



HARDIN COUNTY

Hazard Mitigation Plan Update 2017



Maintaining a Safe, Secure, and Sustainable Community

July 13, 2017



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BACKGROUND

Hardin County is located on the flat coastal plains of southeast Texas and is situated roughly 35-65 air miles inland from the Gulf of Mexico. Hardin County was established in 1858, drawing territory from both Jefferson and Liberty Counties, and was named for the family of William Hardin from Liberty County.

Hardin County is surrounded by the following counties: Tyler to the north, Jasper and Orange to the east, Jefferson to the south, Liberty to the west, and Polk to the northwest. The City of Kountze is the county seat.

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, Hardin County is susceptible to a wide range of natural hazards, including but not limited to extreme heat, tornadoes, hail, and wildfires. 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 effects from many hazards to people and property can be lessened. This concept is known as hazard mitigation, which is defined by the Federal Emergency Management Agency (FEMA) as *sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects.*² Communities participate in hazard mitigation by developing hazard mitigation plans. The Texas Division of Emergency Management (TDEM) and FEMA have the authority to review and approve hazard mitigation plans through the Disaster Mitigation Act of 2000.

In 2005-2006, Hardin County and the participating jurisdictions originally developed their Hazard Mitigation Action Plan (HMAP). Then in 2011, information about the planning area and hazard events were updated and incorporated into their HMAP update titled, “Hardin County Multi-Jurisdiction Hazard Mitigation Action Plan Version 2.0.” This plan was developed by the Hardin County Hazard Mitigation Team with assistance from Metro Planning, Inc.

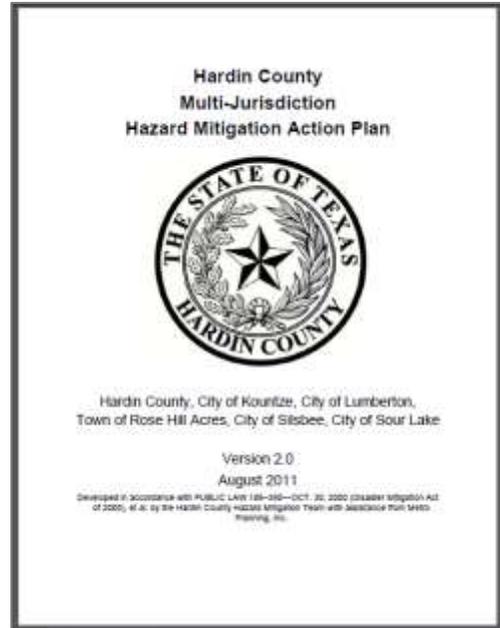
The Disaster Mitigation Act requires that hazard mitigation plans be reviewed and revised every five years to maintain eligibility for Hazard Mitigation Assistance (HMA) grant funding. Since FEMA originally approved

¹ http://floodsafety.com/texas/regional_info/regional_info/dallas_zone.htm

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

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the Hardin County HMAP in 2006, and then approved an update in 2011, the County began the process of developing a HMAP Update in order to maintain eligibility for grant funding within the five-year window. The South East Texas Regional Planning Commission (SETRPC) coordinated among Orange County, Hardin County, and Jefferson County to update each of their HMAP plans and selected the consultant team of H2O Partners, Inc. to write and develop the HMAP Update 2017 for each of the three counties, including Hardin County. The HMAP Update planning process provided an opportunity for Hardin County to evaluate successful mitigation actions and explore opportunities to avoid future disaster loss. The 2011 HMAP Update will expire in 2017; therefore, the SETRPC and Hardin County has selected H2O Partners, Inc. to write and develop the 2017 HMAP Update, hereinafter titled: “Hardin County Hazard Mitigation Plan Update 2017: Maintaining a Safe, Secure, and Sustainable Community” (Plan or Plan Update).



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 update to a hazard mitigation plan addresses hazard vulnerabilities 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 AND PARTICIPATION

Hardin County’s 2017 Plan Update is a multi-jurisdictional plan. The participating jurisdictions include Hardin County, the City of Kountze, the City of Lumberton, the Town of Rose Hill Acres, the City of Silsbee, and the City of Sour Lake. These jurisdictions provided valuable input into the planning process. Throughout the Plan “Hardin County planning area” refers to the entire planning area including all participating jurisdictions. Similarly, the term “countywide” refers to the entire planning area including all participating jurisdictions.

The focus of the 2017 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 Hardin County and the participating jurisdictions. Hazards that pose a “low” or “negligible” risk will continue to be evaluated during future updates to the Plan, but may be included in the appendices and not be fully addressed until they are determined to be a high or moderate risk. The hazard classification enables the County and participating jurisdictions to prioritize mitigation actions based on hazards which can present the greatest risk to lives and property in the geographic scope (i.e. planning area).

PURPOSE

The 2017 Plan Update was prepared by Hardin County, participating jurisdictions, 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 and property from known hazards by identifying and implementing cost-effective hazard mitigation actions. The planning process is an opportunity for Hardin County, the participating jurisdictions, 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 the Hardin County planning area.

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.”*

Hardin County, participating jurisdictions, and planning participants identified eleven natural hazards to be addressed by the Plan Update. Additional hazards that have a very low risk or no risk to the planning area are included in Appendix A. The specific goals of the Plan Update are to:

- Provide a comprehensive update to the 2011 HMAP;
- Minimize disruption to Hardin County and the participating jurisdictions 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 grant and technical assistance programs offered by the State or Federal government. The Plan Update will enable Hardin County and participating jurisdictions to take advantage of rapidly developing mitigation grant opportunities as they arise; and
- Ensure that Hardin County and participating jurisdictions maintain eligibility for the full range of future Federal disaster relief.

AUTHORITY



The Plan Update is tailored specifically for Hardin County, participating jurisdictions, and plan participants including Planning Team members, stakeholders, and the general public who participated in the Plan Update development process. The Plan Update 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 Plan Review Guide” (October

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2011) and the “Local Mitigation Planning Handbook” (March 2013). Additionally, the Plan is developed in accordance with FEMA’s Community Rating System (CRS) Floodplain Management Plan standards and policies.

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 14 present a hazard overview and information on individual natural hazards in the planning area. The hazards generally appear in order of priority based on potential losses to life and property and other community concerns. 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 15 presents hazard mitigation goals and objectives; Section 16 gives an analysis for the previous actions; and Section 17 presents hazard mitigation actions for Hardin County and the participating jurisdictions. Section 18 identifies Plan maintenance mechanisms.

Several hazards that were included in the previous plans that have very low or no risk to the planning area are included in Appendix A and are updated with any occurrences that have arisen in the past five years. A list of Planning Team members is located in Appendix B. Public survey results are analyzed and presented in Appendix C. Appendix D contains a detailed list of critical facilities for the planning area, and Appendix E provides a list of dam locations. Appendix F contains information regarding workshops, including meeting documentation. The Capability Assessment for Hardin County and the participating jurisdictions is located in Appendix G.³

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

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PLAN PREPARATION AND DEVELOPMENT

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

Overview of the Plan

The South East Texas Regional Planning Commission (SETRPC) hired H2O Partners, Inc. (Consultant Team), to provide technical support and oversee the development of the Plan Update 2017 for Hardin County. The Consultant Team used the FEMA “Local Mitigation Plan Review Guide” (October 1, 2011) and the Local Mitigation Planning Handbook” (March 2013) to develop the Plan. The overall planning process is shown in Figure 2-1 below.

Figure 2-1. Mitigation Planning Process



Hardin County, participating jurisdictions, and the Consultant Team met in March 2016 to begin organizing resources, identifying Planning Team members, and conducting 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 from each of the participating jurisdictions as well as Hardin County and SETRPC, shown in Table 2-1, was formed to coordinate planning efforts and request input and participation in the planning process.

Table 2-1. Executive Planning Team

ORGANIZATION	TITLE
City of Kountze	Emergency Management Coordinator
City of Lumberton	City Manager
City of Rose Hill Acres	Mayor
City of Silsbee	Emergency Management Coordinator
City of Silsbee	Assistant Emergency Management Coordinator
City of Sour Lake	City Manager

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ORGANIZATION	TITLE
City of Sour Lake	Police Chief
Hardin County	Emergency Management Coordinator
Hardin County	Floodplain Administrator
South East Texas Regional Planning Commission	Homeland Security and Emergency Management Planning Director

Additionally, a Stakeholder Group was invited to participate in the planning process via e-mail. The Consultant Team, Planning Team, and Stakeholder Group coordinated to identify mitigation goals and develop mitigation strategies and actions for the Plan Update. Appendix B provides a complete listing of all participating Planning Team members and stakeholders by organization and title.

Based on results of the completed Capability Assessment, Hardin County and participating jurisdictions described methods for achieving future hazard mitigation measures by expanding existing capabilities. For example, while each jurisdiction has a floodplain manager, the City of Lumberton is the only jurisdiction to have a Stormwater management plan in place. Other options for improving capabilities include the following:

- Establishing Planning Team members with the authority to monitor the Plan Update and identify grant funding opportunities for expanding staff.
- Identifying 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 preparetexas.org.
- Reviewing current floodplain ordinances for opportunities to increase resiliency such as modifying permitting or building codes.
- Developing ordinances that will require all new developments to conform to the highest mitigation standards.

Sample hazard mitigation actions developed with similar hazard risk were shared at the meetings. These important discussions resulted in 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 potential flooding and hurricanes, including storm-hardening or retrofitting critical facilities and infrastructure throughout the County to mitigate hazard damage from water and wind and practicing hazard mitigation techniques. The Plan Update also includes county-wide actions to conduct a tree pruning initiative along power lines to reduce power outages and road closure due to downed trees during and after storms throughout Hardin County.

Planning Process

The process used to prepare the 2017 Plan Update followed the four major steps included in Figure 2-1. After the Planning Team was organized, a capability assessment was developed and distributed at the Kick-Off

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Workshop. Hazards were identified and assessed and results associated with each of the hazards were provided at the Risk Assessment Workshop. Based on Hardin 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 Update development workshops held throughout the planning process described herein, the following factors were taken into consideration:

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

Kickoff Workshop

The Kickoff Workshop was held at the SETRPC Offices on March 30, 2016. The initial workshop informed County officials and key department personnel about how the planning process pertained to their distinct roles and responsibilities, and engaged stakeholder groups such as the South East Texas Disaster Recovery Group. 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. Participants ranked hazards high to low in terms of perceived level of risk, frequency of occurrence, and potential impact.

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 as a whole, the 2013 State of Texas Hazard Mitigation Plan Update, 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.

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RISK ASSESSMENT

An initial risk assessment for Hardin County and the participating jurisdictions was completed in May 2016 and results were presented to Planning Team members at the Risk Assessment Workshop held on June 1, 2016. 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.

Potential dollar losses from each hazard were estimated using the Federal Emergency Management Agency's Hazards U.S. Multi-Hazards (MH) Model (HAZUS-MH) and other HAZUS-like modeling techniques. The assessments examined the impact of various hazards on the built environment, including general building stock (e.g., residential, commercial, industrial), 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. Each participant at the Risk Assessment Workshop was provided a risk ranking sheet that asked participants to rank hazards in terms of the probability or frequency of occurrence, extent of spatial impact, and the magnitude of impact. The results of the ranking sheets identified unique perspectives on varied risks throughout the planning area.

The assessments were also used to set priorities for hazard mitigation actions based on potential loss of life and dollar losses. A hazard profile and vulnerability analysis for each of the hazards can be found in Sections 4 through 14.

MITIGATION REVIEW AND DEVELOPMENT

Developing the Mitigation Strategy for the Plan Update involved identifying mitigation goals and new mitigation actions. A Mitigation Workshop was held at the SETRPC Offices on August 24, 2016. In addition to the Planning Team, stakeholder groups were invited to attend the workshop. Regarding hazard mitigation actions, Workshop participants emphasized the desire for those that addressed flood and hurricane hazards. Additionally, the County and 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 2017 Plan Update. The prioritization method was based on FEMA's STAPLE+E 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:

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- 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, match 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 2017 Plan Update was maintained on file by the Hardin County Office of Emergency Management and participating jurisdictions and was made available to the general public for review.

REVIEW AND INCORPORATION OF EXISTING PLANS

Review

Background information utilized during the planning process included various studies, plans, reports, and technical information from sources such as FEMA, the United States Army Corps of Engineers (USACE), the U.S. Fire Administration, National Oceanic and Atmospheric Administration (NOAA), the Texas Water Development Board (TWDB), the Texas Commission on Environmental Quality (TCEQ), the Texas State Data Center, Texas 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 5-14) 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 Climatic Data Center (NCDC). Results of past hazard events were found through searching the NCDC. USACE studies were reviewed for their assessment of risk and potential projects in the region. State Data Center documents were used to obtain population projections. State Demographer webpages were reviewed for population and other projections and included in Section 3 of the Plan Update. Information from the Texas 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 Hardin County and participating jurisdictions' departments 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, the City of Lumberton is in the process of acquiring an Engineering study for the installation of a bridge to aid residents in flood prone areas. Therefore, an action to elevate roadways and bridges prone to inundation from flooding was included for the City. Additionally, the Community Wildfire Protection Plan from several participating jurisdictions is incorporated in the Plan as a county wide action to install signage to notify the public when a Burn Ban is activated. Other plans were reviewed, such as Evacuation Plans, to identify any additional mitigation actions. Finally, the 2013 State of Texas Mitigation Plan Update, 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 2013 State Plan Update was also used as a guidance document along with FEMA materials in the development of the Hardin County Plan Update.

Incorporation of the HMAP into Other Planning Mechanisms

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

Hardin County and the participating jurisdictions will be responsible for implementing hazard mitigation actions contained in Section 18. Each hazard mitigation action has been assigned to a specific County and 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.

Hardin County and the participating jurisdictions will integrate hazard mitigation actions contained in the Plan Update with existing planning mechanisms such as floodplain ordinances, Emergency Operation Plans, Evacuation Plans and other local and area planning efforts. Hardin County will work closely with area organizations to coordinate implementation of hazard mitigation actions that benefit the planning area financially and economically.

Upon formal adoption of the 2017 Plan Update, Planning Team members from Hardin County and the participating jurisdictions will review existing plans along with building codes to guide development and ensure

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that hazard mitigation actions are implemented. Each of the jurisdictions will be responsible for coordinating periodic review of the Plan Update with members of the 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 amendments or updates in light of the approved Plan Update. Hardin County and the participating jurisdictions will ensure that future long-term planning objectives will contribute to the goals of the Plan Update 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 Update, 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.

Further, Hardin 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 from natural hazards throughout the planning area.

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

Table 2-2. Examples of Methods of Incorporation

Planning Mechanism	Incorporation of Plan
Grant Applications	The Plan Update will be evaluated by Hardin County and participating jurisdictions when grant funding is sought for mitigation projects. If a project is not in the Plan Update, an amendment may be necessary to include the action in the Plan Update.
Annual Budget Review	Various departments and key personnel that participated in the planning process for Hardin County and participating jurisdictions 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 per the implementation schedule of the specific action.
Regulatory Plans	Currently, Hardin County and participating jurisdictions have regulatory plans in place, such as Emergency Management Plans, Continuity of Operations Plans, Economic Development, and Evacuation Plans. The Plan Update will be consulted when County and City departments review or revise their current regulatory

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Planning Mechanism	Incorporation of Plan
	planning mechanisms or in the development of regulatory plans that are not currently in place.
Capital Improvement Plans	Hardin County and participating jurisdictions have a Capital Improvement Plan (CIP) in place. Prior to any revisions to the CIP, County and 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.
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 5 of this Plan Update discussing the people and property at risk to flood will be reviewed and revised when Hardin County updates their management plans or develops new plans.

Appendix G provides an overview of Planning Team members’ existing planning and regulatory capabilities to support implementation of mitigation strategy objectives. Appendix G also provides further analysis of how each intends to incorporate hazard mitigation actions into existing plans, policies, and the annual budget review as it pertains to prioritizing grant applications for funding and implementation of identified hazard mitigation projects.

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

Plan Review and Plan Update

As with the development of Plan Update, Hardin County will oversee the review and update process for relevance and to make necessary adjustments. At the beginning of each fiscal year, Planning Team Members will meet to evaluate the Plan Update and review other planning mechanisms to ensure consistency with long-range planning efforts. In addition, planning participants will also meet twice a year by conference call or presentation to re-evaluate prioritization of the hazard mitigation actions.

TIMELINE FOR IMPLEMENTING MITIGATION ACTIONS

The Executive Planning Team (Table B-1, Appendix B) 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

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implementation based on prioritization of each action as identified on individual Hazard Mitigation Action worksheets included in the Plan Update for Hardin County and participating jurisdictions.

The Executive 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 Hardin County's comprehensive planning process, budgetary constraints, and community needs. Hardin County and the participating jurisdictions 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 implemented 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 Hardin County's 2017 Plan Update at different stages prior to official Plan Update 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 at Hardin County's website.

The draft 2017 Plan Update was made available to the general public for review and comment at the Hardin County Office of Emergency Management and participating municipalities. 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 2017 Plan Update, although it was given on the public survey, and all relevant information was incorporated into the Plan Update.

The 2017 Plan Update will be advertised and posted on Hardin County's website upon approval from FEMA.

Stakeholder Involvement

Stakeholder involvement is essential to hazard mitigation planning since a wide range of stakeholders can provide input on specific topics and input from various points of view. Throughout the planning process, members of community groups, local businesses, neighboring jurisdictions, schools, and hospitals were invited to participate in development of the 2017 Plan Update. The Stakeholder Group (Appendix B, Table B-2) and Table 2-3, below), included a broad range of representatives from both the public and private sector and served as a key component in Hardin County's outreach efforts for development of the Plan Update. Documentation

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of stakeholder meetings is found in Appendix F. A list of organizations invited to attend via e-mail is found in Table 2-3.

Table 2-3. Stakeholder Working Group

AGENCY	TITLE	PARTICIPATED
Lamar University	Assistant Professor	X
RPS	Senior Consulting Engineer	X
South East Texas Disaster Recovery Group	Executive Director	X
Texas State Senate	Texas State Senator	
Texas House of Representatives	Texas US Representatives	X
United Way	Executive Director	X
Colonial Pipeline	Manager	X
Local Emergency Planning Committee	Chairperson	X
City of Beaumont	Community Manager	X
City of Beaumont	Emergency Management Assistant	X
City of Beaumont	Emergency Specialist	X
City of Beaumont Police Department	Assistant Chief	X
City of China	City Secretary	X
City of Nederland Police Department	Assistant Chief	X
City of Nome	City Secretary	X
City of Port Arthur	Senior Planner	X
City of Port Arthur Development Services	Director	X
City of Port Arthur Fire Department	Emergency Management Coordinator	X
City of Port Arthur Police Department	Emergency Management Coordinator	X
City of Port Neches Fire Department	Emergency Management Coordinator	X
City of Taylor Landing	Mayor	X
Jefferson County	Assistant Emergency Management Coordinator	X
City of Vidor Police Department	Chief	X
City of West Orange Public Works	Manager	X

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AGENCY	TITLE	PARTICIPATED
City of West Orange Public Works	Supervisor	X
Orange County Economic Development Center	Director	X
Orange County Emergency Services District #1	Chief	X
Orange County Emergency Services District #2	Chief	X
Orange County Environmental Health	Director	X
Orange County Human Resources	Director	X
Orange County Information Technology	Director	X
Orange County Maintenance Department	Director	X
Orange County Public Health	Public Health Emergency Preparedness Planner	X
Orange County Sheriff	Captain	X
Orange County Water Control #1	Finance Director	X
South East Texas Regional Planning Commission	Homeland Security and Emergency Management Planning Director	X
Vidor Independent School District Police Department	Sergeant	X
Vidor Independent School District Police Department	Interim Director	X

Stakeholders and participants from neighboring communities that attended the Planning Team and public meetings played a key role in the planning process. For example, hurricanes and flooding were major concerns to the stakeholders, so many of the participating jurisdictions included mitigation actions to upgrade their storm water capacity to include installing/upgrading culverts and headwalls and enlarging storm water ditches and canals as well as identifying actions that would assist evacuations to make the evacuation process more efficient and safer for local residents and first responders.

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. Representatives from area neighborhood associations, and area residents were invited to participate. Additionally, Hardin County utilized social media sources including Facebook, Twitter, and the local media to increase public participation in the Plan Update development process. Documentation on the public meetings are found in Appendix F.

Public meetings were held on the following dates and locations:

- March 30, 2016, SETRPC Homer E Nagel Conference Room

Section 2: Planning Process

- June 1, 2016, Hardin County Courthouse Commissioners' Courtroom
- August 24, 2016, Orange County Expo Center

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 and 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 Hardin County's website. A total of 21 surveys were completed online and the results are analyzed in Appendix C. Hardin County reviewed the input from the surveys and decided which information to incorporate into the Plan Update as hazard mitigation actions. For example, many citizens mentioned concerns about flooding and suggested drainage improvements and clearing out ditches as potential steps the jurisdictions could take. In response to public input, several hazard mitigation actions were added to the Plan Update to include drainage improvement and storm water conveyance for areas including Coon Marsh Gulley, which consists of excavating the channel, lining the bottom with concrete, installing box culverts and wing walls, and installing erosion control.

SECTION 3: COUNTY PROFILE

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OVERVIEW

Hardin County was established in 1858, after the region’s population had increased sufficiently to warrant establishment of its own county government. Territory was drawn from both Liberty and Jefferson Counties, and legislators specified that the county’s name honor the Hardin family of Liberty. Hardin County has a total area of 898 square miles, of which 891 square miles is land and 7 square miles (0.8%) is water. The County consists of several cities, a few census-designated places, and unincorporated communities. The following jurisdictions are participating within this plan and are considered part of the planning area: the City of Kountze, the City of Lumberton, the Town of Rose Hill Acres, the City of Silsbee, and the City of Sour Lake. The other unincorporated communities will be considered under Hardin County.

Hardin County lies within the Neches and Trinity River basins. The Trinity River basin occupies a small corner of the northwest portion of the county and the remainder is contained within the Neches River basin. Major rivers and bayous include the Neches River and Pine Island Bayou. Other smaller water courses include: Little Pine Island Bayou, Boggy Creek, Coon Marsh Gulley, Black Creek, Village Creek, and Mill Creek. Soils in Hardin County consist mainly of acidic, poorly drained, loamy soils.

Hardin County is located on the flat coastal plains, with topographic relief ranging from flat expanses along the southern county boundary to hilly relief elsewhere. Elevations range from approximately 5 feet above sea level in uninhabited areas in the southern portions of the county along the Neches River to about 150 feet. Pine and hardwood forests dominate the landscape, while grasses and dense undergrowth also exist. Timber production is the primary agricultural enterprise in Hardin County with production of livestock, hay, and field crops also significant. Approximately 52 percent of the total land area is owned by timber companies, and approximately 8 percent is managed by the National Park Service (Big Thicket National Preserve), with the balance in residential, commercial and industrial, and public holdings.



Section 3: County Profile

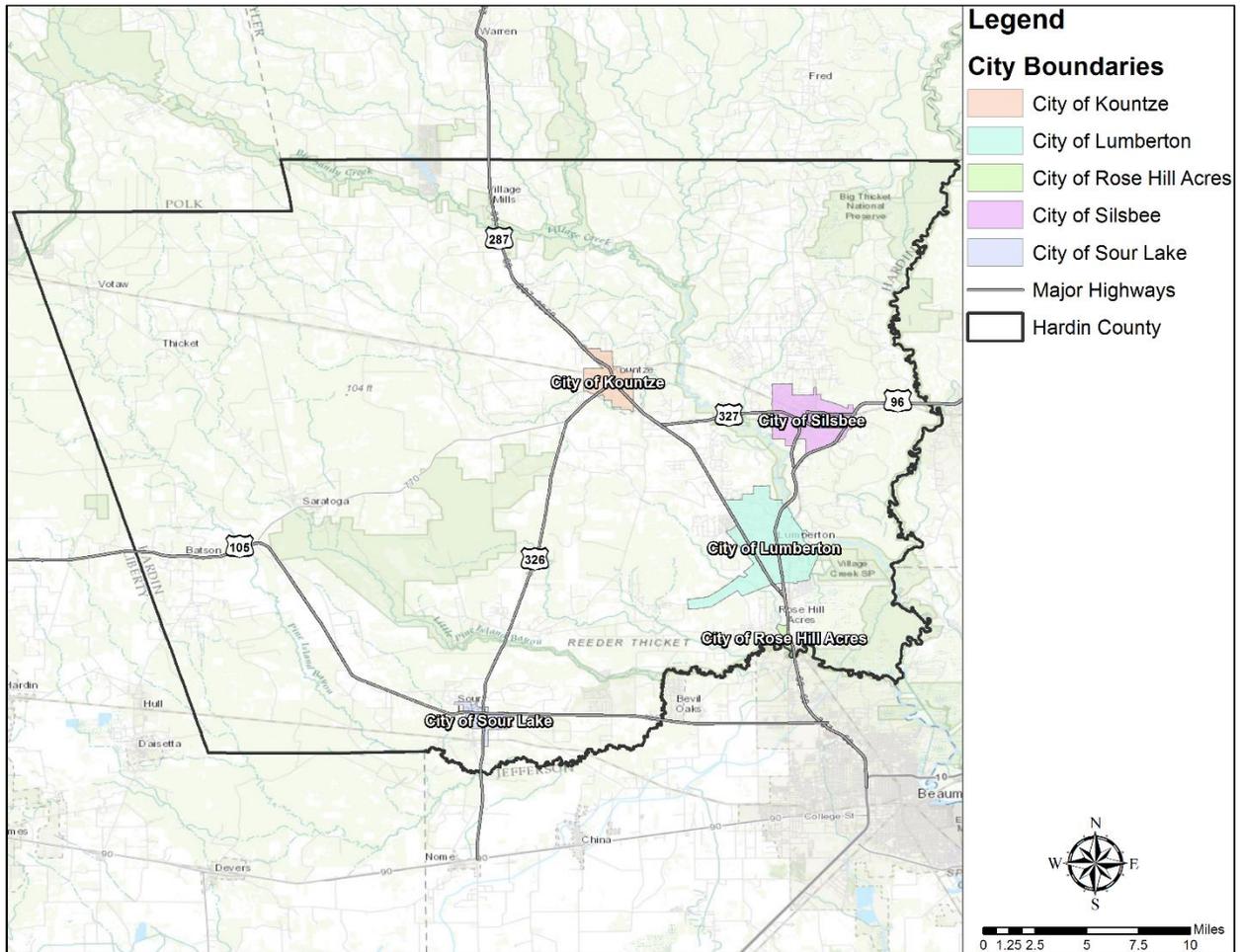
Figure 3-1 shows the general location of Hardin County, along with the Cities that are located within the County.

Figure 3-1. Location of Hardin County Planning Area



Figure 3-2 shows the Hardin County Study Area, including the participating jurisdictions that are covered in the risk assessment analysis of the Plan.

Figure 3-2. Hardin County Study Area



Provided in Table 3-1 below is a listing of the jurisdictions in Hardin County that participated in the Hazard Mitigation Plan Update.

Table 3-1. Participating Jurisdictions

PARTICIPATING JURISDICTIONS
Hardin County
City of Kountze
City of Lumberton
Town of Rose Hill Acres
City of Silsbee
City of Sour Lake

POPULATION AND DEMOGRAPHICS

In the official Census population count, as of April 1, 2010, Hardin County had a population of 54,635 residents. By July 2014, the number had grown to 55,540, and by July 2015, the population was 55,865. Table 3-2 provides the population distribution by jurisdiction within Hardin County.¹

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 there are many variables involved in achieving an accurate estimation of people living in a given area at a given time.

Table 3-2. Population Distribution by Jurisdiction

JURISDICTION	TOTAL 2010 POPULATION	PERCENTAGE	ESTIMATED VULNERABLE OR SENSITIVE POPULATIONS	
			Elderly (Over 65)	Below Poverty Level
Kountze	2,123	3.9%	323	412
Lumberton	11,943	21.9%	1,330	908
Rose Hill Acres	441	0.8%	79	31
Silsbee	6,611	12.1%	1,150	1,878
Sour Lake	1,813	3.3%	253	147
Unincorporated Hardin County	31,704	58.0%	4,241	3,071
HARDIN COUNTY TOTAL	54,635	100%	7,376	6,447

Population Growth

The official 2010 Hardin County population is 54,635. Overall, Hardin County experienced an increase in population between 1980 and 2010 by 34.2%, or an increase by 13,914 people. Lumberton, Sour Lake, and the unincorporated areas of Hardin County experienced a population growth between 1980 and 2010, while the rest of the jurisdictions experienced a decrease in their population. Rose Hill Acres is the only jurisdiction that additionally experienced a decrease in population between 2000 and 2010, while the rest of the jurisdictions and the unincorporated areas of the County exhibited an increase in population during this time period. Table 3-3 provides historic growth rates in Hardin County.

¹ <http://www.census.gov/quickfacts/table/PST045215/48199,00>

Table 3-3. Population for Hardin County, 1980-2010

JURISDICTIONS	1980	1990	2000	2010	POP CHANGE 1980-2010	PERCENT OF CHANGE	POP CHANGE 2000-2010	PERCENT OF CHANGE
Kountze	2,716	2,067	2,115	2,123	-593	-21.8%	8	0.4%
Lumberton	2,480	6,640	8,731	11,943	9,463	381.6%	3,212	36.8%
Rose Hill Acres	460	468	480	441	-19	-4.1%	-39	-8.1%
Silsbee	7,684	6,368	6,393	6,611	-1,073	-14.0%	218	3.4%
Sour Lake	1,807	1,547	1,667	1,813	6	0.3%	146	8.8%
Unincorporated Hardin County	25,574	24,230	28,687	31,704	6,130	24.0%	3,017	10.5%
COUNTY TOTAL	40,721	41,320	48,073	54,635	13,914	34.2%	6,562	13.7%

FUTURE DEVELOPMENT

To better understand how future growth and development in the 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, the number of permits that have been issued throughout the county, and economic impacts.

Population projections from 2010 to 2040 are listed in Table 3-4, as provided by the Office of the State Demographer, Texas State Data Center, and the Institute for Demographic and Socioeconomic Research. Population projections are based on a 0.5 scenario growth rate, which is 50 percent of the population growth rate that occurred during 2000-2010. This information is only available at the County level; however, the population projection shows an increase in population density for the County, which would mean overall growth for the County.

Table 3-4. Hardin County Population Projections

County	LAND AREA (SQ MI)	2010		2020		2030		2040	
		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)
Hardin	898	54,635	60.84	59,349	66.09	63,687	70.92	66,742	74.32

ECONOMIC IMPACT

Building and maintaining infrastructure depends on the economy; therefore, protecting infrastructure from risk due to natural hazards in the planning area is important to Hardin County. 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.

Major employers in the area are critical to the health of the economy, as well as effective transportation connectivity.

EXISTING AND FUTURE LAND USE AND DEVELOPMENT TRENDS

Hardin County is part of the South East Texas Regional Planning Commission (SETRPC) which has many departments to promote intergovernmental cooperation and coordination, conduct comprehensive regional planning, and provide a forum for the discussion and study of area issues. The Community Development Department focuses on building a stronger more prosperous region through the focus on an individual community, while the Transportation and Environmental Resources department provides assistance through grants and resources regarding the environment and working with state, city, and county entities to coordinate transportation planning for the Jefferson-Orange-Hardin Regional Transportation Study area.

Additionally, the City of Lumberton has a Comprehensive Master Plan in place, while the City of Rose Hill and the City of Sour Lake each have a Land Use plan in place. These plans, along with the planning department are responsible for the comprehensive planning activities of the city and for administering the subdivision regulations.

Building Permits

Building permits indicate what types of buildings are being constructed and their relative uses. Table 3-5 lists the number of residential building permits for Hardin County that have been granted between 1996 and 2015. The data includes all sizes of family homes for reported permits, including the construction costs, to show the potential increase in vulnerability of structures to the various hazards reviewed in the risk assessment. The increase in vulnerability can be attributed to the higher construction costs that would be factored into repairing or replacing a structure using current market values. Permits are reported annually in September; data reflects permits for years 2010-2015 to demonstrate growth rates.

Section 3: County Profile

Table 3-5. County Residential Building Permits²

Hardin County			
Year	Buildings	Units	Construction Cost
1996	15	15	\$1,306,320
2000	21	21	\$1,383,935
2005	98	98	\$14,333,757
2010	87	87	\$10,007,707
2011	73	73	\$10,599,129
2012	94	94	\$10,258,063
2013	96	96	\$13,452,595
2014	117	117	\$16,021,502
2015	230	232	\$42,781,673

² <http://censtats.census.gov/cgi-bin/bldgprmt/bldgdisp.pl>

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HAZARD DESCRIPTION

Section 4 is the first phase of the Risk Assessment and provides background information for the hazard identification process and descriptions for the hazards identified. The Risk Assessment continues with Sections 5 through 14, which include hazard descriptions and vulnerability assessments.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, Hardin County and the participating jurisdictions identified eleven natural hazards that are addressed in the 2017 Hazard Mitigation Plan Update. Of the hazards identified, ten natural hazards and one quasi-technological hazard (dam failure) 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 2013 State of Texas Hazard Mitigation Plan Update (State Plan Update). Readily available online information from reputable sources, such as federal and state agencies, were also evaluated and utilized to supplement information as needed.

In general, there are three main categories of hazards including atmospheric, hydrologic, and technological. Atmospheric hazards are events or incidents associated with weather generated phenomenon. Atmospheric hazards that have been identified as significant for the Hardin County Planning area include extreme heat, hail, hurricane, lightning, thunderstorm wind, tornado, and winter storm (Table 4-1).

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.

For the Risk Assessment, the wildfire hazard is considered “other,” since a wildfire may be natural or human-caused and is not considered atmospheric or hydrologic.

Table 4-1. Hazard Descriptions

HAZARD	DESCRIPTION
ATMOSPHERIC	
Extreme Heat	Extreme heat is the condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period of time.
Hail	Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and subsequent cooling of the air mass.
Hurricane	A hurricane is an intense tropical weather system of strong thunderstorms with a well-defined surface circulation and maximum sustained winds of 74 mph or higher.
Lightning	Lightning is a sudden electrostatic discharge that occurs during an electrical storm. This discharge occurs between electrically charged regions of a cloud, between two clouds, or between a cloud and the ground.
Thunderstorm Wind	A thunderstorm occurs when an observer hears thunder. Radar observers use the intensity of the radar echo to distinguish between rain showers and thunderstorms. Lightning detection networks routinely track cloud-to-ground flashes, and therefore thunderstorms.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. The destruction caused by tornadoes ranges from light to catastrophic, depending on the location, intensity, size, and duration of the storm.
Winter Storm	Severe winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 miles per hour, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads, and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.
HYDROLOGIC	
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality.

Section 4: Risk Overview

HAZARD	DESCRIPTION
Flood	The accumulation of water within a body of water, which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, and shallow flooding.
OTHER	
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.

Hazards that weren't considered significant and were not included in the Plan are located in Table 4-2, along with the evaluation process used for determining the significance of each of these hazards. These natural hazards are not addressed in detail due to their no to minimal level of risk within the Hardin County planning area. Hazards not identified for inclusion at this time may be addressed during future evaluations and updates.

Table 4-2. Hazard Identification Process

HAZARD	DESCRIPTION
Dam Failure	There are two dams located in the unincorporated area of Hardin County. However, there are no historical occurrences of these dams failing and there is none expected in the future. If the dams were to fail Hardin County would not experience any impact to life, property, or services provided by the community.
Expansive Soils	Expansive soils occurrences and damages are not well documented. There are no historical occurrences of expansive soils for the Hardin County planning area and it is located in an area where occurrences are considered rare. Expansive Soils poses little to no risk for the area and was not addressed further in the plan.
Earthquakes	According to the State Plan, an earthquake occurrence for the Hardin County planning area is considered exceedingly rare. Although a small event is possible, it would pose little to no risk for the area. There are no recorded earthquake events or damages for the planning area. Due to the low frequency of the hazard and limited impact, the hazard was not addressed further in the plan.
Land Subsidence	There are no historical occurrences of land subsidence for the Hardin County planning area and it is located in an area where occurrences are considered rare. The impact would be limited and the frequency of occurrence is unlikely according to the State Plan. Land Subsidence

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HAZARD	DESCRIPTION
	poses little to no risk for the area and was not addressed further in the plan.

NATURAL HAZARDS AND CLIMATE CHANGE

Climate change is defined as a long-term hazard which can increase or decrease the risk of other weather hazards. It directly endangers property and biological organisms due to sea level rise and habitat destruction.

Global climate change is expected to exacerbate the risks of certain types of natural hazards impacted through rising sea levels, warmer ocean temperatures, higher humidity, the possibility of stronger storms, and an increase in wind and flood damages due to storm surges. While sea level rise is a natural phenomenon and has been occurring for several thousand years, the general scientific consensus is that the rate has increased in the past 200 years, from 0.5 millimeters per year to 2 millimeters per year.

Texas is considered one of the more vulnerable states in the U.S. to both abrupt climate changes and to the impact of gradual climate changes to the natural and built environments. Mega-droughts can trigger abrupt changes to regional ecosystems and the water cycle, drastically increase extreme summer temperature and fire risk, and reduce availability of water resources, as Texas experienced during 2011-2012.

Paleoclimate records also show that the climate over Texas had large changes between periods of frequent mega-droughts and the periods of mild droughts that Texas is currently experiencing. While the cause of these fluctuations is unclear, it would be wise to anticipate that such changes could occur again, and may even be occurring now.

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 the Hardin County planning area, including the participating jurisdictions. Remaining records identifying the occurrence of hazard events in the planning area and the maximum recorded magnitude of each event were also evaluated.

The use of geographic information system (GIS) technology to identify and assess risks for the Hardin County planning area, and evaluate community assets and their vulnerability to the hazards.

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

Section 4: Risk Overview

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 4-3, and impact statements are defined in Table 4-4 below.

Table 4-3. 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 4-4. 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 for at least two 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 more than 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 damages 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 damages, 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.

To better understand how future growth and development in the County might affect hazard vulnerability, it is useful to consider population growth, occupied and vacant land, the potential for future development in hazard areas, and current planning and growth management efforts. Hazard Vulnerability for Hardin County was reviewed based on recent development changes that occurred throughout the County. The Hardin County

Section 4: Risk Overview

planning area has grown slightly between 2010 and 2015 according to the U.S. Census Bureau, therefore there has been no significant factors or development trends with a consequential effect or increase in vulnerability to the population, infrastructure, and buildings for hazards.

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

Table 4-5 portrays the results of the County's self-assessment for hazard ranking, based on the preliminary results of the risk assessment presented at the Risk Assessment Workshop. This table also takes into account local knowledge regarding frequency of occurrence and the potential impact of each hazard.

Table 4-5. Hazard Risk Ranking

HAZARD	FREQUENCY OF OCCURENCE	POTENTIAL SEVERITY	RANKING
Flood	Highly Likely	Limited/Minor ¹	High
Lightning	Occasional	Limited	High
Hurricane	Unlikely	Major	High
Hail	Highly Likely	Limited	High
Thunderstorm Wind	Highly Likely	Minor	High
Tornado	Highly Likely	Major	High
Winter Storm	Highly Likely	Limited	High
Extreme Heat	Unlikely	Limited	Moderate
Wildfire	Highly Likely	Minor	Moderate
Drought	Occasional	Limited	Low

¹ Hardin County, the City of Kountze, the Town of Rose Hill Acres, and the City of Silsbee have a Limited level of impact, while the City of Lumberton and the City of Sour Lake have a Minor level of impact.

SECTION 5: FLOOD

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NFIP Compliance and Maintenance..... 18

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HAZARD DESCRIPTION

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

The primary types of general flooding are inland and coastal flooding. 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, thus 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.

LOCATION

The Digital Flood Insurance Rate Map (DFIRM) data provided by FEMA for Hardin 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.

Section 5: Flood

- Zone AE: Areas subject to inundation by 1-percent-annual-chance shallow flooding. It is the base floodplain where base flood elevations 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 Hardin County based on the digital Flood Insurance Rate Map (DFIRM) from FEMA are illustrated in Figures 5-1 to 5-6.

