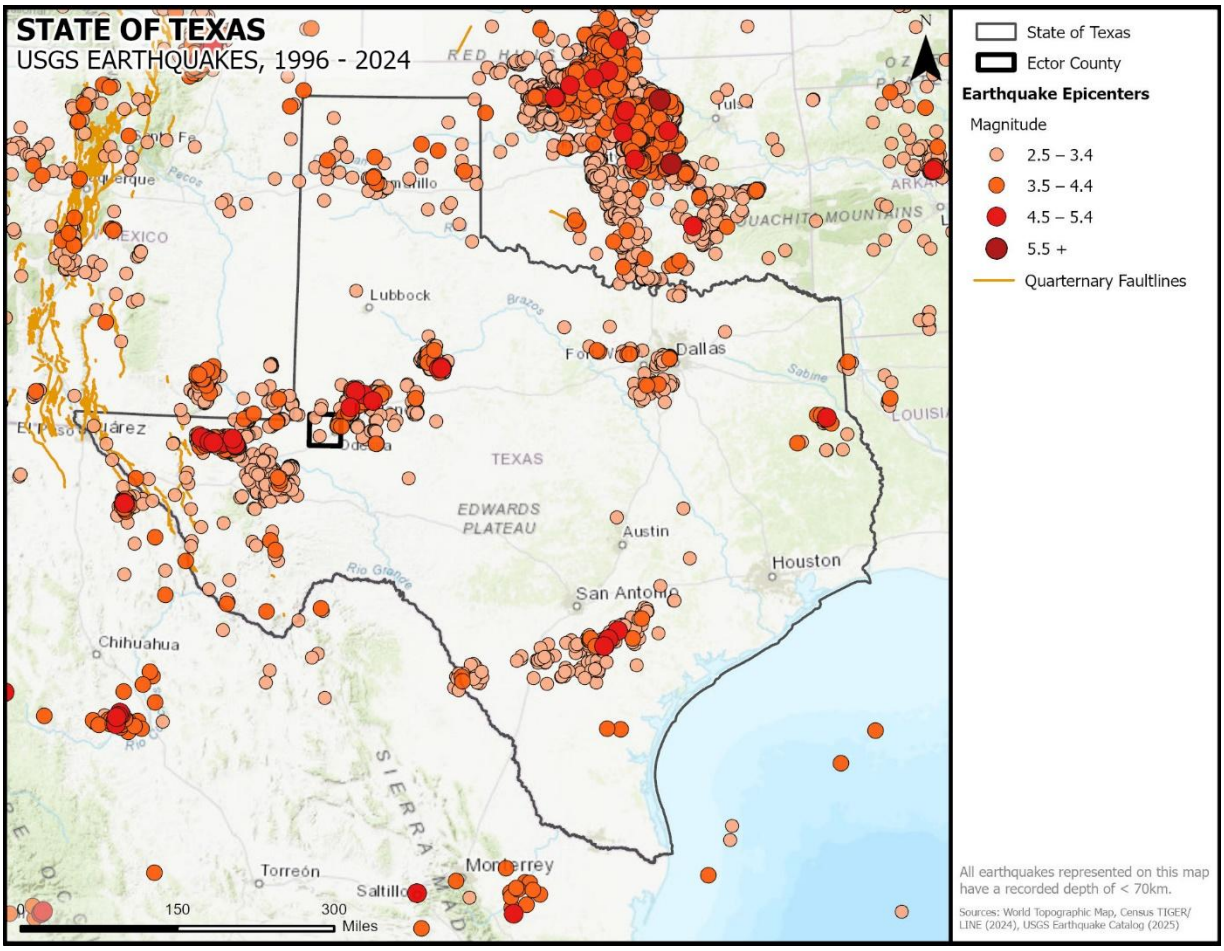


Figure 7-2 maps historic earthquake epicenters across Texas between 1996 and 2024.

[3] The Ector County planning area is indicated by the black circle.

Figure 7-2. Historic Earthquake Epicenters in Texas, 1996-2024[4]



EXTENT

Earthquakes are measured in terms of magnitude and intensity. The prevalent magnitude measurement in use today is based on the Moment Magnitude Scale (MMS). MMS measures the movement of rock along the fault. It accurately measures larger earthquakes, which can last for minutes, affect a much larger area, and cause more damage. Magnitudes are based on a logarithmic scale (base 10), meaning that for each whole number you go up on the magnitude scale, the amplitude of the ground motion recorded by a seismograph goes up ten times. Using this scale, a magnitude 5 earthquake would result in ten times the level of ground shaking as a magnitude 4 earthquake (and about 32 times as much energy would be released).[5] The USGS reports earthquake magnitudes above 4.0 as “moment magnitude,” often described in the press as "Richter” magnitude. Table 7-2 shows the magnitude levels for the current Richter / Moment Magnitude scale.

[4] Ector County is indicated by the black polygon.

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

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

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

Earthquake intensity measurement is an on-the-ground description. The measurement qualitatively explains the severity of earthquake shaking and its effects on people and their environment. Intensity measurements will differ depending on each location's proximity to the epicenter or point on the surface of the earth directly above the focus where the earthquake started. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and total destruction. There can be multiple intensity measurements associated with an earthquake as opposed to one magnitude measurement.[7] The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the nonscientist than the magnitude because intensity refers to the effects actually experienced at a specific location. The scale provides the intensity of the earthquake in values ranging from I to X. Table 7-3 describes the typical effects and intensities associated with earthquakes of various magnitudes. The intensity and effects depend on multiple factors (earthquake depth, epicenter location, site geology, population density, to name a few) and can vary widely.

[6] (n.d.). Earthquakes. Britannica. https://www.britannica.com/science/earthquake-geology

[7] Wood, H. O., and Neumann, Frank (1931). Modified Mercalli Intensity Scale of 1931: Seismological Society of America Bulletin, v. 21, no. 4, p. 277-283.

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

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

[8] Source: USGS

Taking into consideration the possible extent of an earthquake for the area, by reviewing Tables 7-2 and 7-3 in conjunction with no significant previous occurrences, as depicted in Figure 7-2, the Ector County planning area experiences on average less than 4.0 magnitude or Levels II-III (weak impact) on the Modified Mercalli Intensity scale. This is the greatest extent the entire planning area can anticipate in the future, based on historic records.

HISTORICAL OCCURRENCES

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

The USGS also has a database that tracks all earthquakes with a magnitude 2.5 or greater across the United States. According to the database, there were 46 earthquakes reported within the planning area between 1996 and 2024 (Table 7-4). Of these, the strongest recorded was a magnitude 3.6 earthquake, considered a Level II-III (weak). During that same period, 511 earthquakes occurred within a 50-mile radius of the planning area and 2,793 earthquakes occurred within a 100-mile radius. Many of these occurred to the west of the Ector County planning area. The maximum magnitude recorded for earthquakes within the 50-mile radius was magnitude 5.2, considered a Level VI-VII (strong to very strong) earthquake. In the 100-mile radius, the greatest recorded magnitude was 5.4, considered a Level VI-VII (strong to very strong) earthquake.

Another aspect of earthquakes tracked by the USGS is the depth at which they occur. Shallow earthquakes tend to be more damaging and cause more intense shaking than deeper earthquakes, however deep earthquakes are more likely to be felt over a wider area. All recorded earthquakes in or near the Ector County planning area have originated at depths categorized as shallow (1-70 km) or very shallow (<1 km).

While it is possible for the planning area to feel stronger earthquakes that occur inside county boundaries, or within the 100-mile area around the planning area, at this time, there are no known damages associated with these events for the Ector County planning area. Table 7-5 summarizes historical earthquake events that have occurred in or near the planning area.

Figure 7-3. Historic Earthquake Events in or Near Ector County, 1996 – 2024

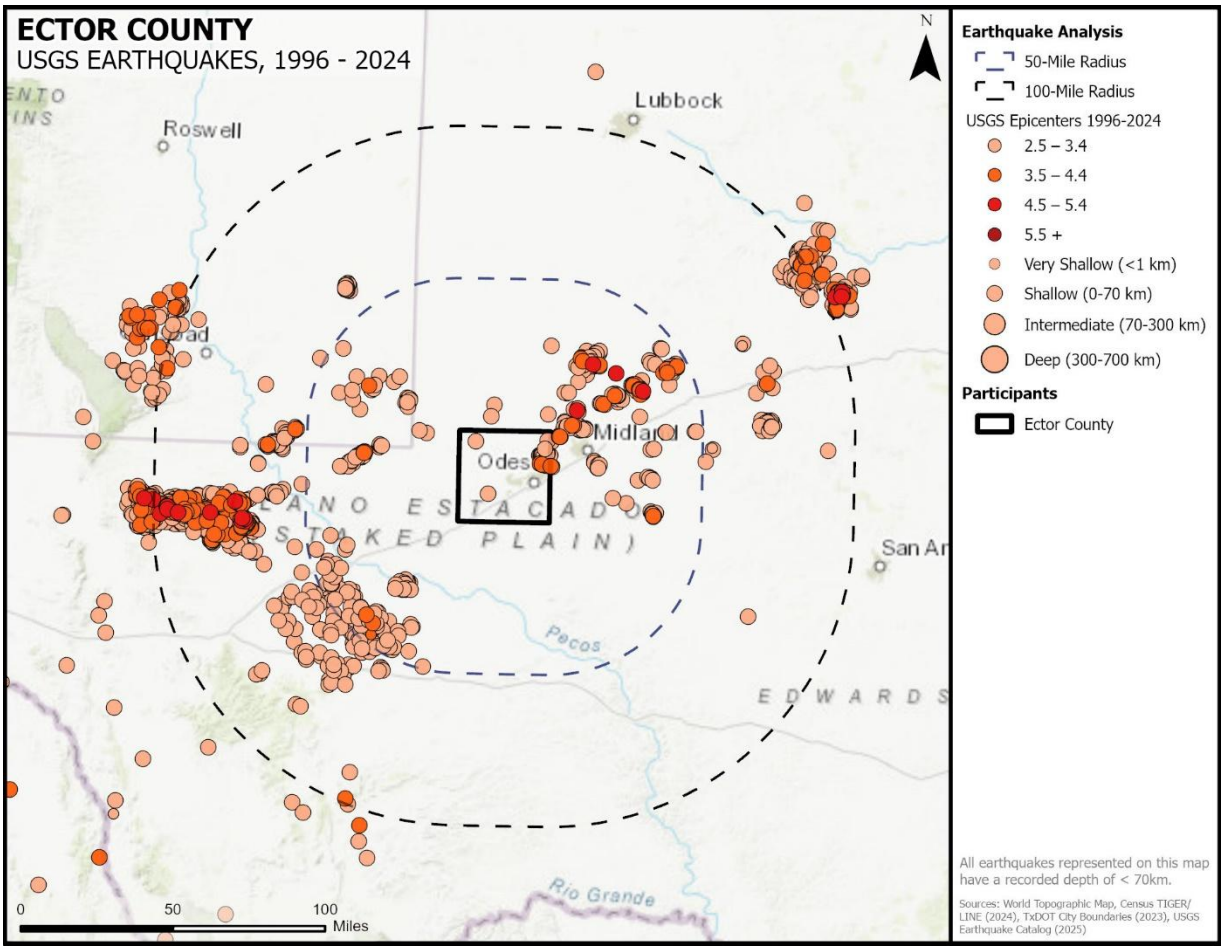


Table 7-4. Historic Earthquakes in Ector County, 1996 – 2024[9]

JURISDICTION	DATE	EXTENT	DEPTH (km)	INJURIES & FATALITIES	PROPERTY & CROP DAMAGE
Ector County	11/22/2001	3.1	5	0	$0
Ector County	2/08/2019	2.5	9.98	0	$0
Ector County	6/15/2019	2.7	5	0	$0
Ector County	12/02/2019	2.8	5	0	$0
Ector County	12/20/2019	2.5	5	0	$0
Ector County	1/11/2020	2.5	4.36	0	$0
Ector County	2/19/2020	3.3	6.9	0	$0
Ector County	3/2/2020	2.5	5	0	$0

[9] USGS, only earthquakes to occur inside the Ector County planning area are listed.

JURISDICTION	DATE	EXTENT	DEPTH (km)	INJURIES & FATALITIES	PROPERTY & CROP DAMAGE
Ector County	3/2/2020	3	5	0	$0
Ector County	3/9/2020	2.6	3.84	0	$0
Ector County	3/22/2020	3	5	0	$0
Ector County	4/21/2020	3.1	5	0	$0
Ector County	6/1/2020	3.2	5	0	$0
Ector County	6/10/2020	2.5	5	0	$0
Ector County	7/16/2020	2.5	2.5	0	$0
Ector County	7/18/2020	3	5	0	$0
Ector County	7/22/2020	2.7	5	0	$0
Ector County	8/1/2020	2.7	6.25	0	$0
Ector County	8/1/2020	2.9	5	0	$0
Ector County	10/13/2020	2.6	5.65	0	$0
Ector County	11/9/2020	3	3.6	0	$0
Ector County	12/23/2020	2.7	4.21	0	$0
Ector County	1/8/2021	2.5	2.93	0	$0
Ector County	1/28/2021	2.5	2.48	0	$0
Ector County	3/16/2021	3.1	7.94	0	$0
Ector County	3/16/2021	2.7	8.33	0	$0
Ector County	5/5/2021	2.5	7.16	0	$0
Ector County	10/26/2021	3.6	8.38	0	$0
Ector County	10/26/2021	3.4	8.38	0	$0
Ector County	10/27/2021	3.2	7.77	0	$0
Ector County	1/25/2022	2.6	7.70	0	$0
Ector County	1/25/2022	2.7	7.0	0	$0
Ector County	1/28/2022	3.1	8.19	0	$0
Ector County	1/30/2022	2.5	8.31	0	$0
Ector County	1/31/2022	2.7	8.68	0	$0

JURISDICTION	DATE	EXTENT	DEPTH (km)	INJURIES & FATALITIES	PROPERTY & CROP DAMAGE
Ector County	2/2/2022	2.5	5.25	0	$0
Ector County	2/4/2022	3	8.43	0	$0
Ector County	2/7/2022	2.7	5	0	$0
Ector County	3/7/2022	2.9	7.18	0	$0
Ector County	3/19/2022	2.8	7.21	0	$0
Ector County	3/24/2022	2.9	8.48	0	$0
Ector County	4/21/2022	2.6	7.92	0	$0
Ector County	5/14/2022	2.7	7.26	0	$0
Ector County	11/24/2022	2.5	9.73	0	$0
Ector County	7/21/2023	2.6	7.94	0	$0
Ector County	7/22/2023	3.5	7.80	0	$0

Table 7-5. Historical Earthquake Event Summary, 1996 – 2024[10]

JURISDICTION	NUMBER OF EVENTS	MAXIMUM EXTENT	DEPTH RANGE (km)	INJURIES & FATALITIES	PROPERTY & CROP DAMAGE
Ector County	46	3.6	2.48 – 9.98	0	$0
50-Mile Radius	511	5.2	0.09 – 22.30	0	$0
100-Mile Radius	2,793	5.4	0.02 – 22.30	0	$0

Based on the list of historical earthquake events for the Ector County planning area, 45 events were reported since the 2011 Plan.

PROBABILITY OF FUTURE EVENTS

Earthquake Hazard Maps show the distribution of earthquake shaking levels that have a certain probability of occurring over a given period. According to the USGS, the entire Ector County planning area has less than a five percent chance of a slightly damaging (or greater) earthquake within 100 years. Based on historical records, the probability of a damaging earthquake affecting the planning area is “Unlikely,” meaning that an event is probable in the next 10 years.

[10] Source: USGS

CLIMATE CHANGE CONSIDERATIONS

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

According to the USGS, statistically there is an approximately equal distribution of earthquakes in all cold weather, hot weather, rainy weather, etc. Very large low-pressure changes associated with major storm systems, like typhoons and hurricanes, are known to trigger episodes of fault slip or slow earthquakes in the Earth's crust and may also play a role in triggering some damaging earthquakes. However, the numbers are small and are not statistically significant.[11]

The Ector County planning area is located outside of any known earthquake hazard areas, though it is located in the Midland Basin which contains a series of fault lines. Climate change is assumed to have no impact on the probability or intensity of potential earthquakes in the planning area.

VULNERABILITY AND IMPACT

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

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

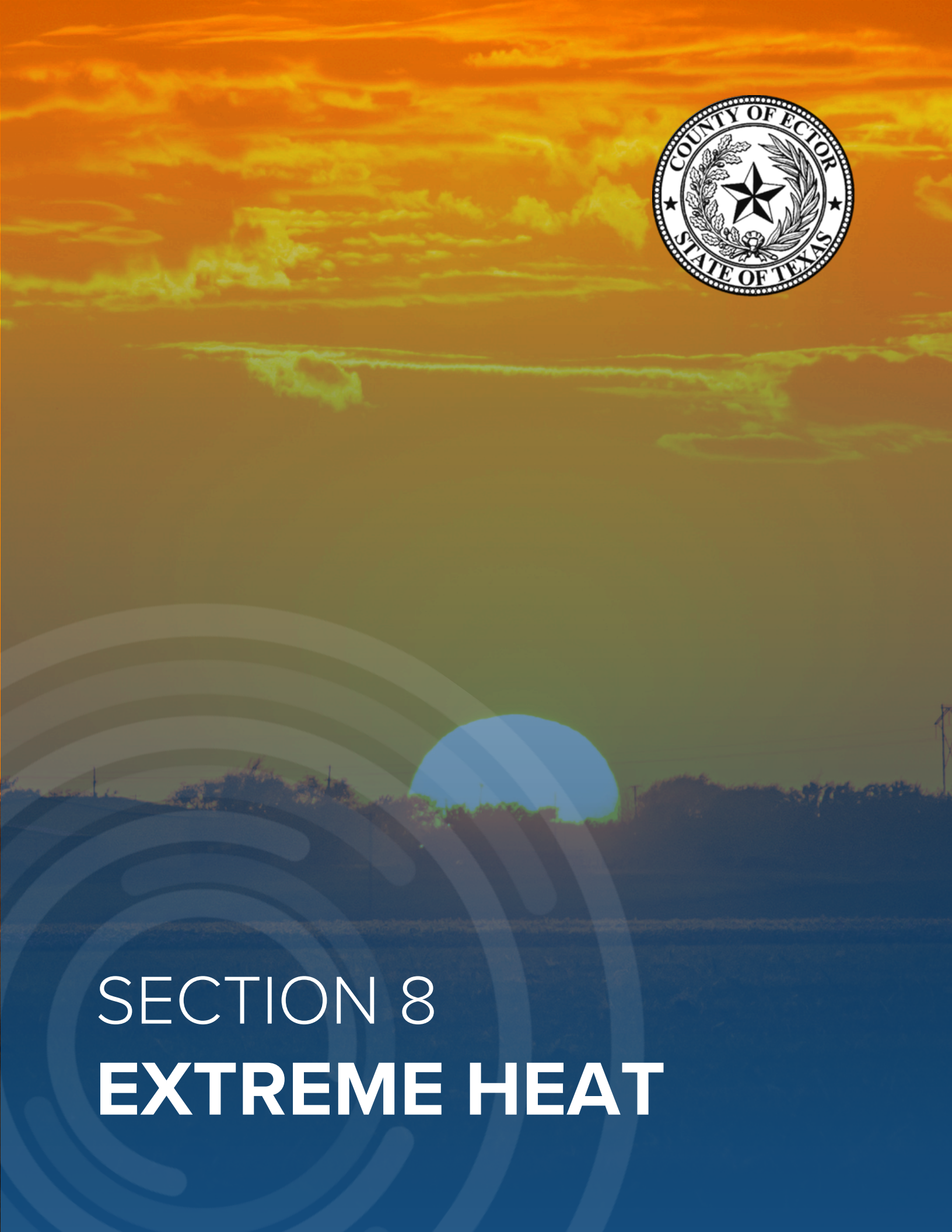
Table 7-6. Critical Facilities Vulnerable to an Earthquake

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to power outages, damaged facilities, fires and/or loss of communications. Impact can impede emergency response vehicle access to areas. • Power outages could disrupt communications, delaying emergency response times. • Extended power outages may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

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

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

With no significant historical events recorded, neither annualized loss-estimates nor a breakdown of potential dollar losses of critical facilities and infrastructure from earthquakes are available. The potential severity of impact from an earthquake for the entire Ector County planning area is classified as “Limited,” meaning that less than 10 percent of infrastructure would be damaged with critical facilities being shut down for less than 24 hours.



SECTION 8
EXTREME HEAT

SECTION 8: EXTREME HEAT

HAZARD DESCRIPTION

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

Although heat can damage buildings and facilities, it presents a more significant threat to the safety and welfare of citizens. The major human risks associated with extreme heat include heat cramps; sunburn; dehydration; fatigue; heat exhaustion; and even heat stroke. The most vulnerable population to heat casualties are children and the elderly or infirmed who frequently live on low fixed incomes and cannot afford to run air-conditioning on a regular basis. This population is sometimes isolated, with no immediate family or friends to look out for their well-being.

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

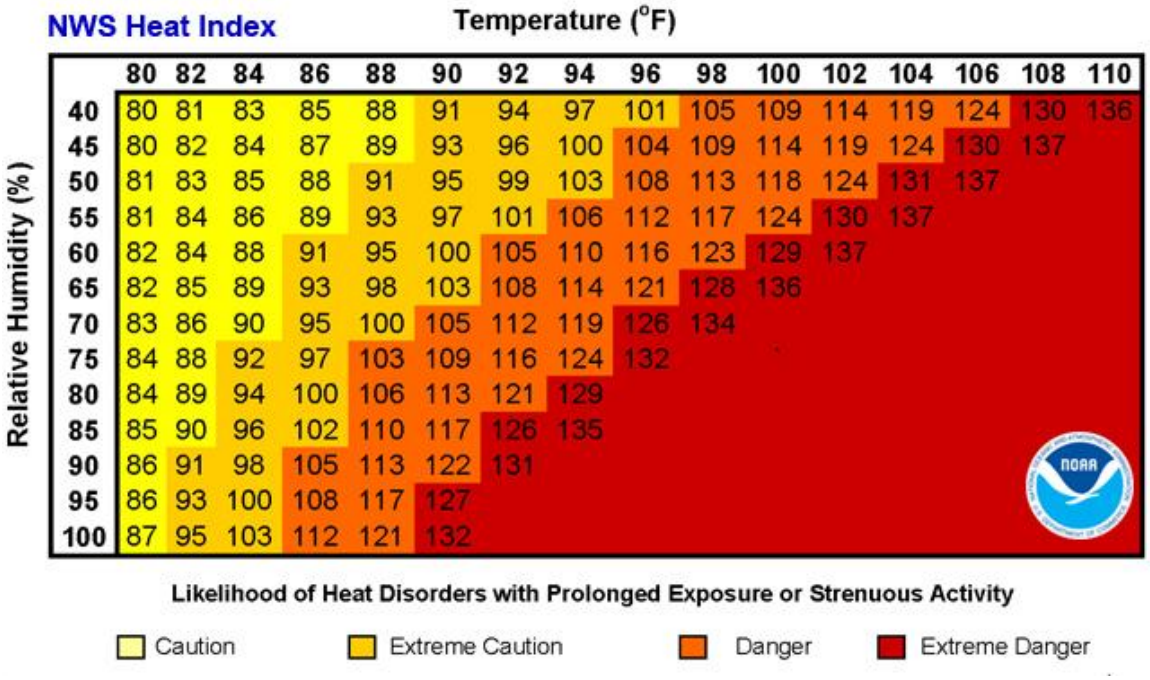
LOCATION

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

EXTENT

The magnitude or intensity of an extreme heat event is measured according to temperature in relation to the percentage of humidity. According to the National Oceanic Atmospheric Administration (NOAA), this relationship is referred to as the “Heat Index” and is depicted in Figure 8-1. This index measures how hot it feels outside when humidity is combined with high temperatures.

Figure 8-1. Extent Scale for Extreme Heat[1]



The index in Figure 8-1 displays varying categories of caution depending on the relative humidity combined with the temperature. For example, when the temperature is at 90 degrees Fahrenheit (°F) or lower, caution should be exercised if the humidity level is at or above 40 percent.

The shaded zones on the chart indicate varying symptoms or disorders that could occur depending on the magnitude or intensity of the event. “Caution” is the first category of intensity, and it indicates when fatigue due to heat exposure is possible. “Extreme Caution” indicates that sunstroke, muscle cramps, or heat exhaustion are possible, and a “Danger” level means that these symptoms are likely. “Extreme Danger” indicates that heat stroke is likely. The National Weather Service (NWS) initiates alerts based on the Heat Index as shown in Table 8-1.

Table 8-1. Heat Index and Warnings

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

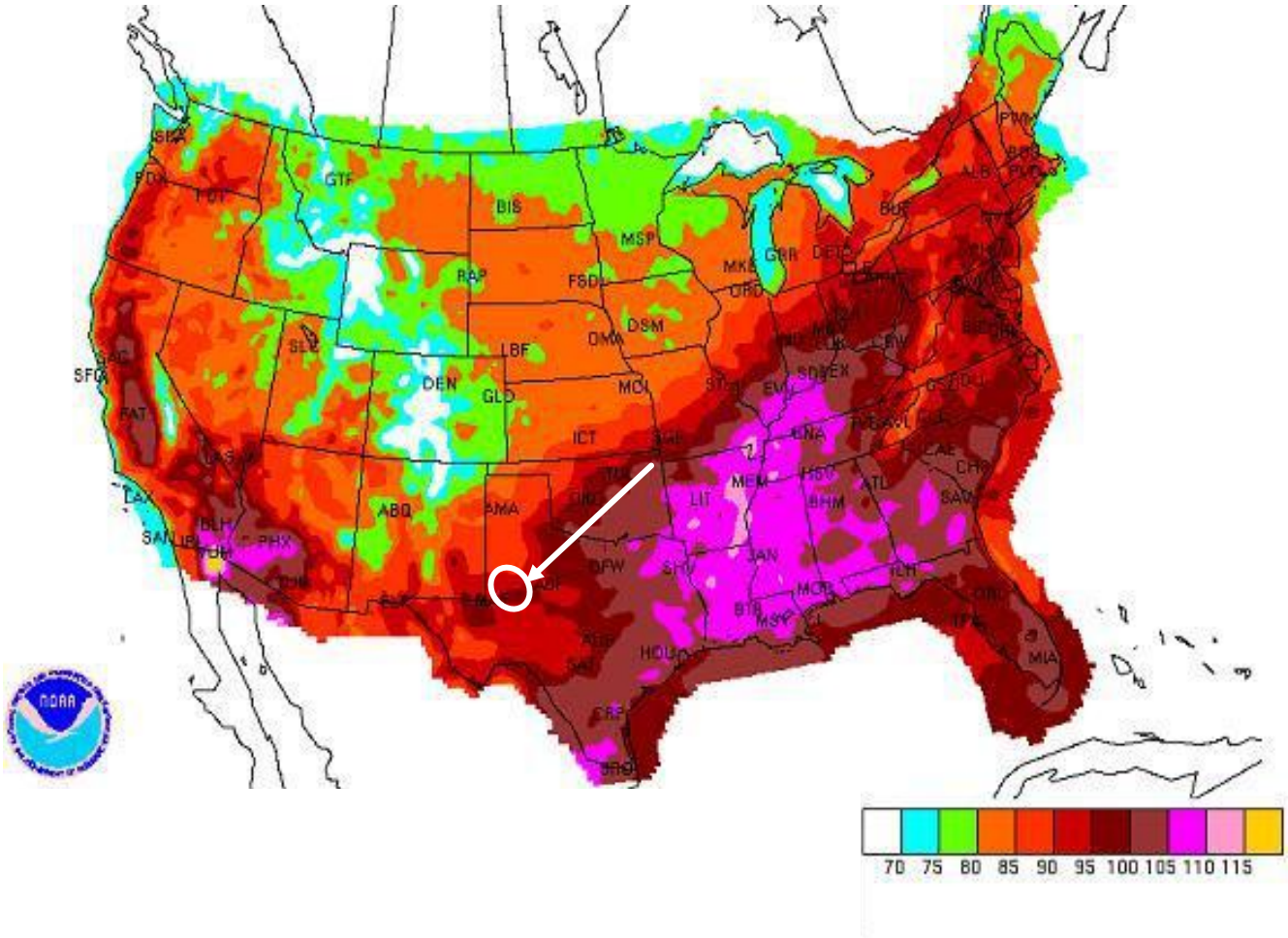
[1] Source: NOAA

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

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

Figure 8-2 displays the daily maximum heat index as derived from NOAA based on data compiled from 1838 to 2015. The white circle shows the Ector County planning area. The planning area is represented in a red color across the County. The red color indicates an average daily heat index of 90°F to 95°F. Therefore, Ector County could experience dangerous heat from 90°F to 95°F and should mitigate to the extent of “Extreme Caution” which can include sunstroke, muscle cramps, and heat exhaustion. This is the average maximum temperature the planning area can anticipate based on historical events.

Figure 8-2. Average Daily Maximum Heat Index Days[2]



HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) Storm Events database is a national data source organized under the National Oceanic and Atmospheric Administration (NOAA). The NCEI is the largest archive available for historic storm events data. Previous occurrences for extreme heat are derived from the NCEI database, which identifies extreme heat events at the county level for each event. According to the NCEI database, there is one extreme heat event on record for the planning area (Table 8-2). Historical extreme heat information, as provided by the NCEI, shows extreme heat activity across a multi-county forecast area for each event, the appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event.

Historical data for all participating jurisdictions is provided on a county-wide basis per the NCEI database from 1996 through 2024. No additional injuries or damages were reported to the NCEI.

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

SECTION 8: EXTREME HEAT

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

Table 8-2. Historical Extreme Heat Events, 1996 – 2024[3]

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Ector County	8/26/2019	0	0	$0	$0
TOTALS		**0**	**0**	**$0**	**$0**

Table 8-3. Historical Extreme Heat Events Summary, 1996 – 2024

JURISDICTION	NUMBER OF EVENTS	DEATH	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Ector County	1	0	0	$0	$0

Based on the list of historical extreme heat events for the Ector County planning area, one event was reported to the NCEI since the 2011 Plan.

SIGNIFICANT EVENTS

August 26, 2019

According to the National Weather Service, August of 2019 was particularly hot following a fairly typical warm June and July. The second half of July was dry, and the dry conditions intensified into early August. These dry conditions, combined with a building upper level ridge nearby, fueled the hot August. Heat in the month of August reached triple digits across the state. On August 26, 2019, a ridge of high pressure accompanied by very dry air moved into west Texas and southeast New Mexico, resulting in record breaking triple digit temperatures that impacted the Ector County planning area

PROBABILITY OF FUTURE EVENTS

According to historical records, the Ector County planning area has experienced one event in a 29-year reporting period, though it is highly likely that multiple events were unreported. Although no events were reported before or after the year 2019, historical records in combination with an analysis of maximum average temperatures provide a probability of at least one event every year. This frequency supports an “Highly Likely” probability of future events for the planning area.

CLIMATE CHANGE CONSIDERATIONS

Climate change is expected to lead to an increase in average temperatures as well as an increase in frequency, duration, and intensity of extreme heat events. With no reductions in emissions

[3] NOAA, NCEI Storm Events Database

worldwide, the state of Texas is projected to experience an additional 30 to 60 days per year above 100°F than what is experienced now.[4]

In addition, it is projected that future changes to Ector County will include increased temperatures, which according to the U.S. Climate Explorer, the planning area may experience a 6°F increase in the average extreme heat temperatures. Historically, extreme temperatures averaged 101°F in Ector County, but between 2035 and 2064 the average will be 107°F, increasing the severity and frequency of extreme heat events. Some projections show an even higher increase; however, the severity will be dependent on overall future emissions and is subject to change.

VULNERABILITY AND IMPACT

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

Every summer, the hazard of heat-related illness becomes a significant public health issue throughout much of the United States. Mortality rates increase during heat waves, and excessive heat is an important contributing factor to deaths from other causes, particularly among the elderly. Extreme temperatures present a significant threat to life and safety for the population of the County as a whole. Heat casualties, for example, are typically caused by a lack of adequate air conditioning or heat exhaustion. The most vulnerable population to heat casualties are the elderly or infirmed who frequently live on fixed incomes and cannot afford to run air conditioning on a regular basis. This population is sometimes isolated, with no immediate family or friends to look out for their well-being. Children may also be more vulnerable if left unattended in vehicles. Populations living below the poverty level are often unable to run air conditioning on a regular basis and are limited in their ability to seek medical treatment.

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

The population over 65 in the Ector County planning area is estimated at 10 percent of the total population and children under the age of 5 are estimated at 9 percent. The population with a disability is estimated at 10 percent of the total population. An estimated 15 percent of the planning area population live below the poverty level and 14 percent of the populations speak English ‘less than very well’ (Table 8-4).

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

Table 8-4. Populations at Greater Risk by Participating Jurisdiction

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Ector County	16,038	14,115	16,785	24,971	22,046
City of Odessa	11,670	10,246	11,536	16,428	13,178

Extremely high temperatures can have significant secondary impacts, leading to droughts, water shortages, increased fire danger, and prompt excessive demands for energy. The possibility of rolling blackouts increases with unseasonably high temperatures in what is a normally mild month with low power demands. Typically, more than 12 hours of warning time would be given before the onset of an extreme heat event.

In terms of vulnerability to structures, the impact from extreme heat is considered negligible. It is possible that critical facilities and infrastructure could be shut down for 24 hours if cooling units are running constantly, leading to a temporary power outage (Table 8-5). Less than ten percent of residential and commercial property could be damaged if extreme heat events lead to structure fires. Based on historical records, annualized property and crop losses for the Ector County planning area are negligible The potential impact of excessive summer heat is considered "Limited," with illnesses and injuries are possible depending on the extent and duration of the event.

The Ector County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by extreme heat events. The following critical facilities would be vulnerable to extreme heat events in the Ector County planning area. For a comprehensive list by participating jurisdiction, please see Appendix D.

Table 8-5. Critical Facilities Vulnerable to Extreme Heat Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS, Hospitals)	• Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Exposure to heat can cause heat illnesses in first responders, especially for those in heavy equipment. • Roads may become impassable due to excessive heat causing asphalt roads to soften and concrete roads to shift or buckle impacting response times by emergency services. • Extended power outages due to increased usage may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities,	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Power outages due to increased usage could disrupt critical care. • Backup power sources could be damaged.

CRITICAL FACILITIES	POTENTIAL IMPACTS
Evacuation Centers & Shelters, Governmental Facilities	• Evacuations may be necessary due to extended power outages, breaks in water main lines or other associated damage to facilities. • Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Economic disruption due to power outages negatively impact airport services as well as area businesses reliant on airport operations.
Commercial Suppliers (food, gas, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Roads may become impassable due to excessive heat causing asphalt roads to soften and concrete roads to shift or buckle impacting response times by emergency services. • Breaks in water main lines or other associated damage to facilities.

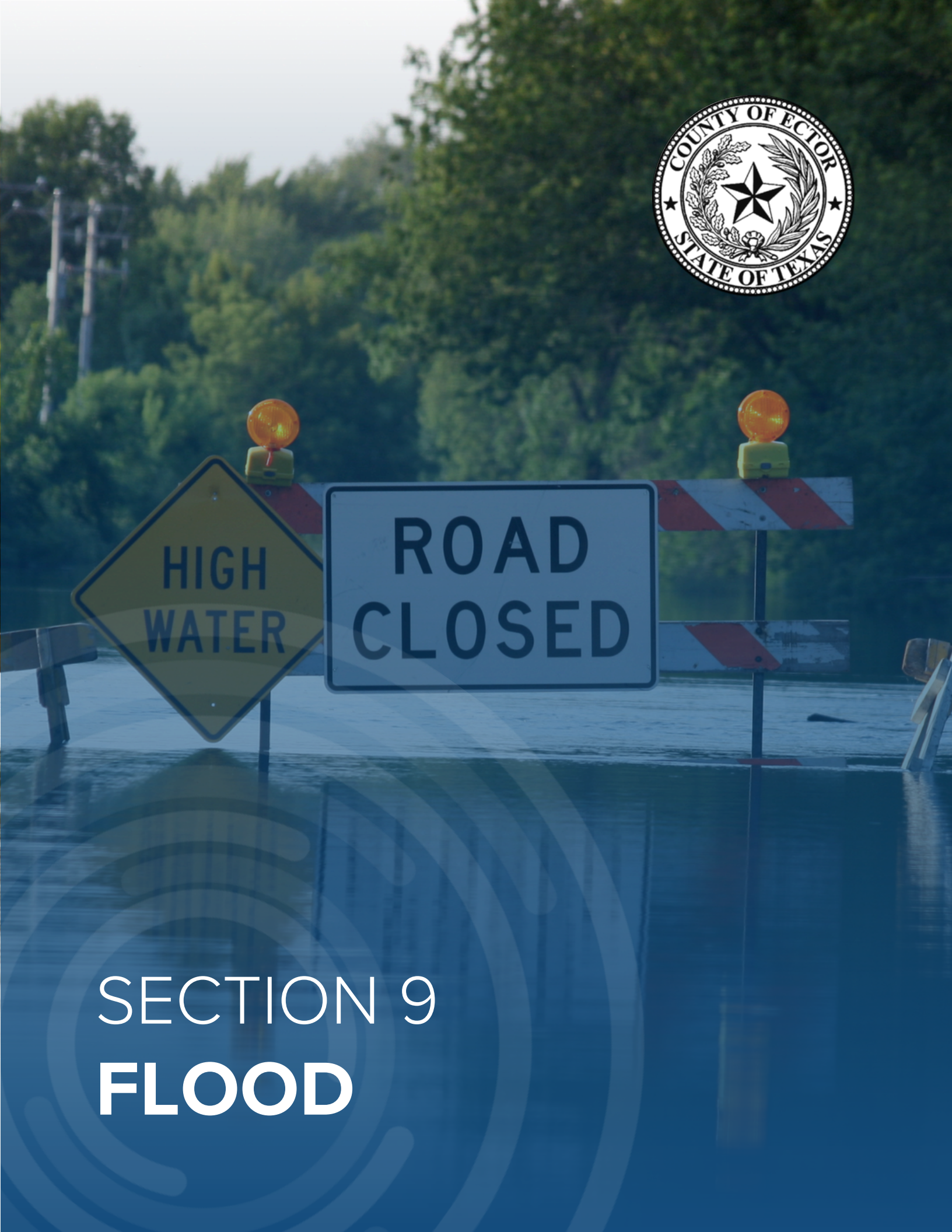
ASSESSMENT OF IMPACTS

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

- Vulnerable populations, particularly the elderly (10 percent of total population), children under 5 (9 percent of total population), and those with a disability (10 percent of total population) can face serious or life-threatening health problems from exposure to extreme heat including hyperthermia, heat cramps, heat exhaustion, and heat stroke (or sunstroke).
- Response personnel, including utility workers, public works personnel, and any other professions where individuals are required to work outside, are more subject to extreme heat related illnesses since their exposure would typically be greater.
- High energy demand periods can outpace the supply of energy, potentially creating the need for rolling brownouts which would elevate the risk of illness to vulnerable residents.
- Highways and roads may be damaged by excessive heat causing asphalt roads to soften and concrete roads to shift or buckle.
- Vehicle engines and cooling systems typically run harder during extreme heat events resulting in increases in mechanical failures.
- Extreme heat events during times of drought can exacerbate the environmental impacts associated with drought, decreasing water and air quality and further degrading wildlife habitat.
- Extreme heat increases ground-level ozone (smog), increasing the risk of respiratory illnesses.

- Negatively impacted water suppliers may face increased costs resulting from the transport of water resources or development of supplemental water resources.
- Tourism and recreational activities at places may be negatively impacted during extreme heat events, reducing seasonal revenue.
- Outdoor activities may see an increase in school injury or illness during extreme heat events.

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



SECTION 9
FLOOD

SECTION 9: FLOOD

HAZARD DESCRIPTION

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

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

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

LOCATION

The Flood Insurance Rate Maps (FIRMs) prepared by FEMA provide an overview of flood risk but can also be used to identify the areas of the County that are vulnerable to flooding. FIRMs are used to regulate new development and to control the substantial improvement and repair of substantially damaged buildings. Flood Insurance Studies (FIS) are often developed in conjunction with FIRMs. The FIS typically contains a narrative of the flood history of a community and discusses the engineering methods used to develop the FIRMs. The FIS also contains flood profiles for studying flooding sources and can be used to determine Base Flood Elevations (BFEs) for some areas.

SECTION 9: FLOOD

The FIS for Ector County is dated March 15, 2012. This compiles all previous flood information including data collected on numerous waterways. This study indicates that the principal flood problems come from localized thunderstorms, which may occur at any time during the year but are more prevalent in the spring and summer months. Flash flooding occurs throughout the City of Odessa and often causes the closure of many city roads.

The current effective Digital Flood Insurance Rate Map or DFIRM (map ID 48135C, panels 25-525, dated March 15, 2012) data provided by FEMA for Ector County shows the following flood hazard areas:

- Zone A: Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance requirements and floodplain management standards apply.
- Zone AE: Areas subject to inundation by 1-percent-annual-chance shallow flooding. It is the base floodplain where BFEs are provided. AE zones are now used on new format FIRMs instead of A1-30 zones.
- Zone X: Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones.

Locations of flood zones in Ector County based on the Digital Flood Insurance Rate Map (DFIRM) from FEMA are illustrated in Figures 9-1 and 9-2.

Figure 9-1. Estimated Flood Zones in Ector County

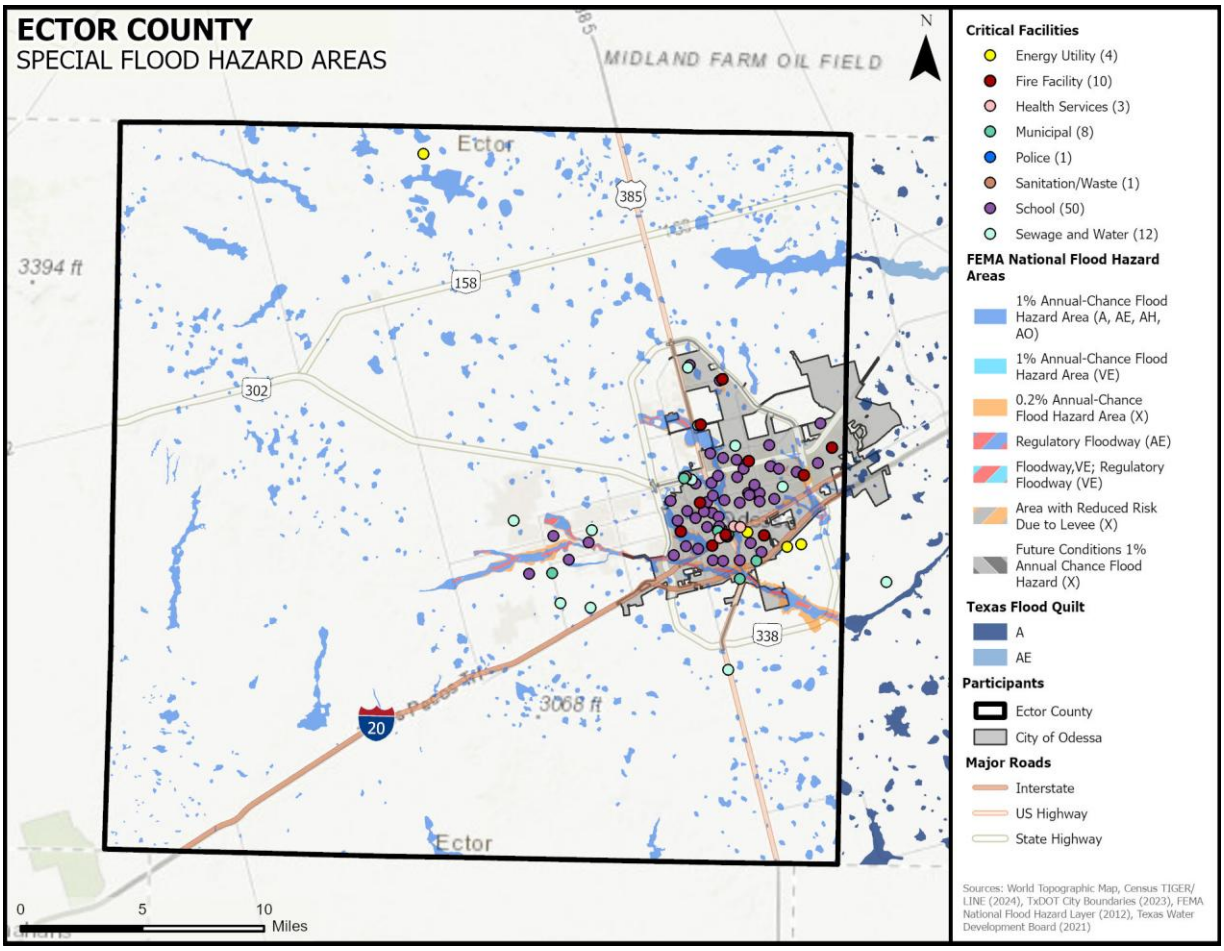
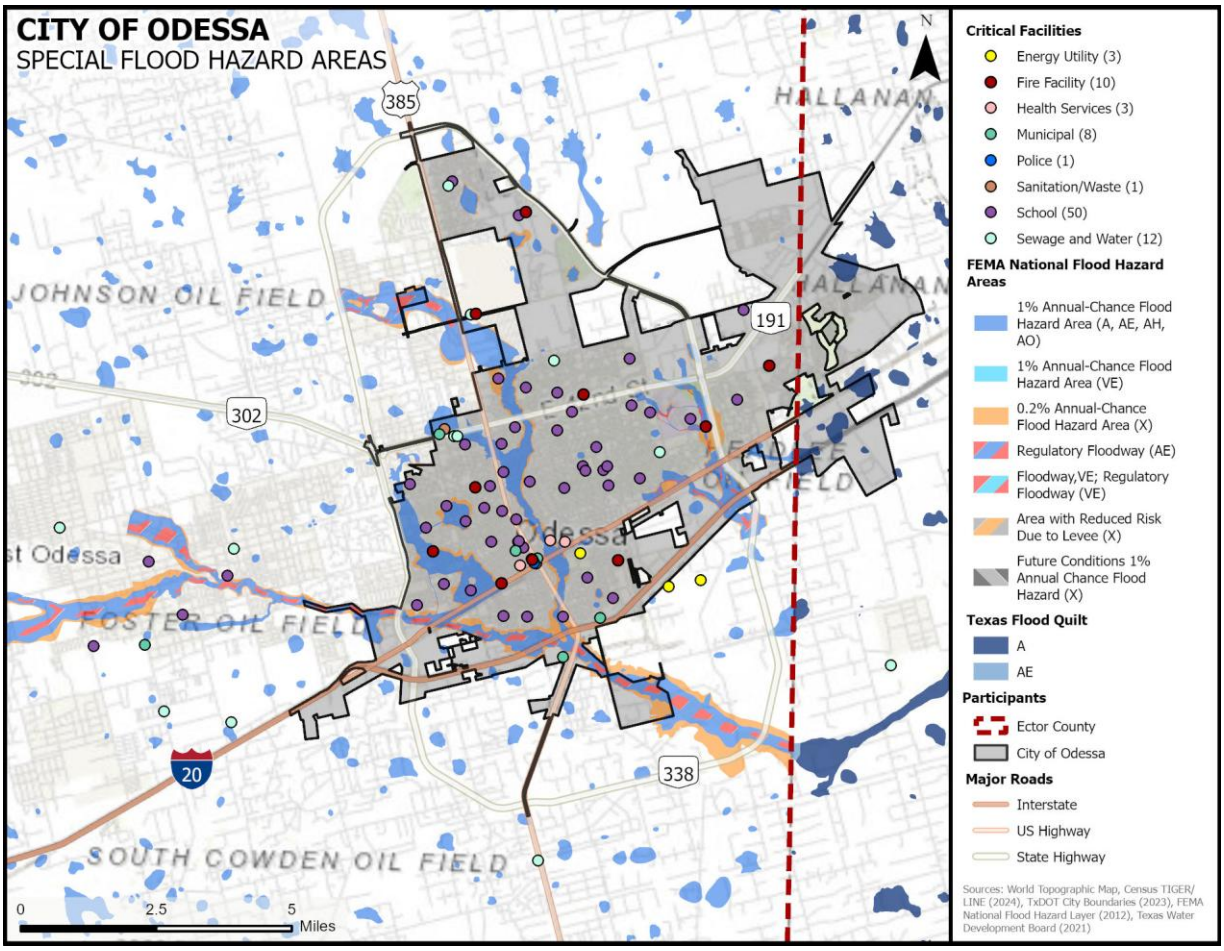


Figure 9-2. Estimated Flood Zones in the City of Odessa



EXTENT

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

Determining the intensity and magnitude of a flood event is dependent upon the flood zone and location of the flood hazard area in addition to the depths of flood waters. The extent of flood damages can be expected to be more damaging in the areas that will convey a base flood. FEMA categorizes areas on the terrain according to how the area will convey flood water. Flood zones are the categories that are mapped on FIRMs. Table 9-1 provides a description of FEMA flood zones and the flood impact in terms of severity or potential harm. Flood Zones A, AE, and X are the hazard areas mapped in the region. Figures 9-1 and 9-2 should be read in conjunction with the extent for flooding in Table 9-1 and Figures 9-3 and 9-4 to determine the intensity of a potential flood event.

Table 9-1. Flood Zones

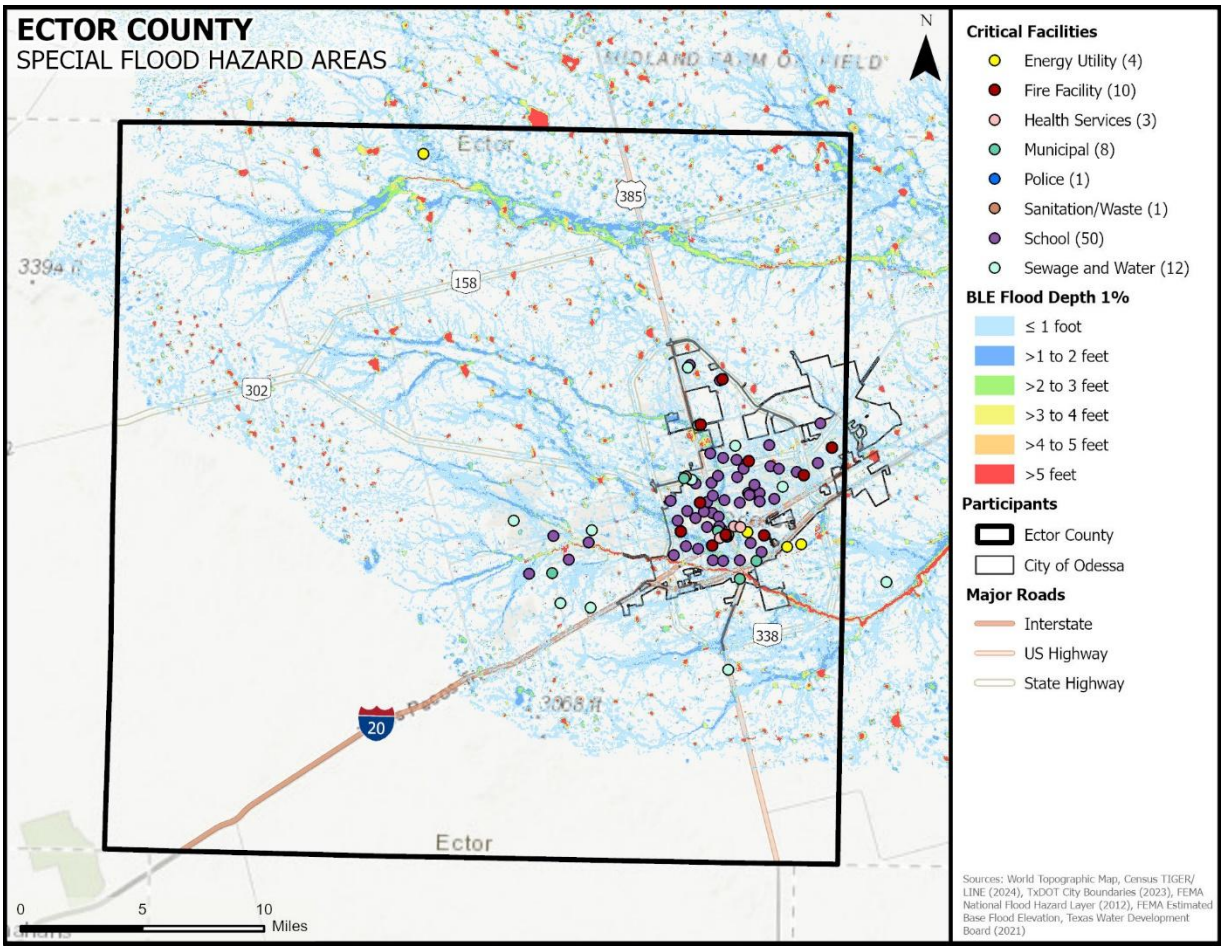
INTENSITY	ZONE	DESCRIPTION
HIGH	ZONE A	Areas with a 1-percent-annual-chance of flooding and a 26 percent chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or base flood elevations are shown within these zones.
	ZONE A1-30	These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

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

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

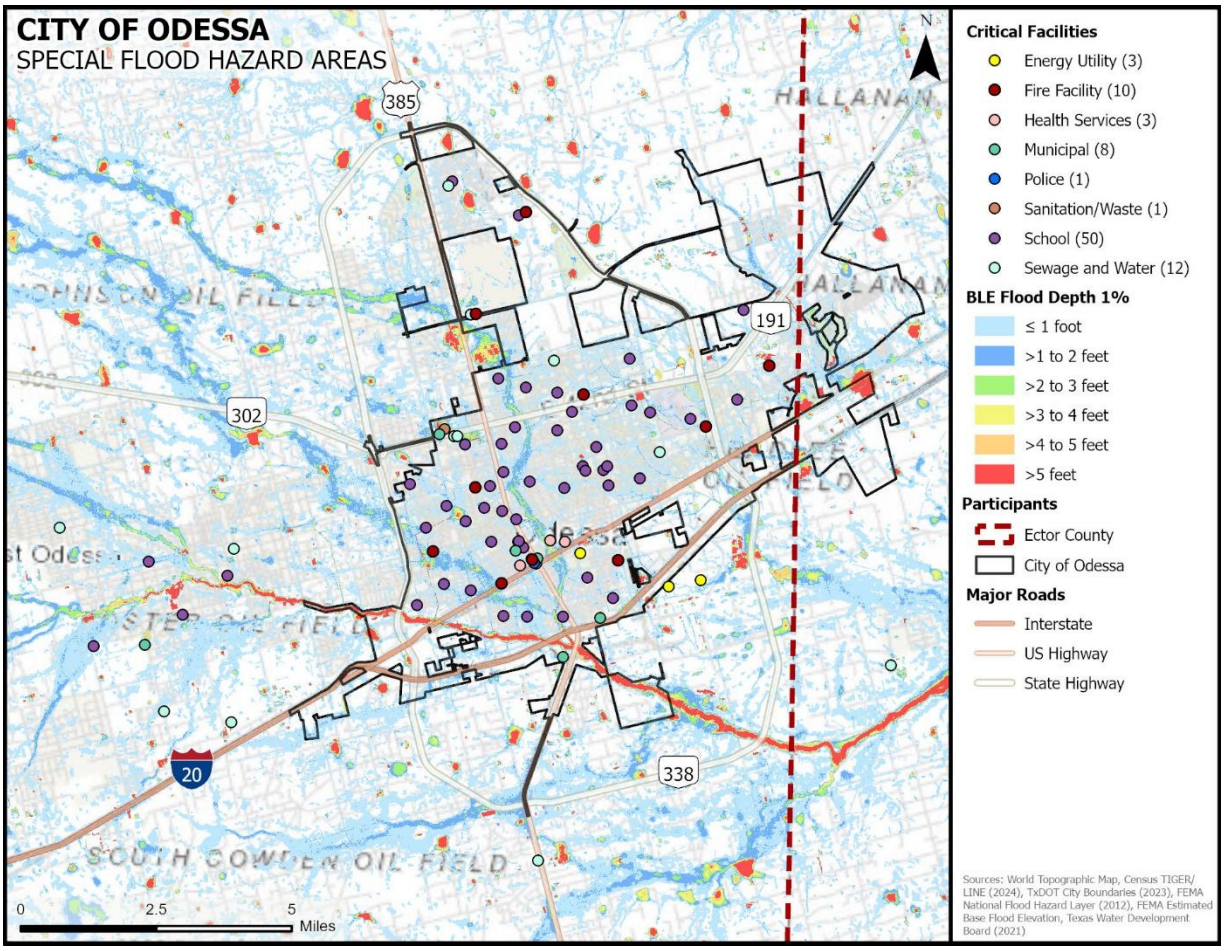
The intensity and magnitude of a flood event is also determined by the depth of flood water. According to FEMA's Region 6 Estimated Base Flood Elevation Viewer, the Ector County planning area may experience flood depths of greater than 5 feet.[1] A map for the planning area with the Base Flood Elevation depth range is provided in Figures 9-3 and 9-4.