Figure 5-1. Estimated Flood Zones in Hardin County

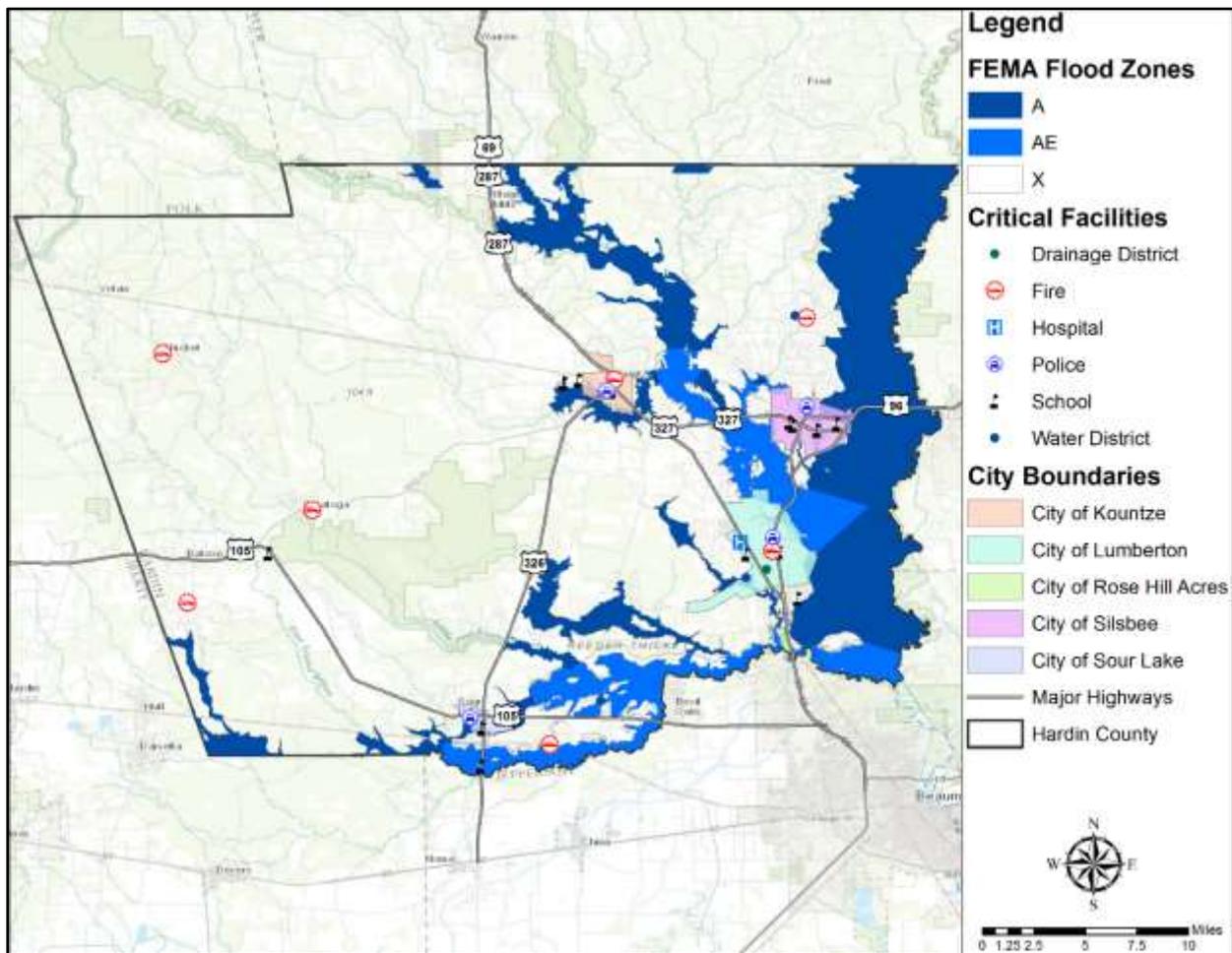


Figure 5-2. Estimated Flood Zones in the City of Kountze

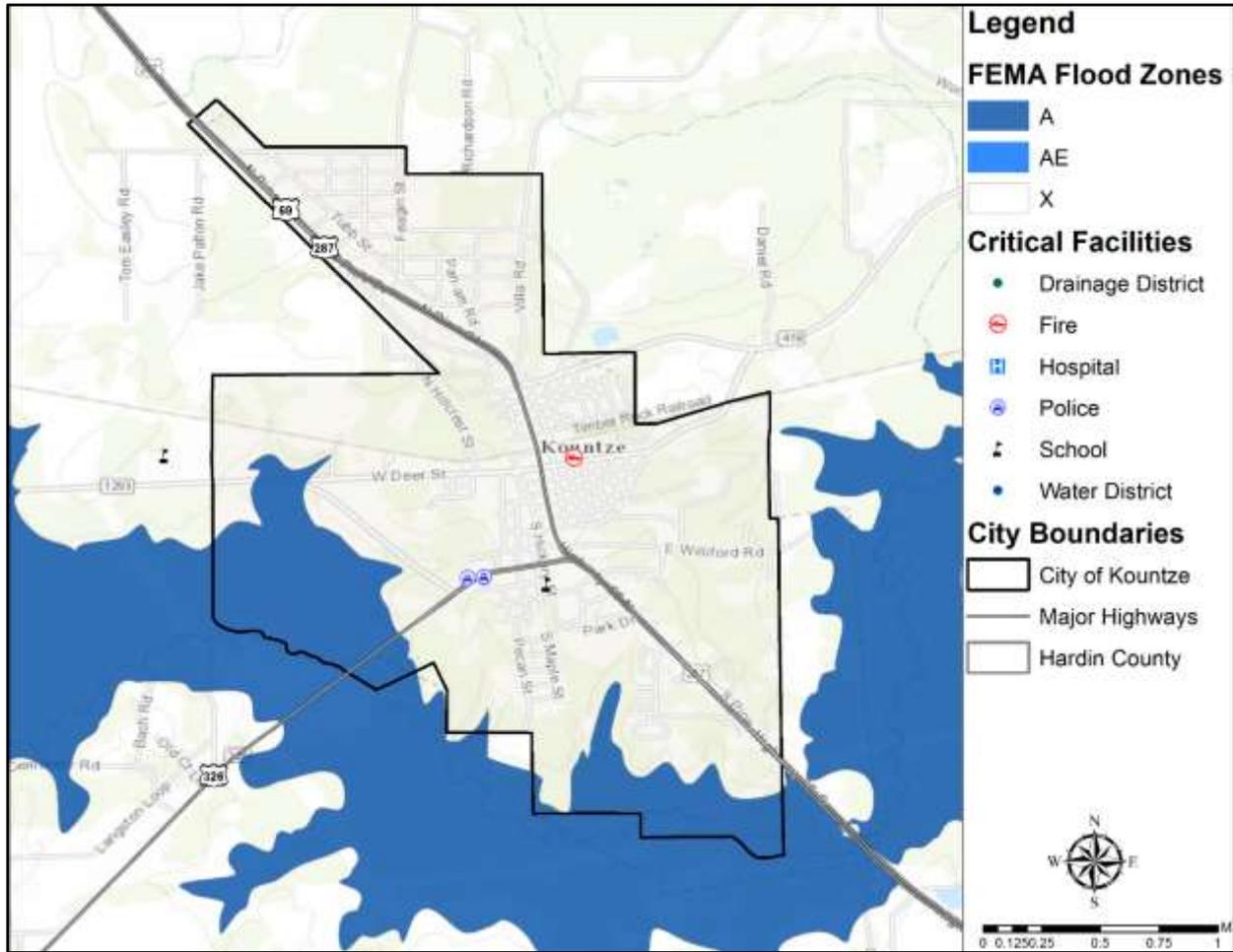


Figure 5-3. Estimated Flood Zones in the City of Lumberton

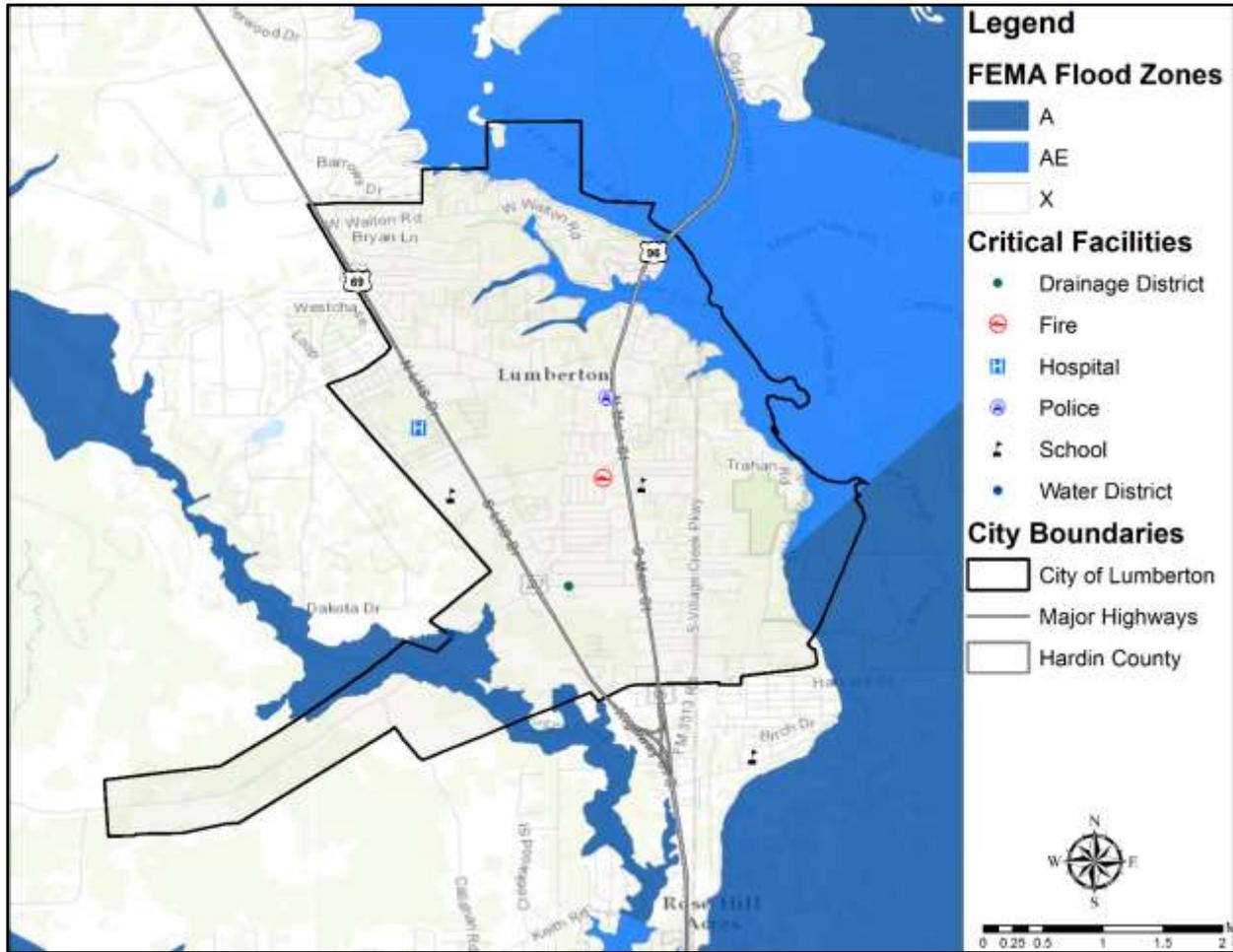


Figure 5-4. Estimated Flood Zones in the City of Rose Hill Acres

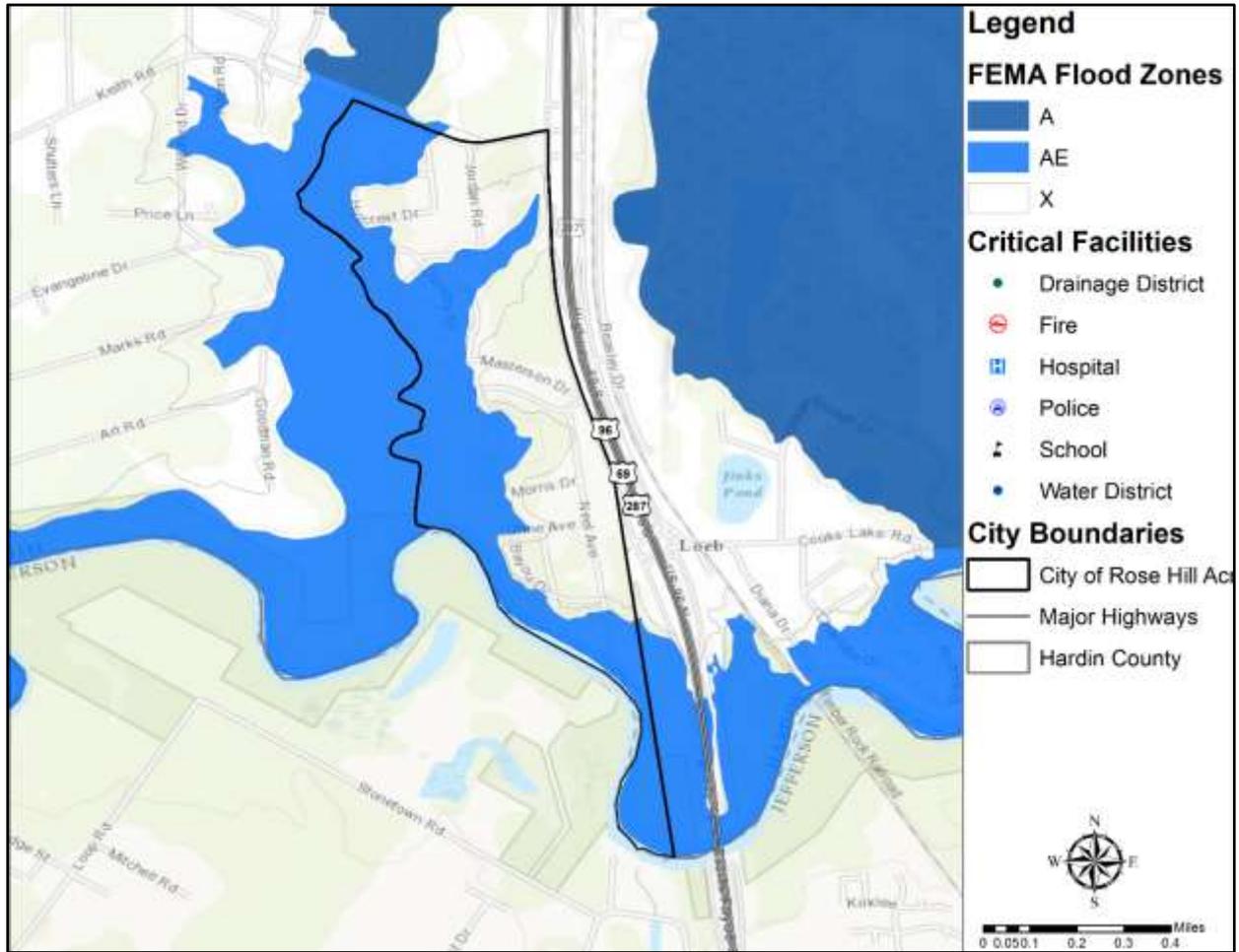


Figure 5-5. Estimated Flood Zones in the City of Silsbee

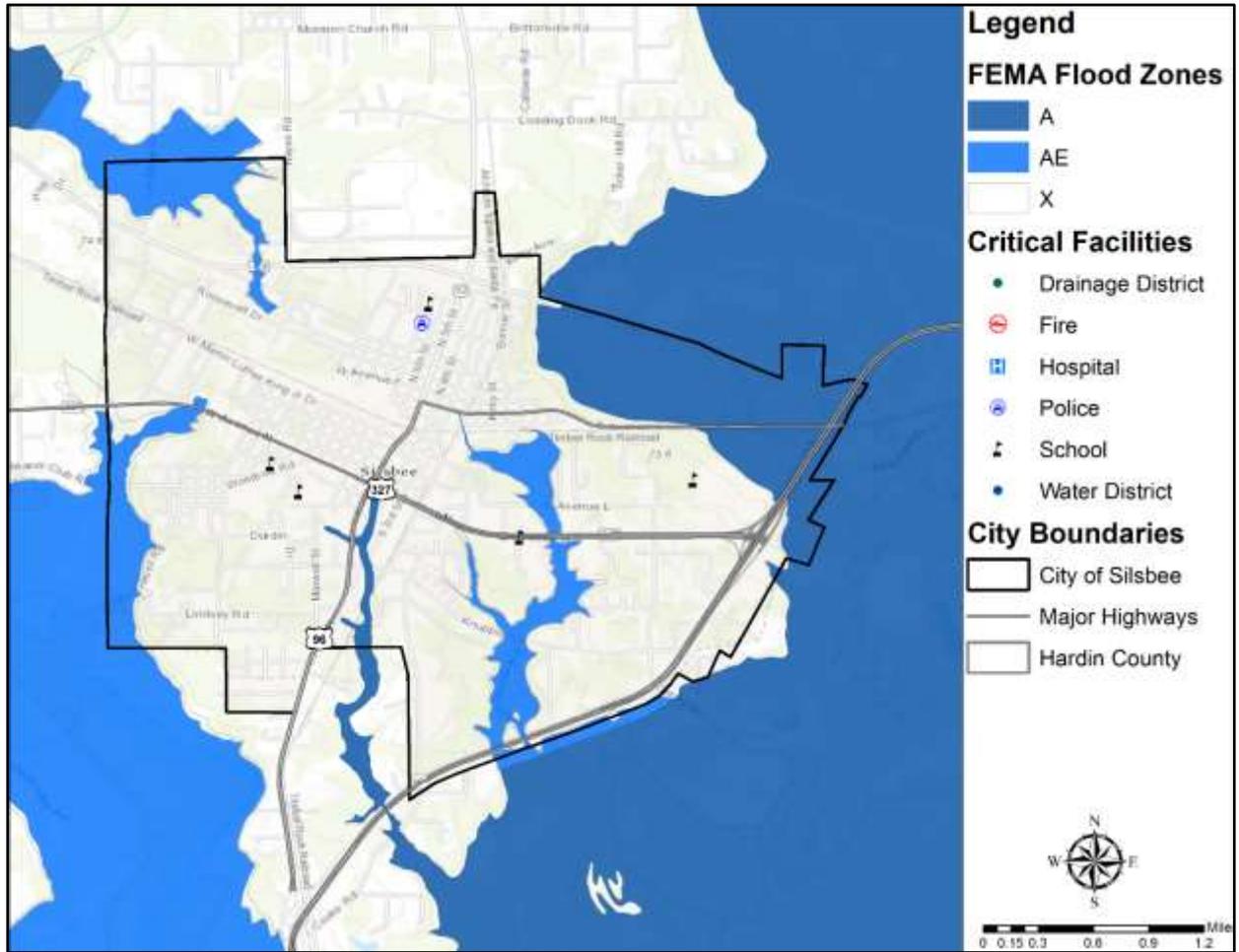
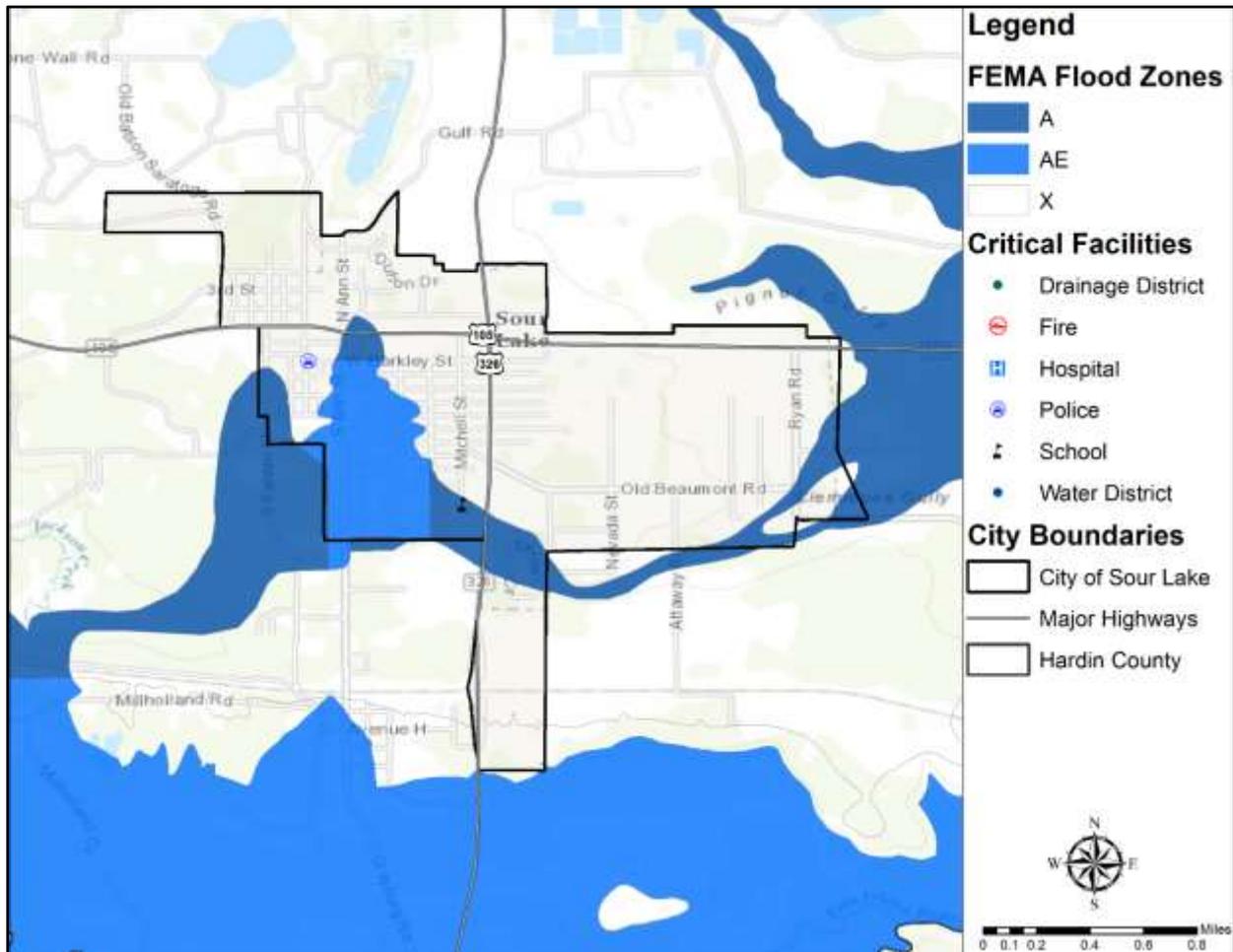


Figure 5-6. Estimated Flood Zones in the City of Sour Lake



EXTENT

The severity of a flood event is determined by a combination of several factors including: stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and degree of vegetative clearing and impervious surface. 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, location of the flood hazard area, and depths of flood waters. 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 Flood Insurance Rate Maps. Table 5-1 provides a description of FEMA flood zones and the flood impact in terms of severity or potential harm. Flood Zones A, AE, AO, and X are the hazard areas mapped in the region. Figures 5-1 through 5-6 should be read in conjunction with the extent for flooding in Tables 5-1, 5-2, and 5-3 to determine the intensity of a potential flood event.

Table 5-1. Flood Zones

INTENSITY	ZONE	DESCRIPTION
HIGH	ZONE A	Areas with a one 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 base flood elevations 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 one percent or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from one to three 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 one percent annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from one to three feet. These areas have a 26 percent chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
	ZONE A99	Areas with a one 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 base flood elevations 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.
	ZONE V	Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards associated with storm-induced waves. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood

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INTENSITY	ZONE	DESCRIPTION
		insurance purchase requirements and floodplain management standards apply.
	ZONE VE	Areas subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action. Base Flood Elevations (BFEs) derived from detailed hydraulic analyses are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.
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 one foot or with drainage areas less than one square mile; or an area protected by levees from 100-year flooding.

Zone A is interchangeably referred to as the 100-year flood, the one-percent-annual chance flood, or 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. Utility systems, such as heating, ventilation, air conditioning, fuel, electrical systems, sewage maintenance systems, and water systems, if not elevated above base flood elevation, may also be damaged.

The intensity and magnitude of a flood event is also determined by the depth of flood waters. Table 5-2 below describes the category of risk and potential magnitude of an event in correlation to water depth. The water depths depicted in Table 5-2 are an approximation based on elevation data. Table 5-3 describes the extent associated with stream gauge data provided by the United States Geological Survey (USGS).

Table 5-2. Extent Scale – Water Depth

SEVERITY	DEPTH (in feet)	DESCRIPTION
BELOW FLOOD STAGE	0 to 15	Water begins to exceed low sections of banks and the lowest sections of the floodplain.
ACTION STAGE	16 to 23	Flow is well into the floodplain, minor lowland flooding reaches low areas of the floodplain. Livestock should be moved from low lying areas.

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SEVERITY	DEPTH (in feet)	DESCRIPTION
FLOOD STAGE	24 to 28	Homes are threatened and properties downstream of river flows or in low lying areas begin to flood.
MODERATE FLOOD STAGE	29 to 32	At this stage the lowest homes downstream flood. Roads and bridges in the floodplain flood severely and are dangerous to motorists.
MAJOR FLOOD STAGE	33 and above	Major flooding approaches homes in the floodplain. Primary and secondary roads and bridges are severely flooded and very dangerous. Major flooding extends well into the floodplain, destroying property, equipment and livestock.

Table 5-3. Extent for Hardin County¹

JURISDICTION ²	ESTIMATED SEVERITY PER FLOOD EVENT	PEAK FLOOD EVENT
Hardin County	Action Stage, 16 to 23 feet	Flood Stage: Village Creek reached an overflow elevation of 28.33 feet in October 2006 near Kountze, Texas.
Hardin County	Below Flood Stage, 0 to 15 feet	Action Stage: Pine Island Bayou reached an overflow elevation of 16.18 feet in October 2006 near Sour Lake, Texas.

The range of flood intensity that the County can experience is high, or Zone A. Based on reporting from the USGS, a flood event can place the County at the extent of “Action Flood Stage” as shown in Tables 5-2 and 5-3. Based on historical occurrences, the planning area could expect to experience from 8 to 18 inches of water within a 24 hour period due to flooding.

The data described in Tables 5-1 through 5-3, together with Figures 5-1 through 5-6, and historical occurrences for the area, provides an estimated potential magnitude and severity for the County. For example the City of Sour Lake, as shown in Figure 5-6, has areas designated as Zones A and AE. Reading this figure in conjunction with Table 5-1 means the area is an area of high risk for flood.

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

² Severity is provided for jurisdictions where peak data was provided.

HISTORICAL OCCURRENCES

Historical evidence indicates that areas within the County 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 5-4 identifies historical flood events that resulted in damages, injuries, or fatalities within the Hardin County planning area. Table 5-5 provides the historical flood event summary by jurisdiction. Historical Data is provided by the Storm Prediction Center (NOAA), NCEI database for Hardin County.

Table 5-4. Historical Flood Events, 1996-2016³

JURISDICTION	DATE	TIME	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Kountze	6/24/1997	5:30 PM	0	0	\$7,418	\$0
Lumberton	1/6/1998	10:00 AM	0	0	\$14,609	\$0
Silsbee	1/13/1998	11:00 AM	0	0	\$14,609	\$0
Hardin County	10/22/2000	8:00 PM	0	0	\$27,658	\$0
Lumberton	6/7/2001	4:00 AM	0	0	\$672,309	\$0
Sour Lake	11/27/2001	8:00 AM	0	0	\$13,446	\$0
Hardin County	10/16/2006	7:00 AM	0	0	\$23,624	\$0
Kountze	10/16/2006	2:00 PM	0	0	\$3,544	\$0
Lumberton	10/16/2006	12:00 PM	0	0	\$2,362,421	\$0
Silsbee	10/18/2006	6:00 PM	0	0	\$5,906	\$0
Lumberton	2/12/2007	7:45 PM	0	0	\$57,425	\$0
Sour Lake	2/12/2007	6:00 PM	0	0	\$11,485	\$0
Hardin County	5/10/2013	1:00 PM	0	0	\$102,221	\$0
Sour Lake	3/12/2015	7:00 AM	0	0	\$2,009	\$0
Hardin County	5/18/2015	4:00 PM	0	0	\$2,009	\$0
Hardin County	5/25/2015	9:45 PM	0	0	\$5,024	\$0
Hardin County	6/17/2015	1:29 PM	0	0	\$2,009	\$0

³ Only recorded events with fatalities, injuries, and/or damages are listed, values are in 2016 dollars.

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JURISDICTION	DATE	TIME	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Hardin County	10/31/2015	2:00 PM	0	0	\$251,176	\$0
Sour Lake	10/31/2015	5:15 AM	0	0	\$2,009,409	\$0
Hardin County	3/10/2016	5:17 AM	0	0	\$150,000	\$0
Hardin County	3/10/2016	8:00 PM	0	0	\$100,000	\$0

Table 5-5. Summary of Historical Flood Events, 1996-2016⁴

JURISDICTION	Number of Events	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Hardin County	14	0	0	\$663,722	\$0
Kountze	3	0	0	\$10,962	\$0
Lumberton	4	0	0	\$3,106,764	\$0
Rose Hill Acres	0	0	0	\$0	\$0
Silsbee	2	0	0	\$20,515	\$0
Sour Lake	4	0	0	\$2,036,349	\$0
TOTAL LOSSES	27	0	0	\$5,838,313	

Based on the list of historical flood events for the Hardin County planning area (listed above), including all participating jurisdictions, 14 of the events have occurred since the 2011 Plan.

Significant Events

Flash Flood June 7, 2001 – Hardin County

Tropical Storm Allison caused minor problems along coastal sections of southeast Texas, but eventually resulted in catastrophic flood losses further inland. Wind gusts of 30 to 40 mph resulted in minor roof damage to less than ten homes along the coast in neighboring Jefferson County between the evening of June 5th and the early morning hours of June 6th. A two foot storm surge resulted in minor beach erosion and portions of Highway 82 between Sabine Pass and Port Arthur to go under water during the night high tide of June 5th to 6th. The specific flood events that occurred between June 7th and 9th were a result of the remnants of Tropical Storm Allison, as it meandered across southeast and east Texas. Southern sections of Hardin County received between six and ten inches of rain in less than six hours, resulting in almost 40 homes flooded in rural portions of the Sour Lake to Lumberton area.

⁴ Values are in 2016 dollars.

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Flood on October 16, 2006 – Hardin County

An abundance of moisture and high wind shear resulted in flash floods across southeast Texas. Two day rain totals of 12 to 18 inches resulted in long duration flooding across portions of Hardin County. The hardest hit areas were along near Village Creek near Lumberton, where many roads were flooded for almost a week and homes were cut off by high water. Approximately 25 homes near Brushy Creek had flood damage. Another 75 homes were damaged across the county. Damages were estimated at approximately \$2,000,000.

Flood on October 31, 2015 – Sour Lake/Hardin County

Deep moisture moved into Southeast Texas from the Gulf of Mexico ahead of an approaching shortwave and cold front. Heavy rain fell across portions of the area that had just received several inches less than a week before. The radar estimated a storm total of 10 to 20 inches over the week with some locations receiving almost one foot from this event alone.

Heavy rain moved into Hardin County early during the morning of the 31st. Flooding of roadways with water at least 2 feet deep was reported in Silsbee by sunrise. By mid-morning the Department of Highways reported that most roads in the county had water covering them and water rescues were ongoing according to the county police department near Silsbee and Kountze. Around 50 houses in the county were flooded. By the end of the event Reeves Elementary in Silsbee received 9.0 inches, Kountze Elementary received 9.71 inches, 11.58 inches was reported from West Hardin High School in Saratoga, and 14.25 reported at Highway 105 at Pine Island Bayou near Batson. Damages were estimated at approximately \$2,000,000.

PROBABILITY OF FUTURE EVENTS

Based on recorded historical occurrences and extent within the Hardin County planning area, flooding is highly likely and an event will likely occur within the next year.

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.

All participating jurisdictions encourage development outside of the floodplain, although there are some critical facilities, homes, and businesses already located in the floodplain. Table 5-6 includes critical facilities in the planning area that are located in the floodplain and are vulnerable to flooding.

Table 5-6. Critical Facilities in the Floodplain by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Hardin County	None
Kountze	1 School
Lumberton	Water District Facility

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JURISDICTION	CRITICAL FACILITIES
Rose Hill Acres	None
Silsbee	None
Sour Lake	Fire Station, 1 School

Historic loss estimates due to flood are presented in Table 5-7 below. Considering 27 flood events over a 21-year period, frequency is approximately one to two events every year.

Table 5-7. Potential Annualized Losses by Jurisdiction, 1996-2016⁵

JURISDICTION	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATE
Hardin County	\$663,722	\$31,606
Kountze	\$10,962	\$522
Lumberton	\$3,106,764	\$147,941
Rose Hill Acres	\$0	\$0
Silsbee	\$20,515	\$977
Sour Lake	\$2,036,349	\$96,969
Planning Area	\$5,838,313	\$278,015

The severity of a flooding event varies depending on the relative risk to citizens and structures located within each city. Table 5-8 depicts the level of impact for Hardin County and each participating city.

Table 5-8. Impact by Jurisdiction

JURISDICTION	IMPACT	DESCRIPTION
Hardin County	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the county.
Kountze	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.

⁵ Values are in 2016 dollars.

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JURISDICTION	IMPACT	DESCRIPTION
Lumberton	Minor	Any injuries and/or illnesses do not result in permanent disability. Complete shutdown of facilities and services for more than 1 week. More than 10 percent of property is destroyed or with major damage.
Rose Hill Acres	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Silsbee	Limited	Any injuries or illnesses would be treatable with first aid, with minor quality of life lost. If critical facilities are shut down it would be for 24 hours or less, and it is expected that less than 10 percent of property would be destroyed or damaged in the city.
Sour Lake	Minor	Any injuries and/or illnesses do not result in permanent disability. Complete shutdown of facilities and services for more than 1 week. More than 10 percent of property is destroyed or with major damage.

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 planning area. Impacts to the planning area can include:

- The Hardin County Airport may be damaged or inaccessible, creating delays in emergency response and supplies.
- 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 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.
- Floods can destroy or make residential structures uninhabitable, requiring shelter or relocation of residents in the aftermath of the event.

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- 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 impacted by a flood event and unable to report for duty, limiting response capabilities.
- County or City departments may be flooded, delaying response and recovery efforts for the entire community.
- Private sector entities that the County or City 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.
- Flooding may cause significant disruptions of clean water and sewer services, elevating health risks and delaying recovery efforts.
- The psycho-social 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, potential increased livestock mortality due to stress and water borne disease, and increased cost for feed.

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- Recreation activities at Village Creek State Park or along the Neches River 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.
- The Big Thicket National Preserve area may suffer significant wildlife mortality during and following a flood due to damaged or destroyed ecosystems and water contamination.

The overall extent of damages caused by floods is dependent on the extent, depth, and duration of flooding, and the velocities of flows in the flooded areas. The level of preparedness and pre-event planning done by government, 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. All of the jurisdictions located in Hardin County participate in the NFIP.

As an additional indicator of floodplain management responsibility, communities may choose to participate in FEMA's Community Rating System (CRS). This is an incentive-based program that allows communities to undertake flood mitigation activities that go beyond NFIP requirements. Currently, none of the communities in Hardin County participate in CRS.

Hardin County, Lumberton, and Sour Lake currently have adopted higher standards above the NFIP minimum such as 1 foot of freeboard for new construction and substantial Improvements of structures. Kountze, Lumberton, and Silsbee currently have adopted the minimum NFIP standards. These jurisdictions are considering adopting additional higher regulatory NFIP standards to limit floodplain development.

The flood hazard areas throughout Hardin County are subject to periodic inundation, which may result 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, of which adversely affect public safety.

These flood losses are created by the cumulative effect of obstructions in floodplains, which cause an increase in flood heights and velocities, and by the occupancy of flood hazard areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, 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 more adequately convey flood waters.

It is the purpose of Hardin County and NFIP jurisdictions participating in the Hazard Mitigation plan to continue to promote the 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

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through their local permitting, inspection, and record-keeping requirements for new and substantially developed construction. Further, the NFIP program for each of the participating jurisdictions 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, and 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, Hardin County and participating NFIP jurisdictions seek to follow these guidelines to achieve flood mitigation by:

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

NFIP COMPLIANCE AND MAINTENANCE

As mentioned, Hardin County and participating jurisdictions have developed mitigation actions that relate to either NFIP maintenance or compliance. Compliance and maintenance actions can be found in Section 19.

Flooding was identified by the majority of the communities as a high risk hazard during hazard ranking activities at the Risk Assessment Workshop. As a result, 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. County-wide, communities recognize the need and are working towards adopting higher NFIP regulatory standards to further minimize flood risk in their community. Smaller, no-growth communities that typically do not have personnel or funds to implement more stringent NFIP compliance measures are focusing on NFIP public awareness activities. This includes promoting the availability of flood insurance by placing NFIP brochures and flyers in public libraries or public meeting places.

REPETITIVE LOSS

The Severe Repetitive Loss (SRL) 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 severe repetitive loss residential structures insured under the NFIP. The Texas Water Development Board (TWDB) administers the SRL grant program for the State of Texas.

Severe Repetitive Loss properties are defined as residential properties that are:

- Covered under the NFIP and have at least four 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 two 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 two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart.⁶ Table 5-9 shows repetitive loss and severe repetitive loss properties for Hardin County and all participating jurisdictions.

Table 5-9. Repetitive Loss and Severe Repetitive Loss Properties

JURISDICTION	INSURED?	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR ⁷
Hardin County	YES	SINGLE FMLY	2	12,122.47	-
Hardin County	NO	SINGLE FMLY	3	94,595.44	PU
Hardin County	YES	SINGLE FMLY	2	23,830.43	-
Hardin County	NO	SINGLE FMLY	2	10,659.73	-
Hardin County	NO	SINGLE FMLY	3	34,405.83	-
Hardin County	NO	SINGLE FMLY	3	26,625.48	-
Hardin County	NO	SINGLE FMLY	2	73,502.81	-
Hardin County	YES	SINGLE FMLY	2	43,854.66	-
Hardin County	NO	SINGLE FMLY	2	61,083.42	-
Hardin County	NO	SINGLE FMLY	3	30,049.38	-

⁶ Source: Texas Water Development Board

⁷ In this column: “V” stands for “Validated”; “VN” stands for “Validated Nonresidential”; “VU” stand for “Validated Uninsured”; “VNU” stands for “Validated Nonresidential Uninsured”; “P” stands for “Pending”; “PU” stands for “Pending Uninsured”; and “PN” stands for “Pending Nonresidential”.

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JURISDICTION	INSURED?	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR ⁷
Hardin County	NO	SINGLE FMLY	2	19,276.72	-
Hardin County	YES	SINGLE FMLY	2	61,984.36	-
Hardin County	NO	SINGLE FMLY	2	19,575.83	-
Hardin County	NO	SINGLE FMLY	6	118,165.60	VU
Hardin County	NO	SINGLE FMLY	2	43,052.07	-
Hardin County	YES	SINGLE FMLY	3	251,722.94	-
Hardin County	YES	SINGLE FMLY	2	26,901.80	-
Hardin County	NO	SINGLE FMLY	2	20,034.10	-
Hardin County	YES	ASSMD CONDO	3	193,452.59	-
Hardin County	SDF	SINGLE FMLY	4	168,759.31	V
Hardin County	SDF	SINGLE FMLY	5	206,345.78	V
Hardin County	SDF	SINGLE FMLY	4	155,363.38	V
Hardin County	NO	SINGLE FMLY	3	153,675.92	VU
Hardin County	YES	SINGLE FMLY	2	55,934.24	-
Hardin County	NO	SINGLE FMLY	2	11,545.60	-
Hardin County	NO	SINGLE FMLY	2	74,776.40	-
Hardin County	NO	SINGLE FMLY	3	119,837.96	-
Hardin County	YES	SINGLE FMLY	2	28,654.17	-
Hardin County	NO	SINGLE FMLY	2	42,124.12	-
Hardin County	YES	SINGLE FMLY	2	57,602.77	-
Hardin County	YES	SINGLE FMLY	3	180,247.81	P
Hardin County	NO	SINGLE FMLY	2	52,233.66	-
Hardin County	SDF	OTHR-NONRES	3	63,457.43	PN
Hardin County	NO	SINGLE FMLY	2	4,498.84	-
Hardin County	NO	SINGLE FMLY	2	13,624.83	-
Hardin County	YES	SINGLE FMLY	4	33,364.75	-

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JURISDICTION	INSURED?	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR ⁷
Hardin County	YES	SINGLE FMLY	3	160,515.21	-
Hardin County	NO	SINGLE FMLY	2	110,589.71	-
Hardin County	YES	SINGLE FMLY	4	142,050.66	-
Hardin County	SDF	SINGLE FMLY	4	80,226.01	V
Hardin County	NO	OTHR-NONRES	2	32,006.81	-
Hardin County	NO	SINGLE FMLY	3	15,948.97	-
Hardin County	NO	SINGLE FMLY	5	33,443.10	VU
Hardin County	NO	SINGLE FMLY	4	32,839.73	-
Hardin County	NO	SINGLE FMLY	2	102,237.49	-
Hardin County	NO	SINGLE FMLY	10	419,670.04	VU
Hardin County	NO	SINGLE FMLY	2	45,920.18	-
Hardin County	NO	SINGLE FMLY	3	25,802.44	-
Hardin County	SDF	SINGLE FMLY	5	127,987.07	V
Hardin County	NO	SINGLE FMLY	2	5,698.09	-
Hardin County	YES	SINGLE FMLY	2	4,531.45	-
Hardin County	YES	SINGLE FMLY	4	79,278.55	-
Hardin County	YES	SINGLE FMLY	2	68,282.42	-
Hardin County	NO	ASSMD CONDO	2	42,321.79	-
Hardin County	NO	SINGLE FMLY	5	168,499.15	PU
Hardin County	YES	SINGLE FMLY	2	48,635.32	-
Hardin County	NO	SINGLE FMLY	3	37,777.49	-
Hardin County	NO	ASSMD CONDO	2	156,986.76	-
Hardin County	YES	SINGLE FMLY	3	100,865.87	-
Hardin County	YES	SINGLE FMLY	2	192,760.32	-
Hardin County	NO	SINGLE FMLY	3	10,730.14	-
Hardin County	NO	SINGLE FMLY	2	34,196.36	-

Section 5: Flood

JURISDICTION	INSURED?	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR ⁷
Hardin County	NO	SINGLE FMLY	8	56,882.42	-
Hardin County	NO	SINGLE FMLY	3	5,947.52	-
Hardin County	NO	OTHR-NONRES	2	13,731.10	-
Hardin County	NO	SINGLE FMLY	2	103,927.47	-
Hardin County	SDF	SINGLE FMLY	13	209,933.44	V
Hardin County	NO	SINGLE FMLY	4	80,446.77	-
Hardin County	NO	SINGLE FMLY	2	41,321.84	-
Hardin County	SDF	SINGLE FMLY	5	94,001.83	V
Hardin County	NO	SINGLE FMLY	2	41,886.11	-
Hardin County	NO	SINGLE FMLY	3	128,155.06	-
Hardin County	NO	SINGLE FMLY	2	17,202.44	-
Hardin County	NO	SINGLE FMLY	2	51,230.67	-
Hardin County	NO	SINGLE FMLY	2	35,190.00	-
Hardin County	NO	SINGLE FMLY	5	118,766.12	MVU
Hardin County	NO	SINGLE FMLY	2	14,475.73	-
Hardin County	NO	SINGLE FMLY	3	150,839.50	-
Hardin County	NO	SINGLE FMLY	3	206,866.23	-
Hardin County	NO	SINGLE FMLY	7	241,710.03	MVU
Hardin County	NO	SINGLE FMLY	3	28,193.50	-
Kountze	NO	OTHR-NONRES	3	49,033.48	-
Lumberton	NO	SINGLE FMLY	2	38,711.84	-
Lumberton	NO	SINGLE FMLY	2	105,720.09	-
Lumberton	YES	SINGLE FMLY	3	184,751.51	-
Lumberton	YES	SINGLE FMLY	2	9,023.92	-
Lumberton	NO	OTHR-NONRES	3	84,335.95	-
Lumberton	NO	SINGLE FMLY	6	242,477.84	VU

Section 5: Flood

JURISDICTION	INSURED?	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR ⁷
Lumberton	NO	SINGLE FMLY	2	4,193.28	-
Lumberton	SDF	OTHR-NONRES	6	77,821.15	VN
Lumberton	NO	SINGLE FMLY	3	73,677.04	-
Lumberton	NO	SINGLE FMLY	6	221,350.00	VU
Lumberton	SDF	SINGLE FMLY	17	358,463.50	V
Lumberton	YES	SINGLE FMLY	3	104,794.50	-
Lumberton	YES	SINGLE FMLY	2	89,233.58	-
Lumberton	NO	SINGLE FMLY	2	26,633.85	-
Lumberton	YES	SINGLE FMLY	3	10,793.17	-
Lumberton	SDF	SINGLE FMLY	7	113,821.93	V
Lumberton	SDF	SINGLE FMLY	6	146,151.96	V
Lumberton	YES	SINGLE FMLY	7	124,278.08	V
Lumberton	SDF	SINGLE FMLY	27	376,634.43	V
Lumberton	NO	SINGLE FMLY	4	63,738.33	-
Lumberton	YES	SINGLE FMLY	2	4,073.65	-
Lumberton	YES	SINGLE FMLY	2	39,553.92	-
Lumberton	YES	SINGLE FMLY	2	119,748.41	-
Lumberton	NO	SINGLE FMLY	4	20,649.38	-
Lumberton	NO	SINGLE FMLY	2	14,376.03	-
Lumberton	NO	SINGLE FMLY	2	51,201.99	-
Lumberton	NO	SINGLE FMLY	2	31,996.21	-
Lumberton	NO	SINGLE FMLY	2	31,716.21	-
Lumberton	NO	SINGLE FMLY	3	69,594.92	-
Lumberton	NO	SINGLE FMLY	2	4,504.84	-
Lumberton	YES	OTHR-NONRES	7	127,745.92	VN
Lumberton	YES	OTHR-NONRES	3	50,327.75	-

Section 5: Flood

JURISDICTION	INSURED?	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR ⁷
Lumberton	YES	SINGLE FMLY	4	159,474.04	-
Lumberton	NO	SINGLE FMLY	2	2,703.71	-
Lumberton	YES	SINGLE FMLY	2	75,081.90	-
Lumberton	YES	SINGLE FMLY	2	84,974.32	-
Lumberton	YES	SINGLE FMLY	2	244,258.65	-
Lumberton	NO	SINGLE FMLY	2	50,699.54	-
Lumberton	YES	SINGLE FMLY	6	42,164.71	-
Lumberton	YES	SINGLE FMLY	3	17,650.57	-
Lumberton	YES	SINGLE FMLY	3	68,775.19	-
Lumberton	NO	SINGLE FMLY	3	101,374.50	-
Lumberton	YES	SINGLE FMLY	2	37,550.23	-
Lumberton	NO	SINGLE FMLY	11	164,537.16	VU
Lumberton	YES	SINGLE FMLY	2	22,338.01	-
Lumberton	NO	SINGLE FMLY	9	271,060.42	MVU
Lumberton	NO	SINGLE FMLY	4	77,316.93	-
Lumberton	NO	SINGLE FMLY	8	113,267.66	MVU
Lumberton	NO	SINGLE FMLY	2	43,184.90	-
Lumberton	NO	SINGLE FMLY	4	50,570.13	MVU
Rose Hill Acres	NO	SINGLE FMLY	4	119,631.73	-
Rose Hill Acres	NO	SINGLE FMLY	3	66,210.34	-
Rose Hill Acres	SDF	SINGLE FMLY	13	312,688.69	V
Rose Hill Acres	NO	SINGLE FMLY	5	75,058.52	VU
Rose Hill Acres	NO	SINGLE FMLY	2	22,868.93	-
Rose Hill Acres	NO	SINGLE FMLY	3	76,415.62	PU
Rose Hill Acres	SDF	SINGLE FMLY	6	124,668.07	V
Rose Hill Acres	YES	SINGLE FMLY	2	56,164.49	-

Section 5: Flood

JURISDICTION	INSURED?	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR ⁷
Rose Hill Acres	SDF	SINGLE FMLY	5	106,974.06	V
Rose Hill Acres	SDF	SINGLE FMLY	6	144,429.91	V
Rose Hill Acres	SDF	SINGLE FMLY	6	86,852.23	V
Rose Hill Acres	SDF	SINGLE FMLY	9	340,577.60	V
Rose Hill Acres	NO	SINGLE FMLY	2	84,652.50	-
Rose Hill Acres	NO	SINGLE FMLY	3	69,320.90	-
Rose Hill Acres	YES	SINGLE FMLY	3	31,691.97	-
Rose Hill Acres	NO	SINGLE FMLY	3	136,455.13	-
Rose Hill Acres	NO	SINGLE FMLY	2	33,498.43	-
Rose Hill Acres	NO	SINGLE FMLY	6	87,848.79	-
Rose Hill Acres	NO	SINGLE FMLY	3	166,233.59	-
Rose Hill Acres	NO	SINGLE FMLY	11	236,537.38	MVU
Rose Hill Acres	NO	SINGLE FMLY	3	99,743.05	-
Rose Hill Acres	NO	SINGLE FMLY	2	11,278.79	-
Silsbee	NO	SINGLE FMLY	2	10,481.07	-
Silsbee	YES	SINGLE FMLY	3	53,257.95	-
Silsbee	NO	SINGLE FMLY	4	16,315.51	-
Silsbee	YES	SINGLE FMLY	4	158,051.43	V
Silsbee	YES	SINGLE FMLY	3	109,763.26	-
Silsbee	YES	SINGLE FMLY	3	54,503.07	-
Silsbee	NO	SINGLE FMLY	4	23,700.55	-
Silsbee	YES	SINGLE FMLY	3	52,986.07	-
Silsbee	YES	SINGLE FMLY	3	50,067.74	-
Silsbee	YES	SINGLE FMLY	2	46,382.78	-
Silsbee	NO	SINGLE FMLY	2	3,247.08	-
Silsbee	NO	SINGLE FMLY	2	3,845.72	-

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JURISDICTION	INSURED?	BUILDING TYPE	LOSSES	TOTAL PAID	SRL INDICATOR ⁷
Silsbee	NO	SINGLE FMLY	3	29,397.92	-
Sour Lake	NO	SINGLE FMLY	2	39,728.69	-
Sour Lake	NO	SINGLE FMLY	2	15,127.89	PU
Sour Lake	YES	SINGLE FMLY	2	86,624.04	-
Sour Lake	NO	SINGLE FMLY	3	161,357.55	-
Sour Lake	NO	SINGLE FMLY	5	263,500.23	VU
Sour Lake	SDF	SINGLE FMLY	9	315,235.48	V
Sour Lake	NO	SINGLE FMLY	7	286,623.02	VU
Sour Lake	NO	SINGLE FMLY	2	10,778.76	-
Sour Lake	NO	SINGLE FMLY	3	42,714.45	-
Sour Lake	NO	ASSMD CONDO	7	47,437.77	-
Sour Lake	NO	OTHR-NONRES	3	57,227.25	-
Sour Lake	NO	SINGLE FMLY	4	234,576.06	MVU
Sour Lake	NO	SINGLE FMLY	5	235,630.19	MVU

SECTION 6: LIGHTNING

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- Probability of Future Events 3
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HAZARD DESCRIPTION

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

According to FEMA, an average of 300 people are injured and 80 people are killed in the United States each year by lightning. Direct lightning strikes also have the ability to cause significant damage to buildings, critical facilities, and infrastructure. 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.

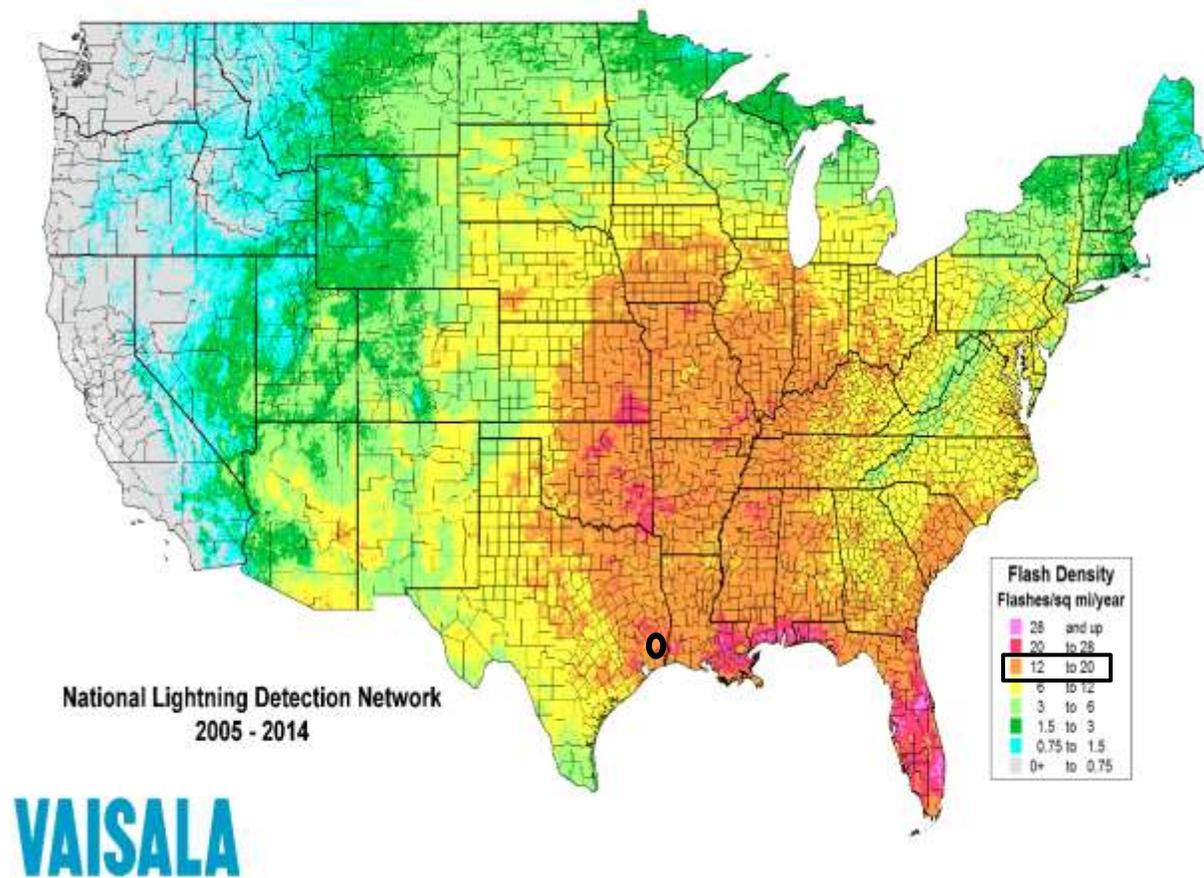
LOCATION

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

EXTENT

The planning area considers a flash density of less than two to be a minor severity and a flash density of three and greater to be a major severity. Any lightning strike that causes death or property damage is considered a major severity. The Vaisala’s U.S. National Lightning Detection Network lightning flash density map (Figure 6-1) shows a range of 12 to 20 lightning flashes per square mile per year for the Hardin County planning area.

Figure 6-1. Lightning Flash Density, 2005-2014



HISTORICAL OCCURRENCES

Table 6-1 depicts historical occurrences of lightning for the Hardin County planning area, including all participating jurisdictions, with associated damages according to the National Centers for Environmental Information (NCEI) data. Since January 1996, only one recorded lightning event is known to have impacted Hardin County, based upon NCEI records. It is likely additional 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. The NCEI is the largest archive available for climate data; however, it is important to note that the only incidents factored into this risk assessment are those that are reported to the NCEI for the Hardin County planning area. Damage estimates provided in a table for losses have been modified to reflect the damage in 2016 dollars.

Section 6: Lightning

Table 6-1. Historical Lightning Events, With Reported Damages, 1996-2016¹

JURISDICTION	DATE	TIME	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Sour Lake	11/12/2008	2:30 AM	0	0	\$82,952	\$0
TOTALS			0	0	\$82,952	\$0

Based on the historical lightning events data for the Hardin County planning area (listed above), including all participating jurisdictions, the only recorded event occurred prior to the 2011 Plan.

Significant Past Events

November 12, 2008 – Sour Lake

A low pressure area tracked across east Texas and western Louisiana, creating up to 8 inches of rainfall. The storm event produced some lightning throughout the storm's path. Lightning struck and destroyed a church educational building in Sour Lake.

PROBABILITY OF FUTURE EVENTS

Based on historical records and input from the planning team the probability of occurrence for future lightning events in the Hardin County planning area is considered occasional, or an event probable in the next five years. The Hardin County planning team stated that lightning occurs regularly in the area. According to NOAA, Hardin County is located in an area of the country that experiences 12-20 lightning flashes per square mile per year (approximately 10,776 to 17,960 flashes per year). Given this estimated frequency of occurrence, it can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the planning area.

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 damages depending on the strike location. Due to the randomness of these events, all existing and future structures and facilities in the Hardin County planning area could potentially be impacted and remain vulnerable to possible injury and property loss from lightning strikes. The Hardin County planning area has had only one reported lightning event, however all participating jurisdictions are vulnerable and could be impacted by lightning.

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 Hardin County is 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

¹ Damage values are in 2016 dollars.

Section 6: Lightning

when people are outdoors and/or participating in some form of recreation. Population located outdoors is considered at risk and more vulnerable to a lightning strike compared to being inside a structure. Moving to a lower risk location will decrease a person’s vulnerability.

The entire general building stock and all infrastructure of Hardin County 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. Agricultural losses can be extensive due to lightning and resulting fires.

The following critical facilities would be vulnerable to lightning events in each participating jurisdiction:

Table 6-2. Critical Facilities by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Hardin County	4 Fire Stations, 3 Schools
Kountze	Fire Station, Sheriff's Department, Police Station, 4 Schools
Lumberton	Fire Station, Police Station, Water District Facility, Drainage District Facility, Hospital, 3 Schools
Rose Hill Acres	None
Silsbee	Fire Station, Police Station, Water District Facility, 6 Schools
Sour Lake	Fire Station, Police Station, Water District Facility, 2 Schools

Impact of lightning experienced in the Hardin County planning area has resulted in no injuries or fatalities. Impact of lightning events experienced in the Hardin County planning area would be “Limited,” and injuries and illnesses would be treatable with first aid. The quality of life lost would be minor, and facilities would be shut down for 24 hours or less. Overall, the average loss estimate for Hardin County, including all participating jurisdictions, (in 2016 dollars) is \$82,952, having an approximate annual loss estimate of \$3,950 (Table 6-3).

Table 6-3. Potential Annualized Losses for Hardin County²

JURISDICTION	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATE
Hardin County	\$0	\$0
Kountze	\$0	\$0
Lumberton	\$0	\$0
Rose Hill Acres	\$0	\$0
Silsbee	\$0	\$0

² Damage values are in 2016 dollars.

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JURISDICTION	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATE
Sour Lake	\$82,952	\$3,950
Planning Area	\$82,952	\$3,950

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. Impacts to the planning area can include:

- 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.
- The Big Thicket National Preserve and Village Creek State Park may see an elevated risk of wildfire during lightning events.
- Residents and visitors engaged in outdoor recreational activities along Neches River may be at greater risk during lightning events.
- Emergency operations and services may be significantly impacted due to power outages and/or loss of communications.
- City or county 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 damages 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 county, communities, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any lightning event.

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HAZARD DESCRIPTION

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

Hurricanes often begin as tropical depressions that intensify into tropical storms when maximum sustained winds increase to between 35 – 64 knots (39 – 73 mph). At these wind speeds, the storm becomes more organized and circular in shape and begins to resemble a hurricane. Tropical storms resulting in high winds and heavy rainfall can be equally problematic without ever becoming a hurricane and can be dangerous to people and property, resulting in high winds and heavy rainfall, as Tropical Storm



Frances did for southeast Texas in September 1998. Once sustained winds reach or exceed 74 mph, the storm becomes a hurricane. The intensity of a land falling hurricane is expressed in categories relating wind speeds to potential damage. Tropical storm-force winds are strong enough to be dangerous to those caught in them. For this reason, emergency managers plan to have evacuations completed and personnel sheltered before winds of tropical storm-force arrive, which precedes the arrival of hurricane-force winds.

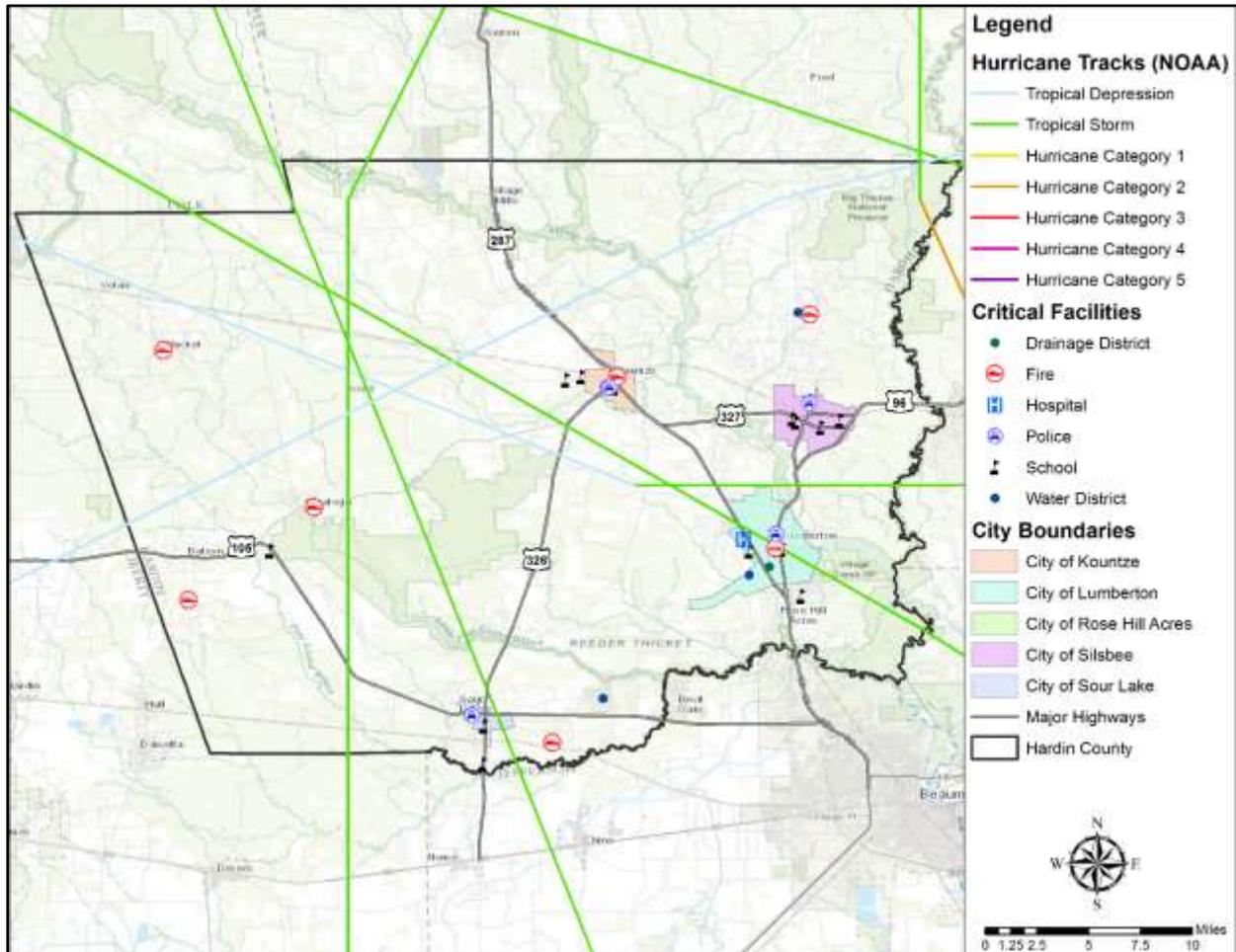
LOCATION

The location of Hardin County near the coast makes the planning area vulnerable to threats directly and indirectly related to a hurricane event, such as high-force winds and flooding. While the county is not located along the Gulf coast, the southeast county line is located approximately 30 miles from the Gulf of Mexico coast, making it susceptible to hurricanes. Hurricanes and/or tropical storms can impact Hardin County from June to

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November, the official Atlantic U.S. hurricane season. The Hardin County planning area is in a moderate to high risk area for hurricane wind speeds up to 155 miles per hour (mph).

Figure 7-1. Location of Historic Hurricane Tracks



EXTENT

As a hurricane develops, the barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane.

Hurricanes are categorized according to the strength and intensity of their winds using the Saffir-Simpson Hurricane Scale (Table 7-1). A Category 1 storm has the lowest wind speeds, while a Category 5 hurricane has

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the highest. However, a lower category storm can inflict greater damage than higher category storms depending on where they strike, the amount of storm surge, other weather they interact with, and how slow they move.

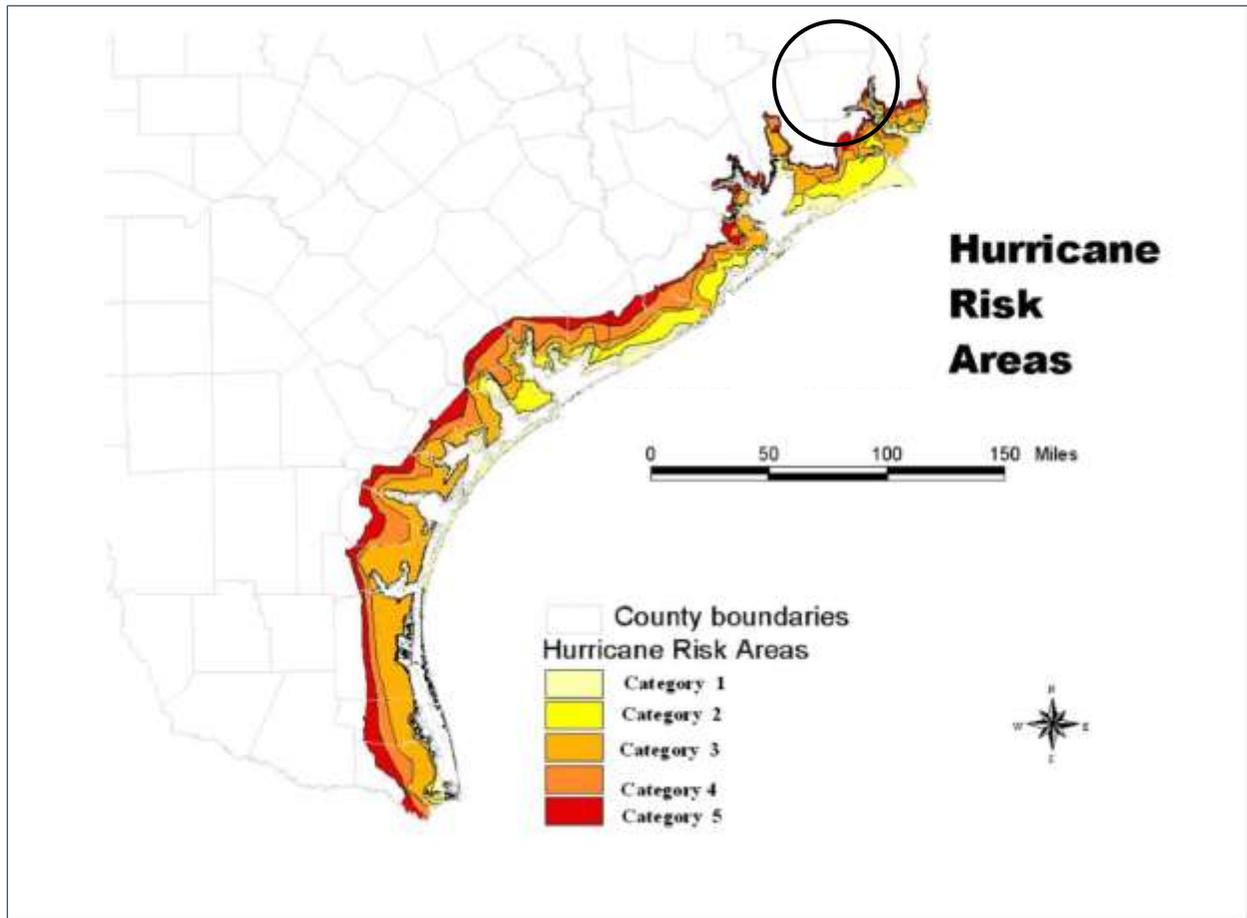
Table 7-1. Extent Scale for Hurricanes¹

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

Based on the historical storm tracks for hurricanes and tropical storms, as well as the location of Hardin County, the average extent to be mitigated for is a Category 4 storm. The Hardin County planning area has experienced wind speeds up to 155 mph, therefore a Category 4 should be mitigated in the event of a hurricane. Figure 7-2 displays the location of hurricane risk by storm category along the Gulf Coast.

¹ Source: National Hurricane Center

Figure 7-2. Location of Hurricane Risk along the Texas Coast



HISTORICAL OCCURRENCES

Previous occurrences include storms that had a direct path through the Hardin County study area. Table 7-2 below lists the storms that have impacted the Hardin County planning area during the years of 1996-2016. Historical hurricane data for the Cities of Kountze, Lumberton, Silsbee, and Sour Lake and the Town of Rose Hill Acres are provided on a County-wide basis per the NCEI and NOAA databases.

Table 7-2. Historical Hurricane/Tropical Storm Events, 1996-2016²

YEAR	STORM NAME	CATEGORY	PROPERTY DAMAGE	CROP DAMAGE
2005	Rita	Category 3	\$61,254,736	\$0
2008	Ike	Category 2	\$77,789,300	\$0
TOTALS			\$139,044,036	\$0

² Values are in 2016 dollars.

Section 7: Hurricane

Based on the list of historical hurricane events for the Hardin County planning area (listed above), including all participating jurisdictions, none of the events have occurred since the 2011 Plan.

Significant Past Events

Hurricane Rita, September 18-26, 2005 – Hardin County

Hurricane Rita made landfall just east of the Texas - Louisiana border. The hurricane moved northwest and across southeast Texas in the morning hours of September 24th as a dangerous Category 3 hurricane with sustained winds of 120 mph. Along the coast of neighboring Jefferson County, storm surges near 10 feet occurred near Sabine Pass where over 90 percent of the homes were severely damaged or destroyed. The storm surge backed up the Sabine River and flooded a small section of downtown neighboring Orange with around 4 to 5 feet of storm surge. Winds blew over 100 mph across the entire region, snapping and uprooting trees, and damaged over 125,000 homes and businesses. Some homes in neighboring Jasper and Newton counties did not have electricity restored for over six weeks. Seven fatalities were attributed to the storm, however none of the deaths occurred in Hardin County.

Hurricane Ike, September 12-13, 2008 – Hardin County

Hurricane Ike caused wind damage and significant storm surge flooding across southeast Texas. Ike made landfall near Galveston, Texas, early in the morning on September 13th as a strong Category 2 hurricane. Sustained hurricane force winds were confined to Jefferson County, Hardin County, western Orange County, southwestern Jasper County, and western Tyler County. The highest recorded winds were at Southeast Texas Regional Airport with sustained winds of 61 knots (70 mph) and gusts of 83 knots (96 mph). Maximum storm total rainfall was between 5 and 8 inches across Jefferson, Hardin, Orange, and southern Jasper counties. Hurricane Ike caused Category 1 wind damage across Hardin County. Many trees and power lines were downed, some landing on homes and businesses.

PROBABILITY OF FUTURE EVENTS

Based on historical occurrences of significant hurricane events, the probability of future events is unlikely, with a frequency of occurrence of one event every ten years for the Hardin County planning area.

VULNERABILITY AND IMPACT

Hurricanes and Tropical Storms can cause major damage to large areas; hence all existing buildings, facilities, and populations are equally exposed and vulnerable to this hazard and could potentially be impacted. The Hardin County planning area features multiple mobile or manufactured home parks throughout the planning area and all participating jurisdictions. These parks are typically more vulnerable to hurricane events than typical site built structures. In addition, manufactured homes are located sporadically throughout the planning area, including all jurisdictions. These homes would also be more vulnerable. The US Census data indicates a total of 6,022 manufactured homes located in the Hardin County planning area including all participating jurisdictions (Table 7-3). In addition, 42% (approximately 9,772 structures) of the single family residential (SFR)

Section 7: Hurricane

structures in the Hardin County planning area were built before 1980.³ These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damages during significant events.

Table 7-3. Structures at Greater Risk by Jurisdiction

JURISDICTION	MANUFACTURED HOMES	SFR STRUCTURES BUILT BEFORE 1980
Kountze	234	480
Lumberton	931	1,642
Rose Hill Acres	7	118
Silsbee	310	1,981
Sour Lake	171	501
Hardin County⁴	6,022	9,772

The following critical facilities would be vulnerable to hurricane events in each participating jurisdiction, respectively.

Table 7-4. Critical Facilities by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Hardin County	4 Fire Stations, 3 Schools
Kountze	Fire Station, Sheriff's Department, Police Station, 4 Schools
Lumberton	Fire Station, Police Station, Water District Facility, Drainage District Facility, Hospital, 3 Schools
Rose Hill Acres	None
Silsbee	Fire Station, Police Station, Water District Facility, 6 Schools
Sour Lake	Fire Station, Police Station, Water District Facility, 2 Schools

Table 7-5 shows impact or loss estimation for storms impacting the county. Damages are reported on a countywide basis and are not available for each participating jurisdiction. Annual loss estimates were based on the 21 year reporting period for such damages (Table 7-4). The average annual loss estimate for Hardin County is approximately \$6.6 million.

³ Source: US Census Bureau data estimates for 2015.

⁴ County totals includes all participating jurisdictions and unincorporated areas.

Table 7-5. Summary of Hurricane Events and Potential Annualized Losses, 1996-2016⁵

JURISDICTION	NUMBER OF EVENTS	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATE
Hardin County	2	\$139,044,036	\$6,621,145

The potential severity of impact from a hurricane for the Hardin County planning area is classified as major, meaning injuries and/or illnesses could result in permanent disability, complete shutdown of critical facilities and services for two weeks or more, and more than 25 percent of property would be destroyed or have major damage.

Assessment of Impacts

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

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Driving conditions in all jurisdictions may be dangerous during a hurricane event, especially over elevated bridges, elevating the risk of injury and accidents during evacuations if not timed properly.
- Emergency evacuations may be necessary prior to a hurricane landfall, requiring emergency responders, evacuation routing, and temporary shelters.
- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- During hurricane landfall, first responders may be prevented from responding to calls as the winds may reach a speed in which their vehicles and equipment are unsafe to operate.
- Hurricane events often result in widespread power outages increasing the risk to more vulnerable portions of the population who rely on power for health and/or life safety.
- Extended power outage often results in an increase in structure fires and carbon monoxide poisoning as individuals attempt to cook or heat their homes with alternate, unsafe cooking or heating devices, such as grills.
- Extreme hurricane events may rupture gas lines and down trees and power lines, increasing the risk of structure fires during and after a storm event.

⁵ Values are in 2016 dollars.

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- Extreme hurricane events may lead to prolonged evacuations during search and rescue, and immediate recovery efforts requiring additional emergency personnel and resources to prevent entry, protect citizens, and protect property.
- First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications.
- Critical staff may be unable to report for duty, limiting response capabilities.
- City or county departments may be damaged, delaying response and recovery efforts for the entire community.
- Private sector entities that the city 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.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long term loss in revenue.
- Some businesses not directly damaged by the hurricane may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to hurricane damage.
- Large scale hurricanes can have significant economic impact on the affected area, as it must now fund expenses such as infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damages without a backup power source.

The economic and financial impacts of a hurricane 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 county, communities, local businesses, and citizens will also contribute to the overall economic and financial conditions in the aftermath of any hurricane event.

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HAZARD DESCRIPTION

Extreme heat is the condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period. Extreme heat during the summer months is a common occurrence throughout the State of Texas, and Hardin County is no exception. Severe, excessive summer heat is characterized by a combination of exceptionally high temperatures and humidity. When these conditions persist over a period of time, it is defined as a heat wave. Hardin County and all participating jurisdictions typically experience extended heat waves.



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 severe summer heat include: heat cramps, sunburn, dehydration, fatigue, heat exhaustion, and even heat stroke. The most vulnerable population to heat casualties are children, 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.

LOCATION

Though no deaths from extreme heat have been recorded in Hardin County, there have been heat related deaths reported in neighboring counties including Jefferson and Liberty County. There is no specific geographic scope to the extreme heat hazard. Extreme heat could occur anywhere within the Hardin County planning area.

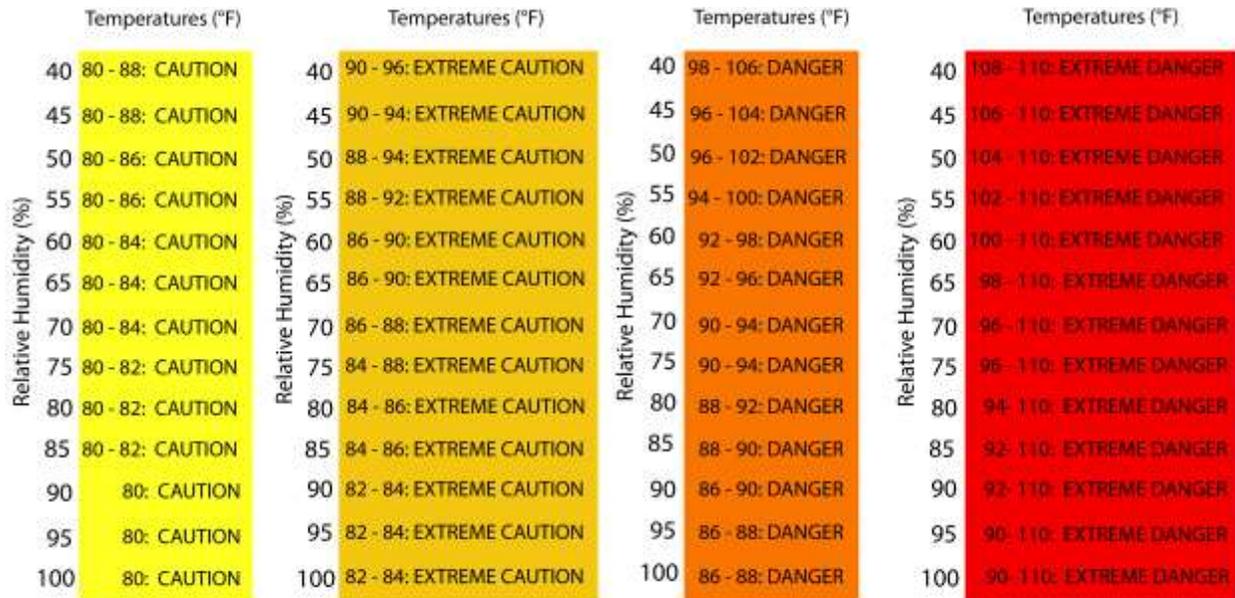
EXTENT

The magnitude or intensity of an extreme heat event is measured according to temperature in relation to the percentage of humidity. According to the National Oceanic Atmospheric Administration (NOAA), this

Section 8: Extreme Heat

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 Summer Heat¹



Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

The Extent Scale 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.

¹ Source: NOAA

Section 8: Extreme Heat

Table 8-1. Heat Index & Warnings

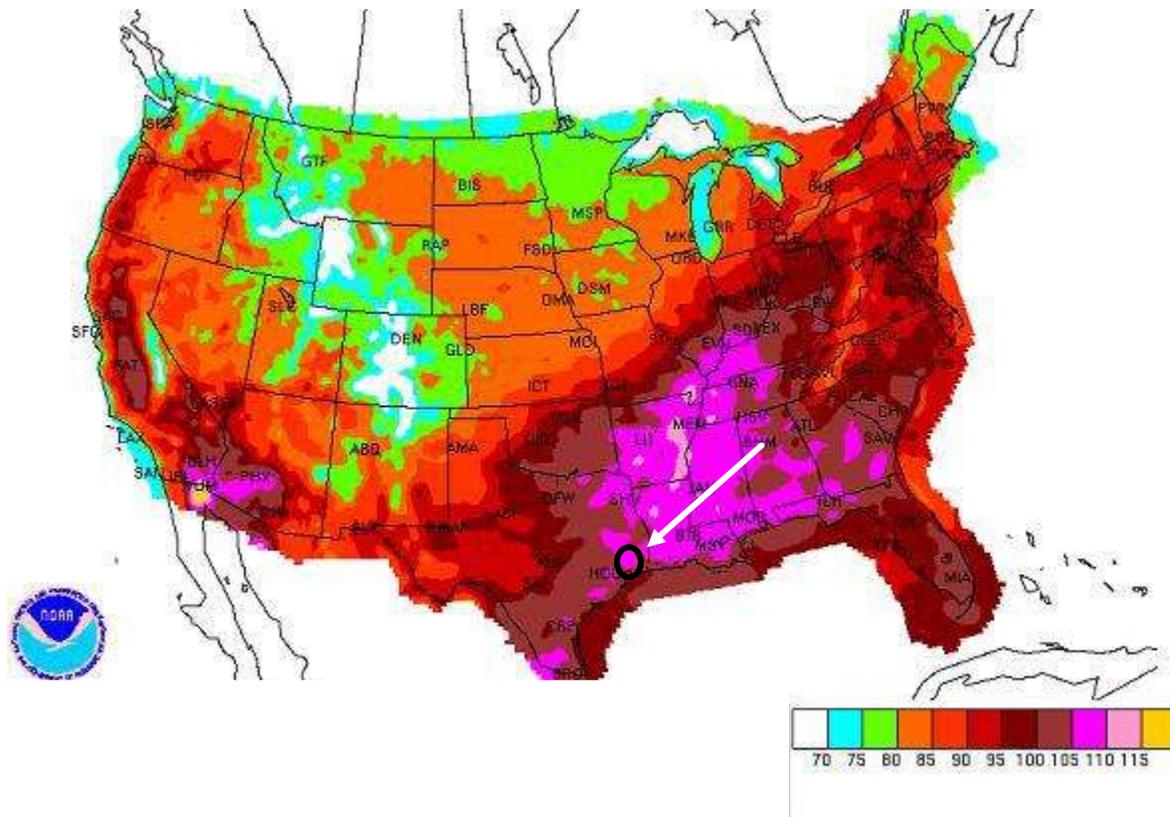
CATEGORY	HEAT INDEX	POSSIBLE HEAT DISORDERS	WARNING TYPE
Extreme Danger	125°F and higher	Heat stroke or sun stroke likely.	A heat advisory will be issued to warn that the Heat Index may exceed 105°F.
Danger	103 – 124°F	Sunstroke, muscle cramps, and/or heat exhaustion are likely. Heatstroke possible with prolonged exposure and/or physical activity.	
Extreme Caution	90 – 103°F	Sunstroke, muscle cramps, and/or heat exhaustion 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.
Caution	80 – 90°F	Fatigue is possible with prolonged exposure and/or physical activity.	

Hardin County’s terrain is relatively level terrain with limited elevation variations located in Southeast Texas. The county is largely covered by forest land of the Big Thicket.

Due to its geography, and warm, sunny, humid subtropical climate, the Hardin 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. Also at risk are those working or remaining outdoors.

Figure 8-2 displays the daily maximum heat index as derived from NOAA based on data compiled from 1838 to 2015. The black circle shows the Hardin County area. The primary pink and partial brown colors indicate a daily maximum heat index of 100-110 degrees F. The Hardin County planning area could experience extreme heat from 90° to 110° and should mitigate to the extent of “danger,” which can include sunstroke, muscle cramps, heat exhaustion, and potential heatstroke with prolonged exposure.

Figure 8-2. Average Daily Maximum Heat Index Days²



HISTORICAL OCCURRENCES

Every summer, the hazard of heat-related illness becomes a significant public health issue throughout much of the US. Mortality from all causes increases during heat waves, and excessive heat is an important contributing factor to deaths from other causes, particularly among the elderly. Preliminary data suggest that by August 21, 2009, record high summer temperatures in Texas resulted in more than 120 heat-related deaths statewide. Table 8-2 depicts historical occurrences of mortality from heat from 1994 to 2004 from the Texas Department of State Health Services and 2005 to 2016 from the NCEI database.

Table 8-2. Extreme Heat Related Deaths in Texas

YEAR	DEATHS
1994	1
1995	12
1996	10

² Source: NRDC and the black circle indicates the Hardin County planning area.

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YEAR	DEATHS
1997	2
1998	66
1999	22
2000	71
2001	20
2002	1
2003	0
2004	3
2005	49
2006	2
2007	2
2008	7
2009	6
2010	4
2011	20
2012	2
2013	1
2014	0
2015	5
2016	1

Because the Texas Department of State Health Services reports on total events statewide, previous occurrences for extreme heat are derived from the NCEI database. According to heat related incidents located solely within Hardin County, there is one heat wave³ on record for the County (Table 8-3). 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 extreme heat data for the Cities of Kountze, Lumberton, Silsbee, and Sour Lake and the Town of Rose Hill Acres area provided on a County-wide

³ Even though the County experiences heat waves each summer, NCEI data only records events reported. Based on reports, only one event is on record.

Section 8: Extreme Heat

bases per the NCEI database. Only extreme heat events that have been reported have been factored into this Risk Assessment. It is likely additional extreme heat occurrences have gone unreported before and during the recording period.

Table 8-3. Historical Extreme Heat Events, 1996-2016⁴

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Hardin County	8/29/2000	0	0	\$0	\$0
TOTALS		0	0	\$0	\$0

Based on the list of historical extreme heat events for the Hardin County planning area (listed above), including all participating jurisdictions, no events have occurred since the 2011 Plan.

PROBABILITY OF FUTURE EVENTS

According to historical records, the Hardin County planning area has experienced one event in a twenty-one year reporting period. This provides a frequency of occurrence of one event every ten years. This frequency supports an unlikely probability of future events.

VULNERABILITY AND IMPACT

There is no defined geographic boundary for extreme heat events. While all of Hardin County 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.

Extreme temperatures do however 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 heat exhaustion or a lack of adequate air-conditioning. The most vulnerable population to heat casualties are 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. The very young are also vulnerable as they may not display early warning signs of heat exhaustion or dehydration.

In the Hardin County planning area, the population over the age of 65 exceeds 14% of the total population, and children under the age of 5 exceed 6% or an estimated total of 11,797⁵ potentially vulnerable residents based on age (Table 8-4).

⁴ Values are in 2016 dollars.

⁵ US Census Bureau 2015 data for Hardin County.

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Table 8-4. Populations at Greater Risk by Jurisdiction

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5
Kountze	296	151
Lumberton	1,781	843
Rose Hill Acres	98	21
Silsbee	1,275	422
Sour Lake	303	84
Hardin County⁶	8,190	3,607

Another segment of the population at risk are those whose jobs consist of strenuous labor outdoors. The Harding County planning area is more than 85 percent forested with timber providing the most income.⁷ Livestock and crops (beef cattle, hay, blueberries, bees, rice, and timber) can become stressed, decreasing in quality or in production, during times of extreme heat. Extreme 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. Only minor property damage would result. The potential impact of excessive summer heat is considered “Limited” as injuries and/or illnesses would be minor and treatable with first aid.

In terms of vulnerability to structures, the impact from extreme heat would be 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. Less than ten percent of residential and commercial property could be damaged if extreme heat events lead to structure fires.

The potential impact of extreme heat for the Hardin County planning area, including all participating jurisdictions, can be considered “Limited,” resulting in few injuries and minimal disruption to the quality of life. Based on historical records over a 21-year period, annualized losses for the entire Hardin County planning area are negligible.

⁶ County totals includes all participating jurisdictions and unincorporated areas.

⁷ <http://texasalmanac.com/topics/government/hardin-county>

Assessment of Impacts

The greatest risk from extreme heat is to public health and safety. Potential impacts the community may include:

- Vulnerable populations, particularly the elderly and infants, 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.
- Vehicles 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.
- Tourism and recreational activities predominant in the Big Thicket National Preserve and Village Creek State Park areas may be negatively impacted during extreme heat events, reducing seasonal revenue.
- Food suppliers can anticipate an increase in food costs due to increases in production costs and crop and livestock losses.
- Fisheries may be negatively impacted by extreme heat, suffering damage to fish habitats (either natural or man-made) and a loss of fish and/or other aquatic organisms due to decreased water flows or availability.
- Negatively impacted water suppliers may face increased costs resulting from the transport water or develop supplemental water resources.
- Outdoor activities may see an increase in 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 jurisdiction, local businesses, and citizens will impact the overall economic and financial conditions before, during, and after an extreme heat event.

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HAZARD DESCRIPTION



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

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 Hardin County planning area is equally at risk to the hazard of hail.

EXTENT

The National Weather Service (NWS) classifies a storm as “severe” if there is hail three-quarters of an inch in diameter (approximately the size of a penny) or greater, based on radar intensity or as seen by observers. The intensity category of a hailstorm depends on hail size and the potential damage it could cause, as depicted in the National Centers for Environmental Information (NCEI) Intensity Scale in Table 9-1.

Table 9-1. Hail Intensity and Magnitude¹

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

The intensity scale in Table 9-1 ranges from H0 to H10, with increments of intensity or damage potential in relation to hail size (distribution and maximum), texture, fall speed, speed of storm translation, and strength of the accompanying wind. Based on available data regarding the previous occurrences for the area, the Hardin County planning area may experience hailstorms ranging from an H0 to an H5. The County can mitigate a storm from low risk or hard hail to a serious hailstorm with half dollar size hail that leads to widespread roof and glass damage and could cause serious injuries.

HISTORICAL OCCURRENCES

Historical evidence shown in Figure 9-1 demonstrates that the planning area is vulnerable to hail events overall, which typically result from severe thunderstorm activity. Historical events with reported damages, injuries, or fatalities are shown in Table 9-2. A total of 47 reported historical hail events impacted Hardin County between 1996 and September 2016 (Summary Table 9-3). These events were reported to NCEI and NOAA databases and may not represent all hail events to have occurred during the past 21 years. Only those events for Hardin County with latitude and longitude available were plotted (Figure 9-1).

¹ NCEI Intensity Scale, based on the TORRO Hailstorm Intensity Scale.

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Figure 9-1. Spatial Historical Hail Events, 1996-2016

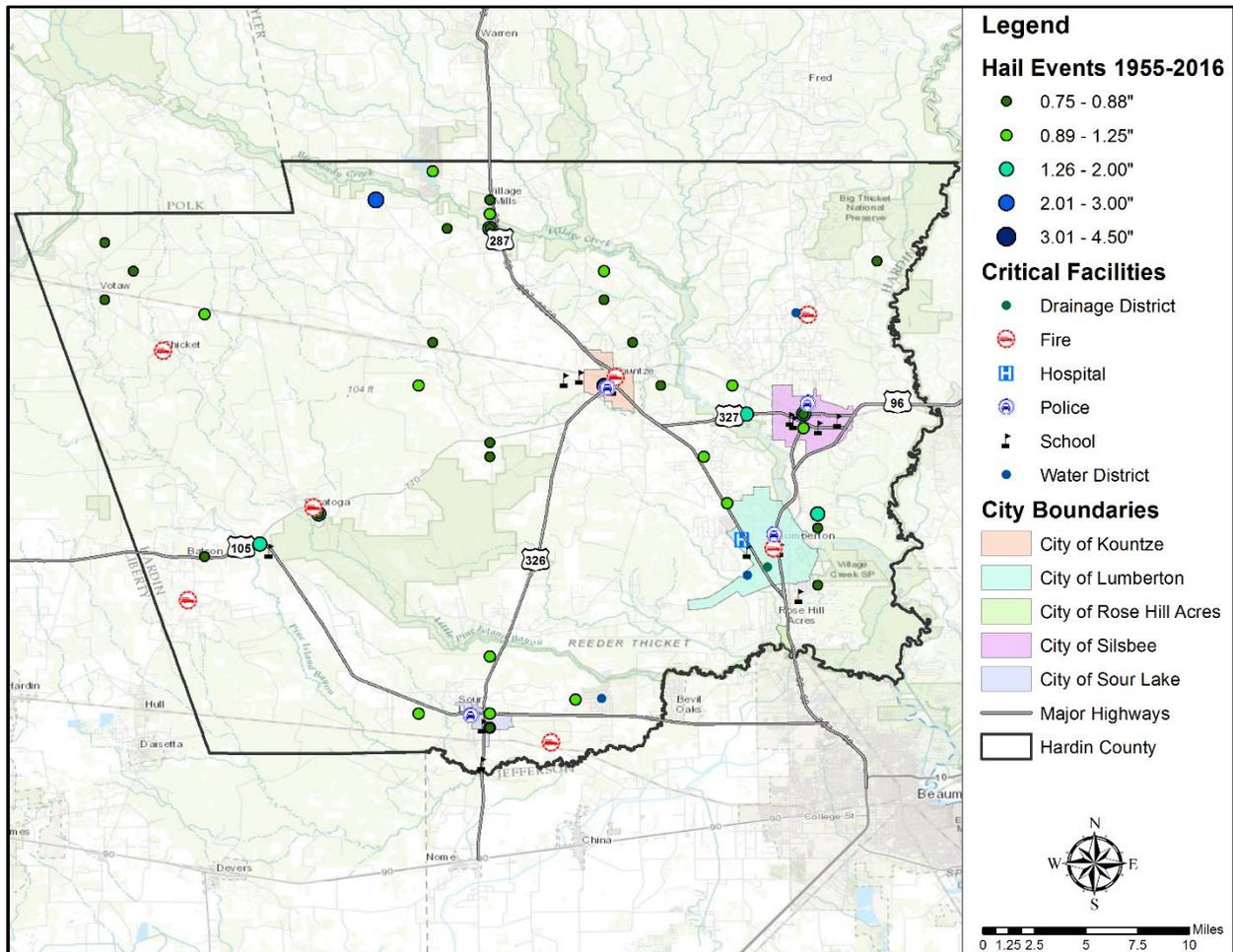


Table 9-2. Historical Hail Events, 1996-2016²

JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Lumberton	4/23/1995	11:58 PM	1.75	0	0	\$0	\$0
Hardin County	11/24/1996	12:44 PM	0.75	0	0	\$0	\$0
Kountze	4/22/1997	12:30 PM	1	0	0	\$0	\$0
Lumberton	4/25/1997	3:35 PM	0.75	0	0	\$0	\$0
Kountze	1/21/1998	2:48 PM	1.75	0	0	\$0	\$0
Kountze	1/26/1998	5:38 AM	0.75	0	0	\$0	\$0
Silsbee	1/26/1998	6:30 AM	0.75	0	0	\$0	\$0

² Damages reported in 2016 dollars.

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JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Lumberton	3/7/1998	5:55 AM	0.75	0	0	\$0	\$0
Hardin County	4/3/2000	1:55 AM	0.75	0	0	\$0	\$0
Hardin County	4/23/2000	7:15 AM	0.75	0	0	\$0	\$0
Hardin County	4/23/2000	7:25 AM	0.75	0	0	\$0	\$0
Silsbee	5/2/2000	12:00 AM	1.75	0	0	\$0	\$0
Hardin County	3/14/2001	3:55 PM	0.88	0	0	\$0	\$0
Lumberton	5/26/2001	2:40 PM	0.75	0	0	\$0	\$0
Hardin County	3/30/2002	8:25 PM	0.75	0	0	\$0	\$0
Sour Lake	4/8/2002	2:30 AM	1.25	0	0	\$0	\$0
Hardin County	6/2/2003	2:45 PM	0.75	0	0	\$0	\$0
Lumberton	5/29/2005	7:50 PM	0.75	0	0	\$0	\$0
Sour Lake	5/29/2005	7:10 PM	0.88	0	0	\$0	\$0
Lumberton	7/11/2005	3:40 PM	0.88	0	0	\$0	\$0
Lumberton	12/4/2005	1:05 PM	1.75	0	0	\$0	\$0
Silsbee	12/14/2005	12:45 PM	0.88	0	0	\$0	\$0
Hardin County	4/29/2006	6:38 AM	0.75	0	0	\$0	\$0
Kountze	5/2/2006	4:59 PM	1	0	0	\$0	\$0
Kountze	5/2/2006	5:15 PM	1	0	0	\$0	\$0
Hardin County	5/10/2006	4:20 PM	1	0	0	\$0	\$0
Hardin County	5/10/2006	4:47 PM	0.88	0	0	\$0	\$0
Sour Lake	2/12/2007	1:00 PM	0.75	0	0	\$0	\$0
Hardin County	1/31/2008	7:31 PM	0.75	0	0	\$0	\$0
Sour Lake	2/12/2008	12:40 PM	1	0	0	\$0	\$0
Hardin County	4/4/2008	1:52 PM	0.75	0	0	\$0	\$0
Hardin County	5/11/2008	3:30 AM	0.88	0	0	\$0	\$0
Kountze	5/11/2008	3:15 AM	0.75	0	0	\$0	\$0
Silsbee	5/11/2008	3:30 AM	1	0	0	\$0	\$0
Hardin County	3/27/2009	4:28 PM	0.75	0	0	\$0	\$0

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JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Hardin County	3/27/2009	4:30 PM	1.25	0	0	\$0	\$0
Hardin County	6/6/2011	2:58 PM	1	0	0	\$0	\$0
Sour Lake	6/6/2011	2:49 PM	1	0	0	\$0	\$0
Sour Lake	9/29/2011	1:54 PM	1	0	0	\$0	\$0
Silsbee	12/4/2012	3:10 PM	0.88	0	0	\$0	\$0
Hardin County	2/11/2013	8:00 PM	1	0	0	\$0	\$0
Hardin County	2/11/2013	8:01 PM	1	0	0	\$1,022	\$0
Hardin County	5/22/2013	3:20 AM	1.75	0	0	\$0	\$0
Hardin County	4/27/2015	5:01 AM	1	0	0	\$0	\$0
Hardin County	5/25/2015	8:53 PM	1	0	0	\$0	\$0
Hardin County	1/8/2016	7:00 PM	1	0	0	\$0	\$0
Hardin County	5/21/2016	6:49 PM	1	0	0	\$0	\$0

Table 9-3. Historical Hail Events Summary, 1996-2016³

JURISDICTION	NUMBER OF EVENTS	MAGNITUDE (Max Extent)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Hardin County	23	1.75 inches	0	0	\$1,022	\$0
Kountze	6	1.75 inches	0	0	\$0	\$0
Lumberton	7	1.75 inches	0	0	\$0	\$0
Rose Hill Acres	0	N/A	0	0	\$0	\$0
Silsbee	5	1.75 inches	0	0	\$0	\$0
Sour Lake	6	1.25 inches	0	0	\$0	\$0
TOTAL LOSSES	47	1.75 inches	0	0	\$1,022	

Based on the list of historical hail events for the Hardin County planning area (listed above), including all participating jurisdictions, 11 of the events have occurred since the 2011 Plan.

³ Values are in 2016 dollars.

Significant Past Events

February 11, 2013 – Hardin County

On February 11, 2013, a strong cold front swept through the planning area with strong to severe storms ahead of the boundary. Pea to quarter sized hail was reported on social media in the Village Mills area of Hardin County. A local ham radio operator reported car and property damage caused by nickel to quarter sized hail.

PROBABILITY OF FUTURE EVENTS

Based on available records of historic events, 47 events in a 21 year reporting period for the Hardin County planning area provides a frequency of occurrence of two to three events every year. This frequency supports a “highly likely” probability of future events. The numbers listed for the jurisdictions within the County are historical events that are known to have specifically impacted those jurisdictions.

VULNERABILITY AND IMPACT

Damage from hail approaches \$1 billion in the U.S. each year. Much of the damage inflicted by hail is to crops. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are most commonly damaged by hail.

Utility systems on roofs at school districts and critical facilities would be vulnerable and could be damaged. Hail could cause a significant threat to people as they could be struck by hail and falling trees and branches. Outdoor activities and events may elevate the risk to residents and visitors in the planning area when a hailstorm strikes with little warning. Older structures not built to current codes may be more vulnerable to damages than newer structures.

The Hardin County planning area features multiple mobile or manufactured home parks throughout the planning area and all participating jurisdictions. These parks are typically more vulnerable to hail events than typical site built structures. In addition, manufactured homes are located sporadically throughout the planning area, including all jurisdictions. These homes would also be more vulnerable. The US Census data indicates a total of 6,022 manufactured homes located in the Hardin County planning area including all participating jurisdictions (Table 9-4). In addition, 42% (approximately 9,772 structures) of the residential structures in the Hardin County planning area were built before 1980.⁴ These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damages during significant hail events.

⁴ Source: US Census Bureau data estimates for 2015.

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Table 9-4. Structures at Greater Risk by Jurisdiction

JURISDICTION	MANUFACTURED HOMES	SFR STRUCTURES BUILT BEFORE 1980
Kountze	234	480
Lumberton	931	1,642
Rose Hill Acres	7	118
Silsbee	310	1,981
Sour Lake	171	501
Hardin County⁵	6,022	9,772

The following critical facilities would be vulnerable to hail events in each participating jurisdiction:

Table 9-5. Critical Facilities by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Hardin County	4 Fire Stations, 3 Schools
Kountze	Fire Station, Sheriff's Department, Police Station, 4 Schools
Lumberton	Fire Station, Police Station, Water District Facility, Drainage District Facility, Hospital, 3 Schools
Rose Hill Acres	None
Silsbee	Fire Station, Police Station, Water District Facility, 6 Schools
Sour Lake	Fire Station, Police Station, Water District Facility, 2 Schools

First responders could not be able to respond to calls due to blocked roads. Also, hail could cause power outages which could cause health and safety risks to more vulnerable populations in the planning area.

Hail has been known to cause injury to humans and occasionally has been fatal. Overall, the average loss estimate of property and crop (in 2016 dollars) is \$1,022, having an approximate annual loss estimate of \$49. Based on historic losses and damages, the impact of hail damages on the Hardin County planning area, including all participating jurisdictions, can be considered "Limited" severity of impact, meaning minor injuries that are treatable with first aid, planning area facilities shut down for 24 hours or less, and less than ten percent of property destroyed or with major damage.

⁵ County totals includes all participating jurisdictions and unincorporated areas.

Table 9-6. Potential Annualized Losses for Hardin County

JURISDICTION	PROPERTY & CROP DAMAGE	ANNUAL LOSS ESTIMATE
Hardin County	\$1,022	\$49
Kountze	\$0	\$0
Lumberton	\$0	\$0
Rose Hill Acres	\$0	\$0
Silsbee	\$0	\$0
Sour Lake	\$0	\$0
Planning Area	\$1,022	\$49

Assessment of Impacts

Hail events have the potential to pose a significant risk to people and can create dangerous situations. Impacts to the planning area can include:

- Hail may create hazardous road conditions during and immediately following an event, 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.
- Residential structures can be damaged by falling trees, which can result in physical harm to occupants.
- 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.
- 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 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.
- 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.
- Downed power lines and large debris, such as downed trees, can result in the inability of emergency response vehicles to access areas of the community.
- Hazardous road conditions may prevent critical staff from reporting for duty, limiting response capabilities.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long term loss in revenue.

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- 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 damages without a backup power source.
- 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 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.
- A large hail event could impact the accessibility of recreational areas and parks due to extended power outages or debris clogged access roads.

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

SECTION 10: THUNDERSTORM WIND

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HAZARD DESCRIPTION

Thunderstorms create extreme wind events which include straight line winds. Wind is the horizontal motion of the air past a given point beginning with differences in air pressures. Pressure that is higher at one place than another sets up a force pushing from the high toward the 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 is accelerated.

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

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



Straight line winds can have gusts of 100 mph or more. Unlike tornadoes, windstorms have a broader path that is several miles wide and can cover several counties. Straight line wind may down trees and power lines, overturn mobile homes, and cause damage to well-built structures.

Straight line winds are responsible for most thunderstorm wind damages. One type of straight line wind, the downburst, is a small area of rapidly descending air beneath a thunderstorm. A downburst can cause damage equivalent to a strong tornado and make air travel extremely hazardous.

LOCATION

Thunderstorm wind events can develop in any geographic location and are considered a common occurrence in Texas. Therefore a thunderstorm wind event could occur at any location within Hardin County’s planning area, as these storms develop randomly and are not confined to any geographic area within the County. It is assumed that the Hardin County planning area, including all participating jurisdictions, is uniformly exposed to the threat of thunderstorm winds.

EXTENT

The extent or magnitude of a thunderstorm wind event is measured by the Beaufort Wind Scale. Table 10-1 describes the different intensities of wind in terms of speed and effects, from calm to violent and destructive.