Figure 9-3. Estimated Base Flood Elevation Flood Depths for Ector County



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

Figure 9-4. Estimated Base Flood Elevation Flood Depths for the City of Odessa



The range of flood intensity that the planning area can experience is high, or Zone A. Based on historical occurrences, the planning area could expect to experience an average of 2 to 3 inches of rain within a 2-hour period, resulting in flash flooding.

The data described in Table 9-1 together with Figures 9-1 through 9-4, and historical occurrences for the area, provides an estimated potential magnitude and severity for the Ector County planning area.

HISTORICAL OCCURRENCES

Historical evidence indicates that areas within the planning area are susceptible to flooding, especially in the form of flash flooding. It is important to note that only flood events that have been reported have been factored into this risk assessment, therefore it is likely that additional flood occurrences have gone unreported before and during the recording period. Table 9-2 identifies historical flood events that resulted in damages, injuries, or fatalities within the Ector County planning area. Table 9-3 provides the historical flood event summary by jurisdiction. Historical data is provided by the Storm Prediction Center (NOAA), National Centers for Environmental Information (NCEI) database for Ector County. There have been 154 recorded flood events in Ector County.

Table 9-2. Historical Flood Events, 1996 – 2024[2]

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Odessa	8/28/1996	0	0	$10,100	$0
City of Odessa	9/5/1999	0	0	$9,500	$0
City of Odessa	9/12/1999	0	0	$56,800	$0
City of Odessa	8/31/2001	0	0	$17,900	$0
City of Odessa	9/13/2002	0	0	$8,800	$0
City of Odessa	10/6/2002	0	0	$17,600	$0
City of Odessa	10/18/2002	0	0	$35,100	$0
City of Odessa	5/24/2003	1	0	$519,400	$0
City of Odessa	8/30/2003	0	0	$34,500	$0
City of Odessa	10/5/2003	0	0	$51,600	$0
City of Odessa	7/25/2004	0	0	$16,800	$0
City of Odessa	9/25/2004	0	0	$50,200	$0
City of Odessa	9/27/2004	0	0	$3,345,700	$0
Ector County	9/28/2004	0	0	$418,300	$0
City of Odessa	10/4/2004	0	0	$33,300	$0
City of Odessa	10/5/2004	0	0	$124,900	$0
City of Odessa	11/14/2004	0	0	$25,000	$0
City of Odessa	11/15/2004	0	0	$49,900	$0
City of Odessa	5/15/2005	0	0	$408,600	$0
City of Odessa	5/28/2005	0	0	$122,600	$0
City of Odessa	8/14/2005	0	0	$8,100	$0
City of Odessa	10/13/2005	0	0	$31,900	$0
City of Odessa	10/13/2005	0	0	$16,000	$0
City of Odessa	3/28/2006	0	0	$8,000	$0

[2] Table only includes historical flood events that resulted in damages, injuries, or fatalities between 1996 and 2024 in the NCEI database. Values are in 2025 dollars.

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Odessa	8/13/2006	0	0	$77,900	$0
City of Odessa	8/25/2006	0	0	$7,800	$0
City of Odessa	3/25/2007	0	0	$31,000	$0
City of Odessa	5/2/2007	0	0	$763,900	$0
City of Odessa	5/9/2007	0	0	$15,300	$0
City of Odessa	8/2/2007	0	0	$76,400	$0
City of Odessa	9/10/2007	0	0	$22,900	$0
Ector County	10/11/2007	0	0	$15,300	$0
City of Odessa	10/11/2007	0	0	$15,300	$0
City of Odessa	7/17/2009	0	0	$29,600	$0
Ector County	7/31/2009	0	0	$14,800	$0
Ector County	1/28/2010	0	0	$7,400	$0
Ector County	1/28/2010	0	0	$22,000	$0
City of Odessa	6/14/2010	0	0	$5,900	$0
Ector County	6/29/2010	0	0	$1,500	$0
City of Odessa	6/29/2010	0	0	$1,500	$0
City of Odessa	9/28/2012	0	0	$2,059,200	$0
City of Odessa	7/30/2013	0	0	$8,200	$0
City of Odessa	10/13/2013	0	0	$2,800	$0
Ector County	5/25/2014	0	0	$700	$0
City of Odessa	5/25/2014	0	0	$700	$0
Ector County	9/17/2014	0	0	$5,400	$0
City of Odessa	9/19/2014	0	0	$1,000	$0
City of Odessa	1/2/2015	0	0	$8,200	$0
Ector County	5/28/2015	0	0	$700	$0
City of Odessa	6/30/2015	0	0	$1,400	$0
City of Odessa	6/30/2015	0	0	$1,400	$0

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Odessa	6/30/2015	0	0	$2,000	$0
City of Odessa	6/30/2015	0	0	$1,400	$0
City of Odessa	10/21/2015	0	0	$30,800	$0
Ector County	10/22/2015	0	0	$10,700	$0
Ector County	10/22/2015	0	0	$500	$0
City of Odessa	10/22/2015	0	0	$400,700	$0
City of Odessa	5/31/2016	0	0	$6,900	$0
City of Odessa	6/12/2016	0	0	$13,200	$0
City of Odessa	6/12/2016	0	0	$2,000	$0
Ector County	9/17/2016	0	0	$700	$0
City of Odessa	9/17/2016	0	0	$6,600	$0
City of Odessa	5/31/2017	0	0	$1,300	$0
Ector County	8/1/2017	0	0	$2,600	$0
City of Odessa	8/1/2017	0	0	$3,900	$0
City of Odessa	9/26/2017	0	0	$2,600	$0
Ector County	6/17/2018	0	0	$700	$0
City of Odessa	8/27/2018	0	0	$25,200	$0
Ector County	9/7/2018	0	0	$100,700	$0
City of Odessa	9/7/2018	0	0	$8,900	$0
Ector County	5/31/2021	0	0	$1,200	$0
Ector County	5/31/2021	0	0	$118,100	$0
City of Odessa	5/31/2021	0	0	$600	$0
City of Odessa	5/31/2021	0	0	$11,900	$0
City of Odessa	5/31/2021	0	0	$11,900	$0
Ector County	6/28/2021	0	0	$5,900	$0
City of Odessa	6/28/2021	0	0	$5,900	$0
City of Odessa	6/28/2021	0	0	$233,900	$0

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Odessa	8/19/2021	0	0	$58,100	$0
City of Odessa	8/28/2022	0	0	$43,000	$0
City of Odessa	9/14/2022	0	0	$600	$0
Ector County	9/2/2024	0	0	$100,800	$0
Ector County	9/2/2024	0	0	$25,200	$0
Ector County	9/2/2024	0	0	$25,200	$0
City of Odessa	9/2/2024	0	0	$151,200	$0
City of Odessa	9/2/2024	0	0	$20,200	$0
City of Odessa	11/17/2024	0	0	$50,400	$0
Total Losses		**1**	**0**	**$10,104,300**	**$0**

Table 9-3. Summary of Historical Flood Events, 1996 – 2024

JURISDICTION	NUMBER OF EVENTS	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Ector County	44	0	0	$878,400	$0
City of Odessa	110	1	0	$9,225,900	$0
Total Losses	**154**	**1**	**0**	**$10,104,300**	

Based on the list of historical flood events for the Ector County planning area, 42 events have occurred since the 2011 Plan.

SIGNIFICANT EVENTS

Flash Flood on May 24, 2003

A significant flash flood event which resulted in one fatality impacted the City of Odessa during the evening hours of May 24, 2003. Numerous reports of flash flooding, including water in homes and stalled vehicles were received. Several swift water rescues were conducted by the Odessa Fire Department across the city. An 18 year old female was killed when she was swept away by raging flood waters while trying to evacuate her stalled pickup truck. Two passengers were successfully rescued from that particular vehicle. High water resulted in dangerous conditions for motorists throughout the city. A few of the most significant reports were received from the area around Ratliff Stadium (where a high school graduation was scheduled to occur) and along University Street. This event also resulted in an estimated $519,300 (2025 dollars) in property damages.

Flash Flood on September 27, 2004

Very intense rainfall fell over Monahans Draw near West Odessa on September 27, 2004. The first reports of flash flooding indicated that high water rendered Farm-to-Market (FM) Road 866,

State Highway 302 and Interstate 20 impassable. Up to 6 feet of water was reported crossing low lying areas of FM Road 866 just north of the I-20 junction. Several vehicles stalled in high water flowing across the Interstate, resulting in high water rescues of stranded motorists.

By late evening the swollen Monahans Draw, usually a dry depression, inundated residential areas in West Odessa. The hardest hit areas were near Third and Damascus streets. The most extensive damage occurred to several trailer parks in the Westcliff, Knox Village and Manor subdivisions. Rescue crews from three fire departments worked to remove distressed residents from homes and vehicles that were threatened by high water. One fire engine stalled in the floodwaters. Many families were displaced to emergency shelters in other portions of the City of Odessa and West Odessa. More than 40 homes suffered serious damage. Four trailer homes and two permanent homes were destroyed. Another 15 single family homes experienced major damage from the floodwaters. Local emergency management officials continued to report major flash flooding resulting from runoff along Monahans Draw through the night.

During the pre dawn hours of September 28th, another band of showers and thunderstorms moved north across Ector County. Brief heavy rainfall from this activity aggravated the flash flood situation. By 6:35 a.m., local officials were again at work to evacuate residents near the intersections of Tripp and Twenty-Third streets and Tenth and Redondo streets. Between 2 and 3 feet of water was reported rushing through those streets threatening numerous homes. At least three high water rescues were also conducted to save stranded motorists. Significant runoff and associated flash flooding of low lying areas prevented access to much of West Odessa through the early afternoon hours. Scattered thunderstorms developed and produced locally heavy rainfall over the western parts of the West Texas Permian Basin during the late afternoon and evening of the 27th. Many West Odessa residents were displaced from their homes during the late evening hours when flash flooding along Monahans Draw devastated parts of the city. No casualties were reported, but at least twenty families were left displaced. This event resulted in $3,345,700 (2025 dollars) in property damages.

Flash Flood on September 28, 2012
A tropical storm remnant near Baja California brought abundant moisture into the region, aided by southwest mid-level flow and southeast low-level winds pulling in Gulf moisture. Combined with instability and passing shortwave troughs, this led to sustained heavy rain over West Texas and Southeast New Mexico. Flooding and water rescues were reported, especially in Midland and Odessa within the Permian Basin and Trans Pecos.

Heavy rain developed and moved over Ector County and produced widespread flooding in the City of Odessa. There were numerous reports of stalled vehicles and about 12 water rescues were conducted in Midland and Odessa. The cost of damage for the flooding in the City of Odessa is estimated to be around $2,059,200 (2025 dollars). There were no injuries reported.

PROBABILITY OF FUTURE EVENTS

Based on 154 recorded historical occurrences within a 29-year reporting period within the Ector County planning area, flooding is considered “Highly Likely,” meaning an event is probable within the next year.

CLIMATE CHANGE CONSIDERATIONS

River flooding in Texas is projected to have no substantial change through 2036. This is in large part due to the construction of dams and reservoirs for flood management in the 20th century. There is a mixture of historical trends categorized by season, with no one clear trend to project. In addition, meteorological drivers of river flooding (increased rainfall intensity, decreased soil moisture) are projected to have competing influences. On balance, if an increasing trend is present in river flooding, it will be at the most extreme flood events or in the wettest parts of the state where there is so much rainfall that a decrease in soil moisture would have little mitigating impact.[3]

VULNERABILITY AND IMPACT

A property's vulnerability to a flood depends on its location and proximity to the floodplain. Structures that lie along banks of a waterway are the most vulnerable and are often repetitive loss structures. Ector County promotes development outside of the floodplain. In terms of structure and infrastructure damages and service disruptions, the potential severity of impacts for flood events is considered Limited, with the complete shutdown of critical facilities for 24-hours or less and less than 10 percent of property destroyed or with major damage. However, due to the reported historical fatality, the impact of flooding in Ector County is considered "Substantial" with multiple deaths possible, depending on the size and extent of the event.

Table 9-4 includes the comprehensive critical facilities identified in Appendix D that were considered the most important to the planning area that are subject to a range of impacts due to flood and are located in the regulatory floodplain. For a comprehensive list of identified critical facilities by participating jurisdiction, please see Appendix D.

Table 9-4. Critical Facilities in the Floodplain by Participating Jurisdiction

CRITICAL FACILITY TYPES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
Emergency Response Departments (EOC, Fire, Police, EMS), Hospitals	Ector County: 3 Fire Facilities, 1 Health Service Facility City of Odessa: 3 Fire Facilities, 1 Health Service Facility	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by rising flood waters. • Flood-related rescues may be necessary at swift and low water crossings or in flooded neighborhoods where roads have become impassable, placing first responders in harm's way. • Evacuations may be required for entire neighborhoods because of rising floodwaters, further taxing limited response capabilities and increasing sheltering needs for displaced residents. • Power outages could disrupt communications, delaying emergency response times.

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

CRITICAL FACILITY TYPES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
		• Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Washed out roads and bridges can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • First responders are exposed to downed power lines, contaminated and unusual debris, hazardous materials, and generally unsafe conditions. • Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Community Residential Facilities, Day Care Facilities, Evacuation Centers & Shelters, Governmental Facilities	Ector County: 2 Municipal Facilities, 8 School Facilities City of Odessa: 2 Municipal Facilities, 8 School Facilities	• Structures can be damaged by rising flood waters. • Power outages could disrupt critical care. • Backup power sources could be damaged, inundated or otherwise inoperable. • Critical staff may be impacted and unable to report for duty, limiting response capabilities. • Evacuations may be necessary due to extended power outages, gas line ruptures, or inundation of facilities. • Additional emergency responders and critical aid workers may not be able to reach the area for days. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. • Temporary break in operations may significantly inhibit post event evacuations. • Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Suppliers (food, gas, etc.)	N/A	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	Ector County: 1 Sanitation/Waste Facility, 2 Sewage and Water Facilities City of Odessa: 1 Sanitation/Waste Facility, 2 Sewage and Water Facilities	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency service vehicles can be damaged by rising flood waters. • Flood-related rescues may be necessary at swift and low water crossings or in flooded neighborhoods where roads have become impassable, placing emergency service workers in harm's way. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel.

CRITICAL FACILITY TYPES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
		• Service responders are exposed to downed power lines, contaminated and unusual debris, hazardous materials, and generally unsafe conditions. • Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

Historic loss estimates due to flood are presented in Table 9-5 below. Considering 154 flood events over a 29-year period, frequency is approximately five events every year.

Table 9-5. Average Annualized Losses by Jurisdiction, 1996 – 2024

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Ector County	$878,400	$30,300
City of Odessa	$9,225,900	$318,100
TOTALS	**$10,104,300**	**$348,400**

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

The population over 65 in the Ector County planning area is estimated at 10 percent of the total population and children under the age of 5 are estimated at 9 percent. The population with a disability is estimated at 10 percent of the total population. An estimated 15 percent of the planning area population live below the poverty level and 14 percent of the populations speak English 'less than very well'.

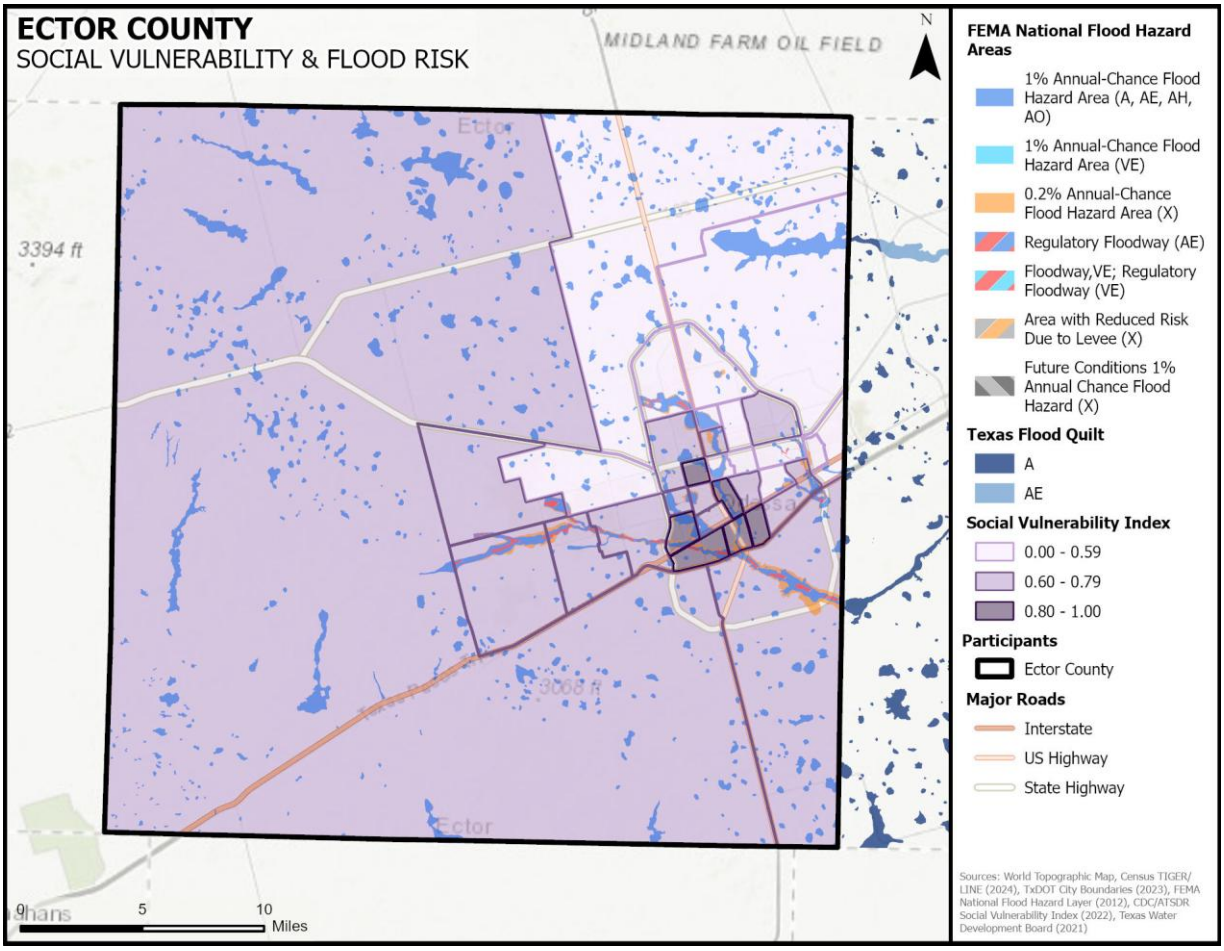
Table 9-6. Populations at Greater Risk by Jurisdiction[4]

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Ector County	16,038	14,115	16,785	24,971	22,046
City of Odessa	11,670	10,246	11,536	16,428	13,178

[4] U.S. Census Bureau Five-Year estimates

The Center for Disease Control (CDC) created a Social Vulnerability Index (SVI) which includes a database and mapping application that identifies and quantifies communities experiencing social vulnerability. The current CDC SVI uses 16 U.S. census variables from the 5-year American Community Survey (ACS) to identify communities that may need support before, during, or after disasters. All 16 variables fall under four broad categories including socioeconomic status (population in poverty, unemployment, etc.), household characteristics (age, disability status, etc.), racial and ethnic minority status, and housing type and transportation (mobile homes, no vehicles, etc.). Populations experiencing social vulnerability may be adversely impacted by natural hazards, disasters, and other community-level stressors. Figure 9-5 identifies areas of social vulnerability using the CDC's SVI and where these areas overlap with the Ector County flood hazard areas.

Figure 9-5. Ector County Social Vulnerability and Flood Hazard Areas



ASSESSMENT OF IMPACTS

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

- Flood-related rescues may be necessary at swift water and low water crossings or in flooded neighborhoods where roads have become impassable, placing first responders in harm's way.
- Evacuations may be required for entire neighborhoods because of rising floodwaters, further taxing limited response capabilities and increasing sheltering needs for displaced residents.
- Health risks and threats to residents are elevated after the flood waters have receded due to contaminated flood waters (untreated sewage and hazardous chemicals) and mold growth typical in flooded buildings and homes.
- Significant flood events often result in widespread power outages, increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning, as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- Floods can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.
- First responders are exposed to downed power lines, contaminated and potentially unstable debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Emergency operations and services may be significantly impacted due to damaged facilities.
- Significant flooding can result in the inability of emergency response vehicles to access areas of the community.
- Critical staff may suffer personal losses or otherwise be impacted by a flood event and be unable to report for duty, limiting response capabilities.
- City or County departments may be flooded, delaying response and recovery efforts for the entire community.
- Private sector entities that the planning area and its residents rely on, such as utility providers, financial institutions, and medical care providers, may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- Some businesses not directly damaged by the flood may be negatively impacted while utilities are being restored or water recedes, further slowing economic recovery.
- When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Residential structures substantially damaged by a flood may not be rebuilt for years and uninsured or underinsured residential structures may never be rebuilt, reducing the tax base for the community.

- Large floods may result in a dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- Recreation activities may be unavailable, and tourism can be unappealing for years following a large flood event, devastating directly related local businesses and negatively impacting economic recovery.
- Flooding may cause significant disruptions of clean water and sewer services, elevating health risks and delaying recovery efforts.
- The psychosocial effects on flood victims and their families can traumatize them for long periods of time, creating long term increases in medical treatment and services.
- Extensive or repetitive flooding can lead to decreases in property value for the affected community.
- Flood poses a potential catastrophic risk to annual and perennial crop production and overall crop quality, leading to higher food costs.
- Flood related declines in production may lead to an increase in unemployment.
- Large floods may result in loss of livestock, increased livestock mortality due to stress and waterborne disease, and increased cost for feed.

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

NATIONAL FLOOD INSURANCE PROGRAM (NFIP) PARTICIPATION

Flood insurance offered through the National Flood Insurance Program (NFIP) is the best way for home and business owners to protect themselves financially against the flood hazard. Ector County and the City of Odessa participate in the NFIP and are in good standing.

As an additional indicator of floodplain management responsibility, communities may choose to participate in FEMA's Community Rating System (CRS). This is an incentive-based program that allows communities to undertake flood mitigation activities that go beyond NFIP requirements. Currently, Ector County does not participate in the CRS but may evaluate their capacity for CRS participation in the next planning cycle. The City of Odessa participates in the CRS program. The city joined the program in 1992 and is currently a Class 8 which allows citizens up to a 10 percent reduction in flood insurance costs.

Ector County currently has in place minimum NFIP standards for new construction and substantial improvements of structures. The City of Odessa has adopted some additional higher regulatory standards for further flood protection as part of its participation in the CRS. Both jurisdictions are considering adopting additional higher regulatory NFIP standards to limit floodplain development.

The flood hazard areas throughout Ector County are subject to periodic inundation, which may adversely affect public safety, resulting in loss of life and property, health and safety hazards,

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

It is the purpose of Ector County and the City of Odessa to continue to promote public health, safety, and general welfare by minimizing public and private losses due to flood conditions in specific areas. Each of the NFIP participating jurisdictions in the Plan Update are guided by their local Flood Damage Prevention Ordinance. These communities will continue to comply with NFIP requirements through their local permitting, inspection, and record-keeping requirements for new and substantially developed construction. Further, the NFIP program promotes sound development in floodplain areas and includes provisions designed to:

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

In order to accomplish these tasks, Ector County and the City of Odessa seek to observe the following guidelines in order to achieve flood mitigation:

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

NFIP COMPLIANCE AND MAINTENANCE

All NFIP participating jurisdictions have developed mitigation actions that relate to either NFIP maintenance or compliance. Compliance and maintenance actions can be found in Section 18.

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

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

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

REPETITIVE LOSS

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

Repetitive Loss properties are defined as structures that are:

- Any insurable building for which 2 or more claims of more than $1,000 each, paid by the National Flood Insurance Program (NFIP) within any 9-year period, since 1978;
- May or may not be currently insured under the NFIP.

Severe Repetitive Loss properties are defined as structures that are:

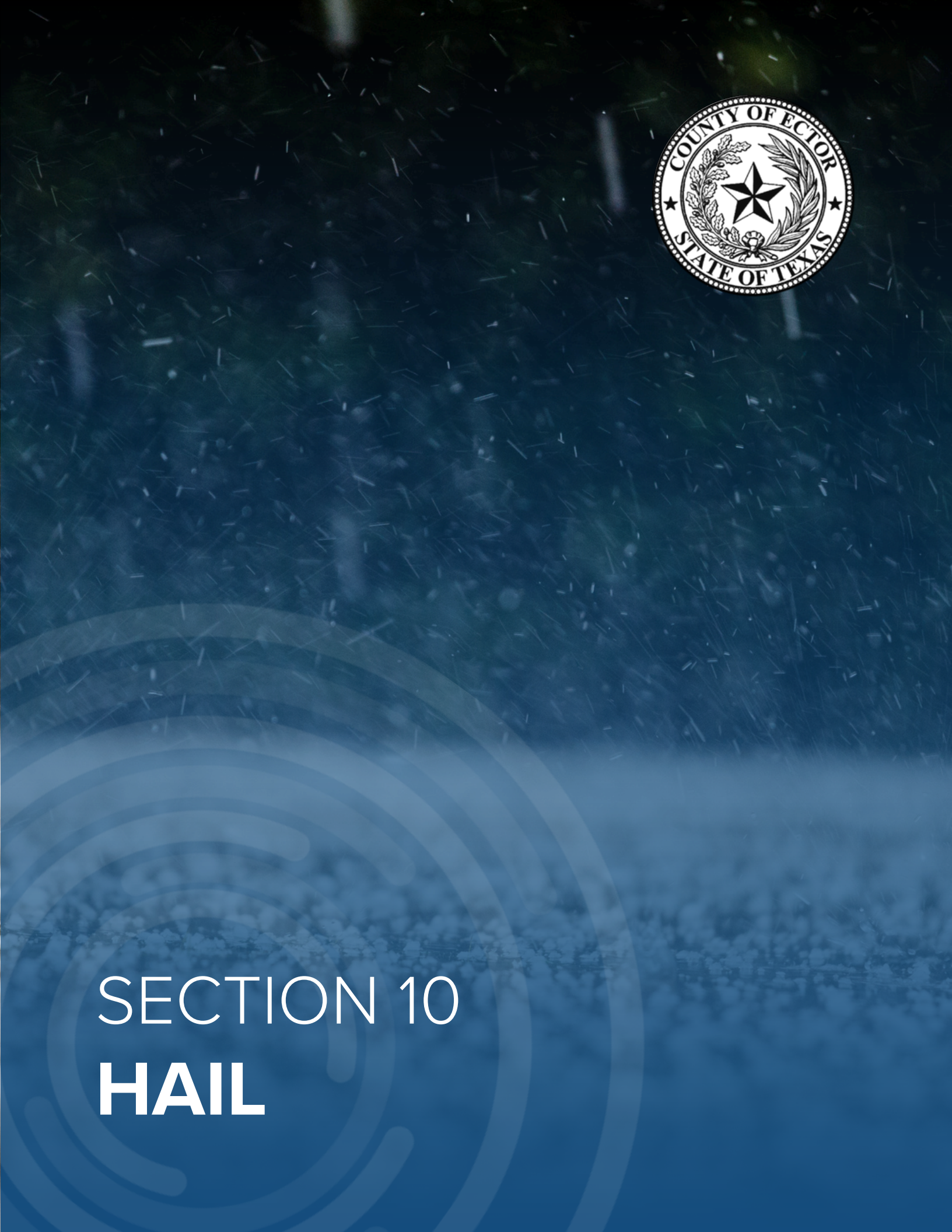
- Covered under the NFIP and have at least 4 flood related damage claim payments (building and contents) over $5,000.00 each, and the cumulative amount of such claims payments exceed $20,000; or
- At least 2 separate claim payments (building payments only) have been made, with the cumulative amount of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

In either scenario, at least 2 of the referenced claims must have occurred within any 9-year period and must be greater than 10 days apart.[5] Table 9-7 shows repetitive loss and severe repetitive loss properties for Ector County and the City of Odessa.

Table 9-7. Repetitive Loss and Severe Repetitive Loss Properties[6]

JURISDICTION	NUMBER OF STRUCTURES	NUMBER OF LOSSES	STRUCTURE TYPE
Ector County	2	4	Single Family
City of Odessa	2	4	Single Family

[5] Source: Texas Water Development Board.
[6] Some properties assumed single family type.



SECTION 10
HAIL

SECTION 10: HAIL

HAZARD DESCRIPTION

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

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

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

LOCATION

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

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

risk to the hazard of hail. Refer to Figure 10-1 for the location of past hail events in the planning area.

EXTENT

The National Weather Service (NWS) classifies a storm as "severe" if there is hail three-quarters of an inch in diameter (approximately the size of a penny) or greater, based on radar intensity or as seen by observers. The intensity category of a hailstorm depends on hail size and the potential damage it could cause, as depicted in the National Centers for Environmental Information (NCEI) Intensity Scale in Table 10-1.

Table 10-1. Hail Intensity and Magnitude[2]

SIZE CODE	INTENSITY CATEGORY	SIZE (diameter inches)	DESCRIPTIVE TERM	TYPICAL DAMAGE
H0	Hard Hail	Up to 0.33	Pea	No damage
H1	Potentially Damaging	0.33 – 0.60	Marble	Slight damage to plants and crops
H2	Potentially Damaging	0.60 – 0.80	Dime	Significant damage to plants and crops
H3	Severe	0.80 – 1.20	Nickel	Severe damage to plants and crops
H4	Severe	1.2 – 1.6	Quarter	Widespread glass and auto damage
H5	Destructive	1.6 – 2.0	Half Dollar	Widespread destruction of glass, roofs, and risk of injuries
H6	Destructive	2.0 – 2.4	Ping Pong Ball	Aircraft bodywork dented and brick walls pitted
H7	Very Destructive	2.4 – 3.0	Golf Ball	Severe roof damage and risk of serious injuries
H8	Very Destructive	3.0 – 3.5	Hen Egg	Severe damage to all structures
H9	Super Hailstorms	3.5 – 4.0	Tennis Ball	Extensive structural damage, could cause fatal injuries
H10	Super Hailstorms	4.0 +	Baseball	Extensive structural damage, could cause fatal injuries

The intensity scale in Table 10-1 ranges from H0 to H10, with increments of intensity or damage potential in relation to hail size (distribution and maximum), texture, fall speed, speed of storm translation, and strength of the accompanying wind. Based on the best available data regarding the previous occurrences for the area, the Ector County planning area may experience hailstorms ranging from an H0 (pea size) to an H10 (tennis ball size). The largest size hail to be reported in the planning area was 5 inches in diameter, or an H10, which is considered a super hailstorm that can cause extensive structural damage and potentially fatal injuries. An event of this magnitude

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

occurred on June 14, 2017. This is likely the greatest extent the planning area can anticipate in the future, based on historical events.

HISTORICAL OCCURRENCES

Historical evidence shown in Figure 10-1 demonstrates that the planning area is vulnerable to hail events overall. Historical events with reported damages, injuries, or fatalities are shown in Table 10-2. A total of 293 reported historical hail events impacted the Ector County planning area between 1993 and 2024; these events were reported to NCEI and NOAA databases and may not represent all hail events to have occurred during the past 32 years. Only those events for the Ector County planning area with latitude and longitude available were plotted (Figure 10-1).

Figure 10-1. Spatial Historical Hail Events, 1993 – 2024

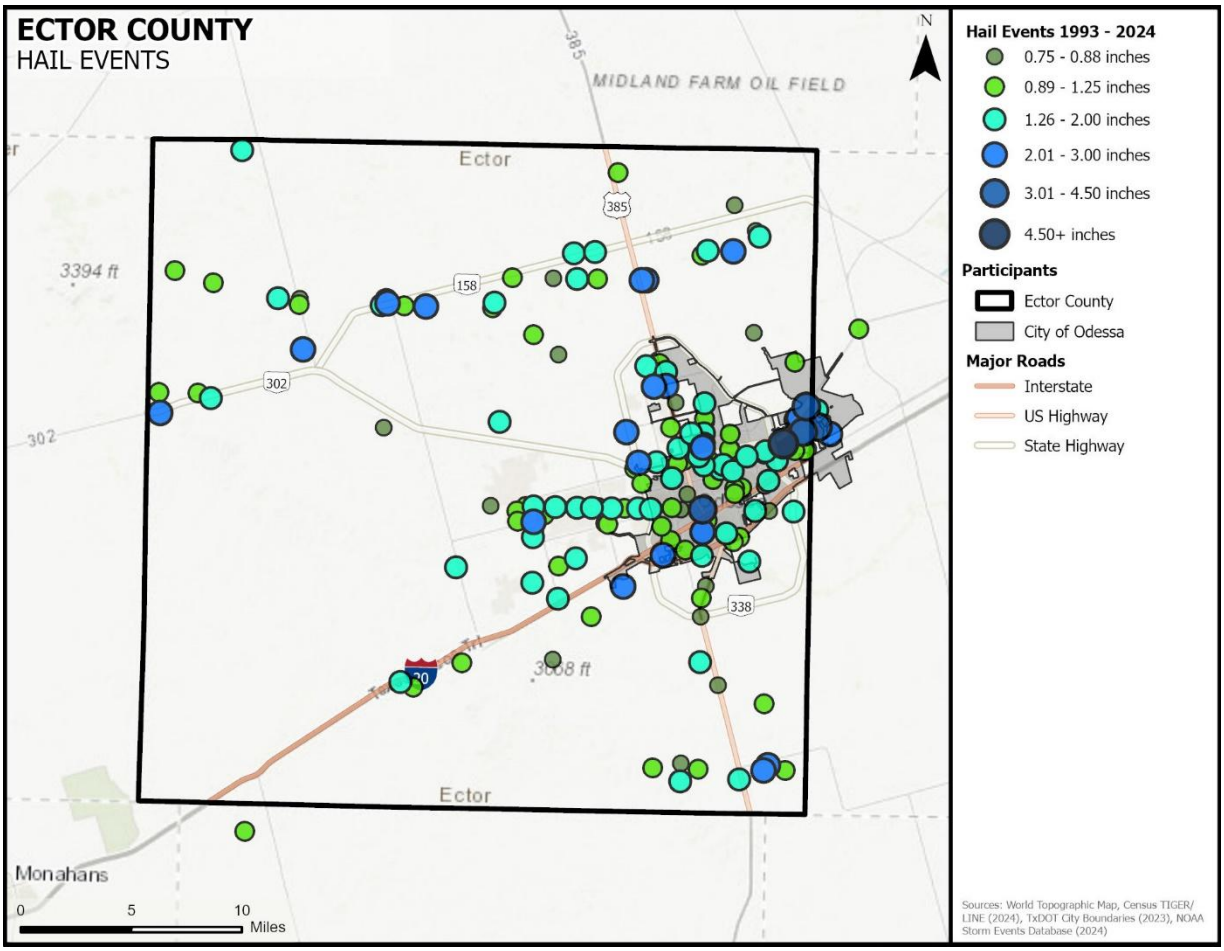


Table 10-2. Damaging Historical Hail Events, 1993 – 2024[3]

JURISDICTION	DATE	MAGNITUDE (inches)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Ector County	4/28/1993	1.75	0	0	$1,103,100	$110,400
City of Odessa	4/28/1993	1.75	0	0	$1,103,100	$200
City of Odessa	4/28/1993	1.75	0	0	$0	$1,200
City of Odessa	8/25/1993	1.75	0	0	$1,100	$0
City of Odessa	5/12/1994	1	0	0	$1,100	$0
Ector County	5/26/1994	0.75	0	0	$200	$200
City of Odessa	11/19/1994	0.75	0	0	$1,100	$0
City of Odessa	5/8/1997	2.75	0	0	$19,900	$0
City of Odessa	5/26/1999	2.75	0	0	$162,467,200	$0
City of Odessa	5/25/2002	1.75	0	0	$88,400	$0
Ector County	6/12/2004	2.5	0	0	$25,200	$0
Ector County	6/12/2004	1	0	0	$8,400	$0
Ector County	3/28/2007	2	0	0	$800	$0
City of Odessa	3/30/2007	1.75	0	0	$4,700	$0
City of Odessa	10/11/2007	1.75	0	0	$7,700	$0
City of Odessa	4/9/2008	2.5	0	0	$147,900	$0
Ector County	5/27/2008	1.75	0	0	$14,700	$0
City of Odessa	6/18/2008	1.75	0	0	$7,300	$0
City of Odessa	6/12/2015	2.75	0	0	$40,000	$0
Ector County	9/17/2016	2.75	0	0	$131,600	$0
Ector County	4/16/2017	2.5	0	0	$1,300	$0
City of Odessa	6/12/2017	2	0	0	$700	$0
City of Odessa	6/14/2017	5	0	0	$129,685,500	$0
City of Odessa	6/14/2017	5	0	0	$129,685,500	$0
City of Odessa	6/14/2017	2	0	0	$1,296,900	$0

[3] Only recorded events with damages are listed. No reports of injuries or fatalities were recorded in the NCEI database. Monetary damages have been inflated to their 2025 value.

JURISDICTION	DATE	MAGNITUDE (inches)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Odessa	6/14/2017	4	0	0	$1,296,900	$0
City of Odessa	6/14/2017	5	0	0	$1,296,900	$0
City of Odessa	6/14/2017	1.75	0	0	$1,296,900	$0
City of Odessa	6/14/2017	5	0	0	$1,296,900	$0
City of Odessa	6/14/2017	3.5	0	0	$1,296,900	$0
City of Odessa	6/14/2017	5	0	0	$1,296,900	$0
City of Odessa	5/22/2023	2.5	0	0	$15,700	$0
City of Odessa	6/10/2024	1.75	0	0	$10,200	$0
TOTALS		**(Max Extent)**	**0**	**0**	**$433,650,700**	**$112,000**

Table 10-3. Historical Hail Events Summary, 1993 – 2024

JURISDICTION	NUMBER of EVENTS	MAX MAGNITUDE (inches)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Ector County	99	2.75	0	0	$1,285,300	$110,600
City of Odessa	194	5	0	0	$432,365,400	$1,400
TOTAL LOSSES	**293**	**(Max Extent)**	**0**	**0**	**$433,762,700**	

Based on the list of historical hail events for the Ector County planning area (listed above), 156 of the events have been reported since the 2011 Plan according to reports in the NCEI database.

SIGNIFICANT EVENTS

May 26, 1999

As a large storm system moved over the City of Odessa, baseball size hail was reported near the intersection of West County Road and University Boulevard. The storm continued north where golf ball size hail impacted more than 1,000 people who were located outdoors during a graduation practice, though no injuries were reported. One-inch hail was also reported to accumulate several inches deep in downtown Odessa. Total property damages were estimated at $162,467,200 (2025 dollars).

September 17, 2016

Unstable conditions led to widespread thunderstorms across southeastern New Mexico and the Permian Basin. One of these storms moved across Ector County, producing baseball size hail two miles east of Goldsmith. This large hail severely damaged numerous homes and automobiles, causing an estimated $131,600 (2025 dollars) in total property damages.

June 14, 2017
During the early evening, a line of severe thunderstorms developed and moved over the cities of Odessa and Midland. Within the Ector County planning area, these storms brought widespread hail as large as 5 inches in diameter, the largest hail reported within the county historically. Impacts from the hailstorm included extensive damages to cars and homes, such as broken windshields and windows, dents, and damaged roofing. In total, 19 individual event reports were made in the NCEI database documenting these hail impacts. Altogether, these reports estimated total property damages at $268,449,300 (2025 dollars), making this the most costly hail event documented within the planning area.

PROBABILITY OF FUTURE EVENTS

Based on available records of historic events, 293 events in a 32-year reporting period for Ector County provides an average annual occurrence of approximately nine to ten events per year. This frequency supports a “Highly Likely” probability of future events for the Ector County planning area, with an event probable within the next year.

CLIMATE CHANGE CONSIDERATIONS

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

VULNERABILITY AND IMPACT

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

The Ector County planning area features mobile or manufactured homes throughout the planning area. These structures are typically more vulnerable to hail events than typical site-built structures. The U.S. Census data indicates a total of 11,009 (16 percent of total housing stock) manufactured homes located in the Ector County planning area. In addition, 48 percent (32,678 structures) of the housing structures in the Ector County planning area were built before 1980.

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

These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during hail events.

Table 10-4. Structures at Greater Risk by Participating Jurisdiction

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Ector County	32,678	11,009
City of Odessa	26,130	1,479

While all citizens are at risk of the impacts of hail, forced relocation and disaster recovery disproportionately impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 15 percent of the planning area population live below the poverty level (Table 10-5). While warning times for this type of hazard events should be substantial enough for these individuals to seek shelter, the elderly, children, and people with a disability may have trouble taking shelter due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

Table 10-5. Populations at Greater Risk by Jurisdiction[5]

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Ector County	16,038	14,115	16,785	24,971	22,046
City of Odessa	11,670	10,246	11,536	16,428	13,178

The Ector County Planning Team identified the following critical facilities (Table 10-6) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by hail events. For a comprehensive list by participating jurisdiction, please see Appendix D.

Table 10-6. Critical Facilities Vulnerable to Hail

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by hailstones. • Power outages could disrupt communications, delaying emergency response times. • Accumulated hail on the streets may impede emergency response vehicle access to areas.

[5] US Census Bureau 2023 data for Ector County

CRITICAL FACILITY TYPE	POTENTIAL IMPACTS
	• Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Structures can be damaged by hailstones. • Power outages could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary due to extended power outages, gas line ruptures, or structural damage to facilities. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. • Temporary break in operations may significantly inhibit post event evacuations. • Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Supplier (Food, fuel, etc.)	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Power outages could disrupt communications, delaying emergency response times. • Accumulated hail on the streets may impede service response vehicle access to areas. • Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

Hail has been known to cause injury to humans and occasionally has been fatal, though no injuries have been reported within the Ector County planning area. Overall, the total loss estimate of property and crops in the planning area is $433,762,700 (2025 dollars) with an average annualized loss of $13,555,100. Based on historic loss and damages, the impact of hail on the Ector County planning area is considered “Limited” severity of impact, meaning injuries and illnesses are treatable with first aid, shutdown of critical facilities and services for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

Table 10-7. Estimated Annualized Losses by Jurisdiction

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Ector County	$1,395,900	$43,600
City of Odessa	$432,366,800	$13,511,500
TOTALS	**$433,762,700**	**$13,555,100**

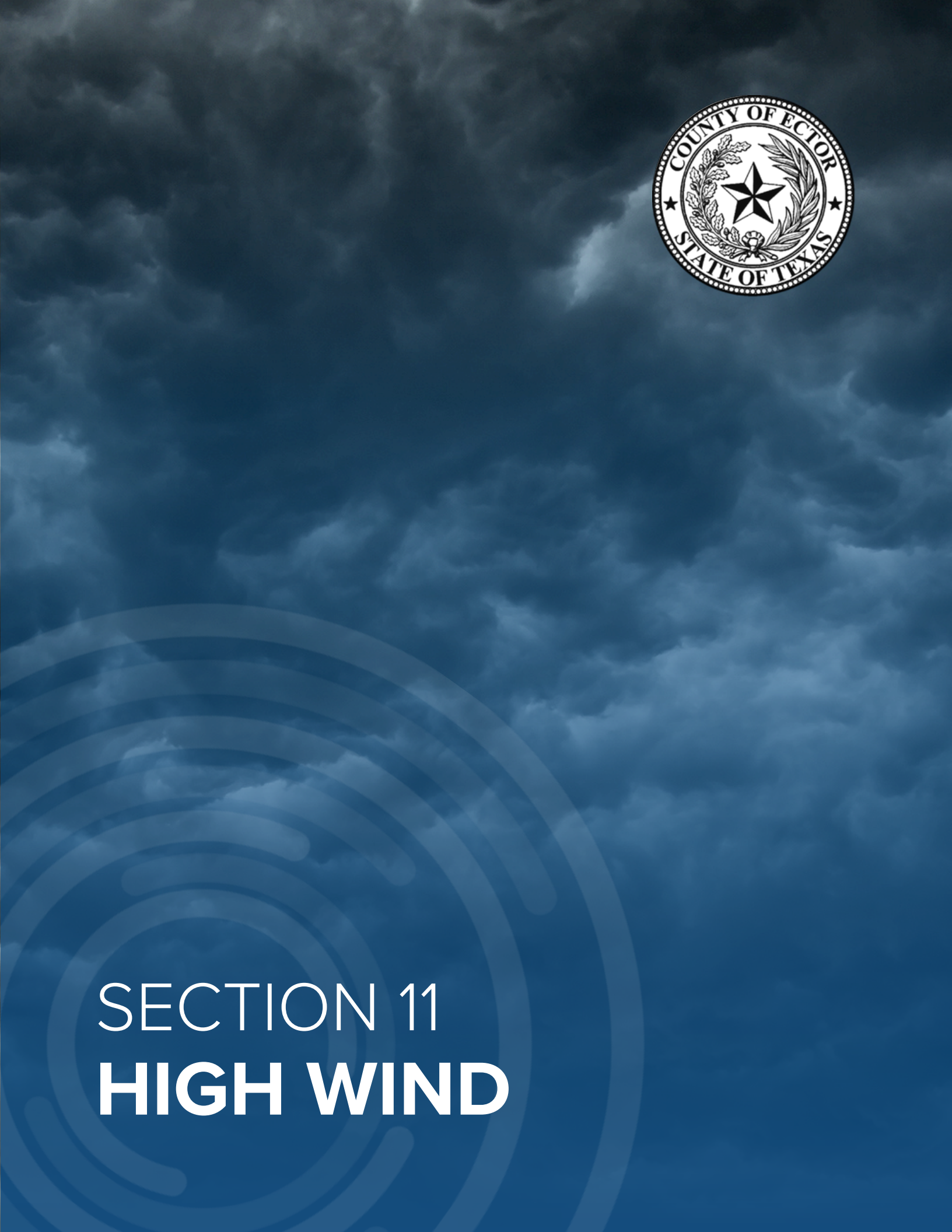
SECTION 10: HAIL

ASSESSMENT OF IMPACTS

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

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

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



SECTION 11
HIGH WIND

SECTION 11: HIGH WIND

HAZARD DESCRIPTION

Wind is the horizontal motion of the air past a given point, beginning with differences in air pressures. Pressure that is higher at one place than another sets up a force pushing from high toward low pressure: the greater the difference in pressures, the stronger the force. The distance between the area of high pressure and the area of low pressure also determines how fast the moving air accelerates.

High wind events, those that sustain speeds of 40 mph or greater according to the National Weather Service (NWS), are often associated with severe thunderstorms. These wind events can cause significant property and crop damages. Winds in Ector County are typically straight-line winds, which are generally any thunderstorm wind that is not associated with rotation or tornados. Straight line winds are responsible for most high wind damages. One type of straight-line wind, the downburst, is a small area of rapidly descending air beneath a thunderstorm. A downburst can cause damage equivalent to a strong tornado and make air travel extremely hazardous. In addition, these strong winds and thunderstorm winds can sometimes blow large amounts of dust and debris, creating dust storms. Strong thunderstorm winds may become more frequent or extreme during monsoon season, which begins in June and ends in October.

High winds can also occur in the absence of other definable hazard conditions creating “windstorms.” According to the NWS, high winds not associated with thunderstorms are often referred to as gradient winds. They are usually the result of tight pressure gradients between strong areas of low pressure and high pressure. These strong winds can be just as strong as thunderstorm wind gusts, but cover a much larger area, and can result in widespread damage.

LOCATION

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

EXTENT

The extent or magnitude of a high wind event is measured by the Beaufort Wind Scale. Table 11-1 describes the different intensities of wind in terms of speed and effects, from calm to violent and destructive.

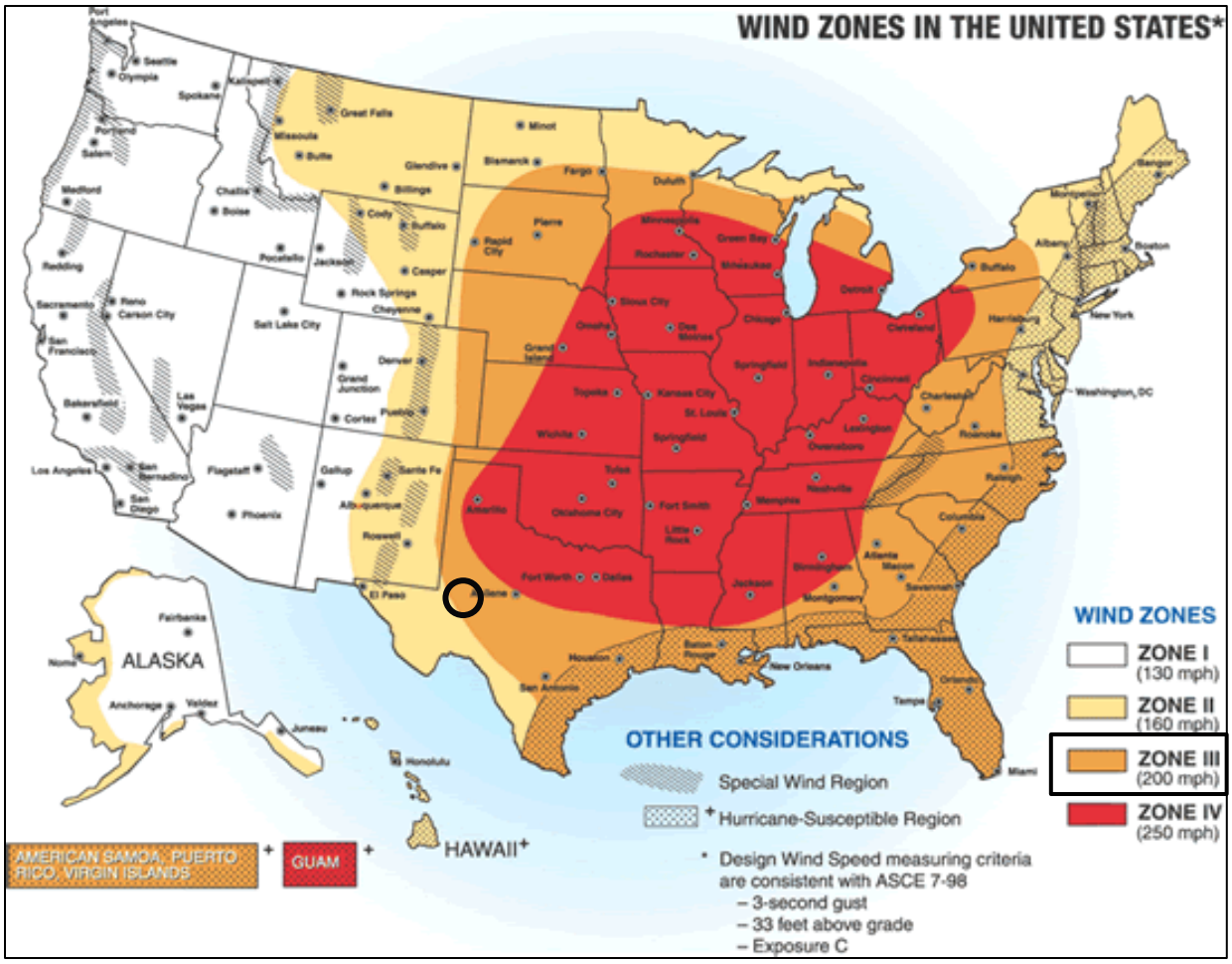
Table 11-1. Beaufort Wind Scale[1]

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

Figure 11-1 displays the wind zones as derived from NOAA.

[1] Source: World Meteorological Organization

Figure 11-1. Wind Zones in the United States[2]



On average, the planning area experiences five to six high wind events each year. The Ector County planning area is located within Wind Zone III, meaning the planning area can experience maximum windspeeds up to 200 mph. The Ector County planning area has experienced a significant wind event, or an event with winds in the range of "Force 12" on the Beaufort Wind Scale with winds above 72 mph. The highest magnitude event occurred on May 16, 2024, with winds recorded at 100 knots, or approximately 115 mph. This is the worst to be anticipated for the entire planning area based on historic events.

HISTORICAL OCCURRENCES

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

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

37 years. Tables 11-2, 11-3, and 11-4 depict historical occurrences of high wind events for the Ector County planning area according to the NCEI database.

Since 1988, 195 high wind events are known to have occurred in the Ector County planning area. Table 11-4 presents information on known historical events impacting the Ector County planning area, resulting in damages, injuries, or fatalities. The strongest event reported in the planning area occurred on May 16, 2024, with reported wind speeds of 100 knots, or 115 mph.

It is important to note that high wind events associated with other hazards, such as tornadoes, are not accounted for in this section. Property damage estimates are not always available. Table 11-5 provides event and damage summaries for each participating jurisdiction. Where an estimate has been provided in a table for losses, the dollar amounts have been modified for inflation to indicate the damage in 2025 dollars.