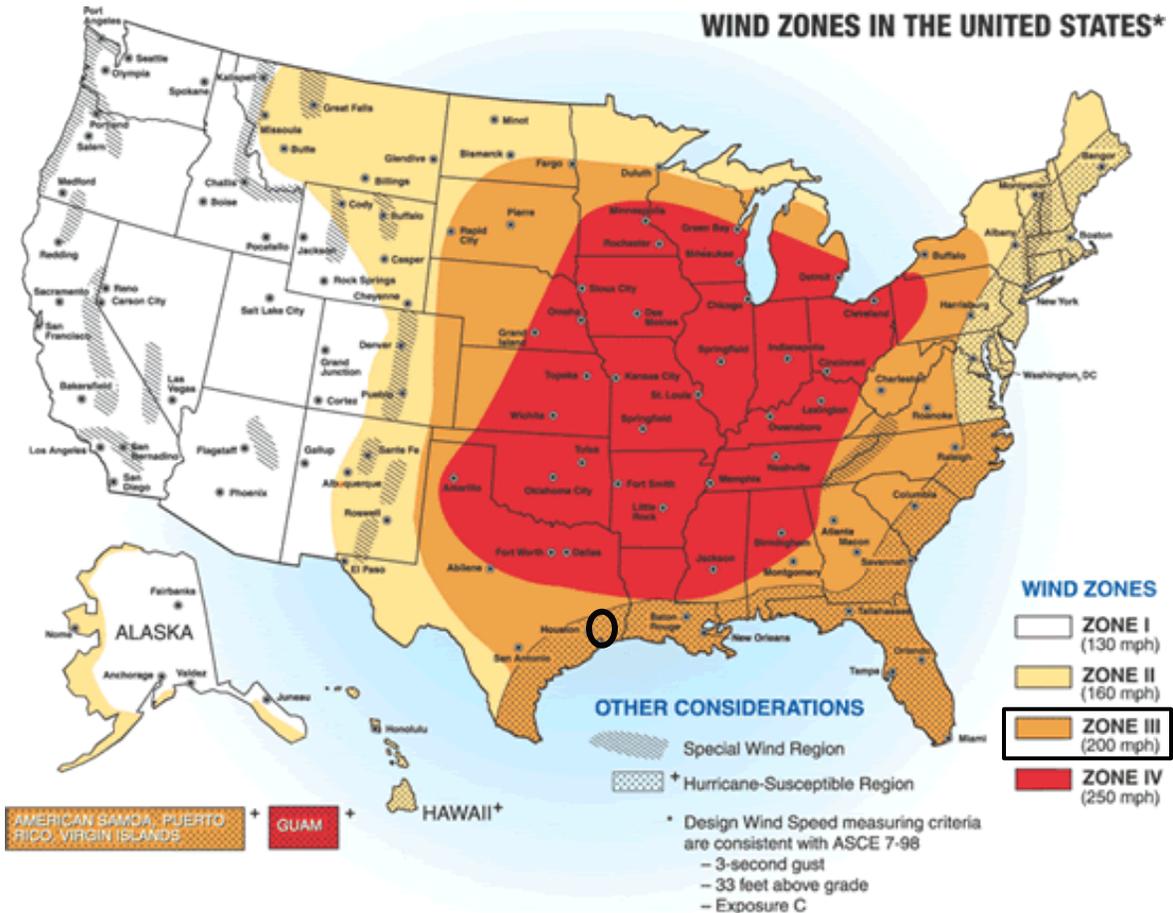
Table 10-1. Beaufort Wind Scale¹

FORCE	WIND (KNOTS)	WMO CLASSIFICATION	APPEARANCE OF WIND EFFECTS
0	Less than 1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4-7	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	13-18	Moderate Breeze	Dust, leaves and loose paper lifted, small tree branches move
5	19-24	Fresh Breeze	Small trees in leaf begin to sway
6	25-31	Strong Breeze	Larger tree branches moving, whistling in wires
7	32-38	Near Gale	Whole trees moving, resistance felt walking against wind
8	39-46	Gale	Whole trees in motion, resistance felt walking against wind
9	47-54	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	55-63	Storm	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	64-72	Violent Storm	If experienced on land, widespread damage
12	73+	Hurricane	Violence and destruction

Figure 10-1 displays the wind zones as derived from NOAA.

¹ Source: World Meteorological Organization

Figure 10-1. Wind Zones in the United States²



On average, the planning area experiences two to three thunderstorm wind events every year. The County is located within a Zone III, meaning it can experience winds up to 200 mph. Hardin County has experienced a significant wind event, or an event with winds in the range of “Force 10” on the Beaufort Wind Scale with winds above 55 knots.

HISTORICAL OCCURRENCES

Tables 10-2, 10-3, and 10-4 depict historical occurrences of thunderstorm wind events for the Hardin County planning area according to the National Centers for Environmental Information (NCEI) data. Since January 1996, 55 thunderstorm wind events are known to have impacted Hardin County, based upon NCEI records. Table 10-3 presents information on known historical events impacting the Hardin County planning area and includes resulting damages. It is important to note that high wind events associated with other hazards, such as tornadoes, are not accounted for in this section.

² Hardin County is indicated by the circle.

Section 10: Thunderstorm Wind

The NCEI is a national data source organized under the National Oceanic and Atmospheric Administration. The NCEI is the largest archive available for climate data; however, it is important to note that the only incidents factored into the risk assessment are those that are reported to and recorded by the NCEI. In the tables that follow throughout this section, some occurrences seem to appear multiple times in one table. This is due to reports from various locations throughout the County. In addition, property damage estimates are not always available. When this occurs, estimates are provided. Where an estimate has been provided in a table for losses, the dollar amounts have been altered to indicate the damage in 2016 dollars.

Table 10-2. Historical Thunderstorm Wind Events, With Reported Damages, 1996-2016

MAXIMUM WIND SPEED RECORDED (KNOTS)	NUMBER OF REPORTED EVENTS
0-30	0
31-40	0
41-50	24
51-60	4
61-70	0
71-80	0
81-90	1
91-100	0
Unknown	26

Table 10-3. Historical Thunderstorm Wind Events, 1996-2016³

JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Kountze	4/22/1996	5:45 AM	Unknown	0	0	\$7,589	\$0
Silsbee	5/29/1996	6:45 PM	Unknown	0	0	\$7,589	\$7,589
Sour Lake	5/29/1996	9:05 PM	Unknown	0	1	\$1,669,504	\$37,943
Hardin County	6/13/1996	4:45 AM	Unknown	0	0	\$7,589	\$0
Hardin County	9/15/1996	11:30 AM	Unknown	0	0	\$15,177	\$0
Sour Lake	1/27/1997	8:30 PM	Unknown	0	0	\$14,837	\$0
Hardin County	9/9/1997	4:00 PM	Unknown	0	0	\$14,837	\$0

³ Only recorded events with fatalities, injuries or damages are listed. Magnitude is listed when available. Damage values are in 2016 dollars.

Section 10: Thunderstorm Wind

JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Hardin County	12/23/1997	6:15 PM	Unknown	0	0	\$29,674	\$0
Silsbee	12/23/1997	6:50 PM	Unknown	0	0	\$14,837	\$0
Kountze	1/26/1998	6:10 AM	Unknown	0	0	\$73,047	\$0
Silsbee	8/21/1998	2:59 PM	Unknown	0	0	\$36,523	\$0
Kountze	1/1/1999	11:51 PM	Unknown	0	0	\$14,294	\$0
Silsbee	7/12/1999	1:00 PM	Unknown	0	0	\$2,859	\$0
Silsbee	3/26/2000	6:30 AM	Unknown	0	0	\$13,829	\$0
Kountze	5/2/2000	4:30 AM	Unknown	0	0	\$2,766	\$0
Silsbee	8/11/2000	4:20 PM	Unknown	0	0	\$2,766	\$0
Hardin County	9/1/2000	3:20 PM	Unknown	0	0	\$2,766	\$0
Sour Lake	9/1/2000	3:54 PM	Unknown	0	0	\$6,914	\$0
Kountze	11/8/2000	1:45 AM	Unknown	0	0	\$6,914	\$0
Hardin County	10/13/2001	4:00 AM	Unknown	0	0	\$26,892	\$0
Silsbee	12/13/2001	12:20 PM	Unknown	0	0	\$6,723	\$0
Kountze	4/8/2002	1:03 AM	Unknown	0	0	\$6,618	\$0
Hardin County	7/7/2002	10:45 PM	Unknown	0	0	\$6,618	\$0
Silsbee	8/27/2002	11:50 AM	Unknown	0	0	\$2,647	\$0
Sour Lake	8/27/2002	12:00 PM	Unknown	0	0	\$6,618	\$0
Lumberton	12/23/2002	10:50 PM	Unknown	0	0	\$6,618	\$0
Hardin County	3/18/2003	12:50 PM	50	0	0	\$2,588	\$0
Silsbee	8/21/2003	4:58 PM	50	0	0	\$6,471	\$0
Lumberton	8/23/2003	2:30 PM	50	0	0	\$32,355	\$0
Kountze	11/17/2003	6:40 PM	50	0	0	\$12,942	\$0
Silsbee	11/18/2003	12:30 AM	50	0	0	\$6,471	\$0
Hardin County	6/2/2004	1:30 AM	50	0	0	\$2,521	\$0
Lumberton	11/23/2004	11:18 PM	50	0	0	\$126,062	\$0
Lumberton	4/11/2005	10:40 AM	50	0	0	\$6,097	\$0
Lumberton	5/25/2005	6:28 PM	50	0	0	\$2,439	\$0

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JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Lumberton	5/29/2005	7:50 PM	50	0	0	\$2,439	\$0
Kountze	4/29/2006	9:45 AM	50	0	0	\$11,812	\$0
Silsbee	8/5/2006	9:10 PM	50	0	0	\$2,362	\$0
Hardin County	10/16/2006	6:10 AM	60	0	0	\$23,624	\$0
Sour Lake	2/12/2007	5:30 PM	50	0	0	\$2,297	\$0
Hardin County	5/11/2008	3:24 AM	50	0	0	\$11,060	\$0
Kountze	5/11/2008	3:20 AM	50	0	0	\$5,530	\$0
Hardin County	4/26/2011	1:59 AM	52	0	0	\$2,117	\$0
Silsbee	4/26/2011	1:05 AM	52	0	0	\$3,176	\$0
Hardin County	6/6/2011	2:25 PM	50	0	0	\$10,587	\$0
Hardin County	6/12/2012	12:05 PM	50	0	0	\$3,112	\$0
Hardin County	6/6/2013	5:20 PM	50	0	0	\$3,067	\$0
Hardin County	4/25/2015	7:45 AM	50	0	0	\$5,024	\$0
Kountze	5/25/2015	7:52 PM	50	0	0	\$1,005	\$0
Kountze	5/25/2015	8:32 PM	50	0	0	\$2,009	\$0
Kountze	8/11/2015	3:05 PM	87	0	0	\$502,352	\$0
Kountze	4/27/2016	5:05 AM	50	0	0	\$10,000	\$0
Hardin County	5/27/2016	4:40 AM	50	0	0	\$2,000	\$0

Table 10-4. Summary of Historical Thunderstorm Wind Events, 1996-2016⁴

JURISDICTION	NUMBER OF EVENTS	MAGNITUDE (Max Extent)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Hardin County	18	60 knots	0	0	\$169,253	\$0
Kountze	13	87 knots	0	0	\$656,878	\$0
Lumberton	6	50 knots	0	0	\$176,010	\$0
Rose Hill Acres	0	N/A	0	0	\$0	\$0
Silsbee	12	52 knots	0	0	\$106,253	\$7,589

⁴ Values are in 2016 dollars.

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JURISDICTION	NUMBER OF EVENTS	MAGNITUDE (Max Extent)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Sour Lake	6	52 knots	0	1	\$1,700,171	\$37,943
TOTAL LOSSES	55	87 knots	0	0	\$2,854,096	

Based on the list of historical thunderstorm wind events for the Hardin County planning area (listed above), including all participating jurisdictions, 13 of the events have occurred since the 2011 Plan.

Significant Past Events

May 29, 1996 – Sour Lake

Severe downburst winds hit the community of Sour Lake. A man was injured in a motel room when the ceiling and air conditioner collapsed on him. Between 20 and 30 percent of the buildings in Sour Lake received some kind of damage including 5 homes that were completely destroyed, 20 homes severely damaged, and 60 homes with minor damage.

February 10, 1998 – Silsbee

Several cars were overturned at the Pine Harbor Health Center in Silsbee. Local wind equipment recorded winds in excess of 79 mph. At the Louisiana Pacific Lumber Company, over one hundred tall pine trees were snapped. Several homes and businesses in the area received roof damage. Strong winds, in excess of 50 knots, blew through the Little Cypress area damaging a barn. Several roofs were damaged in the area. Damage estimates exceeded \$250,000.

August 11, 2015 – Kountze

A severe thunderstorm hit the City of Kountze damaging the local airport. High winds from a microburst resulted in eight general aviation aircrafts breaking loose from tie downs and being lifted and thrown. One aircraft hangar was also damaged. Damage estimates exceeded \$500,000.

PROBABILITY OF FUTURE EVENTS

Most thunderstorm winds occur during the spring months of March, April, and May, and during the month of September in the fall. Based on available records of historic events, 55 events in a 21 year reporting period provides a frequency of occurrence of 2 to 3 events every year. Even though the intensity of thunderstorm wind events is not always damaging for the Hardin County planning area, the frequency of occurrence for a thunderstorm wind event is highly likely, meaning that an event is probable within the next year for the Hardin County planning area, including all participating jurisdictions.

VULNERABILITY AND IMPACT

Vulnerability is difficult to evaluate since thunderstorm wind events can occur at different strength levels, in random locations, and can create relatively narrow paths of destruction. Due to the randomness of these

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events, all existing and future structures and facilities in Hardin County could potentially be impacted and remain vulnerable to possible injury and property loss from strong winds.

Trees, power lines and poles, signage, manufactured housing, radio towers, concrete block walls, storage barns, windows, garbage receptacles, brick facades, and vehicles, unless reinforced, are vulnerable to thunderstorm wind events. The Hardin County planning area features multiple mobile or manufactured home parks throughout the planning area and all participating jurisdictions. These parks are typically more vulnerable to thunderstorm wind events than typical site built structures. In addition, manufactured homes are located sporadically throughout the planning area, including all jurisdictions. These homes would also be more vulnerable. The US Census data indicates a total of 6,022 manufactured homes located in the Hardin County planning area, including all participating jurisdictions (Table 10-5). In addition, 42% (approximately 9,772 structures) of the residential structures in the Hardin County planning area were built before 1980⁵. These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damages during significant wind events.

Table 10-5. Structures at Greater Risk by Jurisdiction

JURISDICTION	MANUFACTURED HOMES	SFR STRUCTURES BUILT BEFORE 1980
Kountze	234	480
Lumberton	931	1,642
Rose Hill Acres	7	118
Silsbee	310	1,981
Sour Lake	171	501
Hardin County⁶	6,022	9,772

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.

The following critical facilities would be vulnerable to thunderstorm wind events in each participating jurisdiction:

Table 10-6. Critical Facilities by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Hardin County	4 Fire Stations, 3 Schools

⁵ Source: U.S. Census Bureau data estimates for 2015.

⁶ County totals includes all participating jurisdictions and unincorporated areas.

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JURISDICTION	CRITICAL FACILITIES
Kountze	Fire Station, Sheriff's Department, Police Station, 4 Schools
Lumberton	Fire Station, Police Station, Water District Facility, Drainage District Facility, Hospital, 3 Schools
Rose Hill Acres	None
Silsbee	Fire Station, Police Station, Water District Facility, 6 Schools
Sour Lake	Fire Station, Police Station, Water District Facility, 2 Schools

A thunderstorm wind event can also result in traffic disruptions, injuries, and in rare cases, fatalities. Impact of extreme winds experienced in the Hardin County planning area has resulted in one injury and no fatalities. Impact of thunderstorm wind events experienced in the Hardin County planning area would be “Minor,” meaning injuries and illnesses would not result in permanent disability, the quality of life lost would be minor, and facilities would be shut down for more than 1 week. Overall, the average loss estimate (in 2016 dollars) is \$2,854,096, having an approximate annual loss estimate of \$135,909 (Table 10-7).

Table 10-7. Potential Annualized Losses for Hardin County⁷

JURISDICTION	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATE
Hardin County	\$169,253	\$8,060
Kountze	\$656,878	\$31,280
Lumberton	\$176,010	\$8,381
Rose Hill Acres	\$0	\$0
Silsbee	\$113,842	\$5,421
Sour Lake	\$1,738,114	\$82,767
Planning Area	\$2,854,096	\$135,909

Assessment of Impacts

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

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.

⁷ Values are in 2016 dollars.

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- Significant debris and downed trees can result in emergency response vehicles being unable to access areas of the community.
- Downed power lines may result in roadways being unsafe for use, which may prevent first responders from answering calls for assistance or rescue.
- During exceptionally heavy wind events, first responders may be prevented from responding to calls, as the winds may reach a speed in which their vehicles and equipment are unsafe to operate.
- 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.
- First responders are exposed to downed power lines, unstable and unusual debris, hazardous materials, and generally unsafe conditions.
- Emergency operations and services may be significantly impacted due to damaged facilities and/or loss of communications.
- Critical staff may be unable to report for duty, limiting response capabilities.
- County or City departments may be damaged, delaying response and recovery efforts for the entire community.
- Private sector entities that the County or City 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.
- 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 extreme wind events may be negatively impacted while roads are cleared and utilities are being restored, further slowing economic recovery.
- Older structures built to less stringent building codes may suffer greater damage as they are typically more vulnerable to extreme winds.
- Large scale wind events can have significant economic impact on the affected area, as it must now fund expenses such as infrastructure repair and restoration, temporary services and facilities, overtime pay for responders, as well as normal day-to-day operating expenses.
- Businesses that are more reliant on utility infrastructure than others may suffer greater damages without a backup power source.
- The planning area includes several popular recreational areas that attract camping, boating and fishing activities throughout the year including Village Creek State Park, Big Thicket National Preserve, and the Neches River. A large thunderstorm wind event could impact recreational activities, placing boaters and campers in imminent danger and potentially requiring emergency services or evacuation.
- Recreational areas and parks may be damaged or inaccessible due to downed trees or debris, causing temporary impacts to area businesses.

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

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HAZARD DESCRIPTION



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

The most powerful tornadoes are produced by “Supercell Thunderstorms.” Supercell 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 11-1. Tornado Variations

WEAK TORNADOES	STRONG TORNADOES	VIOLENT TORNADOES
<ul style="list-style-type: none"> • 69% of all tornadoes • Less than 5% of tornado deaths • Lifetime 1-10+ minutes • Winds less than 110 mph 	<ul style="list-style-type: none"> • 29% of all tornadoes • Nearly 30% of all tornado deaths • May last 20 minutes or longer • Winds 110 – 205 mph 	<ul style="list-style-type: none"> • 2% of all tornadoes • 70% of all tornado deaths • Lifetime can exceed one hour • Winds greater than 205 mph

LOCATION

As with thunderstorms, tornadoes do not have any specific geographic boundary and can occur throughout the Hardin County planning area, including all participating jurisdictions, uniformly. It is assumed that the Hardin County planning area is uniformly exposed to tornado activity. Hardin County is located in Wind Zone III (Figure 11-1), where tornado winds can be as high as 200 mph.

Figure 11-1. FEMA Wind Zones in the United States¹



EXTENT

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

Tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita Scale (Table 11-2). Since February 2007, the Fujita Scale has been replaced by the Enhanced Fujita Scale (Table 11-3), which retains the same basic design and six strength categories as the previous scale. The newer scale reflects more

¹ Hardin County is indicated by the star.

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refined assessments of tornado damage surveys, standardization, and damage consideration to a wider range of structures.

Table 11-2. The Fujita Tornado Scale²

F-SCALE NUMBER	INTENSITY	WIND SPEED (MPH)	TYPE OF DAMAGE DONE	PERCENT OF APPRAISED STRUCTURE VALUE LOST DUE TO DAMAGE
F0	Gale Tornado	40 – 72	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.	None Estimated
F1	Moderate Tornado	73 – 112	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads; attached garages may be destroyed.	0% – 20%
F2	Significant Tornado	113 – 157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.	50% – 100%
F3	Severe Tornado	158 – 206	Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.	100%
F4	Devastating Tornado	207 – 260	Well-constructed homes leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.	100%
F5	Incredible Tornado	261 – 318	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles flying through the air in excess of 330 yards; trees debarked; steel reinforced concrete badly damaged.	100%

² Source: <http://www.tornadoproject.com/fscale/fscale.htm>

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Table 11-3. Enhanced Fujita Scale for Tornadoes

STORM CATEGORY	DAMAGE LEVEL	3 SECOND GUST (MPH)	DESCRIPTION OF DAMAGES	PHOTO EXAMPLE
EF0	Gale	65–85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.	
EF1	Weak	86–110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads; attached garages may be destroyed.	
EF2	Strong	111–135	Considerable damage; roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.	
EF3	Severe	136–165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.	
EF4	Devastating	166–200	Well-constructed homes leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.	
EF5	Incredible	200+	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles flying through the air in excess of 330 yards; trees debarked; steel reinforced concrete badly damaged.	

Both the Fujita Scale and Enhanced Fujita Scale should be referenced in reviewing previous occurrences since tornado events prior to 2007 will follow the original Fujita Scale. The largest magnitude reported within the planning area is F2 on the Fujita Scale, a “Strong Tornado.” Being located in Wind Zone III, the planning area could experience anywhere from an EF0 to an EF4 depending on the wind speed.

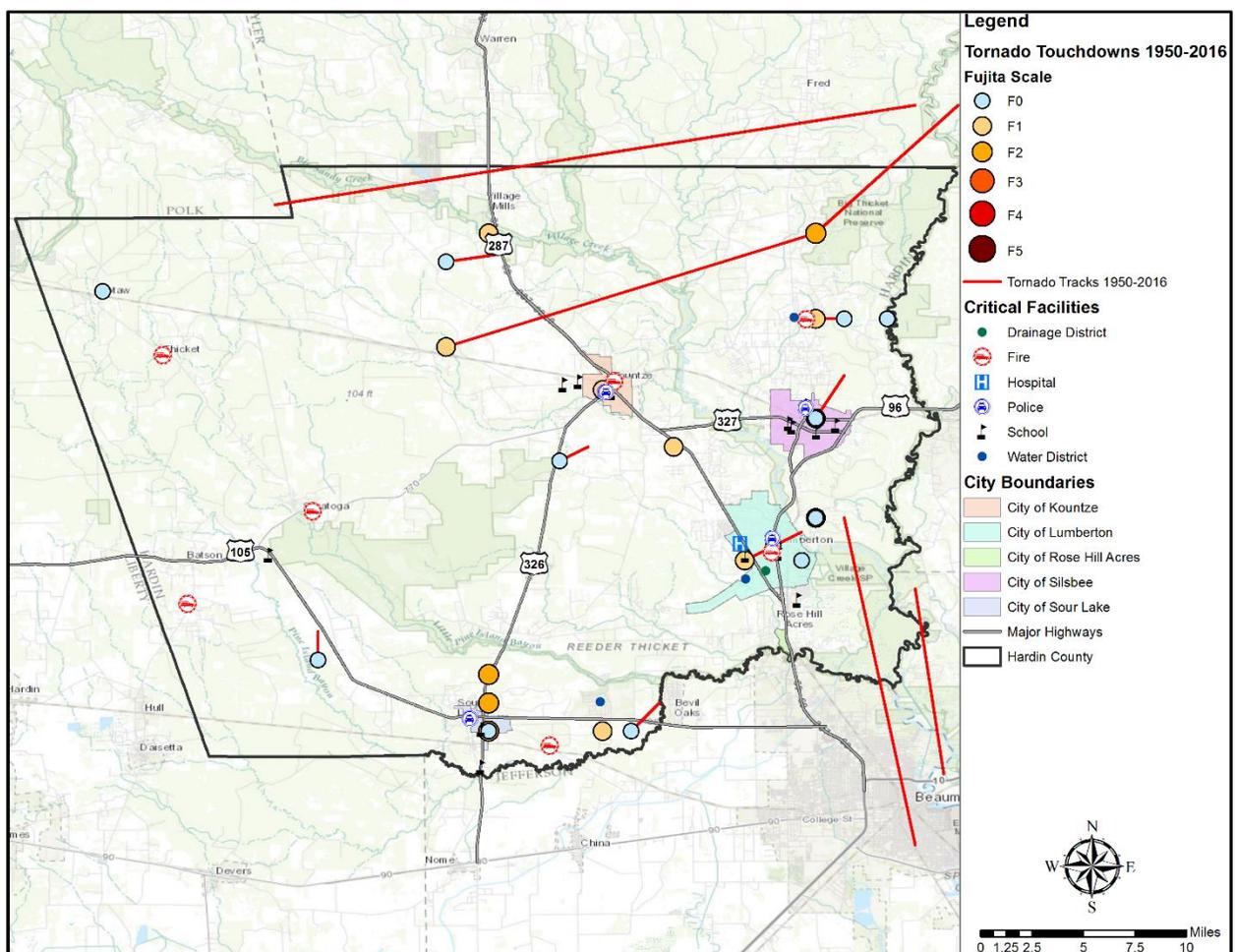
The events in Hardin County have been between EF0 to an EF2 (Table 11-4). Therefore, the range of intensity that the Hardin County planning area would be expected to mitigate is a tornado event that would be a low to high risk, an EF0 to EF4.

HISTORICAL OCCURRENCES

Only reported tornadoes were factored into the Risk Assessment. It is likely that a number of occurrences have gone unreported over the past 21 years.

Figure 11-2 identifies the locations of previous occurrences in the Hardin County planning area from 1996 to 2016. A total of 12 events have been recorded by the Storm Prediction Center (NOAA) and NCEI databases for the Hardin County planning area, including all participating jurisdictions. The most significant event reported occurred in northeastern Hardin County near the Tyler County line on November 23, 2004. The F2 tornado was 600 yards wide and stayed on the ground for approximately 3 miles.

Figure 11-2. Spatial Historical Tornado Events, 1996-2016³



³ Source: NOAA Records

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Table 11-4. Historical Tornado Events, 1996-2016⁴

JURISDICTION	DATE	TIME	MAGNITUDE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Sour Lake	10/18/1998	8:20 AM	F0	0	0	\$14,609	\$0
Silsbee	5/10/1999	6:55 AM	F0	0	0	\$71,468	\$0
Hardin County	10/11/2001	9:30 AM	F0	0	0	\$13,446	\$0
Lumberton	10/12/2001	2:40 PM	F0	0	0	\$2,689	\$0
Sour Lake	10/12/2001	2:00 PM	F0	0	0	\$0	\$0
Lumberton	10/28/2002	10:58 PM	F1	0	0	\$132,369	\$0
Hardin County	11/23/2004	4:08 PM	F1	0	0	\$126,062	\$1,260,625
Kountze	11/23/2004	4:27 PM	F2	1	0	\$630,312	\$0
Kountze	4/29/2006	9:55 AM	F0	0	0	\$11,812	\$0
Hardin County	10/16/2006	6:00 PM	F0	0	0	\$5,906	\$0
Hardin County	3/27/2009	4:12 PM	F0	0	0	\$0	\$0
Hardin County	1/25/2012	12:10 PM	F0	0	0	\$10,372	\$0

Table 11-5. Summary of Historical Tornado Events, 1996-2016⁵

JURISDICTION	NUMBER OF EVENTS	MAGNITUDE (Max Extent)	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Hardin County	5	F1	0	0	\$155,787	\$1,260,625
Kountze	2	F2	1	0	\$642,124	\$0
Lumberton	2	F1	0	0	\$135,058	\$0
Rose Hill Acres	0	N/A	0	0	\$0	\$0
Silsbee	1	F0	0	0	\$71,468	\$0
Sour Lake	2	F0	0	0	\$14,609	\$0
TOTAL LOSSES	3	F2	1	0	\$2,279,672	

Based on the list of historical tornado events for the Hardin County planning area (listed above), including all participating jurisdictions, 1 of the events has occurred since the 2011 Plan.

⁴ Values are in 2016 dollars.

⁵ Values are in 2016 dollars.

Significant Past Events

November 23, 2004 – Hardin County

A tornado touched down in northeastern Hardin County on November 23, 2004. Residents reported seeing two tornadoes on the ground for a brief time. One elderly woman was killed when several large trees fell on the mobile home she was in. Between 10 and 20 homes were damaged or destroyed, primarily near Highway 92 near the Hardin-Tyler county line.

October 28, 2002 – Lumberton

A tornado touched down in Lumberton on October 28, 2002. The F1 tornado was 10 yards wide and stayed on the ground for more than two miles. The National Weather Service storm survey indicated the worst damage occurred along Keith Road and Creekwood Road, where several new homes were damaged from flying debris or falling trees. Damage estimates exceeded \$100,000.

PROBABILITY OF FUTURE EVENTS

Tornadic storms 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. According to historical records, Hardin County experiences a tornado touchdown approximately once a year. This frequency supports a highly likely probability of future events for the Hardin County planning area, including all participating jurisdictions.

VULNERABILITY AND IMPACT

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

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

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

Tornadoes can possibly cause a significant threat to people as they could be struck by flying debris, falling trees/branches, utility lines, and poles. First responders could also not be able to respond to calls due to blocked roads. Tornadoes commonly cause power outages which could cause health and safety risks to patients in hospitals or other vulnerable populations that rely on power for medical necessities.

Section 11: Tornado

The Hardin County planning area features multiple mobile or manufactured home parks throughout the planning area and all participating jurisdictions. These parks are typically more vulnerable to tornado events than typical site built structures. In addition, manufactured homes are located sporadically throughout the planning area, including all jurisdictions. These homes would also be more vulnerable. The US Census data indicates a total of 6,022 manufactured homes located in the Hardin County planning area including all participating jurisdictions (Table 11-6). In addition, 42% (approximately 9,772 structures) of the residential structures in the Hardin County planning area were built before 1980.⁶ These structures would typically be built to lower or less stringent construction standards than newer construction and may be more susceptible to damages during significant tornado events.

Table 11-6. Structures at Greater Risk by Jurisdiction

JURISDICTION	MANUFACTURED HOMES	SFR STRUCTURES BUILT BEFORE 1980
Kountze	234	480
Lumberton	931	1,642
Rose Hill Acres	7	118
Silsbee	310	1,981
Sour Lake	171	501
Hardin County⁷	6,022	9,772

The following critical facilities would be vulnerable to tornado events in each participating jurisdiction:

Table 11-7. Critical Facilities by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Hardin County	4 Fire Stations, 3 Schools
Kountze	Fire Station, Sheriff's Department, Police Station, 4 Schools
Lumberton	Fire Station, Police Station, Water District Facility, Drainage District Facility, Hospital, 3 Schools
Rose Hill Acres	None
Silsbee	Fire Station, Police Station, Water District Facility, 6 Schools
Sour Lake	Fire Station, Police Station, Water District Facility, 2 Schools

⁶ Source: US Census Bureau data estimates for 2015.

⁷ County totals includes all participating jurisdictions and unincorporated areas.

Section 11: Tornado

The average loss estimate of property and crop is \$2,279,672 (in 2016 dollars), having an approximate annual loss estimate of \$108,556. Based on historic loss and damages, the impact of tornado on the Hardin County planning area can be considered “Major,” with more than 25 percent of property expected to be destroyed or with major damage, injuries and/or illness that result in permanent disability, and critical facilities shut down for at least 2 weeks.

Table 11-8. Potential Annualized Losses by Jurisdiction, 1996-2016

JURISDICTION	PROPERTY AND CROP DAMAGE	ANNUAL LOSS ESTIMATE
Hardin County	\$1,416,412	\$67,448
Kountze	\$642,124	\$30,577
Lumberton	\$135,058	\$6,431
Rose Hill Acres	\$0	\$0
Silsbee	\$71,468	\$3,403
Sour Lake	\$14,609	\$696

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. Impacts to the planning area can include:

- Individuals exposed to the storm can be struck by flying debris, falling limbs, or downed trees causing serious injury or death.
- Structures can be damaged or crushed by falling trees, which can result in physical harm to the occupants.
- Manufactured homes may suffer substantial damage as they would be more vulnerable than typical site built structures.
- Sub-standard construction may suffer substantial damage as they are not built to code and would be more vulnerable to tornado events than code compliant 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 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.

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- 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.
- County or City departments may be damaged or destroyed, delaying response and recovery efforts for the entire community.
- Private sector entities that the County or City 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.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long term loss in revenue.
- Damage to infrastructure may slow economic recovery since repairs may be extensive and lengthy.
- Some businesses not directly damaged by the tornado may be negatively impacted while roads and utilities are being restored, 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 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.

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 government, businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a tornado event.

SECTION 12: DROUGHT

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HAZARD DESCRIPTION

Drought is a period of time without substantial rainfall that persists from one year to the next. Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of anticipated natural precipitation reduction over an extended period of time, usually a season or more in length. Droughts can be classified as meteorological, hydrologic, agricultural, and socioeconomic. Table 12-1 presents definitions for these different types of drought.



Table 12-1. Drought Classification Definitions¹

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

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,

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

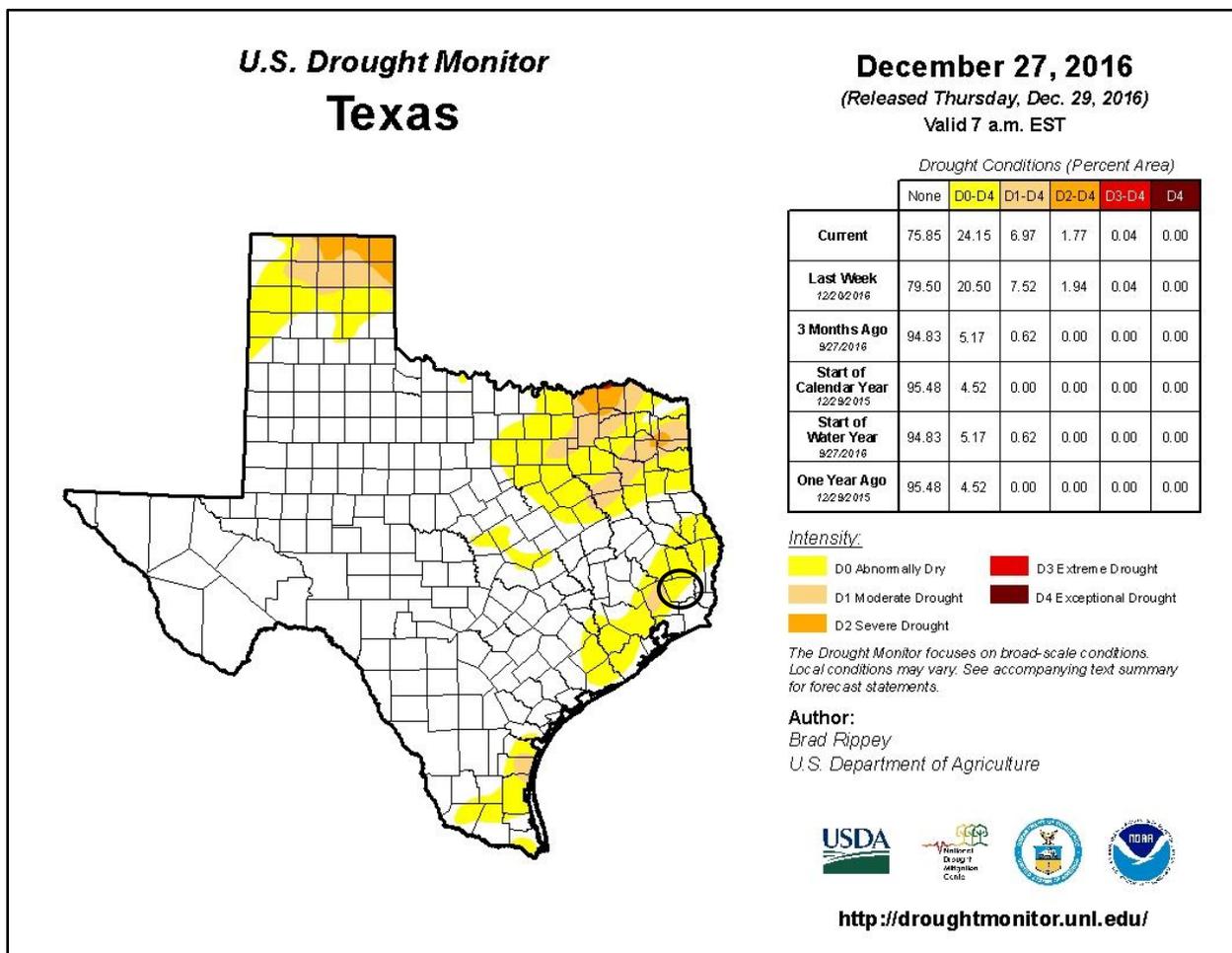
Section 12: Drought

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.

LOCATION

Droughts occur regularly throughout Texas and Hardin County and are a frequent condition. However, they can vary greatly in their intensity and duration. The Drought Monitor (Figure 12-1) shows the majority of the study region is currently experiencing abnormally dry conditions. The southeast portion of the planning area is experiencing normal conditions. The planning area has experienced abnormally dry to exceptional drought conditions over the last ten years. There is no distinct geographic boundary to drought; therefore, it can occur throughout the Hardin County planning area, including all participating jurisdictions, equally.

Figure 12-1. U.S. Drought Monitor, December 2016



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

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of previous months. The hydrological impacts of drought (e.g. reservoir levels, groundwater levels, etc.) take longer to develop. Table 12-2 depicts magnitude of drought, while Table 12-3 describes the classification descriptions.

Table 12-2. 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 12-3. Palmer Drought Category Descriptions²

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

² Source: National Drought Mitigation Center

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

Based on the historical occurrences for drought and the location of Hardin County, the entire planning area, including all participating jurisdictions, can anticipate a range of drought from abnormally dry to exceptional, or D0 to D4 based on the Palmer Drought Category.

HISTORICAL OCCURRENCES

Hardin County may typically experience a severe drought. Table 12-4 and 12-5 list historical events that have occurred in Hardin County as reported in the National Center for Environmental Information (NCEI). Historical drought information, as provided by the NCEI, 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 for the participating jurisdictions in the Hardin County planning area, including all participating jurisdictions, is provided on a County-wide basis per the NCEI database.

Table 12-4. Historical Drought Years, 1996-2016

DROUGHT YEAR
1996
1998
2000
3 unique events

Table 12-5. Historical Drought Events, 1996-2016³

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Hardin County	5/1/1996	0	0	\$0	\$0
Hardin County	5/20/1998	0	0	\$0	\$0
Hardin County	6/1/1998	0	0	\$0	\$0
Hardin County	7/1/1998	0	0	\$0	\$0
Hardin County	2/1/2000	0	0	\$0	\$0
TOTALS		0	0	\$0	

³ Values are in 2016 dollars.

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Based on the list of historical drought events for the Hardin County planning area (listed above), including all participating jurisdictions, no events have occurred since the 2011 Plan.

Significant Past Events

January - May, 1996 – Hardin County

Rainfall totals from January through May averaged 10 to 15 inches below normal. The main areas affected include farming and fire protection. Crop damage in neighboring counties exceeded 1 million dollars. Drought conditions continue across southeast Texas through May.

May - July, 1998 – Hardin County

Drought conditions began by mid-May, as southeast Texans had gone over 6 weeks without any significant rainfall. By the end of May, many locations had seen less than 0.10 inches of rain for the month. This was the start of a significant impact on agriculture and forestry resources. A mild to moderate drought continued across southeast Texas in the month of June. Only 2 days provided any relief from the dry weather, June 5 and June 26, 1998. Many places recorded less than 2 inches of rain for the entire month of June. Crop losses continued to mount, primarily in the rice business, as well as forestry resources.

February, 2000 – Hardin County

The month of February was one of the 5 driest Februarys on record across southeast Texas. Less than 1 inch of rain fell across the entire region. The 2 month total for January and February 2000 was the second driest on record for the neighboring Beaumont/Port Arthur area, with less than 2.5 inches of rainfall.

PROBABILITY OF FUTURE EVENTS

Based on available records of historic events, there have been 3 extended time periods of drought within a 21 year reporting period, which provides a frequency of occurrence of 1 event probable in the next 5 years. This frequency supports an occasional probability of future events. All participating jurisdictions are included under the County.

VULNERABILITY AND IMPACT

Loss estimates were based on 21 years of statistical data from the NCEI. 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. Table 12-6 shows annualized exposure.

Table 12-6. Drought Event Damage Totals, 1996-2016

JURISDICTION	PROPERTY & CROP LOSS	ANNUALIZED LOSS ESTIMATES
Hardin County	\$0	\$0

Drought impacts large areas and crosses jurisdictional boundaries. 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 and crop/livestock losses on agricultural lands and typically have no impact on buildings.

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In terms of vulnerability, population, agriculture, property, and environment are all vulnerable to drought. The average person will survive only a few days without water, and this timeframe can be drastically shortened for those people with more fragile health – typically children, the elderly, and the ill. Populations over 65 in the Hardin County planning area are estimated at 14.7% of the total population and children under the age of 5 exceed 6% – an estimated total of 11,797⁴ potentially vulnerable residents in the planning area based on age (Table 12-7).

Table 12-7. Populations at Greater Risk by Jurisdiction

JURISDICTION	POPULATION 65 AND OLDER	POPULATION UNDER 5
Kountze	296	151
Lumberton	1,781	843
Rose Hill Acres	98	21
Silsbee	1,275	422
Sour Lake	303	84
Hardin County⁵	8,190	3,607

The population 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 Hardin County planning area could be adversely affected by drought conditions, which could limit water supplies and present health threats. However, during summer drought, or hot and dry conditions, elderly persons, small children, infants, and the chronically ill who do not have adequate cooling units in their homes may become more vulnerable to injury and/or death.

The economic impact of droughts can be significant as it produces a complex web of effects that span 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 a number of years, the direct and indirect economic impact can be significant.

Habitat damage is a vulnerability of the environment during periods of drought for both aquatic and terrestrial species. The environment also becomes vulnerable during periods of extreme or prolonged drought due to severe erosion and land degradation.

The impact of droughts experienced in the Hardin County planning area, including all participating jurisdictions, has resulted in 0 injuries and fatalities. This supports 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%

⁴ U.S. Census Bureau 2015 data for Hardin County.

⁵ County totals includes all participating jurisdictions and unincorporated areas.

Section 12: Drought

of property is destroyed or sustains major damage. Annualized loss over the 21-year reporting period in Hardin County is negligible.

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. Table 12-8 lists the drought impacts for Hardin County from 2005 to 2016, based on reports received by the Drought Impact Reporter.

Table 12-8. Drought Impacts, 2005-2016

DROUGHT IMPACTS	
Agriculture	22
Business & Industry	2
Energy	1
Fire	12
Plants & Wildlife	9
Relief, Response, & Restrictions	13
Society & Public Health	2
Tourism & Recreation	0
Water Supply & Quality	3

Drought has the potential to impact people in the Hardin 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. Drought is also frequently associated with a variety of impacts, including:

- Recreational activities at the Neches River and Village Creek State Park that rely on water may be curtailed, such as hunting and fishing, resulting in fewer tourists and lower revenue.
- The Big Thicket National Preserve area may be especially vulnerable as 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 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.

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- 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).
- Jurisdictions and residents may disagree 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 in order 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.
- Dry and dead vegetation will increase the risk of wildfire.
- Land subsidence threat increases as groundwater is depleted.
- 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 develop supplemental water resources.
- Long term drought may negatively impact future economic development.

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

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HAZARD DESCRIPTION

A wildfire event can rapidly spread out of control and occurs most often in the summer, when the brush is dry and flames can move unchecked through a highly vegetative area. Wildfires can start as a slow burning fire along the forest floor, killing and damaging trees. The fires often spread more rapidly as they reach the tops of trees, with wind carrying the flames from tree to tree. Usually, dense smoke is the first indication of a wildfire.

A wildfire event often begins unnoticed and spreads quickly, lighting brush, trees, and homes on fire. For example, a wildfire may be started by a campfire that was not doused properly, a tossed cigarette, burning debris, or arson.

Texas has seen a significant increase in the number of wildfires in the past 30 years, which included wildland, interface, or intermix fires. Wildland Urban Interface or Intermix (WUI) fires occur in areas where structures and other human improvements meet or intermingle with undeveloped wildland or vegetative fuels. 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 event can be a potentially damaging consequence of drought. 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 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 WUI. (Figures 13-1 through 13-6). It is estimated that 85 percent of the total population in Hardin County live within the WUI. However, the entire Hardin County planning area is at risk for wildfires.