Table 11-2. Historical High Wind Speeds, 1988 – 2024

MAXIMUM WIND SPEED RECORDED (knots)	NUMBER OF REPORTED EVENTS
0-30	0
31-40	3
41-50	13
51-60	103
61-70	45
71-80	4
81-90	3
91-100+	1
Unknown	23

Table 11-3. Historical Wind Event Types as Reported in the NCEI, 1988 – 2024

TYPE	NUMBER OF REPORTED EVENTS
Dust Storm	1
High Wind	23
Strong Wind	3
Thunderstorm Wind	168

Table 11-4. Historical High Wind Events, 1988 – 2024[3]

JURISDICTION	DATE	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Ector County	8/9/1988	-	0	2	$0	$0
Ector County	8/12/1988	-	0	2	$0	$0
Ector County	6/6/1989	52	0	1	$0	$0
Ector County	4/28/1993	65	0	0	$110,400	$200
City of Odessa	4/28/1993	-	0	0	$110,400	$0
City of Odessa	5/17/1993	-	0	0	$1,101,500	$0
City of Odessa	8/23/1993	52	0	0	$1,100	$0
Ector County	8/25/1993	52	0	0	$1,100	$0
City of Odessa	7/13/1994	52	0	0	$1,100	$0
City of Odessa	11/19/1994	65	0	0	$1,061,100	$0
City of Odessa	11/19/1994	52	0	0	$10,700	$0
Ector County	5/6/1995	71	0	0	$62,700	$0
City of Odessa	7/21/1995	-	0	0	$62,500	$0
Ector County	10/2/1995	-	0	0	$20,700	$0
City of Odessa	5/8/1997	-	0	0	$39,700	$0
City of Odessa	6/20/1997	-	0	0	$19,900	$0
Ector County	7/5/1997	-	0	0	$49,500	$0
Ector County	7/28/1997	57	0	0	$118,800	$0
City of Odessa	10/9/1997	-	0	0	$39,400	$0
City of Odessa	10/9/1997	-	0	0	$19,700	$0
City of Odessa	4/8/1998	-	0	0	$2,000	$0
Ector County	6/10/1998	-	0	0	$3,900	$0
City of Odessa	6/10/1998	-	0	0	$2,000	$0
Ector County	6/17/1998	52	0	0	$19,500	$0
Ector County	7/21/1998	-	0	0	$5,900	$0

[3] Only recorded events with fatalities, injuries or damages are listed. Magnitude is listed when available. Damage values are in 2025 dollars.

JURISDICTION	DATE	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Odessa	7/31/1999	-	0	0	$19,100	$0
Ector County	2/22/2000	-	0	0	$9,400	$0
City of Odessa	3/7/2000	-	0	0	$18,600	$0
Ector County	5/29/2002	57	0	0	$3,600	$0
Ector County	8/1/2002	61	0	0	$26,400	$0
City of Odessa	9/13/2002	70	0	0	$263,300	$0
City of Odessa	9/13/2002	70	0	0	$52,700	$0
City of Odessa	9/13/2002	61	0	0	$26,400	$0
City of Odessa	10/6/2002	65	0	0	$131,500	$0
City of Odessa	10/18/2002	57	0	0	$122,700	$0
Ector County	6/3/2003	62	0	0	$778,200	$0
Ector County	6/5/2003	53	0	0	$181,600	$0
Ector County	6/5/2003	57	0	0	$5,200	$0
Ector County	8/22/2003	57	0	0	$43,100	$0
City of Odessa	10/5/2003	70	0	0	$171,800	$0
Ector County	1/26/2004	43	0	0	$25,800	$0
Ector County	3/4/2004	39	0	0	$17,000	$0
City of Odessa	10/7/2004	57	0	0	$25,000	$0
Ector County	12/6/2004	57	0	0	$58,500	$0
City of Odessa	5/15/2005	52	0	0	$8,200	$0
Ector County	7/26/2005	52	0	0	$32,600	$0
Ector County	2/24/2007	50	0	0	$62,500	$0
City of Odessa	5/2/2007	58	0	0	$45,900	$0
Ector County	7/12/2007	52	0	0	$30,600	$0
City of Odessa	7/30/2008	56	0	0	$1,500	$0
City of Odessa	4/11/2009	65	0	0	$178,800	$0
Ector County	6/2/2009	56	0	0	$14,800	$0
City of Odessa	9/9/2009	56	0	0	$3,000	$0

SECTION 11: HIGH WIND

JURISDICTION	DATE	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Ector County	6/14/2010	65	0	0	$145,800	$0
Ector County	6/12/2012	61	0	0	$11,100	$0
Ector County	6/12/2012	54	0	0	$2,800	$0
City of Odessa	6/12/2012	56	0	0	$1,400	$0
City of Odessa	6/12/2012	56	0	0	$700	$0
City of Odessa	6/14/2012	65	0	0	$278,300	$0
Ector County	6/5/2013	52	0	0	$2,100	$0
City of Odessa	8/6/2013	65	0	0	$32,600	$0
City of Odessa	6/18/2014	61	0	0	$26,700	$0
City of Odessa	8/10/2014	65	0	0	$93,500	$0
City of Odessa	8/10/2014	56	0	0	$8,100	$0
City of Odessa	8/10/2014	61	0	0	$1,700	$0
City of Odessa	8/20/2014	65	0	0	$6,700	$0
City of Odessa	5/23/2015	56	0	0	$66,800	$0
City of Odessa	5/23/2015	56	0	0	$13,400	$0
City of Odessa	6/30/2015	65	0	0	$6,700	$0
City of Odessa	6/30/2015	65	0	0	$2,700	$0
City of Odessa	8/14/2015	74	0	0	$33,400	$0
City of Odessa	8/14/2015	70	0	0	$26,700	$0
Ector County	5/26/2016	46	0	0	$2,700	$0
City of Odessa	7/6/2016	61	0	0	$19,900	$0
City of Odessa	9/17/2016	61	0	0	$131,600	$0
City of Odessa	6/12/2017	61	0	0	$129,700	$0
City of Odessa	6/14/2017	56	0	0	$1,296,900	$0
City of Odessa	6/14/2017	87	0	0	$41,500	$0
City of Odessa	8/25/2017	61	0	0	$10,400	$0
Ector County	8/27/2018	65	0	0	$700	$0
City of Odessa	8/27/2018	52	0	0	$400	$0

JURISDICTION	DATE	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Ector County	12/26/2018	61	0	0	$10,200	$0
Ector County	3/13/2021	61	0	0	$2,400	$0
Ector County	5/19/2021	65	0	0	$2,400	$0
Ector County	5/28/2021	56	0	0	$2,400	$0
City of Odessa	5/28/2021	52	0	0	$2,400	$0
City of Odessa	5/28/2021	52	0	0	$300	$0
Ector County	6/2/2021	65	0	0	$4,700	$0
City of Odessa	6/26/2021	61	0	0	$14,100	$0
City of Odessa	8/19/2021	61	0	0	$23,300	$0
City of Odessa	5/24/2022	61	0	0	$10,900	$0
City of Odessa	8/28/2022	83	0	0	$120,200	$0
City of Odessa	8/28/2022	74	0	0	$107,300	$0
Ector County	2/26/2023	55	0	0	$10,600	$0
Ector County	3/2/2023	55	0	0	$5,300	$0
Ector County	5/16/2024	100	0	0	$40,500	$0
City of Odessa	5/16/2024	87	0	0	$40,500	$0
Ector County	5/16/2024	78	0	0	$1,100	$0
City of Odessa	5/16/2024	70	0	0	$1,100	$0
City of Odessa	5/30/2024	52	0	0	$5,100	$0
TOTALS		**(MAX EXTENT)**	**0**	**5**	**$8,021,200**	**$200**

Table 11-5. Summary of Historical Events by Jurisdiction, 1988 – 2024

JURISDICTION	NUMBER OF EVENTS	MAGNITUDE (knots)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Ector County	91	100	0	5	$1,926,600	$200
City of Odessa	104	87	0	0	$6,094,600	$0
TOTALS	**195**	**(MAX EXTENT)**	**0**	**5**	**$8,021,400**	

Based on the list of historical high wind events for the Ector County planning area, 97 events have been reported since the 2011 Plan according to the NCEI database.

SECTION 11: HIGH WIND

SIGNIFICANT EVENTS

August 9, 1988

During a thunderstorm, downburst winds damaged one trailer and one wood-frame home approximately eight miles south of the City of Odessa, resulting in two minor injuries.

August 12, 1988

Strong thunderstorm winds impacted the City of Odessa, blowing out windows of buildings on the south side of the city. One home, located at 2nd and Crane Streets, had its roof blown off during the storm. Two children were blown into a plate glass window and injured during the storm. Property damage estimates were not available for this event.

June 3, 2003

A large severe thunderstorm developed over central Ector County between Odessa and Penwell, bringing wind gusts over 70 mph to the planning area. These damaging winds caused numerous impacts, which included a barn being destroyed, a tractor trailer being overturned, and large trees and power poles being downed. Additional damage was observed in the City of Odessa, with roofs being blown off structures, and an apartment complex sustaining significant roof damage. Damages to this apartment complex left 60 families without shelter. Total property damages were estimated at $778,200 (2025 dollars).

June 14, 2017

During the early evening, a line of severe thunderstorms developed and moved over the cities of Odessa and Midland. Within the City of Odessa, these storms brought wind gusts up to 100 mph, the greatest wind speeds reported for the city in the NCEI database. Widespread damages were reported within the planning area, with impacts including roof, window, and siding damage to homes; 16 snapped power poles; many trees being uprooted and downed; and multiple sheds and outbuildings being destroyed. Total property damage was estimated at $1,338,400 (2025 dollars). In terms of property damages, this is the most severe event reported within the planning area.

May 16, 2024

A shortwave trough and a stalled cold front over the Permian Basin resulted in the development of afternoon thunderstorms in the Ector County planning area with severe winds ranging from 60 mph up to 120 mph. Impacts were felt across much of the County. On the western edge of the planning area, a radio tower collapsed from wind gusts in excess of 100 mph. Near the eastern boundary of the county, a restaurant sign was blown apart by 80 mph winds. Elsewhere in the City of Odessa, additional impacts included large trees being uprooted and streetlights being downed. Total property damage was estimated at $88,300 (2025 dollars).

PROBABILITY OF FUTURE EVENTS

Most high winds occur during the spring and fall seasons and during the months of March, April, May, and September. Based on available records of historic events, there have been a total of 195 events in a 37-year reporting period, which provides an estimated annual frequency of five to six events. Even though the intensity of high wind events is not always damaging for the Ector County planning area, the frequency of occurrence for a high wind event is “Highly Likely”. This means that an event is probable within the next year for the Ector County planning area.

CLIMATE CHANGE CONSIDERATIONS

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

VULNERABILITY AND IMPACT

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

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

According to the American Community Survey (ACS) five-year estimates for 2023, a total of 11,009 manufactured homes are located in the Ector County planning area (16 percent of total housing stock). In addition, 48 percent (32,678 structures) of the housing units were built before 1980. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant wind events.

Table 11-6. Structures at Greater Risk by Participating Jurisdiction

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Ector County	32,678	11,009
City of Odessa	26,130	1,479

While all citizens are vulnerable to the impacts of high wind, forced relocation and disaster recovery disproportionately impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 15

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

percent of the planning area population live below the poverty level (Table 11-7). While warning times for these types of hazard events should be substantial enough for these individuals to seek shelter, the elderly, children, and people with a disability may have trouble taking shelter due to mobility issues or a lack of awareness, making them more susceptible to injury or harm. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

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

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Ector County	16,038	14,115	16,785	24,971	22,046
City of Odessa	11,670	10,246	11,536	16,428	13,178

The Ector County Planning Team identified the following critical facilities (Table 11-8) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by high wind events. The critical infrastructure with the greatest vulnerability to thunderstorms are power and communications facilities. Failures of these facilities can result in a loss of service and cascading impacts such as posing enormous risk to individuals dependent on electricity as a medical necessity. For a comprehensive list by participating jurisdiction, please see Appendix D.

Table 11-8. Critical Facilities Vulnerable to High Wind Events

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

[5] US Census Bureau 2023 data for Ector County.

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

A high wind event can also result in traffic disruptions, injuries and in rare cases, fatalities. The impacts of high winds experienced in the Ector County planning area has resulted in five reported injuries. Overall, in the past 37 years there has been an estimated total of $8,021,400 in damages (2025 dollars) in the Ector County planning area due to high wind events. The estimated average annual loss from high wind events is $216,800. Based on historic damages to the built environment, the impact of high winds on the Ector County planning area would be considered Limited severity of impact, meaning critical facilities and services shut down for 24 hours or less and less than 10 percent of property destroyed or with major damage. However, with multiple reported injuries due to past wind events, the severity of impact is considered “Minor,” meaning multiple injuries that do not result in permanent disability are possible.

Table 11-9. Estimated Annualized Losses by Participating Jurisdiction

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Ector County	$1,926,800	$52,100
City of Odessa	$6,094,600	$164,700
PLANNING AREA	**$8,021,400**	**$216,800**

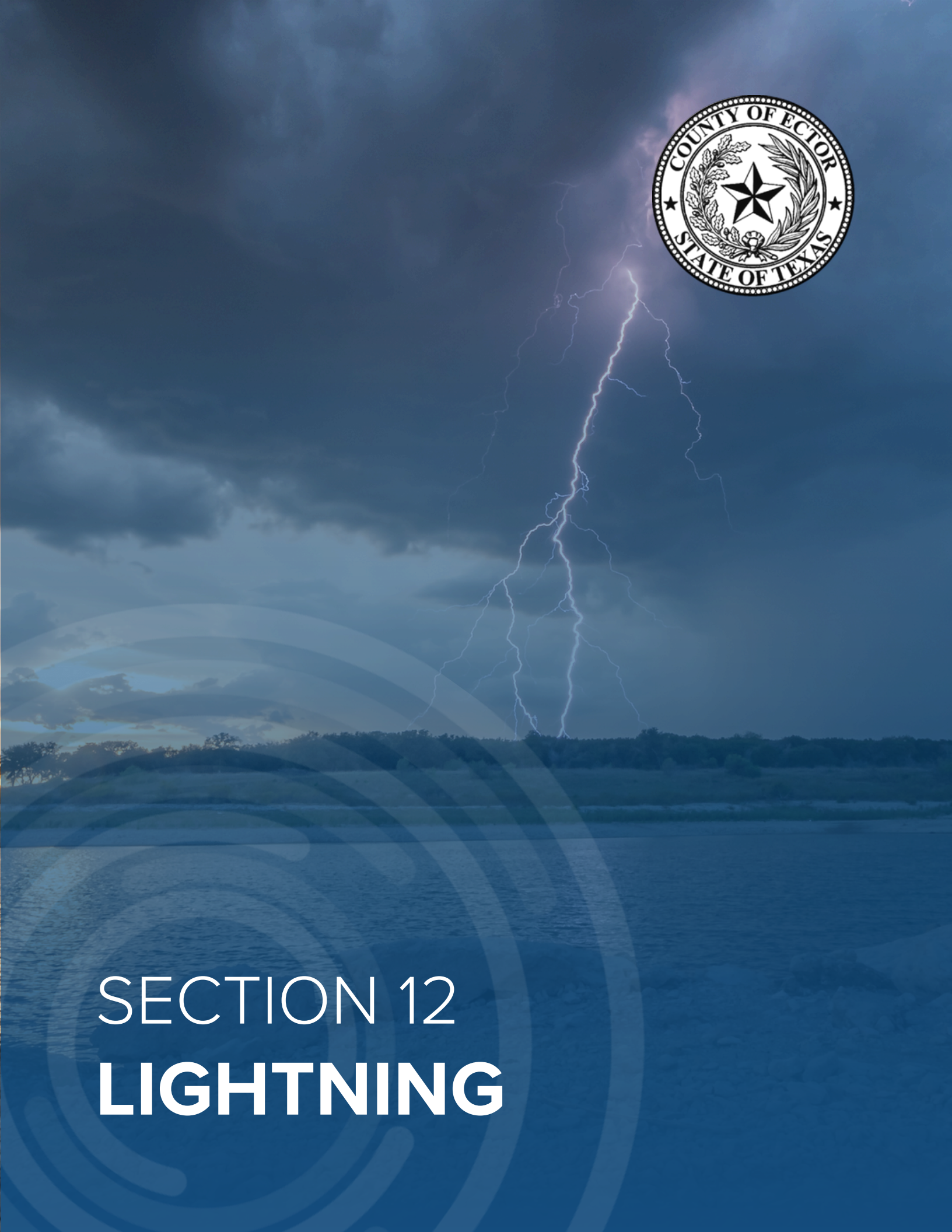
ASSESSMENT OF IMPACTS

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

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- Thunderstorm wind events often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage often results in an increase in structure fires and carbon monoxide poisoning, as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- Critical staff may be unable to report for duty, limiting response capabilities.
- Private sector entities that residents rely on, such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- Some businesses not directly damaged by high wind events may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Older structures, specifically those built before 1980 (48 percent of the planning area), were built to less stringent building codes may suffer greater damage as they are typically more vulnerable to high winds.
- Recreational areas such as community parks and green spaces may be damaged or inaccessible due to downed trees or debris, causing temporary impacts to associated businesses in the area.
- Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There is one historical

site, the White-Pool House in the City of Odessa, listed on the National Register of Historic Places for Ector County.

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



SECTION 12
LIGHTNING

SECTION 12: LIGHTNING

HAZARD DESCRIPTION

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

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

LOCATION

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

EXTENT

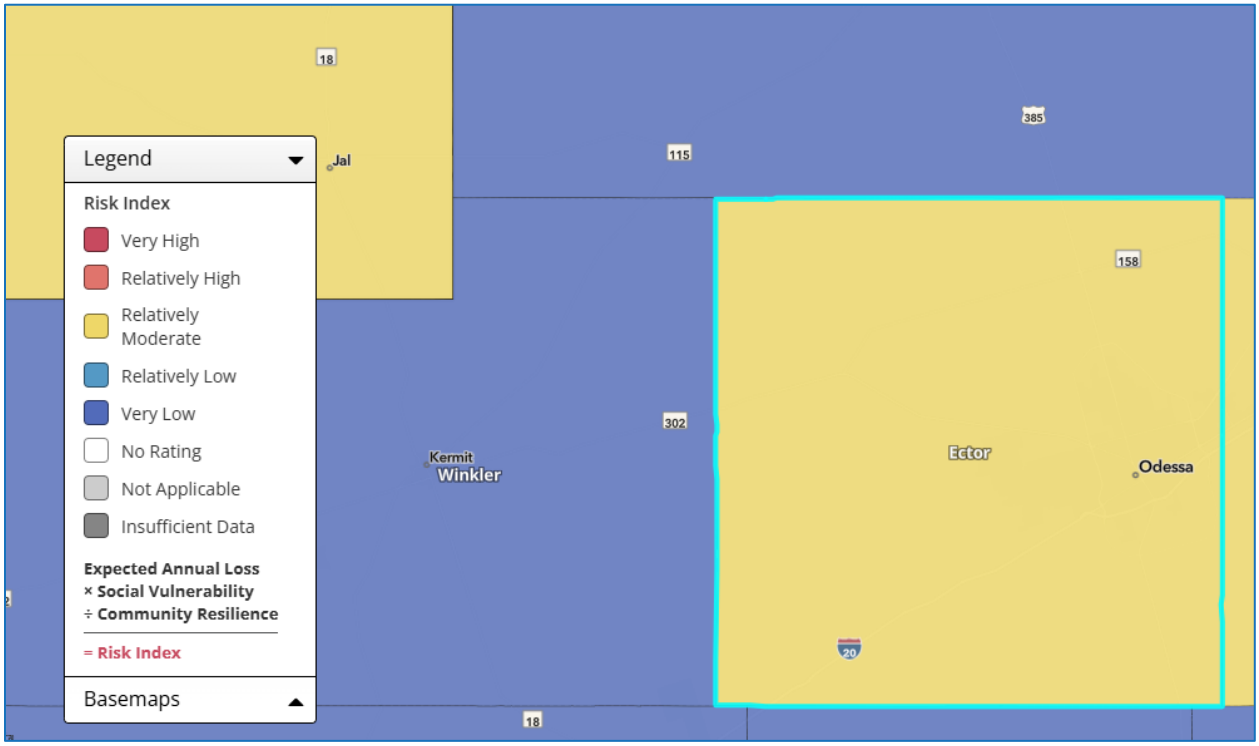
According to the 2024 Annual Lightning Report by Vaisala, the State of Texas ranks fifth in the U.S. for lightning strike density with an average of 150.5 flashes per square mile.[1] Vaisala's U.S. National Lightning Detection Network lightning flash density map shows an average of 95 lightning events per square mile per year for the Ector County planning area. This rate equates to

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

approximately 85,300 flashes per year for the entire planning area, or two to three flashes per 15-minute interval during storm events.

FEMA's National Risk Index includes an analysis of the planning area's expected annual loss and the community's risk factor which incorporates social vulnerability as well as community resilience to determine the lightning risk for the area, compared to the rest of the United States. Ector County is located in an area where the extent is classified as relatively moderate (Figure 12-1).

Figure 12-1. Ector County Lightning Risk, National Risk Index, April 2025[2]



HISTORICAL OCCURRENCES

The National Centers for Environmental Information (NCEI) database indicates three recorded lightning events for the Ector County planning area. It is highly likely multiple lightning occurrences have gone unreported before and during the recording period. The NCEI is a national data source organized under the National Oceanic and Atmospheric Administration and considered a reliable resource for hazards. However, the flash density for the planning area along with input from local team members indicates regular lightning occurrences that simply have not been reported.

Table 12-1. Historical Lightning Events, 1996 – 2024[3]

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Ector County	5/25/2003	0	0	$104,300	$0

[2] Source: Map | National Risk Index, https://hazards.fema.gov/nri/map
[3] Values are in 2025 dollars. Database was searched for events between 1996 and 2024.

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Ector County	6/9/2003	0	0	$60,800	$0
Ector County	5/15/2005	0	0	$123,100	$0
TOTALS		**0**	**0**	**$288,200**	

Table 12-2. Historical Lightning Events Summary, 1996 – 2024[4]

JURISDICTION	NUMBER OF EVENTS	DEATHS	INJURIES	PROPERTY DAMAGES	CROP DAMAGES
Ector County	3	0	0	$288,200	$0
City of Odessa	0	-	-	-	-
TOTALS	**3**	**0**	**0**	**$288,200**	**$0**

Based on the list of historical lightning events for the Ector County planning area (listed above), no events have been reported since the 2011 Plan according to the NCEI database.

SIGNIFICANT EVENTS

May 25, 2003

An active round of thunderstorms that affected parts of West Texas on May 24th also included a serious flash flood event. Several thunderstorms developed along the outflow boundary, which was located along the Interstate 20 corridor in the Permian Basin. These storms trailed across the boundary and moved into the county. As a result, lightning struck a warehouse which caused it to catch fire in West Odessa. The warehouse was destroyed as a result. Damages from this incident were estimated at $104,300 (2025 dollars).

May 15, 2005

Several showers and thunderstorms appeared over the Permian Basin in West Texas during the early morning hours of May 15th. This storm system was also accompanied by damaging thunderstorm winds. During this event, lightning was responsible for igniting two structure fires in the City of Odessa. Damages from this incident were estimated at $123,102 (2025 dollars).

PROBABILITY OF FUTURE EVENTS

Based on historical records and input from the planning team the probability of occurrence for future lightning events in the Ector County planning area is considered “Highly Likely”, or an event probable in the next year. The planning team indicated that lightning occurs regularly in the area. According to the 2024 Annual Lightning Report by Vaisala, the Ector County planning area is located in an area of the country that experiences approximately 95 lightning flashes per square mile per year (approximately 85,300 flashes per year). Given this estimated probability of events, it can be expected that future lightning events will continue to threaten life and cause minor property damage throughout the planning area. Impacts of climate change are not expected to

[4] Participating jurisdictions with no reported events show a “-“ in table columns where damages, deaths or injuries would be otherwise reported.

increase the average frequency of lightning events but may lead to an increase in the intensity of events when they do occur.

CLIMATE CHANGE CONSIDERATIONS

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

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

VULNERABILITY AND IMPACT

Vulnerability is difficult to evaluate since lightning events can occur at different strength levels, in random locations, and can create a broad range of damage depending on the strike location. Due to the randomness of these events, all existing and future structures and facilities in the Ector County planning area could potentially be impacted and remain vulnerable to possible injury and property loss from lightning strikes.

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

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

While all citizens are at risk to the impacts of lightning, forced relocation and disaster recovery disproportionately impacts low-income residents who lack the financial means to travel, afford a long-term stay away from home, and to rebuild or repair their homes. An estimated 15 percent of

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

the planning area population live below the poverty level. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures. Table 12-3 lists these vulnerable populations and several others for Ector County and the City of Odessa.

Table 12-3. Populations at Greater Risk by Jurisdiction[6]

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Ector County	16,038	14,115	16,785	24,971	22,046
City of Odessa	11,670	10,246	11,536	16,428	13,178

The Ector County Planning Team identified the following critical facilities (Table 12-4) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by lightning events. For a comprehensive list by participating jurisdiction, please see Appendix D.

Table 12-4. Critical Facilities Vulnerable to Lightning Events

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to power outages, damaged facilities, fires and/or loss of communications as a result of lightning strikes. • Emergency vehicles, including critical equipment, can be damaged by lightning strikes or by falling trees damaged by lightning. • Power outages could disrupt communications, delaying emergency response times. • Downed trees due to lightning strikes can impede emergency response vehicle access to areas. • Lightning strikes can be associated with structure fires and wildfires, further straining the capacity and resources of emergency personnel. • Extended power outages may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/	• Structures can be damaged by falling trees damaged by lightning. • Power outages could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary due to extended power outages, fires, or other associated damages to facilities.

[6] US Census Bureau, American Community Survey Five-Year Estimates, 2023

CRITICAL FACILITIES	POTENTIAL IMPACTS
Assisted Living Facilities	
Commercial Supplier (food, fuel, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed. • Economic disruption due to power outages and fires negatively impact airport services as well as area businesses reliant on airport operations.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and critical services may be significantly impacted due to power outages, damaged facilities, fires and/or loss of communications as a result of lightning strikes. • Emergency vehicles, including critical equipment, can be damaged by lightning strikes or by falling trees damaged by lightning. • Power outages could disrupt communications, delaying emergency response times. • Downed trees due to lightning strikes can impede emergency response vehicle access to areas. • Lightning strikes can be associated with structure fires and wildfires, further straining the capacity and resources of emergency personnel. • Extended power outages may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

There are no recorded fatalities or injuries within the Ector County planning area due to lightning events. Overall, the total loss estimate of property and crops in the planning area is $288,200 (2025 dollars) with an average annualized loss of $9,900. Based on recorded impacts and best available data for the Ector County planning area, the potential impact of lightning is considered “Limited” severity of impact, meaning minimal quality of life lost, critical facilities and services shut down for 24 hours or less, and less than 10 percent of property destroyed.

Table 12-5. Estimated Annualized Losses by Jurisdiction

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Ector County	$288,200	$9,900
City of Odessa	$0	$0
TOTALS	**$288,200**	**$9,900**

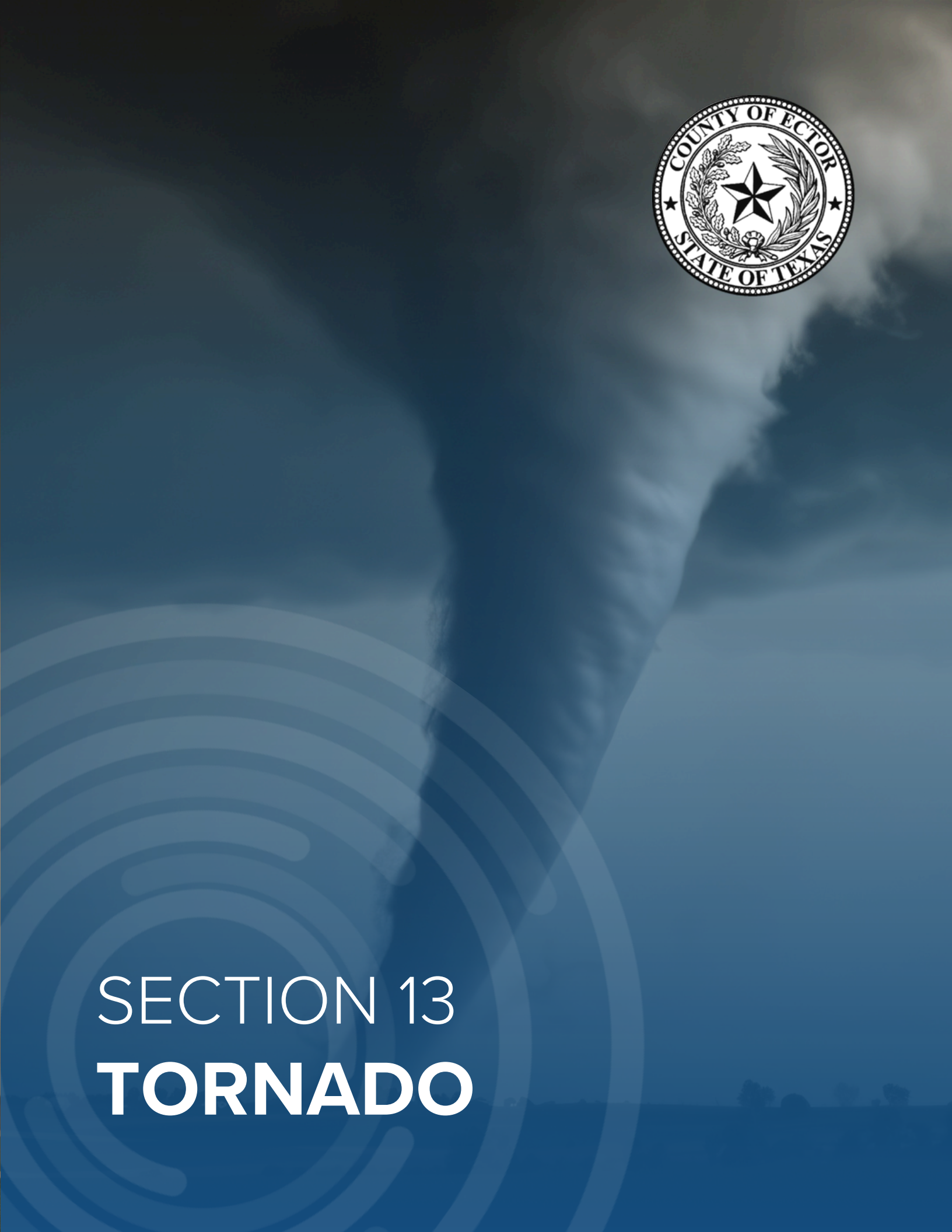
SECTION 12: LIGHTNING

ASSESSMENT OF IMPACTS

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

- The Ector County planning area features developed parks and green spaces. Lightning events could impact recreational activities, placing residents and visitors in imminent danger, potentially requiring emergency services or park evacuation.
- Older structures built to less stringent building codes may suffer greater damage from a lightning strike as they are typically built with less fire-resistant materials and often lack any fire mitigation measures such as sprinkler systems. 48 percent of homes in Ector County were built before 1980. Similarly, historic buildings may lack fire mitigation materials or measures due to their historic status. One historic site in the Ector County planning area is listed on the National Register of Historic Places.
- Vegetation in urban parks may be destroyed by lightning caused brush fires and result in poor air quality impacting public health.
- Individuals exposed to the storm can be directly struck, posing significant health risks and potential death.
- Structures can be damaged or crushed by falling trees damaged by lightning, which can result in physical harm to the occupants.
- Lightning strikes can result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage often results in an increase in structure fires and carbon monoxide poisoning as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- Lightning strikes can be associated with structure fires and wildfires, creating additional risk to residents and first responders.
- Emergency operations and services may be significantly impacted due to power outages and/or loss of communications.
- County and city departments may be damaged, delaying response and recovery efforts for the entire community.
- Economic disruption due to power outages and fires negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue.
- Some businesses not directly damaged by lightning events may be negatively impacted while utilities are being restored, further slowing economic recovery.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damage without a backup power source.

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



SECTION 13
TORNADO

SECTION 13: TORNADO

HAZARD DESCRIPTION

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

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

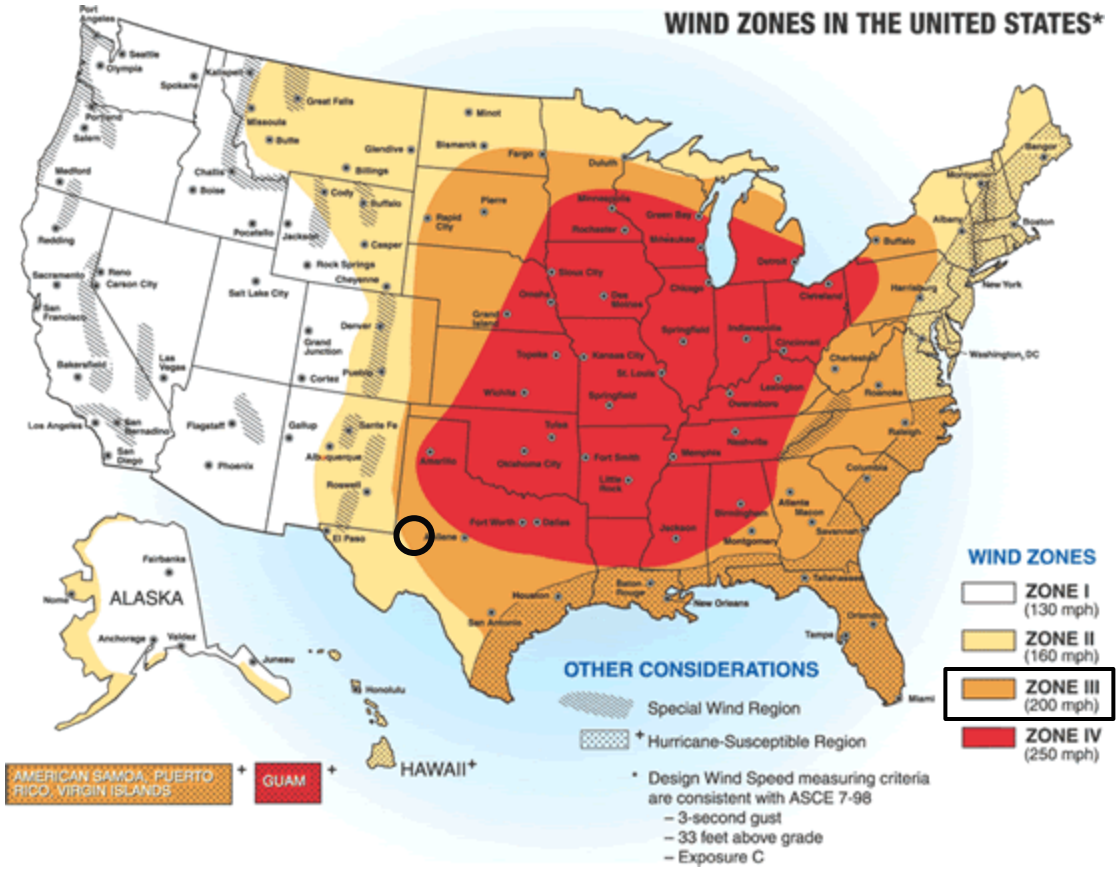
Table 13-1. Variations among Tornadoes

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

LOCATION

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

Figure 13-1. FEMA Wind Zones in the United States[1]



EXTENT

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

Tornado magnitudes prior to 2007 were determined using the traditional version of the Fujita Scale, which estimated tornado wind speeds based on the damage caused by an event. Since February 2007, the Enhanced Fujita Scale has been utilized to classify tornadoes, which included improvements to the original scale. The original Fujita scale had limitations, such as a lack of damage indicators, no account for construction quality and variability, and no definitive correlation between damage and wind speed. These limitations led to some tornadoes being rated in an inconsistent manner and, in some cases, an overestimate of tornado wind speeds. The Enhanced Fujita scale retains the same basic design and six strength categories as the previous scale. The newer scale reflects more refined assessments of tornado damage surveys, standardization, and damage consideration to a wider range of structures. Table 13-2 includes both scales for reference when analyzing historical tornadoes, since tornado events prior to 2007 will follow the original Fujita Scale.

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

Table 13-2. The Fujita and Enhanced Fujita Tornado Scale[2]

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

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

Both the Fujita Scale and Enhanced Fujita Scale should be referenced in reviewing previous occurrences since tornado events that occurred before 2007 will follow the original Fujita Scale. The greatest magnitude reported within the planning area is EF3, a severe tornado capable of causing severe damage to structures, uprooting or snapping large trees, and demolishing mobile homes and small buildings. Based on the planning area's location in Wind Zone III, the planning area has the potential to experience anywhere from an EF0 to an EF5 depending on the wind speed. Previous tornado events in the Ector County planning area (converted from the Fujita Scale) have all been between EF0 and EF3 magnitudes (Figure 13-2). This is the worst the planning area can anticipate based on historical events.

HISTORICAL OCCURRENCES

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

Figure 13-2 identifies the locations of previous occurrences in the Ector County planning area from 1957 through 2024. A total of 45 events have been recorded by NOAA's Storm Prediction Center and the NCEI Storm Events databases for the Ector County planning area. The strongest magnitude reported in the planning area is an EF3 tornado; tornadoes of this severity have occurred twice, in 2010 and 2019 (Table 13-3).

Figure 13-2. Spatial Historical Tornado Events, 1957 –2024[3]

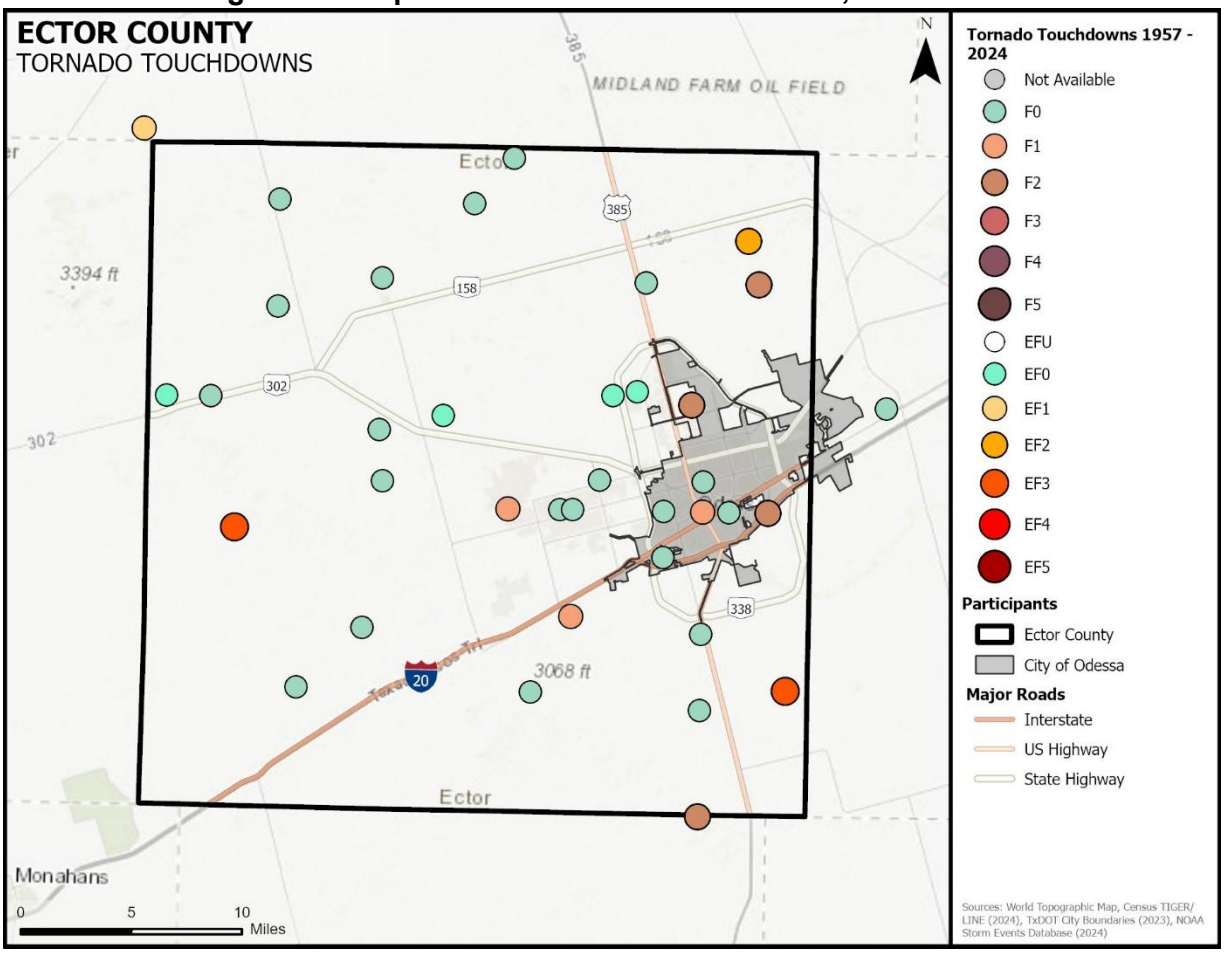


Table 13-3. Historical Tornado Events, 1957 – 2024[4]

JURISDICTION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Odessa	4/22/1957	F0	0	0	$400	$0
Ector County	7/21/1961	F2	0	0	$0	$0
Ector County	6/14/1968	F0	0	0	$22,900	$0
Ector County	6/3/1969	F2	0	0	$0	$0
City of Odessa	6/29/1972	F0	0	0	$0	$0
City of Odessa	5/12/1973	F2	0	0	$1,809,100	$0
Ector County	4/19/1977	F0	0	0	$0	$0
Ector County	7/19/1979	F0	0	0	$0	$0

[3] Source: NOAA Storm Prediction Center
[4] Damage values are in 2025 dollars.

JURISDICTION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Odessa	8/28/1981	F0	0	0	$0	$0
Ector County	10/15/1981	F2	0	2	$85,100	$0
Ector County	5/12/1982	F0	0	0	$100	$0
Ector County	5/27/1982	F0	0	0	$100	$0
Ector County	7/2/1982	F1	0	0	$8,200	$0
City of Odessa	5/25/1983	F0	0	0	$100	$0
Ector County	5/30/1983	F0	0	0	$100	$0
Ector County	5/25/1985	F0	0	0	$0	$0
City of Odessa	6/1/1985	F0	0	0	$0	$0
Ector County	10/13/1985	F0	0	0	$0	$0
City of Odessa	5/26/1987	F1	0	0	$70,300	$0
Ector County	5/26/1987	F0	0	0	$0	$0
City of Odessa	5/26/1987	F0	0	0	$0	$0
Ector County	6/3/1989	F0	0	0	$0	$0
Ector County	6/6/1989	F1	0	0	$64,000	$0
Ector County	6/10/1989	F0	0	0	$0	$0
Ector County	6/10/1989	F0	0	0	$0	$0
City of Odessa	8/2/1989	F0	0	0	$0	$0
City of Odessa	9/8/1989	F0	0	0	$0	$0
Ector County	9/21/1990	F0	0	0	$0	$0
Ector County	5/24/1992	F0	0	0	$0	$0
Ector County	6/26/1992	F0	0	0	$0	$0
Ector County	6/26/1992	F0	0	0	$0	$0
Ector County	4/22/1994	F0	0	0	$0	$0
Ector County	5/12/1994	F0	0	0	$0	$0
Ector County	5/1/1999	F0	0	0	$0	$0
Ector County	3/22/2000	F0	0	0	$18,600	$0
Ector County	5/27/2002	F0	0	0	$3,600	$0

JURISDICTION	DATE	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
City of Odessa	7/26/2005	F0	0	0	$0	$0
Ector County	6/3/2007	EF0	0	0	$0	$0
Ector County	5/14/2010	EF3	0	0	$145,700	$0
Ector County	5/14/2010	EF0	0	0	$0	$0
City of Odessa	9/1/2010	EF0	0	0	$0	$0
Ector County	3/18/2012	EF2	0	3	$1,384,900	$0
City of Odessa	9/16/2016	EF0	0	0	$0	$0
Ector County	9/17/2016	EF1	0	0	$39,500	$0
Ector County	5/20/2019	EF3	0	0	$248,100	$0
TOTALS		**(MAX EXTENT)**	**0**	**5**	**$3,900,800**	**$0**

Table 13-4. Summary of Historical Tornado Events, 1957 – 2024

JURISDICTION	NUMBER OF EVENTS	MAX MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Ector County	32	EF3	0	5	$2,020,900	$0
City of Odessa	13	F2	0	0	$1,879,900	$0
TOTALS	**45**	**(MAX EXTENT)**	**0**	**5**	**$3,900,800**	

Based on the list of historical tornado events for the Ector County planning area, there have been seven recorded events since the 2011 Plan.

SIGNIFICANT EVENTS

May 12, 1973

An F2 tornado on the southeastern side of the City of Odessa caused considerable damage along its one mile path along the ground. Impacts included a destroyed commercial building, heavily damaged houses and mobile homes, and widespread tree damage. Total property damage was estimated at $1,809,100 (2025 dollars).

May 14, 2010

Just after noon, a powerful EF3 tornado was spotted in Ector County approximately 6.5 miles south of Notrees. The tornado progressed to the northeast, creating a damage path over 4 miles long and 500 yards wide. Impacts from the tornado consisted of downed power poles and significant damage to oil equipment. This includes two pump jacks, each weighing 71,000 pounds, which were blown over by the tornadic winds. Total property damage was estimated at $145,700 (2025 dollars).

March 18, 2012
A tornado touched down in the Gardendale community overnight, causing considerable damage during its brief duration in the Ector County planning area. Damage surveys indicated most of the impacts to be consistent with EF1 and EF2 level winds. Impacts included a large camper being overturned in an RV park, significant damage to several homes, and a travel trailer and barn being destroyed. Additionally, great amounts of debris were reported with small pieces being launched by the tornado and lodged in the walls of homes. Three minor injuries were also reported during this event. Total property damage was estimated at $1,384,900 (2025 dollars).

May 20, 2019
Severe thunderstorms over the planning area produced an EF3 tornado between the City of Odessa and the community of Pleasant Farms. Along the tornado's approximately 1.3-mile path, damages included numerous downed power poles as well as pump jacks and other oil field equipment being toppled. Total property damage was estimated at $248,100 (2025 dollars).

PROBABILITY OF FUTURE EVENTS

Tornadoes can occur at any time of year and at any time of day, but they are typically more common in the spring months during the late afternoon and evening hours. A smaller, high frequency period can emerge in the fall during the brief transition between the warm and cold seasons. With 45 historical events over a 68-year reporting period, the Ector County planning area can anticipate a tornado touchdown approximately once every one to two years. This frequency supports a "Highly Likely" probability of future events for the Ector County planning area, meaning an event is probable within the next year.

CLIMATE CHANGE CONSIDERATIONS

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

VULNERABILITY AND IMPACT

Because tornadoes often cross jurisdictional boundaries, all existing and future buildings, facilities, and populations in the entire Ector County planning area is considered to be exposed to

[5] Treisman, Rachel. *The exact link between tornadoes and climate change is hard to draw. Here's why*. NPR. December 13, 2021. https://www.npr.org/2021/12/13/1063676832/the-exact-link-between-tornadoes-and-climate-change-is-hard-to-draw-heres-why
[6] Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, Texas A&M University Office of the Texas State Climatologist, 2021 update.

this hazard and could potentially be impacted. The damage caused by a tornado is typically a result of high wind velocity, wind-blown debris, lightning, and large hail.

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

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

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

The Ector County planning area features mobile or manufactured homes throughout the planning area. These structures are typically more vulnerable to tornado events than typical site-built structures. The U.S. Census data indicates a total of 11,009 (16 percent of total housing stock) manufactured homes located in the Ector County planning area. In addition, 48 percent (32,678 structures) of the housing structures in the Ector County planning area were built before 1980. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant tornado events (Table 13-5).

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

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Ector County	32,678	11,009
City of Odessa	26,130	1,479

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

The population over 65 in the Ector County planning area is estimated at 10 percent of the total population and children under the age of 5 are estimated at 9 percent. The population with a disability is estimated at 10 percent of the total population. An estimated 15 percent of the planning area population live below the poverty level and 14 percent of the populations speak English ‘less than very well’ (Table 13-6).

Table 13-6. Populations at Greater Risk by Participating Jurisdiction[7]

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Ector County	16,038	14,115	16,785	24,971	22,046
City of Odessa	11,670	10,246	11,536	16,428	13,178

The Ector County Planning Team identified the following critical facilities as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by tornado events (Table 13-7). The critical infrastructure with the greatest vulnerability to tornadoes are power and communications facilities. Failures of these facilities can result in a loss of service and cascading impacts such as posing enormous risk to individuals dependent on electricity as a medical necessity. For a comprehensive list by participating jurisdiction, please see Appendix D.

Table 13-7. Critical Facilities Vulnerable to Tornado Event

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling trees or flying debris. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Debris/downed trees can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions. • Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/	• Structures can be damaged by falling trees damaged by lightning. • Power outages could disrupt critical care. • Backup power sources could be damaged. • Evacuations may be necessary due to extended power outages, fires, or other associated damage to facilities.

[7] U.S. Census Bureau 2023 data for Ector County

CRITICAL FACILITIES	POTENTIAL IMPACTS
Assisted Living Facilities	• Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations. • Temporary break in operations may significantly inhibit post event evacuations. • Damaged or destroyed highway infrastructure may substantially increase the need for airport operations.
Commercial Supplier (Food, fuel, etc.)	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed. • Additional emergency responders and critical aid workers may not be able to reach the area for days.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Emergency vehicles can be damaged by falling trees or flying debris. • Power outages could disrupt communications, delaying emergency response times. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities. • Debris/downed trees can impede emergency response vehicle access to areas. • Increased number of structure fires due to gas line ruptures and downed power lines, further straining the capacity and resources of emergency personnel. • First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions. • Extended power outages and evacuations may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.

The total loss estimate due to tornado events in Ector County is $3,900,800 (2025 dollars), having an approximate average annual loss estimate of $57,400. Additionally, tornadoes have caused five injuries within the planning area. Based on historical damages to property and crops, the impact of a tornado event on the Ector County planning area would be considered Limited severity of impact, meaning complete shutdown of facilities for 24 hours or less and less than 10 percent of property destroyed or with major damage. However, based on several previously reported injuries due to tornado, the severity of impact is considered “Major,” meaning injuries resulting in permanent disability are possible depending on the size and extent of the event.

Table 13-8. Estimated Average Annual Losses by Jurisdiction

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
Ector County	$2,020,900	$29,700

JURISDICTION	TOTAL PROPERTY & CROP LOSS	AVERAGE ANNUAL LOSS ESTIMATES
City of Odessa	$1,879,900	$27,600
Planning Area	**$3,900,800**	**$57,400**

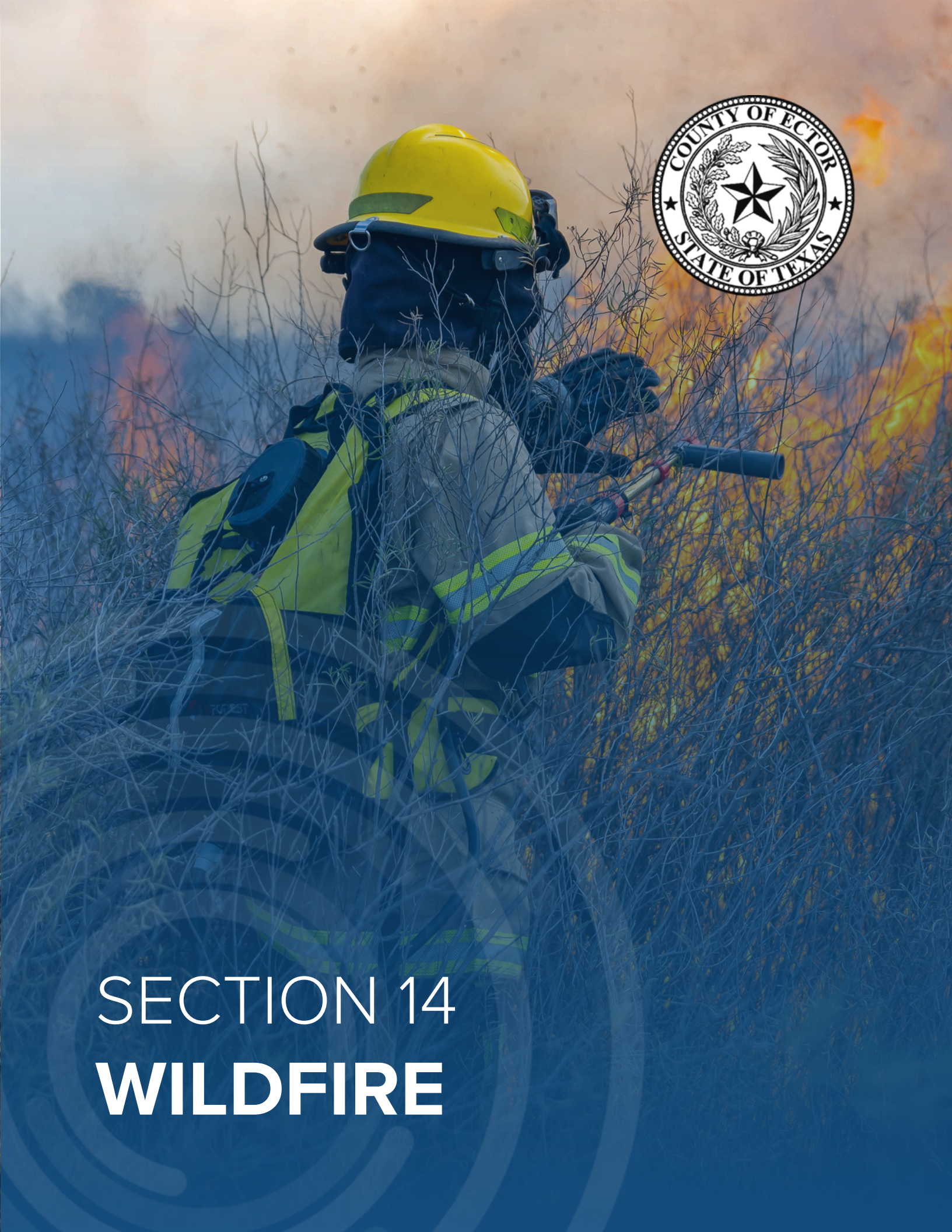
ASSESSMENT OF IMPACTS

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

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Manufactured homes (16 percent of total housing stock) may suffer substantial damage as they would be more vulnerable than typical site-built structures.
- Portable classrooms may also suffer substantial damage as they would be more vulnerable than other classroom structures.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- Tornadoes often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outages can result in an increase in structure fires and/or carbon monoxide poisoning as individuals attempt to cook or heat their home with alternate, unsafe cooking or heating devices, such as grills.
- Tornadoes can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.
- First responders must enter the damage area shortly after the tornado passes to begin rescue operations and to organize cleanup and assessments efforts, therefore they are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions, elevating the risk of injury to first responders and potentially diminishing emergency response capabilities.
- Emergency operations and services may be significantly impacted due to damaged facilities, loss of communications, and damaged emergency vehicles and equipment.
- Private sector entities such as utility providers, financial institutions, and medical care providers may not be fully operational and may require assistance from neighboring communities until full services can be restored.
- Economic disruption negatively impacts the programs and services provided by the community due to short- and long-term loss in revenue, especially if damage is sustained to major employers within the planning area.

- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- When the community is affected by significant property damage it is anticipated that funding would be required for infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, and normal day-to-day operating expenses.
- Displaced residents may not be able to immediately return to work, further slowing economic recovery.
- Residential structures destroyed by a tornado may not be rebuilt for years, reducing the tax base for the community.
- Large or intense tornadoes may result in a dramatic population fluctuation, as people are unable to return to their homes or jobs and must seek shelter and/or work outside of the affected area.
- Businesses that are uninsured or underinsured may have difficulty reopening, which results in a net loss of jobs for the community and a potential increase in the unemployment rate.
- Recreation activities may be unavailable, and tourism can be unappealing for years following a large tornado, devastating directly related local businesses.
- Tornadoes may destroy or degrade endangered species habitat; currently, there are four federally endangered, threatened, or candidate species in the planning area.
- Historical sites and properties are placed at a higher risk of impact due to materials used and the inability to change properties due to their historic status. There is one historical site, the White-Pool House in the City of Odessa, listed on the National Register of Historic Places for Ector County.

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



SECTION 14
WILDFIRE

SECTION 14: WILDFIRE

HAZARD DESCRIPTION

Wildfire is an unplanned fire burning in natural or wildland areas such as forests, shrub lands, grasslands, or prairies.[1] Texas is one of the fastest growing states in the nation, with much of this growth occurring adjacent to metropolitan areas. This increase in population across the state will impact counties and communities that are located within the Wildland Urban Interface (WUI). The WUI is described as the area where structures and other human improvements meet and intermingle with undeveloped wildland or vegetative fuels. Population growth within the WUI substantially increases the risk of wildfire. In Texas nearly 85 percent of wildfires occur within two miles of a community.[2]

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

Development has increased in west Texas, resulting in more populated areas within the wildland interface / intermix. Additionally, the area is experiencing hotter, drier climatic conditions. These factors combine to make south Texas at risk from wildfires. While the planning area is continually at some risk for wildfires, that risk is elevated during two periods each year: the winter wildfire season (February through April) and the summer wildfire season (August through October).[3]

The Ector County population is expected to increase over time following population trends over the last few decades. Continued housing development in the WUI will put more people at a greater risk of catastrophic wildfire and put more pressure on land managers and fire department personnel to mitigate fire risk.

Wildfires spread based on the type and quantity of fuel that surrounds it. Fuel can include everything from trees, underbrush and dry grassy fields to homes. The amount of flammable material that surrounds a fire is referred to as the fuel load. Conditions in the weather and

[1] FEMA: https://hazards.fema.gov/nri/wildfire
[2] Texas A&M Forest Service, Texas Wildfire Risk Assessment Summary Report, Ector County: https://texaswildfirerisk.com/
[3] Austin American Statesman, “Winter wildfire risk is rising in Central Texas. Here’s what you should know.” January 2023: https://www.statesman.com/story/news/environment/2023/01/30/wildfire-risk-is-rising-in-central-texas-what-you-should-know/69845234007/

environment, such as drought, winds and extreme heat, can cause a fire to spread more quickly.[4] A wildfire event often begins unnoticed and spreads quickly, lighting brush, trees, and homes on fire. For example, a wildfire may be started by a campfire that was not doused properly, a tossed cigarette, burning debris, or arson. Additionally, the Ector County planning team reports that wildfires are often caused by lightning and thunderstorm wind events.

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

LOCATION

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

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

The threat to people and property from a wildfire event is greater in the fringe areas where developed areas meet open grass lands, such as the Functional Wildland Urban Interface (WUI) (Figures 14-1 and 14-2). The Functional WUI is based on a comprehensive building footprint dataset, fire intensity modeling, and a simulation of ember production and transport. The Zones used in the Functional WUI are described below. Critical facilities are only mapped within the Direct Exposure Zone of the WUI, as these structures face the greatest risk from wildfire due to their proximity to flammable vegetation and potential fire pathways.

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

The **Indirect Exposure Zone** is non-burnable land cover within 1,500 meters of burnable land cover that is within 75 meters of a structure, meaning that embers and home-to-home spread could reach within this zone. Indirectly exposed structures would benefit from the hardening of the structure to resist ignition from embers and nearby structures, but defensible space is usually not required due to the heavily developed nature of the zone.

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

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

The **Sources of Ember Load to Buildings (SELB) Zone** is a critical area or burnable land cover that produces embers capable of reaching nearby buildings. Ember production is a function of fire type and intensity, and ember travel is a function of wind speed and direction. Fuel treatment in this zone is a priority for reducing ember load to the nearby buildings.

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

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

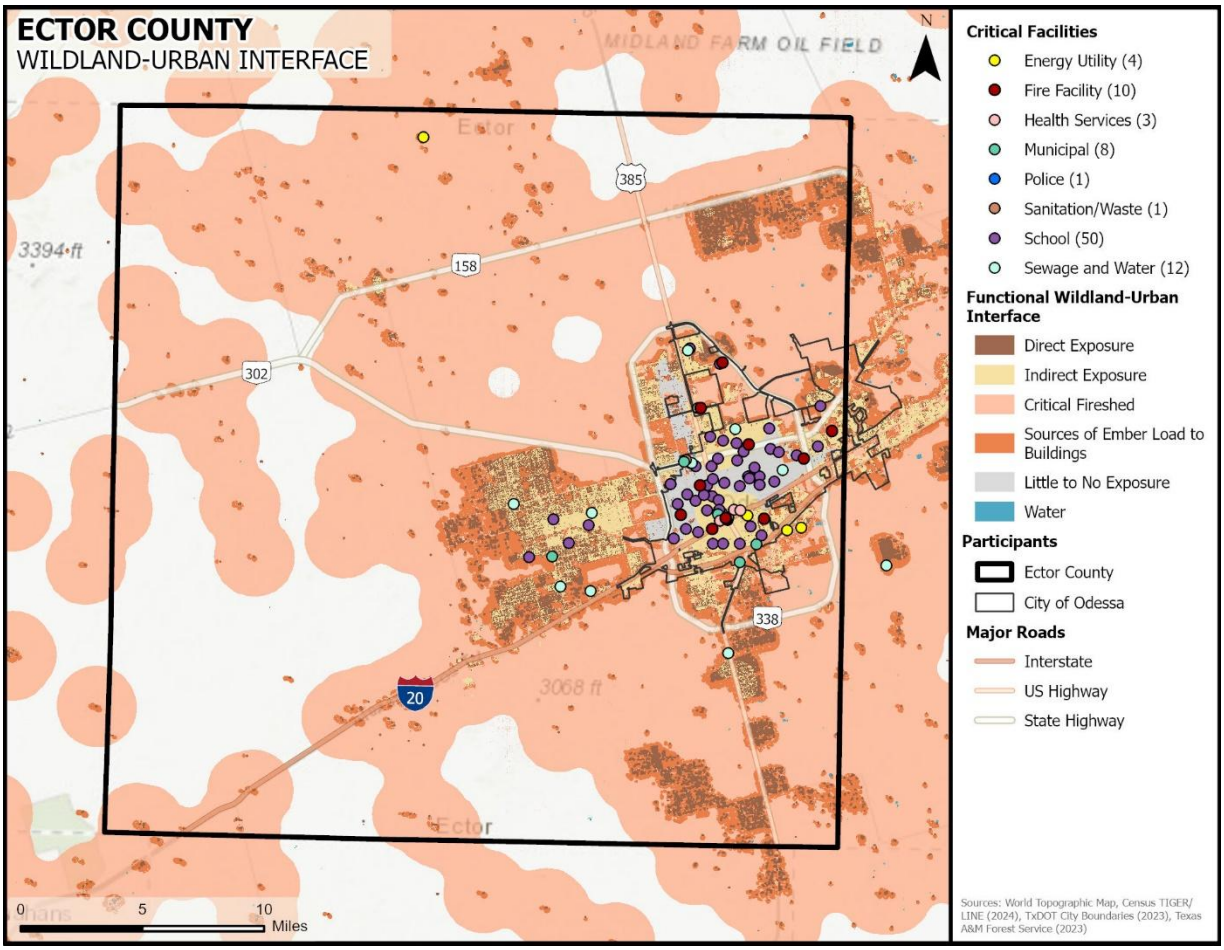
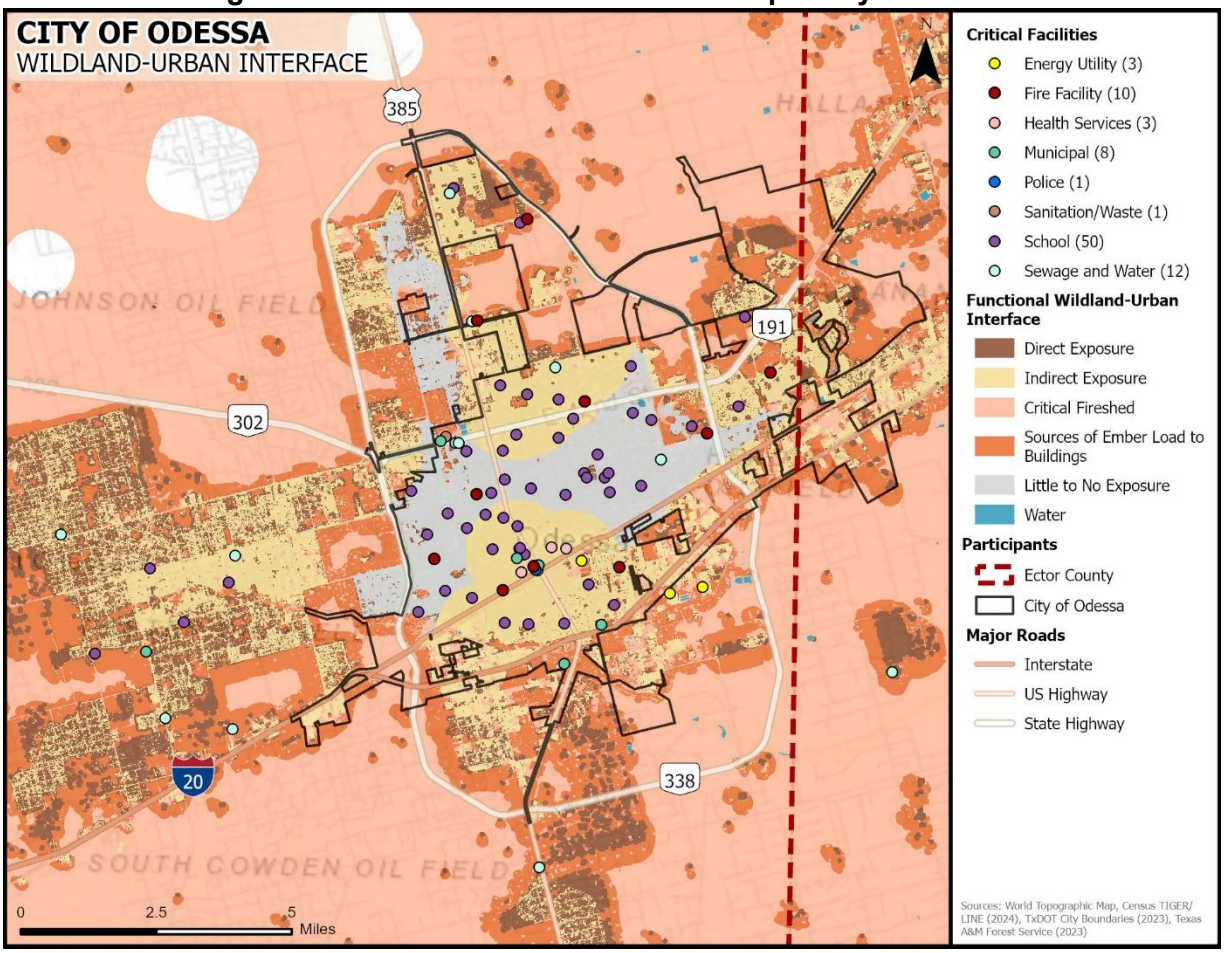


Figure 14-2. Wildland Urban Interface Map – City of Odessa



EXTENT

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

The FIS provides a standard scale to measure potential wildfire intensity. The FIS consists of 5 classes where the order of magnitude between classes is ten-fold. The minimum class, Class 1, represents very low wildfire intensities and the maximum class, Class 5, represents very high wildfire intensities (Table 14-1).

Table 14-1. Characteristic Fire Intensity Scale (FIS)

FIS CLASS	CLASS DESCRIPTION
Class 1 (Very Low)	Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non-specialized equipment.
Class 2 (Low)	Small flames, usually less than 2 feet long; small amount of very short range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
Class 3 (Moderate)	Flames up to 9 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
Class 4 (High)	Large flames, up to 40 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.
Class 5 (Very High)	Flames exceed 200 feet in length; expect extreme fire behavior.

The Ector County planning area is susceptible to the full range of FIS classes. Figures 14-3 and 14-4 identify the current estimated wildfire intensity for the planning area.

Figure 14-3. Fire Intensity Scale Map – Ector County

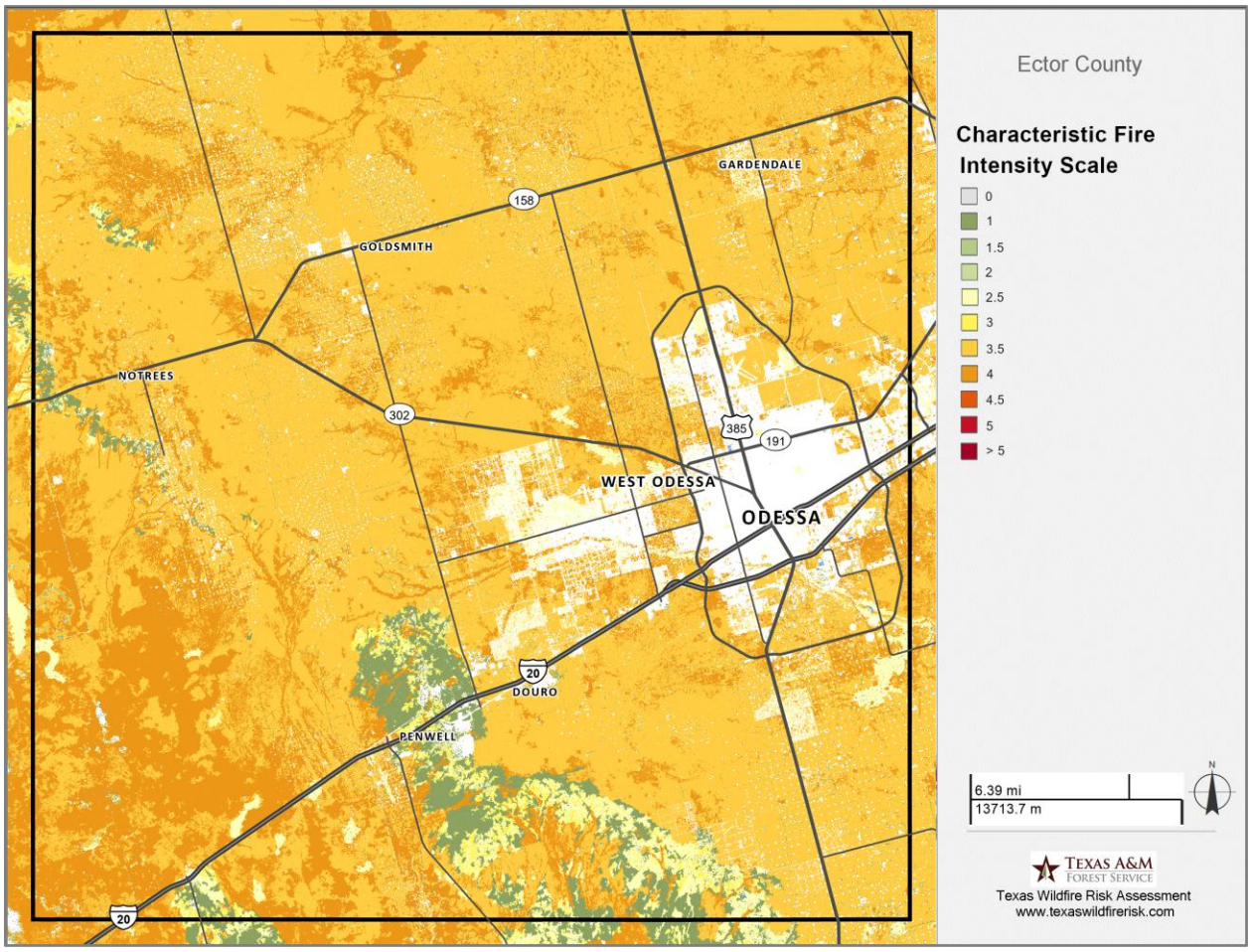
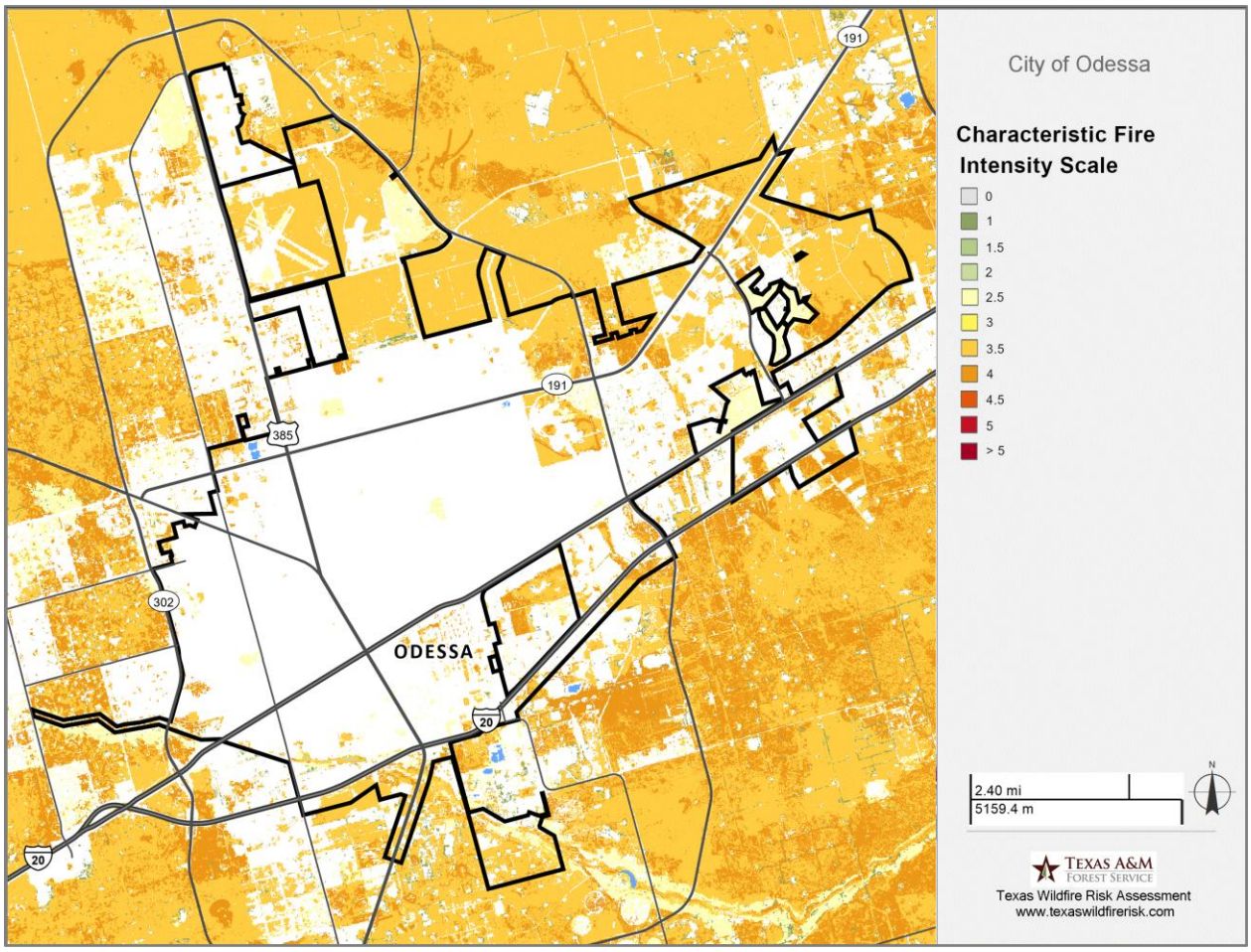


Figure 14-4. Fire Intensity Scale Map – City of Odessa



HISTORICAL OCCURRENCES

The NCEI Storm Events Database includes two records of wildfire events from 1996 through 2024. Both events took place in 2011 and are known as the Bate's Field Fire and the Pleasant Farms Fire. The Pleasant Farms Fire resulted in $141,300 (2025 dollars) in property damages. There are no reported injuries or deaths for the events reported in the NCEI.

The Texas A&M Forest Service (TFS) reported 275 wildfire events for the Ector County planning area between 2005 and 2024. The TFS started collecting wildfire reported by volunteer fire departments in 2005. Due to a lack of recorded data for wildfire events prior to 2005 and after 2024, frequency calculations are based on a 20-year reporting period, using only data from recorded years. Tables 14-2 through 14-4 identify the number of wildfires and total acreage burned each year within the county boundaries.

Table 14-2. Historical Wildfire Events Summary, 2005 - 2024[5]

JURISDICTION	NUMBER OF EVENTS	ACRES BURNED
Ector County	234	51,810
City of Odessa	41	1,419

Table 14-3. Historical Wildfire Events by Year

YEAR	ECTOR COUNTY	CITY OF ODESSA
2005	0	0
2006	0	0
2007	1	0
2008	14	1
2009	7	3
2010	10	2
2011	132	30
2012	1	0
2013	4	4
2014	2	1
2015	1	0
2016	1	0
2017	8	0
2018	2	0
2019	0	0
2020	0	0
2021	13	0
2022	11	0
2023	27	0
2024	0	0
TOTALS	**234**	**41**

[5] Source: Texas A&M Forest Service

Based on the list of historical wildfire events for the Ector County planning area, 62 events have occurred since the 2011 Plan.

Table 14-4. Acreage of Suppressed Wildfire by Year

YEAR	ECTOR COUNTY	CITY OF ODESSA
2005	0	0
2006	0	0
2007	2	0
2008	20,631	1
2009	2,647	1,002
2010	13,273	3
2011	14,199	407
2012	1	0
2013	6	6
2014	0	0
2015	0	0
2016	5	0
2017	42	0
2018	700	0
2019	0	0
2020	0	0
2021	31	0
2022	13	0
2023	260	0
2024	0	0
TOTALS	**51,810**	**1,419**

SIGNIFICANT EVENTS

There have been six declared disasters related to wildfire in Ector County between 1996 and 2024 (Table 14-5). Additional details on certain wildfire events are described below.

Table 14-5. Disaster Declarations for Wildfire, 1996-2024

YEAR	DECLARATION TITLE	DECLARATION TYPE	DISASTER NO.
1999	Texas Extreme Fire Hazards	EM	EM-3142-TX
2006	Extreme Wildfire Threat in Texas	DR	DR-1624-TX
2008	Texas South Odessa Fire	FM	FM-2745-TX
2008	Wildfires in Texas	EM	EM-3284-TX
2011	Texas Bates Field Fire	FM	FM-2881-TX
2011	Texas Pleasant Farms Fire	FM	FM-2901-TX

February 25, 2008 – FM-2745-TX
According to the National Weather Service, a surface low pressure system that developed resulted in very windy conditions across all of southwest Texas and southeast New Mexico. Extremely critical fire weather and multiple fires occurred across the region at the same time. According to local news reports, the wildfire threatened and evacuated 200 structures in the City of Odessa, with a few destroyed from the fire. The fire burned an estimated 5,000 acres.

April 3, 2011 – FM-2881-TX
Low relative humidity values combined with breezy southwest surface winds above 20 mph to produce critical fire weather conditions across the Permian Basin of Texas. The Bate's Field Fire burned 3,200 acres and threatened 300 homes, a power plant and a water treatment plant. No damages, injuries, or fatalities are reported to the NCEI for this event.

April 26th, 2011
Near record high temperatures and relative humidity values of five percent or less were present across the Permian Basin and Trans Pecos area. Strong winds aloft mixed down to the surface resulting in wind speeds near 30 to 40 mph with gusts to 50 mph across the region. A Red Flag Warning and a Wind Advisory were in effect at this time. This fire, known as the Pleasant Farms Fire, burned 4,000 acres in Ector County. Several homes were threatened, and one home was destroyed. This fire eventually merged with the C-Bar fire in Crane County. The Pleasant Farms Fire resulted in $141,300 (2025 dollars) in property damages.

PROBABILITY OF FUTURE EVENTS

Wildfires can occur at any time of the year. As Ector County communities move into wildland, the potential area of occurrence of wildfire increases. With 275 events in a 20-year period, an event within the Ector County planning area is “Highly Likely”, meaning an event is probable within the next year.

CLIMATE CHANGE CONSIDERATIONS

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

changes in climate create warmer, drier conditions, leading to longer and more active fire seasons. Increases in temperatures and the thirst of the atmosphere due to human-caused climate change have increased aridity of forest fuels during the fire season.[6]

Vapor pressure deficit, an indicator of the ability of moisture to evaporate, is projected to increase as temperatures rise and carbon dioxide fertilization reduces transpiration, leading to both lower humidity and increased surface dryness. Overall, increased dryness should extend the wildfire season in places where the fire season is presently constrained by low levels of aridity, such as eastern Texas.[7]

Additionally, it is projected that future changes to Ector County will include increased temperatures, which according to the U.S. Climate Explorer, the planning area may experience a 6°F increase in the average extreme heat temperatures. Historically, extreme temperatures averaged 101°F in Ector County, but between 2035 and 2064 the average will be 107°F, increasing the severity and frequency of extreme heat events, contributing to favorable wildfire conditions.

Extreme heat and extended periods of drought contribute to wildfire risk in the planning area. Extreme temperatures and periods of drought destroy vegetation in the area, contributing to available fuels that spread wildfires. Additional climate change impacts from drought and extreme heat are discussed in Sections 6 and 8 of this Plan. The projected rise of severity in drought and extreme heat events suggest a growing likelihood of conditions that favor wildfires. Additional information and studies are needed to determine the degree and rate of any increased wildfire risk.

VULNERABILITY AND IMPACT

Periods of drought, dry conditions, high temperatures, and low humidity are factors that contribute to the occurrence of a wildfire event. Less developed areas, such as along interstates or in more remote areas where fuels are more prevalent have an increased risk of being affected by wildfire.

The more heavily populated areas of the planning area are not highly likely to experience large, sweeping fires. Unoccupied buildings and open spaces that have not been maintained have the greatest vulnerability to wildfire. The overall level of concern for wildfires is located across the county where wildland and urban areas interface. Figures 14-5 and 14-6[8] illustrate the areas that are the most vulnerable to wildfire throughout the Ector County planning area.

The Ector County Planning Team identified the following critical facilities (Table 14-6) as assets that are considered the most important to the planning area and are susceptible to a range of impacts caused by wildfire events. Critical facilities within the Direct Exposure Zone of the WUI are at the greatest risk from wildfire. For a comprehensive list of critical facilities by participating jurisdiction, please see Appendix D.

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

Table 14-6. Critical Facilities / Critical Services Vulnerable to Wildfire Events

CRITICAL FACILITIES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	N/A	• Emergency services may be disrupted during a wildfire if facilities are impacted, roadways are inaccessible, or personnel are unable to report for duty. • First responders are at greater risk of injury when in close proximity to the hazard while extinguishing flames, protecting property, or evacuating residents in the area. • Critical city departments may not be able to function and provide necessary services depending on the location of the fire and the structures or personnel impacted. • Roadways in or near the WUI could be damaged or closed due to smoke and limited visibility, slowing or preventing access for emergency response vehicles. • Fire suppression costs can be substantial, exhausting the financial resources of the community. • First responders can experience heart disease, respiratory problems, and other long-term related illnesses from prolonged exposure to smoke, chemicals, and heat. • Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications. • Power outages could disrupt communications, delaying emergency response times. • Structures can be damaged or destroyed in the path of the wildfire. • Power outages could disrupt critical care. • Backup power sources could be damaged or destroyed. • Critical staff may be injured or otherwise unable to report for duty, limiting response capabilities.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	Ector County: 3 Municipal Facilities, 16 School Facilities City of Odessa: 3 Municipal Facilities, 16 School Facilities	• Facilities or infrastructure may be damaged, destroyed or otherwise inaccessible. • Essential supplies like medicines, water, food, and equipment deliveries may be significantly delayed. • Additional emergency responders and critical aid workers may not be able to reach the area for days. • Power outages and infrastructure damage may prevent larger airports from acting as temporary command centers for logistics, communications, and emergency operations.

CRITICAL FACILITIES	CRITICAL FACILITIES AT RISK	POTENTIAL IMPACTS
Commercial Supplier (food, fuel, etc.)	N/A	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed. • Economic disruption due to power outages and fires negatively impact services as well as area businesses reliant on commercial suppliers.
Utility Services and Infrastructure (electric, water, wastewater, communications)	Ector County: 2 Energy Utility Facilities, 5 Sewage and Water Facilities City of Odessa: 2 Energy Utility Facilities, 5 Sewage and Water Facilities	• Wastewater and drinking water facilities and infrastructure may be damaged or destroyed resulting in service disruption or outage for multiple days or weeks. • Disruptions and outages impact public welfare as safe drinking water is critical. • A break in essential and effective wastewater collection and treatment is a health concern, potentially spreading disease. • Exposure to untreated wastewater is harmful to people and the environment. • Any service disruptions can negatively impact or delay emergency management operations.

Within the Ector County planning area, a total of 275 fire events were reported from 2005 through 2024 by Texas A&M Forest Service. All events were suspected wildfires. Historic loss and annualized estimates of acres burned due to wildfires are presented in Table 14-7 below. The average frequency is approximately 14 events every year.

Table 14-7. Average Annualized Acreage Losses[9]

JURISDICTION	TOTAL ACRES BURNED	AVERAGE ANNUAL ACRE LOSSES
Ector County	51,810	2,591
City of Odessa	1,419	71
TOTALS	**53,229**	**2,662**

Damage Potential provides an index of potential damage to homes from wildfire. It considers factors like flame length and embers lofted from nearby fuel. Damage Potential is a relative index (from low to high), that provides a broad measure of the possible damage from wildfire, based generally on the landscape, rather than specific characteristics of a home or parcel. For planning uses and broad applications, the index is calculated for all areas regardless of whether a structure currently exists at that location. This index does not incorporate a measure of wildfire likelihood.[10]

[9] Events divided by 17 years of data.
[10] TxWRAP portal at the following site: https://texaswildfirerisk.com/

Figures 14-5 and 14-6 show the level of potential damage of wildfires in the Ector County planning area.

Figure 14-5. Damage Potential – Ector County

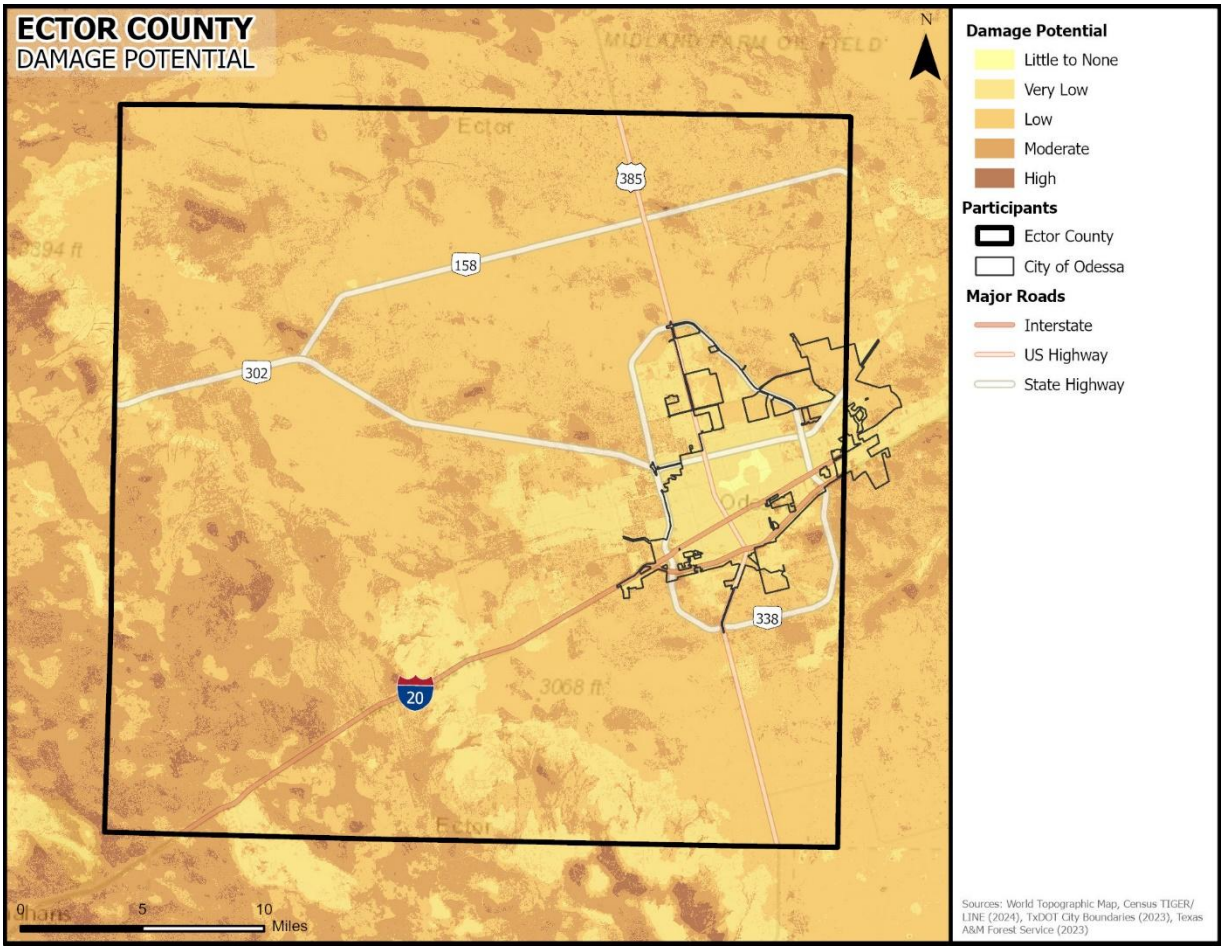
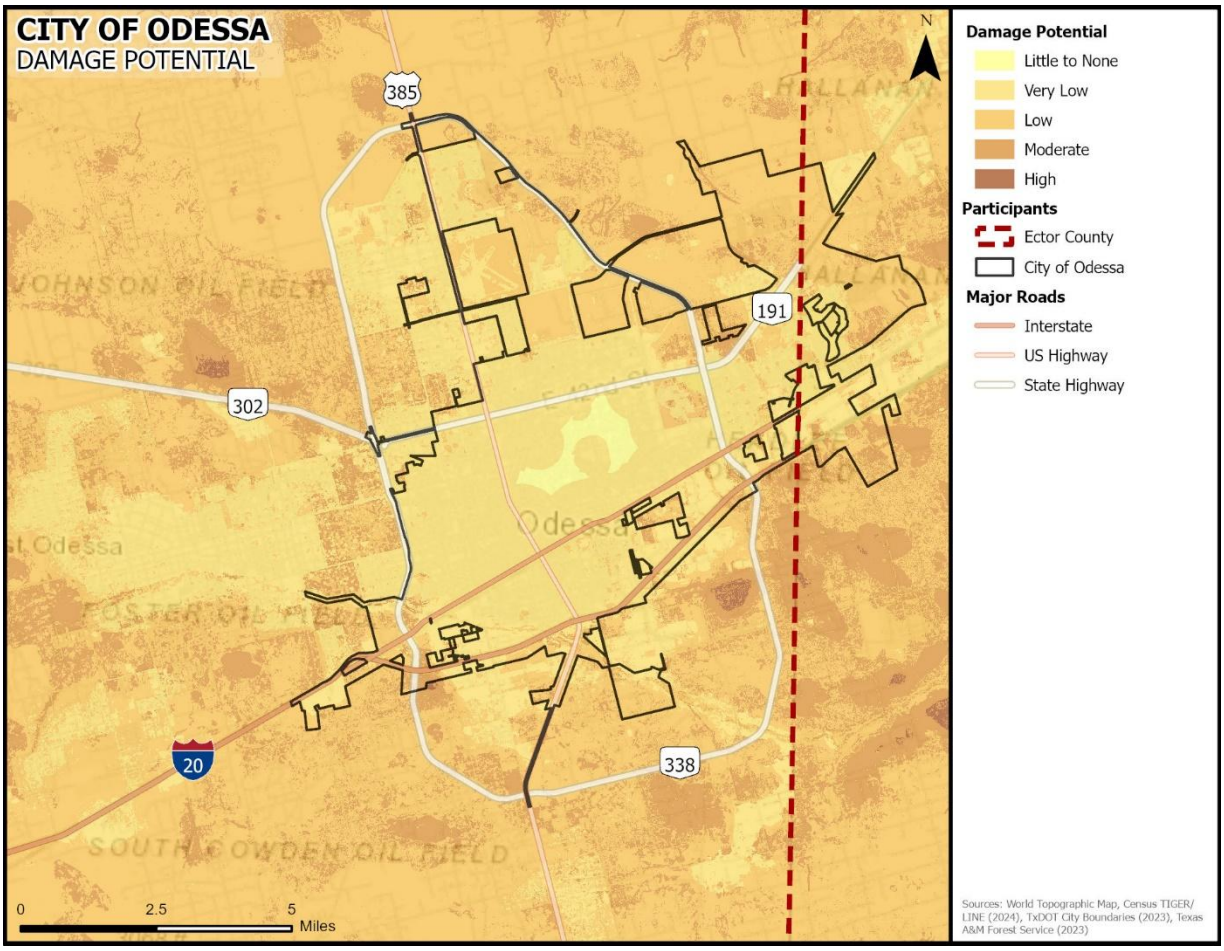


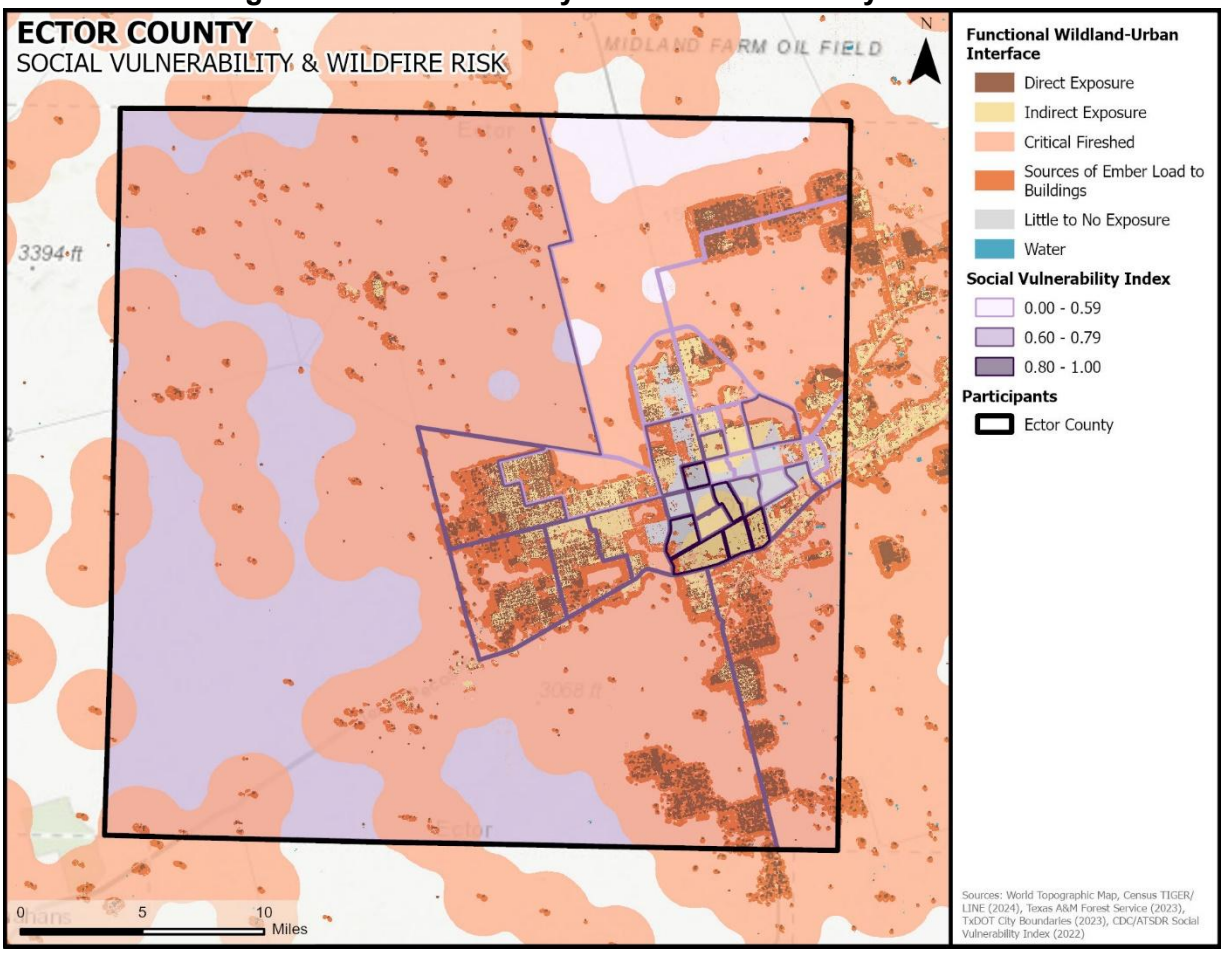
Figure 14-6. Damage Potential – City of Odessa



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

The Center for Disease Control (CDC) created a Social Vulnerability Index (SVI) which includes a database and mapping application that identifies and quantifies communities experiencing social vulnerability. The current CDC SVI uses 16 U.S. census variables from the 5-year American Community Survey (ACS) to identify communities that may need support before, during, or after disasters. All 16 variables fall under four broad categories including socioeconomic status (population in poverty, unemployment, etc.), household characteristics (age, disability status, etc.), racial and ethnic minority status, and housing type and transportation (mobile homes, no vehicles, etc.). Populations experiencing social vulnerability may be adversely impacted by natural hazards, disasters, and other community-level stressors. Figure 14-7 identifies areas of social vulnerability using the CDC's SVI and where these areas overlap with the Ector County WUI areas, where wildfire risk is considered the highest.

Figure 14-7. Ector County's Social Vulnerability and WUI



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

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

Table 14-8. Impact for Ector County

JURISDICTION	IMPACT	DESCRIPTION
Ector County	Limited	A majority of the county (61 percent) is in the "low" damage potential category. In addition, 26 percent is in the "moderate" category, 12 percent is in the "very low" category, and 1 percent is in the "high" category. County residents may suffer injuries that are treatable with first

JURISDICTION	IMPACT	DESCRIPTION
		aid. Critical facilities could be shut down for 24 hours, and less than 10 percent of total property could be damaged.
City of Odessa	Limited	A majority of the city (70 percent) is in the "very low" damage potential category. In addition, 23 percent is in the "low" category, 4 percent is in the "Moderate" category, and 3 percent is in the "little to none" category. City residents may suffer injuries that are treatable with first aid. Critical facilities could be shut down for 24 hours, and less than 10 percent of total property could be damaged.

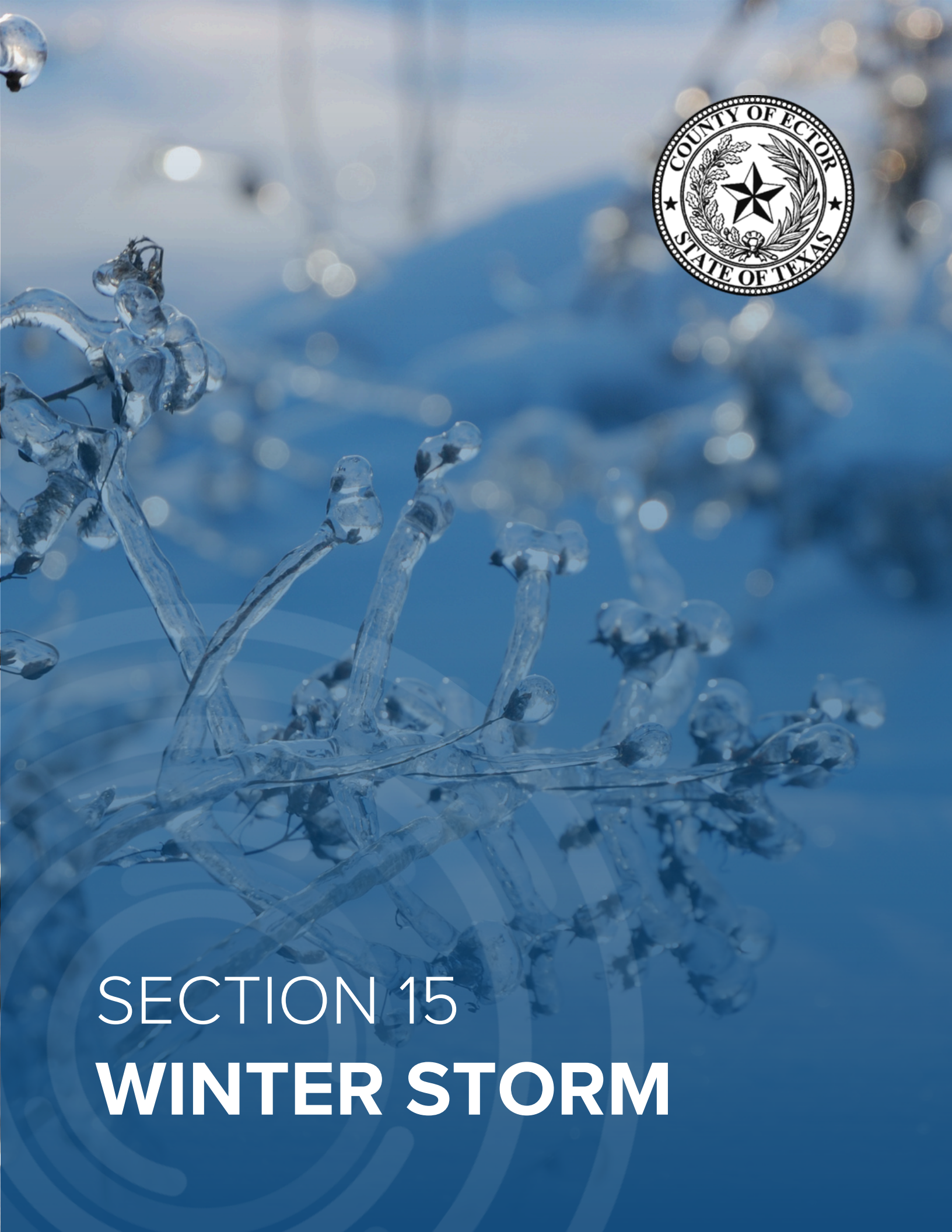
ASSESSMENT OF IMPACTS

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

- The Ector County planning area contains numerous open space areas. Wildfire may adversely affect or destroy endangered species' habitat, reduce air quality, increase erosion and risk of flash flooding, contribute to increased local temperatures, and disrupt other ecological functions.
- Recreation activities throughout the county and city parks may be unavailable and tourism can be unappealing for years following a large wildfire event, devastating directly related local businesses and negatively impacting economic recovery.
- Persons, pets, and wildlife in the area at the time of the fire are at risk for injury or death from burns and/or smoke inhalation. First responders are at greater risk of physical injury when in close proximity to the hazard while extinguishing flames, protecting property, or evacuating residents in the area.
- First responders can experience heart disease, respiratory problems, and other long-term related illnesses from prolonged exposure to smoke, chemicals, and heat.
- Emergency services may be disrupted during a wildfire if facilities are impacted, roadways are inaccessible, or personnel are unable to report for duty.
- Critical county and city departments may not be able to function and provide necessary services depending on the location of the fire and the structures or personnel impacted.
- Non-critical businesses may be directly damaged, suffer loss of utility services, or be otherwise inaccessible, delaying normal operations and slowing the recovery process.
- Displaced residents may not be able to immediately return to work, slowing economic recovery.
- Roadways in or near the WUI could be damaged or closed due to smoke and limited visibility.
- Older homes are generally exempt from modern building code requirements, which may require fire suppression equipment in the structure. An estimated 48 percent (11,009 structures) of homes in the planning area were built before 1980. Similarly, historic buildings may lack fire mitigation materials or measures due to their historic status. There is one historical site listed on the National Register of Historic Places for Ector County.

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

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



SECTION 15
WINTER STORM

SECTION 15: WINTER STORM

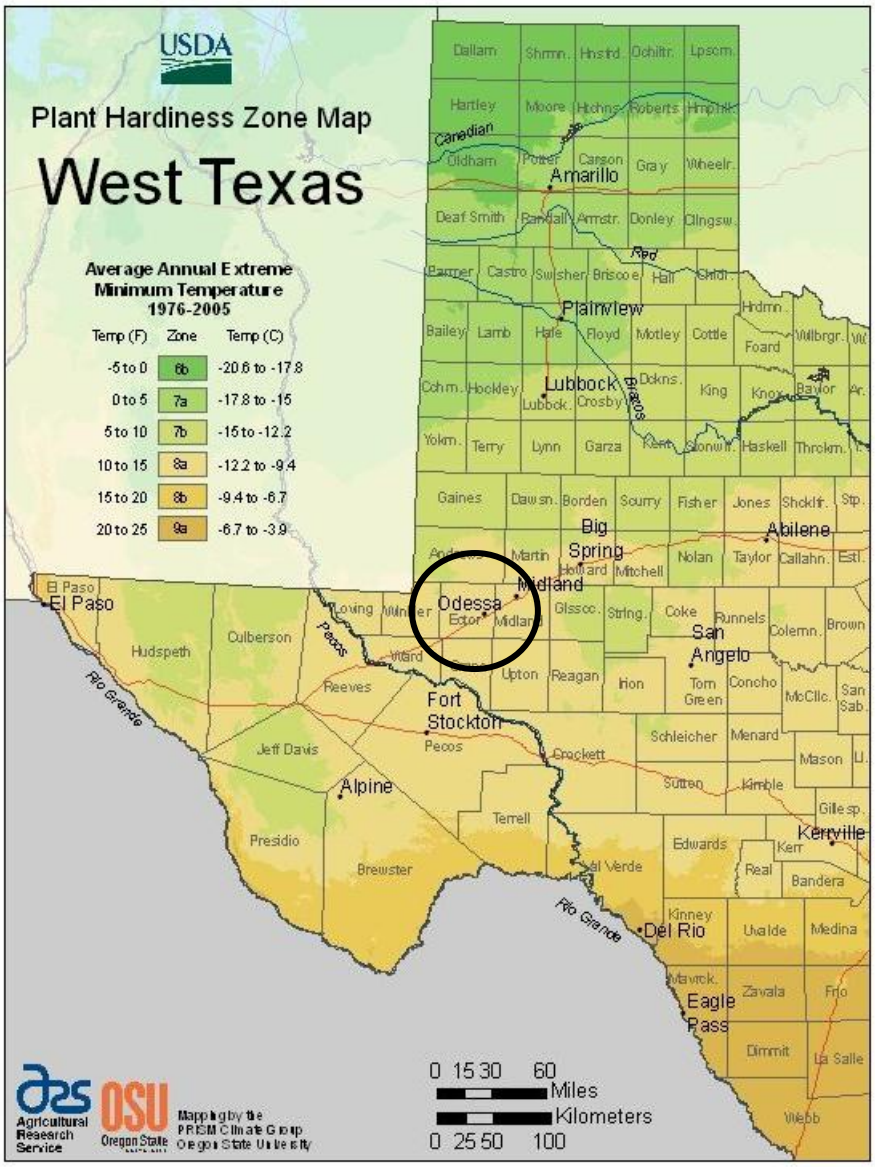
HAZARD DESCRIPTION

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

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

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

Figure 15-1. Annual Minimum Temperature[1]



[1] USDA

Table 15-1. Types of Winter Weather

TYPE OF WINTER WEATHER	DESCRIPTION
Freezing Rain or Freezing Drizzle	Rain or drizzle is likely to freeze upon impact, resulting in a coating of ice glaze on roads and all other exposed objects.
Sleet	Small particles of ice usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.
Blizzard	Sustained wind speeds of at least 35 mph are accompanied by considerable falling or blowing snow. This alert is the most perilous winter storm with visibility dangerously restricted.
Frost / Freeze	Below freezing temperatures are expected and may cause significant damage to plants, crops, and fruit trees.
Wind Chill	A strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower in a calm atmosphere. The combined cooling power of the wind and temperature on exposed flesh is called the wind-chill factor.

LOCATION

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

EXTENT

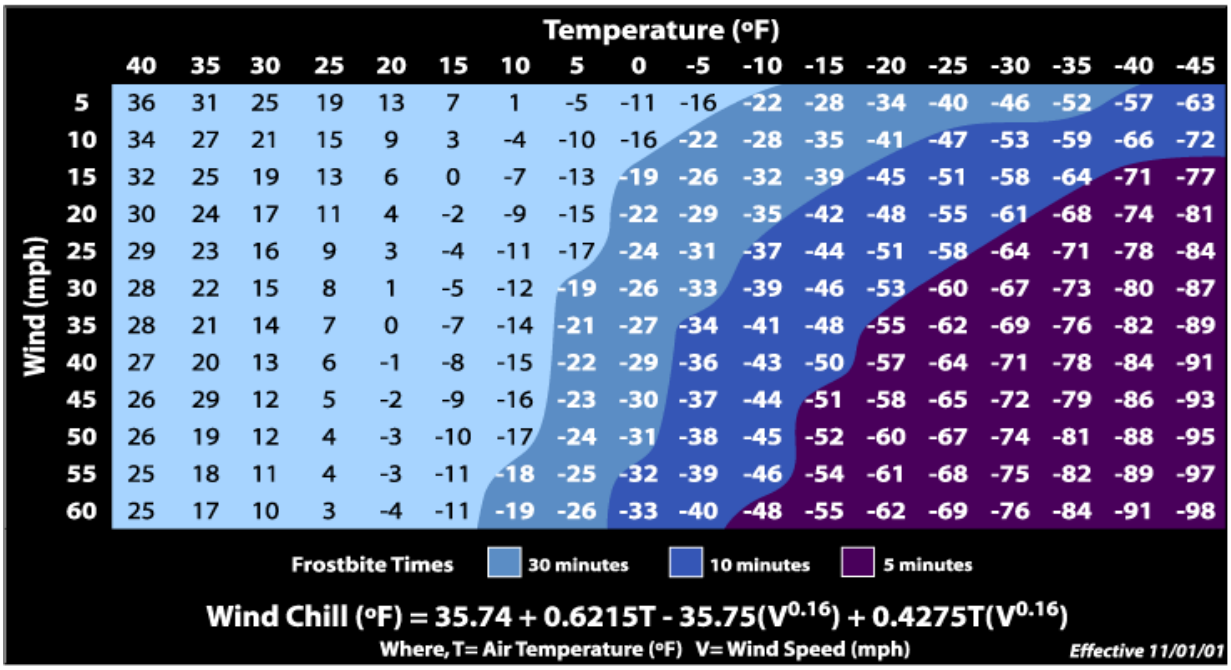
The extent or magnitude of a severe winter storm is measured in intensity based on the temperature and level of accumulations as shown in Table 15-2. Table 15-2 should be read in conjunction with the wind-chill factor described in Figure 15-2 to determine the intensity of a winter storm. The chart is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

Table 15-2. Magnitude of Severe Winter Storms

INTENSITY	TEMPERATURE RANGE (Fahrenheit)	EXTENT DESCRIPTION
Mild	40° – 50°	Winds less than 10 mph and freezing rain or light snow falling for short durations with little or no accumulations
Moderate	30° – 40°	Winds 10 – 15 mph and sleet and/or snow up to 4 inches
Significant	25° – 30°	Intense snow showers accompanied with strong gusty winds between 15 and 20 mph with significant accumulation
Extreme	20° – 25°	Wind driven snow that reduces visibility, heavy winds (between 20 to 30 mph), and sleet or ice up to 5 millimeters in diameter

INTENSITY	TEMPERATURE RANGE (Fahrenheit)	EXTENT DESCRIPTION
Severe	Below 20°	Winds of 35 mph or more and snow and sleet greater than 4 inches

Figure 15-2. Wind Chill Chart



Wind (mph) \ Temperature (°F)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	29	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Wind chill temperature is a measure of how cold the wind makes real air temperature feel to the human body. Since wind can dramatically accelerate heat loss from the body, a blustery 30°F day would feel just as cold as a calm day with 10°F temperatures. The Ector County planning area has 20 previous occurrences recorded from 1996 through 2024 in the National Centers for Environmental Information (NCEI) Storm Events Database. The planning area has never experienced a blizzard, but it has been subject to heavy snow, frost / freeze, ice storm, cold / wind chill, winter storm, and winter weather.