Figure 13-1. Wildland Urban Interface Map – Hardin County

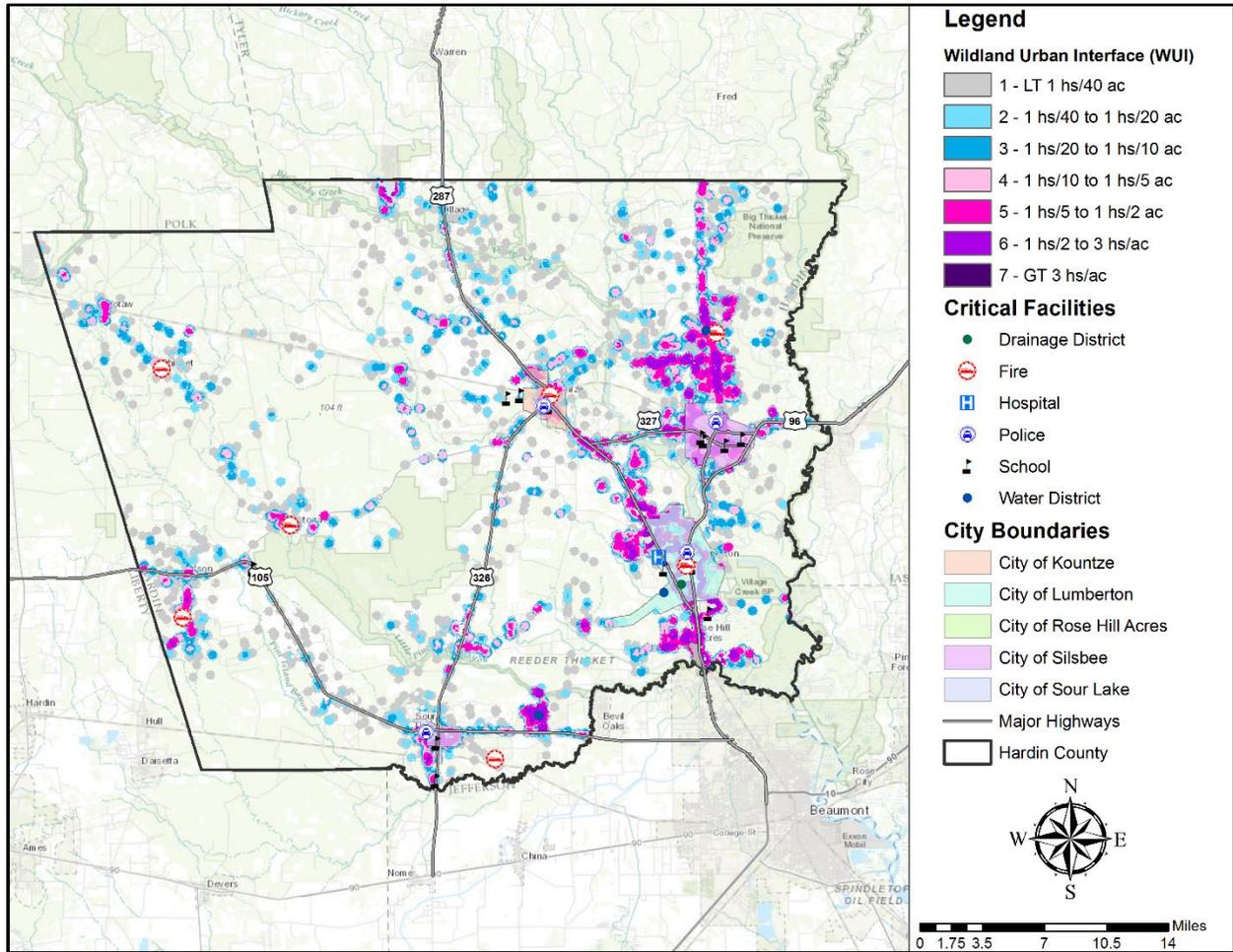
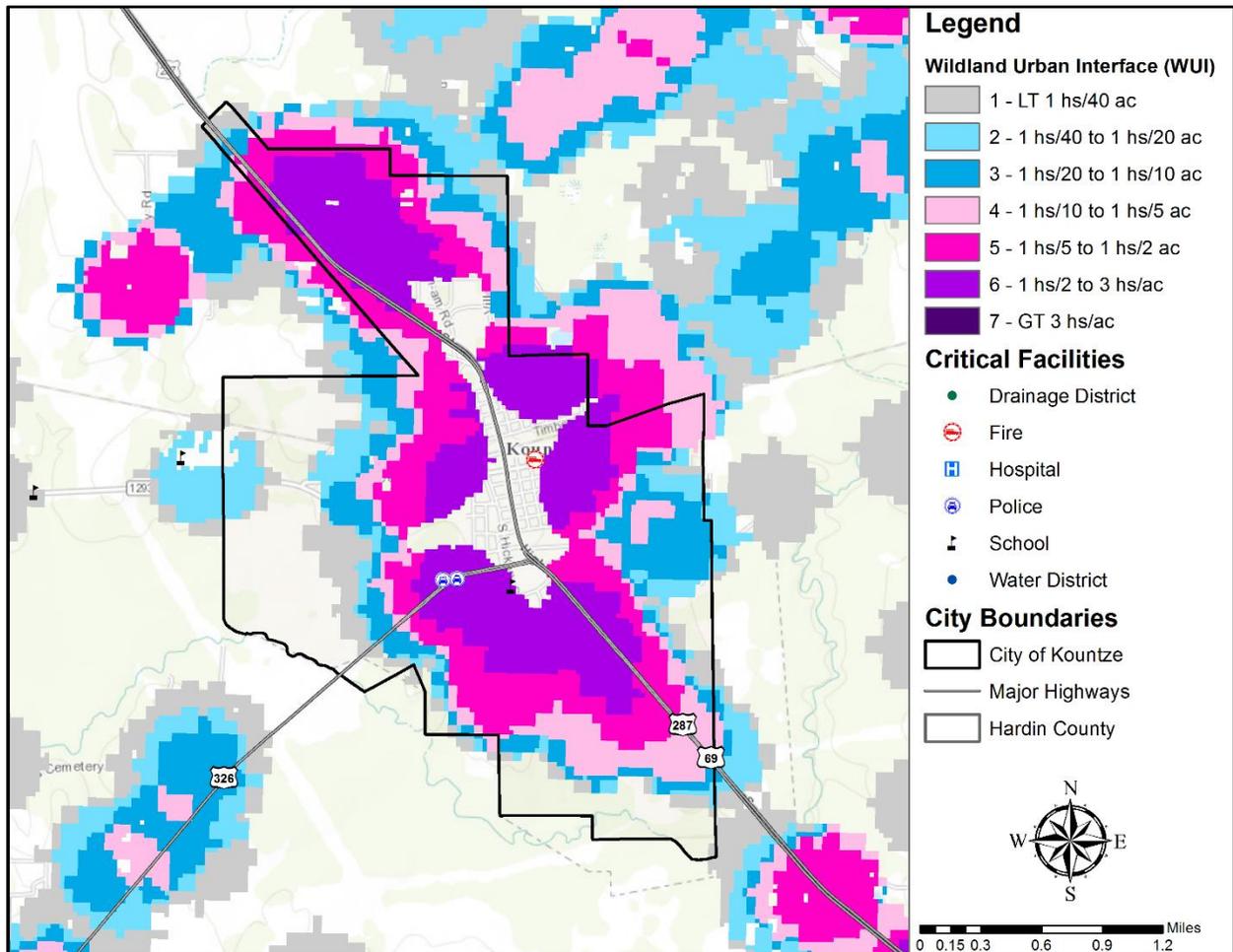
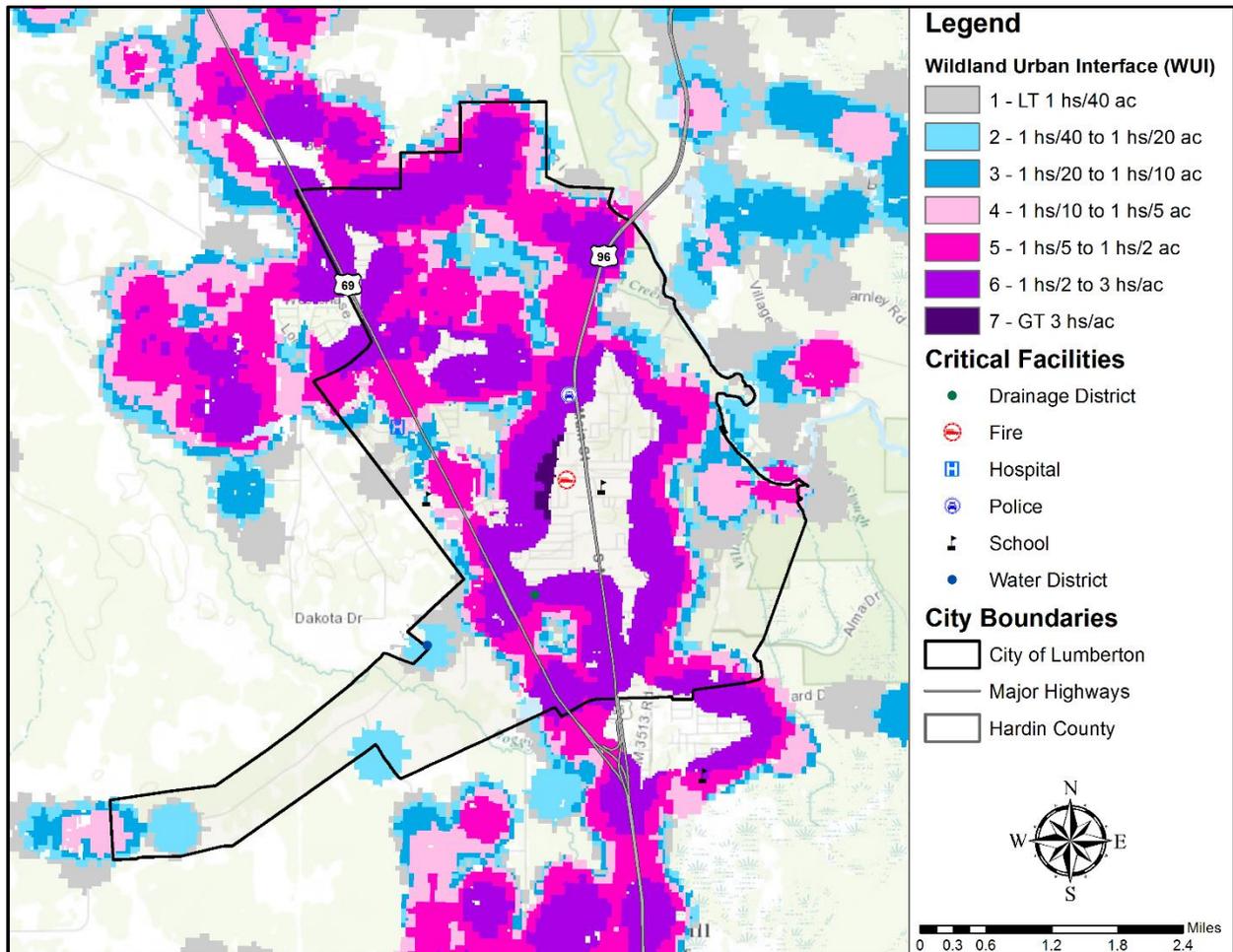


Figure 13-2. Wildland Urban Interface Map – Kountze



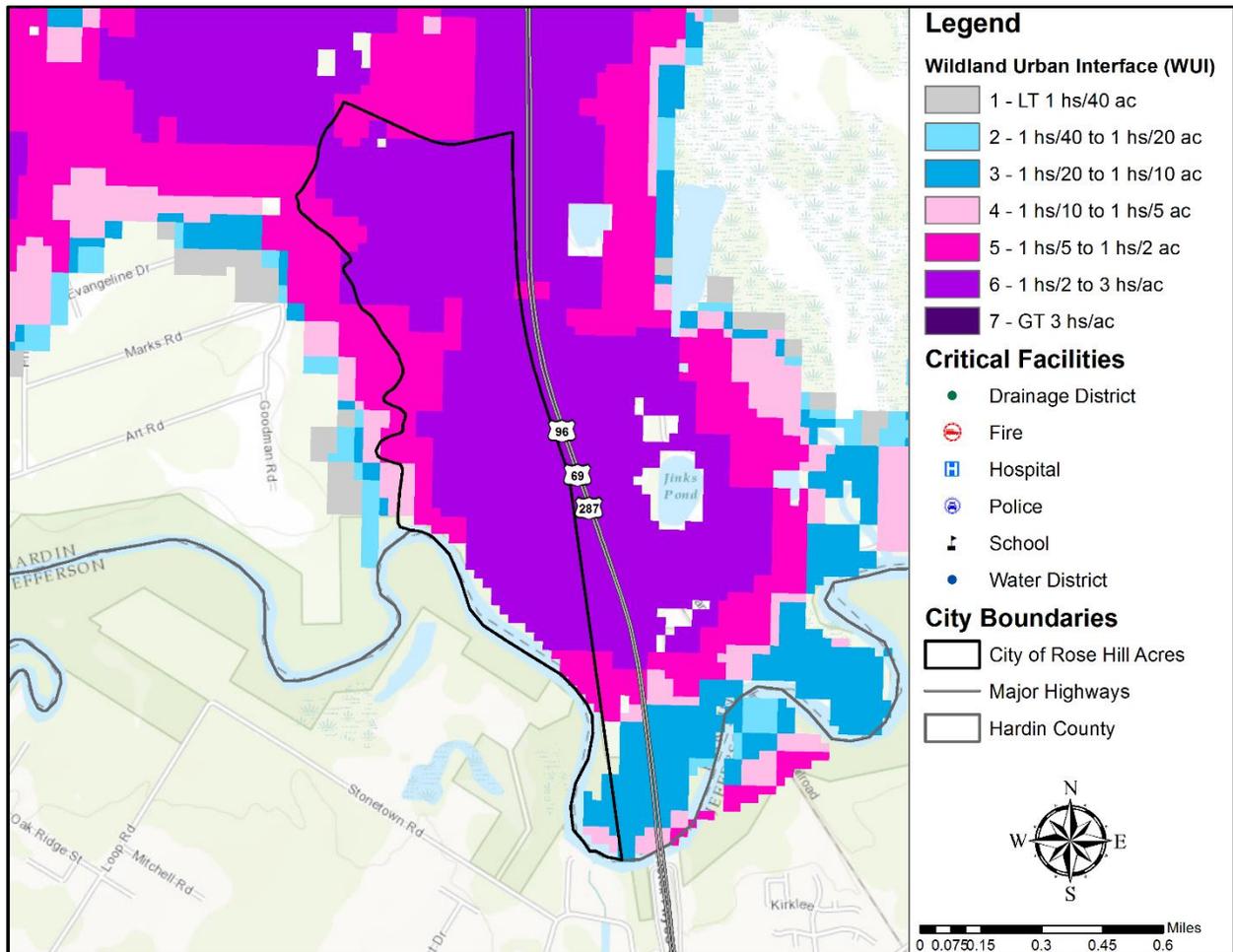
It is estimated that 85 percent of the total population in Kountze live within the WUI. However, the entire City of Kountze is at risk for wildfires.

Figure 13-3. Wildland Urban Interface Map – Lumberton



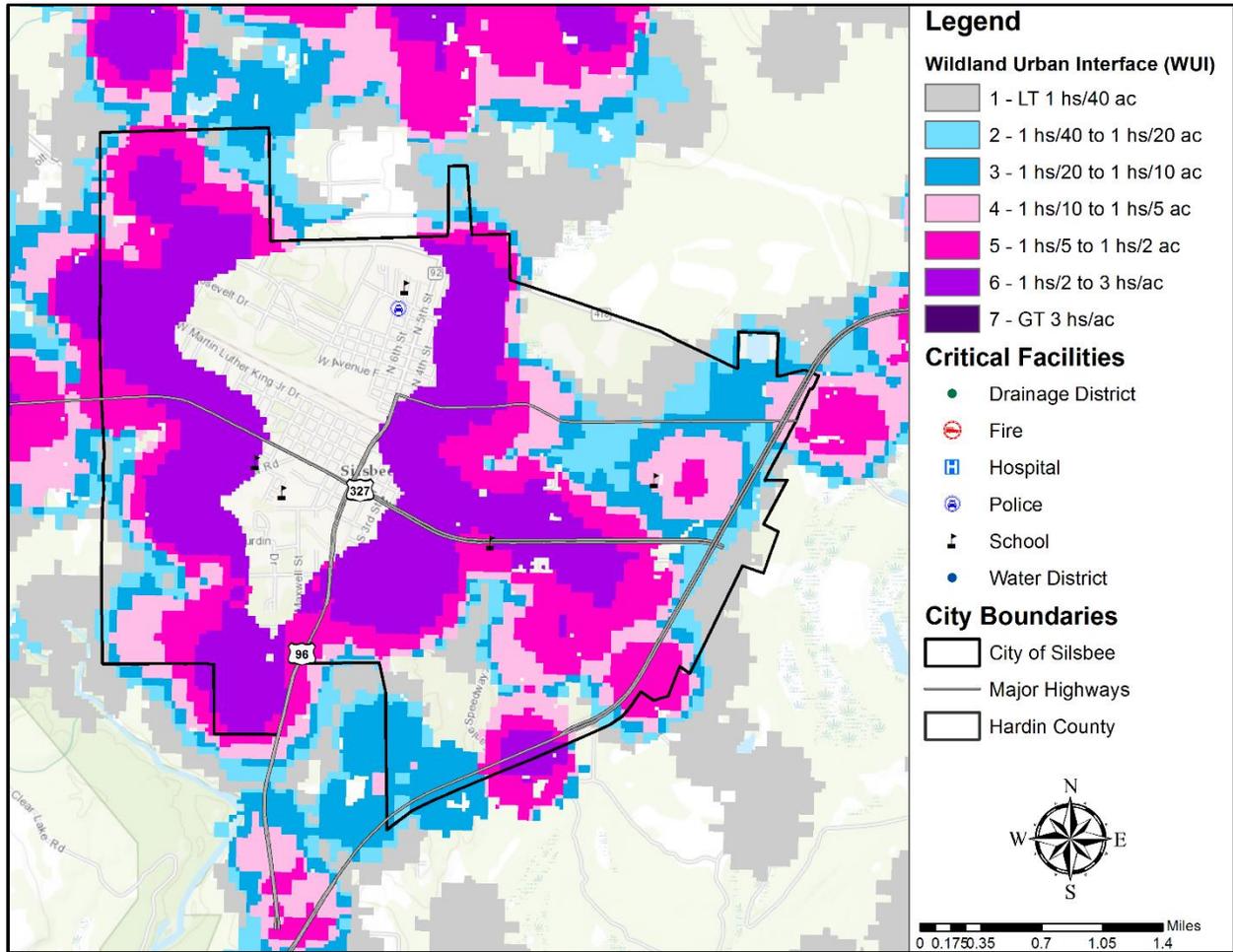
It is estimated that 68 percent of the total population in Lumberton live within the WUI. However, the entire City of Lumberton is at risk for wildfires.

Figure 13-4. Wildland Urban Interface Map – Rose Hill Acres



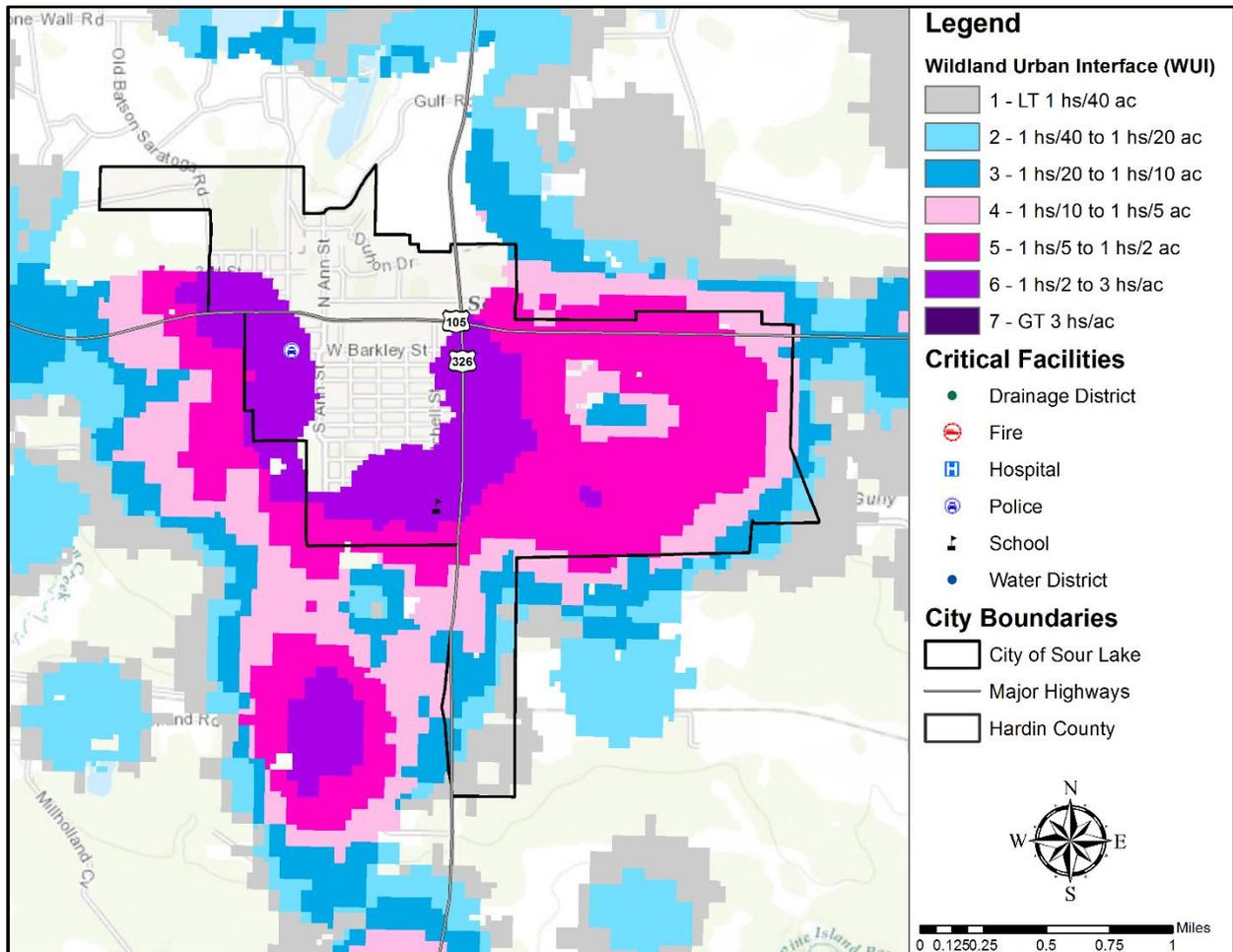
It is estimated that 100 percent of the total population in Rose Hill Acres live within the WUI, and therefore the entire City of Rose Hill Acres is at risk for wildfires.

Figure 13-5. Wildland Urban Interface Map – Silsbee



It is estimated that 69 percent of the total population in Silsbee live within the WUI. However, the entire City of Silsbee is at risk for wildfires.

Figure 13-6. Wildland Urban Interface Map – Sour Lake



It is estimated that 55 percent of the total population in Sour Lake live within the WUI. However, the entire City of Sour Lake is at risk for wildfires.

EXTENT

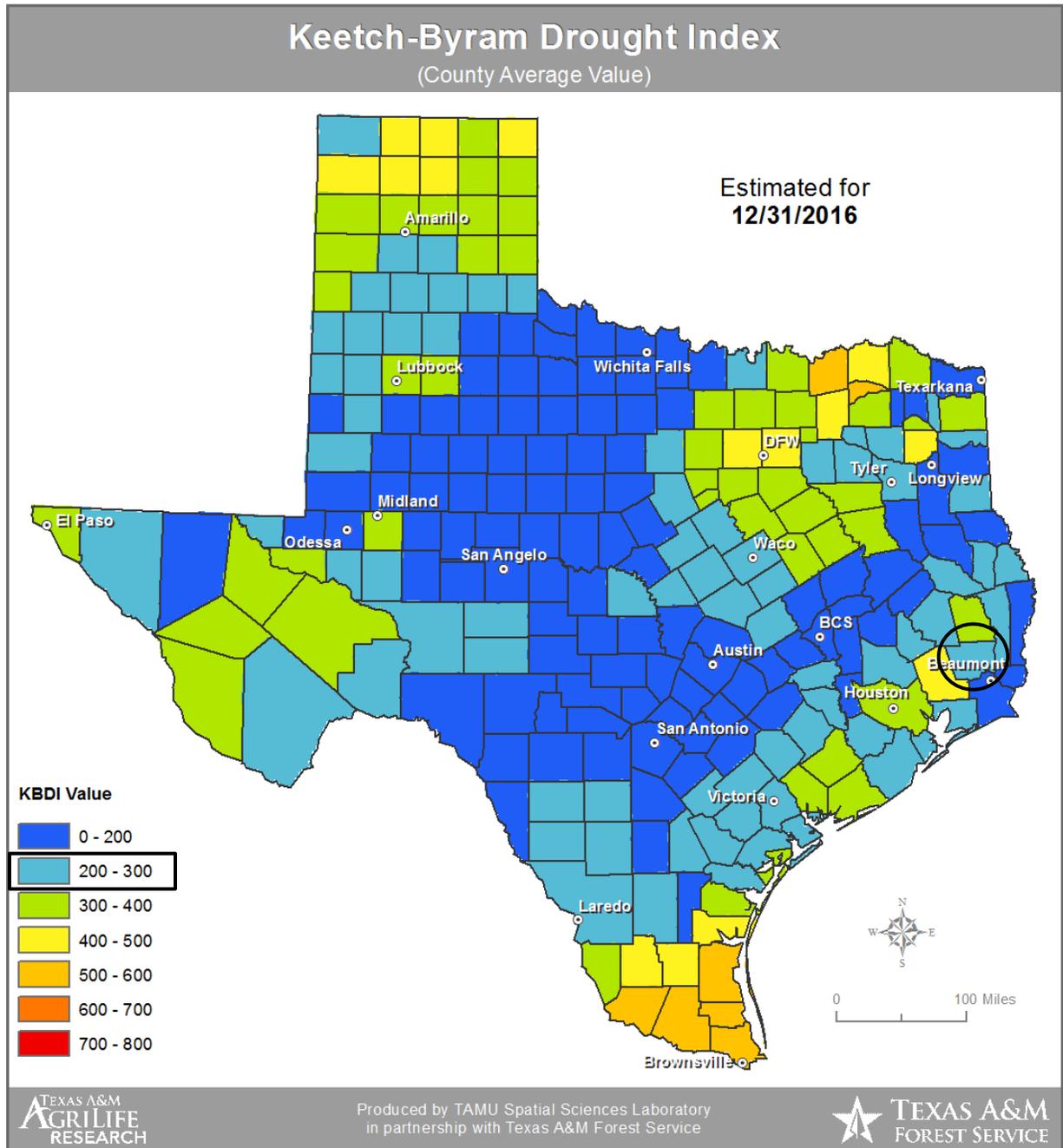


Risk for a wildfire event is measured in terms of magnitude and intensity using the Keetch Byram Drought Index (KBDI), a mathematical system for relating current and recent weather conditions to potential or expected fire behavior. The KBDI determines forest fire potential based on a daily water balance,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

Section 13: Wildfire

Each color in Figure 13-7 represents the drought index at that location. The drought index ranges from 0 to 800. A drought index of 0 represents no moisture depletion, and a drought index of 800 represents absolutely dry conditions.

Figure 13-7. Keetch-Byram Drought Index (KBDI) for the State of Texas, 2016¹



¹ Hardin County is located within the black circle.

Section 13: Wildfire

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

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

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

The range of intensity for Hardin County in a wildfire event is within 200-300. The average extent to be mitigated for the Hardin County planning area is a KBDI of 464. At this level fires intensity begins to significantly increase and fires readily burn in all directions, exposing mineral soils in some locations.

The Texas Forest Service's Fire Intensity Scale identifies areas where significant fuel hazards and associated dangerous fire behavior potential exist based on weighted average of four percentile weather categories. Hardin County is currently at a predominantly low potential wildfire intensity. Figures 13-8 through 13-13 identifies the wildfire intensity for the Hardin County planning area.

Figure 13-8. Fire Intensity Scale Map – Hardin County

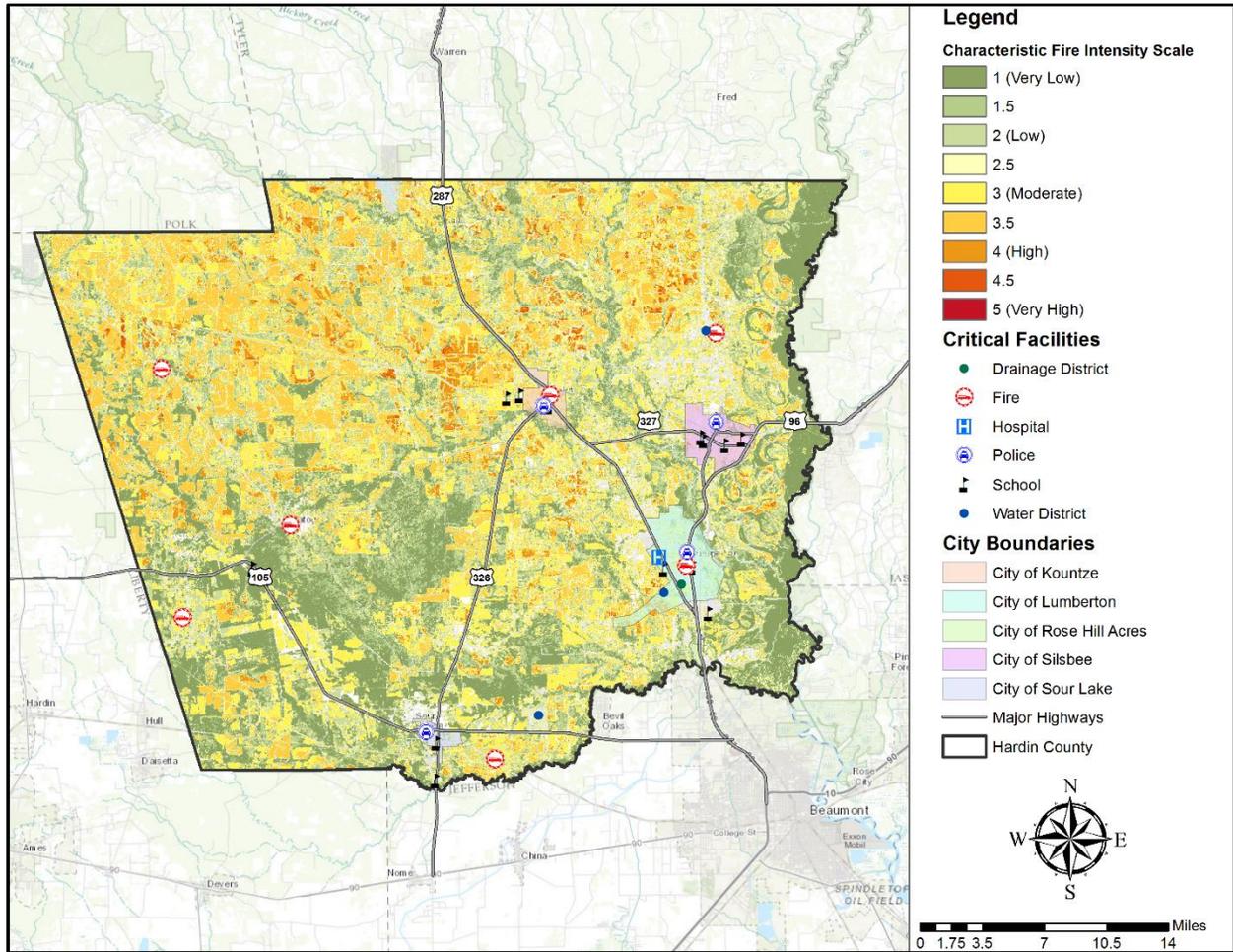


Figure 13-9. Fire Intensity Scale Map – Kountze

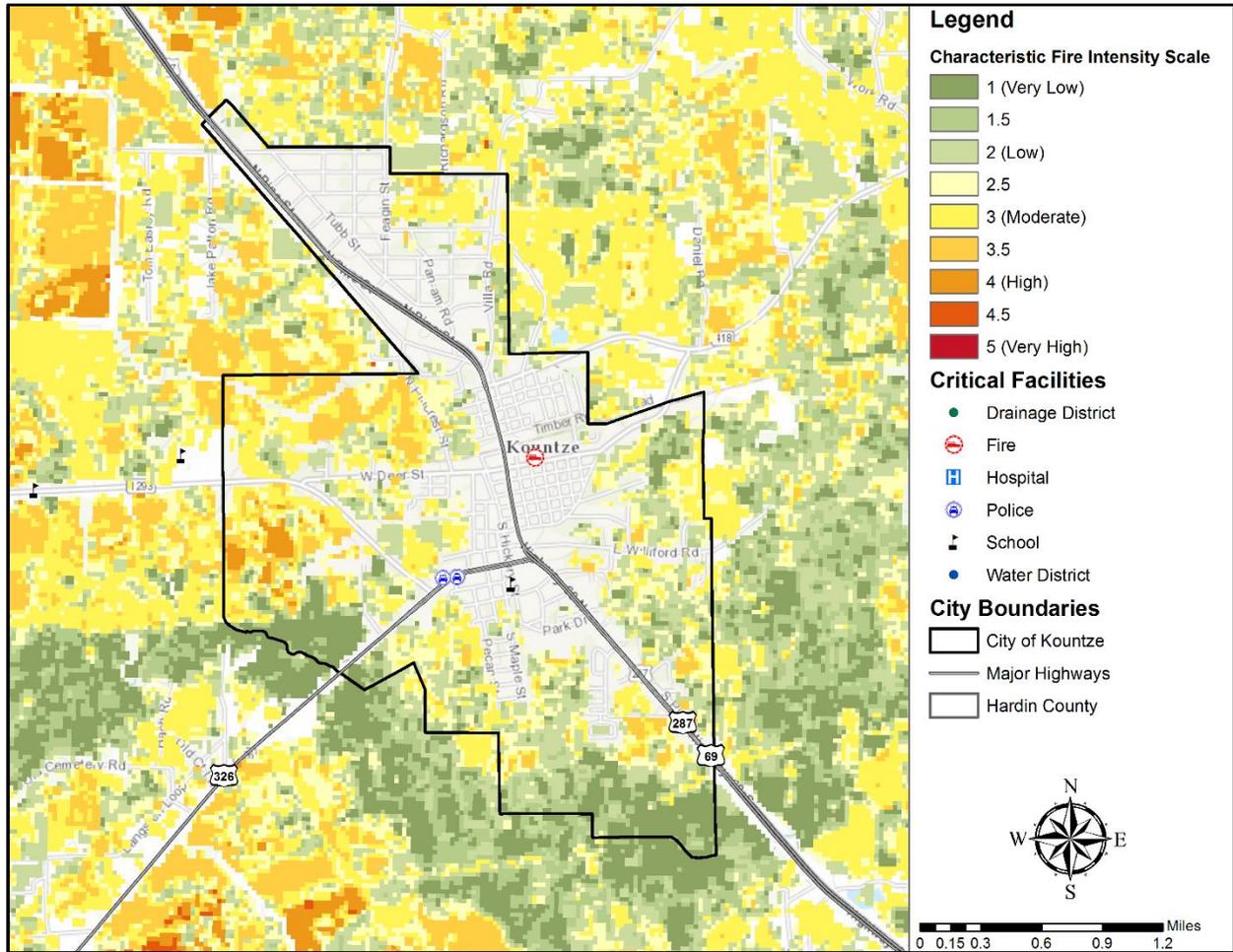


Figure 13-10. Fire Intensity Scale Map – Lumberton

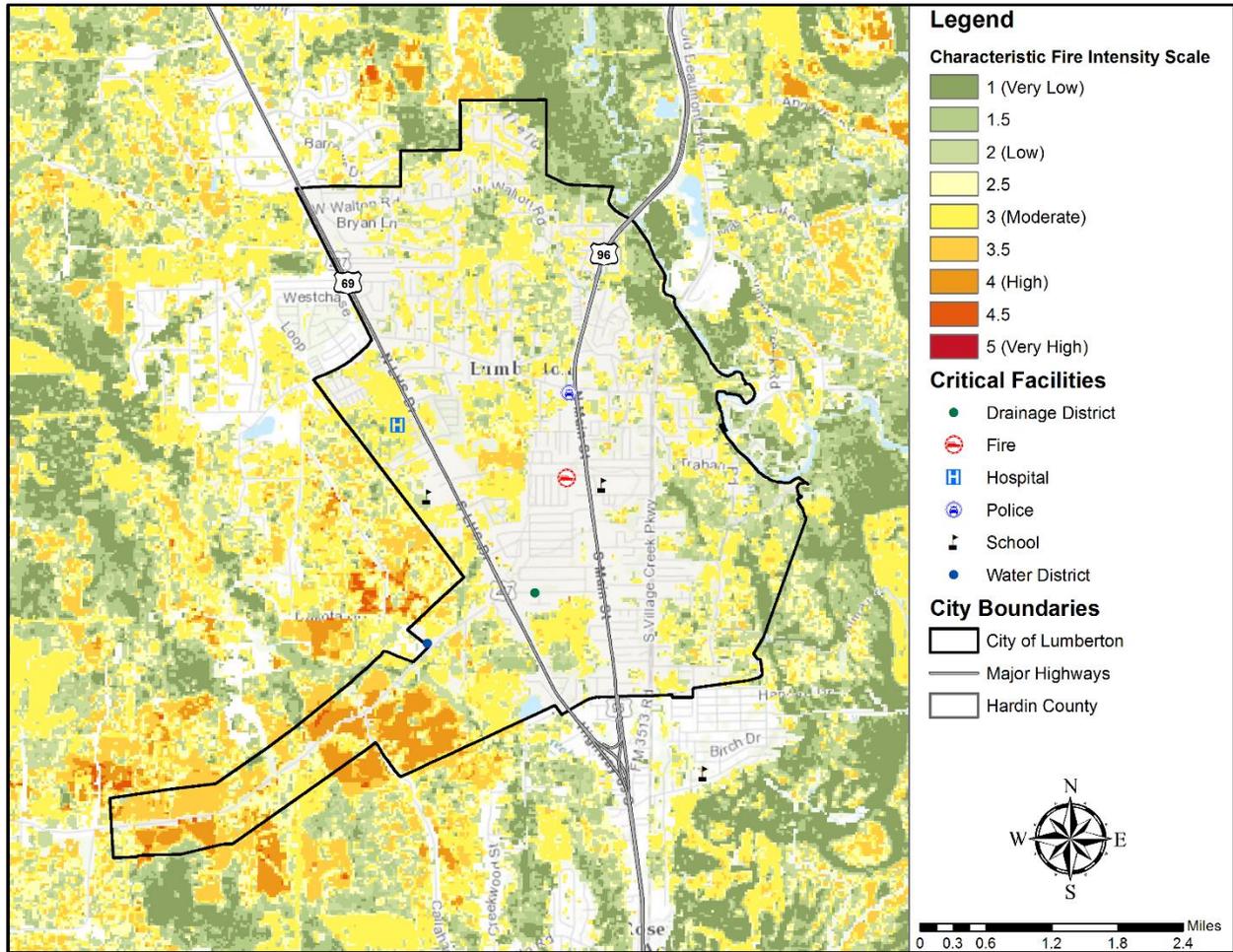


Figure 13-11. Fire Intensity Scale Map – Rose Hill Acres

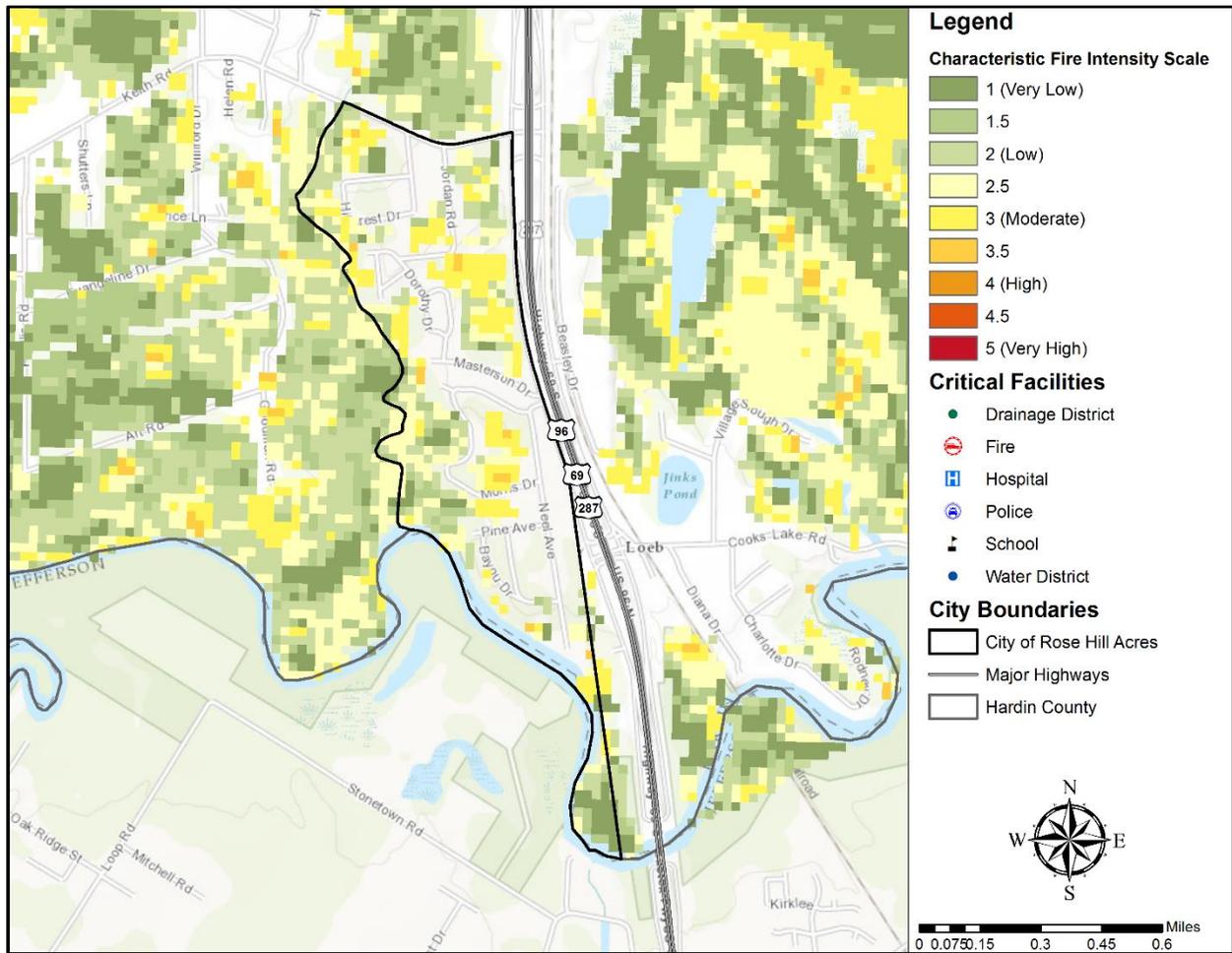


Figure 13-12. Fire Intensity Scale Map – Silsbee

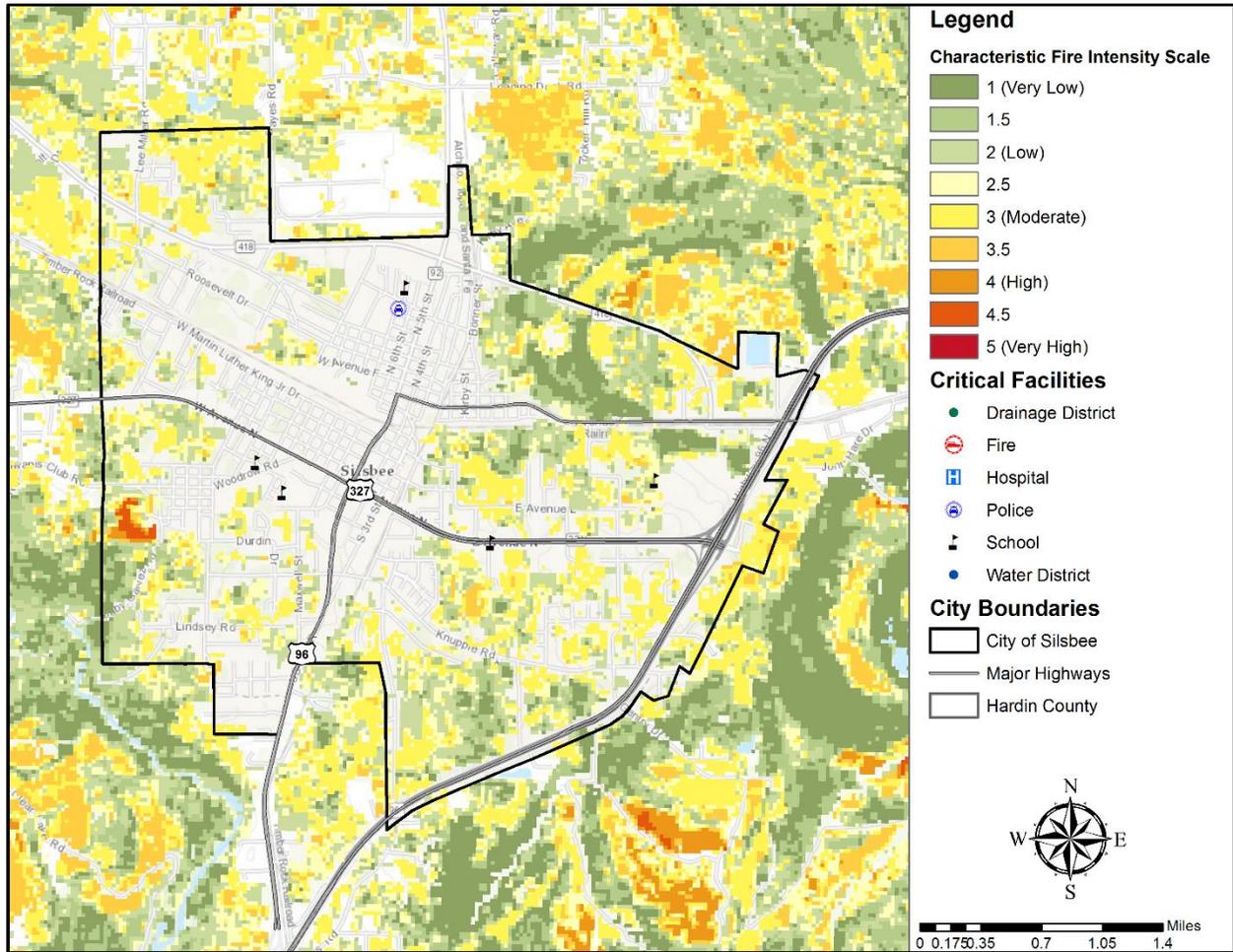
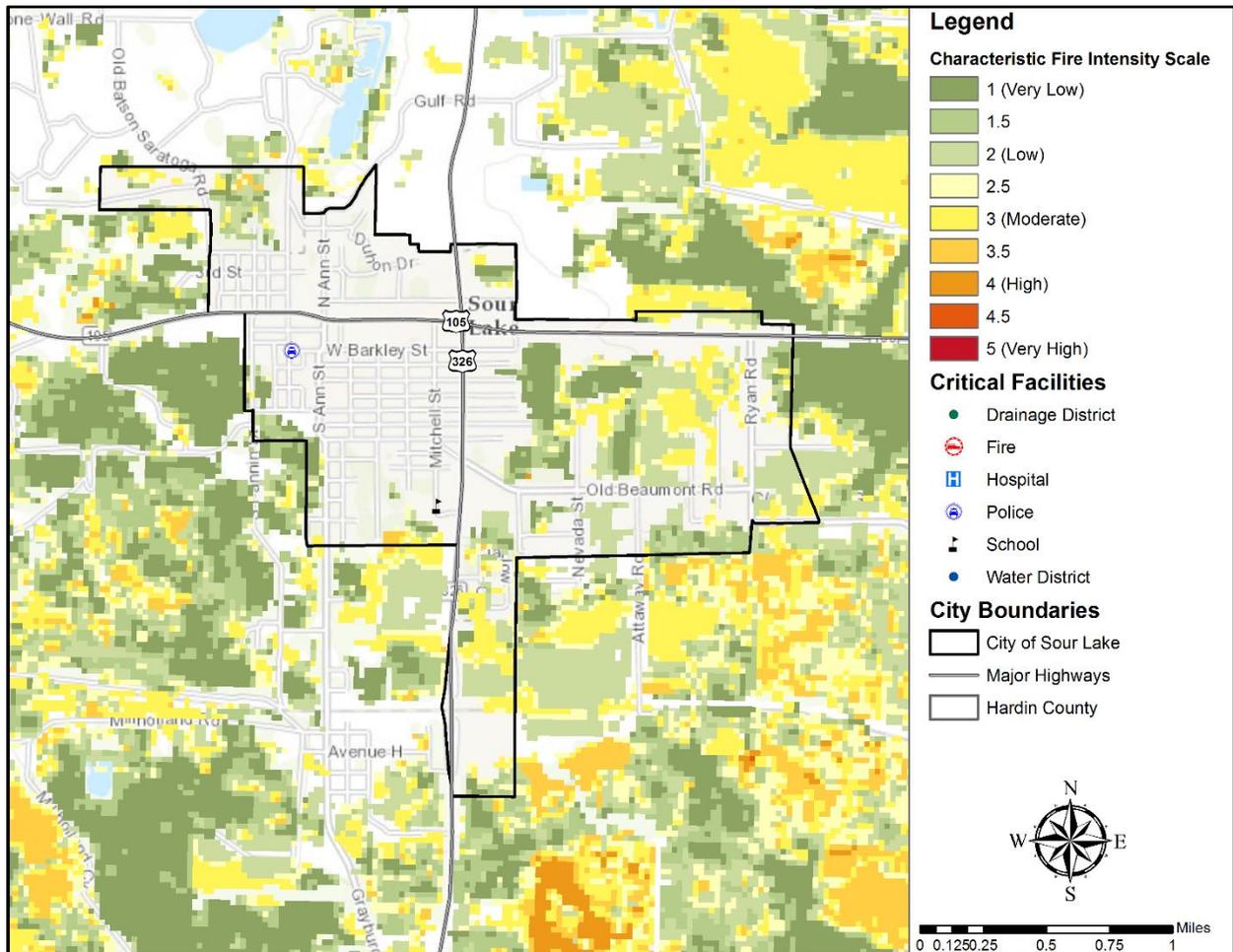


Figure 13-13. Fire Intensity Scale Map – Sour Lake



HISTORICAL OCCURRENCES

The Texas Forest Service reported 987 wildfire events between 2005 and 2015. The National Centers for Environmental Information (NCEI) reported 5 events from 1996 through June 2016. The Texas Forest Service (TFS) started collecting wildfire data in 1985 and volunteer fire departments started reporting events until 2005. Due to a lack of recorded data for wildfire events prior to 2005, frequency calculations are based on an eleven-year period, using only data from recorded years. The map below shows approximate locations of wildfires, which can be grass or brushfires of any size (Figure 13-14). Table 13-1 identifies the number of wildfires by jurisdiction and total acreage burned.