The average number of cold days is similar for the entire planning area, with the average low for winter months being above 35°F.[2] The intensity or extent of a winter storm event to be mitigated for the area ranges from moderate to severe according to the definitions in Table 15-2. The Ector County planning area can expect anywhere between 0.1 to 1.0 inches of ice and 0.1 to 9.0 inches of snow during a winter storm event, and temperatures between 10°F and 15°F with winds ranging from 0 to over 30 mph. The greatest single day snowfall on record in Ector County was 11.0 inches, which occurred on January 9, 2012.[3] During Winter Storm Uri in February 2021, several

[2] National Weather Service
[3] NCEI database. https://www.ncei.noaa.gov/access/monitoring/snowfall-extremes/TX.

days of persistent below-freezing temperatures, ice accumulations, and snow up to 7 inches were reported in Ector County. These are likely the greatest extent the planning area can anticipate in the future, based on historical events.

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

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

TYPE OF WINTER WEATHER	DESCRIPTION
Winter Weather Advisory	This alert may be issued for a variety of severe conditions. Weather advisories may be announced for snow, blowing or drifting snow, freezing drizzle, freezing rain, or a combination of weather events.
Winter Storm Watch	Severe winter weather conditions may affect your area (freezing rain, sleet, or heavy snow may occur separately or in combination).
Winter Storm Warning	Severe winter weather conditions are imminent.
Freezing Rain or Freezing Drizzle	Rain or drizzle is likely to freeze upon impact, resulting in a coating of ice glaze on roads and all other exposed objects.
Sleet	Small particles of ice usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.
Blizzard	Sustained wind speeds of at least 35 mph are accompanied by considerable falling or blowing snow. This alert is the most perilous winter storm with visibility dangerously restricted.
Frost / Freeze	Below freezing temperatures are expected and may cause significant damage to plants, crops, and fruit trees.
Wind Chill	A strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower in a calm atmosphere. The combined cooling power of the wind and temperature on exposed flesh is called the wind-chill factor.

HISTORICAL OCCURRENCES

According to historical records and the best available data there have been 20 recorded winter storm events in the Ector County planning area. Historical winter storm information, as provided by the NCEI, identifies winter storm activity across a multi-county forecast area for each event. The appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each county impacted by the event, when appropriate. Historical winter storm data for the planning area is provided on a County-wide basis per the NCEI database. Table 15-4 shows historical incident information for the planning area.

Table 15-4. Historical Winter Storm Events, 1996 – 2024[4]

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Ector County	12/1/1998	0	0	$0	$0
Ector County	2/12/2004	0	0	$0	$0
Ector County	2/1/2005	0	0	$0	$0
Ector County	1/12/2007	0	0	$0	$0
Ector County	1/18/2007	0	0	$0	$0
Ector County	12/4/2009	0	0	$0	$0
Ector County	2/22/2010	0	0	$0	$0
Ector County	12/23/2011	0	0	$0	$0
Ector County	1/9/2012	0	0	$0	$0
Ector County	11/22/2013	0	0	$0	$0
Ector County	11/22/2013	0	0	$0	$0
Ector County	12/5/2013	0	0	$0	$0
Ector County	12/30/2014	0	0	$0	$0
Ector County	12/30/2014	0	0	$0	$0
Ector County	1/1/2015	0	0	$0	$0
Ector County	1/1/2015	0	0	$0	$0
Ector County	1/22/2015	0	0	$0	$0
Ector County	12/26/2015	0	0	$0	$0
Ector County	2/5/2020	0	0	$0	$0
Ector County	2/14/2021	0	0	$0	$0
TOTALS		**0**	**0**	**$0**	

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

JURISDICTION	NUMBER OF EVENTS	DEATHS	INJURIES	PROPERTY DAMAGES	CROP DAMAGES
Ector County	20	0	0	$0	$0

[4] No reports of injuries or fatalities were recorded in the NCEI database. Monetary damages have been inflated to their 2025 value.

Based on the list of historical winter storm events for the Ector County planning area, 15 of the events have been reported since the 2011 Plan.

SIGNIFICANT EVENTS

November 22, 2013

An Arctic airmass swept into the region, bringing temperatures well below normal in its wake. An upper-level trough settled over the western U.S. and remained in place for several days, leading to an extended period of wintry precipitation across West Texas.

The Texas DPS reported numerous vehicles stranded on Interstate 20 for several hours due to icy conditions. The Ector County Sheriff's Office observed up to 2 inches of ice accumulation. A tractor trailer slid off Interstate 20 southwest of the City of Odessa, and overpasses along the Interstate were closed from 10 to 13 miles southwest of the City of Odessa due to the ice. Thousands of customers in the City of Odessa remained without power due to downed power lines that were impacted by the ice.

December 30, 2014

A combination of freezing rain and sleet fell across West Texas following the passage of an Arctic airmass and downstream of a slow-moving upper-level trough. The City of Odessa responded to approximately 121 vehicle accidents from the onset of the winter weather. The Odessa Automated Surface Observing System (ASOS) reported an ice accumulation of 0.25 inches.

January 1, 2015

Two days after the December 30 storms impacting Ector County, a mix of freezing rain, sleet, and snow fell again across southeast New Mexico and West Texas as an Arctic airmass settled over the region, ahead of a slow-moving upper-level trough. Oncor Utilities reported approximately 7,500 customers without power due to downed power lines caused by ice accumulation. The Odessa Police Department reported street flooding from moderate to heavy rainfall, with ice blocking drainage systems. Odessa Fire and Rescue reported numerous downed power lines and conducted several high-water rescues. The Odessa Automated Surface Observing System (ASOS) measured a total ice accumulation of 0.42 inch, which included a prior accumulation of about 0.25 inch from earlier in the storm.

December 26, 2015

An upper-level storm system intensified over the southwestern United States on Christmas Day, then tracked southeastward over the following days, affecting parts of northeast Mexico and Far West Texas. This system coincided with the arrival of an Arctic air mass, creating favorable conditions for heavy snowfall and blustery winds. Forecasters identified the potential for a significant snowstorm and issued the first watches on the morning of Christmas Eve.

This weather pattern produced the most impactful winter storm on record within the Weather Forecast Office (WFO) Midland County Warning Area. It also marked the first time Blizzard Warnings were both issued and verified by WFO Midland. While snowfall totals of 6 to 9 inches were widespread across West Texas—particularly throughout the Texas Permian Basin—these amounts were generally not record-breaking. However, substantial snow also fell in the mountainous regions of southwest Texas. In Ector County and the City of Odessa, reported snowfall ranged from 7 to 8.5 inches.

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

Fatalities across the state were attributed to hypothermia, vehicle accidents, carbon monoxide poisoning, and chronic medical conditions complicated by a lack of electricity over several days. Statewide, more than 69 percent of households lost power at some point during the event, with average disruptions lasting 42 hours. Water service was also disrupted, with 49 percent of households losing running water with an average disruption of 52 hours.[5]

In Ector County, freezing temperatures affected the area from the 14th until the 18th. There were seven inches of snow reported in West Odessa. There were no property damages reported in Ector County.

PROBABILITY OF FUTURE EVENTS

According to historical records, the Ector County planning area is expected to experience approximately one winter storm event every one to two years. The probability of a future winter storm event affecting the Ector County planning area is considered "Highly Likely," with a winter storm probable to occur within the next year.

CLIMATE CHANGE CONSIDERATIONS

Climate change is expected to reduce the number of extreme cold events statewide but increase in the variability of events.[6] Extreme cold events will continue to be possible but overall winters are becoming milder, and the frequency of extreme winter weather events are decreasing due to the warming of the Arctic and less extreme cold air coming from that region.[7] A trend that is expected to continue with winter extremes estimated to be milder by 2036 compared to extremes in the historic record.[8]

VULNERABILITY AND IMPACT

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

An economic impact may occur due to increased consumption of heating fuel, which can lead to energy shortages and higher prices. House fires and resulting deaths tend to occur more frequently from increased and improper use of alternate heating sources. Fires during winter

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

storms also present a greater danger because water supplies may freeze and impede firefighting efforts.

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

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

CRITICAL FACILITIES	POTENTIAL IMPACTS
Emergency Response Services (EOC, Fire, Police, EMS), Hospitals and Medical Centers	• Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Exposure to extreme cold can cause illnesses in first responders if exposed for a period of time. • Roads may become impassable due to snow and/or ice impacting response times by emergency services. • Extended power outages due to increased usage may lead to possible looting, destruction of property, and theft, further burdening law enforcement resources.
Airport, Academic Institutions, Animal Shelter, Evacuation Centers & Shelters, Governmental Facilities, Residential/ Assisted Living Facilities	• Power outages due to increased usage could disrupt critical care. • Backup power sources could be damaged. • Increased number of patients due to exposure to cold temperatures could lead to a strain on staff. • Water pipes can freeze and burst leading to flooding within facilities. • Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed. • Economic disruption due to power outages negatively impact airport services as well as area businesses reliant on airport operations. • Exposure risks to outdoor workers.
Commercial Supplier (food, fuel, etc.)	• Facilities, infrastructure, or critical equipment including communications may be damaged, destroyed or otherwise inoperable. • Essential supplies like medicines, water, food, and equipment deliveries may be delayed.
Utility Services and Infrastructure (electric, water, wastewater, communications)	• Emergency operations, services and response times may be significantly impacted due to power outages, and/or loss of communications. • Roads may become impassable due to snow and/or ice impacting response times by emergency services. • Power outages due to increased usage could disrupt critical care. • Backup power sources could be damaged. • Water pipes can freeze and burst leading to flooding within facilities.

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

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

Populations living below the poverty level may not be able to afford to run heat on a regular basis or an extended period of time. In addition, people who speak a language other than English may face increased vulnerability due to language barriers that limit their access to important information such as weather-related warnings and instructions regarding safety measures.

The population over 65 in the Ector County planning area is estimated at 10 percent of the total population and children under the age of 5 are estimated at 9 percent. The population with a disability is estimated at 10 percent of the total population. An estimated 15 percent of the planning area population live below the poverty level and 14 percent of the populations speaks English less than 'very well' (Table 15-7).

Table 15-7. Populations at Greater Risk of Winter Storm Events[9]

JURISDICTION	POPULATION				
	65 AND OLDER	UNDER 5	WITH A DISABILITY	BELOW POVERTY LEVEL	LIMITED ENGLISH SPEAKING
Ector County	16,038	14,115	16,785	24,971	22,046
City of Odessa	11,670	10,246	11,536	16,428	13,178

Older homes tend to be more vulnerable to the impacts of winter storm events. Approximately, 48 percent (32,678 structures) of the housing units in the planning area were built before 1980 (Table 15-8).

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

JURISDICTION	SFR STRUCTURES BUILT BEFORE 1980	MANUFACTURED HOMES
Ector County	32,678	11,009
City of Odessa	26,130	1,479

Winter Storms have been known to cause injury to humans and occasionally have been fatal. However, there have been no reports of injuries or fatalities as a result of winter storms in Ector

[9] U.S. Census Bureau 2023 data for Ector County

County historically. Overall, there is no reported total losses of property and crops in the planning area. Based on historic loss and damages, the impact of winter storm damages on the Ector County planning area, can be considered “Limited” severity of impact, meaning minor quality of life lost, critical facilities and services shut down for 24 hours or less, and less than 10 percent of property destroyed or with major damage.

ASSESSMENT OF IMPACTS

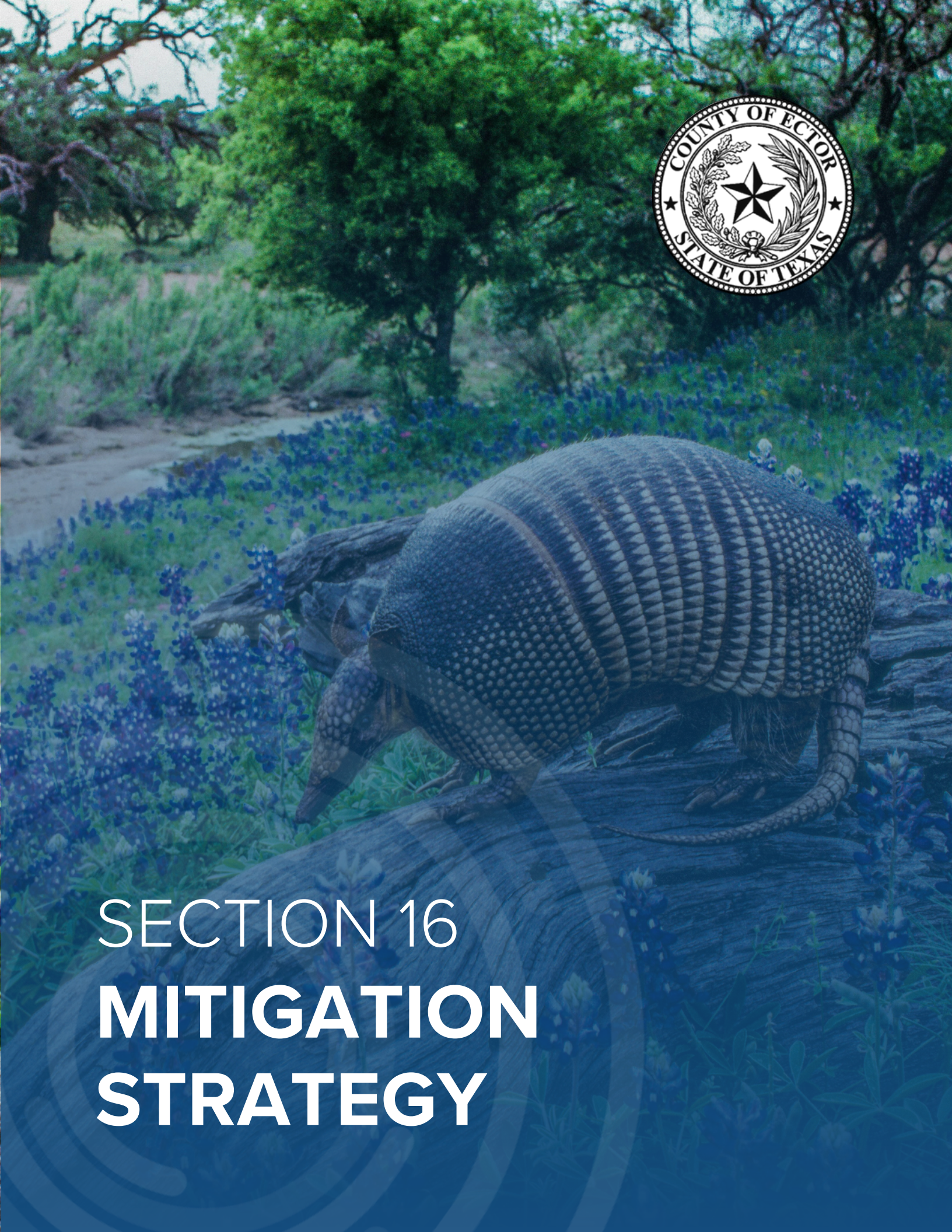
The greatest risk from a winter storm hazard is to public health and safety. The impact of climate change could produce longer, more intense winter storm events, exacerbating the current winter storm impacts. Worsening winter storm conditions can be frequently associated with a variety of impacts, including:

- Vulnerable populations, particularly the elderly (10 percent of total population), children under 5 (9 percent of total population), and those with a disability (10 percent of total population), can face serious or life-threatening health problems from exposure to extreme cold including hypothermia and frostbite.
- Loss of electric power or other heat source can result in increased potential for fire injuries or hazardous gas inhalation because residents burn candles for light or use fires or generators to stay warm.
- Response personnel, including utility workers, public works personnel, debris removal staff, tow truck operators, and other first responders, are subject to injury or illness resulting from exposure to extreme cold temperatures.
- Response personnel would be required to travel in potentially hazardous conditions, elevating the life safety risk due to accidents and potential contact with downed power lines.
- Operations or service delivery may experience impacts from electricity blackouts due to winter storms.
- Power outages are possible throughout the planning area due to downed trees and power lines and/or rolling blackouts.
- Critical facilities without emergency backup power may not be operational during power outages.
- Emergency response and service operations may be impacted by limitations on access and mobility if roadways are closed, unsafe, or obstructed.
- Hazardous road conditions will likely lead to increases in automobile accidents, further straining emergency response capabilities.
- Depending on the severity and scale of damage caused by ice and snow events, damage to power transmission and distribution infrastructure can require days or weeks to repair.
- Winter storms can reduce the efficacy of shaded fuel breaks for wildfire mitigation as treated areas were more likely to have downed trees and limbs than untreated areas.
- Winter storms can result in damage to endangered species habitat and increased fuel loads within forested habitats.
- Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to impacts of winter storm events. Approximately 48 percent of homes in the County were built before 1980. Similarly, historic buildings and sites are placed at a higher risk of impact due to materials used and the inability to change

properties due to their historic status. There is one historical site listed on the National Register of Historic Places for Ector County.

- Schools may be forced to shut early due to treacherous driving conditions.
- Exposed water pipes may be damaged by severe or late season winter storms at both residential and commercial structures, causing significant damages.

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



SECTION 16

MITIGATION STRATEGY

SECTION 16: MITIGATION STRATEGY

MITIGATION GOALS

Based on the results of the risk and capability assessments, the Planning Team developed and prioritized the mitigation strategy. This involved utilizing the results of both assessments and reviewing the goals and objectives that were included in the previous 2011 Plan. At the Mitigation Strategy Workshop in April 2025, Planning Team members reviewed the mitigation strategy from the previous Plan. The consensus among all members present was that the strategy developed for the 2011 Plan required some changes including expanding on existing goals and the addition of a goal around equity and vulnerable populations.

GOAL 1

Protect public health and safety.

OBJECTIVE 1.1

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

OBJECTIVE 1.2

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

OBJECTIVE 1.3

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

OBJECTIVE 1.4

Protect critical facilities and services.

GOAL 2

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

OBJECTIVE 2.1

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

OBJECTIVE 2.2

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

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

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

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

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

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

GOAL 4
Protect new and existing properties.

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

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

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

GOAL 5
Maximize the resources for investment in hazard mitigation.

OBJECTIVE 5.1
Maximize the use of outside sources of funding.

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

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

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

GOAL 6
Promote growth in a sustainable manner.

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

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

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

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

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

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

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

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

SECTION 17
PREVIOUS ACTIONS

SECTION 17: PREVIOUS ACTIONS

SUMMARY

This section includes analysis from the 2011 Ector County Multi-Jurisdictional Hazard Mitigation Plan. Planning Team members were given copies of the previous mitigation actions submitted in the 2011 Ector County Plan at the Mitigation Strategy Workshop. Each participating entity reviewed the previous actions and provided an analysis as to whether the action had been completed, should be deferred for future implementation, or be deleted from the Plan Update. The actions from the 2011 Plan are included in this section as they were written in 2011, except for the “2025 Analysis” section.

ECTOR COUNTY

Ector County – Previous Action #1	
Proposed Action:	Educate the public on extreme heat/drought safety and health issues.
BACKGROUND INFORMATION	
Site and Location:	Ector County website, media PSAs
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought/Extreme Heat
Effect on New/Existing Buildings:	Water conservation, more efficient use of cooling systems
Priority (High, Moderate, Low):	High
Estimated Cost:	Minimal – staff time only
Potential Funding Sources:	Local
Lead Agency/Department Responsible:	Emergency Management, PIO and Ector County Information Technology
Implementation Schedule:	Summer 2010

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Implement education and awareness program utilizing…” Combine action with County Previous Actions # 4, 12, 24, 32, 33, and 35.

	Ector County – Previous Action #2
Proposed Action:	Identify repetitive loss properties for future Hazard Mitigation Grant Program funding.
BACKGROUND INFORMATION	
Site and Location:	Unincorporated areas of Ector County
History of Damages:	Examples of repetitive flooding in area of 61st Street and Benefield, Florida in north western area of county

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Minimize or eliminate flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	To be developed
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	Ector County Public Works and Emergency Management
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. The County is currently undergoing the RFQ process and anticipates having a Master Plan within 12 months. Amend action to include an updated cost and verbiage to state “Identify flood-prone and repetitive loss…”

	Ector County – Previous Action #3
Proposed Action:	Provide safety procedures to builders and developers for building and operating near hazardous pipelines
BACKGROUND INFORMATION	
Site and Location:	Unincorporated areas of Ector County
History of Damages:	Pipeline damage, explosion and fire due to improper excavation

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Material Release/Pipeline Failure
Effect on New/Existing Buildings:	Prevention of explosion and fire
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$10,000 initial cost
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	EC Public Works and Pipeline Group
Implementation Schedule:	2011-2012

2025 ANALYSIS:
Defer action to Plan Update.

Ector County – Previous Action #4	
Proposed Action:	Educate the public about hazardous materials: safety risks, detecting an accident, responding to an accident, evacuation, and shelter-in-place training via public announcements on local media outlets, brochures and county website.
BACKGROUND INFORMATION	
Site and Location:	Ector County website and offices and media PSAs
History of Damages:	Various hazardous materials incidents in past with minor consequences; major consequences with Champion Technologies explosion; would be a preventative measure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Material Release/Pipeline Failure
Effect on New/Existing Buildings:	Reduce or eliminate contamination, safer sheltering-in-place
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$10,000 initial for brochures
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	Emergency Management, PIO and Ector County Information Technology
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Implement education and awareness program utilizing…” Combine action with County Previous Actions #1, 12, 24, 32, 33, and 35.

	Ector County – Previous Action #5
Proposed Action:	Harden critical Ector County facilities, install vehicle barrier systems.
BACKGROUND INFORMATION	
Site and Location:	Various county-owned buildings, such as Courthouse, Law Enforcement Center, Youth Center, Health Department, Courthouse Administration Building
History of Damages:	Preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Terrorism
Effect on New/Existing Buildings:	Prevention of damage or destruction
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$200,000
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	EC Building Maintenance and Public Works
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Harden/retrofit critical facilities to hazard-resistant levels…” Combine action with County Previous Actions #34, 36, and 40.

SECTION 17: PREVIOUS ACTIONS

Ector County – Previous Action #6	
Proposed Action:	Increase security for Ector County government computer system to prevent cyber-terrorism resulting in loss of critical data and operational capabilities.
BACKGROUND INFORMATION	
Site and Location:	All Ector County departments and facilities
History of Damages:	This would be a preventative measure. Our internet provider has been attacked by hackers in the past.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Terrorism
Effect on New/Existing Buildings:	Protects infiltration of computer system
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$200,000
Potential Funding Sources:	Local, State and Federal Grants
Lead Agency/Department Responsible:	Ector County Information Technology
Implementation Schedule:	2012-2013

2025 ANALYSIS:
Defer action to Plan Update. The County IT Department continuously promotes cyber security and monitoring to prevent malicious attacks.

Ector County – Previous Action #7	
Proposed Action:	Post safety notices for severe weather action plans and designated tornado shelter areas for employees and visitors at Ector County facilities to follow during severe weather events.
BACKGROUND INFORMATION	
Site and Location:	Lobby areas of each Ector County facility
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado/High Wind
Effect on New/Existing Buildings:	Directs employees and public where to go within the buildings during severe weather event
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$7,000
Potential Funding Sources:	Local, State and Federal Grants
Lead Agency/Department Responsible:	Ector County Sign Shop, Building Maintenance
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include an updated cost, all applicable hazards, and verbiage to state “Provide information to employees and visitors...”

Ector County – Previous Action #8	
Proposed Action:	Secure traffic lights and traffic controls from high wind damage.
BACKGROUND INFORMATION	
Site and Location:	Highways and streets in unincorporated areas of Ector County
History of Damages:	Various high wind events in past caused localized damage, but this would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado/High Wind
Effect on New/Existing Buildings:	Preventative measure to ensure public safety in transportation areas
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$50,000
Potential Funding Sources:	Local, State and Federal Grants
Lead Agency/Department Responsible:	Ector County Public Works/ Sign Shop
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. The County currently has implemented the use of bolts, cross members, and concrete on the anchor breaks to secure lights and controls.

	Ector County – Previous Action #9
Proposed Action:	Conduct public education program on fire risks and wildland fire mitigation, with the Texas Forest Service.
BACKGROUND INFORMATION	
Site and Location:	Commissioners Courtroom, Ector County website and news media PSAs
History of Damages:	This would be an educational, preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Prevent and mitigate losses to homes and other structures
Priority (High, Moderate, Low):	High
Estimated Cost:	$5,000 cost of copying brochure materials
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	Emergency Management, PIO and Texas Forest Service
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update.

Ector County – Previous Action #10	
Proposed Action:	Evaluate access and road conditions in unincorporated areas of Ector County for response vehicles and formulate options to improve access.
BACKGROUND INFORMATION	
Site and Location:	Ector County unincorporated areas: housing developments, subdivisions
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Prevention and mitigation of fire damage to structures, livestock and other property
Priority (High, Moderate, Low):	High
Estimated Cost:	$100,000
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	Ector County Public Works
Implementation Schedule:	2012-2013

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards.

SECTION 17: PREVIOUS ACTIONS

Ector County – Previous Action #11	
Proposed Action:	Identify need and suggest to developer additional means of access into single-entry neighborhoods and gated communities in order to prevent residents from becoming trapped in a hazardous area.
BACKGROUND INFORMATION	
Site and Location:	Ector County unincorporated areas: housing developments, subdivisions
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Prevention and mitigation of fire-related deaths or injuries, rather than structures
Priority (High, Moderate, Low):	High
Estimated Cost:	Minimal – staff time for evaluation of locations
Potential Funding Sources:	Local
Lead Agency/Department Responsible:	Ector County Public Works
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards and an updated cost. Combine action with County Previous Action #20. Amend lead agency to Development Services.

Ector County – Previous Action #12	
Proposed Action:	Coordinate, prepare and release public education materials on winter storm safety with American Red Cross, Salvation Army, Cities of Odessa and Goldsmith, and Ector County ISD for facility closing and shelter openings.
BACKGROUND INFORMATION	
Site and Location:	Odessa/Goldsmith/Ector County community-wide effort with ECISD on jurisdictional websites, media PSAs, brochures
History of Damages:	This would be a preventative measure to reduce accidents and increase safety.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storms
Effect on New/Existing Buildings:	Preventative for pipe damage and improve heating safety
Priority (High, Moderate, Low):	Low
Estimated Cost:	$5,000 brochure copies
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	Emergency Management, PIO
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Implement education and awareness program utilizing…” Combine action with County Previous Actions #1, 4, 24, 32, 33, and 35. The County has interagency cooperation in place for shelter training and plans.

	Ector County – Previous Action #13
Proposed Action:	Make flyers available at county offices and post information on county web-site describing xeriscape planting resources and benefits.
BACKGROUND INFORMATION	
Site and Location:	Ector County Offices, web-site.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Extreme Heat
Effect on New/Existing Buildings:	Water Conservation
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	To be determined
Potential Funding Sources:	Local, State, Federal
Lead Agency/Department Responsible:	Ector County Emergency Management and Information Technology
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include an updated cost and verbiage to state “Promote the use of xeriscaping…”

Ector County – Previous Action #14	
Proposed Action:	Provide water conservation education for low-flow plumbing and toilets, efficient washers, rain harvesting.
BACKGROUND INFORMATION	
Site and Location:	Ector County Offices, web-site.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	TBD
Potential Funding Sources:	Grants
Lead Agency/Department Responsible:	Ector County
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, and an updated cost. Amend lead agency to Public Information Officer.

	Ector County – Previous Action #15
Proposed Action:	Discourage vegetation growth and encourage fire-resistant landscaping in easements.
BACKGROUND INFORMATION	
Site and Location:	Throughout Ector County.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce wildfire hazards
Priority (High, Moderate, Low):	High
Estimated Cost:	To be determined
Potential Funding Sources:	Local, State, Federal
Lead Agency/Department Responsible:	Ector County Emergency Management
Implementation Schedule:	2011

2025 ANALYSIS:
Delete action. The County no longer considers this a priority.

	Ector County – Previous Action #16
Proposed Action:	Remove downed trees and fire fuels that increase fire risk in easements and right-of ways.
BACKGROUND INFORMATION	
Site and Location:	Throughout Ector County.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Flooding, Severe Thunderstorm
Effect on New/Existing Buildings:	Reduce risks to buildings
Priority (High, Moderate, Low):	High
Estimated Cost:	To be determined
Potential Funding Sources:	Local, State, Federal
Lead Agency/Department Responsible:	Ector County Public Works
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. This project is ongoing; the County is currently working on a plan to clean up alleys and other rights-of-way. Combine action with County Previous Action #19.

SECTION 17: PREVIOUS ACTIONS

	Ector County – Previous Action #17
Proposed Action:	Provide information on how to select and maintain the appropriate type of fire extinguishers for all homes and businesses.
BACKGROUND INFORMATION	
Site and Location:	County offices and web-site.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce damage to structures
Priority (High, Moderate, Low):	High
Estimated Cost:	Minimal – staff time only
Potential Funding Sources:	Local
Lead Agency/Department Responsible:	Ector County Emergency Management, Information Technology
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include an updated cost.

Ector County – Previous Action #18	
Proposed Action:	Install fire danger rating/ burn ban signs.
BACKGROUND INFORMATION	
Site and Location:	All major roads entering Ector County.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce damage to structures
Priority (High, Moderate, Low):	High
Estimated Cost:	To be determined
Potential Funding Sources:	Local, State, Federal
Lead Agency/Department Responsible:	Ector County Traffic/ Sign Shop
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. Burn ban signs have been installed and fire rating signs are pending installation. Amend action to include an updated cost.

Ector County – Previous Action #19	
Proposed Action:	Implement a tree trimming program that routinely clears tree limbs hanging in right-of- way.
BACKGROUND INFORMATION	
Site and Location:	Throughout Ector County.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storms, Wildfire
Effect on New/Existing Buildings:	Reduce damage to structures
Priority (High, Moderate, Low):	Low/High
Estimated Cost:	To be determined
Potential Funding Sources:	Local
Lead Agency/Department Responsible:	Ector County Public Works
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. The County is currently working on a plan to clean up alleys and other rights-of-way. Combine action with County Previous Action #16.

	Ector County – Previous Action #20
Proposed Action:	Provide additional means of access into single-entry neighborhoods.
BACKGROUND INFORMATION	
Site and Location:	New subdivisions in Ector County.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Earthquake
Effect on New/Existing Buildings:	Reduce damage to structures
Priority (High, Moderate, Low):	High
Estimated Cost:	Minimal- staff time only
Potential Funding Sources:	Local
Lead Agency/Department Responsible:	Ector County Public Works
Implementation Schedule:	2010

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include an updated cost and all applicable hazards. Combine action with County Previous Action #11.

SECTION 17: PREVIOUS ACTIONS

Ector County – Previous Action #21	
Proposed Action:	Add minimal residential street width criteria to accommodate sizeable rescue vehicle.
BACKGROUND INFORMATION	
Site and Location:	New subdivisions in Ector County.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Lightning
Effect on New/Existing Buildings:	Reduce damage to structures
Priority (High, Moderate, Low):	High
Estimated Cost:	Minimal- staff time only
Potential Funding Sources:	Local
Lead Agency/Department Responsible:	Ector County Public Works
Implementation Schedule:	2010

2025 ANALYSIS:
Action complete.

	Ector County – Previous Action #22
Proposed Action:	Erect lightning rods on the roof tops of critical facilities to prevent power outages.
BACKGROUND INFORMATION	
Site and Location:	Ector County's various facilities.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Lightning
Effect on New/Existing Buildings:	Prevent damage to structures
Priority (High, Moderate, Low):	High
Estimated Cost:	To be determined
Potential Funding Sources:	Local, State, Federal
Lead Agency/Department Responsible:	Ector County Emergency Management, Building Maintenance
Implementation Schedule:	2012

2025 ANALYSIS:
Defer to action Plan Update. The County has installed rods at the Sheriff's Office, County Jail, and County Coliseum. Amend action to include a cost update.

Ector County – Previous Action #23	
Proposed Action:	Achieve certification by the National Weather Service as a StormReady community
BACKGROUND INFORMATION	
Site and Location:	Throughout Ector County.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm
Effect on New/Existing Buildings:	Prevent damage to structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	To be determined
Potential Funding Sources:	Local, State, Federal
Lead Agency/Department Responsible:	Ector County Emergency Management
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include an updated cost, all applicable hazards, and verbiage to state “Obtain certification in the National Weather Service StormReady Program.”

	Ector County – Previous Action #24
Proposed Action:	Run PSAs to remind public the need for a tornado evacuation plan or shelter in place plan
BACKGROUND INFORMATION	
Site and Location:	Throughout Ector County on local news media, County website**.**
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado
Effect on New/Existing Buildings:	Reduce bodily harm to residents
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Minimal – staff time only
Potential Funding Sources:	Local
Lead Agency/Department Responsible:	Ector County Emergency Management
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Implement education and awareness program utilizing…” Combine action with County Previous Actions #1, 4, 12, 32, 33, and 35.

	Ector County – Previous Action #25
Proposed Action:	Provide construction specifications to builders, developers and the public for construction of concrete tornado safe rooms in populated areas of County
BACKGROUND INFORMATION	
Site and Location:	To be determined by preference of builders, developers or individual members of public within unincorporated areas of Ector County
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado
Effect on New/Existing Buildings:	Enhance survivability of citizens in new or retrofitted buildings
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	To be determined – brochure printing
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	Emergency Management and Public Works
Implementation Schedule:	2011-2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include an updated cost. Amend lead agency to remove Public Works and replace with the Public Information Officer.

	Ector County – Previous Action #26
Proposed Action:	Flood proof public buildings in flood prone areas
BACKGROUND INFORMATION	
Site and Location:	Ector County's various facilities.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Prevent damage to structures
Priority (High, Moderate, Low):	High
Estimated Cost:	To be determined
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	Ector County Building Maintenance
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include an updated cost.

Ector County – Previous Action #27	
Proposed Action:	Implement a Countywide mass notification system.
BACKGROUND INFORMATION	
Site and Location:	Throughout Ector County.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Earthquake
Effect on New/Existing Buildings:	Reduce damage to structures
Priority (High, Moderate, Low):	Very Low
Estimated Cost:	To be determined
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	Ector County Emergency Management
Implementation Schedule:	2012

2025 ANALYSIS:
Delete action. The County no longer considers this a priority.

Ector County – Previous Action #28	
Proposed Action:	Construct a barn to house County equipment and vehicles
BACKGROUND INFORMATION	
Site and Location:	Throughout Ector County, but especially at Highways and Streets yard.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Prevent damage to equipment and vehicles
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	To be determined
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	Ector County Public Works, Building Maintenance
Implementation Schedule:	2013

2025 ANALYSIS:
Action complete.

Ector County – Previous Action #29	
Proposed Action:	Introduce County residents to and enlist volunteers in CoCoRAHS
BACKGROUND INFORMATION	
Site and Location:	Throughout unincorporated areas of Ector County.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	Negligible
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	Ector County Emergency Management
Implementation Schedule:	To begin after Plan approval

2025 ANALYSIS:
Delete action. The County no longer considers this a priority.

	Ector County – Previous Action #30
Proposed Action:	Increase tree planting in public right of ways to reduce urban heat levels
BACKGROUND INFORMATION	
Site and Location:	Throughout unincorporated areas of Ector County.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	Prevent damage to structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	To be determined
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	Ector County Public Works, Building Maintenance
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. This project is currently in the planning stage utilizing the Parks Master Plan. Amend action to include all applicable hazards and an updated cost.

Ector County – Previous Action #31	
Proposed Action:	Assess needs for the county's emergency response services/ work with County hospital and Health Department to ensure supplies, such as anti-viral medications, are stocked
BACKGROUND INFORMATION	
Site and Location:	Throughout unincorporated areas of Ector County.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Infectious Disease
Effect on New/Existing Buildings:	Reduce bodily harm to residents
Priority (High, Moderate, Low):	Low
Estimated Cost:	To be determined
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	Ector County Emergency Management, Health Department
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. The county is currently working with local and state partners. Amend action to include an updated cost.

SECTION 17: PREVIOUS ACTIONS

	Ector County – Previous Action #32
Proposed Action:	Make PSA announcements reminding the public of basic preventative measures to preserve health
BACKGROUND INFORMATION	
Site and Location:	Throughout Ector County on local media and Ector County's website.
History of Damages:	This would be a preventative measure.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Infectious Disease
Effect on New/Existing Buildings:	Reduce bodily harm to residents
Priority (High, Moderate, Low):	Low
Estimated Cost:	Minimal- staff time only
Potential Funding Sources:	Local, State and Federal
Lead Agency/Department Responsible:	Ector County Emergency Management, Health Department Information Technology and PIO
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state "Implement education and awareness program utilizing…" Combine action with County Previous Actions # 1, 4, 12, 24, 33, and 35.

Ector County – Previous Action #33	
Proposed Action:	Develop a public awareness campaign to educate county residents about safety during an earthquake event.
BACKGROUND INFORMATION	
Site and Location:	Countywide
History of Damages:	There have been a limited number of events over the past 50 years, and for those events the intensity has been moderate or less.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Earthquake
Effect on New/Existing Buildings:	Not applicable as this is a public awareness action
Priority (High, Moderate, Low):	Low
Estimated Cost:	Minimal- staff time only
Potential Funding Sources:	Local
Lead Agency/Department Responsible:	Ector County Public Works
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Implement education and awareness program utilizing…” Combine action with County Previous Actions # 1, 4, 12, 24, 32, and 35.

	Ector County – Previous Action #34
Proposed Action:	Harden County facilities by adding bracing and vital equipment and elevating generators.
BACKGROUND INFORMATION	
Site and Location:	Countywide buildings
History of Damages:	There has not been an occurrence of an earthquake in Ector county.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Earthquake
Effect on New/Existing Buildings:	Existing public buildings will be secured in the event of an earthquake to prevent collapse and permanent damage.
Priority (High, Moderate, Low):	Low
Estimated Cost:	$500,00
Potential Funding Sources:	DHS, HMGP grants
Lead Agency/Department Responsible:	EMC, Building maintenance
Implementation Schedule:	2012, as funding is available

2025 ANALYSIS:
Defer action to Plan Update.Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Harden/retrofit critical facilities to hazard-resistant levels…” Combine action with County Previous Actions #5, 36, and 40.

	Ector County – Previous Action #35
Proposed Action:	Educate the public about activities to mitigate the effects of hail. Make plans available for residents.
BACKGROUND INFORMATION	
Site and Location:	Countywide
History of Damages:	The County experiences high wind and hail storm events and currently does not have information available to residents for activities such as sheltering in place.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	Not applicable as this is a public awareness action
Priority (High, Moderate, Low):	High
Estimated Cost:	$5,000
Potential Funding Sources:	Local funding and State grants
Lead Agency/Department Responsible:	Building Maintenance, Sign Shop, EMC
Implementation Schedule:	2011-2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Implement education and awareness program utilizing…” Combine action with County Previous Actions #1, 4, 12, 24, 32, and 33.

Ector County – Previous Action #36	
Proposed Action:	Retrofit County buildings by acquiring roofing products that bear the UL 2218 hail-resistant product listing.
BACKGROUND INFORMATION	
Site and Location:	Countywide
History of Damages:	The County experiences high wind and hail storm events, which can cause significant damage to roofing.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	This action would protect existing county facilities by preventing significant property damage in the event of a hailstorm. It could also mitigate the effects on new buildings if used in the development of new facilities.
Priority (High, Moderate, Low):	Low
Estimated Cost:	$25,000
Potential Funding Sources:	Local funds and Federal grants
Lead Agency/Department Responsible:	Building Maintenance, EMC
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Harden/retrofit critical facilities to hazard-resistant levels…” Combine action with County Previous Actions #5, 34, and 40.

Ector County – Previous Action #37	
Proposed Action:	Purchase NOAA radios for in the event of a power outage due to a thunderstorm.
BACKGROUND INFORMATION	
Site and Location:	Countywide
History of Damages:	Thunderstorms often disrupt power. This action will keep citizens informed to help mitigate the loss of lives in a thunderstorm event.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Medium
Estimated Cost:	$10,000
Potential Funding Sources:	Federal Grants
Lead Agency/Department Responsible:	EMC
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Acquire and distribute NOAA weather radios.”

Ector County – Previous Action #38	
Proposed Action:	Install critical facility back-up generators
BACKGROUND INFORMATION	
Site and Location:	The critical facilities to be strengthened include: County Jail, Juvenile Detention, Sheriff Patrol and Dispatch, as well as fueling facilities for County vehicles.
History of Damages:	Thunderstorms cause severe damage to buildings and loss of power, meaning a loss of critical services to the public.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorms
Effect on New/Existing Buildings:	Hardening critical facilities will allow for the continual operation of buildings during and after a storm event.
Priority (High, Moderate, Low):	High
Estimated Cost:	$100,000
Potential Funding Sources:	Federal Grants
Lead Agency/Department Responsible:	Building Maintenance, Engineering
Implementation Schedule:	2012

2025 ANALYSIS:
Action complete.

Ector County – Previous Action #39	
Proposed Action:	Develop plan to coordinate with TxDOT to install warning signs on roadways in the event of a severe winter storm.
BACKGROUND INFORMATION	
Site and Location:	Countywide
History of Damages:	Severe winter storms have caused serious traffic accidents, injuries and damage to property due to ice on roads.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Low
Estimated Cost:	Minimal - staff time only
Potential Funding Sources:	Local
Lead Agency/Department Responsible:	Ector County Public Works
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include an updated cost.

Ector County – Previous Action #40	
Proposed Action:	Retrofit critical facilities with storm shutters and hazard- resistant materials for severe winter storm.
BACKGROUND INFORMATION	
Site and Location:	Countywide
History of Damages:	Severe winter storms have in the past caused broken windows and damage to critical public facilities.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Winter Storm
Effect on New/Existing Buildings:	This action would reduce damage to critical facilities during storm by retrofitting windows and shutters on existing facilities.
Priority (High, Moderate, Low):	Medium
Estimated Cost:	$300,000
Potential Funding Sources:	Federal Grants
Lead Agency/Department Responsible:	Public Works
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Harden/retrofit critical facilities to hazard-resistant levels…” Combine action with County Previous Actions #5, 34, and 36.

CITY OF ODESSA

	City of Odessa – Previous Action #1
Proposed Action:	Conduct a study to determine pollutant levels in County areas nearby sewer system for level of contaminants before and after a flood event
BACKGROUND INFORMATION	
Site and Location:	Near areas that flood
History of Damages:	Flooding occurs seasonally in the areas to be studied. E.coli has been reported in these flood waters.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Infectious Disease/Flood
Effect on New/Existing Buildings:	Protects public health
Priority (High, Moderate, Low):	High
Estimated Cost:	To be determined
Potential Funding Sources:	Federal and State programs (TCEQ, TWBD, EPA)
Lead Agency/Department Responsible:	Odessa College
Implementation Schedule:	2012

2025 ANALYSIS:
Action complete.

City of Odessa – Previous Action #2	
Proposed Action:	Implement a leak detection system for the rail switch yard to detect a hazardous material release.
BACKGROUND INFORMATION	
Site and Location:	Rail switch yard & spurs south of Highway 80
History of Damage:	Railcars are stopped within ½ mile of Odessa city limits, and small leaks have occurred several times in the rail switch yard.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials Release
Effect on New/Existing Buildings:	None to building
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$100,000
Potential Funding Sources:	Local, State, Federal
Lead Agency/Department Responsible:	Odessa Fire Dept
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update.

City of Odessa – Previous Action #3	
Proposed Action:	Implement ordinance to require low vegetation for open areas within 500 yards of structures.
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	There is a regular occurrence of wildfires in this area.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Structures will be protected by the new setback requirements
Priority (High, Moderate, Low):	High
Estimated Cost:	$20,000
Potential Funding Sources:	Local, State, Federal
Lead Agency/Department Responsible:	Legal Dept. of City of Odessa
Implementation Schedule:	2012

2025 ANALYSIS:
Action complete.

City of Odessa – Previous Action #4	
Proposed Action:	Identify new sources of water
BACKGROUND INFORMATION	
Site and Location:	Colorado River Municipal Water District (CRMWD)
History of Damage:	Local lakes are at less than ¾ capacity.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$50 million
Potential Funding Sources:	Federal and State
Lead Agency/Department Responsible:	CRMWD
Implementation Schedule:	2012

2025 ANALYSIS:
Action complete.

	City of Odessa – Previous Action #5
Proposed Action:	Improve outdated emergency center of operations technological capabilities for monitoring, recording, and responding to disasters
BACKGROUND INFORMATION	
Site and Location:	To be determined
History of Damage:	Flooding damages in the City of Odessa occur annually.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Extreme Heat, Flood, Hail, Hazardous Materials, High Wind, Lightning, Pandemic, Pipeline Failure, Thunderstorm, Winter Storm, Terrorism, Tornado, Wildfire
Effect on New/Existing Buildings:	Improving emergency response time is reducing the threat of a hazard to structures
Priority (High, Moderate, Low):	High
Estimated Cost:	$4 million
Potential Funding Sources:	Federal grants
Lead Agency/Department Responsible:	City of Odessa
Implementation Schedule:	2012-2013

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Phased Project for EOC location…”

	City of Odessa – Previous Action #6
Proposed Action:	Implement and enhance an area wide telephone emergency notification system “code red”
BACKGROUND INFORMATION	
Site and Location:	Public Safety Commission
History of Damage:	Damages have resulted from area residents being unaware of an incident leaving no time to take proactive measures

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Extreme Heat, Flood, Hail, Hazardous Materials, High Wind, Lightning, Pandemic, Pipeline Failure, Thunderstorm, Winter Storm, Terrorism, Tornado, Wildfire
Effect on New/Existing Buildings:	Early warnings sent to occupants will allow for buildings to be secured in the face of a threat.
Priority (High, Moderate, Low):	High
Estimated Cost:	$100,000
Potential Funding Sources:	State, Federal
Lead Agency/Department Responsible:	City of Odessa, Public Safety Commission
Implementation Schedule:	2011-2012

2025 ANALYSIS:
Defer action to Plan Update. Combined with new action and amend verbiage to state “Expand Community Warning System…”

	City of Odessa – Previous Action #7
Proposed Action:	Implement National Weather Chat for stakeholders and emergency management coordinators during weather critical Events
BACKGROUND INFORMATION	
Site and Location:	The County and Ector County Independent School District
History of Damage:	Previous

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Extreme Heat, Flood, Hail, High Wind, Lightning, Thunderstorm, Winter Storm, Tornado, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Negligible
Potential Funding Sources:	Local
Lead Agency/Department Responsible:	National Weather Service
Implementation Schedule:	2011

2025 ANALYSIS:
Action complete.

City of Odessa – Previous Action #8	
Proposed Action:	Convert the use of chlorine gas to non-hazardous disinfectant at water treatment plant
BACKGROUND INFORMATION	
Site and Location:	City water treatment plants in Odessa
History of Damage:	The potential for terrorist incident is high, this action reduces that risk.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials Release, Terrorism
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$1.5 million
Potential Funding Sources:	Local, state, federal
Lead Agency/Department Responsible:	City of Odessa utilities
Implementation Schedule:	2012-2013

2025 ANALYSIS:
Delete action. The City no longer considers this action a priority.

City of Odessa – Previous Action #9	
Proposed Action:	Purchase “All Hazards” radios for early warning and post event information. Place them in area schools, businesses, and critical facilities.
BACKGROUND INFORMATION	
Site and Location:	Various locations identified on the Critical Facilities list
History of Damage:	Previous damage has made for unreliable communications with the community.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Extreme Heat, Flood, Hail, Hazardous Materials, High Wind, Lightning, Pandemic, Pipeline Failure, Thunderstorm, Winter Storm, Terrorism, Tornado, Wildfire
Effect on New/Existing Buildings:	Increased warning time and communication will allow people to better protect existing buildings when possible.
Priority (High, Moderate, Low):	High
Estimated Cost:	$50,000
Potential Funding Sources:	Local, federal, and private
Lead Agency/Department Responsible:	National Weather Service of Odessa
Implementation Schedule:	2011-2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards and verbiage to state “Acquire and distribute NOAA weather radios.”

City of Odessa – Previous Action #10	
Proposed Action:	Provide proper design criteria to the public for tornado safe rooms
BACKGROUND INFORMATION	
Site and Location:	City wide
History of Damage:	Improperly designed and make shift safe rooms have left residents in harm's way.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	High Wind/ Tornado
Effect on New/Existing Buildings:	Proper construction will insure a building is resistant to high winds and tornados
Priority (High, Moderate, Low):	High
Estimated Cost:	To be determined
Potential Funding Sources:	Federal
Lead Agency/Department Responsible:	City of Odessa – PIO Plans
Implementation Schedule:	2011-2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state "Utilizing FEMA requirements and current building code…"

City of Odessa – Previous Action #11	
Proposed Action:	Launch Public Awareness campaign that will provide emergency preparedness information, activities, and kits to prepare for potential terrorist attacks.
BACKGROUND INFORMATION	
Site and Location:	City wide
History of Damage:	Historical damages are very minimal but the potential is great

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Terrorism
Effect on New/Existing Buildings:	A public that is more aware will prevent all (structural) damages possible.
Priority (High, Moderate, Low):	Low
Estimated Cost:	$50,000 - $100,000
Potential Funding Sources:	Local business partners/federal
Lead Agency/Department Responsible:	City of Odessa & Ector County
Implementation Schedule:	2011-2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Implement education and awareness…” Combine action with City Previous Actions #23 and 35.

City of Odessa – Previous Action #12	
Proposed Action:	Establish a program for students to partner with oil and gas to explore new technologies and possible re-use
BACKGROUND INFORMATION	
Site and Location:	Odessa College
History of Damage:	City experiences minor and major hazardous materials spills and pipeline incidents. Both hazards are high for the area.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials Release/Pipeline Failure
Effect on New/Existing Buildings:	Potential for energy efficiency and savings in both existing and future development
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	To be determined
Potential Funding Sources:	Federal education grants, NSF
Lead Agency/Department Responsible:	Odessa College
Implementation Schedule:	Continuous if successful, upon implementation

2025 ANALYSIS:
Delete action. The City no longer considers this action a priority.

City of Odessa – Previous Action #13	
Proposed Action:	Assess needs for the city's emergency response services
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	Lives and property can always be better protected. Emergency services need to grow with the populations they protect.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials Release/Pipeline Failure
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$2million - $3 million
Potential Funding Sources:	Local, Federal
Lead Agency/Department Responsible:	City of Odessa Dept. of Public Safety
Implementation Schedule:	2011-2012

2025 ANALYSIS:
Defer action to Plan Update.

City of Odessa – Previous Action #14	
Proposed Action:	Develop a Disaster Recovery Plan
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Earthquake, Extreme Heat, Flood, Hail, Hazardous Materials, High Wind, Lightning, Pandemic, Pipeline Failure, Thunderstorm, Winter Storm, Terrorism, Tornado, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$50k
Potential Funding Sources:	Local Match, Federal
Lead Agency/Department Responsible:	City of Odessa, Emergency Management
Implementation Schedule:	2011-2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards.

	City of Odessa – Previous Action #15
Proposed Action:	Obtain certification of communities by the national weather service as “Storm Ready” communities
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flooding, Hail, High Wind, Lightning, Thunderstorm, Winter Storm, Tornado
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$5,000
Potential Funding Sources:	Local, State
Lead Agency/Department Responsible:	National Weather Service, City of Odessa
Implementation Schedule:	2011-2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action verbiage to state “Obtain certification in the National Weather Service…”

City of Odessa – Previous Action #16	
Proposed Action:	Implement lightning meters at public parks, gatherings, and schools
BACKGROUND INFORMATION	
Site and Location:	Throughout the City
History of Damage:	Previous Lightning Strikes

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Lightning/Thunderstorm
Effect on New/Existing Buildings:	This will help mitigate against potential damage to existing structures as lightning can at the very least cause a power outage, but also lead to structure fire.
Priority (High, Moderate, Low):	High
Estimated Cost:	$15,000
Potential Funding Sources:	Local, State, and Federal
Lead Agency/Department Responsible:	City of Odessa Parks Department
Implementation Schedule:	2012-2013

2025 ANALYSIS:
Defer action to Plan Update. Amend action verbiage to state “Implement lightning meters at critical facilities, public parks…”

City of Odessa – Previous Action #17	
Proposed Action:	Update public community facilities to include Severe weather actions plan and designated tornado shelter
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	The City experiences high wind events with thunderstorms and tornadoes as well as separate windstorm events. Currently a designated shelter is not available.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail, High Wind, Thunderstorm, Winter Storm, Tornado
Effect on New/Existing Buildings:	This action will directly impact people, rather than property
Priority (High, Moderate, Low):	High
Estimated Cost:	$5,000
Potential Funding Sources:	Local, State
Lead Agency/Department Responsible:	City of Odessa
Implementation Schedule:	2011-2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards and verbiage to state “Feasibility Study: Identify community…”

City of Odessa – Previous Action #18	
Proposed Action:	Install back-up generators for the wastewater treatment plant
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	Power outages cause the system to stop treatment process and sewage back up into homes can occur.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Earthquake, Flooding, Hail, High Wind, Lightning, Thunderstorm, Winter Storm, Terrorism, Tornado, Wildfire
Effect on New/Existing Buildings:	Backup generators will prevent the loss of power during a hazard event. Keeping power to existing structures will protect against additional damages to this critical facility and also prevent sewage backup to personal property.
Priority (High, Moderate, Low):	High
Estimated Cost:	$500,000
Potential Funding Sources:	Federal, State, Local
Lead Agency/Department Responsible:	City of Odessa Utilities
Implementation Schedule:	2012-2013

2025 ANALYSIS:
Action complete.

City of Odessa – Previous Action #19	
Proposed Action:	Implement or expand rainfall observer program using volunteers (Community Collaborative Rain Hail and Snow Network (CoCoRaHS) through NOAA
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	NOAA relies on reports of weather events and by implementing a CoCoRahs program, the City can help to more accurately report hazard occurrences.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood/Thunderstorm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	Local, State
Potential Funding Sources:	$4,000
Lead Agency/Department Responsible:	City of Odessa and NWS
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards.