Figure 13-14. Location and Historic Wildfire Events for Hardin County

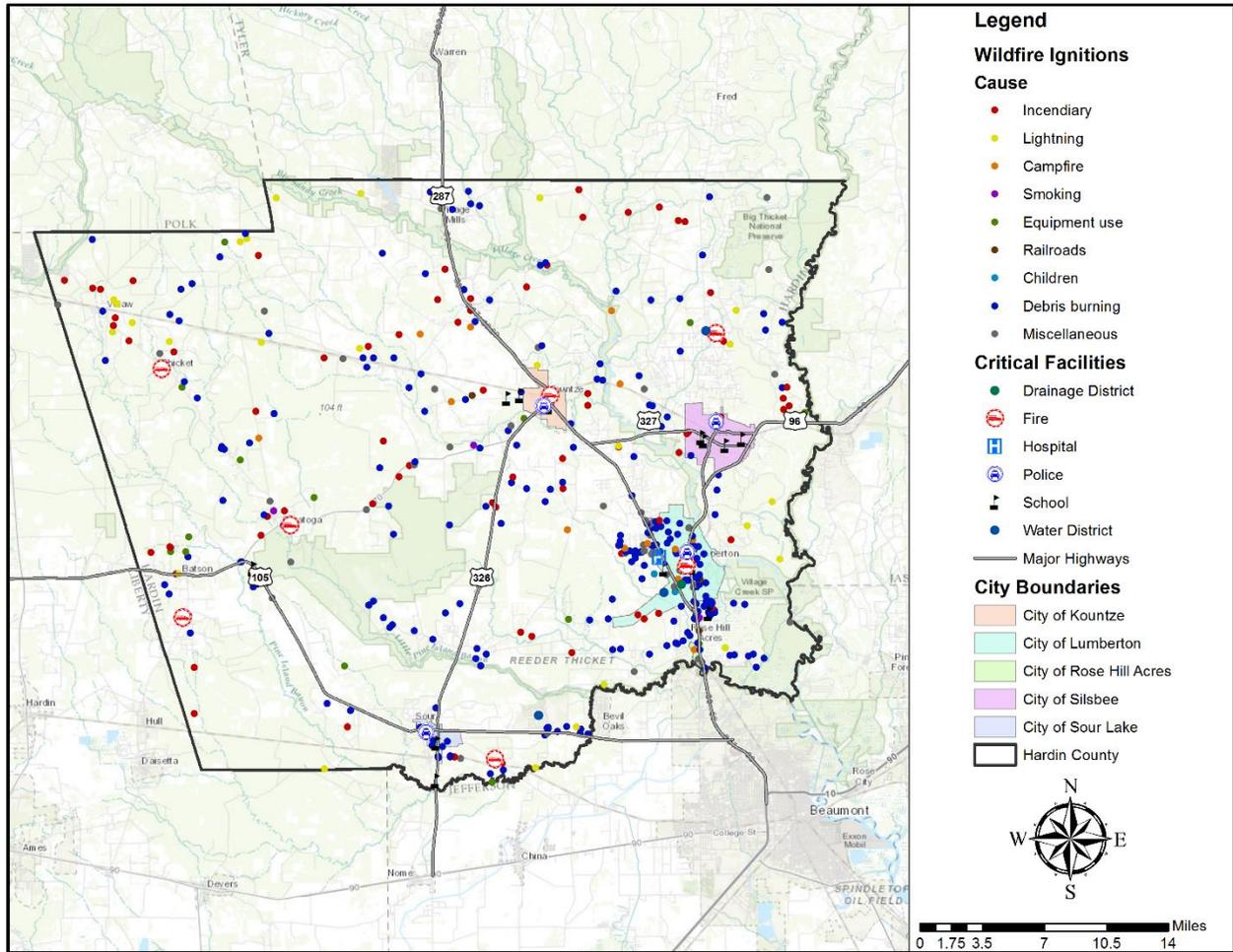


Table 13-1. Historical Wildfire Events Summary

JURISDICTION	NUMBER OF EVENTS	ACRES BURNED
Hardin County	876	17,031
Kountze	12	100
Lumberton	83	57
Rose Hill Acres	2	0
Silsbee	8	39
Sour Lake	11	28

Table 13-2. Acreage of Suppressed Wildfire by Year

JURISDICTION	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Hardin County	1,802	1,319	168	1,184	1,159	3,910	5,936	1,084	358	86	25
Kountze	0	0	1	5	0	61	23	10	0	0	0
Lumberton	0	16	6	20	12	0	1	2	0	0	0
Rose Hill Acres	0	0	0	0	0	0	0	0	0	0	0
Silsbee	19	6	0	3	0	0	7	4	0	0	0
Sour Lake	0	0	0	1	6	7	9	0	5	0	0

PROBABILITY OF FUTURE EVENTS

Wildfires can occur at any time of the year. As the jurisdictions within the county move into wildland, the potential area of occurrence of wildfire increases. With 992 events in an 11 year period, an event within Hardin County, including all participating jurisdictions, is highly likely, meaning an event is probable within the next year.

VULNERABILITY AND IMPACT

Periods of drought, dry conditions, high temperatures, and low humidity are factors that contribute to the occurrence of a wildfire event. Areas along railroads and people whose homes are in woodland settings have an increased risk of being affected by wildfire.

The heavily populated, urban areas of Hardin County are not likely to experience large, sweeping fires. Areas outside of city limits and in the unincorporated areas of Hardin County are vulnerable. 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 mostly along the perimeter of the study area where wildland and urban areas interface. Figures 13-1 through 13-6 illustrate the areas that are the most vulnerable to wildfire throughout the County.

The sparsely populated unincorporated areas of Hardin County and the small community of Rose Hill Acres are capable of experiencing large sweeping fires, especially where areas of vegetation are not maintained. Areas along major highways in Silsbee and Sour Lake, as well as Hardin County, have an increased vulnerability where empty lots and unoccupied areas are located.

The following critical facilities are located in the Wildland Urban Interface (WUI) and are more susceptible to wildfire in each participating jurisdiction:

Section 13: Wildfire

Table 13-3. Critical Facilities Located in WUI by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Hardin County	2 Fire Stations, 1 School
Kountze	Sheriff's Department, Police Station, 2 Schools
Lumberton	Police Station, Water District Facility, Drainage District Facility, Hospital, 1 School
Rose Hill Acres	None
Silsbee	Fire Station, Water District Facility, 3 Schools
Sour Lake	Police Station, Water District Facility, 2 Schools

Within Hardin County, a total of 992 fire events were reported from 2005 to 2016. All of these events were suspected wildfires. Historic loss and annualized estimates due to wildfires are presented in Table 13-4 below. The frequency is approximately 90 events every year.

Table 13-4. Historic Loss Estimates Due to Wildfire²

JURISDICTION	NUMBER OF EVENTS	ACRES BURNED	ANNUAL ACRE LOSSES
Hardin County	876	17,031	1,548
Kountze	12	100	9.1
Lumberton	83	57	5.2
Rose Hill Acres	2	0	0
Silsbee	8	39	3.5
Sour Lake	11	28	2.5

Figures 13-15 through 13-20 show Hardin County and the threat of wildfire to the County and participating jurisdictions.

² Events divided by 11 years of data.

Figure 13-15. Wildfire Ignition Density – Hardin County

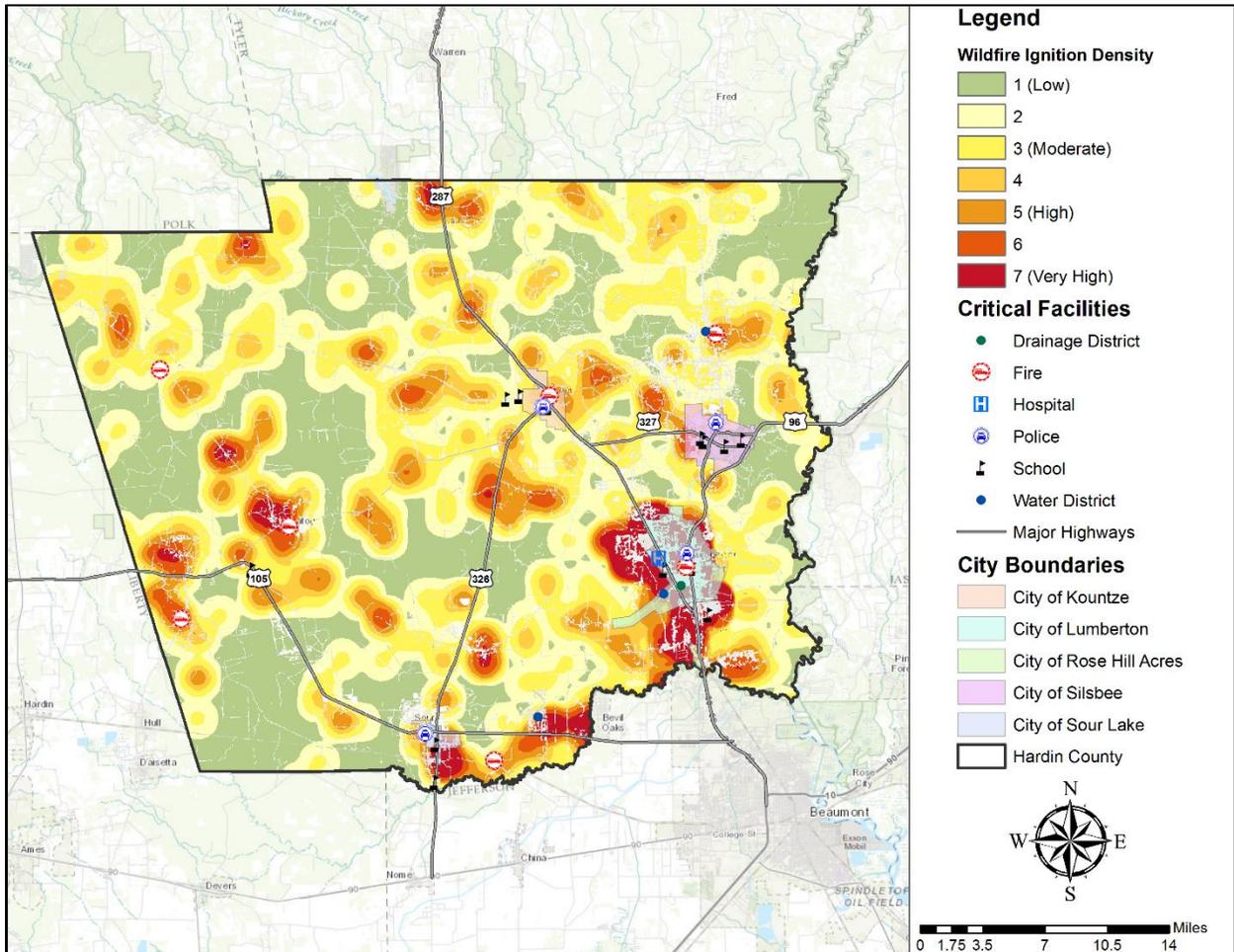


Figure 13-16. Wildfire Ignition Density – Kountze

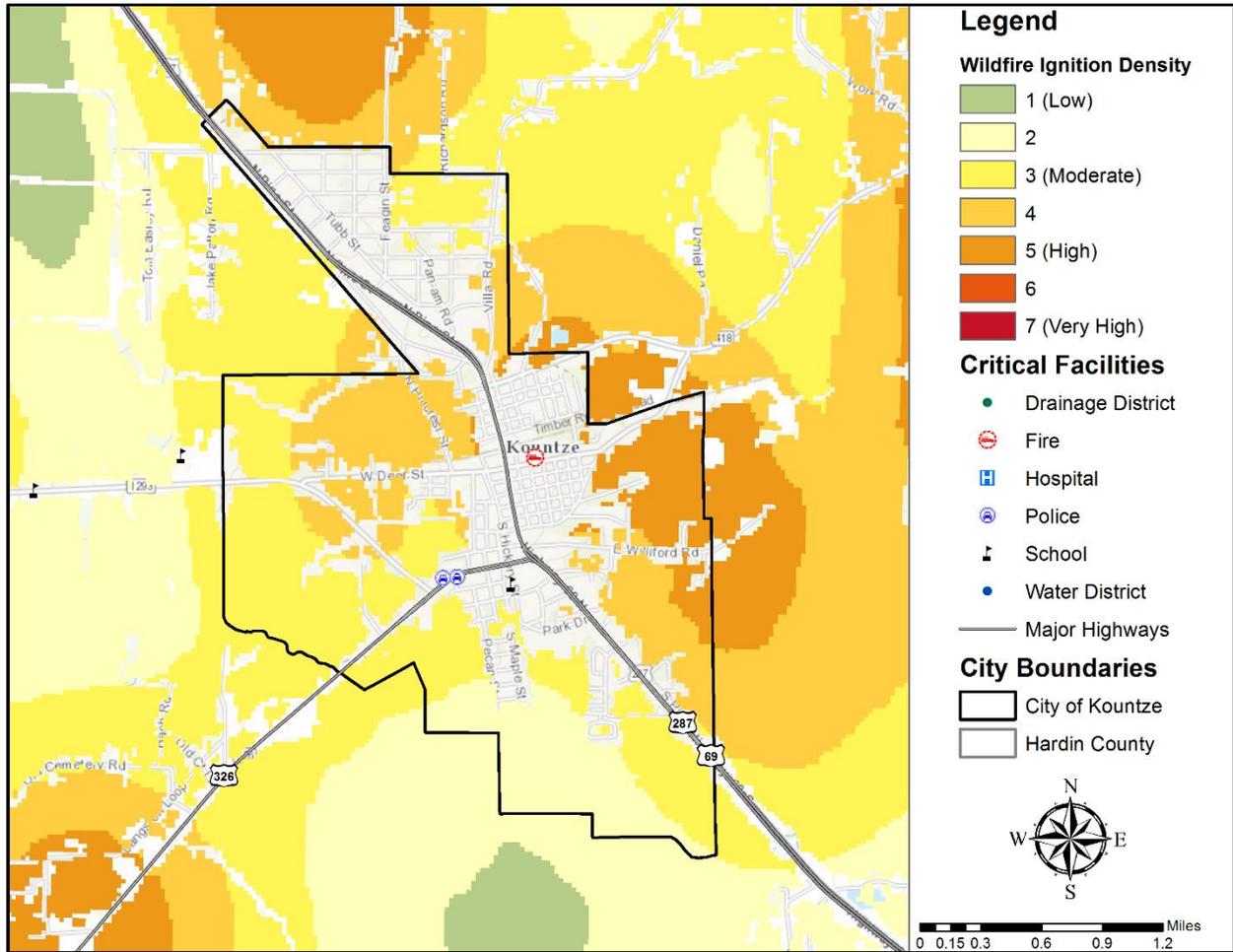


Figure 13-17. Wildfire Ignition Density – Lumberton

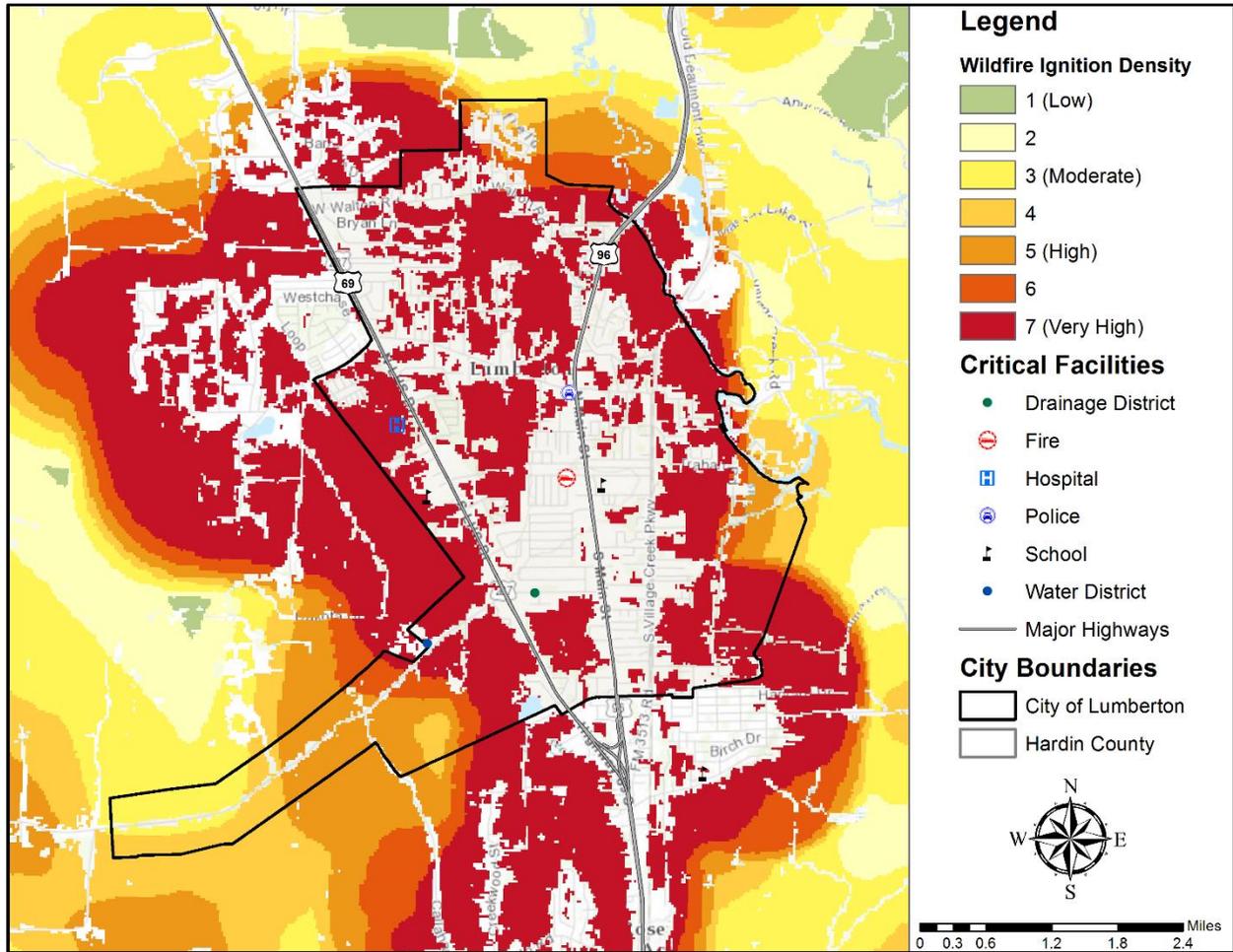


Figure 13-18. Wildfire Ignition Density – Rose Hill Acres

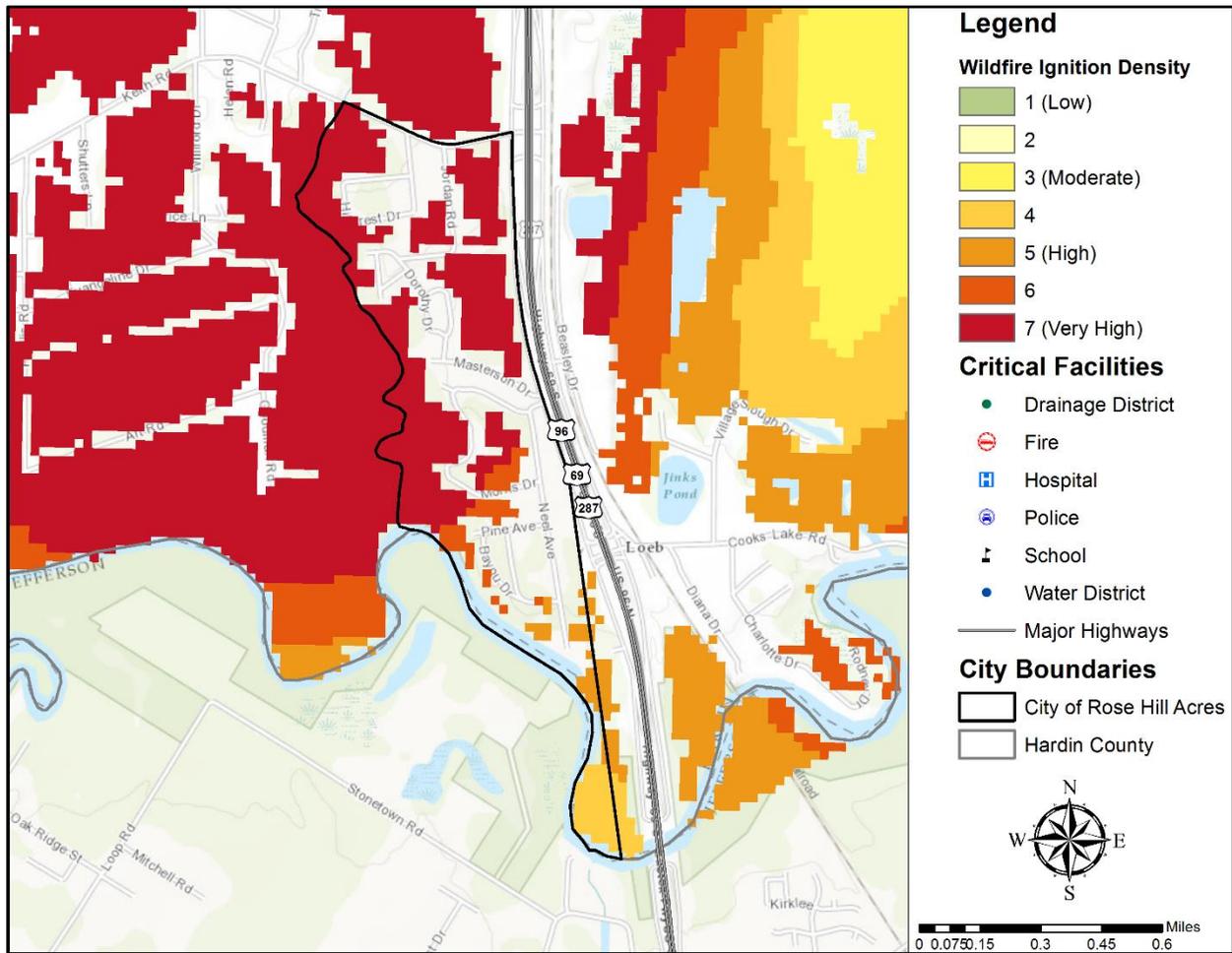


Figure 13-19. Wildfire Ignition Density – Silsbee

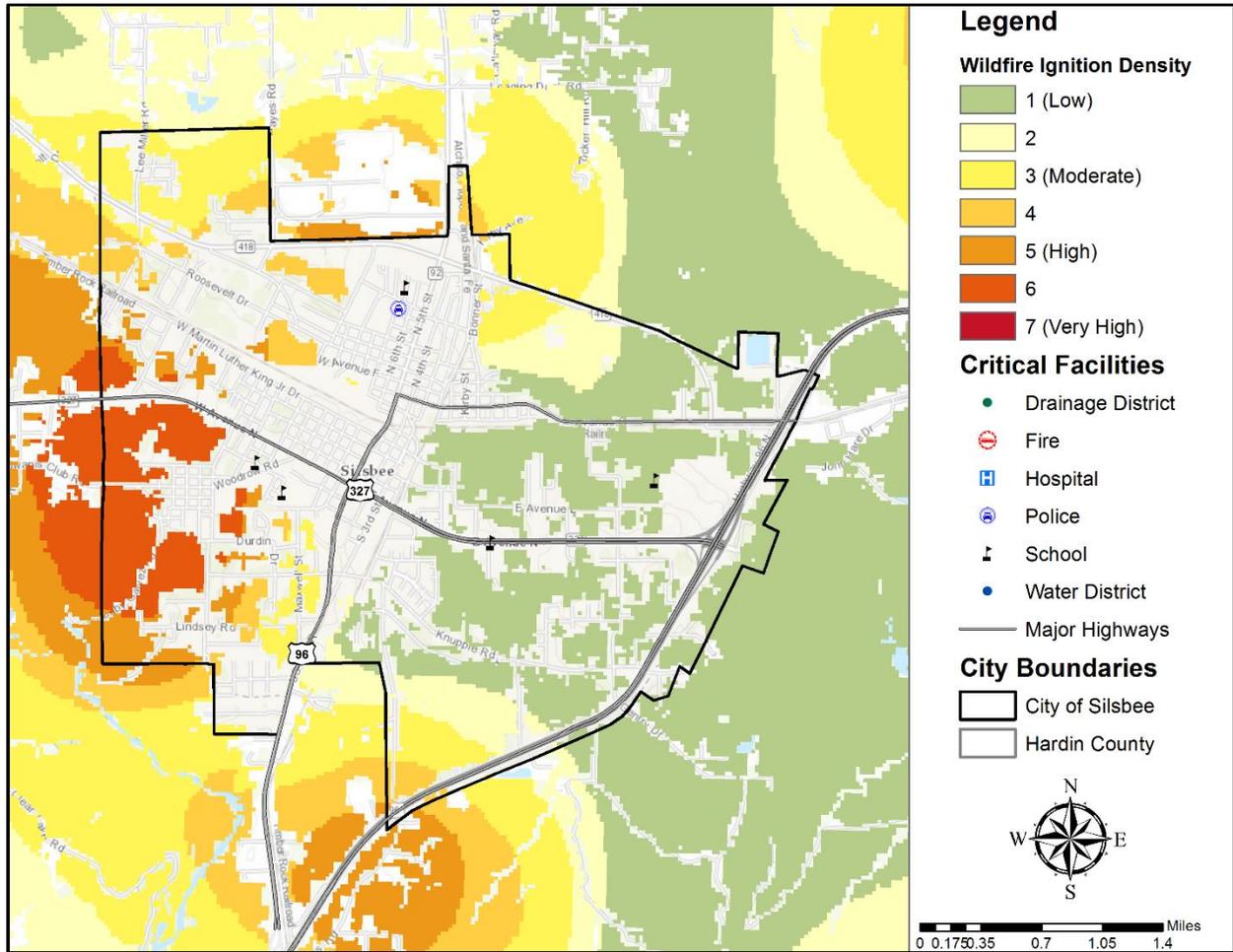
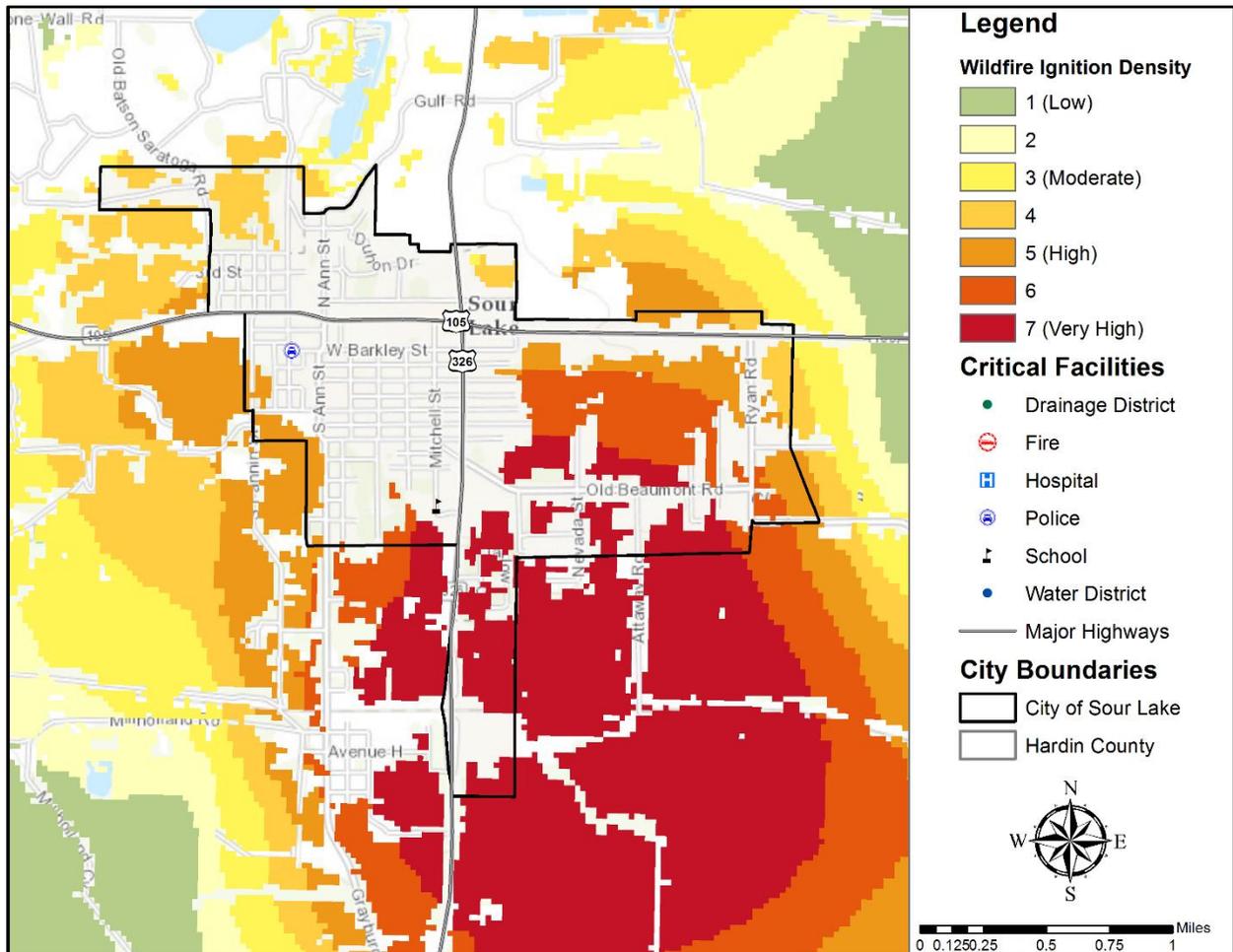


Figure 13-20. Wildfire Ignition Density – Sour Lake



Diminished air quality is an environmental impact that can result from a wildfire event and pose a potential health risk. The smoke plumes from wildfires can contain potentially inhalable carcinogenic matter. Fine particles of invisible soot and ash that are too microscopic 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.

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

The severity of impact from major wildfire events can be substantial. Such events can cause multiple deaths, shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. Severity of impact is gauged by acreage burned, homes and structures lost, and the number of resulting injuries and fatalities. For the Hardin County planning area, the impact from a wildfire

Section 13: Wildfire

event can be considered "Minor," meaning injuries and/or illnesses are treatable with first aid, shutdown of facilities and services for 24 hours or less, and less than 10% of property is destroyed or with major damage.

Assessment of Impacts

A Wildfire event poses a potentially significant risk to public health and safety, particularly if the wildfire is initially unnoticed and spreads quickly. The impacts associated with a wildfire are not limited to the direct damages. Potential impacts for the planning area include:

- Persons 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 since they are 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, and roadways are inaccessible or personnel are unable to report for duty.
- Critical city and/or county departments may not be able to function and provide necessary services depending on the location of the fire and the structures or personnel impacted.
- Non-critical businesses may be directly damaged, suffer loss of utility services, or be otherwise inaccessible, delaying normal operations and slowing the recovery process.
- Displaced residents may not be able to immediately return to work, further 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.
- 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.
- Wildfires can cause erosion, degrading stream water quality.
- Wildlife may be displaced or destroyed.
- Historical or cultural resources may be damaged or destroyed.
- Tourism can be significantly disrupted, further delaying economic recovery for the area.
- Economic disruption negatively impacts the programs and services provided by the community due to short and long term loss in revenue.
- Fire suppression costs can be substantial, exhausting the financial resources of the community.
- Residential structures lost in a wildfire may not be rebuilt for years, reducing the tax base for the community.

Section 13: Wildfire

- Neches River and Village Creek State Park recreation and tourism can be unappealing for years following a large wildfire, devastating directly related businesses.
- 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 government, businesses, and citizens will contribute to the overall economic and financial conditions in the aftermath of a wildfire event.

SECTION 14: WINTER STORM

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HAZARD DESCRIPTION



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

Winter storms that threaten Hardin County usually begin as powerful cold fronts that push south from central Canada. The County is at risk to ice hazards and extremely cold temperatures, as well as snow. The effects and frequencies of winter storm events are generally mild and short-lived. As indicated in Figure 14-1, on average, the area experiences 1-10 cold days a year, meaning 1-10 days per year are at or around freezing temperatures. During these times of ice and snow accumulation, response times will increase until public works road crews are able to assist in making the major roads passable. Table 14-1 describes the types of winter storms possible to occur in Hardin County.

Figure 14-1. Extreme Cold Days, 1960-2003¹

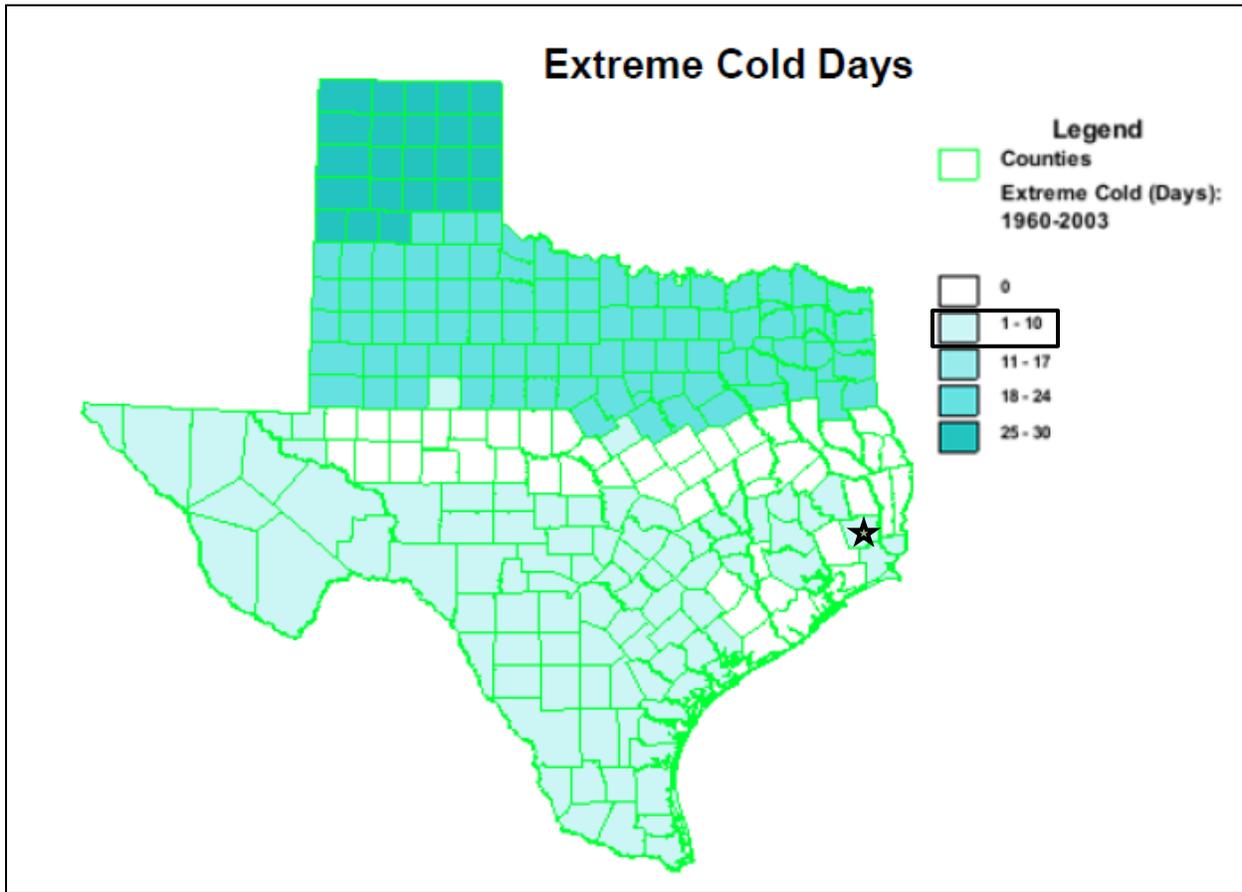


Table 14-1. Types of Winter Storms

TYPE OF WINTER STORM	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.

¹ Source: National Weather Service. Hardin County indicated by star.

Section 14: Winter Storm

TYPE OF WINTER STORM	DESCRIPTION
Blizzard Warning	Sustained wind speeds of at least 35 mph are accompanied by considerable falling or blowing snow. This alert is the most perilous winter storm with visibility dangerously restricted.
Frost/Freeze Warning	Below freezing temperatures are expected and may cause significant damage to plants, crops, and fruit trees.
Wind Chill	A strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower in a calm atmosphere. The combined cooling power of the wind and temperature on exposed flesh is called the wind-chill factor.

LOCATION

Winter storm events are not confined to specific geographic boundaries. Therefore, all existing and future buildings, facilities, and populations in the Hardin County planning area, including all participating jurisdictions, are considered to be exposed 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 14-2. Table 14-2 should be read in conjunction with the wind-chill factor described in Figure 14-2 to determine the intensity of a winter storm. The chart is not applicable when temperatures are over 50°F, or winds are calm. This is an index developed by the National Weather Service.

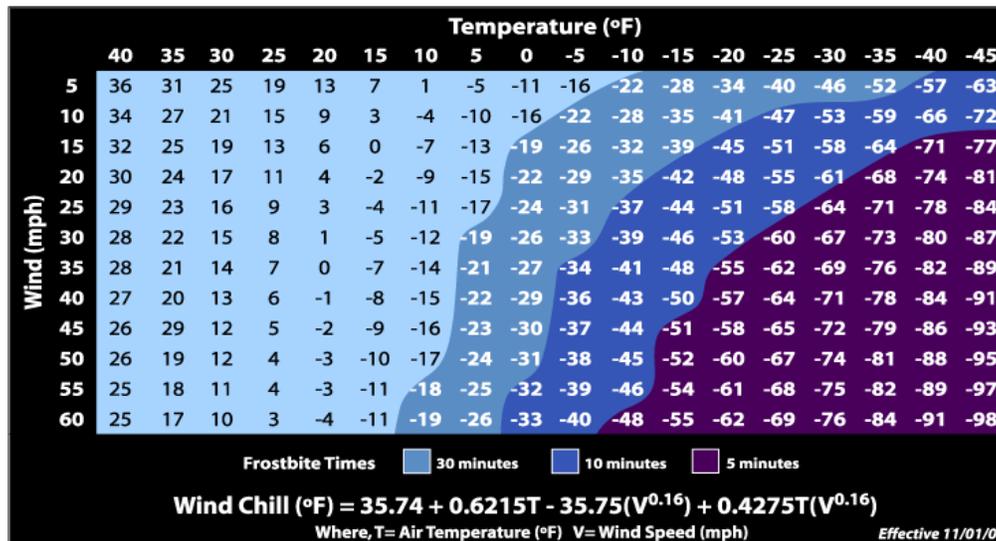
Table 14-2. Magnitude of Severe Winter Storms

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

Figure 14-2. Wind Chill Chart



Wind Chill Chart



Wind chill temperature is a measure of how cold the wind makes real air temperature feel to the human body. Since wind can dramatically accelerate heat loss from the body, a blustery 30°F day would feel just as cold as a calm day with 0°F temperatures. Hardin County has never experienced a blizzard, but based on 10 previous occurrences recorded from 1996 to September 2016, it has been subject to winter storm watches, warnings, freezing rain, sleet, snow, and wind chill.

The average number of cold days is similar for the entire county planning area. Therefore the intensity or extent of a winter storm event to be mitigated for the area ranges from mild to significant according to the definitions at Table 14-2. Hardin County planning area can expect anywhere between 0.1 to 3.0 inches of ice and snow during a winter storm event and temperatures between 25 and 50 degrees with winds ranging from 0 to 20 mph.

HISTORICAL OCCURRENCES

Table 14-3 shows historical occurrences for Hardin County from 1996 to September 2016 provided by the NCEI database. There have been 10 recorded winter storm events in Hardin County. 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. Historical winter storm data for all participating jurisdictions are provided on a County-wide basis per the NCEI database.

Table 14-3. Historical Winter Storm Events, 1996-2016²

JURISDICTION	DATE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
Hardin County	1/12/1997	0	0	\$1,496,798	\$0
Hardin County	4/7/2007	0	0	\$0	\$0
Hardin County	12/11/2008	0	0	\$0	\$0
Hardin County	12/4/2009	0	0	\$0	\$0
Hardin County	1/8/2010	0	0	\$55,086	\$0
Hardin County	2/23/2010	0	0	\$0	\$0
Hardin County	2/3/2011	0	0	\$10,680	\$0
Hardin County	1/23/2014	0	0	\$0	\$0
Hardin County	1/28/2014	0	0	\$0	\$0
Hardin County	3/4/2014	0	0	\$5,074	\$0
TOTALS		0	0	\$1,567,638	

Based on the list of historical winter storm events for the Hardin County planning area (listed above), including all participating jurisdictions, 4 of the events have occurred since the 2011 Plan.

Significant Past Events

January 12 - 14, 1997 – Hardin County

A record ice storm paralyzed southeast Texas and southwest Louisiana. Around 90,000 electric customers across southeast Texas were without power for up to six days. Emergency shelters were opened for several nights due to the cold weather following the ice storm. Hundreds of homes received minor damage due to trees or tree limbs falling on roofs. Several house fires were directly or indirectly related to the ice storm. Numerous traffic accidents attributed to icy roads led to several minor injuries. One death was indirectly attributed to the ice storm in neighboring Orange County.

January 8 – 11, 2010 – Hardin County

A deep upper level trough moving eastward across the United States forced a bitterly cold Arctic air mass southward from Canada into the Gulf Coast states on January 7, 2010. This air mass remained in place for several days across southeast Texas, leading to the coldest temperatures seen across this region since February 1996. A few record low temperatures and record low maximum temperatures were set. Many locations in the

² Values are in 2016 dollars.

Section 14: Winter Storm

Lakes Region of southeast Texas remained below freezing for over 36 hours from around midnight early on January 8th through the afternoon on Saturday January 9th.

The cold temperatures led to several school closures, numerous weather-related fires, and widespread plumbing ruptures throughout southeast Texas. One indirect fatality occurred near Jamestown in Newton County due to a house fire. The Insurance Council of Texas estimated losses across southeast Texas from the cold weather at around \$1 million.

PROBABILITY OF FUTURE EVENTS

According to historical records, Hardin County experiences approximately one winter storm event per year. Hence, the probability of a future winter storm event affecting the Hardin County planning area is highly likely, with a winter storm likely to occur within the next year. All participating jurisdiction events are included under the County.

VULNERABILITY AND IMPACT

During periods of extreme cold and freezing temperatures, water pipes can freeze and crack. In addition, the buildup of ice can cause power lines and tree limbs to break under the weight, potentially causing damage to property or power lines. These events can disrupt electric service for long periods.

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

All populations, buildings, critical facilities, and infrastructure in the entire Hardin County planning area, including all participating jurisdictions, are vulnerable to severe winter events.

The following critical facilities would be vulnerable to Winter Storm events in each participating jurisdiction:

Table 14-4. Critical Facilities by Jurisdiction

JURISDICTION	CRITICAL FACILITIES
Hardin County	4 Fire Stations, 3 Schools
Kountze	Fire Station, Sheriff's Department, Police Station, 4 Schools
Lumberton	Fire Station, Police Station, Water District Facility, Drainage District Facility, Hospital, 3 Schools
Rose Hill Acres	None
Silsbee	Fire Station, Police Station, Water District Facility, 6 Schools
Sour Lake	Fire Station, Police Station, Water District Facility, 2 Schools

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People and animals are subject to health risks from extended exposure to cold air. Elderly people are at greater risk of death from hypothermia during these events, especially in the rural areas of the county where populations are sparse, icy roads may impede travel, and there are fewer neighbors to check in on the elderly. 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.

Population over 65 in the Hardin County planning area is approximately 14.7% of the total population or an estimated total of 8,190³ potentially vulnerable residents based on age (Table 14-5).

Table 14-5. Populations at Greater Risk by Jurisdiction

JURISDICTION	POPULATION 65 AND OLDER
Kountze	296
Lumberton	1,781
Rose Hill Acres	98
Silsbee	1,275
Sour Lake	303
Hardin County⁴	8,190

Historic loss, in 2016 dollars, is estimated at \$1,567,638 in damages over the 21-year recording period giving an approximate loss of \$74,649 in damages annually (Table 14-6). The potential severity of impact is “Limited,” meaning injuries are treatable with first aid, shutdown of facilities and services for 24 hours or less, and less than 10% of property destroyed or with major damage.

Table 14-6. Potential Annualized Losses for Hardin County

JURISDICTION	PROPERTY & CROP LOSS	ANNUAL LOSS ESTIMATE
Hardin County	\$1,567,638	\$74,649

Assessment of Impacts

The greatest risk from a winter storm hazard is to public health and safety. Potential impacts for the planning area may include:

- Vulnerable populations, particularly the elderly and infants, can face serious or life-threatening health problems from exposure to extreme cold including hypothermia and frostbite.

³ US Census Bureau 2015 data for Hardin County

⁴ County totals includes all participating jurisdictions and unincorporated areas.

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- 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.
- A winter storm event could lead to tree, shrub, and plant damage or death.
- Severe cold and ice could significantly damage agricultural crops.
- 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 businesses and citizens will also contribute to the overall economic and financial conditions in the aftermath of a winter storm event.

SECTION 15: MITIGATION STRATEGY

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Goal 2.....	1
Goal 3.....	2
Goal 4.....	2
Goal 5.....	3
Goal 6.....	3

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 Workshop in August 2016, Planning Team members reviewed the mitigation strategy from the previous 2011 Plan. The consensus among all members present was that the strategy developed for the 2011 Plan did not require changes, as it identified overall improvements to be sought in the Plan Update. However, the order and priority of the goals and objectives were reorganized.

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.

Section 15: Mitigation Strategy

OBJECTIVE 2.1

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

OBJECTIVE 2.2

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

OBJECTIVE 2.3

Build hazard mitigation concerns into county 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 and man-made hazards the public may face.

OBJECTIVE 3.2

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

OBJECTIVE 3.3

Publicize and encourage the adoption of appropriate hazard mitigation measures.

Goal 4

Protect new and existing properties.

OBJECTIVE 4.1

Reduce repetitive losses to the National Flood Insurance Program (NFIP).

OBJECTIVE 4.2

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

Section 15: Mitigation Strategy

OBJECTIVE 4.3

Enact and enforce regulatory measures to ensure that future development will not put people in harm's way or increase threats to existing properties.



Goal 5

Maximize the resources for investment in hazard mitigation.

OBJECTIVE 5.1

Maximize the use of outside sources of funding.

OBJECTIVE 5.2

Maximize participation of property owners in protecting their properties.

OBJECTIVE 5.3

Maximize insurance coverage to provide financial protection against hazard events.

OBJECTIVE 5.4

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

Goal 6

Promote growth in a sustainable manner.

OBJECTIVE 6.1

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

OBJECTIVE 6.2

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

OBJECTIVE 6.3

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

SECTION 16: PREVIOUS ACTIONS

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SUMMARY

Planning Team members were given copies of the previous mitigation actions submitted in the 2011 Plan at the mitigation workshop. Hardin County reviewed the previous actions and provided an analysis as to whether the action had been completed, should be deferred as an ongoing activity, or be deleted from the Plan. The actions from the 2011 Plan are included in this section as they were written in 2011, with the exception of the “2017 Analysis” section.

HARDIN COUNTY

Hardin County (Past Action) – 1	
Proposed Action:	Seek funding and construct centralized shelter(s) of last resort within the county that is elevated out of the flood prone area and designed for appropriate wind load, in coordination with the Texas Safe Shelter Initiative.
Reason for Action	Public safety and protection for special needs populations

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricanes, Thunderstorms, Tornado
Priority-Effects on new/existing buildings	High
Estimated Cost	\$6,000,000
Implementation Schedule	2-3 years
Coordinating Agency	Hardin County OEM, Lumberton ISD, City of Kountze, Municipalities, ISDs
Potential Funding Sources	HMGP, local funding, Texas Safe Shelter Initiative

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$6,000,000 - \$10,000,000. Note: a safe shelter was built in the City of Lumberton in coordination with Lumberton ISD. Additional shelters are needed in the county.