	City of Odessa – Previous Action #20
Proposed Action:	Create GIS map showing the locations of hazardous material sites & pipelines. Make sure the map is provided to builders, homeowners, and lenders.
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	Fatal accidents and useless investments have resulted from builders, homeowners, and lenders not being aware of a pipeline's location in relation to their project site.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Pipeline Failure
Effect on New/Existing Buildings:	Knowing exact locations of type of certain pipelines will prevent damages to existing buildings undergoing repairs or renovations. It will also prevent incidents resulting from new construction projects.
Priority (High, Moderate, Low):	High
Estimated Cost:	$70,000
Potential Funding Sources:	Local, State
Lead Agency/Department Responsible:	City of Odessa GIS Department
Implementation Schedule:	2011-2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action verbiage to state "Create GIS map showing the locations of hazardous materials…."

City of Odessa – Previous Action #21	
Proposed Action:	Provide man hole inserts for low lying areas to prevent inflow during rainfall events.
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	The sewer system cannot accommodate a deluge of flood water. Inserts will prevent running the WWTP from exceeding capacity.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	This action will prevent the existing critical facility, Wastewater Treatment Plant, from exceeding capacity.
Priority (High, Moderate, Low):	High
Estimated Cost:	$100,000
Potential Funding Sources:	State, Federal
Lead Agency/Department Responsible:	City of Odessa Utilities
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update.

City of Odessa – Previous Action #22	
Proposed Action:	Develop and enforce ordinance for water conservation usage rate
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	Water conservation is increasingly important as droughts become more severe. The City experiences moderate to severe drought during the summer months.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$100,000
Potential Funding Sources:	Local, State, Federal
Lead Agency/Department Responsible:	Utilities
Implementation Schedule:	2011

2025 ANALYSIS:
Action complete.

City of Odessa – Previous Action #23	
Proposed Action:	Issue public awareness conservation methods within businesses & residential areas
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	Increasing public awareness about the importance of conservation will help to plan for future droughts.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	$20,000
Potential Funding Sources:	Local, State
Lead Agency/Department Responsible:	City of Odessa Utilities
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Implement education and awareness…” Combine action with City Previous Actions #11 and 35.

	City of Odessa – Previous Action #24
Proposed Action:	Harden critical facilities for terrorism by installing vehicle barrier systems
BACKGROUND INFORMATION	
Site and Location:	All critical facilities with the city where needed
History of Damage:	History is minimal but potential is great

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Terrorism
Effect on New/Existing Buildings:	Critical protection of new and existing critical facilities
Priority (High, Moderate, Low):	Low
Estimated Cost:	$50,000 - $100,000
Potential Funding Sources:	Local, Federal
Lead Agency/Department Responsible:	Local vendors
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Harden/retrofit critical facilities…”

City of Odessa – Previous Action #25	
Proposed Action:	Create an evacuation plan of areas within City Limits that are surrounded by 50 acres or more
BACKGROUND INFORMATION	
Site and Location:	Borders of City Limits
History of Damage:	Regular occurrence of wildfire outside of the City threatens the City

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	A protective buffer can prevent buildings from catching on fire.
Priority (High, Moderate, Low):	High
Estimated Cost:	$25,000
Potential Funding Sources:	Local, State, Federal
Lead Agency/Department Responsible:	City of Odessa Fire Department
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards and verbiage to state “Develop alternative evacuation routes…”

City of Odessa – Previous Action #26	
Proposed Action:	Establish a hazardous cargo route
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	There is a history of minor and major hazardous materials incidents within the last 15 years

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials Release
Effect on New/Existing Buildings:	Routing this traffic away from existing buildings will reduce the threat of that hazard to the structures and occupants
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$25,000
Potential Funding Sources:	Federal and Local
Lead Agency/Department Responsible:	TxDOT
Implementation Schedule:	2011

2025 ANALYSIS:
Action complete.

City of Odessa – Previous Action #27	
Proposed Action:	Develop a land acquisition program in flood hazard areas.
BACKGROUND INFORMATION	
Site and Location:	Muskingum Draw flood plain between 8th Street and University Boulevard
History of Damage:	Numerous houses and small businesses are subject to damage from water, some 400 potential properties.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Eliminate damage for existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	$3.2 M
Potential Funding Sources:	Federal and local
Lead Agency/Department Responsible:	City of Odessa Public Works
Implementation Schedule:	2011

2025 ANALYSIS:
Delete action. The City no longer considers this action a priority.

City of Odessa – Previous Action #28	
Proposed Action:	Annually distribute flood protection/NFIP pamphlets to owners of flood-prone properties.
BACKGROUND INFORMATION	
Site and Location:	Throughout flood plains in Odessa
History of Damage:	Numerous houses and businesses are subject to flood water damage.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Educate owners on how to reduce losses due to flooding
Priority (High, Moderate, Low):	High
Estimated Cost:	$9,000/year
Potential Funding Sources:	Federal and local
Lead Agency/Department Responsible:	City of Odessa Public Works
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. Combine action with City Previous Actions #29 and amend verbiage to state “Organize annual outreach initiatives…”

City of Odessa – Previous Action #29	
Proposed Action:	Conduct workshops for local lending agencies, insurance agents, surveyors and title companies to promote availability of and understanding of flood insurance.
BACKGROUND INFORMATION	
Site and Location:	Odessa, community-wide
History of Damage:	Damages in flood plain areas in Odessa.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Increase insurance coverage on new/existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$10,000
Potential Funding Sources:	Federal and local
Lead Agency/Department Responsible:	City of Odessa Public Works
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Combine action with City Previous Actions #28 and amend verbiage to state “Organize annual outreach initiatives…”

City of Odessa – Previous Action #30	
Proposed Action:	Increase capacity of drainage channels in areas prone to flooding or with drainage problems.
BACKGROUND INFORMATION	
Site and Location:	1. In Odessa, Eastside Channel from east of Pagewood Avenue, at confluence, to Pueblo Avenue culvert 2. In Odessa, East Channel Drainage Basin improvements in vicinity of Spur 588 (Faudree Rd.) and BI-20
History of Damage:	Numerous homes and apartments are subject to flooding if channel overflows. Flood prone area identified in 1977 Drainage Study subject to increasing floods due to developed areas.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce potential for flooding structures in flood plains
Priority (High, Moderate, Low):	High
Estimated Cost:	$8.1 M
Potential Funding Sources:	Federal and local
Lead Agency/Department Responsible:	City of Odessa Public Works
Implementation Schedule:	2011

2025 ANALYSIS:
Defer action to Plan Update. Amend action verbiage to state “Upgrade undersized stormwater drains and culverts.”

City of Odessa – Previous Action #31	
Proposed Action:	Prepare Comprehensive Flood Plain and Drainage Study for the City of Odessa, determine BFE in currently identified “A” zones.
BACKGROUND INFORMATION	
Site and Location:	City-wide study
History of Damage:	Addressing all current flood plains and development areas to reduce potential for damages.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Prevent future flooding damages
Priority (High, Moderate, Low):	High
Estimated Cost:	$750,000
Potential Funding Sources:	Federal, local
Lead Agency/Department Responsible:	City of Odessa Public Works
Implementation Schedule:	2012

2025 ANALYSIS:
Action complete.

City of Odessa – Previous Action #32	
Proposed Action:	Install rain gauges at eight (8) locations around city to collect data and improve warning system.
BACKGROUND INFORMATION	
Site and Location:	Eight (8) at City of Odessa Fire Stations
History of Damage:	Community-wide response to flood prone areas.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce potential for damages and to prepare warnings
Priority (High, Moderate, Low):	High
Estimated Cost:	$5,200
Potential Funding Sources:	Federal and local
Lead Agency/Department Responsible:	City of Odessa Public Works
Implementation Schedule:	2010

2025 ANALYSIS:
Action complete.

	City of Odessa – Previous Action #33
Proposed Action:	Implement a tree trimming program that routinely clears tree limbs hanging in right-of-way
BACKGROUND INFORMATION	
Site and Location:	Throughout the City of Odessa
History of Damage:	During thunderstorms and high wind events trees and tree limbs fall in the streets causing safety problems for traffic

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	High Wind/ Thunderstorms
Effect on New/Existing Buildings:	Reduce damage from falling branches and provide clear access for emergency vehicles to homes and businesses
Priority (High, Moderate, Low):	M
Estimated Cost:	$40,000
Potential Funding Sources:	Federal and local
Lead Agency/Department Responsible:	City of Odessa Public Works Dept.
Implementation Schedule:	2012

2025 ANALYSIS:
Action complete.

City of Odessa – Previous Action #34	
Proposed Action:	Increase tree planting in public right of ways to reduce urban heat levels
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	Area has received heat waves in the past. On record events occurred on June 25, 1994 and June 30, 1994. High temperatures in most areas reached between 105 and 110 degrees daily. All-time records were set on June 27, 1994.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	No effect
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$750k
Potential Funding Sources:	Federal Funding
Lead Agency/Department Responsible:	Parks Department
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update.

City of Odessa – Previous Action #35	
Proposed Action:	Insert flyers in residential and business water bills describing xeriscape planting resources and benefits
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	Area has received heat waves in the past. On record events occurred on June 25, 1994 and June 30, 1994. High temperatures in most areas reached between 105 and 110 degrees daily. All-time records were set on June 27, 1994.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	No effect
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$5k
Potential Funding Sources:	State/Federal Funding
Lead Agency/Department Responsible:	Emergency Management
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards, an updated cost, and verbiage to state “Implement education and awareness…” Combine action with City Previous Actions #11 and 23.

City of Odessa – Previous Action #36	
Proposed Action:	Secure traffic lights and traffic controls from high wind damage. Install a system-wide communications system (Wireless Access Points) for maintenance or problems association from high wind.
BACKGROUND INFORMATION	
Site and Location:	City of Odessa
History of Damage:	Previous “Derecho Event” on June 27, 2007. Straight-line winds occurred throughout the Permian Basin. Wind speeds reached 93mph.

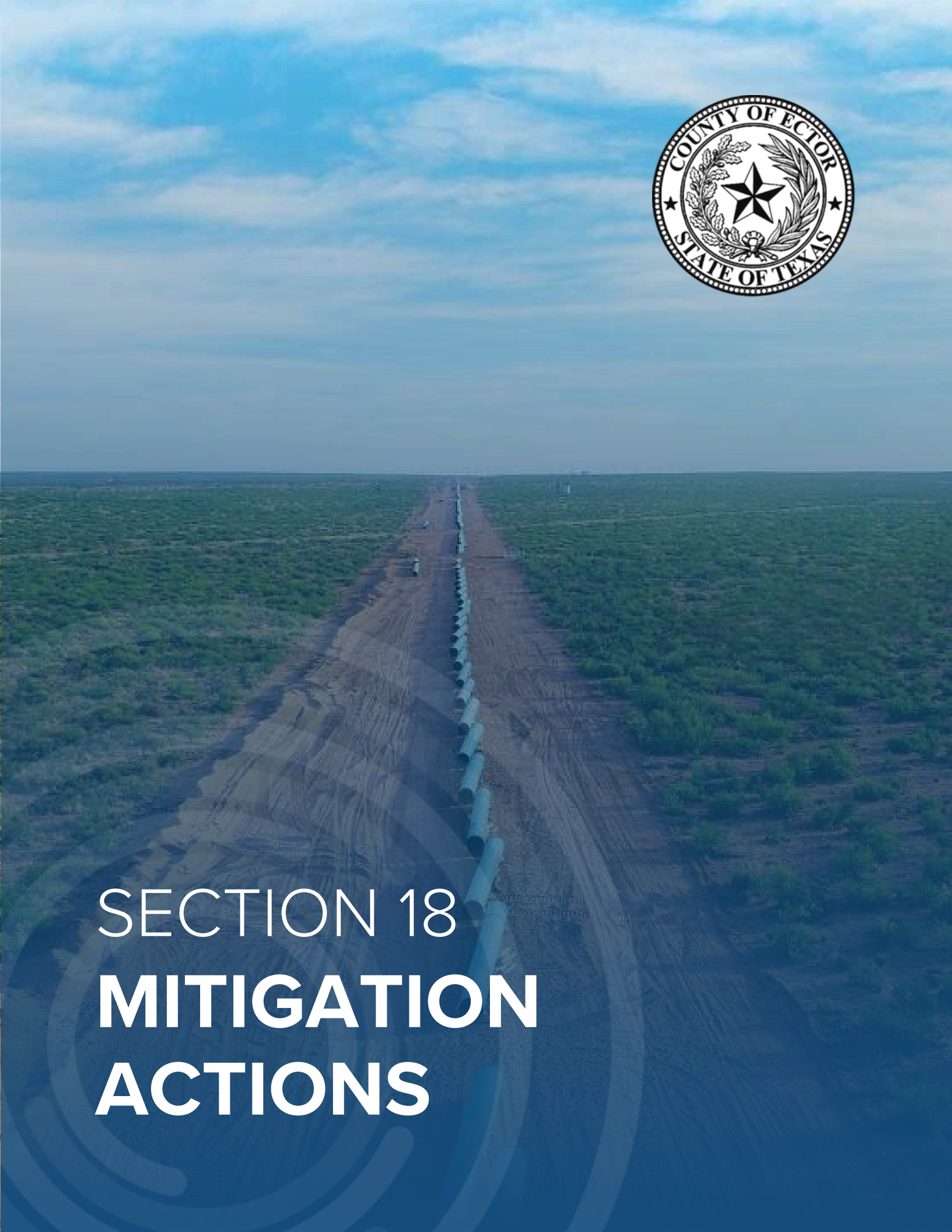
MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	High Wind
Effect on New/Existing Buildings:	No effect
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$2.5 Million
Potential Funding Sources:	Federal Funding
Lead Agency/Department Responsible:	Traffic Engineering
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include an updated cost, all applicable hazards, and verbiage to state “Secure traffic lights and traffic controls...”

City of Odessa – Previous Action #37	
Proposed Action:	Evaluate need for metal shed or barn to protect maintenance vehicles from hail
BACKGROUND INFORMATION	
Site and Location:	City of Odessa Facilities
History of Damage:	215 historical hail events. Most notably in storms on May 26, 1999, May 2, 2007 caused 2,500 claims and April 9, 2008.

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hail
Effect on New/Existing Buildings:	New construction
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	$1 Million
Potential Funding Sources:	Federal Funding
Lead Agency/Department Responsible:	Building Services
Implementation Schedule:	2012

2025 ANALYSIS:
Defer action to Plan Update. Amend action to include all applicable hazards and verbiage to state “Install covered parking for city-owned vehicles and equipment.”



SECTION 18
MITIGATION ACTIONS

SECTION 18: MITIGATION ACTIONS

SUMMARY

The 44 CFR § 201.6(c)(3)(ii) states that the plan must include "A section that *identifies* and *analyzes* a comprehensive range of specific mitigation actions and projects *being considered* to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure." The mitigation planning process is designed to help communities identify feasible and cost-effective mitigation strategies, but implementation of actions is dependent on factors such as funding, staff time, and evolving community priorities and there is no penalty for jurisdictions unable to implement projects throughout the plan's life[1].

As discussed in Section 2, at the mitigation workshop, the planning team and stakeholders met to develop mitigation actions for each of the natural hazards included in the Plan Update. Each of the actions in this section were prioritized based on FEMA's Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) criteria necessary for the implementation of each action.

As part of the economic evaluation of the STAPLEE analysis, jurisdictions analyzed each action in terms of overall costs, measuring whether the potential benefits to be gained from the action outweighed the costs associated with it. As a result of this exercise, priority was assigned to each mitigation action by marking them as High (H), Moderate (M), or Low (L). An action that is ranked as "High" indicates that the action will be implemented as soon as funding is received. A "Moderate" action is one that may not be implemented right away, depending on the cost and number of citizens served by the action. Actions ranked as "Low" indicate that they will not be implemented without first seeking grant funding, and after "High" and "Moderate" actions have been completed.

Within each mitigation action, the Planning Team considered all potential funding sources that could be utilized to implement the proposed project. To ensure all potential funding resources are considered and are not limited to those sources identified within the action worksheet, please see Appendix H for a list of all available State and Federal grant programs as of 2025. The Planning Team will continue to seek out other available funding sources during the 5-year cycle as notices of funding opportunity (NOFO) are released.

All mitigation actions created by Planning Team members are presented in this section in the form of a Mitigation Action Table. More than one hazard is sometimes listed for an action, if appropriate. Actions presented in this section represent a comprehensive range of mitigation actions per current State and FEMA Guidelines, including one action per hazard, and at least two different types for each participating jurisdiction.

Ector County and the City of Odessa are participants in the National Flood Insurance Program (NFIP). Flooding was identified as a significant risk for these communities; therefore, many of

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

the mitigation actions were developed with flood mitigation in mind. Actions related to NFIP compliance include additional narrative when deemed appropriate.

Table 18-1. Ector County Mitigation Action Matrix

TYPE OF ACTION	
Action #1 – Plans/Regulations (Blue)	Action #4 – Structural (Orange)
Action #2 – Education/Awareness (Red)	Action #5 – Preparedness/Response (Black)
Action #3 – Natural Systems Protections (Green)	

JURISDICTION	Dam Failure	Drought	Extreme Heat	Earthquake	Flood	Hail	High Wind	Lightning	Tornado	Wildfire	Winter Storm
Ector County	●●●●	●●●●●	●●●●	●●●●	●●●●●	●●●●	●●●●	●●●●	●●●●	●●●●●	●●●●
City of Odessa	●●●	●●●	●●●●●	●●●●	●●●	●●●●	●●●●	●●●	●●●●	●●●	●●●

ECTOR COUNTY

ECTOR COUNTY MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
1	Implement education and awareness program utilizing media, social media, bulletins, flyers, etc. to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and property damages. Include links to weather alerts and departmental phone listings with contact personnel for residents.	County-wide	Promote hazard awareness and protect citizens from potential injuries and damages.	Education and Awareness	Dam Failure, Drought, Earthquake, Extreme Heat, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Communication	N/A	M	$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager, PIO, IT	24 Months	Comprehensive Plan	Promote public safety.
	Description of the Solution: Monthly tips can be promoted for each hazard type via social media or other media outlets: **Dam Failure**: Know your evacuation route; **Drought**: Drought tolerant landscaping guidance; **Earthquake:** Securing indoor appliances. **Extreme Heat**: Know signs of heat stroke; **Flood**: Elevating appliances; **Hail**: Replace roofing with hail resistant materials; **High Wind**: Securing outdoor items; **Lightning**: Surge protection; **Tornado**: Where to seek shelter; **Wildfire**: Creating defensible space; **Winter Storm**: Wrapping exposed pipes.													

SECTION 18: MITIGATION ACTIONS

ECTOR COUNTY MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
2	Implement a Phased Project for community shelters. Phase I: Complete a feasibility study of potential locations in Ector County. This study will identify location suitability, shelter specifications, and costs. Phase II: Implement installation or construction of shelters at identified sites from the Phase I study.	County-wide	Reduce risk to citizens by providing shelter in high-risk areas during extreme weather events.	Structure and Infrastructure	Earthquake, Hail, High Wind, Lightning, Tornado, Wildfire, Human-caused Hazards	Safety/Security, Food/Hydration/Shelter	N/A	H	$1,000,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	48 Months	Emergency Management Action Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
3	Implement a Phased Project for an Emergency Operations Center (EOC). Phase I: Complete a feasibility study of potential locations in Ector County. This study will identify location suitability, EOC specifications, and costs. Phase II: Implement construction of the EOC at the selected site from the Phase I study.	County-wide	EOC serve as a centralized location for continuity of operations during hazard events.	Structure and Infrastructure	Dam Failure, Drought, Extreme Heat, Earthquake, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Safety/Security	Y	H	$1,000,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	60 Months	Emergency Management Action Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

ECTOR COUNTY MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
4	Acquire and install generators with hard-wired quick connections at all critical facilities.	County-wide	Provide power for critical facilities during power outages and ensure continuity of critical services.	Structure and Infrastructure	Dam Failure, Extreme Heat, Earthquake, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Energy (Power/Fuel)	N/A	H	$1,000,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	48 Months	Emergency Management Action Plan Emergency Operations Plan	Helps ensure critical facilities continue to provide services during a power outage caused by unforeseen events.
5	Educate residents on how they can conduct rainwater harvesting at their own homes to store rainfall for later use, to slow runoff, and reduce the demand for potable water.	County-wide	Promote hazard awareness using the natural environment while reducing the impact of drought through education and conservation.	Education and Awareness Natural Systems Protection	Drought, Flood	Communication, Safety/Security	N/A	M	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	24 Months	Comprehensive Plan	Protects communities and reduces risk of flooding.

ECTOR COUNTY MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
6	Install covered parking for County owned vehicles and equipment.	County-wide	Reduce loss and damage to County property.	Structure and Infrastructure	Hail, High Wind, Lightning, Wildfire	Safety/Security	Y	H	$500,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	36 Months	Comprehensive Plan	N/A
7	Develop a land acquisition program in flood hazard areas. Identify flood-prone and repetitive loss properties through the Texas Water Development Board. Identify and implement actions to reduce or eliminate flooding at identified properties. Acquire high-risk vacant land and maintain it as open space.	County-wide	Eliminate risk of flood damage to high-risk structures and prevent future losses in high-risk flood hazard areas.	Local Plans and Regulations Structure and Infrastructure Natural Systems Protection	Flood	Safety/Security	NY	H	$2,000,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager, Public Works	48 Months	Floodplain Ordinance	Protects communities and reduces risk of flooding.

ECTOR COUNTY MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
8	Adopt and implement a program for clearing debris from bridges, drains, and culverts.	County-wide	Reduce damages caused by flooding by maintaining or restoring drainage capacity.	Structure and Infrastructure	Flood	Safety/Security	Y	M	$50,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	24 Months	Stormwater Management Plan	Protects communities and reduces risk of flooding.
9	Establish, adopt, and implement a "green infrastructure" program for parks, nature preserves, greenbelts, etc.	County-wide	Reduce impacts of drought through green infrastructure that works to replenish groundwater reserves.	Natural Systems Protection Local Plans and Regulations	Drought, Flood	Safety/Security	Y	M	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	60 Months	Comprehensive Plan	Protects communities and reduces risk of flooding.

ECTOR COUNTY MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
10	Build safe room shelters throughout the jurisdiction, including in high density developments, to ensure that all residents can reach shelter within five minutes. Additionally, educate residents on shelter in place practices during extreme weather events.	County-wide	Reduce risk to citizens by providing shelter in high-risk areas during extreme weather events.	Education and Awareness	High Wind, Tornado	Safety/Security	N/A	M	$500,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County EMC	48 Months	N/A	N/A
11	Adopt innovative or smart growth initiatives and incorporate hazard mitigation into long-term community development planning activities.	County-wide	Reduce risk of damages through improved planning and construction practices.	Local Plans and Regulations	Dam Failure, Drought, Extreme Heat, Flood, High Wind, Wildfire	Safety/Security	Y	M	$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	24 Months	Comprehensive Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 18: MITIGATION ACTIONS

ECTOR COUNTY MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
12	Develop a plan for the use of reclaimed wastewater or greywater and implement projects to develop the necessary infrastructure for these purposes in parks or other identified public locations.	County-wide, City of Odessa	Reduce damages at critical facilities and public locations.	Structure and Infrastructure	Drought	Safety/Security	Y	M	$100,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Utilities	24 Months	Comprehensive Plan	N/A
13	Install portable and fixed indoor / outdoor digital warning systems and/or signage at strategic locations or public gathering areas to warn of emergency events and actions to take. In addition, expand Community Warning System (sirens, reverse 911, Mass Notification, EAS, iPAWS, radio) to increase coverage to residents in hazard-prone areas of the community.	County-wide	Promote hazard awareness and protect citizens from potential injuries and damages.	Structure and Infrastructure Education and Awareness Preparedness /Response	Dam Failure, Drought, Extreme Heat, Earthquake, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Safety/Security	Y	M	$450,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	24-36 Months	Comprehensive Plan, Emergency Management Action Plan	Promotes public safety.

ECTOR COUNTY MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
14	Create and Implement a Wildfire Fuels Reduction Program. This program would include components to obtain wildland firefighting mitigation equipment such as mechanized equipment, tractors, wood chippers, etc., to create fire breaks and perform other mitigation measures.	County-wide	Reduce risk of wildfires and the spread of wildfire through targeted fuels reduction programs.	Natural Systems Protection Preparedness /Response	Wildfire	Safety/Security	Y	H	$1,000,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	36-48 Months	Emergency Management Action Plan	N/A
15	Develop a drought contingency plan or water conservation action plan, including public education and outreach to warn citizens about the risks of drought. Develop steps to be taken in Level I, II, and III droughts.	County-wide	Reduce impact of drought through education and conservation.	Education and Awareness	Drought	Safety/Security	Y	M	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	24-36 Months	N/A	N/A

ECTOR COUNTY MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
16	Install surge protectors on critical electronic equipment at all critical facilities.	County-wide	Reduce damage to critical electronic equipment and ensure continuity of operations.	Structure and Infrastructure	Earthquake, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm	Safety/Security	Y	M	$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	24-36 Months	N/A	Helps ensure critical facilities continue to provide services during a power outage caused by unforeseen events.
17	Maintain good standing in the National Flood Insurance Program.	County-wide	Reduce flood risks while providing city residents and businesses with flood insurance coverage and reduce flood risks.	Education and Awareness	Flood	Communication	Y	H	$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	12-24 Months	Floodplain Ordinance	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

SECTION 18: MITIGATION ACTIONS

ECTOR COUNTY MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
18	Implement drainage projects, including the construction or upgrading of culverts at low-water crossings.	County-wide	New and upgraded culverts will help carry flood waters away from roads and bridges. It will also help reduce damage to buildings and the disruption of transportation systems and critical utilities.	Structure and Infrastructure	Flood	Safety/Security	Y	M	$500,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	12-24 Months	Stormwater Management Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
19	Develop an emergency response and evacuation plan for use in the unlikely event of a major disaster.	County-Wide	This action can save lives in the unlikely event of disaster.	Local Plans and Regulations Preparedness /Response	Dam Failure, Earthquake, Extreme Heat, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Safety/Security	N/A	M	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	24-36 Months	Transportation Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

ECTOR COUNTY MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
20	Harden/retrofit critical facilities to hazard-resistant levels, including the installation of vehicle barrier systems, adding bracing, vital equipment, hazard resistant roofing, and elevating generators.	County-wide	Reduce damages at critical facilities; Ensure continuity of critical services during and after event; Reduce risk of injury to emergency and critical personnel.	Structure and Infrastructure	Dam Failure, Drought, Earthquake, Extreme Heat, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Safety/Security	Y	M	$500,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Building Maintenance, Public Works	36 Months	Comprehensive Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
21	Provide information to employees and visitors regarding severe weather action plans and the locations of designated tornado shelter areas at Ector County facilities.	County-wide	Reduce risk of injury to staff and visitors at County owned facilities.	Education and Awareness	Earthquake, Hail, High Wind, Lightning, Tornado	Safety/Security, Food/Hydration/Shelter	Y	M	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Sign Shop, Building Maintenance	12 Months	Comprehensive Plan	N/A

ECTOR COUNTY MITIGATION ACTIONS														
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Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
22	Secure traffic lights and traffic controls from high wind damage.	County-wide	Reduce loss of life and injury due to flying debris during severe weather events.	Structure and Infrastructure	High Wind, Tornado	Safety/Security	Y	M	$50,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Public Works, Sign Shop	12-24 Months	Comprehensive Plan	N/A
23	Conduct public education program on fire risks and wildland fire mitigation, with the Texas Forest Service.	County-wide	Reduce risks to life and property from wildfire.	Education and Awareness	Wildfire	Safety/Security	Y	H	$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Management, PIO, Texas Forest Service	36 Months	N/A	N/A

ECTOR COUNTY MITIGATION ACTIONS														
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Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
24	Evaluate access and road conditions in unincorporated areas of Ector County for response vehicles and formulate options to improve access.	County-wide	Reduce risk to residents through improved evacuation alternatives.	Structure and Infrastructure	Dam Failure, Earthquake, Extreme Heat, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Safety/Security	Y	H	$100,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Public Works	12 Months	Transportation Plan	Promotes public safety.
25	Identify the need, suggest to the developer, and provide additional means of access into single-entry neighborhoods and gated communities to prevent residents from becoming trapped in hazardous areas.	County-wide	Reduce risk to residents through improved evacuation alternatives	Structure and Infrastructure Local Plans and Regulations	Dam Failure, Earthquake, Extreme Heat, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Safety/Security	Y	H	$50,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Development Services	24 Months	N/A	Promotes public safety.

ECTOR COUNTY MITIGATION ACTIONS														
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Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
26	Promote the use of xeriscaping for residential areas, utilizing the Ector County Website and posted material in Ector County buildings.	County-wide	Reduce impact of drought through education.	Education and Awareness	Drought, Extreme Heat	Safety/Security	Y	M	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Management, IT	24-36 Months	Comprehensive Plan	N/A
27	Provide water conservation education for low-flow plumbing and toilets, efficient washers, and rain harvesting.	County-wide	Reduce impact of drought through education.	Education and Awareness	Drought, Extreme Heat	Safety/Security	Y	M	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Public Information Ofiicer	36 Months	N/A	N/A

ECTOR COUNTY MITIGATION ACTIONS														
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Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
28	Provide information on how to select and maintain the appropriate type of fire extinguishers for all homes and businesses.	County-wide	Promote hazard awareness and protect citizens from potential injuries and damages.	Education and Awareness	Wildfire	Safety/Security	N/A	H	$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Management, IT	12 Months	N/A	N/A
29	Install fire danger rating / burn ban signs.	County-wide	Promote hazard awareness and protect citizens from potential injuries and damages.	Education and Awareness	Wildfire	Safety/Security	N/A	H	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Traffic, Sign Shop	12 Months	Emergency Management Action Plan	N/A

ECTOR COUNTY MITIGATION ACTIONS														
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Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
30	Adopt and implement a routine tree trimming program that clears tree limbs near power lines and/or hanging in right-of-way; Remove dead trees from right-of way, easements, and drainage systems on a scheduled basis.	County-wide	Reduce damages to infrastructure; Ensure continuity of services during and after event.	Structure and Infrastructure	Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm	Safety/Security, Energy (Power/Fuel)	Y	H	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Public Works	24 Months	Stormwater Management Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
31	Erect lightning rods on the rooftops of critical facilities to prevent power outages.	County-wide	Reduce risk of lightning damage to county-owned property.	Structure and Infrastructure	Lightning	Safety/Security	Y	H	$200,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Management, Building Maintenance	36-48 Months	Emergency Management Action Plan	N/A

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Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
32	Obtain certification in the National Weather Service StormReady Program.	County-wide	Reduce risk to citizens by educating the public on how to prepare for hazards and disasters.	Education and Awareness	Flood, Hail, High Wind, Tornado, Winter Storm	Communication	Y	M	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Management	24 Months	Comprehensive Plan	Promotes public safety.
33	Provide construction specifications to builders, developers, and the public for the construction of concrete tornado safe rooms in populated areas of the County.	County-wide	Reduce damages through development restrictions and improved construction requirements.	Education and Awareness	Tornado, High Wind	Safety/Security, Food/Hydration/Shelter	N/A	M	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Management, Public Information Officer	12-24 Months	N/A	N/A

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34	Flood-proof public buildings in flood-prone areas.	County-wide	Reduce flood damages through development restrictions and improved construction requirements in flood-prone areas.	Structure and Infrastructure	Flood	Safety/Security	Y	H	$100,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Building Maintenance	12-24 Months	Floodplain Ordinance	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
35	Increase tree planting in public rights-of-way to reduce urban heat levels.	County-wide	Reduce impacts of flood through expanded greenspace and restoration of floodplains and wetlands.	Local Plans and Regulations	Drought, Extreme Heat	Safety/Security	Y	M	$50,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Public Works, Building Maintenance	12 Months	Comprehensive Plan	N/A

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36	Acquire and distribute NOAA weather radios.	County-wide	Reduce risk to citizens through improved education.	Education and Awareness	Dam Failure, Earthquake, Extreme Heat, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Communication	Y	M	$50,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Management	24 Months	Comprehensive Plan	Promotes public safety.
37	Develop a plan to coordinate with TxDOT to install warning signs on roadways in the event of a severe winter storm.	County-wide	Reduce risk of damages and injuries on roadways and bridges during winter storm events through education and awareness programs	Structure and Infrastructure	Winter Storm	Safety/Security	Y	L	$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Public Works	12 Months	Transportation Plan	N/A

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Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
38	Create multipurpose community shelters in conjunction with the parks department at identified park locations.	County-wide	Reduce risk to citizens by providing shelter in high-risk areas during extreme weather events.	Structure and Infrastructure	Earthquake, Hail, High Wind, Lightning, Tornado, Wildfire, Human-caused Hazards	Safety/Security, Food/Hydration/Shelter	N/A	H	$1,000,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	48 Months	Emergency Management Action Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
39	Acquire portable generators for use during emergency events at locations without a generator.	County-wide	Provide power for critical facilities during power outages and ensure continuity of critical services.	Preparedness /Response	Dam Failure, Extreme Heat, Earthquake, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Energy (Power/Fuel)	N/A	H	$1,000,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	48 Months	Emergency Management Action Plan Emergency Operations Plan	Helps ensure critical facilities continue to provide services during a power outage caused by unforeseen events.

ECTOR COUNTY MITIGATION ACTIONS														
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Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
40	Provide fuel storage for emergency vehicles.	County-wide	Continuity of emergency services and operations.	Preparedness /Response	Dam Failure, Extreme Heat, Earthquake, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Safety/Security	N/A	M	$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager, Public Works	24-36 Months	Emergency Management Action Plan Emergency Operations Plan	Helps ensure critical facilities continue to provide services during a power outage caused by unforeseen events.
41	Purchase mobile light towers with trailers.	County-wide	Reduce risk of damages to responders during hazard events by having a reliable light source.	Preparedness /Response	Dam Failure, Extreme Heat, Earthquake, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Safety/Security	Y	M	$150,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	24-36 Months	Emergency Management Action Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

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Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
42	Increase the level of hazardous materials training for first responders; Conduct a county-wide needs assessment and consider acquiring additional equipment and vehicles for hazardous materials response.	County-wide	This action will help improve knowledge and capabilities and minimize risk to the public.	Education and Awareness	Human-caused Hazards	Communication	N/A	M	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager, Public Works	24-36 Months	Emergency Operations Plan	N/A
43	Develop, train, and exercise plans, procedures, and equipment for emergency personnel in the event of a hazardous materials incident.	County-wide	This action will help ensure that roles and responsibilities for a response to an incident are clear and personnel are adequately trained.	Local Plans and Regulations	Human-caused Hazards	Safety/Security	N/A	M	$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Manager	24-36 Months	Emergency Operations Plan	N/A

ECTOR COUNTY MITIGATION ACTIONS														
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Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
44	Provide safety procedures to builders and developers for building and operating near hazardous pipelines.	County-wide	Reduce risk of damages and injury due to hazardous materials and pipelines.	Education and Awareness	Human-caused Hazards	Safety/Security, Hazardous Materials	Y	M	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Public Works, Pipeline Group	36 Months	N/A	N/A
45	Increase security for Ector County government computer system to prevent cyber-terrorism resulting in loss of critical data and operational capabilities.	County-wide	Reduce the risk of damages associated with terrorist cyber-attacks.	Structure and Infrastructure	Human-caused Hazards	Safety/Security	Y	M	$200,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County IT	12 Months	Emergency Operations Plan	N/A

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Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
46	Assess the needs for the County's emergency response services and collaborate with the County hospital and Health Department to ensure that essential supplies, such as antiviral medications, are adequately stocked.	County-wide	Reduce loss of life and property.	Local Plans and Regulations Preparedness /Response	Human-caused Hazards	Safety/Security	Y	L	$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	Ector County Emergency Management, Health Department	12-24 Months	Emergency Management Action Plan	N/A

CITY OF ODESSA

CITY OF ODESSA MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
1	Implement education and awareness program utilizing media, social media, bulletins, flyers, etc. to educate citizens of hazards that can threaten the area and mitigation measures to reduce injuries, fatalities, and property damages. Include links to weather alerts and departmental phone listings with contact personnel for residents.	City-Wide	Promote hazard awareness and protect citizens from potential injuries and damages.	Education and Awareness	Dam Failure, Drought, Earthquake, Extreme Heat, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Communication	N/A	M	$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management	24 Months	Emergency Management Action Plan	Promote public safety.
	Description of the Solution: Monthly tips can be promoted for each hazard type via social media or other media outlets: **Dam Failure**: Know your evacuation route; **Drought**: Drought tolerant landscaping guidance; **Earthquake:** Securing indoor appliances. **Extreme Heat**: Know signs of heat stroke; **Flood**: Elevating appliances; **Hail**: Replace roofing with hail resistant materials; **High Wind**: Securing outdoor items; **Lightning**: Surge protection; **Tornado**: Where to seek shelter; **Wildfire**: Creating defensible space; **Winter Storm**: Wrapping exposed pipes.													

CITY OF ODESSA MITIGATION ACTIONS														
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Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
2	Acquire and install generators with hard-wired quick connections at all critical facilities.	City-Wide	Provide power for critical facilities during power outages and ensure continuity of critical services.	Structure and Infrastructure	Dam Failure, Extreme Heat, Earthquake, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Energy (Power/Fuel)	N/A	H	$1,000,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management, Building Services	48 Months	Emergency Management Action Plan	Helps ensure critical facilities continue to provide services during a power outage caused by unforeseen events.
3	Phased Project for EOC location. Phase I: Identify ideal locations for an EOC. Phase II: Construction of the EOC based on phase I findings.	City-Wide	EOC serve as a centralized location for continuity of operations during hazard events.	Structure and Infrastructure	Dam Failure, Drought, Earthquake, Extreme Heat, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Safety/Security	Y	H	$10,000,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management	36-48 Months	Emergency Operations Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

CITY OF ODESSA MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
4	Expand Community Warning System (sirens, reverse 911, Mass Notification, EAS, iPAWS, radio) to increase coverage to residents in hazard-prone areas of the community.	City-Wide	Promote hazard awareness and protect citizens from potential injuries and damages.	Education and Awareness Preparedness /Response	Dam Failure, Drought, Earthquake, Extreme Heat, Flood, Hail, High Wind, Lightning Tornado, Wildfire, Winter Storm, Human-caused Hazards	Safety/Security, Communication	Y	H	$250,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management	36 Months	Emergency Management Action Plan	Promotes public safety.
5	Acquire and distribute NOAA weather radios.	City-Wide	Reduce risk to citizens through improved education.	Education and Awareness	Dam Failure, Earthquake, Extreme Heat, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Communication	Y	M	$50,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management	24 Months	Emergency Management Action Plan	Promotes public safety.

CITY OF ODESSA MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
6	Utilizing FEMA requirements and current building code requirements create and implement a design criteria to educate the public on building a tornado safe room.	City-Wide	Promote hazard awareness and protect citizens from potential injuries and damages.	Education and Awareness	High Wind, Tornado	Safety/Security, Food/Hydration/Shelter	Y	H	$50,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants: (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Department of Public Safety, Development, Building Inspection	36 Months	Building Codes	N/A
7	Obtain certification in the National Weather Service StormReady Program.	City-Wide	Reduce risk to citizens by educating the public on how to prepare for hazards and disasters.	Education and Awareness	Flood, Hail, High Wind, Tornado, Winter Storm	Safety/Security	N/A	H	$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management	24-36 Months	Emergency Management Action Plan	Promotes public safety.

CITY OF ODESSA MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
8	Implement lightning meters at critical facilities, public parks, schools, and other outdoor gathering areas that are city owned.	City-Wide	Reduce loss of life and property.	Structure and Infrastructure	Lightning	Safety/Security	Y	H	$15,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management, Parks and Recreation	36 Months	Emergency Management Action Plan	N/A
9	Feasibility Study: Identify community facilities that can serve as a designated storm shelters and develop a severe weather actions plan.	City-Wide	Reduce risk to citizens by providing shelter in high-risk areas during extreme weather events.	Local Plans and Regulations	Earthquake, Hail, High Wind, Tornado, Winter Storm	Safety/Security	Y	H	$5,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management	36 Months	Emergency Management Action Plan	N/A

CITY OF ODESSA MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
10	Implement or expand rainfall observer program using volunteers - Community Collaborative Rain Hail and Snow Network (CoCoRaHS) through NOAA.	City-Wide	Reduce risk to citizens by educating the public on how to prepare for hazards and disasters.	Education and Awareness	Flood, Hail, Winter Storm	Communication	N/A	H	$4,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management	36 Months	Capital Improvement Plan	Promote public safety.
11	Create GIS map showing the locations of hazardous material sites & pipelines. This map will be utilized internally for creation of evacuation routes or to monitor hazardous material and pipeline failure related events.	City-Wide	Route awareness can reduce loss of life and property to exposed citizens.	Education and Awareness	Human-caused Hazards	Safety/Security Hazardous Materials	Y	H	$70,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management	48 Months	Evacuation Plan	N/A

CITY OF ODESSA MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
12	Provide manhole inserts for low-lying areas to prevent inflow during rainfall events.	City-Wide	Reduce risk of flood water contamination.	Structure and Infrastructure	Flood	Safety/Security	Y	H	$100,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management, Public Works, Utilities	36 Months	Stormwater Management Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.
13	Harden/retrofit critical facilities to hazard-resistant levels, including the installation of vehicle barrier systems, adding bracing, vital equipment, hazard resistant roofing, and elevating generators.	City-Wide	Reduce damages at critical facilities; Ensure continuity of critical services during and after event; Reduce risk of injury to emergency and critical personnel.	Structure and Infrastructure	Dam Failure, Drought, Earthquake, Extreme Heat, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Safety/Security	Y	M	$500,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management, Building Services	36 Months	Emergency Management Action Plan	Protects infrastructure, reduces cost of reparation, and prevents injury to residents.

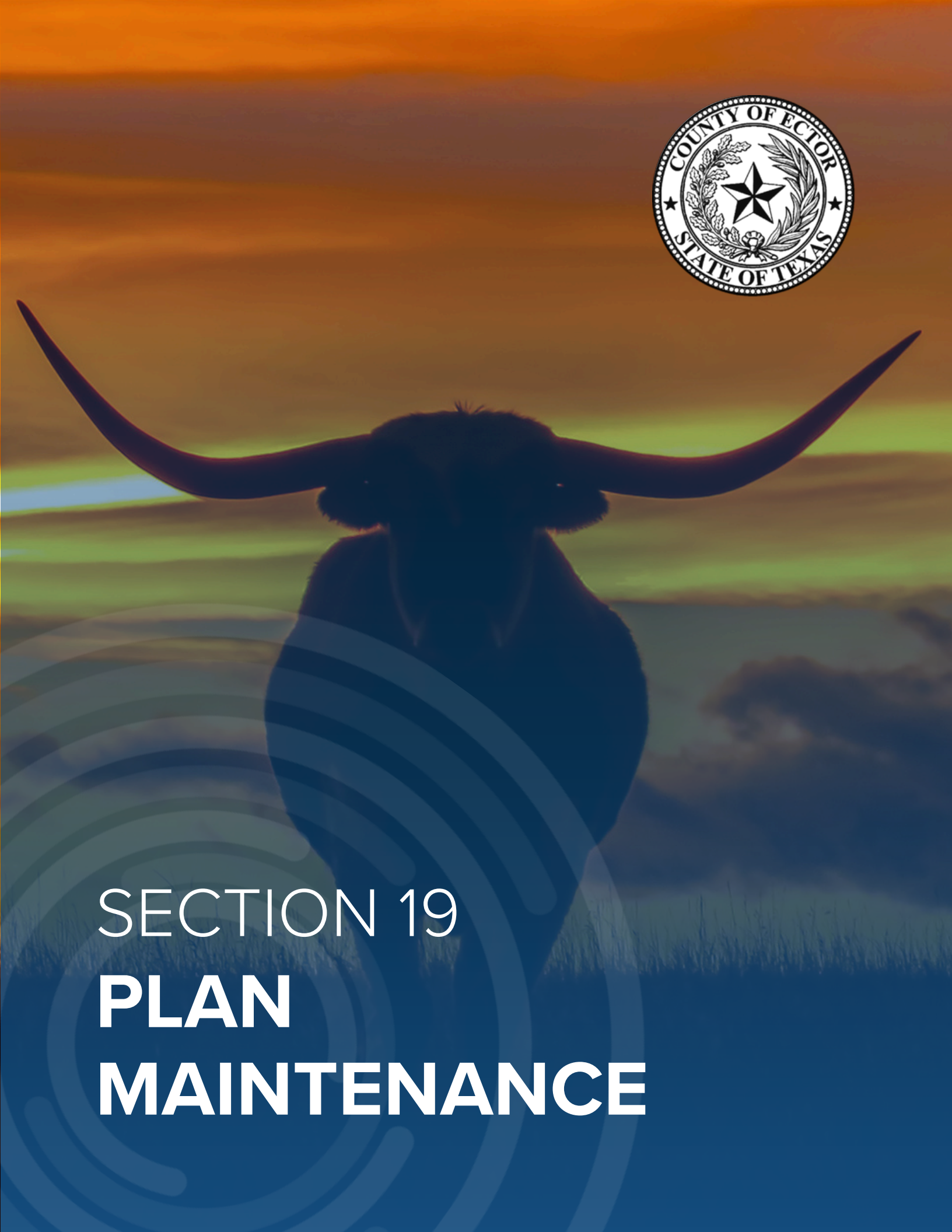
CITY OF ODESSA MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
14	Develop alternative evacuation routes / plans and designate emergency thoroughfares, particularly in areas with limited capacity. Educate citizens on evacuation routes and procedures.	City-Wide	Reduce risk residents through improved evacuation alternatives and awareness efforts.	Education and Awareness Local Plans and Regulations	Dam Failure, Earthquake, Flood, Tornado, Wildfire	Safety/Security	Y	H	$25,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management	36 Months	Evacuation Plan	Promotes public safety.
15	Organize annual outreach initiatives, including workshops for local lenders, insurance agents, surveyors, and title companies to promote awareness and understanding of flood insurance, along with the distribution of flood protection and NFIP informational pamphlets to owners of flood-prone properties.	City-Wide	Reduce risk to citizens by educating the public on flood mitigation.	Education and Awareness	Flood	Safety/Security	N/A	H	$10,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management, Public Works	36 Months	Floodplain Ordinance	Promotes public safety.

CITY OF ODESSA MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
16	Upgrade undersized stormwater drains and culverts.	City-Wide	Reduce risk of flood damages through improved drainage capacity.	Structure and Infrastructure	Flood	Safety/Security	Y	H	$8,100,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management, Development, Stormwater	36 Months	Stormwater Management Plan	Protects communities and reduces risk of flooding.
17	Increase tree planting in public rights-of-way to reduce urban heat levels.	City-Wide	Reduce impacts of Urban Island Heat effect in densely populated areas through tree planting.	Natural Systems Protection Local Plans and Regulations	Drought, Extreme Heat	Safety/Security	N/A	M	$750,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management, Parks and Recreation	48 Months	Capital Improvement Plan	N/A

CITY OF ODESSA MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
18	Secure traffic lights and traffic controls from high wind damage. Install a system-wide communication system to alert city officials to issues due to high wind events.	City-Wide	Reduce loss of life and injury due to flying debris during severe weather events.	Structure and Infrastructure	High Wind, Tornado	Safety/Security	Y	M	$750,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management, Public Works, Traffic	12-24 Months	Emergency Management Action Plan	N/A
19	Install covered parking for City owned vehicles and equipment.	City-Wide	Reduce loss and damage to County property.	Structure and Infrastructure	Hail, High Wind, Lightning, Wildfire	Safety/Security	Y	H	$1,000,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management, Building Services	36 Months	Emergency Management Action Plan	N/A

CITY OF ODESSA MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
20	Implement a leak detection system for the rail switch yard to detect a hazardous material release.	City-Wide	Reduce loss of life and property due to railcar leaks or accidents.	Education and Awareness	Human-caused Hazards	Safety/Security	Y	M	$100,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Fire Department	48 Months	Emergency Operations Plan	N/A
21	Assess needs for the city's emergency response services.	City-Wide	Reduce loss of life and property.	Preparedness /Response	Human-caused Hazards	Safety/Security	Y	H	$2,500,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Department of Public Safety	24 Months	Emergency Management Action Plan	N/A

CITY OF ODESSA MITIGATION ACTIONS														
**Reduces risk to new and/or existing buildings and infrastructure*														
Action #	**Proposed Action**	**Site**	**Benefit**	**Action Type**	**Hazards**	**Community Lifeline**	**Infra.***	**Priority (High, Mod., Low)**	**Cost**	**Potential Funding Sources**	**Lead Agency**	**Timeline**	**Existing Plans**	**NFIP**
22	Develop and implement a Disaster Recovery Plan.	City-Wide	Reduce loss of life and property.	Preparedness /Response	Dam Failure, Drought, Earthquake, Extreme Heat, Flood, Hail, High Wind, Lightning, Tornado, Wildfire, Winter Storm, Human-caused Hazards	Communication,	N/A	H	$50,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management	24 Months	Emergency Management Action Plan	Promotes public safety.
23	In conjunction with the Office of Emergency Management, create and implement a temporary traffic control plan for emergency access during hazard events or emergencies.	City-Wide	Reduce risk residents through improved evacuation alternatives and awareness efforts.	Preparedness /Response	Dam Failure, Flood, High Wind, Tornado, Winter Storm, Wildfire	Safety/Security	Y	H	$25,000	Local Budget; State Grants (GLO, TAMFS, TDA, TDEM, TWDB, TXDOT); Federal Grants (FEMA HMA Grants, CDBG, CDC, DOH, EDA, EPA, HUD, NFIP, NFWF, NOAA, NRCS, SBA, USACE, USDA, USFS, USFWS)	City of Odessa Emergency Management, Traffic Department	36 Months	Transportation Plan	Promotes public safety.



SECTION 19

PLAN MAINTENANCE

SECTION 19: PLAN MAINTENANCE

PLAN MAINTENANCE PROCEDURES

The following is an explanation of how Ector County, the City of Odessa, and the general public will be involved in implementing, evaluating, and enhancing the Plan Update over time. When the Plan is discussed in all maintenance procedures it includes mitigation actions and hazard assessments. The sustained hazard mitigation planning process consists of four main parts:

- Incorporation
- Monitoring and Evaluation
- Updating
- Continued Public Involvement

INCORPORATION

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

PROCESS OF INCORPORATION

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

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

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

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

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

Ector County is committed to supporting the City of Odessa as they implement their mitigation actions. Planning Team members will review and revise, as necessary, the long-range goals and objectives in strategic plan and budgets to ensure that they are consistent with this Hazard Mitigation Action Plan Update. Additionally, the planning area will work to advance the goals of this Hazard Mitigation Plan through its routine, ongoing, long-range planning, budgeting, and work processes.

Table 19-1 identifies types of planning mechanisms and examples of methods for incorporating the Plan Update into other planning efforts. The team members, listed in Table 19-2 below, will be responsible for the review of these planning mechanisms and their incorporation of the Plan, with the exception of the Floodplain Management Plans; the jurisdictions who have a Floodplain Administrator on staff will be responsible for incorporating the Plan when Floodplain Management Plans are updated or new plans are developed.

Table 19-1. Methods of Incorporation of the Plan

PLANNING MECHANISM	DEPARTMENT / TITLE RESPONSIBLE	INCORPORATION OF PLAN
Annual Budget Review	**Ector County –** Government: Public Information Officer **City of Odessa** – Odessa Fire Rescue: Assistant Chief of Emergency Management	Various departments and key personnel that participated in the planning process will review the Plan Update and mitigation actions therein when conducting their annual budget review. Allowances will be made in accordance with grant applications sought, and mitigation actions that will be undertaken, according to the implementation schedule of the specific action.
Capital Improvement Plans	**Ector County –** Government: Public Information Officer	The City of Odessa has a Capital Improvement Plan (CIP) in place. Prior to any revisions to the CIP, city departments will review the risk

PLANNING MECHANISM	DEPARTMENT / TITLE RESPONSIBLE	INCORPORATION OF PLAN
	City of Odessa – Odessa Fire Rescue: Assistant Chief of Emergency Management	assessment and mitigation strategy sections of the HMAP, as limiting public spending in hazardous zones is one of the most effective long-term mitigation actions available to local governments.
Comprehensive Plans	**Ector County –** Government: Public Information Officer **City of Odessa –** Odessa Fire Rescue: Assistant Chief of Emergency Management	Ector County and the City of Odessa have a Comprehensive Land Use Plan in place or under development. Since comprehensive plans involve developing a unified vision for a community, the mitigation vision and goals of the Plan will be reviewed in the development or revision of a Comprehensive Plan.
Floodplain Management Plans	**Ector County –** Floodplain Administrator **City of Odessa –** Floodplain Administrator	Floodplain Management Plans include preventative and corrective actions to address the flood hazard. Therefore, the actions for flooding and information found in Section 9 of this Plan Update discussing the people and property at risk to flood will be reviewed and revised when Ector County and the City of Odessa update their management plans or develop new plans.
Grant Applications	**Ector County –** Government: Public Information Officer **City of Odessa –** Odessa Fire Rescue: Assistant Chief of Emergency Management	The HMAP will be evaluated when grant funding is sought for mitigation projects. If a project is not in the Plan Update, a Plan Revision may be necessary to include the action in the Plan.
Regulatory Plans	**Ector County –** Government: Public Information Officer **City of Odessa –** Odessa Fire Rescue: Assistant Chief of Emergency Management	Ector County and the City of Odessa have regulatory plans in place or underdevelopment, such as Emergency Operations Plans and Land Use Plans, and/or Evacuation Plans. The Plan Update will be consulted when county and city departments review or revise their current regulatory planning mechanisms, or in the development of

PLANNING MECHANISM	DEPARTMENT / TITLE RESPONSIBLE	INCORPORATION OF PLAN
		regulatory plans that are not currently in place.

MONITORING AND EVALUATION

Periodic revisions of the Plan are required to ensure that goals, objectives, and mitigation actions are kept current. When the Plan is discussed in these sections, it includes the risk assessment and mitigation actions as a part of the monitoring, evaluating, updating, and review process. Revisions may be required to ensure the Plan is in compliance with federal and state statutes and regulations. This section outlines the procedures for completing Plan revisions, updates, and review. Table 19-2 indicates the department and title of the party responsible for Plan monitoring, evaluating, updating, and reviewing of the Plan.

Table 19-2. Team Members Responsible for Plan Monitoring, Evaluating, Updating, and Reviewing of the Plan

ORGANIZATION / DEPARTMENT	TITLE
Ector County – Government	Public Information Officer
City of Odessa – Odessa Fire Rescue	Assistant Chief of Emergency Management

MONITORING

Designated Planning Team members are responsible for monitoring, evaluating, updating, and reviewing the Plan, as shown in Table 19-2. Individuals holding the title listed in Table 19-2 will be responsible for monitoring the Plan on an annual basis. Plan monitoring includes reviewing and incorporating into the Plan other existing planning mechanisms that relate or support goals and objectives of the Plan; monitoring the incorporation of the Plan into future updates of other existing planning mechanisms as appropriate; reviewing mitigation actions submitted and coordinating with various County and City departments to determine if mitigation actions need to be re-evaluated and updated; evaluating and updating the Plan as necessary; and monitoring plan maintenance to ensure that the process described is being followed, on an annual basis, throughout the planning process. The Planning Team will develop a brief report that identifies policies and actions in the Plan that have been successfully implemented and any changes in the implementation process needed for continued success. A summary of meeting notes will report the particulars involved in developing an action into a project. In addition to the annual monitoring, the Plan will be similarly reviewed immediately after extreme weather events, including but not limited to state and federally declared disasters.