Section 16: Previous Actions

Hardin County (Past Action) – 2	
Proposed Action:	Retrofit existing county critical facilities (Courthouse Annex, EOC, fire departments, and others) as needed including but not limited to installation of the following features for severe storm protection: storm shutters or tinted shatter-resistant laminate film for windows; roof straps and strengthening for high wind load; roll-up door reinforcement (i.e. fire stations); non-permeable exterior walls, door seals and flood-proofing measures; alternate power supply (generators); fold down alternate site antennas; security cameras; electrical surge protection; secure data back-up systems and critical equipment, as a measure to mitigate or prevent storm damage.
Reason for Action	Continuity of county government during and after a storm event; existing building damage prevention

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricanes, Thunderstorms, Tornado
Priority-Effects on new/existing buildings	High
Estimated Cost	\$1,500,000 – 3,500,000
Implementation Schedule	1-5 years
Coordinating Agency	Hardin County OEM; Public Works’ Fire Departments; Sheriff; Emergency Services District; ISD; Approved Contractor
Potential Funding Sources	PDM, HMGP, operating budgets, local funding

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Hardin County (Past Action) – 3	
Proposed Action:	Voluntary acquisition of repetitive loss and flood prone properties. Assist relocation to safer locations within the county. Property acquired will remain as open space for perpetuity and used for the benefit of the community.
Reason for Action	Improve public safety, reduce flood losses, reduce demand for emergency services, improve floodplain functions and water quality, improve floodplain ordinance compliance

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricanes, Dam Failure, Tsunami
Priority-Effects on new/existing buildings	High
Estimated Cost	\$2,000,000 – 4,000,000
Implementation Schedule	1-5 years
Coordinating Agency	Hardin County OEM, Hardin County Floodplain Administrator, Approved Contractor
Potential Funding Sources	FMA, RFC, SRL, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Hardin County (Past Action) – 4	
Proposed Action:	Rectify and enlarge main outfall channels for the Pinewood subdivision including excavating interior roadside ditches and driveway culvert system. Mitigation needed for 10 separate outfalls draining three interior sections of Pinewood, Sections 1, 2, and 3 to reduce/eliminate future flood damage to flood prone structures including 9 repetitive loss properties within WCID #1 district boundaries.
Reason for Action	Flood damage mitigation, existing building damage prevention

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$1,000,000 – 3,000,000
Implementation Schedule	1-3 years
Coordinating Agency	WCID #1, Public Works, HC OEM
Potential Funding Sources	Operating budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Hardin County (Past Action) – 5	
Proposed Action:	Install alternate power supply (generators) in existing and future county buildings to support continuity of emergency and critical operations during disaster events.
Reason for Action	Continuity of county government during and after a storm event

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricane, Tornado, Thunderstorm
Priority-Effects on new/existing buildings	High
Estimated Cost	\$2,400,000
Implementation Schedule	12 months
Coordinating Agency	Hardin County OEM, Fire Districts, Public Works, Sheriff
Potential Funding Sources	Operating Budgets, local funding, HMGP, PDM

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Note: the courthouse has generators installed from local funding. Other government buildings may need assistance in the future.

Section 16: Previous Actions

Hardin County (Past Action) – 6	
Proposed Action:	<p>Drainage improvement and storm water conveyance project for Coon Gulley Marsh. Preliminary BCR is 2.64. Five stage project for building damage prevention consists of the following:</p> <ul style="list-style-type: none"> • Excavate approximately 4,800 feet of Coon Marsh Gulley Diversion Ditch channel, line bottom with concrete and install erosion control. • Excavate approximately 1,500 feet of Coon Marsh Gulley Diversion Ditch channel from diversion ditch to Hardin County WCID#1 south boundary line; install concrete lining along bottom, sides, and install wing walls at the Pinewood Blvd Bridge; install erosion control. • Excavate approximately 5,000 feet of channel from Coon Marsh Gulley through Countrywood from the south boundary of the Hardin County WCID#1 to Bonura Road, install box culverts and wing walls at Bonura Road crossing, and install erosion control. • Excavate channel and floodway upstream and downstream from Little Pine Island Bridge at Woodway Blvd. • Replace Pines Shadows Bridge over Clemmons Gulley.
Reason for Action	Significantly reduce flooding in Hardin County WCID#1 (Pinewood), Countrywood, and areas immediately upstream.

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$3,275,000
Implementation Schedule	1-3 years
Coordinating Agency	Hardin County OEM
Potential Funding Sources	PDM, HMGP, FMA

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$4,000,000. Note: some work has been done on this project; this is an ongoing process.

Section 16: Previous Actions

Hardin County (Past Action) – 7	
Proposed Action:	Form a Drainage District to construct and maintain drainage projects and oversee structural and regulatory storm water mitigation for new and future development.
Reason for Action	Improve mitigation coordination and damage reduction for new and existing buildings

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$5,000 – 10,000
Implementation Schedule	1-2 years
Coordinating Agency	Hardin County OEM, Commissioner’s Court; Public Works
Potential Funding Sources	Operating budgets, local funding

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$5,000,000.

Hardin County (Past Action) – 8	
Proposed Action:	Upgrade storm water capacity throughout the county. Actions include but are not limited to installing/upgrading culverts and headwalls, enlarging storm water ditches and canals.
Reason for Action	Improved floodwater outflow capacity from city centers and industrial complexes is needed to reduce/prevent impacts of flooding, flash flood. Damage reduction for new and existing buildings.

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$8,000,000 – 16,000,000
Implementation Schedule	3-5 years
Coordinating Agency	Hardin County OEM, Commissioner’s Court; Public Works; USACE
Potential Funding Sources	PDM, HMGP, operating budgets, local funding

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Hardin County (Past Action) – 9	
Proposed Action:	Elevate existing roadways and bridges prone to inundation from flooding. Projects can include general road elevation; installing, upsizing culverts and headwalls; and bridge upgrades.
Reason for Action	Improve public safety, facilitate evacuation and emergency response

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane, Tsunami
Priority-Effects on new/existing buildings	High
Estimated Cost	\$600,000 – 1,800,000
Implementation Schedule	1-5 years
Coordinating Agency	Hardin County OEM, Public Works
Potential Funding Sources	PDM, HMGP

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$6,000,000 - \$10,000,000.

Hardin County (Past Action) – 10	
Proposed Action:	Widen and reinforce critical bridges in Hardin County to assist evacuation.
Reason for Action	Improve public safety, facilitate evacuation/emergency response

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane, Tsunami
Priority-Effects on new/existing buildings	High
Estimated Cost	\$6,000,000 – 10,000,000
Implementation Schedule	1-5 years
Coordinating Agency	Hardin County OEM, Public Works; TxDOT, DOT
Potential Funding Sources	PDM, HMGP, State and Federal Highway Departments

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Hardin County (Past Action) – 11	
Proposed Action:	Expand and maintain training opportunities for first responders.
Reason for Action	Improve knowledge and coordination of emergency response

MITIGATION ACTION DETAILS	
Hazard Addressed	Haz-Mat, Hurricane, Geo-Hazard, Terrorism, Tornado, Wildfire
Priority-Effects on new/existing buildings	High
Estimated Cost	\$20,000 – 40,000
Implementation Schedule	12 months
Coordinating Agency	Hardin County OEM; Fire Dept.'s, Sheriff, ESD
Potential Funding Sources	Operating budgets

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revised Estimated Cost to \$20,000 - \$30,000.

Hardin County (Past Action) – 12	
Proposed Action:	Provide educational brochures and make presentations to the general public and schools regarding mitigation measures for the general public, commercial businesses, and industry.
Reason for Action	Improve public education and individual preparedness, reduce demand for emergency services

MITIGATION ACTION DETAILS	
Hazard Addressed	Drought, Extreme Heat, Geo-Hazard, Haz-Mat, Tsunami, et al.
Priority-Effects on new/existing buildings	High
Estimated Cost	\$20,000 – 30,000
Implementation Schedule	1-5 years
Coordinating Agency	Hardin County OEM; ISDs
Potential Funding Sources	Operating Budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$20,000 - \$50,000.

Section 16: Previous Actions

Hardin County (Past Action) – 13	
Proposed Action:	Relocate utility lines for existing buildings underground to mitigate hazard impacts and prevent loss of function. Identify opportunities to install underground lines at time of construction for new and future development projects to reduce future hazard impacts.
Reason for Action	Maintain electrical service during storms

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricane, Thunderstorm, Tornado, Winter Storm
Priority-Effects on new/existing buildings	High
Estimated Cost	\$750,000 - \$1,500,000
Implementation Schedule	1-5 years
Coordinating Agency	Hardin County OEM, public works, utility companies
Potential Funding Sources	Operating Budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$1,000,000 - \$4,000,000.

Hardin County (Past Action) – 14	
Proposed Action:	Continue participation in the National Flood Insurance Program (NFIP) and investigate opportunities to participate in the Community Rating System (CRS). Activities may include: improvement of flood mapping and elevation data, mitigation for repetitive loss properties, instituting higher regulatory standards for future floodplain development, storm water management plans, and standards for future development to control runoff.
Reason for Action	Maintain NFIP compliance and benefits, mitigate flooding, reduce cost of flood insurance, reduce building damage

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Dam Failure, Tsunami
Priority-Effects on new/existing buildings	High
Estimated Cost	N/A
Implementation Schedule	12 months
Coordinating Agency	Hardin County Floodplain Management, Hardin County OEM
Potential Funding Sources	N/A

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Hardin County (Past Action) – 15	
Proposed Action:	Construct retention ponds to store and regulate discharge of storm water during flooding events.
Reason for Action	Prevent flooding damage to new and existing buildings, improve water storage capacity for times of drought and fighting wildfires

MITIGATION ACTION DETAILS	
Hazard Addressed	Floods, Hurricanes, Wildfire, Drought
Priority-Effects on new/existing buildings	High
Estimated Cost	\$500,000 – 1,500,000
Implementation Schedule	2-5 years
Coordinating Agency	Hardin County OEM, public works, utilities
Potential Funding Sources	Operating Budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$500,000 - \$2,000,000.

Hardin County (Past Action) – 16	
Proposed Action:	Install frangible (break away) connections on utility poles to prevent loss of function.
Reason for Action	Maintain electrical service during storms

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricane, Thunderstorm, Tornado
Priority-Effects on new/existing buildings	High
Estimated Cost	\$200,000 – 600,000
Implementation Schedule	1-3 years
Coordinating Agency	Hardin County OEM, public works, utilities
Potential Funding Sources	Operating Budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$1,000,000 - \$3,000,000.

Section 16: Previous Actions

Hardin County (Past Action) – 17	
Proposed Action:	Identify and pursue mitigation activities that assist efficient evacuations including but not limited to: improved signage, widening roads and bridges, traffic monitoring systems, improved road connectivity, et al. Encourage developers of new and future subdivisions to consider evacuation efficiency in street design.
Reason for Action	Make evacuation process more efficient, safer, less chaotic

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricane, Tsunami
Priority-Effects on new/existing buildings	High
Estimated Cost	\$500,000 – 3,500,000
Implementation Schedule	1-5 years
Coordinating Agency	Hardin County OEM, public works
Potential Funding Sources	PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Hardin County (Past Action) – 18	
Proposed Action:	Install/improve signage to notify public when Burn Ban is activated, improve enforcement through education and coordination.
Reason for Action	Improve public education and compliance with Burn Ban, reduce wildfires

MITIGATION ACTION DETAILS	
Hazard Addressed	Wildfire, Drought
Priority-Effects on new/existing buildings	High
Estimated Cost	\$50,000 – 60,000
Implementation Schedule	1-5 years
Coordinating Agency	Hardin County OEM, fire departments, sheriff
Potential Funding Sources	Operating Budgets, local funding, PDM, HMGP, TFS grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$50,000 - \$90,000.

Section 16: Previous Actions

Hardin County (Past Action) – 19	
Proposed Action:	Conduct tree pruning initiative along power lines. Hardin County will work closely with local energy companies to develop a realistic schedule for tree pruning along electrical power lines.
Reason for Action	Reduce power outage and road closure due to downed trees during and after storms, improved emergency response and first responder safety

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricane, Thunderstorms, Tornado
Priority-Effects on new/existing buildings	High
Estimated Cost	\$600,000 – 800,000
Implementation Schedule	12 months
Coordinating Agency	Hardin County OEM, Public Works, Utility Companies, TFS
Potential Funding Sources	Operating Budgets

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Hardin County (Past Action) – 20	
Proposed Action:	Develop-upgrade contact information database for 1 st responders, volunteers, special needs and medical special needs populations.
Reason for Action	Improved coordination of disaster response

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricane, Tornado, Thunderstorm, Haz-Mat, Geo-Hazard
Priority-Effects on new/existing buildings	High
Estimated Cost	\$10,000 – 15,000
Implementation Schedule	1-2 years
Coordinating Agency	Hardin County OEM
Potential Funding Sources	Operating budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$6,000,000.

Section 16: Previous Actions

Hardin County (Past Action) – 21	
Proposed Action:	Elevate flood prone homes including electrical systems to a minimum of 1' above BFE.
Reason for Action	Mitigate flood damage, improve compliance with floodplain ordinance; prevent flooding damage to existing homes

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane, Dam Failure
Priority-Effects on new/existing buildings	High
Estimated Cost	\$800,000 – 900,000
Implementation Schedule	12 months
Coordinating Agency	Hardin County Floodplain Management, Hardin County OEM
Potential Funding Sources	PDM, HMGP

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$6,000,000.

Hardin County (Past Action) – 22	
Proposed Action:	Educate residents and homebuilders on the importance of constructing and maintaining defensible space around new and existing homes to prevent or mitigate wildfire damage.
Reason for Action	Reduce wildfire damage, improve individual participation in wildfire mitigation, improve safety through site design for future development, reduce water use for firefighting

MITIGATION ACTION DETAILS	
Hazard Addressed	Wildfire, Drought
Priority-Effects on new/existing buildings	High
Estimated Cost	\$30,000 – 40,000
Implementation Schedule	1-5 years
Coordinating Agency	Hardin County OEM, Fire Departments
Potential Funding Sources	Operating Budgets, local funding, PDM, HMGP, TFS grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$1,000,000 - \$3,000,000.

Section 16: Previous Actions

Hardin County (Past Action) – 23	
Proposed Action:	Construct/install safe shelters in public buildings capable of providing protection from severe tornados, extreme straight line winds in accordance with FEMA Publication 320 and/or National Performance Criteria for Tornado Shelters specifications.
Reason for Action	Improved public safety

MITIGATION ACTION DETAILS	
Hazard Addressed	Tornado, Thunderstorm, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$10,000 – 80,000/per shelter
Implementation Schedule	12-24 months
Coordinating Agency	Hardin County OEM
Potential Funding Sources	PDM, HMGP

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Hardin County (Past Action) – 24	
Proposed Action:	Develop incentives and provide instruction for homeowners and future homebuilders to construct/install safe shelters capable of providing protection from severe tornados, extreme straight line winds in accordance with FEMA Publication 320 and/or National Performance Criteria for Tornado Shelters specifications.
Reason for Action	Improved public safety

MITIGATION ACTION DETAILS	
Hazard Addressed	Tornado, Thunderstorm, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$100,000 – 200,000
Implementation Schedule	12-24 months
Coordinating Agency	Hardin County OEM
Potential Funding Sources	PDM, HMGP

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Hardin County (Past Action) – 25	
Proposed Action:	Develop water conservation strategies and/or ordinances for implementation during drought periods.
Reason for Action	Improve public cooperation during water shortages, ensure that water sources are not completely depleted during droughts and that the county has adequate water supplies

MITIGATION ACTION DETAILS	
Hazard Addressed	Floods, Hurricanes, Wildfire, Drought
Priority-Effects on new/existing buildings	High
Estimated Cost	\$50,000 – 80,000
Implementation Schedule	2-5 years
Coordinating Agency	Hardin County OEM, Public Works
Potential Funding Sources	Operating Budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Hardin County (Past Action) – 26	
Proposed Action:	Retrofit structures to act as cooling/warming stations in times of extreme heat and extreme cold.
Reason for Action	Improve health and safety of special needs populations

MITIGATION ACTION DETAILS	
Hazard Addressed	Extreme Heat, Winter Storm
Priority-Effects on new/existing buildings	Medium
Estimated Cost	\$60,000 – 80,0000
Implementation Schedule	1-3 years
Coordinating Agency	Hardin County OEM, social service agencies
Potential Funding Sources	Operating Budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Hardin County (Past Action) – 27	
Proposed Action:	Educate the public on issues related to the inappropriate discharge of hazardous materials and wastewater in the environment and the impacts it has on the water ways.
Reason for Action	Improved public health and safety, environmental and recreational benefits

MITIGATION ACTION DETAILS	
Hazard Addressed	Hazardous Materials
Priority-Effects on new/existing buildings	Medium
Estimated Cost	\$100,000
Implementation Schedule	1-2 years
Coordinating Agency	Hardin County OEM
Potential Funding Sources	Operating budgets, local funding, PDM, CIAP, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Hardin County (Past Action) – 28	
Proposed Action:	Develop inventory of pipelines that are buried too shallow and/or do not meet modern standards.
Reason for Action	Public safety, prevent unnecessary rupture of pipelines

MITIGATION ACTION DETAILS	
Hazard Addressed	Hazardous Materials, Geo-Hazard
Priority-Effects on new/existing buildings	Medium
Estimated Cost	\$25,000 – 45,000
Implementation Schedule	12 months
Coordinating Agency	Hardin County OEM
Potential Funding Sources	HMGP, PDM

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Hardin County (Past Action) – 29	
Proposed Action:	Institute policy of considering drought tolerant landscaping and testing for geologic hazards at the design stage for new and future public facilities.
Reason for Action	Reduce water use; mitigate damage due to geologic hazards

MITIGATION ACTION DETAILS	
Hazard Addressed	Drought, Geo-Hazard
Priority-Effects on new/existing buildings	Medium
Estimated Cost	\$2,000 – 5,000
Implementation Schedule	1-3 years
Coordinating Agency	Hardin County OEM
Potential Funding Sources	Operating Budgets, local funding

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Hardin County (Past Action) – 30	
Proposed Action:	Develop local requirements for mobile home tie-down and anchoring systems and build capacity to conduct periodic inspections to oversee proper implementation for future development.
Reason for Action	Improved public safety

MITIGATION ACTION DETAILS	
Hazard Addressed	Tornado, Thunderstorm, Hurricane
Priority-Effects on new/existing buildings	Medium
Estimated Cost	\$40,000 – 60,000/year
Implementation Schedule	2-5 years
Coordinating Agency	Hardin County OEM; building code inspectors
Potential Funding Sources	PDM; HMGP

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

CITY OF KOUNTZE

Kountze (Past Action) – 1	
Proposed Action:	Seek funding and construct centralized shelter(s) of last resort within the county that is elevated out of the flood prone area and designed for appropriate wind load, in coordination with the Texas Safe Shelter Initiative.
Reason for Action	Public safety and protection for special needs populations

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricanes, Thunderstorms, Tornado
Priority-Effects on new/existing buildings	High
Estimated Cost	\$3,000,000
Implementation Schedule	2-3 years
Coordinating Agency	City Hall, Fire Dept., Public Works, ISD
Potential Funding Sources	HMGP, local funding, Texas Safe Shelter Initiative

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$6,000,000.

Kountze (Past Action) – 2	
Proposed Action:	Retrofit city critical facilities as needed including but not limited to installation of the following features for severe storm protection: storm shutters or tinted shatter-resistant laminate film for windows; roof straps and strengthening for high wind load; roll-up door reinforcement (i.e. fire stations); non-permeable exterior walls, door seals and flood-proofing measures; alternate power supply (generators); fold down alternate site antennas; security cameras; electrical surge protection; secure data back-up systems and critical equipment.
Reason for Action	Continuity of county government during and after a storm event; damage prevention for existing buildings

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricanes, Thunderstorms, Tornado
Priority-Effects on new/existing buildings	High
Estimated Cost	\$500,000 – 1,500,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Fire Dept., Public Works, ISD
Potential Funding Sources	PDM, HMGP, operating budgets, local funding

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Kountze (Past Action) – 3	
Proposed Action:	Voluntary acquisition of Repetitive Loss and flood prone properties in the City of Kountze. Assist relocation to safer locations within the city. Property acquired will remain as open space for perpetuity and used for the benefit of the community.
Reason for Action	Improve public safety, reduce flood losses, reduce demand for emergency services, improve floodplain functions and water quality, improve floodplain ordinance compliance

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricanes, Dam Failure
Priority-Effects on new/existing buildings	High
Estimated Cost	\$200,000 – 500,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Fire Dept., Floodplain Administrator, Approve Contractor
Potential Funding Sources	FMA, RFC, SRL, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$6,000,000.

Kountze (Past Action) – 4	
Proposed Action:	Upgrade storm water capacity throughout the City of Kountze. Actions include but are not limited to installing/upgrading culverts and headwalls, enlarging storm water ditches and canals.
Reason for Action	Improved flood water outflow capacity from city centers and industrial complexes is needed to reduce/prevent impacts of flash flooding

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$1,000,000 – 3,000,000
Implementation Schedule	3-5 years
Coordinating Agency	City Hall, Fire Dept., Floodplain Administrator
Potential Funding Sources	PDM, HMGP, operating budgets, local funding

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Kountze (Past Action) – 5	
Proposed Action:	Elevate roadways and bridges prone to inundation from flooding, Projects can include general road elevation; installing, upsizing culverts and headwalls; and bridge upgrades.
Reason for Action	Improve public safety, facilitate evacuation and emergency response

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$600,000 – 1,800,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Fire Dept., Floodplain Administrator, Public Works
Potential Funding Sources	PDM, HMGP

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$600,000 - \$2,000,000.

Kountze (Past Action) – 6	
Proposed Action:	Construct/install safe shelters in city buildings capable of providing protection from severe tornados, extreme straight line winds in accordance with FEMA Publication 320 and/or National Performance Criteria for Tornado Shelters specifications.
Reason for Action	Improved public safety

MITIGATION ACTION DETAILS	
Hazard Addressed	Tornado, Thunderstorm, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$10,000 – 80,000/per shelter
Implementation Schedule	12-24 months
Coordinating Agency	City Hall, Fire Dept.
Potential Funding Sources	PDM, HMGP

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Kountze (Past Action) – 7	
Proposed Action:	Continue participation in the National Flood Insurance Program (NFIP) and investigate participation in the Community Rating System (CRS). Activities may include: improvement of flood mapping and elevation data, mitigation for repetitive loss properties, instituting higher regulatory standards for future floodplain development, storm water management plans and standards for future development to control runoff.
Reason for Action	Maintain and improve NFIP compliance and benefits, mitigate future flooding damage to new and existing structures, reduce cost of flood insurance

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Dam Failure
Priority-Effects on new/existing buildings	High
Estimated Cost	N/A
Implementation Schedule	12 months
Coordinating Agency	Floodplain Management, City Hall
Potential Funding Sources	N/A

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$5,000 - \$10,000.

Kountze (Past Action) – 8	
Proposed Action:	Develop-upgrade contract information database for 1 st responders, volunteers and special needs populations.
Reason for Action	Improved coordination of disaster response

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricane, Tornado, Flooding, Wildfire, Haz-Mat
Priority-Effects on new/existing buildings	Medium
Estimated Cost	\$5,000 – 10,000
Implementation Schedule	1-2 years
Coordinating Agency	City Hall, Fire Dept.
Potential Funding Sources	Operating budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Note: include emphasis on populations exceptionally vulnerable in the event of long-term power outages.

Section 16: Previous Actions

Kountze (Past Action) – 9	
Proposed Action:	Retrofit existing structures such as social service agencies to act as cooling stations in times of extreme heat.
Reason for Action	Improve health and safety of special needs populations

MITIGATION ACTION DETAILS	
Hazard Addressed	Extreme Heat
Priority-Effects on new/existing buildings	Medium
Estimated Cost	\$60,000 – 80,000
Implementation Schedule	1-3 years
Coordinating Agency	City Hall, Fire Dept.
Potential Funding Sources	Operating Budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Note: include educating the public on the locations and availability of cooling centers.

CITY OF LUMBERTON

Lumberton (Past Action) – 1	
Proposed Action:	Seek funding and construct centralized shelter(s) of last resort within the county that is elevated out of the flood prone area and designed for appropriate wind load, in coordination with the Texas Safe Shelter Initiative.
Reason for Action	Public safety and protection for special needs populations

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricanes, Thunderstorms, Tornado
Priority-Effects on new/existing buildings	High
Estimated Cost	\$3,000,000
Implementation Schedule	2-3 years
Coordinating Agency	City Hall, Public Works, Lumberton ISD
Potential Funding Sources	HMGP, local funding, Texas Safe Shelter Initiative

2017 Analysis:
Delete Action. This action is covered by a Hardin County action.

Lumberton (Past Action) – 2	
Proposed Action:	Voluntary acquisition of Repetitive Loss and flood prone properties in the City of Lumberton. Assist relocation to safer locations within the city. Property acquired will remain as open space for perpetuity and used for the benefit of the community.
Reason for Action	Improve public safety, reduce flood losses, reduce demand for emergency services, improve floodplain functions and water quality, improve floodplain ordinance compliance

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricanes, Dam Failure
Priority-Effects on new/existing buildings	High
Estimated Cost	\$2,500,000 – 3,000,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Floodplain Administrator, Approved Contractor
Potential Funding Sources	FMA, RFC, SRL, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Lumberton (Past Action) – 3	
Proposed Action:	Retrofit city critical facilities as needed including but not limited to installation of the following features for severe storm protection: Storm shutters or tinted shatter-resistant laminate film for windows; roof straps and strengthening for high wind load; roll-up door reinforcement (i.e. fire stations); non-permeable exterior walls, door seals and flood-proofing measures; alternate power supply (generators); fold down alternate site antennas; security cameras; electrical surge protection; secure data back-up systems and critical equipment.
Reason for Action	Continuity of county government during and after a storm event; damage prevention

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricanes, Thunderstorms, Tornado
Priority-Effects on new/existing buildings	High
Estimated Cost	\$1,200,000 – 1,500,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Fire Dept., Public Works, ISD
Potential Funding Sources	PDM, HMGP, operating budgets, local funding

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Lumberton (Past Action) – 4	
Proposed Action:	Construct retention ponds to store and regulate discharge of storm water during flooding events.
Reason for Action	Prevent flooding damage to new and existing homes, improve water storage for times of drought and fighting wildfire

MITIGATION ACTION DETAILS	
Hazard Addressed	Floods, Hurricanes, Wildfire, Drought
Priority-Effects on new/existing buildings	High
Estimated Cost	\$500,000 – 1,500,000
Implementation Schedule	2-5 years
Coordinating Agency	City Hall, Public Works, Floodplain Administrator
Potential Funding Sources	Operating Budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Note: two retention ponds have been constructed in an attempt to reduce flooding. The project includes additional retention ponds to address hazards.

Section 16: Previous Actions

Lumberton (Past Action) – 5	
Proposed Action:	Upgrade storm water capacity throughout the City of Lumberton. Actions include but are not limited to installing/upgrading culverts and headwalls, excavating and enlarging storm water ditches and canals.
Reason for Action	Improved floodwater outflow capacity from city centers and industrial complexes is needed to reduce/prevent impacts of flash flooding

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$1,000,000 - 3,000,000
Implementation Schedule	3-5 years
Coordinating Agency	City Hall, Public Works, Floodplain Administrator
Potential Funding Sources	PDM, HMGP, operating budgets, local funding

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Lumberton (Past Action) – 6	
Proposed Action:	Elevate roadways and bridges prone to inundation from flooding. Projects can include general road elevation; installing, upsizing culverts and headwalls; and bridge upgrades.
Reason for Action	Improve public safety, facilitate evacuation and emergency response

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$800,000 – 1,900,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Floodplain Administrator, Public Works
Potential Funding Sources	PDM, HMGP

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$800,000 - \$4,000,000. Note: the City is in the process of acquiring an Engineering study for the installation of a bridge to aid residents in flood prone areas.

Section 16: Previous Actions

Lumberton (Past Action) – 7	
Proposed Action:	Install frangible links/break away connections on utility poles in the city to maintain utility operation during and after a hazard event.
Reason for Action	Maintain electrical service during storms

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricane, Thunderstorm, Tornado
Priority-Effects on new/existing buildings	High
Estimated Cost	\$200,000 – 400,000
Implementation Schedule	1-3 years
Coordinating Agency	City Hall, Public Works, Utility Companies
Potential Funding Sources	Operating Budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Note: the City will assist companies in any way in the event of a disaster/hazard event.

Lumberton (Past Action) – 8	
Proposed Action:	Construct/install safe shelters in city buildings capable of providing protection from severe tornados, extreme straight line winds in accordance with FEMA Publication 320 and/or National Performance Criteria for Tornado Shelters specifications.
Reason for Action	Improved public safety

MITIGATION ACTION DETAILS	
Hazard Addressed	Tornado, Thunderstorm, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$10,000 – 80,000/per shelter
Implementation Schedule	12-24 months
Coordinating Agency	City Hall
Potential Funding Sources	PDM, HMGP

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Note: the City of Lumberton, in coordination with the Lumberton School District, has constructed a centralized shelter of last resort, which was completed in 2015; however, additional shelters are needed throughout the City.

Section 16: Previous Actions

Lumberton (Past Action) – 9	
Proposed Action:	Retrofit existing structures such as social service agencies etc. to act as cooling/warming stations in times of extreme heat and extreme cold.
Reason for Action	Improve health and safety of special needs populations

MITIGATION ACTION DETAILS	
Hazard Addressed	Extreme Heat, Winter Storm
Priority-Effects on new/existing buildings	High
Estimated Cost	\$60,000 – 80,000
Implementation Schedule	1-3 years
Coordinating Agency	City Hall
Potential Funding Sources	Operating budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Lumberton (Past Action) – 10	
Proposed Action:	Identify and pursue mitigation activities that would assist efficient evacuations through the city including but not limited to improved signage, widening roads and bridges, traffic monitoring systems, improved road connectivity, et al.
Reason for Action	Make evacuation process more efficient, safer, less chaotic

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$500,000 – 1,500,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Hardin County OEM, public works
Potential Funding Sources	PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Lumberton (Past Action) – 11	
Proposed Action:	Continue participation in the National Flood Insurance Program (NFIP) and investigate participation in the Community Rating System (CRS). Activities may include: improvement of flood mapping and elevation data, mitigation for repetitive loss properties, instituting higher regulatory standards for future floodplain development, storm water management plans, and standards for future development to control runoff.
Reason for Action	Maintain NFIP compliance, reduce cost of flood insurance

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Dam Failure
Priority-Effects on new/existing buildings	High
Estimated Cost	N/A
Implementation Schedule	12 months
Coordinating Agency	Floodplain Management, City Hall
Potential Funding Sources	N/A

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Note: the City, and its floodplain coordinator, work closely with all agencies to insure compliance with all standards.

TOWN OF ROSE HILL ACRES

Rose Hill Acres (Past Action) – 1	
Proposed Action:	Upgrade storm water capacity and drainage throughout the Town of Rose Hill Acres. Actions include but are not limited to installing/upgrading culverts and headwalls, excavating new and/or enlarging storm water ditches and canals.
Reason for Action	Improved floodwater outflow capacity from city centers and industrial complexes is needed to reduce/prevent impacts of flash flooding

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$1,000,000 – 1,500,000
Implementation Schedule	2-5 years
Coordinating Agency	Town Hall, Public Works, Floodplain Administrator
Potential Funding Sources	PDM, HMGP, operating budgets, local funding

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Rose Hill Acres (Past Action) – 2	
Proposed Action:	Retrofit city critical facilities as needed including but not limited to installation of the following features for severe storm protection: storm shutters or tinted shatter-resistant laminate film for windows; roof straps and strengthening for high wind load; roll-up door reinforcement (i.e. fire stations); non-permeable exterior walls, door seals and flood-proofing measures; alternate power supply (generators); fold down alternate site antennas; security cameras; electrical surge protection; secure data back-up systems and critical equipment.
Reason for Action	Continuity of county government during and after a storm event; damage prevention

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricanes, Thunderstorms, Tornado
Priority-Effects on new/existing buildings	High
Estimated Cost	\$400,000 – 500,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Public Works
Potential Funding Sources	PDM, HMGP, operating budgets, local funding

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Note: include rehabilitation of incident; monitoring before, during, and post event allowing for onsite operations protecting life and property; providing for communications and emergency assistance; maintain continuity of Municipal government during and after a storm event; damage prevention and IC Operations.

Section 16: Previous Actions

Rose Hill Acres (Past Action) – 3	
Proposed Action:	Install box culvert, concrete pipe, or similar mechanism as needed to mitigate drainage ditch erosion and improved storm water capacity and conveyance.
Reason for Action	Reduce flooding damage and road inundation

MITIGATION ACTION DETAILS	
Hazard Addressed	Flooding, Hurricanes
Priority-Effects on new/existing buildings	High
Estimated Cost	\$200,000 – 400,000
Implementation Schedule	1-3 years
Coordinating Agency	City Hall, Public Works
Potential Funding Sources	Operating budget, local funding, PDM, HMGP

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Rose Hill Acres (Past Action) – 4	
Proposed Action:	Pursue the coordination, construction, expansion and maintenance of flood control structures (barriers, berms) for the purpose of protecting critical facilities, potable water sources, and agricultural resources from water contamination and salt water intrusion.
Reason for Action	Mitigate and general salt water intrusion

MITIGATION ACTION DETAILS	
Hazard Addressed	Flooding, Hurricanes, Water Contamination
Priority-Effects on new/existing buildings	High
Estimated Cost	\$2,500,000 – 4,500,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Hardin County OEM, USACE
Potential Funding Sources	HMGP, PDM

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$1,000,000 - \$3,000,000.

Section 16: Previous Actions

Rose Hill Acres (Past Action) – 5	
Proposed Action:	Rectify and enlarge main outfall channels including excavating interior roadside ditches and driveway culvert system to reduce/eliminate future flood damage to flood prone structures.
Reason for Action	Flood damage mitigation

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$1,000,000 – 3,000,000
Implementation Schedule	1-3 years
Coordinating Agency	WCID #1, Public Works, City Hall, HCOEM
Potential Funding Sources	Operating budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Note: include avoid municipal infrastructure and property losses; improved floodwater outflow capacity from town centers and industrial complexes is needed to reduce/prevent impacts of flash flooding.

Rose Hill Acres (Past Action) – 6	
Proposed Action:	Construct/install safe shelters in city buildings capable of providing protection from severe tornados, extreme straight line winds in accordance with FEMA Publication 320 and/or National Performance Criteria for Tornado Shelters specifications.
Reason for Action	Improved public safety

MITIGATION ACTION DETAILS	
Hazard Addressed	Tornado, Thunderstorm, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$10,000 – 80,000/per shelter
Implementation Schedule	12-24 months
Coordinating Agency	City Hall
Potential Funding Sources	PDM, HMGP

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Rose Hill Acres (Past Action) – 7	
Proposed Action:	Voluntary acquisition of Repetitive Loss flood prone properties in the Town of Rose Hill Acres. Assist relocation to safer locations within the city. Property acquired will remain as open space for perpetuity and used to benefit the community.
Reason for Action	Improve public safety, reduce flood losses, reduce demand for emergency services, improve floodplain functions and water quality, improve floodplain ordinance compliance

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricanes, Dam Failure
Priority-Effects on new/existing buildings	Medium
Estimated Cost	\$200,000 – 500,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Fire Dept., Floodplain Administrator, Approved Contractor
Potential Funding Sources	FMA, RFC, SRL, PDM, HMGP grants

2017 Analysis:
Delete Action. This action is covered by a Hardin County action.

Rose Hill Acres (Past Action) – 8	
Proposed Action:	Retrofit existing structures such as social service agencies etc. to act as cooling/warming stations in times of extreme heat and extreme cold.
Reason for Action	Improve health and safety of special needs populations

MITIGATION ACTION DETAILS	
Hazard Addressed	Extreme Heat, Winter Storm
Priority-Effects on new/existing buildings	High
Estimated Cost	\$60,000 – 80,000
Implementation Schedule	1-3 years
Coordinating Agency	City Hall
Potential Funding Sources	Operating budgets, local funding, PDM, HMGP grants

2017 Analysis:
Delete Action. This action is covered by a Hardin County action.

Section 16: Previous Actions

Rose Hill Acres (Past Action) – 9	
Proposed Action:	Elevate roadways and bridges prone to inundation from flooding. Projects can include general road elevation; installing, upsizing culverts and headwalls; and bridge upgrades.
Reason for Action	Improve public safety, facilitate evacuation and emergency response

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$600,000 – 1,800,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Floodplain Administrator, Public Works
Potential Funding Sources	PDM, HMGP

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Rose Hill Acres (Past Action) – 10	
Proposed Action:	Identify and pursue mitigation activities that would assist efficient evacuations through the city including but not limited to improved signage, widening roads and bridges, traffic monitoring systems, improved road connectivity, et al.
Reason for Action	Make evacuation process more efficient, safer, less chaotic

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$500,000 – 1,500,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Hardin County OEM, Public Works
Potential Funding Sources	PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Note: include Educate citizens on evacuation routes and procedures.

Section 16: Previous Actions

Rose Hill Acres (Past Action) – 11	
Proposed Action:	Widen and reinforce critical bridges through to assist evacuation.
Reason for Action	Improve public safety, facilitate evacuation and emergency response

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$5,000,000 – 10,000,000
Implementation Schedule	1-5 years
Coordinating Agency	Hardin County OEM, Public Works, TXDOT, DOT
Potential Funding Sources	PDM, HMGP, State and Federal Highway Departments

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Note: 69/96 Feeder Road N. and S. bound lanes in Drafting and Engineering state (TXDOT).

Rose Hill Acres (Past Action) – 12	
Proposed Action:	Continue participation in the National Flood Insurance Program (NFIP) and investigate participation in the Community Rating System (CRS0). Activities may include: improvement of flood mapping and elevation data, mitigation for repetitive loss properties, instituting higher regulatory standards for future floodplain development, storm water management plans and standards for future development to control runoff.
Reason for Action	Maintain and improve NFIP compliance and benefits, mitigate future flooding, reduce cost of flood insurance

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Dam Failure
Priority-Effects on new/existing buildings	High
Estimated Cost	N/A
Implementation Schedule	12 months
Coordinating Agency	Floodplain Management, City Hall
Potential Funding Sources	N/A

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$10,000.

CITY OF SILSBEE

Silsbee (Past Action) – 1	
Proposed Action:	Retrofit city critical facilities as needed including but not limited to installation of the following features for severe storm protection: storm shutters or tinted shatter-resistant laminate film for windows; roof straps and strengthening for high wind load; roll-up door reinforcement (i.e. fire stations); non-permeable exterior walls, door seals and flood-proofing measures; alternate power supply (generators); fold down alternate site antennas; security cameras; electrical surge protection; secure data back-up systems and critical equipment.
Reason for Action	Continuity of county government during and after a storm event; damage prevention

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricanes, Thunderstorms, Tornado
Priority-Effects on new/existing buildings	High
Estimated Cost	\$500,000 – 1,500,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Fire Dept., Public Works, ISD
Potential Funding Sources	PDM, HMGP, operating budgets, local funding

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Silsbee (Past Action) – 2	
Proposed Action:	Voluntary acquisition of Repetitive Loss and flood prone properties in the City of Silsbee. Assist relocation to safer locations within the city. Property acquired will remain as open space for perpetuity and used for the benefit of the community.
Reason for Action	Improve public safety, reduce flood losses, reduce demand for emergency services, improve floodplain functions and water quality, improve floodplain ordinance compliance

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricanes
Priority-Effects on new/existing buildings	High
Estimated Cost	\$200,000 – 500,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Floodplain Administrator, Approved Contractor
Potential Funding Sources	FMA, RFC, SRL, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Silsbee (Past Action) – 3	
Proposed Action:	Upgrade storm water capacity and drainage throughout the City of Silsbee. Actions include but are not limited to installing/upgrading culverts and headwalls, excavating new and/or enlarging storm water ditches and canals.
Reason for Action	Improved floodwater outflow capacity from city centers and industrial complexes is needed to reduce/prevent impacts of flash flooding

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricane
Priority-Effects on new/existing buildings	High
Estimated Cost	\$1,000,000 – 1,500,000
Implementation Schedule	2-5 years
Coordinating Agency	City Hall, Public Works, Floodplain Administrator
Potential Funding Sources	PDM, HMGP, operating budgets, local funding

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Section 16: Previous Actions

Silsbee (Past Action) – 4	
Proposed Action:	Construct retention ponds to store and regulate discharge of storm water during flooding events.
Reason for Action	Prevent flooding damage to new and existing homes, improve water storage capacity for times of drought and fighting wildfires

MITIGATION ACTION DETAILS	
Hazard Addressed	Floods, Hurricanes, Wildfire, Drought
Priority-Effects on new/existing buildings	High
Estimated Cost	\$500,000 – 1,500,000
Implementation Schedule	2-5 years
Coordinating Agency	City Hall, Public Works, Floodplain Administrator
Potential Funding Sources	Operating budgets, local funding, PDM, HMGP grants

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update.

Silsbee (Past Action) – 5	
Proposed Action:	Continue participation in the National Flood Insurance Program (NFIP) and investigate participation in the Community Rating System (CRS). Activities may include: Improvement of flood mapping and elevation data, mitigation for repetitive loss properties, instituting higher regulatory standards for future floodplain development, storm water management plans and standards for future development to control runoff.
Reason for Action	Maintain and improve NFIP compliance and benefits, mitigate future flooding, reduce cost of flood insurance

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Dam Failure
Priority-Effects on new/existing buildings	High
Estimated Cost	N/A
Implementation Schedule	12 months
Coordinating Agency	Floodplain Management, City Hall
Potential Funding Sources	N/A

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$25,000.

CITY OF SOUR LAKE

Sour Lake (Past Action) – 1	
Proposed Action:	Voluntary acquisition of Repetitive Loss and flood prone properties in the City of Sour Lake. Assist relocation to safer locations within the city. Property acquired will remain as open space for perpetuity and used for the benefit of the community.
Reason for Action	Improve public safety, reduce flood losses, reduce demand for emergency services, improve floodplain functions and water quality, improve floodplain ordinance compliance

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Hurricanes
Priority-Effects on new/existing buildings	High
Estimated Cost	\$200,000 – 500,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Floodplain Administrator, Approve Contractor
Potential Funding Sources	FMA, RFC, SRL, PDM, HMGP grants

2017 Analysis:
Delete Action. This action is covered by a Hardin County action.

Sour Lake (Past Action) – 2	
Proposed Action:	Install large concrete channel, box culvert, concrete pipe, and/or similar mechanisms as needed to mitigate drainage ditch erosion and improved storm water capacity and conveyance.
Reason for Action	Reduce flooding damage and road inundation

MITIGATION ACTION DETAILS	
Hazard Addressed	Flooding, Hurricanes
Priority-Effects on new/existing buildings	High
Estimated Cost	\$200,000 – 400,000
Implementation Schedule	1-3 years
Coordinating Agency	City Hall, Public Works, Floodplain Administrator
Potential Funding Sources	Operating budget, local funding, PDM, HMGP

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$400,000.

Section 16: Previous Actions

Sour Lake (Past Action) – 3	
Proposed Action:	Retrofit city critical facilities as needed including but not limited to installation of the following features for severe storm protection: storm shutters or tinted shatter-resistant laminate film for windows; roof straps and strengthening for high wind load; roll-up door reinforcement (i.e. fire stations); non-permeable exterior walls, door seals and flood-proofing measures; alternate power supply (generators); fold down alternate site antennas; security cameras; electrical surge protection; secure data back-up systems and critical equipment.
Reason for Action	Continuity of county government during and after a storm event; damage prevention

MITIGATION ACTION DETAILS	
Hazard Addressed	Hurricanes, Thunderstorms, Tornado
Priority-Effects on new/existing buildings	High
Estimated Cost	\$500,000 – 1,500,000
Implementation Schedule	1-5 years
Coordinating Agency	City Hall, Fire Dept., Public Works, ISD
Potential Funding Sources	PDM, HMGP, operating budgets, local funding

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$500,000. Note: include Storm Harden/retrofit throughout Sour Lake.

Section 16: Previous Actions

Sour Lake (Past Action) – 4	
Proposed Action:	Continue participation in the National Flood Insurance Program (NFIP) and investigate participation in the Community Rating System (CRS). Activities may include: improvement of flood mapping and elevation data, mitigation for repetitive loss properties, instituting higher regulatory standards for future floodplain development, storm water management plans and standards for future development to control runoff.
Reason for Action	Maintain and improve NFIP compliance and benefits, mitigate future flooding, reduce cost of flood insurance

MITIGATION ACTION DETAILS	
Hazard Addressed	Flood, Dam Failure
Priority-Effects on new/existing buildings	High
Estimated Cost	N/A
Implementation Schedule	12 months
Coordinating Agency	Floodplain Management, City Hall
Potential Funding Sources	N/A

2017 Analysis:
Defer Action – Will include in the 2017 Plan Update. Revise Estimated Cost to \$50,000.

SECTION 17: MITIGATION ACTIONS

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SUMMARY

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. 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 a result of this exercise, an overall priority was assigned to each mitigation action.

As part of the economic evaluation of the STAPLEE analysis, jurisdictions analyzed each action in terms of the overall costs, measuring whether the potential benefit to be gained from the action outweighed costs associated with it. As a result of this exercise, priority was assigned to each mitigation action by marking them as High (H), Moderate (M), or Low (L). An action that is ranked as “High” indicates that the action will be implemented as soon as funding is received. A “Moderate” action is one that may not be implemented right away depending on the cost and number of citizens served by the action. Actions ranked as “Low” indicate that they will not be implemented without first seeking grant funding and after “High” and “Moderate” actions have been completed.

Planning Team Members developed the actions below while also considering the risk reduction benefits and the effects the proposed action would have on new and existing buildings and infrastructure.

All mitigation actions created by Planning Team members are presented in this section in the form of Mitigation Action Worksheets. 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 two actions per hazard and of two different types.