EVALUATION

As part of the evaluation process, the Planning Team will assess changes in risk; determine whether the implementation of mitigation actions is on schedule; determine whether there are any implementation problems, such as technical, political, legal, or coordination issues; and identify changes in land development or programs that affect mitigation priorities for each respective department or organization.

SECTION 19: PLAN MAINTENANCE

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

UPDATING

PLAN REVISIONS

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

Ector County and the City of Odessa will review proposed revisions and vote to accept, reject, or amend the proposed change. Upon ratification, the revision will be transmitted to the Texas Division of Emergency Management (TDEM).

In determining whether to recommend approval or denial of a Plan Revision request, Ector County and the City of Odessa will consider the following factors:

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

FIVE (5) YEAR REVIEW

The Plan will be thoroughly reviewed by the Planning Team at the end of three years from the approval date to determine whether there have been significant changes in the planning area that necessitate changes in the types of mitigation actions proposed. Factors that may affect the content of the Plan include new development in identified hazard areas, increased exposure to hazards, disaster declarations, increase or decrease in capability to address hazards, and changes to federal or state legislation.

The Plan review process provides Ector County and the City of Odessa an opportunity to evaluate mitigation actions that have been successful, identify losses avoided due to the implementation of specific mitigation measures, and address mitigation actions that may not have been successfully implemented as assigned.

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

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

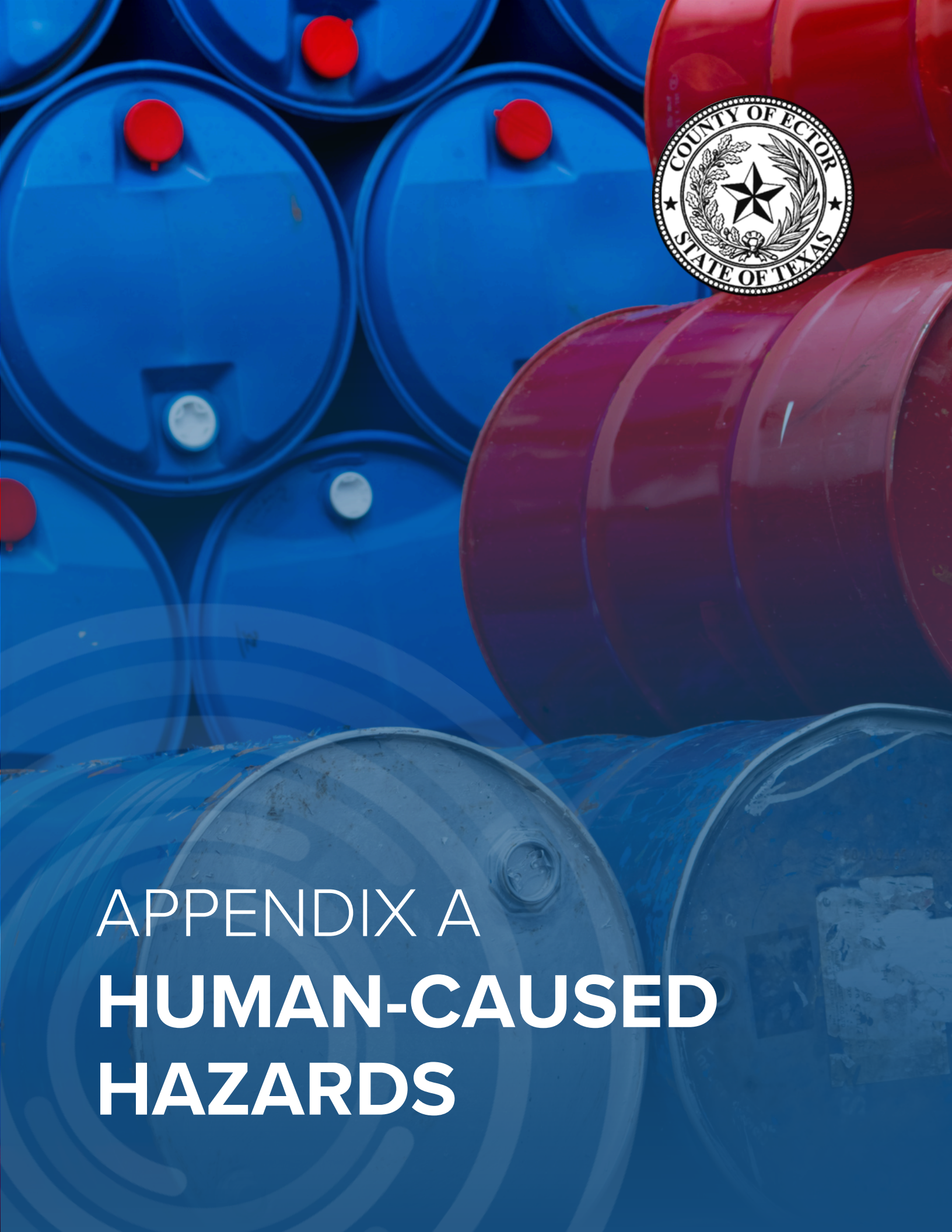
CONTINUED PUBLIC INVOLVEMENT

Public input was an integral part of the preparation of this Plan and will continue to be essential for Plan updates. The public will be directly involved in the annual evaluation, monitoring, reviews, and cyclical updates. Changes or suggestions to improve or update the Plan will provide opportunities for additional public input.

The public can review the Plan on the participating jurisdictions' websites, or at the County Courthouse, where officials and the public are invited to provide ongoing feedback via email.

The Planning Team may also designate voluntary citizens from the planning area or willing stakeholder members from the private sector businesses that were involved in the Plan's development to provide feedback on an annual basis. It is important that stakeholders and the immediate community maintain a vested interest in preserving the functionality of the planning area as it pertains to the overall goals of the mitigation plan. The Planning Team is responsible for notifying stakeholders and community members on an annual basis and maintaining the Plan.

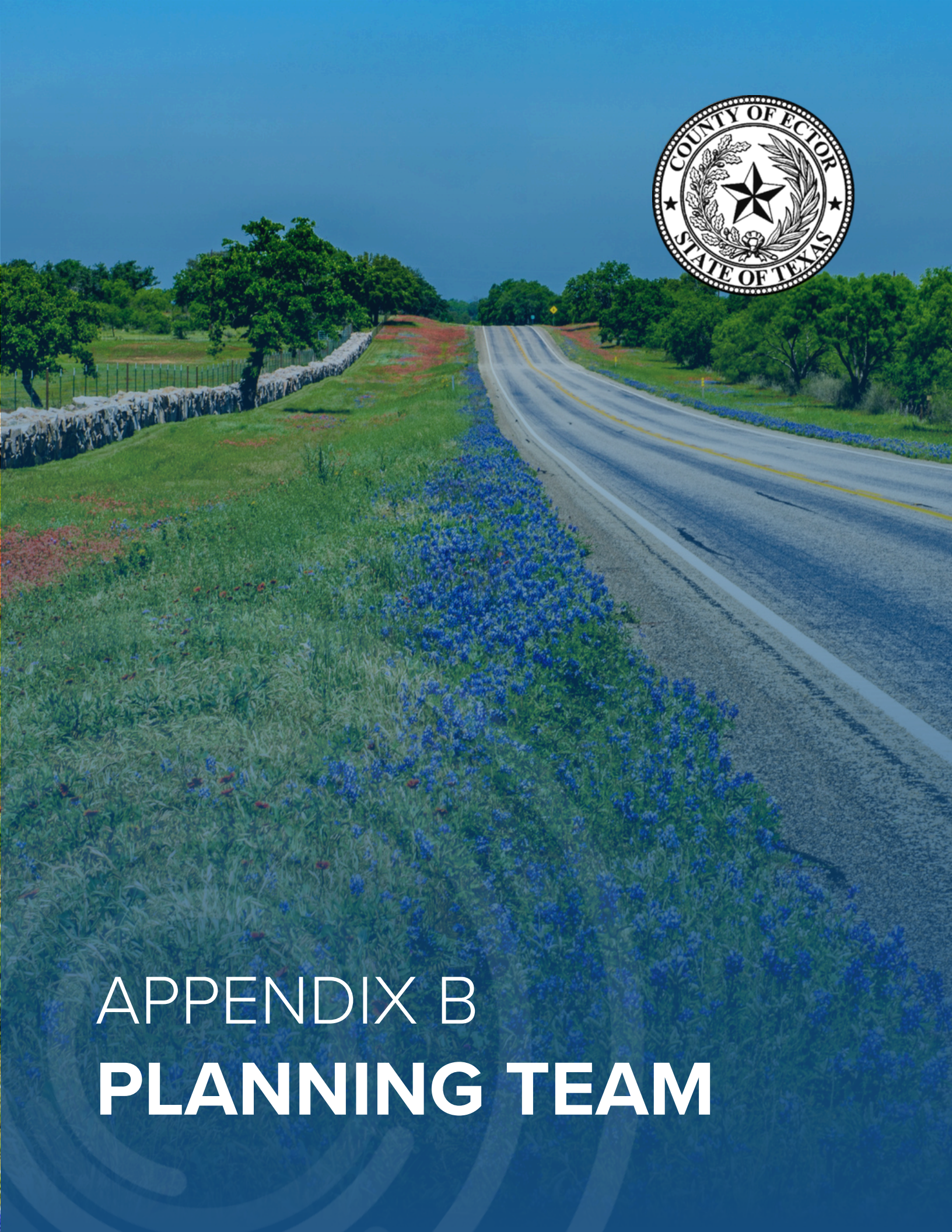
Media, including local newspapers and radio stations, will be used to notify the public of any maintenance or periodic review activities during the implementation, monitoring, and evaluation phases. Additionally, local news media will be contacted to cover information regarding Plan updates, the status of grant applications, and project implementation. Local and social media outlets, such as Facebook, will keep the public and stakeholders apprised of potential opportunities to fund and implement mitigation projects identified in the Plan.



APPENDIX A
HUMAN-CAUSED HAZARDS

APPENDIX A: HUMAN-CAUSED HAZARDS

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



APPENDIX B
PLANNING TEAM

APPENDIX B: PLANNING TEAM

PLANNING TEAM MEMBERS

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

Table B-1. Executive Planning Team

ORGANIZATION / DEPARTMENT	TITLE
Ector County – Government	Public Information Officer
City of Odessa – Odessa Fire Rescue	Assistant Chief of Emergency Management

Table B-2. Advisory Planning Team

ORGANIZATION / DEPARTMENT	TITLE
Ector County – Building Maintenance	Director
Ector County – Development Services	Director
Ector County – Emergency Management	Director
Ector County – Government	County Attorney / Grant Writer
Ector County – Government	County Judge
Ector County – Health Department	Department Coordinator
Ector County – Health Department	Director
Ector County – Public Works	County Engineer
Ector County – Public Works	Department Coordinator
Ector County – Public Works	Director
Ector County – Sheriff's Office	County Sheriff
Ector County – Sheriff's Office	County Sheriff Assistant
Ector County – Sheriff's Office	Sergeant
City of Odessa – Government	Mayor

STAKEHOLDERS

The following groups listed in Table B-3 represent a list of organizations invited to stakeholder meetings, public meetings, and workshops throughout the planning process and include members of community groups, non-profit organizations, private businesses, utility providers, neighboring counties, schools, state and federal agencies. The public were also invited to participate via e-mail throughout the planning process. Many of the invited organizations and stakeholders participated and were integral to providing comments and data for the Plan. For a list of attendees at meetings, please see Appendix F[1].

Table B-3. Stakeholders

AGENCY	TITLE	STAKEHOLDER TYPE
Able Center for Independent Living	Executive Director	Community Organization
American Red Cross – Permian Basin	Executive Director	Regional and Local Agency
American Red Cross	Disaster Program Manager	Regional and Local Agency
American Red Cross	Disaster Volunteer	Regional and Local Agency
Andrews County	Emergency Management Coordinator	Neighboring Jurisdiction
Catholic Charities	General Representative	Non-profit / Community Organization
ContinueCARE Hospital	Safety Officer	Healthcare Agency
Crane County	County Judge	Neighboring Jurisdiction
Ector County Commissioners	County Commissioner Precinct 1	Local Government
Ector County Commissioners	County Commissioner Precinct 2	Local Government
Ector County Commissioners	County Commissioner Precinct 3	Local Government
Ector County Commissioners	County Commissioner Precinct 4	Local Government
Ector County Hospital District	Public Relations	Healthcare Agency
Ector County ISD	Chief of Police	Academia
Ector County ISD	Operations Executive Director	Academia
Ector County ISD	Superintendent	Academia
Ector County Library	General Representative	Community Organization

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

APPENDIX B: PLANNING TEAM

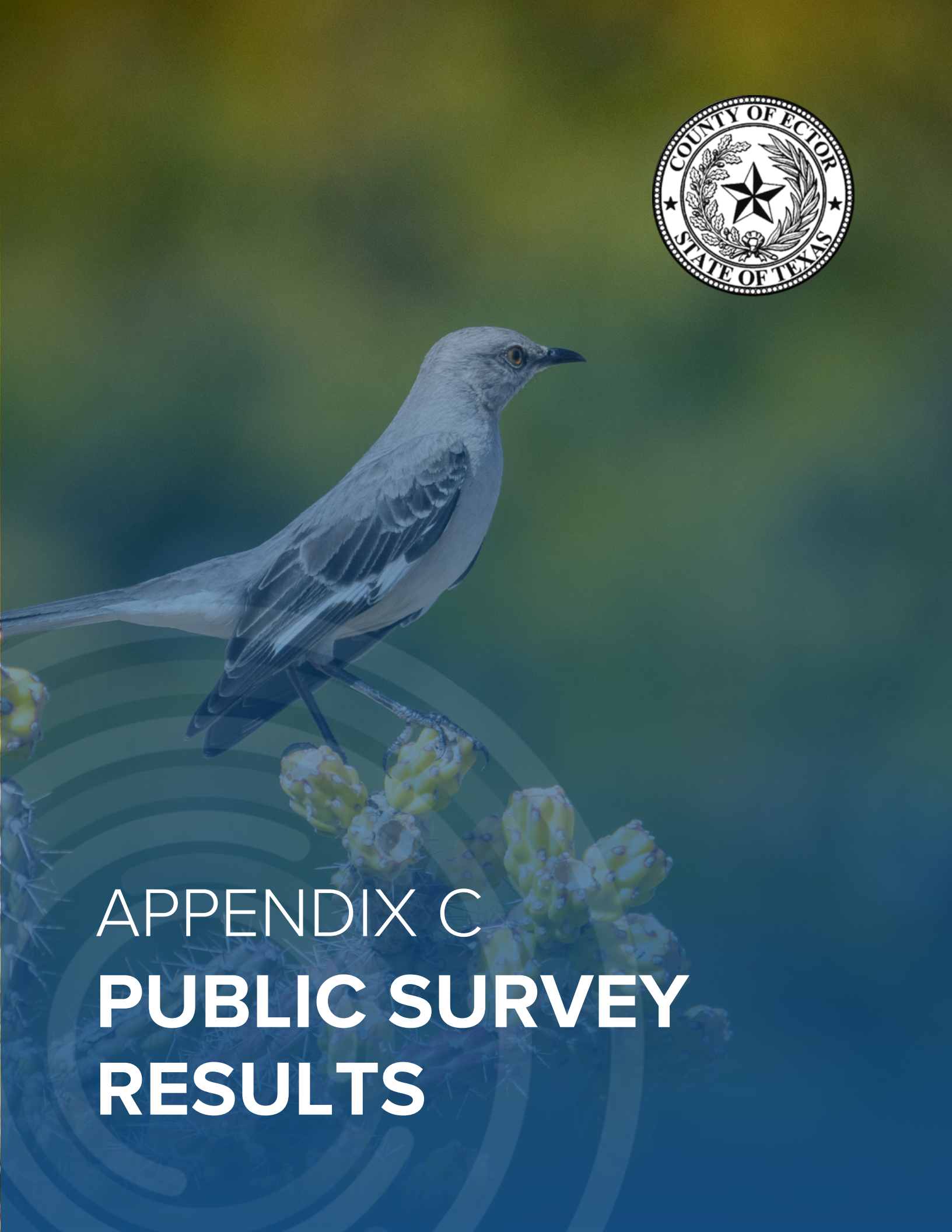
AGENCY	TITLE	STAKEHOLDER TYPE
Ector County Senior Center	Director	Community Organization
Ector County Utility District	General Representative	Utility Provider
Environmental Protection Agency (EPA)	Director of Superfund and Emergency Management Division	Federal Agency
Environmental Protection Agency (EPA)	Regional Administrator	Federal Agency
Gardendale Volunteer Fire Department (VFD)	Fire Chief	Community Organization
Goldsmith Volunteer Fire Department (VFD)	Fire Chief	Community Organization
Goldsmith, City of	Mayor	Neighboring Jurisdiction
Goodwill	Director of Marketing and Communication	Non-Profit / Community Organization
Grand Companions (Animal Shelter)	General Representative	Community Organization
Greater Opportunities of the Permian Basin	Assistant Director of Program Operations	Non-Profit / Community Organization
Keep Odessa Beautiful	Executive Director	Non-Profit / Community Organization
Midland County	Emergency Management Coordinator	Neighboring Jurisdiction
National Weather Service (NWS) – Midland / Odessa	General Representative	Federal Agency
Odessa American	Administrative Assistant	Community Organization
Odessa Fire Rescue	Fire Chief	Community Organization
Odessa Housing Authority	Administrative Assistant	Community Organization
Odessa Housing Finance Corporation	Executive Director	Community Organization
Odessa Junior College	Chief of Police	Academia
Odessa Regional Medical Center	Emergency Management	Healthcare Agency
Odessa, City of	Mayor	Neighboring Jurisdiction
Permian Basin Mission Center	General Representative	Non-Profit / Community Organization
Permian Basin MPO	Transportation Planner	Community Organization
Permian Basin Petroleum Association	General Representative	Community Organization

APPENDIX B: PLANNING TEAM

AGENCY	TITLE	STAKEHOLDER TYPE
Permian Basin Regional Planning Group	Director	Regional and Local Agency
Permian Basin Regional Planning Group	Homeland Security Program Specialist	Regional and Local Agency
Permian Road Safety Coalition	Administrative Assistant	Community Organization
Sandhills SWCD #241	Field Representative	Utility Provider
South Ector County Volunteer Fire Department (VFD)	Fire Chief	Community Organization
Texas A&M AgriLife Extension	County Extension Agent	State Agency
Texas A&M Forest Service	Resource Specialist II	State Agency
Texas Commission on Environmental Quality, Region 7	Dam Safety Program Representative	State Agency
Texas Commission on Environmental Quality, Region 7	Executive Assistant	State Agency
Texas Commission on Environmental Quality, Region 7	Regional Director	State Agency
Texas Department of Health and Human Services, Region 9 / 10	General Representative	State Agency
Texas Department of Health and Human Services, Region 9 / 10	Preparedness and Response Program Manager	State Agency
Texas Department of Homeland Security	Media Representative	State Agency
Texas Department of Housing and Community Affair	Director of Single Family and Homeless Program	State Agency
Texas Department of Housing and Community Affair	Manager of Single-Family Program	State Agency
Texas Department of Transportation, Odessa District	Area Engineer	State Agency
Texas Department of Transportation, Odessa District	Director of Operations	State Agency
Texas Department of Transportation, Odessa District	District Engineer	State Agency

APPENDIX B: PLANNING TEAM

AGENCY	TITLE	STAKEHOLDER TYPE
Texas Department of Transportation, Odessa District	Maintenance Supervisor	State Agency
Texas Division of Emergency Management (TDEM), Region 7	Assistant Chief	State Agency
Texas Division of Emergency Management (TDEM), Region 7	District 9 Chief	State Agency
Texas Division of Emergency Management (TDEM), Region 7	Recovery & Mitigation Section Chief	State Agency
Texas Floodplain Management Association	Region 3 Director	State Agency
Texas State Representative	Texas House District 81	State Legislature
Texas State Senate	Texas Senate District 31	State Legislature
Texas State Soil & Water Conservation Board	Communications and Outreach Coordinator	State Agency
Texas Water Development Board	Executive Assistant, Planning	State Agency
Texas Water Development Board	Regional Water Planning Group Representative	State Agency
Texas Windstorm Associations	Public Information Officer	State Agency
United Way of Odessa	Community Impact Director	Non-Profit / Community Organization
Upton County	Emergency Management Coordinator	Neighboring Jurisdiction
U.S. Army Corps of Engineers	Fort Worth & Galveston District Representative	Federal Agency
U.S. Fish & Wildlife	Southwest Regional Representative	Federal Agency
Ward County	Emergency Management Coordinator	Neighboring Jurisdiction
West Odessa Volunteer Fire Department (VFD)	Fire Chief	Community Organization
West Texas Food Bank	Chief Executive Officer	Non-Profit / Community Organization
Winkler County	Administrative Assistant to County Judge	Neighboring Jurisdiction



APPENDIX C
PUBLIC SURVEY RESULTS

APPENDIX C: PUBLIC SURVEY RESULTS

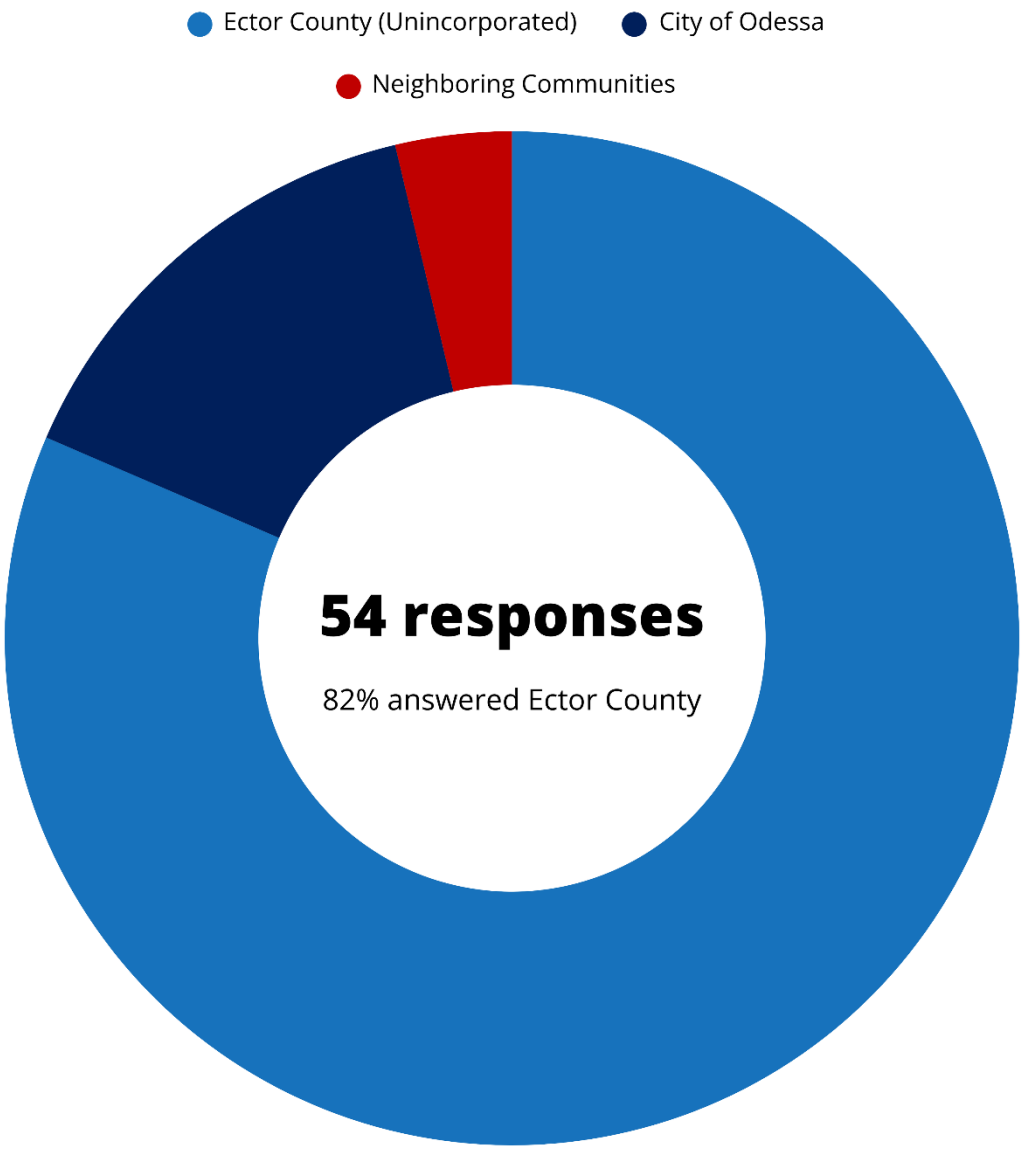
OVERVIEW

Ector County prepared a public survey that requested public opinion on a wide range of questions relating to natural hazards. The survey was made available via the county's website. This survey link was also distributed at public meetings and stakeholder events throughout the planning process.

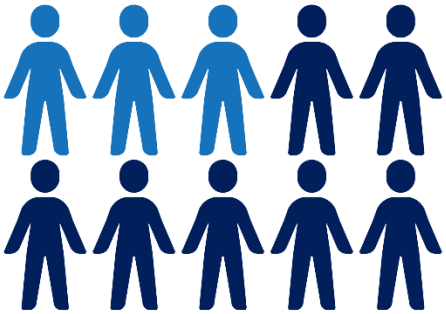
A total of 54 surveys were collected, the results of which are presented in Appendix C. The purpose of the survey was twofold: 1) to solicit public input during the planning process, and 2) to help the jurisdictions identify any potential actions or problem areas.

All public survey results were discussed and shared with the Planning Team during the Mitigation Strategy Workshop. These results are also provided below. The survey results provide information regarding the public's experience with natural hazards, their perceived hazards of concern, recommended mitigation actions, and additional valuable insights. Overall, this survey enhances the mitigation planning process by ensuring the plan properly represents the community, is informed through local knowledge, and by promoting equity.

PUBLIC SURVEY RESULTS



Have you ever experienced or been impacted by a disaster?



26% Responded 'Yes'

Personal experiences shared in survey responses included:

"Have been affected by hail, winter storm, and infectious disease."

"Flooding in different areas of town."

"Fire."

"Loss of water Summer 2022, Loss of Power Winter of 2020."

"I've experienced a few earthquakes in Odessa. None of them major, thankfully."

"Main water line break, cutting off water to city."

"Freeze."

"Electric outage, due to snow storm. Freezing conditions not norm to the city."

"Tornadoes."

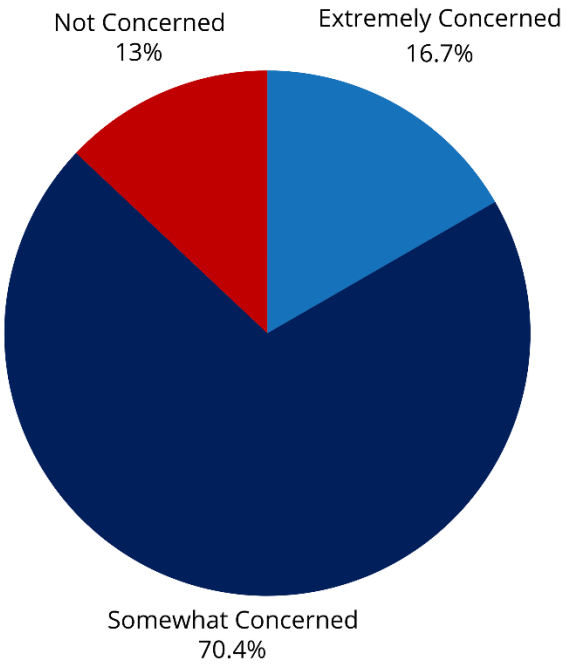
"Power outages during harsh winter weather."

"Multiple day loss of power."

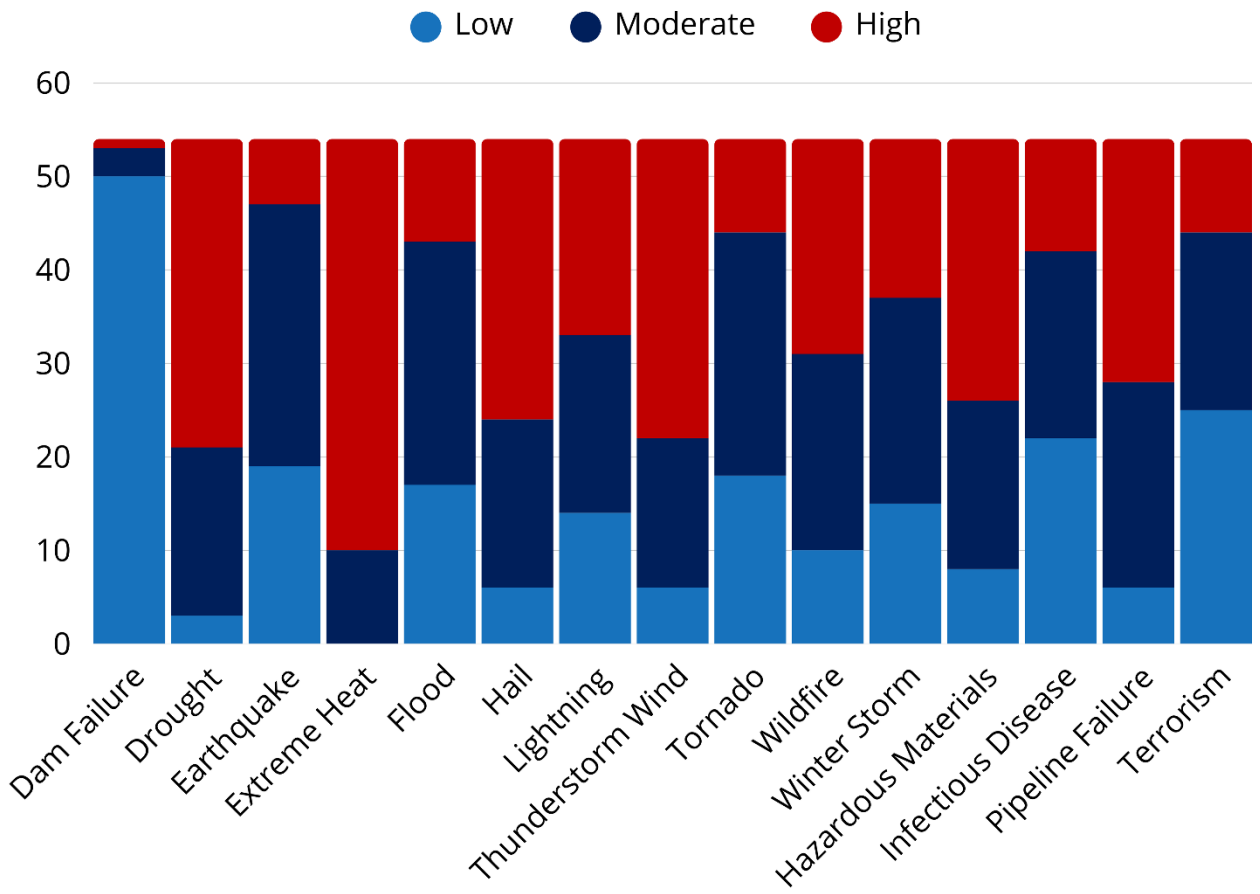
36% of those who have been impacted by a disaster mentioned winter storm and/or freeze in their explanations.

29% of those who have been impacted by a disaster mentioned utilities (loss of power and water) in their explanations.

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

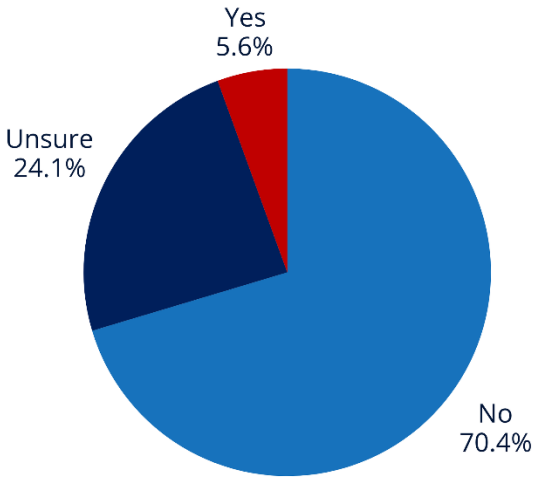


With the consideration of frequency of occurrence and potential impact severity, please select the one hazard you think is the highest and second highest threat to your neighborhood:

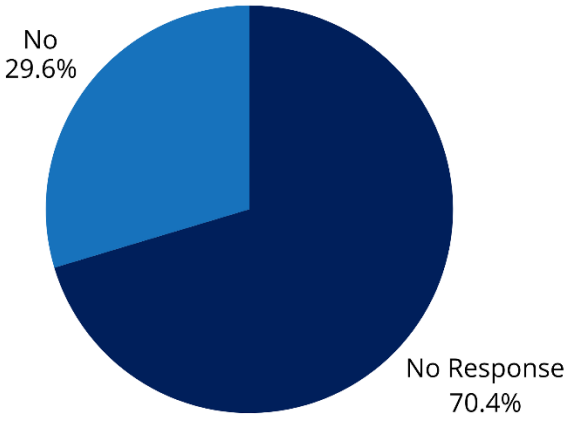


Is there another hazard not listed above that you think is a wide-scale threat to your neighborhood?

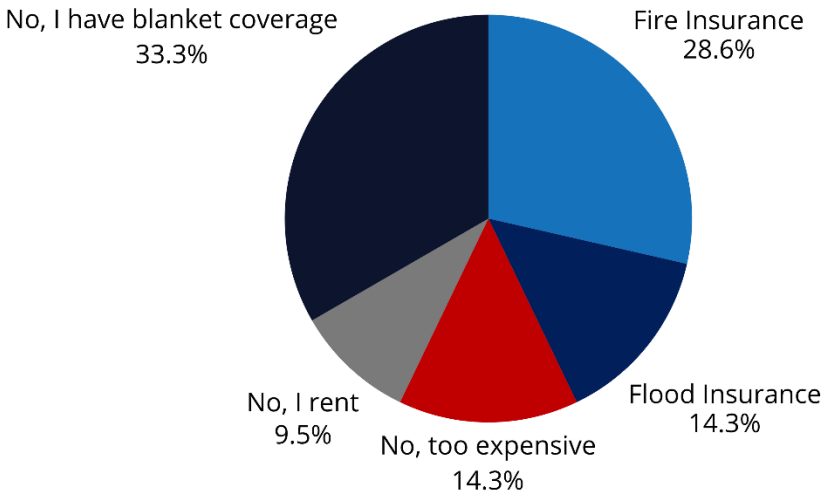
To your knowledge, is your home located in any high hazard risk zones?



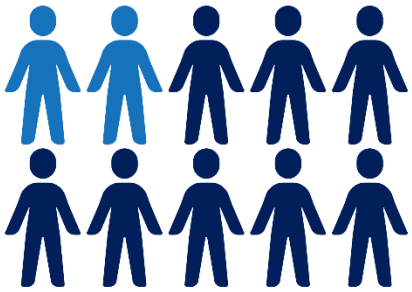
Have you had any issues getting homeowners or renters insurance due to risks of hazardous events?



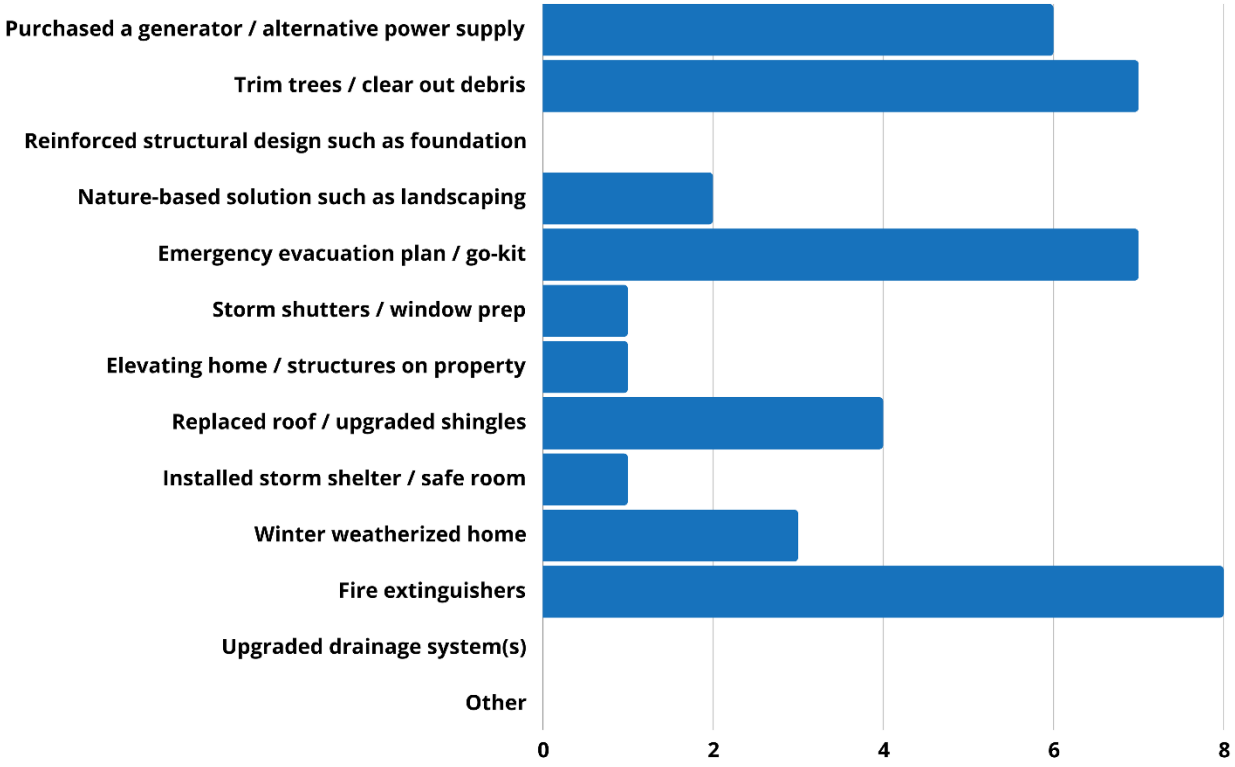
Do you have any hazard specific insurance? If not, why?



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

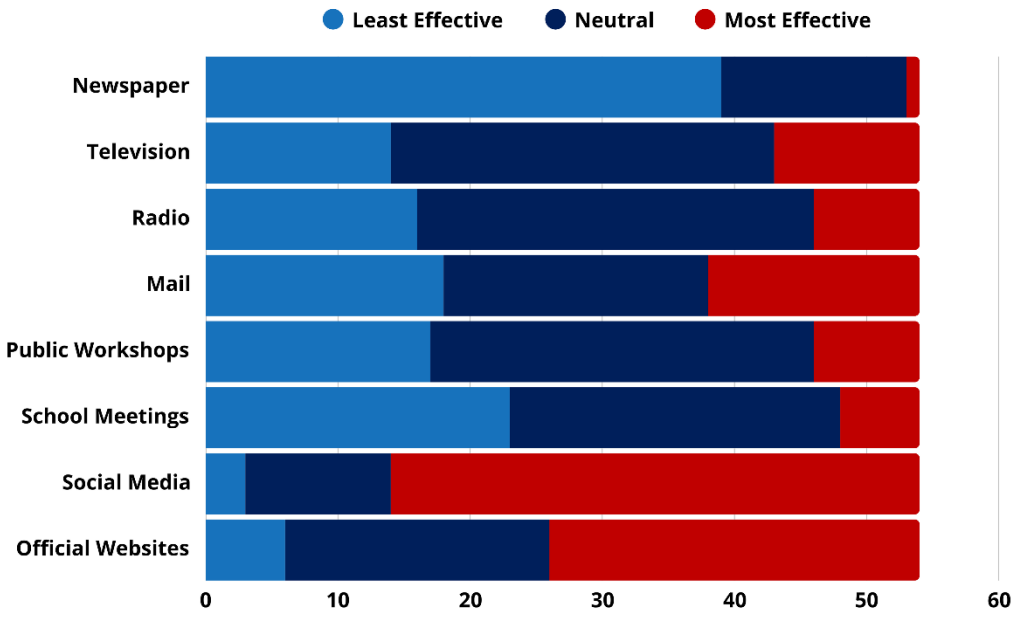


22% Responded 'Yes'

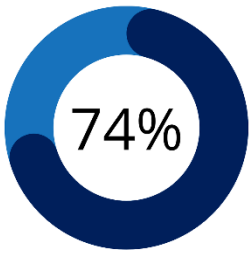


61% of survey responders are interested in making their homes or neighborhoods more resistant to hazards.

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



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

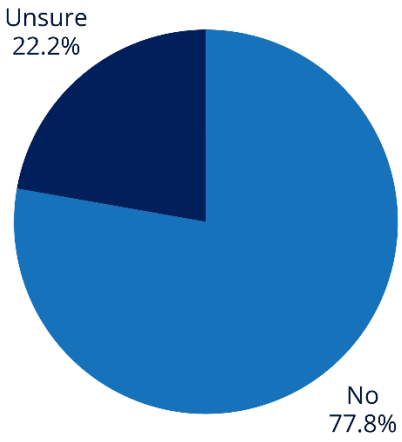


Social Media

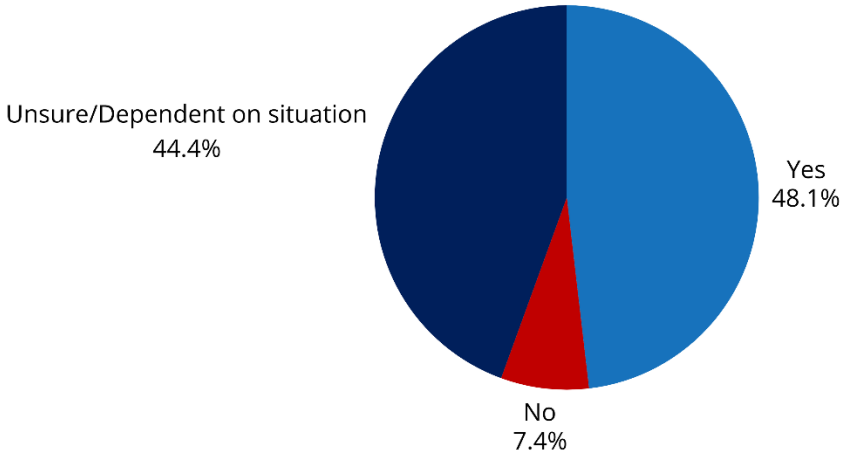
Additional communication methods recommended:

Text / Alert

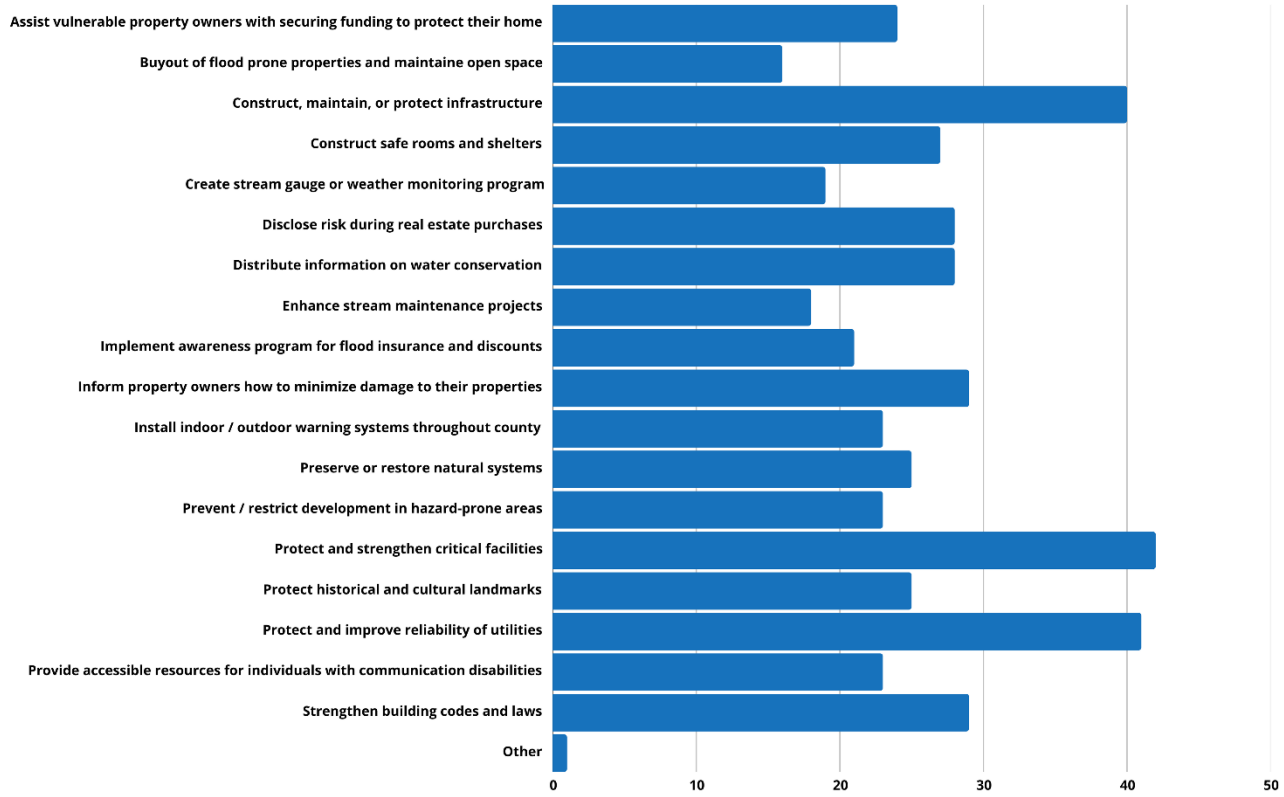
Do you have any special access to functional needs (AFN) within your household that would require early warning or specialized response during disasters?

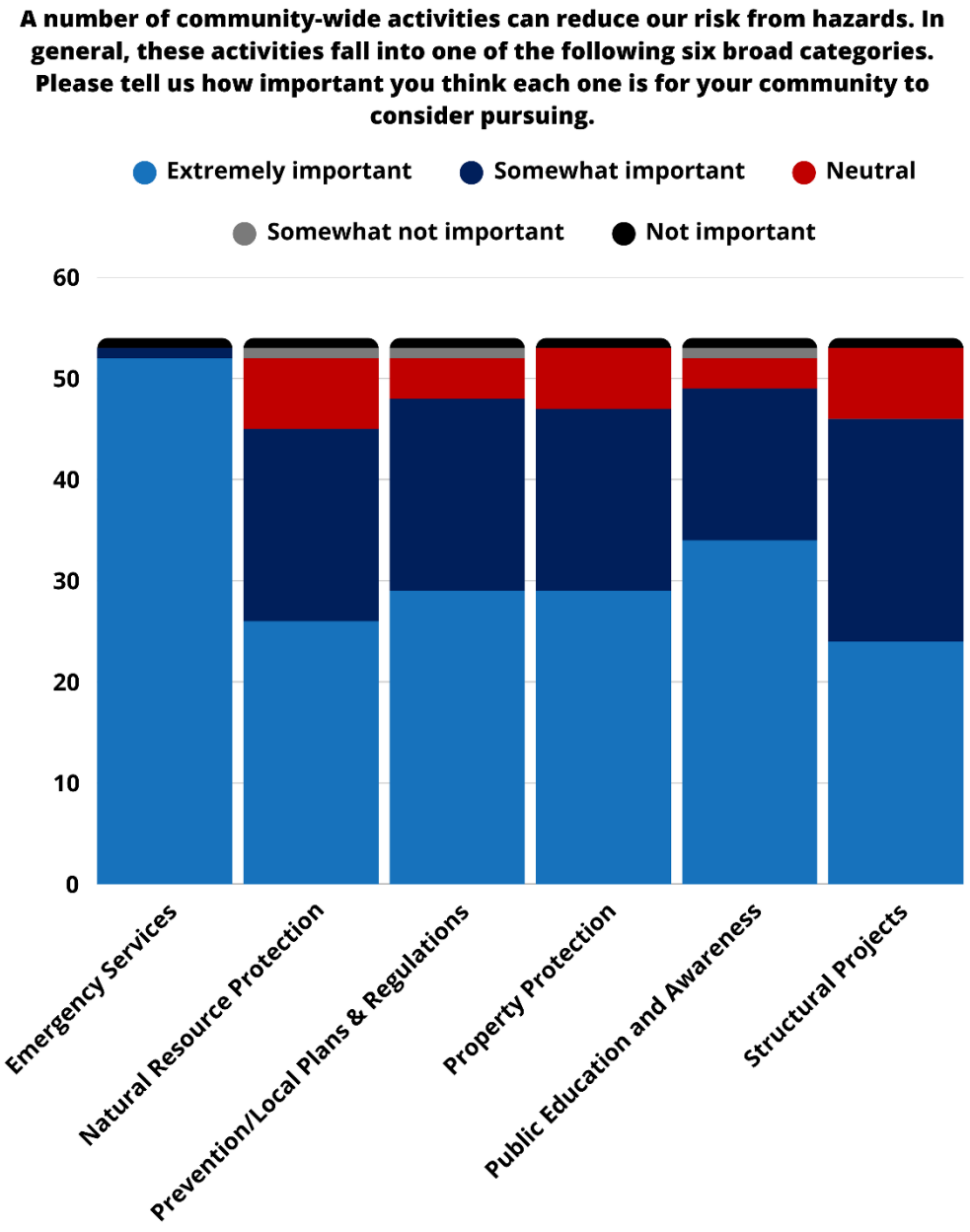


Would you support regulation (restrictions) on land uses within known high hazard areas?



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





Emergency Services - Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical facilities or systems.

Natural Resource Protection - Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.

Prevention / Local Plans & Regulations - Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.

Property Protection - Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.

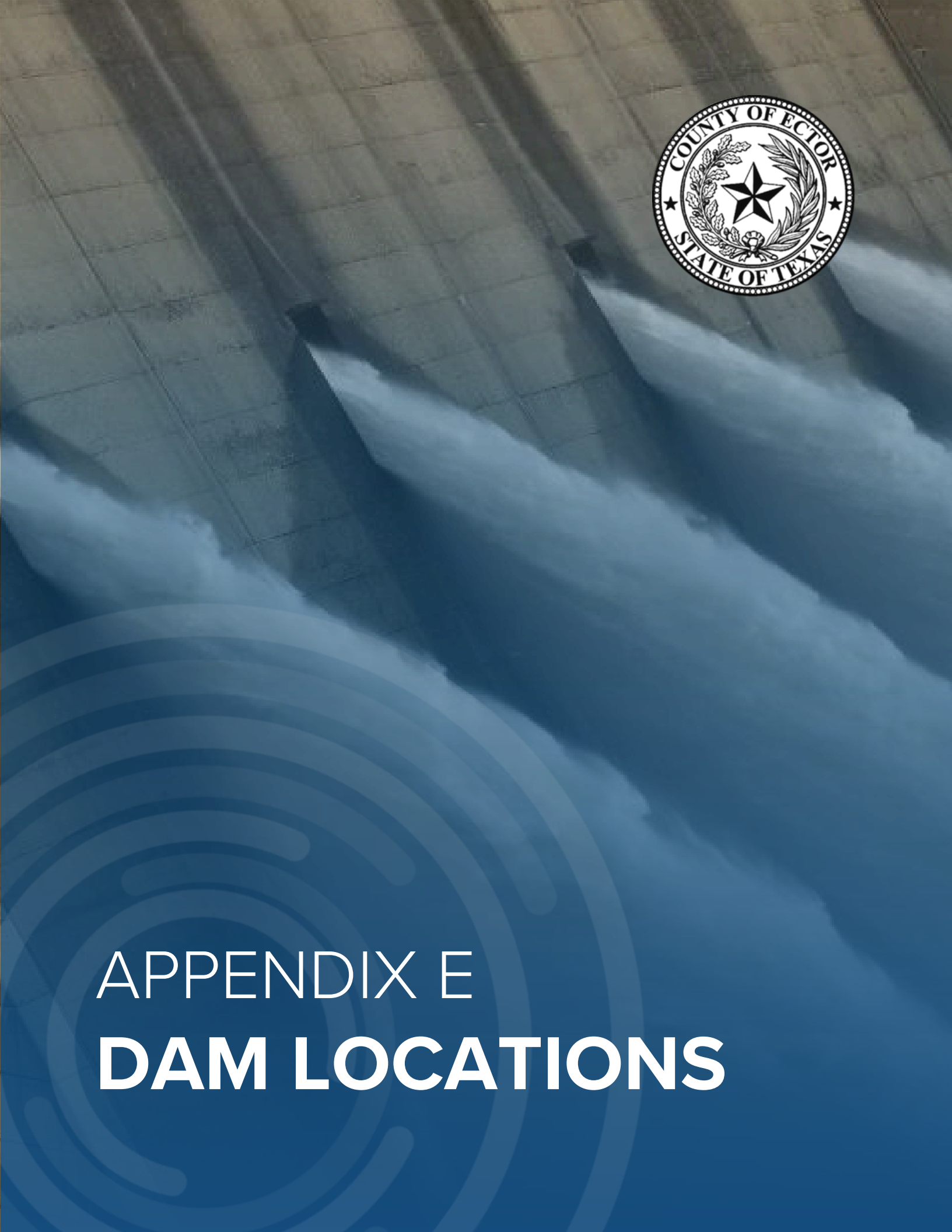
Public Education and Awareness - Actions to inform citizens about hazards and techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials, and demonstration events.

Structural Projects - Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, seawalls detention / retention basins, channel modification, retaining walls, and storm sewers.

APPENDIX D
CRITICAL FACILITIES

APPENDIX D: CRITICAL FACILITIES

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



APPENDIX E
DAM LOCATIONS

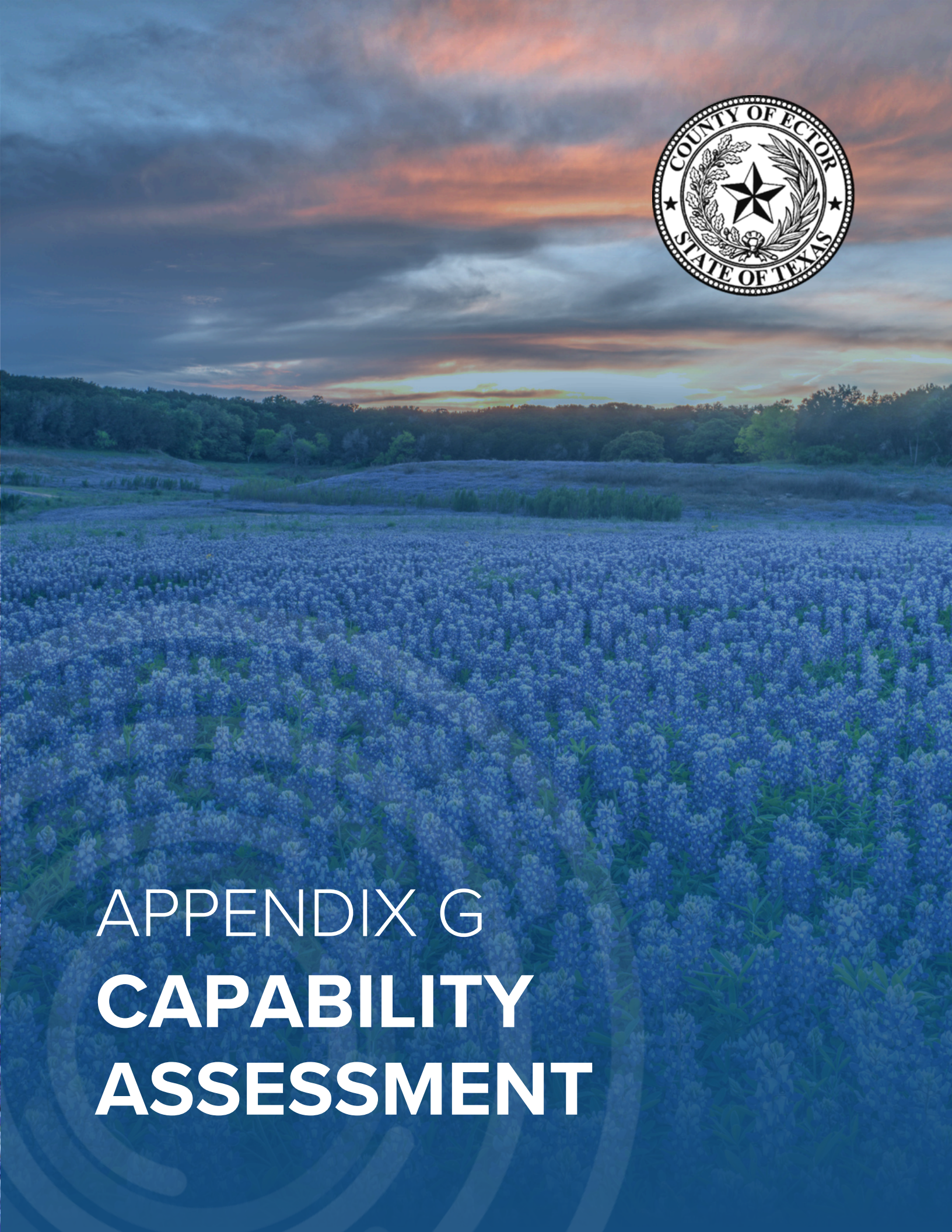
APPENDIX E: DAM LOCATIONS

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

APPENDIX F
MEETING DOCUMENTATION

APPENDIX F: MEETING DOCUMENTATION

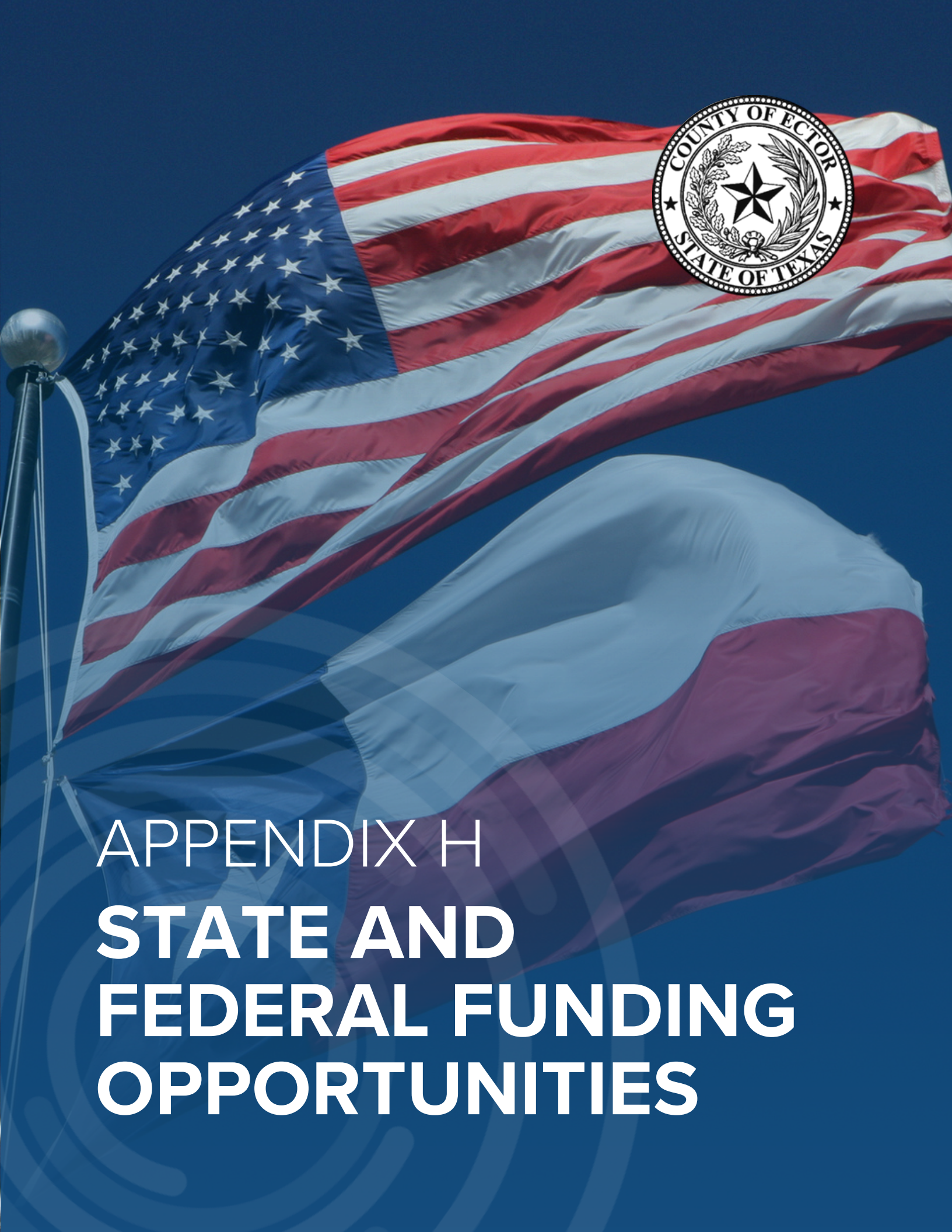
Appendix F is For Official Use Only (FOUO) and may be exempt from public release under the Freedom of Information Act (FOIA).



APPENDIX G
CAPABILITY ASSESSMENT

APPENDIX G: CAPABILITY ASSESSMENT

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



APPENDIX H

STATE AND FEDERAL FUNDING OPPORTUNITIES

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

OVERVIEW

Texas utilizes state funds to improve statewide hazard mitigation capabilities and advance their hazard mitigation goals to help identify, understand, and manage various risks associated with natural hazards. State funds also provide funding for state facilities and infrastructure upgrades, hazard mapping, mitigation planning, and other mitigation programmatic activities. Table H-1 describes a variety of loan and grant programs offered by state agencies for which mitigation activities may be eligible.

Table H-1. Summary of State Funded Mitigation Programs

AGENCY	FUNDING PROGRAM
Texas A&M Forest Service (TAMFS)	• Community Fire Protection Program • Community Wildfire Defense Grant • Fire-Adapted Communities Program (FAC) • Firewise USA Program • Forest Land Enhancement Program • Forest Legacy Program • Mitigation Project Support Fund Prescribed Fire Grants • Resilient Landscapes Program • Rural Fire Assistance Grant • State Fire Assistance for Mitigation (SFAM) - Mechanical Fuels Grants • State Fire Assistance for Mitigation (SFAM) - Vegetative Fuel Break Grant • Texas Longleaf Conservation Assistance Program • Urban Tree Canopy Project (UTC)
Texas Commission on Environmental Quality (TCEQ)	• Clean Water Act Section 319 Grants • High Hazard Potential Dam Program (HHPD) • Nonpoint Source Grant Program • U.S.-Mexico Border Water Infrastructure Program
Texas Department of Agriculture (TDA)	• Agricultural Management Assistance (AMA) • Agricultural Water Enhancement Program (AWEP) • Community Development Block Grant • Community Development Block Grant for Rural Texas • Conservation Innovation Grants (CIG) • Environmental Quality Incentives Program (EQUIP)
Texas Department of Housing and Community Affairs (TDHCA)	• Texas HOME Disaster Relief
Texas Department of State Health Services (TXDSHS)	• Hospital Preparedness Program (HPP) Cooperative Agreement • Public Health Emergency Preparedness (PHEP) Cooperative Agreement

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

AGENCY	FUNDING PROGRAM
Texas Department of Transportation (TXDOT)	• Bridge Preventative Maintenance Program • Emergency Relief (ER) Program • Highway Bridge Replacement and Rehabilitation Program • Safe Rest Stops Program • Transportation Enhancement Program
Texas Division of Emergency Management (TDEM)	• Emergency Management Performance Grant (EMPG) • Fire Management Assistance Grants (FMAG) • Hazard Mitigation Planning Grants Program (HMGP) • Homeland Security Grant Program (HSGP) • Individual Assistance (IA) • National Earthquake Hazard Reduction Program (NEHRP) • Public Assistance (PA) Section 406 Funds
Texas Economic Development & Tourism (EDT)	• Economic Development Administration Grants and Investments
Texas General Land Office (TXGLO)	• Beach Grants • Beach Maintenance Reimbursement Fund • Coastal Erosion Planning and Response Act (CEPRA) • Coastal and Estuarine Land Conservation Program (CELCP) • Coastal Management Program (CMP) • Community Development Block Grant – Disaster Recovery (CDBG-DR) • Community Development Block Grant – Mitigation (CDBG-MIT) • Gulf of Mexico Energy Security Act (GOMESA) • Hazard Mitigation Grant Program Supplemental – LHMPP
Texas Parks and Wildlife Department (TPWD)	• Nation Resources Damage Assessment (NRDA) • National Wildlife Wetland Refuge System • North American Wetland Conservation Fund • Partners for Fish and Wildlife • Texas Farm and Ranch Lands Conservation Program (TFRLCP) • Wildlife Habitat Incentive Program (WHIP)
Texas State Soil and Water Conservation Board (TSSWCB)	• Clean Water Act Section 319 Grants • Nonpoint Source Grant Program
Texas Water Development Board (TWDB)	• Agricultural Water Conservation Grants • Agricultural Water Conservation Loans • Clean Water State Revolving Fund (CWSRF) • Community Assistance Program (CAP) • Drinking Water State Revolving Fund (DWSRF) • Economically Distressed Areas Program • Emergency Community Water Assistance Grants • Flood Infrastructure Fund (FIF) • Flood Mitigation Assistance (FMA) Program • Flood Protection Planning Program

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

AGENCY	FUNDING PROGRAM
	• Groundwater Conservation District Loan Program • Planning Assistance to States • Regional Facility Planning Grant Program • Regional Water Planning Group Grants • Research and Planning Fund and Fund Development Program • Risk MAP Program • Rural Development Grants • Rural Water Assistance Fund (RWAF) • Silver Jackets • Small Flood Control Projects (USACE Section 205) • State Participation Program – Regional Water and Wastewater Facilities • State Water Implementation Fund for Texas (SWIFT) • State Water Resources Research Act Program • Texas Infrastructure Resiliency Fund (TIRF) • Texas Water Development Fund (DFund) • Water Research Grant Program • WaterSMART - Drought Response Program

In addition to state-funded programs, many local jurisdictions benefit from federal mitigation funding opportunities. FEMA's Hazard Mitigation Assistance is a primary source for the implementation of mitigation projects throughout the nation. Table H-2 describes additional federal, state, local, and nonprofit mitigation funding sources specifically within the State of Texas.

Table H-2. Federal, State, Local and Non-Profit Mitigation Funding Sources in Texas

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Agricultural Conservation Easement Program (ACEP)	Federal	NRCS		Provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits.
Agricultural and Food Research Initiative (AFRI)	Federal	USDA	NIFA	Provides $100,000 in funding to support research in two key areas: (1) understanding fundamental watershed processes; and (2) developing technologies and management practices that enhance the efficient use of water, both consumptive and non-consumptive, while protecting or improving water quality for agricultural and forestry production.
Agricultural Management Assistance (AMA)	Federal	USDA, NRCS	TDA	Provides financial and technical assistance to agricultural producers to voluntarily address issues such as water management, water quality, and erosion control by incorporating conservation methods into their farming operations.
Agricultural Water Enhancement Program (AWEP)	Federal	USDA, NRCS	TDA	Voluntary conservation initiative that provides financial and technical assistance to agricultural producers to implement water enhancement activities on agricultural land to conserve surface and ground water and improve water quality.
Agricultural Water Conservation Grants	State	TWDB	TWDB	Funding is available to state agencies and political subdivisions for projects that advance the implementation of conservation or water management strategies identified in state and regional water plans. Applications are accepted annually, with up to $1.2 million in total funding available each year. Grant categories are subject to change annually.
Agricultural Water Conservation Loans	State	TWDB	TWDB	Agricultural water conservation loans to use either for facility improvements or as loans to individuals. Low-interest, fixed rates. Up to 10-year repayment terms. U.S. Iron and Steel requirements apply to certain projects. Eligible loan applicants include political subdivisions.
AmeriCorps - Corporation for National & Community Service (CNCS)	Federal	AmeriCorps	N/A	Provides funding for volunteers to serve communities, including disaster prevention. AmeriCorps/Vista has assisted local communities with wildfire mitigation projects.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
American Recovery and Reinvestment Act (ARRA)	Federal	EPA		Provides significant funding for states to finance high priority water infrastructure projects through a $2 billion appropriation to the Drinking Water State Revolving Fund (DWSRF) program and a $4 billion appropriation to the Clean Water State Revolving Fund (CWSRF) program.
American Recovery and Reinvestment Act (ARRA)	Federal	DOT Federal Transit Administration	TDA	The American Recovery and Reinvestment Act (ARRA), commonly referred to as the Recovery Act, is a stimulus package enacted by the 111th U.S. Congress and signed into law by President Barack Obama in February 2009. Designed in response to the Great Recession, the primary goal of the Act was to preserve existing jobs and generate new employment opportunities as quickly as possible. Additional objectives include providing temporary relief to individuals most affected by the recession and investing in infrastructure, education, healthcare, and renewable energy.
Aquatic Ecosystem Restoration	Federal	DOD-USACE		Direct support for carrying out aquatic ecosystem restoration projects that will improve the quality of the environment.
Assistance to Firefighters program - Fire Prevention & Safety (FP&S) **Grants**	Federal	FEMA, AFG		Fire Prevention & Safety (FP&S) Grants support projects that enhance the safety of the public and firefighters from fire and related hazards.
BEACH Act Grants	Federal	EPA	TXGLO	EPA awards grants under the authority of the BEACH Act to eligible states, territories, and tribes with beaches on oceans and the Great Lakes coasts to develop and implement programs to monitor their beaches and notify the public when it is not safe to swim.
Beach Maintenance Reimbursement Fund	State	GLO	TXGLO	Allocates approximately $750,000 per year to help communities maintain their beaches. Applications are distributed to eligible participants in early fall and are due within a specified amount of time, no less than 30 days. Contracts are renewable annually.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Bridge Preventative Maintenance Program	State	TXDOT	TXDOT	A planned, cost-effective treatment that preserves, improves, or delays future deterioration of the condition of a bridge. To be eligible, a bridge must have a condition rating of 5 or 6 for at least one of the following: deck, superstructure, substructure, culvert, or channel. Safety and improvements to the physical condition of the State's on-system bridges are TxDOT's main goals in the prioritization of the bridges using BMIP funds. Each FY, the Bridge Division develops and distributes an initial list of eligible bridges in each district for the annual program call.
Carbon Reduction Program (CRP)	Federal	USDOT	TXDOT, TCEQ	Provides funds for projects that are designed to reduce transportation emissions (CO2). This program can fund a wide range of projects designed to reduce carbon dioxide emissions from on-road highway sources.
Center for Integration of Natural Disaster Information	Federal	DOI/USGS, The Center for Integration of Natural Hazards Research	Texas A&M	Technical Assistance: Develops and evaluates technology for information integration and dissemination.
Clean School Bus Program	Federal	EPA	TCEQ	Provides assistance in replacing existing school buses with zero-emission and low-emission models.
Clean Water Act Section 319 Grants	Federal	EPA	TCEQ and TSSWCB	Provides grants for a wide variety of activities related to non-point source pollution runoff mitigation.
Clean Water State Revolving Fund (CWSRF)	Federal	EPA	TWDB	Provides low-cost financing for a wide range of wastewater, stormwater, reuse, and other pollution control projects.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Climate Pollution Reduction Grant (CRPG)	Federal	EPA	TCEQ	Supports the state in creating two climate action plans (i.e., one priority plan and one comprehensive plan) for implementing effective greenhouse gas reduction strategies while ensuring the benefits of these actions are delivered to Texans, especially Low Income or Disadvantaged communities (LIDAC) as defined by US EPA. This grant will give Texas communities the opportunity to collaborate with the state to build projects and programs that provide high-quality jobs, improve health, and keep families safe where they live.
Coastal Erosion Planning and Response Act (CEPRA)	State	GLO	TXGLO	Since its inception in 2000, the Texas General Land Office's Coastal Erosion Planning and Response Program has secured over $62 million in state funding, complemented by an additional $62 million in matching funds. This program has facilitated the completion of more than 200 coastal erosion projects and studies. The application process for non-emergency project funding opens every even-numbered year in February and closes in early June of the same year.
Coastal and Estuarine Land Conservation Program (CELCP)	Federal	NOAA	TXGLO	When the National Oceanic and Atmospheric Administration (NOAA) provides funding for CELCP, the General Land Office (GLO) offers coastal communities the opportunity to submit up to three project applications per year. Federal grant awards for individual projects may not exceed $3 million.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Coastal Management Program (CMP)	Federal	NOAA	TXGLO	Texas receives approximately $2 million annually in grants from NOAA and 90 percent of the funds are passed through to local governments and entities to address environmental needs and promote sustainable economic development along the coast. Projects must improve the management of the state's coastal resources and ensure long-term ecological and economic productivity. Section 306 administrative funds can be used for non- construction, coastal planning and education, and research. Section 306A improvement funds can be utilized for construction and land acquisition projects, preservation, and restoration. CMP funding categories include Coastal Natural Hazards Response, Critical Areas Enhancement, Public Access, Water/Sediment Quantity and Quality Improvements, Waterfront Revitalization and Ecotourism Development, Permit Streamlining/ Assistance, Governmental Coordination and Local Government Planning Assistance.
Community Assistance Program (CAP)	Federal	FEMA, NFIP	TWDB	Product-oriented financial assistance program directly related to the flood loss reduction objectives of the National Flood Insurance Program (NFIP).
Community Development Block Grant (CDBG)	Federal	HUD	TDA	The primary objective is to develop viable communities by providing decent housing and suitable living environments and expanding economic opportunities principally for persons of low- to moderate- income. Eligible applicants are non-entitlement cities under 50,000 in population and non-entitlement counties that have a non-metropolitan population under 200,000 and that are not eligible for direct CDBG funding from HUD may apply for funding through any of the Texas CDBG programs.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Community Development Block Grant for Rural Texas	State	TDA	TDA	TDA administers the Community Development Block Grant for Rural Texas. The primary objective of the CDBG is to develop viable communities by providing decent housing and suitable living environments and expanding economic opportunities principally for persons of low- to moderate-income. Eligible applicants are non-entitlement cities under 50,000 in population and non-entitlement counties that have a non-metropolitan population under 200,000 and that are not eligible for direct CDBG funding from HUD may apply for funding through any of the Texas CDBG programs.
Community Development Block Grant – Disaster Recovery (CDBG-DR)	Federal	HUD	TXGLO	Often following a disaster, the state may receive a CDBG-DR Supplement intended for mitigation and disaster recovery projects in the affected areas. Funding can be used to acquire properties in hazard prone areas. Since CDBG funds lose their federal identity they can also be used to supplement state or local match requirements on other funds such as FEMA HMA grants. Funding also supports public facilities including water and wastewater.
Community Development Block Grant – Mitigation (CDBG-MIT)	Federal	HUD	TXGLO	Eligible grantees can use this assistance in areas impacted by recent disasters to carry out strategic and high-impact activities to mitigate disaster risks and reduce future losses. In February 2018, Congress appropriated $12 billion dollars in Community Development Block Grant (CDBG) funds specifically for mitigation activities for qualifying disasters in 2015, 2016, and 2017. HUD was able to allocate an additional $3.9 billion, bringing the amount available for mitigation to nearly $16 billion.
Community Fire Protection Program	Federal	USDA	TAMFS	Mitigation is delivered via the USDA Forest Service and Private Forestry Coop Fire Program.

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Community Rating System (CRS) **CRS** (continued)	Federal	FEMA		A voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. CRS not only assists communities in reducing flood risks, but also enhances public safety, reduces damage to property and public infrastructure, avoids economic disruption and losses, reduces human suffering, and protects the environment. Technical assistance in designing and implementing some activities is available at no charge. Participating in the CRS provides an incentive to maintain and improve a community's floodplain management program over the years. Implementing some CRS activities can help the project qualify for certain other Federal assistance funds.
Community Wildfire Defense Grant	Federal	USFS	TAMFS	Offers financial assistance to at-risk local communities with planning for and against the risk of catastrophic wildfire. This program is authorized in Public Law 117-58, the Infrastructure Investment and Jobs Act. Two primary objectives: The development and revision of Community Wildfire Protection Plans (CWPP), and the implementation of projects described in a CWPP that is less than ten years old. Prioritizes at-risk communities that are in an area identified as having high or very high wildfire hazard potential, are low-income, and/or have been impacted by a severe disaster with no minimum federal funding limit for projects.
Conservation Contracts	Federal	USDA-FSA		Debt reduction for delinquent and non-delinquent borrowers in exchange for conservation contracts placed on environmentally sensitive real property that secures FSA loans.
Conservation Innovation Grants (CIG)	Federal	USDA, NRCS	TDA	A voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging federal investment in environmental enhancement and protection, in conjunction with agricultural production.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Conservation Technical Assistance (CTA) **Program**	Federal	USDA-NRCS		Technical assistance for run-off retardation and soil erosion prevention to reduce hazards to life and property.
Decision, Risk, and Management Science Program	Federal	NSF		Funding is provided for research and related educational activities focused on risk, perception, communication, and management, with an emphasis on technological hazards.
Disaster Mitigation Planning and Technical Assistance	Federal	DOC, EDA		Technical and planning assistance grants for capability building and mitigation project activities focusing on creating disaster resistant jobs and workplaces.
Division of Homeland Security Financial Assistance	Federal	US Department of Homeland Security	OOG	Supports a wide variety of funding and financial assistance programs that promote preparedness, resilience, and post-disaster relief.
Drinking Water State Revolving Fund (DWSRF)	Federal	EPA	TWDB	Provides funding for infrastructure improvements to drinking water systems. The program also emphasizes providing funds to small, disadvantaged communities and programs that encourage pollution prevention as a tool for ensuring safe drinking water.
Economic Development Administration Grants and Investments	Federal	U.S. DOC, EDA	EDT	Provides grants and investments for community construction projects, including mitigation activities.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Economically Distressed Areas Program	State	TWDB	TWDB	Provides financial assistance for projects serving economically distressed areas where water or sewer services do not exist, or systems do not meet minimum state standards. Eligible EDAP applicants include cities, counties, water districts, nonprofit water supply corporations, and all other political subdivisions. The city or county where the project is located must adopt and enforce Model Subdivision Rules for the regulation of subdivisions prior to application for financial assistance. Projects must also be in an economically distressed area where the median household income is not greater than 75 percent of the median state household income.
Economic Injury Disaster Loan	Federal	SBA		The COVID EIDL program ceased accepting applications on December 31, 2021, however, the disaster EIDL program continues to be available to businesses impacted by other publicly declared disasters.
Emergency Community Water Assistance Grants	Federal	USDA	TWDB	$150,000 to $500,000 available to rural communities with populations over 10,000 people with a median household income of less than $65,900. Aids communities that have experienced a decline in quantity or quality of drinking water as a result of an emergency, including drought.
Emergency Management / Mitigation Training	Federal	FEMA		Training in disaster mitigation, preparedness, and planning.
Emergency Management Institute	Federal	FEMA		Education training programs to prepare emergency management professionals to prepare for, respond to, and recover from disasters and emergencies.
Emergency Management Performance Grant (EMPG)	Federal	FEMA	TDEM	Provides a yearly allocation of funding to support state and local emergency management programs. This has included providing funding for local mitigation plans, mitigation-oriented studies, and related activities.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Emergency Relief (ER) **Program**	Federal	US DOT - FHWA	TXDOT	Provides funding for the repair or reconstruction of roads and bridges on Federal-aid highways that have sustained damage as a direct result of a natural disaster or a catastrophic failure due to an external cause.
Emergency Watershed Protection (EWP)	Federal	USDA, NRCS	TWDB	Provides funding and technical assistance for emergency measures, including floodplain easements in impaired watersheds. Funding is available through Simplified Acquisition Procedures (SAP), typically ranging from $25,000 to $100,000. Support is provided through contracts between project sponsors and the Natural Resources Conservation Service (NRCS); grants are not offered under this program. The NRCS covers up to 75 percent of total project costs.
Environmental Justice Government-to-Government Program (EJG2G)	Federal	EPA		Provides funding to support government activities that lead to measurable environmental or public health impacts in communities disproportionately burdened by environmental harm.
Environmental Justice Collaborative Problem Solving Program	Federal	EPA		Provides funding directly to community-based organizations to address environmental injustices.
Environmental Quality Incentives Program (EQUIP)	Federal	USDA, NRCS	TDA	Provides funding and technical assistance to farmers and ranchers to promote agricultural production and environmental quality as compatible goals.
Farm Ownership Loans	Federal	USDA-FSA		Direct loans, guaranteed / insured loans, and technical assistance to farmers so that they may develop, construct, improve, or repair farm homes, farms, and service buildings, and to make other necessary improvements.
Federal Land Transfer / Federal Land to Parks Program	Federal	DOI-NPS		Identifies, assesses, and transfers available federal real property for acquisition for use in state and local parks and recreation, such as open space.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Fire-Adapted Communities Program (FAC)	Federal	FEMA, USFA	TAMFS	Collaborates to identify wildfire risk and take actionable steps to reduce risk of loss by protecting property and enhancing the safety of firefighters and residents.
Fire Management Assistance Grants (FMAG)	Federal	FEMA	TDEM	Provides fire suppression support to states when loss of life and property is imminent. Wildfire mitigation is also eligible under emergency protection if life is in imminent danger.
Fire Prevention and Safety Grant Program	Federal	US Fire Administration		Provides funding for projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations and reduce injury and prevent death.
Firewise USA Program	Federal	USDA, DOI, NASFF, NFPA	TAMFS	Provides a collaborative framework to help neighbors in a geographic area organize and enhance ignition resistance of their homes and community to reduce wildfire risks at the local level.
Flood Infrastructure Fund (FIF)	State	TWDB	TWDB	Provides financial assistance in the form of loans and grants for flood control, flood mitigation, and drainage projects. The Flood Intended Use Plan (Flood IUP) details the structure of each funding cycle and the SWIFT Advisory Committee serves as the oversight entity.
Flood Mitigation Assistance Program (FMA)	Federal	FEMA	TWDB	Repetitive flood loss property reduction and projects that mitigate losses to NFIP-insured properties.
Floodplain Management Services	Federal	DOD-USACE		Provides technical and planning assistance at the local, regional, or national level needed to support effective floodplain management.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Flood Protection Planning Program	State	TWDB	TWDB	Grant funding available to political subdivisions of the State of Texas for the evaluation of structural and nonstructural solutions to flooding problems. Upstream and/or downstream effects of proposed solutions must be considered in the planning and must be regional in nature by considering the flood protection needs of the entire watershed. Eligible planning activities include, but are not limited to, determining and describing flooding-related problems ; conducting hydrologic and hydraulic studies; identifying potential solutions; estimating the benefits and costs of potential solutions, including structural and nonstructural measures; determining the views and needs of the affected public regarding flooding problems; recommending feasible flood protection solutions; evaluating environmental, social, and cultural factors; and ensuring proposed solutions are consistent with regional or statewide plans as well as relevant laws and regulations.
Forest Land Enhancement Program	Federal	USDA, NRCS	TAMFS	Provides educational, technical, and financial assistance to help landowners implement sustainable forestry management objectives.
Forest Legacy Program	Federal	USFS	TAMFS	Provides funding to protect private forest lands that are environmentally, economically, and socially critical, thereby reducing development in the wildland-urban interface.
Greenhouse Gas Reduction Fund (GGRF)	Federal	EPA		The program is designed to combat the climate crisis by mobilizing financing and private capital for greenhouse gas- and air pollution-reducing projects in communities across the country.
Grid Resilience Program (GRIP)	Federal	DOE		Enhance grid flexibility and improve the resilience of the nation's power grid against threats of extreme weather and climate change.
Hazard Mitigation Grant Program (HMGP)	Federal	FEMA	TDEM	Post-disaster multi-hazard mitigation funding for federally declared disasters. HMGP Post Fire funds are available for FMAG declarations.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Hazard Mitigation Grant Program Supplemental – Local Hazard Mitigation Plan Program (LHMPP)	Federal	FEMA	TXGLO	The Local Hazard Mitigation Plan Program (LHMPP) assists eligible entities by providing grants to develop or update local hazard mitigation plans, or to provide cost share for hazard mitigation planning activities funded through other federal sources. Grant awards range from $20,000 to $100,000.
Hazardous Materials Emergency Preparedness (HMEP) **Grant Program**	Federal	DOT	TDEM	Funding is available to help facilitate preparedness in transporting hazardous materials. The program recognizes Local Emergency Planning Committees (LEPCs) as applicants to maximize funding impact through regional partnerships.
Healthy Forests Reserve Program (HFRP)	Federal	NRCS		Assist landowners, on a voluntary basis, in restoring, enhancing and protecting forestland resources on private lands through various means, including conservation easements and cost-sharing agreements.
High Hazard Potential Dam Program (HHPD)	Federal	FEMA	TCEQ	Provides assistance for technical, planning, and design activities related to the repair, removal, and/or structural or nonstructural rehabilitation of eligible non-federal high hazard dams classified as high hazard potential by the state/territory dam safety agency, with an approved Emergency Action Plan (EAP) and rated in poor condition, through a pre-disaster or annual cycle.
Highway Bridge Replacement and Rehabilitation Program	Federal	FHWA	TXDOT	Provides funding to enable states to improve the condition of highway bridges through replacement, rehabilitation, and systematic preventive maintenance. Also includes the National Historic Covered Bridge Preservation Program.
Homeland Security Grant Program (HSGP)	Federal	DHS	TDEM	Funding supports homeland security activities identified in state and local strategic plans, including threat and hazard risk identification for natural, technological, and human-caused hazards.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Hospital Preparedness Program (HPP) **Cooperative Agreement**	Federal	HHS	TXDSHS	The HPP is the primary source of federal funding for health care system preparedness and response. In collaboration with public health, it prepares health-care delivery systems to save lives through the development of health care coalitions (HCCs). Under the direction of the HPP providers, the HCCs develop plans, provide training, and coordinate regional exercises.
Hydrologic Research Grants	Federal	NOAA		Offers up to $125,000 to conduct joint research and development on pressing surface water hydrology issues common to national, regional, and local operational offices. Eligible applicants include federally recognized agencies of state or local governments, quasi-public institutions such as water supply or power companies, hydrologic consultants, and companies involved in using and developing hydrologic forecasts.
Groundwater Conservation District Loan Program	State	TWDB	TWDB	Provides short-term loans to finance the start-up costs of Groundwater Conservation Districts. Funding is available for any Groundwater District or Authority with the ability to regulate water well spacing and/or production. The program is authorized under Texas Water Code Chap. 36, Subchapter. L, and governed by TWDB rules in 31 Tex. Admin. Code Chap. 363, Subchapter. H.
Gulf of Mexico Energy Security Act (GOMESA)	Federal	DOI	TXGLO	GOMESA significantly enhances oil and gas leasing activities and creates revenue sharing provisions for the oil- and gas-producing states of Alabama, Louisiana, Mississippi, Texas, and their coastal political subdivisions (CPSs). The funds are used for coastal conservation, restoration, and hurricane protection. The second phase of GOMESA revenue sharing, which began in Fiscal Year 2017, expands the definition of qualified Outer Continental Shelf revenues to include receipts from Gulf of Mexico leases that are subject to withdrawal or moratoria restrictions. A revenue-sharing cap of $500 million per year for the four Gulf-producing states, their CPSs and the Land and Water Conservation Fund, effective from fiscal years 2016 through 2055.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Indian Housing Assistance - Housing Improvement Program (HIP)	Federal	DOI-BIA		The Housing Improvement Program (HIP) is a home repair, renovation, replacement and new housing grant program administered by the Bureau of Indian Affairs (BIA) and federally recognized Indian tribes. It is designed to assist American Indian and Alaska Native (AI/AN) individuals and families who lack immediate standard housing resources.
Individual Assistance (IA)	Federal	FEMA	TDEM	Following a disaster, funds can be used to mitigate hazards when repairing individual and family homes.
In-Lieu Fee Program Mitigation Projects	Federal	USACE	Community Applicants	Supports the restoration, establishment, enhancement, and/or preservation of aquatic resources through funds paid to a governmental or non-profit natural resources management entity to satisfy compensatory mitigation requirements for Department of the Army permits.
Land Acquisition	Federal	DOI-FWS		Acquires high-quality lands and waters, or easements thereon, for inclusion in the National Wildlife Refuge System.
Landowner Incentive Program	Federal	USFWS	EMNRD	Collaborates with the Forestry Division and private landowners to protect the habitats of at-risk species on private lands. Landowner involvement is voluntary.
Mapping Standards Support	Federal	DOI/USGS		Provides mapping and digital data standards expertise in support of the National Flood Insurance Program (NFIP).
Mitigation Banks	Federal	USACE	Community Applicants	Mitigation Banks are Corps-approved sites that sell compensatory mitigation credits for projects that cause unavoidable impacts to waters of the U.S. When a permit requires compensatory mitigation, it specifies the number of credits to be purchased from an approved mitigation bank.
National Dam Safety Program	Federal	FEMA		Provides technical assistance, training, and grants to enhance state dam safety programs.
National Digital Orthophoto Program	Federal	DOI-USGS		Develops topographic quadrangles for use in flood mapping and other hazards.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
National Earthquake Hazards Reduction Program (NEHRP)	Federal	FEMA	TDEM	Provides funding to support enhanced earthquake risk assessments in local hazard mitigation plans, as well as other earthquake hazard mitigation and preparedness activities.
National Earthquake Hazard Reduction Program (NEHRP) **in Earth Sciences**	Federal	NSF		Conducts research on basic and applied earth and building sciences.
National Earthquake Hazard Reduction Program	Federal	DOI-USGS		NEHRP's work encompasses research, development, and implementation activities. Research helps to advance our understanding of why and how earthquakes occur and impact the natural and built environments. The program develops strategies, tools, techniques, and other measures that can reduce the adverse effects of earthquakes and facilitates and promotes implementation of these measures, thereby strengthening earthquake resilience among at-risk communities.
Natural Resources Damage Assessment (NRDA)	Federal	EPA	TPWD	Evaluates the likelihood of adverse ecological effects that are occurring or may occur as a result of exposure to physical (e.g., cleanup) or chemical (e.g., hazardous release) stressors at a site.
National Flood Insurance Program (NFIP)	Federal	FEMA	TWDB	Provides affordable insurance to property owners and encourages communities to adopt and enforce floodplain management regulations.
National Flood Insurance Program: Technical Mapping Advisory Council	Federal	DOI-USGS		Provides technical guidance and advice to coordinate FEMA's map modernization efforts for the National Flood Insurance Program (NFIP).

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
National Training and Education (NTE)	Federal	FEMA		Offers educational and training programs through online course catalog, which provides searchable, integrated information on courses provided or managed by FEMA's Center for Domestic Preparedness (CDP), Emergency Management Institute (EMI), and National Training and Education Division (NTED).
National Weather Service (NWS)	Federal	NOAA - NWS		The National Weather Service (NWS) offers storm spotter training as well as weather and flood safety guides. It may also provide funding to support severe weather signage in parks and other public areas.
National Wildlife Wetland Refuge System	Federal	USFWS	TPWD	Provides funding for the acquisition of land for inclusion in the National Federal Wildlife Refuge System.
Nonpoint Source Grant Program	Federal	EPA	TCEQ, TSSWCB	The Clean Water Act (CWA) requires states to develop programs to protect the water quality from the adverse effects of nonpoint source (NPS) water pollution. The Texas Commission on Environmental Quality (TCEQ) and the Texas State Soil and Water Conservation Board (TSSWCB) administer federal grants for activities that prevent or reduce NPS pollution.
Non-Structural Alternatives to Structural Rehabilitation of Damaged Flood Control Works	Federal	DOD-USACT		Provides planning and construction grants for non-structural alternatives to the rehabilitation of flood control works damaged by floods or coastal storms.
North American Wetland Conservation Fund	Federal	USFWS	TPWD	Provides funding for wetland conservation projects.
NRCS Conservation Programs	Federal	USDA, NRCS	Community Applicants	Provides funding through various programs for the conservation of natural resources.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Office of Disaster Assistance	Federal	SBA		Provides financial assistance through low interest disaster loans to businesses of all sizes, private non-profit organizations, homeowners, and renters to repair or replace real estate, personal property, machinery and equipment, inventory and business assets that have been damaged or destroyed in a declared disaster.
Partners for Fish and Wildlife	Federal	USFWS	TPWD	Provides financial and technical assistance to landowners for wetland restoration projects in "focus areas" of the state.
Planning Assistance to States	Federal	USACE	TWDB	Aids states in planning for development, utilization, and conservation of water and related land resources.
Pollution Prevention Grant: Environmental Justice in Communities	Federal	EPA		Provides technical assistance to businesses aiming to improve human health and the environment in disadvantaged communities.
Pollution Prevention Grant: Environmental Justice Through Safer and More Sustainable Products	Federal	EPA		Provides technical assistance to businesses to increase the supply, demand, and use of safer, more sustainable products.
Post-Disaster Economic Recovery Grants and Assistance	Federal	DOC-EDA		Provides funding to assist with the long-term economic recovery of communities, industries, and firms adversely impacted by disasters.
Pre-Disaster Mitigation Loan Program	Federal	SBA		Provides low-interest loans to small businesses for mitigation projects.
Pre-Disaster Mitigation (PDM)	Federal	FEMA		Congressional funding for local governments, tribes, and states to plan and implement sustainable, cost-effective measures designed to reduce risk to individuals and property from future natural hazards.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Preparedness (Non-Disaster) Grants	Federal	FEMA		Provides financial assistance to state and local governments for preparedness programs. Funding is allocated to enhance the capacity of emergency responders to prevent, respond to, and recover from terrorism incidents involving weapons of mass destruction—chemical, biological, radiological, nuclear, and explosive devices—as well as cyber-attacks.
Prescribed Fire Grants	State	TAMFS	TAMFS	The Texas A&M Forest Service's Mitigation & Prevention Department annually implements four prescribed fire grants to protect communities and restore ecosystems. (1) SFAM Plains Prescribed Fire Grant – Supports prescribed burns to reduce hazardous fuels near Texas communities at high risk for wildfires—specifically those threatened by Southern Plains Wildfire Outbreaks. Treatment areas are located adjacent to identified priority communities. (2) The Community Protection Program Grant – Funds prescribed burns on private lands within 10 miles of a National Forest boundary to reduce high-risk fuels. The goal is to protect nearby communities and forest resources by lowering the risk of catastrophic wildfire across public and private lands. (3) The State Fire Assistance for Mitigation Central & East Texas Grant – Provides funding for prescribed burns on private lands in 43 Central and East Texas counties that have approved Community Wildfire Protection Plans (CWPPs). The goal is to protect high-risk communities and restore ecosystems by reducing hazardous vegetation. Priority is given to sites that are within a CWPP, near Firewise communities or residential areas (as identified by the Texas Wildfire Risk Assessment Portal), and support ecosystems that benefit from prescribed fire. (4) Neches River and Cypress Basin Watershed Restoration Program – Assists landowners with prescribed burns to improve ecological health in the Neches River and Cypress Basin watersheds. The program benefits water quality and quantity, controls invasive species, and enhances wildlife habitat. Priority is given to treatment areas on private land that promote native ecosystem restoration, fall within priority watershed protection zones, and are located near public lands.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Project Modifications for Improvement of the Environment	Federal	DOD-USACE		Provides funds for ecosystem restoration by modifying structures and/or operations of water resources projects constructed by the U.S. Army Corps of Engineers (USACE), or by restoring areas where a USACE project contributed to environmental degradation.
Protection of Essential Highways, Highway Bridge Approaches, and Public Works	Federal	USACE		Provides technical assistance to ensure bank protection for highways, highway bridges, essential public works, churches, hospitals, schools, and other nonprofit public services endangered by flood-caused erosion.
Public Assistance	Federal	FEMA	DHSEM	Funds are allocated to states and communities to repair damaged infrastructure and public facilities, and to help restore government or government-related services.
Public Assistance (PA) **Section 406 Funds**	Federal	FEMA	TDEM	Following a disaster, funds can be used to mitigate hazards while repairing damages to public structures or infrastructure. Wildfire mitigation is also eligible under emergency protection if lives are in imminent danger.
Public Health Emergency Preparedness (PHEP) **Cooperative Agreement**	Federal	CDC	TXDSHS	Aids health departments in building and strengthening their ability to effectively respond to a range of public health threats, including infectious diseases, natural disasters, and biological, chemical, nuclear, and radiological events. Preparedness activities funded by the PHEP Cooperative Agreement specifically target the development of emergency-ready public health departments that are both flexible and adaptable.
Public Housing Capital Fund	Federal	HUD		Funding available towards public housing agencies for modernization needs resulting from natural disasters including elevation, flood proofing, and retrofitting.

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NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Regional Facility Planning Grant Program	State	TWDB	TWDB	Provides funds to political subdivisions in Texas for studies and analyses to evaluate and determine the most feasible alternatives to meet regional water supply and wastewater facility needs, estimate the costs associated with implementing these alternatives, and identify institutional arrangements for providing regional water supply and wastewater services.
Regional Water Planning Group Grants	State	TWDB	TWDB	Developed to guide and support the planning of the State's water resources, this program administers and assists in the development of regional and state water plans. It aims to improve the planning process by providing clear guidance for stakeholders and utilizing the best available data, methodologies, and technical innovations for each funding cycle.
Repetitive Flood Claims Program	Federal	FEMA	DHSEM	Provides funds to assist states and communities reduce flood damages to insured properties that have had one or more claims under the National Flood Insurance Program (NFIP).
Research and Planning Fund and Fund Development Program	State	TWDB	TWDB	Provides funds to eligible applicants for the development or revision of regional water plans. Eligible activities include the development, revision, or improvement of regional water plans including public meetings, hearings, and special studies. Plans must comply with the Texas Water Code, §16.053 and Chapter 357, or other special studies approved by the Texas Water Development Board (TWDB) that enhance water planning efforts in the region.
Resilient Landscapes Program	Federal	USDA, USFS	TAMFS	Provides coordination to restore healthy, resilient, fire-adapted ecosystems. Restoration efforts include thinning crowded forests and using prescribed fire on two to three million acres annually, which helps prevent the buildup of flammable vegetation that feeds extreme wildfires.
Risk MAP Program	Federal	FEMA, NFIP	TWDB	Establishes or updates floodplain mapping and multi-hazard risk products.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Rural Development Grants	Federal	USDA-Rural Development	TWDB	Provides grants and loans for the development and enhancement of infrastructure and public safety in rural areas, offering up to $100,000 or 75 percent of the total project cost, whichever is less.
Rural Fire Assistance Grant	Federal	NIFC	TAMFS	Funds fire mitigation activities in rural communities.
Rural Utilities Service (RUS)	Federal	USDA-Rural Development		Programs designed to provide needed infrastructure or infrastructure improvements to rural communities, including water and wastewater treatment, electric power, and telecommunications services.
Rural Water Assistance Fund (RWAF)	State	TWDB	TWDB	Provides low-cost financing to assist small rural utilities with water and wastewater projects. The Rural Water Assistance Fund (RWAF) offers tax-exempt equivalent interest rate loans and long-term financing options.
Safe Rest Stops Program	State	TXDOT	TXDOT	Texas has 21 major highways that function as long-distance travel corridors. Along these routes, rest areas serve as critical safety features designed to reduce accidents caused by driver fatigue. These facilities provide travelers with an opportunity to pause, rest, and return to the road more alert and refreshed.
Section 108 Loan Guarantee Program	Federal	HUD		Provides loans to public entities for community and economic development projects, including mitigation measures.
Section 502 Loan Guaranteed Loan Program	Federal	USDA-RHS		Provides loans, loan guarantees, and technical assistance to very low- and low-income applicants seeking to purchase, build, or rehabilitate homes in rural areas.
Section 504 Loans for Housing	Federal	USDA-RHS		Provides repair loans, grants, and technical assistance to low-income senior homeowners in rural areas to address home repairs and eliminate health and safety hazards.
Societal Dimensions of Engineering, Science, and Technology Program	Federal	NSF		Provides funding for research and educational activities on topics such as ethics, values, risk assessment, communication, risk management, and risk perception.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Soil Survey	Federal	USDA-NRCS		Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation or related purposes.
State Fire Assistance for Mitigation (SFAM) **- Mechanical Fuels Grants**	State	TAMFS	TAMFS	Provides financial assistance for hazardous fuel reduction on private lands to decrease wildfire risk. The grant targets high-risk communities within 32 counties in Central Texas, as identified by the Texas A&M Forest Service Mitigation and Prevention Department. Priority is given to landowners who reside in one of the 32 high-risk counties, are located within a city or county with an active Community Wildfire Protection Plan (CWPP) or live in a recognized Firewise USA site.
State Fire Assistance for Mitigation (SFAM) **- Vegetative Fuel Break Grant**	State	TAMFS	TAMFS	Provides financial assistance for the creation of vegetative fuel breaks on private lands in Texas. Vegetative fuel breaks are trees and shrubs systematically planted adjacent to fields, homesteads, or feedlots to reduce or redirect wind. The goal of the grant is to protect high-risk communities by reducing the risk of catastrophic wildfires on private and public lands. Grant recipients will be reimbursed up to $2,500 for actual costs associated with creating a green, vegetative fuel break, consisting of a minimum of three rows of trees and 400 feet in length. Eligible projects must be located within the Texas High Plains.
Silver Jackets	Federal	USACE	TWDB	Provides funding for flood-related studies, public awareness efforts, risk analyses, flood response plans, and the construction of small flood control projects.
Small Flood Control Projects (USACE Section 205)	Federal	USACE	TWDB	Authorizes the U.S. Army Corps of Engineers (USACE) to conduct feasibility studies and construct small flood control projects

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
State Participation Program – Regional Water and Wastewater Facilities	State	TWDB	TWDB	Provides funding and assumes a temporary ownership interest in regional water, wastewater, or flood control projects when local sponsors are unable to assume debt for an optimally sized facility. The program is intended to encourage the optimum regional development of projects by funding excess capacity for future use, where benefits can be documented and such development is otherwise unaffordable without state participation. The goal is to enable the right-sizing of projects by accounting for future demand.
State Water Implementation Fund for Texas (SWIFT)	State	TWDB	TWDB	The SWIFT program helps communities develop and optimize water supplies at cost-effective rates. It offers low-interest loans, extended repayment terms, deferred loan repayments, and incremental repurchase terms for projects with state ownership aspects.
State Water Resources Research Act Program	Federal	USGS	TWDB	The U.S. Geological Survey (USGS), in cooperation with the National Institutes for Water Resources (NIWR), issues an annual call for proposals that address water challenges and concerns of regional or interstate significance, or that relate to a specific program priority identified by the Secretary of the Interior and the Institutes.
Stream Gauging and Flood Monitoring Network	Federal	DOE-USGS		Operation of a network of over 7,000 stream gauging stations that provide data on river flooding characteristics.
Surface Transportation Program	Federal	USDOT/ FHWA		Provides funding for activities such as safety-related construction and transportation enhancements. These enhancements include a broad range of initiatives, from safety education to environmentally and historically focused activities.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Texas Farm and Ranch Lands Conservation Program (TFRLCP)	State	TPWD	TPWD	Maintains and enhances the ecological and agricultural productivity of lands through Agricultural Conservation Easements. The TFRLCP supports responsible stewardship and conservation of working lands, water, fish and wildlife, and agricultural production through: • Generating interest and awareness in easement programs and other options for conserving working lands. • Leveraging available monies to fund as many high-quality projects as possible. • Highlighting the ecological and economic value of working lands and the long-term opportunities for their conservation.
Texas HOME Disaster Relief	Federal	TDHCA	TDHCA	The Texas HOME Disaster Relief Program is a long-term housing initiative designed to help eligible organizations assist income-qualified households affected by disasters. Funds are available for federal or state-declared disasters, as well as other natural or man-made events. It is the Department's practice to maintain a HOME Disaster Relief Fund balance of $1 million whenever possible. These funds may be used to support affected households located outside communities that receive HOME funds directly from the U.S. Department of Housing and Urban Development (HUD).
Texas Longleaf Conservation Assistance Program	Federal	National Fish and Wildlife Foundation (NFWF)	TAMFS	Provides eligible landowners with financial and technical assistance for establishing, enhancing, and managing longleaf pine. Landowners with property within 11 East Texas counties— including Angelina, Hardin, Jasper, Nacogdoches, Newton, Polk, San Augustine, Sabine, San Jacinto, Trinity, and Tyler— are eligible to apply. Approved participants may receive up to 50 percent payment not to exceed a standard cap rate, for implementing approved conservation practices. Approved conservation practices include prescribed burning, reforestation, site preparation, and forest stand improvement.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Texas Infrastructure Resiliency Fund (TIRF)	State	TWDB	TWDB	The purpose of this program is to provide loans, grants, and matching funds for flood projects through four separate accounts. It was enacted through Senate Bill 7 to address needs identified following the flood disasters of 2015, 2016, and 2017. Senate Bill 500 appropriated $685 million to support the program. Each account serves a distinct purpose. The oversight entity is the Texas Infrastructure Resiliency Fund (TIRF) Advisory Board, with the SWIFT Advisory Committee and the Texas Division of Emergency Management (TDEM) Director as non-voting members.
Texas Water Development Fund (DFund)	State	TWDB	TWDB	Provides financing for various types of eligible infrastructure projects, including planning, design, acquisition, and construction of projects for: water supply (such as reservoirs and well fields), conservation, water quality enhancement, flood control, and wastewater. This program enables the Texas Water Development Board (TWDB) to fund multi-purpose projects (e.g., water and wastewater) through a single commitment. Eligible applicants include political subdivisions and nonprofit water supply corporations.
Transfers of Inventory Farm Properties to Federal and State Agencies for Conservation Purposes	Federal	USDA-FSA		Transfers the titles of certain inventory farm properties owned by the FSA to federal and state agencies for conservation purposes, including the restoration of wetlands and floodplain areas to reduce future flood potential.
Transportation Enhancement Program	Federal	FHWA	TXDOT	This program supports non-traditional transportation-related activities that extend beyond standard infrastructure initiatives. Eligible projects must demonstrate thoughtful integration with the surrounding environment, contributing meaningfully to community vitality, environmental quality, and the visual character of transportation corridors. Reimbursement of up to 80 percent of allowable costs is available for qualifying enhancement activities.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
United States Geological Survey (USGS)	Federal	USGS		The U.S. Geological Survey (USGS) issues competitive grants and cooperative agreements to support research in earthquake hazards, the physics of earthquakes, earthquake occurrence, and earthquake safety policy.
Urban Tree Canopy Project (UTC)	Federal	USDA, USFS	TAMFS	The urban tree canopy (UTC) refers to the layer of leaves, branches, and stems of trees that cover the ground when viewed from above. In urban environments, the UTC plays a crucial role in stormwater management by intercepting rainfall that would otherwise run off paved surfaces and enter local waterways through storm drainage systems, carrying pollutants along the way. Additionally, the UTC mitigates the urban heat island effect, reduces heating and cooling costs, lowers air temperatures, improves air quality, increases property values, provides wildlife habitat, and offers aesthetic and community benefits, including an enhanced quality of life.
Urban Waters Small Grants	Federal	EPA		Funding is allocated to improve urban water quality through activities that also support community revitalization and other local priorities, which may include the implementation of green infrastructure.
USDA Conservation Programs	Federal	USDA/FSA		These programs[1] work to address a large number of farming and ranching related conservation issues including drinking water protection, soil erosion reduction, wildlife habitat preservation, the preservation and restoration of forests and wetlands, and aiding farmers whose farms have been damaged by natural disasters.
U.S.-Mexico Border Water Infrastructure Program	Federal	EPA	TCEQ	Provides grant assistance to U.S. and Mexican communities located within 60 miles of the border for the development and construction of high-priority drinking water and wastewater facilities. The program furthers EPA's mission to protect human health and the environment by providing critical resources for what is often an area's first drinking water and basic sanitation services.

[1] Programs include Conservation Reserve Program, Conservation Reserve Enhancement Program, Emergency Conservation Program, Emergency Forest Restoration Program, Farmable Wetlands Program, Grassland Reserve Program, Source Water Protection Program.

APPENDIX H: STATE AND FEDERAL FUNDING OPPORTUNITIES

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Water Research Grant Program	State	TWDB	TWDB	The Texas Water Development Board (TWDB) funds a variety of water planning and research studies and projects designed to support regional water planning efforts and address region-specific water resource questions.
Water Conservation Field Services Program	Federal	HUD	Texas A&M AgriLife	Encourage beneficiaries of federal water projects to conserve water and assists agricultural and urban water districts in developing and implementing water conservation plans in accordance with the Reclamation Reform Act (RRA) of 1982. Through the WCFSP, cost-shared financial assistance is available for developing water conservation plans, identification of water management improvements through System Optimization Reviews (SORs), design of water management improvements, and promotion of water conservation techniques through demonstration activities. WaterSMART also supports Reclamation's priorities to increase water reliability and resilience, advance racial and economic equity, and enhance water conservation, ecosystem health, and climate resilience.
Watershed Processes and Water Resources	Federal	Bureau of Reclamation	TWDB	Promotes up to $250,000 for projects that can be completed within 24 months and that reduce conflicts through water conservation, efficiency, and markets.
WaterSMART – Drought Response Program	Federal	USDA	TWDB	Provides $500,000 to support innovative research focused on: (1) understanding the fundamental processes that influence the quality and quantity of water resources across diverse spatial and temporal scales; (2) improving water resource management in agricultural, forested, and rangeland watersheds; and (3) developing appropriate technologies to achieve these objectives.
Wetlands Protection – Development Grants	Federal	EPA		Provides funding to support the development and enhancement of state and tribal wetlands protection programs.

NAME	LEVEL	SOURCE AGENCY	MANAGING STATE AGENCY	PURPOSE OF FUNDING
Wetlands Reserve Program	Federal	USDA, NRCS		Provides financial and technical assistance to protect and restore wetlands through the use of easements and restoration agreements.
Wildlife Habitat Incentive Program (WHIP)	Federal	USDA, NRCS	TPWD	A voluntary program for conservation-minded landowners seeking to develop and improve wildlife habitat on agricultural land, nonindustrial private forest lands, and tribal lands.

ADOPTION RESOLUTIONS