Section 17: Mitigation Actions

Table 17-1. Hardin County and Participating Jurisdictions Mitigation Action Matrix

MITIGATION ACTION MATRIX				
Actions presented in this matrix represent a comprehensive range and minimum number of required mitigation actions per current State and FEMA Guidelines, including two actions per hazard and of two different types.				
HARDIN COUNTY: MITIGATION ACTION MATRIX				
HAZARDS	Types of Action:			
	LOCAL PLANS/ REGULATIONS	STRUCTURAL/ INFRASTRUCTURE	NATURAL SYSTEM PROTECTION	EDUCATION & AWARENESS
Flood	XXX	XXXXXXXXXXXXXX	X	XX
Lightning	XX	XXXXX		XX
Hurricane	XXXX	XXXXXXXXXXXXXXXXXX		XX
Extreme Heat		XX		XXX
Hail	XX	XXXXX		XX
Thunderstorm Wind	XXXX	XXXXXXX		XX
Tornado	XXX	XXXXXXXXXX	X	X
Drought	XX	X		XXX
Wildfire	X	XXXXX		XXXX
Winter Storm	X	XXXX		XXX
KOUNTZE: MITIGATION ACTION MATRIX				
HAZARDS	Types of Action:			
	LOCAL PLANS/ REGULATIONS	STRUCTURAL/ INFRASTRUCTURE	NATURAL SYSTEM PROTECTION	EDUCATION & AWARENESS
Flood	XX	XXXXXXXXXXXXXX	X	XX
Lightning	XX	XXXXX		XX
Hurricane	XX	XXXXXXXXXXXXXXXXXX	X	XX
Extreme Heat		XX		XXX
Hail	XX	XXXXX		XX
Thunderstorm Wind	XX	XXXXXXX		XX
Tornado	XX	XXXXXXX	X	XX
Drought	XX	X		XXX
Wildfire	X	XXXXX		XXXX
Winter Storm	X	XXX		XXX

Section 17: Mitigation Actions

LUMBERTON: MITIGATION ACTION MATRIX				
HAZARDS	Types of Action:			
	LOCAL PLANS/ REGULATIONS	STRUCTURAL/ INFRASTRUCTURE	NATURAL SYSTEM PROTECTION	EDUCATION & AWARENESS
Flood	XXX	XXXXXXXXXX	X	X
Lightning	XX	XXXX		X
Hurricane	XXX	XXXXXXXXXXXX	X	X
Extreme Heat		X		XX
Hail	XX	XXXX		X
Thunderstorm Wind	XXX	XXXXXX		X
Tornado	XX	XXXXXX	X	X
Drought	XX	X		XXX
Wildfire	X	XXXX		XXX
Winter Storm	X	XXX		XX

ROSE HILL ACRES: MITIGATION ACTION MATRIX				
HAZARDS	Types of Action:			
	LOCAL PLANS/ REGULATIONS	STRUCTURAL/ INFRASTRUCTURE	NATURAL SYSTEM PROTECTION	EDUCATION & AWARENESS
Flood	XXX	XXXXXXXXXXXXXX	X	X
Lightning	XX	XXXX		X
Hurricane	XXXX	XXXXXXXXXXXXXX	X	X
Extreme Heat		X		XX
Hail	XX	XXXX		X
Thunderstorm Wind	XXX	XXXXXX		X
Tornado	XX	XXXXXX	X	X
Drought	XX	X		XXX
Wildfire	X	XXXX		XXX
Winter Storm	X	XXX		XX

Section 17: Mitigation Actions

SILSBEE: MITIGATION ACTION MATRIX				
HAZARDS	Types of Action:			
	LOCAL PLANS/ REGULATIONS	STRUCTURAL/ INFRASTRUCTURE	NATURAL SYSTEM PROTECTION	EDUCATION & AWARENESS
Flood	XXX	XXXXXXXXXX	X	X
Lightning	XX	XXXX		X
Hurricane	XXX	XXXXXXXXXXXX	X	X
Extreme Heat		X		XX
Hail	XX	XXXX		X
Thunderstorm Wind	XXX	XXXXXX		X
Tornado	XX	XXXXXX	X	X
Drought	XX	X		XXX
Wildfire	X	XXXX		XXX
Winter Storm	X	XXX		XX
SOUR LAKE: MITIGATION ACTION MATRIX				
HAZARDS	Types of Action:			
	LOCAL PLANS/ REGULATIONS	STRUCTURAL/ INFRASTRUCTURE	NATURAL SYSTEM PROTECTION	EDUCATION & AWARENESS
Flood	XXX	XXXXXXXXXX	X	X
Lightning	XX	XXXX		X
Hurricane	XXXX	XXXXXXXXXXXX	X	X
Extreme Heat		X		XX
Hail	XX	XXXX		X
Thunderstorm Wind	XXXX	XXXXXX		X
Tornado	XXX	XXXXXX	X	X
Drought	XX	X		XXX
Wildfire	X	XXXX		XXX
Winter Storm	X	XXX		XX

HARDIN COUNTY

Hardin County – Action #1	
Proposed Action:	Seek funding and construct centralized shelter(s) of last resort within the county that is elevated out of the flood prone area and designed for appropriate wind load, in coordination with the Texas Safe Shelter Initiative.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Location TBD – Hardin County
Risk Reduction Benefit (Current Cost/Losses Avoided):	Public safety and protection for special needs populations and first responders.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Tornado
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$6,000,000 - \$10,000,000
Potential Funding Sources:	HMGP, PDM, GLO, TWBD, Texas Safe Shelter Initiative Program, other grants available
Lead Agency/Department Responsible:	Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Mitigation Action Plan, Emergency Response Plan

COMMENTS
A safe shelter was built in the City of Lumberton in coordination with Lumberton ISD. Additional shelters are needed in the county.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Hardin County – Action #2	
Proposed Action:	Rectify and enlarge main outfall channels for the Pinewood subdivision including excavating interior roadside ditches and driveway culvert system.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Pinewood subdivision including adjacent and interior roadside ditches and driveway culvert system
Risk Reduction Benefit (Current Cost/Losses Avoided):	Flood damage mitigation – mitigation needed for 10 separate outfalls draining three interior sections of Pinewood, Sections 1, 2, and 3, to reduce/eliminate future flood damage to flood prone structures including 9 repetitive loss properties within WCID#1 district boundaries.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000 - \$3,000,000
Potential Funding Sources:	Operating budgets, PDM, HMGP, other grants
Lead Agency/Department Responsible:	Hardin County Public Works, Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Hardin County – Action #3	
Proposed Action:	Install alternate power supply (possibly generators) within permanent hook-ups in existing and future county buildings.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Government and Critical Infrastructure Buildings
Risk Reduction Benefit (Current Cost/Losses Avoided):	Continuity of county government.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Flood, Thunderstorm Wind, Extreme Heat, Hail, Lightning, Tornado, Winter Storm
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,500,000
Potential Funding Sources:	Operating budgets, local funding, HMGP, PDM
Lead Agency/Department Responsible:	Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
The courthouse has generators installed from local funding. Other government buildings may need assistance in the future.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 17: Mitigation Actions

Hardin County – Action #4	
Proposed Action:	<p>Drainage improvement and storm water conveyance project for Coon Marsh Gulley. Five stage project for building damage prevention consists of the following:</p> <ul style="list-style-type: none"> • Excavate approximately 4,800 feet of Coon Marsh Gulley Diversion Ditch channel; line bottom with concrete; and install erosion control. • Excavate approximately 1,500 feet of Coon Marsh Gulley Diversion Ditch channel from diversion ditch to Hardin County WCID#1 south boundary line; install concrete lining along bottom sides, and install wing walls at the Pinewood Blvd. Bridge; and install erosion control. • Excavate approximately 5,000 feet of Coon Marsh Gulley channel through Countrywood from the south boundary of the Hardin County WCID#1 to Bonura Road; install box culverts and wing walls at Bonura Road crossing; and install erosion control. • Excavate channel and floodway upstream and downstream from Little Pine Island Bridge at Woodway Blvd. • Replace Pines Shadows Bridge of Clemmons Gulley.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Coon Marsh Gulley – as indicated above
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce flooding risk to structures and infrastructure in Hardin County.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

Section 17: Mitigation Actions

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$4,000,000
Potential Funding Sources:	HMGP, GLO, PDM, other grants
Lead Agency/Department Responsible:	Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Preliminary BCR is 2.64. Some work has been done on this project. This is an ongoing process.</p>
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 17: Mitigation Actions

Hardin County – Action #5	
Proposed Action:	Form a Drainage District to construct and maintain drainage projects and oversee structural and regulatory storm water mitigation for new and future development.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Water outflow capacity from all over the county and industrial complexes
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improved floodwater or rising water outflow capacity from county and industrial complexes to reduce/ prevent impacts of flooding, storm surge, and flash flood.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000,000
Potential Funding Sources:	PDM, HMGP, operating budgets, local funding
Lead Agency/Department Responsible:	Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Comprehensive Plan

COMMENTS
Actions include but are not limited to installing/upgrading culverts and headwalls, excavating and enlarging storm water ditches and canals.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Hardin County – Action #6	
Proposed Action:	Widen and reinforce critical bridges in Hardin County to assist evacuation.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide critical bridges
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve citizen and transportation safety; facilitate evacuation and emergency response.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$6,000,000 - \$10,000,000
Potential Funding Sources:	Operating budgets, HMGP, GLO, PDM
Lead Agency/Department Responsible:	Hardin County Public Works, Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Comprehensive Plan

COMMENTS
Some areas would include the Pine Island Bayou Bridge areas.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Hardin County – Action #7	
Proposed Action:	Expand and maintain training opportunities for first responders.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve knowledge and coordination of emergency responders.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness - Response

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane, Wildfire, Winter Storm, Tornado, Extreme Heat, Drought, Hail, Lightning, Thunderstorm Wind
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$20,000 - \$30,000
Potential Funding Sources:	PDM, HMGP, GLO, other grants
Lead Agency/Department Responsible:	Hardin County OEM
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 17: Mitigation Actions

Hardin County – Action #8	
Proposed Action:	Continue participation in the National Flood Insurance Program (NFIP) and participate in the Community Rating System (CRS). Activities may include: improvement of flood mapping and elevation data, mitigation for repetitive loss properties, instituting higher regulatory standards for future floodplain development, storm water management plans, and standards for future development to control runoff.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Maintain NFIP compliance and benefits, mitigate flooding, and reduce cost of flood insurance.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	Minimal – Staff Time
Potential Funding Sources:	Operating budget
Lead Agency/Department Responsible:	Hardin County Floodplain Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Floodplain Management Plan, Floodplain Ordinance

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Hardin County – Action #9	
Proposed Action:	Develop-upgrade contact information database for first responders, volunteers, special needs, and medical special needs populations.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce loss of life; safety and protection for all of the population.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane, Extreme Heat, Winter Storm, Hail, Lightning, Thunderstorm Wind, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$6,000,000
Potential Funding Sources:	HMGP, GLO, PDM, local funding
Lead Agency/Department Responsible:	Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Hardin County – Action #10	
Proposed Action:	Educate the public on issues related to the inappropriate discharge of hazardous materials and wastewater in the environment and the impacts it has on the waterways.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Appropriate training facilities, school distribution (handouts and brochures), website and media outlets
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improved public health and safety; environmental and recreational benefits.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$100,000
Potential Funding Sources:	CIAP, PDM, HMGP, other grants
Lead Agency/Department Responsible:	Hardin County OEM
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 17: Mitigation Actions

Hardin County – Action #11	
Proposed Action:	Develop inventory of pipelines that are buried too shallow for safety and that do not meet modern standards.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Mitigate or help prevent unnecessary rupture of pipelines; enhanced risk assessment.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hazardous Materials
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$25,000 - \$45,000
Potential Funding Sources:	HMGP, PDM, other grants
Lead Agency/Department Responsible:	Hardin County OEM
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Emergency Plans

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Hardin County – Action #12	
Proposed Action:	Develop local requirements for mobile home tie-down and anchoring systems, and build capacity to conduct periodic inspections.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Unincorporated areas of Hardin County
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improved public safety.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing and new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$40,000 - \$60,000/year
Potential Funding Sources:	PDM, HMGP, CDBG, TWDB, other grants
Lead Agency/Department Responsible:	Hardin County OEM, Floodplain Office
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #13	
Proposed Action:	Retrofit new or existing county critical facilities (Courthouse Annex, EOC, government buildings, and others) as needed, including but not limited to installation of the following features for severe storm protection: storm shutters or tinted shatter-resistant laminate film for windows; roof straps and strengthening for high wind load; roll-up door reinforcement (i.e. fire stations); non-permeable exterior walls, door seals and flood-proofing measures; alternate power supply (generators) with permanent hook-ups; fold down alternate site antennas; security cameras; electrical surge protection; secured data back-up systems and critical equipment, as a measure to mitigate or prevent storm damage.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Critical facilities in and throughout Hardin County and all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Continuity of county government during and after a storm event; damage prevention.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Tornado, Thunderstorm Wind, Flood, Winter Storm, Wildfire, Lightning, Extreme Heat, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,500,000 - \$3,500,000
Potential Funding Sources:	HMGP, PDM, GLO, Texas Safe Shelter Initiative, TWDB, other grants sources available
Lead Agency/Department Responsible:	County and City Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Mitigation Action Plan, Comprehensive Plan

COMMENTS

Section 17: Mitigation Actions

Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #14	
Proposed Action:	Voluntary acquisition of Repetitive Loss and flood prone properties throughout Hardin County and all jurisdictions. Assist relocation to safer locations within the County.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Low lying repetitive loss and flood prone properties throughout the county and all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve public safety, reduce flood losses, reduce demand for emergency services, improve floodplain functions and water quality, and improve floodplain ordinance compliance.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project Natural Systems Protection

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane
Effect on New/Existing Buildings:	Eliminate risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,000,000 - \$4,000,000
Potential Funding Sources:	FMA, RFC, SRL, PDM, HMGP, GLO
Lead Agency/Department Responsible:	County and City Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Comprehensive Plan

COMMENTS
Property acquired will remain as open space for perpetuity and used for the benefit of the community.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 3; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #15	
Proposed Action:	Upgrade storm water capacity throughout the county and local jurisdictions. Actions include but are not limited to installing/upgrading culverts and headwalls, and enlarging storm water ditches and canals.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide including all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improved water outflow capacity to prevent/reduce impacts of flash flooding, rising water, etc. Reduction of damage to new and existing buildings.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane, Thunderstorm Wind
Effect on New/Existing Buildings:	Reduce risk of damage to new and existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$8,000,000 - \$16,000,000
Potential Funding Sources:	PDM, HMGP, TWDB, GLO, other grants
Lead Agency/Department Responsible:	Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Some improvements have been completed but other projects/improvements need to be implemented, including the Black Creek and Beaver Brook area.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #16	
Proposed Action:	Elevate existing roadways and bridges prone to inundation from flooding. Projects can include general road elevation; installing, upsizing culverts and headwalls; and bridge upgrades.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Various locations throughout Hardin County and all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve public safety; facilitate evacuation and emergency response; and reduce infrastructure damage.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$6,000,000 - \$10,000,000
Potential Funding Sources:	PDM, HMGP, GLO, Highway Departments, other grants
Lead Agency/Department Responsible:	Hardin County Public Works, Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #17	
Proposed Action:	Provide educational brochures and make presentations to the general public and schools regarding mitigation measures for the general public, commercial businesses, and industry. Provide educational materials and presentations to increase awareness and educate citizens on mitigation techniques, emergency preparedness, evacuation routes, and other hazard information as appropriate.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide including all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve public education and individual preparedness which will in turn reduce need for some emergency services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane, Wildfire, Winter Storm, Tornado, Extreme Heat, Drought, Hail, Lightning, Thunderstorm Wind
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$20,000 - \$50,000
Potential Funding Sources:	PDM, HMGP, GLO, other grants
Lead Agency/Department Responsible:	County and City Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #18	
Proposed Action:	Relocate utility lines for existing buildings underground to mitigate hazard impacts and prevent loss of function. Require power lines to be buried for future development projects.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide including all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Maintain electrical service during storms; decrease utility and public services restoration time and expense.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane, Wildfire, Winter Storm, Tornado, Hail, Lightning, Thunderstorm Wind
Effect on New/Existing Buildings:	Reduce risk to existing and new structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000 - \$4,000,000
Potential Funding Sources:	HMGP, PDM, operating budgets, utility fees
Lead Agency/Department Responsible:	County and City Public Works, Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Comprehensive Plan, Local Ordinances

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #19	
Proposed Action:	Construct water retention ponds to collect storm water run-off, reduce flooding and use as an alternate water source throughout Hardin County.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Locations TBD throughout Hardin County and all participating jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Prevent flooding damage to homes, improve water storage capacity for times of drought and fighting wildfires.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought, Flood, Hurricane, Wildfire
Effect on New/Existing Buildings:	Reduce damages to existing and new structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000 - \$2,000,000
Potential Funding Sources:	Operating budgets, local funding, PDM, HMGP
Lead Agency/Department Responsible:	County and City Public Works, Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Master Drainage Plan, Water Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #20	
Proposed Action:	Install frangible links/break away connections on utility poles to maintain utility operation during and after a hazard event.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Hardin County and all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Maintain electrical service during storms, decrease utility and public services restoration time and expense.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane, Tornado, Thunderstorm Wind, Hail, Lightning, Winter Storm
Effect on New/Existing Buildings:	Reduce damages to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000 - \$3,000,000
Potential Funding Sources:	Operating budgets, local funding, PDM, HMGP
Lead Agency/Department Responsible:	County and City Public Works, Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Comprehensive Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #21	
Proposed Action:	Identify and pursue mitigation activities that would assist in efficient evacuations throughout the county including but not limited to improved signage, widening roads and bridges, traffic monitoring systems, and improved road connectivity.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Hardin County and all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Make evacuation process more efficient and safer.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Flood, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000 - \$3,500,000
Potential Funding Sources:	PDM, HMGP
Lead Agency/Department Responsible:	County and City Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Evacuation Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #22	
Proposed Action:	Install signage to notify public when Burn Ban is activated. Improve enforcement through education and coordination.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Hardin County and all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve public education and compliance with Burn Ban to reduce wildfires.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Drought
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$50,000 - \$90,000
Potential Funding Sources:	HMGP, PDM, local budgets, TFS grants
Lead Agency/Department Responsible:	County and City Fire Departments, Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Community Wildfire Protection Plans

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #23	
Proposed Action:	Conduct tree pruning initiative along power lines. Hardin County will work closely with local energy companies to develop a realistic schedule for tree pruning along electrical power lines.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce power outage and road closure due to downed trees during and after storms; improve emergency response and first responder safety.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hail, Lightning, Hurricane, Tornado
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$600,000 - \$800,000
Potential Funding Sources:	Operating budgets, utility fees
Lead Agency/Department Responsible:	County and City Public Works, Hardin County OEM
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #24	
Proposed Action:	Elevate flood prone homes including electrical systems to a minimum of 1’ above Base Flood Elevation.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Hardin County homes located near Rivers, Bayous, Canals, and Creeks, or other low lying areas subject to rising water and flooding. Local jurisdiction flood prone or repetitive loss properties.
Risk Reduction Benefit (Current Cost/Losses Avoided):	Mitigate flood damage; improve compliance with floodplain ordinance.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$6,000,000
Potential Funding Sources:	HMGP, PDM, GLO, local funding
Lead Agency/Department Responsible:	County and City Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Comprehensive Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #25	
Proposed Action:	Educate homeowners and builders on the importance of maintaining defensible space surrounding structures to prevent damage.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce wildfire and drought damage; improve individual participation in wildfire mitigation; improve safety through site design for future development; and reduce water use for firefighting.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Drought
Effect on New/Existing Buildings:	Mitigate residential and property losses, existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000 - \$3,000,000
Potential Funding Sources:	Operating budgets, local funding, PDM, HMGP, TFS grants
Lead Agency/Department Responsible:	County and City Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #26	
Proposed Action:	Construct/install safe shelters in public buildings capable of providing protection from severe tornados, extreme straight line winds in accordance with FEMA Publication 320 and/or National Performance Criteria for Tornado Shelters specifications.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Hardin County, including all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve public safety; life safety benefits.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000 - \$80,000
Potential Funding Sources:	PDM, HMGP, GLO
Lead Agency/Department Responsible:	County and City Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #27	
Proposed Action:	Develop incentives and provide instruction for homeowners to construct/install residential safe shelters capable of providing protection from severe tornados, extreme straight winds in accordance with FEMA Publication 320 and/or National Performance Criteria for Tornado Shelters specifications.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improved public safety; life safety benefits.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Thunderstorm Wind, Tornado
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$100,000 - \$200,000
Potential Funding Sources:	HMGP, PDM, GLO, local funding
Lead Agency/Department Responsible:	County and City Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #28	
Proposed Action:	Develop water conservation strategies and/or ordinances for implementation during times of drought.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve public cooperation during water shortages; ensure that water sources are not completely depleted in times of drought; and that the county has adequate water supplies.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$50,000 - \$80,000
Potential Funding Sources:	Operating budgets, local funding, PDM, HMGP
Lead Agency/Department Responsible:	County and City Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #29	
Proposed Action:	Retrofit existing structures to act as cooling/warming stations in times of extreme heat and extreme cold.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all jurisdictions – locations TBD
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improved health and safety of general population and special needs populations.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$60,000 - \$80,000
Potential Funding Sources:	Operating budgets, local funding, PDM, HMGP
Lead Agency/Department Responsible:	Hardin County OEM
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #30	
Proposed Action:	Institute policy of considering drought tolerant landscaping at the design stage for future public development.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce water use.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,000 - \$5,000
Potential Funding Sources:	TFS, HMGP, PDM, other grants
Lead Agency/Department Responsible:	Hardin County OEM
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinance

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Hardin County (County-wide) – Action #31	
Proposed Action:	Develop and implement a public education program to educate residents of the risk of dam failure, actions to reduce risk, and evacuation routes and procedures for residents downstream of the Sam Rayburn Dam and the Toleda Bend Dam in the event of a dam failure.
BACKGROUND INFORMATION	
Jurisdiction/Location:	County-wide, including all jurisdictions
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce loss of life
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Prevent or minimize flood damage to structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$2,000 - \$5,000
Potential Funding Sources:	HMGP, PDM, other grants
Lead Agency/Department Responsible:	Hardin County OEM
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
For purposes of the HMAP, upstream dam failure would affect part of the communities within Hardin County boundaries. However, the impacts associated with these dams are flood related.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

CITY OF KOUNTZE

Kountze – Action #1	
Proposed Action:	Seek funding and construct centralized shelters of last resort within the City of Kountze that are elevated out of the flood prone area and designed for appropriate wind load in coordination with the Texas Safe Shelter Initiative.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Locations TBD in City of Kountze
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going repair cost; continue essential utility services during severe weather event; and reduce disaster response time. Public safety and protection for special needs populations.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Thunderstorm Wind, Tornado, Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$6,000,000
Potential Funding Sources:	HMGP, TDEM, local operating budgets
Lead Agency/Department Responsible:	Kountze OEM / Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 17: Mitigation Actions

Kountze – Action #2	
Proposed Action:	Retrofit city critical facilities as needed including but not limited to installation of the following features for severe storm protection: storm shutters or tinted shatter-resistant laminate film for windows; roof straps and strengthening for high wind load; roll-up door reinforcement (fire stations); non-permeable exterior walls, door seals and flood-proofing measures; alternate power supply (generators) with permanent hook-ups; fold down alternate site antennas; security cameras; electrical surge protection; secure data back-up systems and critical equipment.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide critical facilities
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to critical facilities and ensure continuity of critical services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Thunderstorm Wind, Tornado, Flood, Winter Storm, Wildfire, Extreme Heat, Hail, Lightning
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000 - \$1,500,000
Potential Funding Sources:	HMGP, local operating budgets, PDM
Lead Agency/Department Responsible:	Kountze OEM / Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Kountze – Action #3	
Proposed Action:	Voluntary acquisition of Repetitive Loss and flood prone properties in the City of Kountze. Assist relocation to safer locations within the city. Property acquired will remain as open space for perpetuity and used for the benefit of the community.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide flood prone structures
Risk Reduction Benefit (Current Cost/Losses Avoided):	Eliminate damages to repetitive loss structures; reduce emergency response burden.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Flood
Effect on New/Existing Buildings:	Eliminate risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$6,000,000
Potential Funding Sources:	HMGP, PDM, FMA
Lead Agency/Department Responsible:	Kountze OEM / Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Comprehensive Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 3; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Kountze – Action #4	
Proposed Action:	Upgrade storm water capacity throughout the City of Kountze. Actions include but are not limited to installing/upgrading culverts and headwalls, enlarging storm water ditches and canals.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce flood damages to structures and infrastructure due to undersized or inadequate storm water drainage.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000 - \$3,000,000
Potential Funding Sources:	HMGP, PDM, local operating budgets
Lead Agency/Department Responsible:	Kountze OEM / Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 17: Mitigation Actions

Kountze – Action #5	
Proposed Action:	Elevate roadways and bridges prone to inundation from flooding. Projects can include general road elevation; installing, upsizing culverts and headwalls; and bridge upgrades.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going repair cost; continue essential utility services during severe weather events; and reduce disaster response time.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$600,000 - \$2,000,000
Potential Funding Sources:	HMGP, PDM, local operating budget
Lead Agency/Department Responsible:	Kountze OEM / Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 17: Mitigation Actions

Kountze – Action #6	
Proposed Action:	Construct/install safe shelters in city critical facilities and fire department buildings, providing protection from severe tornados, and/or extreme straight line winds in accordance with FEMA publication 320 and/or National Performance Criteria for tornado shelters specification.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Kountze – Critical Facilities
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to structures and provide protection for first responders and emergency personnel.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Thunderstorm Wind, Tornado
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000 - \$80,000 per shelter
Potential Funding Sources:	HMGP, PDM
Lead Agency/Department Responsible:	Kountze OEM / Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Kountze – Action #7	
Proposed Action:	Continue participation in the National Flood Insurance Program (NFIP) and participate in the Community Rating System (CRS). Activities may include: improvement of flood mapping and elevation data, mitigation for repetitive loss properties, instituting higher regulatory standards for future floodplain development, storm water management plans and standards for future development to control runoff.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents; reduce on-going repair costs due to flooding; reduce insurance premiums.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000 - \$10,000
Potential Funding Sources:	Local operating budgets
Lead Agency/Department Responsible:	Kountze OEM / Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Floodplain Management Plan, Floodplain Ordinance

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Kountze – Action #8	
Proposed Action:	Develop-upgrade contact information database for first responders and special needs populations with emphasis on populations exceptionally vulnerable in the event of long-term power outages.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to vulnerable populations through early identification and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Thunderstorm Wind, Tornado, Flood, Wildfire, Extreme Heat, Winter Storm, Hail, Lightning
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$5,000 - \$10,000
Potential Funding Sources:	Local operating budget
Lead Agency/Department Responsible:	Kountze OEM / Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Kountze – Action #9	
Proposed Action:	Retrofit existing structures such as social service agencies to act as cooling stations in times of extreme heat. Educate public on locations and availability of cooling centers.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Kountze – locations TBD
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents during extreme heat events.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$60,000 - \$80,000
Potential Funding Sources:	Local operating budgets, PDM, HMGP
Lead Agency/Department Responsible:	Kountze OEM / Public Works
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

CITY OF LUMBERTON

Lumberton – Action #1	
Proposed Action:	Voluntary acquisition of Repetitive Loss and flood prone properties in the City of Lumberton. Assist relocation to safer locations within the city. Property acquired will remain as open space for perpetuity and used for the benefit of the community.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Lumberton
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve public safety; reduce flood loss; reduce demand for emergency services; improve floodplain functions and water quality; improve floodplain ordinance compliance.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane
Effect on New/Existing Buildings:	Eliminate risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$2,500,000 - \$3,000,000 – TBD per structure
Potential Funding Sources:	FMA, PDM, HMGP
Lead Agency/Department Responsible:	Lumberton City Administration
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Comprehensive Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 3; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Lumberton – Action #2	
Proposed Action:	Retrofit any and all government and/or city critical facilities as needed including but not limited to installation of the following features for severe storm protection: storm shutters or tinted shatter-resistant laminate film for windows; roof straps and strengthening for high wind load; roll-up door reinforcement (i.e. fire stations); non-permeable exterior walls, door seals and flood-proofing measures; alternate power supply (generators) with permanent hook-ups; fold down alternate site antennas; security cameras; electrical surge protection; secure data back-up systems and critical equipment.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Lumberton
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve Public Safety.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Tornado, Thunderstorm Wind, Flood, Winter Storm, Wildfire, Lightning, Extreme Heat, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,200,000 - \$1,500,000
Potential Funding Sources:	PDM, HMGP operating budgets, local funding
Lead Agency/Department Responsible:	Lumberton Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Lumberton – Action #3	
Proposed Action:	Construct water retention ponds to collect storm water run-off, reduce flooding and use as an alternate water source throughout Lumberton.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Lumberton
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve Public Safety; prevent flooding damage to new and existing homes; improve water storage for times of drought and fighting wildfires.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane, Wildfire, Drought
Effect on New/Existing Buildings:	Reduce damages to existing and new structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000 - \$1,500,000
Potential Funding Sources:	PDM, HMGP, operating budgets, local funding
Lead Agency/Department Responsible:	Lumberton Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Master Drainage Plan, Water Plan

COMMENTS
Two retention ponds have been constructed in an attempt to reduce flooding. The project includes additional retention ponds to address hazards.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Lumberton – Action #4	
Proposed Action:	Upgrade storm water capacity throughout the City of Lumberton. Actions include but are not limited to installing/upgrading culverts and headwalls, excavating and enlarging storm water ditches and canals.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Various locations throughout City of Lumberton
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improved floodwater outflow capacity from city centers and industrial complexes is needed to reduce/ prevent impacts of flash flooding.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000 - \$3,000,000
Potential Funding Sources:	PDM, HMGP, operating budgets, local funding
Lead Agency/Department Responsible:	Lumberton Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Lumberton – Action #5	
Proposed Action:	Elevate roadways and bridges prone to inundation from flooding. Projects can include general road elevation; installing, upsizing culverts and headwalls; and bridge upgrades.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Lumberton
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve public safety; facilitate evacuation and emergency response; reduce flood damages to infrastructure and surrounding structures.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$800,000 - \$4,000,000
Potential Funding Sources:	PDM, HMGP, GLO
Lead Agency/Department Responsible:	Lumberton Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
The City is in the process of acquiring an Engineering study for the installation of a bridge to aid residents in flood prone areas.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Lumberton – Action #6	
Proposed Action:	Install frangible links/break away connections on utility poles in the City to maintain utility operation during and after a hazard event.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Lumberton
Risk Reduction Benefit (Current Cost/Losses Avoided):	Maintain electrical service during storms.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane, Tornado, Thunderstorm, Hail, Lightning, Winter Storm
Effect on New/Existing Buildings:	Reduce damages to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$200,000 - \$400,000
Potential Funding Sources:	Operating budgets, local funding, PDM, HMGP, utility fees
Lead Agency/Department Responsible:	Lumberton Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Comprehensive Plan

COMMENTS
The City will assist utility companies in any way in the event of a disaster/hazard event.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Lumberton – Action #7	
Proposed Action:	Construct/install safe shelters in City buildings capable of providing protection from severe tornados, and/or extreme straight line winds in accordance with FEMA Publication 320 and/or National Performance Criteria for Tornado Shelters specifications.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Lumberton
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improved public safety.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Thunderstorm Wind, Tornado
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000 - \$80,000 per shelter
Potential Funding Sources:	PDM, HMGP
Lead Agency/Department Responsible:	Lumberton City Administration
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
The City of Lumberton in coordination with the Lumberton School District has constructed a centralized shelter of last resort, which was completed in 2015; however, additional shelters are needed throughout the City.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Lumberton – Action #8	
Proposed Action:	Retrofit existing structures such as social service agencies to act as cooling/warming stations in times of extreme heat and extreme cold.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Lumberton
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improved health and safety of general population and special needs population.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Extreme Heat, Winter Storm
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$60,000 - \$80,000
Potential Funding Sources:	Operating budgets, local funding, PDM, HMGP
Lead Agency/Department Responsible:	Lumberton City Administration
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Lumberton – Action #9	
Proposed Action:	Identify and pursue mitigation activities that would assist efficient evacuations through the City including but not limited to improved signage, widening roads and bridges, traffic monitoring systems, improved road connectivity, etc.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Lumberton
Risk Reduction Benefit (Current Cost/Losses Avoided):	Make evacuation process more efficient and safer; life safety benefits of improved evacuation routes and procedures.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000 - \$1,500,000
Potential Funding Sources:	PDM, HMGP
Lead Agency/Department Responsible:	Lumberton Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
The City, including the Police Department, works with any and all entities involving traffic flow in the event of a disaster/evacuation.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Lumberton – Action #10	
Proposed Action:	Continue participation in the National Flood Insurance Program (NFIP) and participate in the Community Rating System (CRS). Activities may include: improvement of flood mapping and elevation data, mitigation for repetitive loss properties, instituting higher regulatory standards for future floodplain development, storm water management plans and standards for future development to control runoff.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Lumberton
Risk Reduction Benefit (Current Cost/Losses Avoided):	Maintain NFIP compliance; reduce cost of flood insurance; mitigate flood damages.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	Minimal – Staff Time
Potential Funding Sources:	PDM, HMGP
Lead Agency/Department Responsible:	Lumberton Floodplain Management
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Floodplain Management Plan, Floodplain Ordinance

COMMENTS
The City, and its floodplain coordinator, work closely with all agencies to insure compliance with all standards.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

TOWN OF ROSE HILL ACRES

Rose Hill Acres – Action #1	
Proposed Action:	Upgrade storm water capacity and drainage throughout the Town of Rose Hill Acres. Actions include but are not limited to installing/upgrading culverts and headwalls, excavating new and/or enlarging storm water ditches and canals.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Rose Hill Acres, all easements diverting drainage from municipal out flows to Boggy Creek and Pine Island Bayou.
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improved floodwater outflow capacity from town centers and industrial complexes is needed to reduce/ prevent impacts of flash flooding; reduce risk to residents from standing water, i.e. mosquito born disease, virus, etc.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000 - \$1,500,000
Potential Funding Sources:	PDM, HMGP, operating budgets, local funding
Lead Agency/Department Responsible:	Rose Hill Acres Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Flood Management Plan, Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Rose Hill Acres – Action #2	
Proposed Action:	Retrofit town critical facilities as needed including but not limited to installation of the following features for severe storm protection: storm shutters or tinted shatter-resistant laminate film for windows; roof straps and strengthening for high wind load; roll-up door reinforcement (i.e. fire stations); non-permeable exterior walls, door seals and flood proofing measures; alternate power supply (generators) with permanent hook-ups; fold down alternate site antennas; security cameras; electrical surge protection; hail and fire resistant roofing material; secure data back-up systems and critical equipment.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town Hall and supporting critical facilities
Risk Reduction Benefit (Current Cost/Losses Avoided):	Rehabilitation of incident; monitoring before, during, and post event allowing for onsite operations protecting life and property; providing for communications and emergency assistance; maintain continuity of Municipal government during and after a storm event; damage prevention and IC Operations.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Tornado, Flood, Thunderstorm Wind, Winter Storm, Wildfire, Lightning, Extreme Heat
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$400,000 - \$500,000
Potential Funding Sources:	PDM, HMGP, operating budgets, local funding
Lead Agency/Department Responsible:	Rose Hill Acres Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS

Section 17: Mitigation Actions

Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Rose Hill Acres – Action #3	
Proposed Action:	Install box culvert, concrete pipe, or similar mechanism as needed to mitigate inadequate drainage and improve storm water capacity and conveyance.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Rose Hill Acres bridge and roads
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce flooding damage to structures and infrastructure and road inundation.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Thunderstorm Wind, Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$200,000 - \$400,000
Potential Funding Sources:	Operating budget, local funding, PDM, HMGP
Lead Agency/Department Responsible:	Rose Hill Acres Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Prevent Road inundation resulting in flood damage and creation of traffic hazard.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Rose Hill Acres – Action #4	
Proposed Action:	Pursue the coordination, construction, expansion, and maintenance of flood control structures (barriers, berms) for the purpose of protecting critical facilities, potable water sources, and agricultural resources from water contamination and salt water intrusion.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Municipal pumping stations, floodways, critical facilities
Risk Reduction Benefit (Current Cost/Losses Avoided):	Protect critical facilities, potable water sources, and agricultural resources from water contamination and salt water intrusion.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000 - \$3,000,000
Potential Funding Sources:	Operating budgets, local funding, PDM, HMGP
Lead Agency/Department Responsible:	Rose Hill Acres Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Mitigate flooding and general salt water intrusion.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Rose Hill Acres – Action #5	
Proposed Action:	Rectify and enlarge main outfall channels including excavating interior roadside ditches and driveway culvert system to reduce/eliminate future flood damage to flood prone structures.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Rose Hill Acres interior also bayou and creek properties
Risk Reduction Benefit (Current Cost/Losses Avoided):	Avoid municipal infrastructure and property losses; improved floodwater outflow capacity from town centers and industrial complexes is needed to reduce/ prevent impacts of flash flooding.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000 - \$3,000,000
Potential Funding Sources:	Local funding, PDM, HMGP
Lead Agency/Department Responsible:	Rose Hill Acres Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 17: Mitigation Actions

Rose Hill Acres – Action #6	
Proposed Action:	Construct/install safe shelters in town buildings capable of providing protection from severe tornados, and/or extreme straight line winds in accordance with FEMA Publication 320 and/or National Performance Criteria for Tornado Shelters specifications.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Rose Hill Acres residential, municipal, and commercial structures
Risk Reduction Benefit (Current Cost/Losses Avoided):	Provide improved public safety.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Tornado, Thunderstorm Wind, Hurricane, Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$10,000 - \$80,000 per shelter
Potential Funding Sources:	PDM, HMGP
Lead Agency/Department Responsible:	Rose Hill Acres Administration
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Mitigation Action Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Rose Hill Acres – Action #7	
Proposed Action:	Elevate roadways and bridges prone to inundation from flooding. Projects can include general road elevation; installing, upsizing culverts and headwalls; and bridge upgrades.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Rose Hill Acres, elevating roadways and bridges prone to inundation from flooding
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce flooding damage and road inundation; flood water management; ensure emergency access.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$600,000 - \$1,800,000
Potential Funding Sources:	PDM, HMGP
Lead Agency/Department Responsible:	Rose Hill Acres Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Comprehensive Plan

COMMENTS
Improve public safety, facilitate evacuation and emergency response.
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Rose Hill Acres – Action #8	
Proposed Action:	Identify and pursue mitigation activities that would assist efficient evacuations through the town including but not limited to improved signage, widening roads and bridges, traffic monitoring systems, improved road connectivity, etc. Educate citizens on evacuation routes and procedures.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Rose Hill Acres town-wide. Specific to intersections, one way street routing and signage fixed and portable to facilitate traffic flow.
Risk Reduction Benefit (Current Cost/Losses Avoided):	Make evacuation process more efficient and safer; life safety benefits of early evacuation.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000 - \$1,500,000
Potential Funding Sources:	PDM, HMGP
Lead Agency/Department Responsible:	Rose Hill Acres Emergency Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Rose Hill Acres – Action #9	
Proposed Action:	Widen and reinforce critical bridges throughout the town to assist evacuation.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Rose Hill Acres
Risk Reduction Benefit (Current Cost/Losses Avoided):	Facilitate evacuation and emergency response.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Flood, CBRNE* Incident
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$5,000,000 - \$10,000,000
Potential Funding Sources:	PDM, HMGP, State and Federal Highway Departments
Lead Agency/Department Responsible:	Hardin County / Rose Hill Acres OEM, Public Works, TXDOT, Texas Department of Transportation
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Rose Hill Acres Mitigation Action Plan

COMMENTS
69/96 Feeder Road N. and S. bound lanes in Drafting and Engineering state (TXDOT) Improve public safety, facilitate evacuation and emergency response *CBRNE Incident: Chemical, Biological, Radiological, Nuclear & Explosive Incidents
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Rose Hill Acres – Action #10	
Proposed Action:	Continue participation in the National Flood Insurance Program (NFIP) and investigate participation in the Community Rating System (CRS). Activities may include: improvement of flood mapping and elevation data, mitigation for repetitive loss properties, instituting higher regulatory standards for future floodplain development, storm water management plans and standards for future development to control runoff.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Rose Hill Acres
Risk Reduction Benefit (Current Cost/Losses Avoided):	Maintain and improve NFIP compliance and benefits; mitigate future flooding; reduce cost of flood insurance.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Flood
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$10,000
Potential Funding Sources:	PDM, local operating budget
Lead Agency/Department Responsible:	Rose Hill Acres Floodplain Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Floodplain Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

Section 17: Mitigation Actions

Rose Hill Acres – Action #11	
Proposed Action:	Install frangible links/break away connections on utility poles in the town to maintain utility operation during and after a hazard event.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Town of Rose Hill Acres
Risk Reduction Benefit (Current Cost/Losses Avoided):	Maintain utility operation during and after a hazard event; improve public safety; facilitate evacuation and emergency response.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Thunderstorm Wind, Tornado, Hail, Winter Storm, Lightning
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$50,000 - \$100,000
Potential Funding Sources:	Operating budgets, local funding, PDM, HMGP
Lead Agency/Department Responsible:	Rose Hill Acres Public Works, Utility Companies
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Rose Hill Acres Emergency Management Plan/Hardin County Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Rose Hill Acres – Action #12	
Proposed Action:	Construct structure(s) of last resort with in the town that is elevated out of the flood prone area and designed for the appropriate wind load in compliance with the safe shelter initiative.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Elevate Property within Town of Rose Hill Acres
Risk Reduction Benefit (Current Cost/Losses Avoided):	Public safety and protection for special needs populations.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane, Thunderstorm Wind, Tornado
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$750,000 - \$1,500,000
Potential Funding Sources:	Local funding, HMGP, Texas Safe Shelter
Lead Agency/Department Responsible:	Rose Hill Acres Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Rose Hill Acres Emergency Management Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 4; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

CITY OF SILSBEE

Silsbee – Action #1	
Proposed Action:	Retrofit city critical facilities as needed including but not limited to installation of the following features for severe storm protection: storm shutters or tinted shatter-resistant laminate film for windows; roof straps and strengthening for high wind load; roll-up door reinforcement (i.e. fire stations); non-permeable exterior walls, door seals and flood-proofing measures; alternate power supply (generators) with permanent hook-ups; fold down alternate site antennas; security cameras; electrical surge protection; secure data back-up systems and critical equipment. These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages to critical facilities and ensure continuity of city government during and after a storm event.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Thunderstorm Wind, Tornado, Hail, Lightning, Flood, Winter Storm, Wildfire, Extreme Heat
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000 - \$1,500,000
Potential Funding Sources:	PDM, HMGP, Operating budgets, local funding
Lead Agency/Department Responsible:	Silsbee Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS

Section 17: Mitigation Actions

Additional Considerations:

The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies)

Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Silsbee – Action #2	
Proposed Action:	Voluntary acquisition of Repetitive Loss and flood prone properties in the City of Silsbee. Assist relocation to safer locations within the city. Property acquired will remain as open space for perpetuity and used for the benefit of the community.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide repetitive loss structures
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improve public safety; reduce flood losses; reduce demand for emergency services; improve floodplain functions and water quality; improve floodplain ordinance compliance.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane
Effect on New/Existing Buildings:	Eliminate risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$200,000 - \$500,000 – TBD per structure
Potential Funding Sources:	PDM, HMGP, FMA
Lead Agency/Department Responsible:	Silsbee Administration
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Comprehensive Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 3; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Silsbee – Action #3	
Proposed Action:	Upgrade storm water capacity and drainage throughout the City of Silsbee. Actions include but are not limited to installing/upgrading culverts and headwalls, excavating new and/or enlarging storm water ditches and canals. These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Improved floodwater outflow capacity from city centers and industrial complexes is needed to reduce/prevent impacts of flash flooding.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$1,000,000 - \$1,500,000
Potential Funding Sources:	PDM, HMGP, operating budgets, local funding
Lead Agency/Department Responsible:	Silsbee Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Silsbee – Action #4	
Proposed Action:	Construct retention ponds to store and regulate discharge of storm water during flooding events. These actions include creating new infrastructure to mitigate or reduce potential or threatening floodwater damage or runoff.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Locations TBD within Silsbee
Risk Reduction Benefit (Current Cost/Losses Avoided):	Prevent flooding damage to new and existing homes; improve water storage capacity for times of drought and fighting wildfires.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Drought, Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing structures and infrastructure
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000 - \$1,500,000
Potential Funding Sources:	Operating budgets, local funding, PDM, HMGP
Lead Agency/Department Responsible:	Silsbee Public Works
Implementation Schedule:	Within 12-24 months of Plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4

Section 17: Mitigation Actions

Silsbee – Action #5	
Proposed Action:	Continue participation in the National Flood Insurance Program (NFIP) and investigate participation in the Community Rating System (CRS). Activities may include: improvement of flood mapping and elevation data, mitigation for repetitive loss properties, instituting higher regulatory standards for future floodplain development, storm water management plans and standards for future development to control runoff.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City-wide
Risk Reduction Benefit (Current Cost/Losses Avoided):	Maintain and improve NFIP compliance and benefits; mitigate future flooding; reduce cost of flood insurance.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce damages to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$25,000
Potential Funding Sources:	HMGP, PDM, local operating budgets
Lead Agency/Department Responsible:	Silsbee Floodplain Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Floodplain Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

CITY OF SOUR LAKE

Sour Lake – Action #1	
Proposed Action:	Construct water retention ponds to store and regulate discharge of storm water during flood events.
BACKGROUND INFORMATION	
Jurisdiction/Location:	TBD site in Sour Lake
Risk Reduction Benefit (Current Cost/Losses Avoided):	Localized flood reduction and improved water storage for times of drought and wildfire.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Wildfire, Drought
Effect on New/Existing Buildings:	Reduce damages to existing and new structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000 - \$1,000,000
Potential Funding Sources:	HMGP, PDM, local operating budgets
Lead Agency/Department Responsible:	Sour Lake Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Master Drainage Plan, Water Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 17: Mitigation Actions

Sour Lake – Action #2	
Proposed Action:	Continue participation in the NFIP and participate in CRS. Activities may include: improvement of flood mapping and elevation data, mitigation of repetitive loss properties, instituting higher regulatory standards for future floodplain development, storm water management plans and standards for future development to control runoff.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Sour Lake
Risk Reduction Benefit (Current Cost/Losses Avoided):	Maintain and improve NFIP compliance and benefits; mitigate future flooding; reduce cost of flood insurance.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce damages to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$50,000
Potential Funding Sources:	HMGP, PDM, local operating budgets
Lead Agency/Department Responsible:	Sour Lake Floodplain Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Floodplain Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Sour Lake – Action #3	
Proposed Action:	Install large concrete channel, box culvert, concrete pipe, and/or mechanisms as needed to mitigate drainage ditch erosion and improve water capacity and conveyance.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Sour Lake
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to structures and infrastructure through improved flood control measures.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood
Effect on New/Existing Buildings:	Reduce risk to existing and new structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$400,000
Potential Funding Sources:	HMGP, PDM, local operating budgets
Lead Agency/Department Responsible:	Sour Lake Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Drainage Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 4; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 17: Mitigation Actions

Sour Lake – Action #4	
Proposed Action:	Provide the general public and schools with educational brochures for mitigating damages, planning ahead for disasters and reducing the risk of injury during events, including: mitigation measures such as window film, elevated appliances, surge protectors, insulating pipes, and drought tolerate landscaping, etc. Education on when to take cover, when to evacuate, locations of local safe rooms, signs of dehydration, and proper storage of flammable materials, or other appropriate materials to mitigate damages and health hazards.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Sour Lake
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk to residents and structures through education and preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Flood, Thunderstorm Wind, Winter Storm, Wildfire, Tornado, Lightning, Extreme Heat, Hail, Drought
Effect on New/Existing Buildings:	Reduce risk to existing and new structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$30,000
Potential Funding Sources:	HMGP, PDM, local operating budgets
Lead Agency/Department Responsible:	Sour Lake Emergency Management
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Emergency Management Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Sour Lake – Action #5	
Proposed Action:	Storm harden/retrofit critical facilities throughout Sour Lake. Actions can include but are not limited to window shutters, roof straps, flood proofing, roll-up door reinforcement (i.e. for fire stations), backup generator power with permanent hook-ups, secure data backup systems, hail resistant roofing materials, surge protectors or other appropriate measures to mitigate storm damage.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Critical facilities in Sour Lake
Risk Reduction Benefit (Current Cost/Losses Avoided):	Protect critical facilities from damages and ensure continuity of emergency services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Tornado, Thunderstorm Wind, Flood, Winter Storm, Wildfire, Lightning, Extreme Heat, Hail
Effect on New/Existing Buildings:	Reduce risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$500,000
Potential Funding Sources:	HMGP, PDM, local operating budgets
Lead Agency/Department Responsible:	Sour Lake Public Works
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Disaster Response Plan

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Sour Lake – Action #6	
Proposed Action:	Relocate utility lines for existing buildings underground to mitigate hazard impacts and prevent loss of function. Require installation of underground lines at time of construction for new and future development projects to reduce future hazard impacts.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Utility lines throughout Sour Lake
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce risk of loss of power and ensure continuity of emergency services.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane, Thunderstorm Wind, Winter Storm, Tornado, Lightning, Hail
Effect on New/Existing Buildings:	Reduce risk to existing and future structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$200,000
Potential Funding Sources:	HMGP, PDM, local operating budgets, TDEM
Lead Agency/Department Responsible:	Sour Lake Public Works, Local Power Company
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Comprehensive Plan, Local Ordinance

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Sour Lake – Action #7	
Proposed Action:	Identify and pursue any mitigation activities that would assist efficient evacuations in Sour Lake, including but not limited to: improved signage, traffic monitoring systems, and encourage developers of new and future subdivisions to consider evacuation efficiency in street design.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Sour Lake
Risk Reduction Benefit (Current Cost/Losses Avoided):	Life safety benefits through preparedness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Hurricane, Flood, Winter Storm, Tornado, Thunderstorm Wind, Wildfire
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$150,000
Potential Funding Sources:	HMGP, PDM
Lead Agency/Department Responsible:	Sour Lake Administration, HCESD#5
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Evacuation Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 4; and Environmentally Sound = 4</p>

Section 17: Mitigation Actions

Sour Lake – Action #8	
Proposed Action:	Install/improve signage to notify public when burn ban is activated. Improve enforcement through education and coordination.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Sour Lake
Risk Reduction Benefit (Current Cost/Losses Avoided):	Life safety benefits and damage reduction through education and awareness.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire, Drought
Effect on New/Existing Buildings:	N/A
Priority (High, Moderate, Low):	High
Estimated Cost:	\$50,000
Potential Funding Sources:	HMGP, PDM, local operating budgets, TFS Grants
Lead Agency/Department Responsible:	Sour Lake Administration
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Sour Lake – Action #9	
Proposed Action:	Remove structures from flood prone areas to minimize future flood losses by acquiring and demolishing or relocating structures from voluntary property owners and preserving lands subject to repetitive flooding.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Sour Lake flood prone structures
Risk Reduction Benefit (Current Cost/Losses Avoided):	Mitigate flood damage; improve compliance with floodplain ordinance; prevent flooding damage to existing structures.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Structure and Infrastructure Project

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Flood, Hurricane
Effect on New/Existing Buildings:	Reduce or eliminate risk to existing structures
Priority (High, Moderate, Low):	High
Estimated Cost:	TBD – per structure
Potential Funding Sources:	HMGP, PDM, FMA, RFC
Lead Agency/Department Responsible:	Sour Lake Floodplain Management
Implementation Schedule:	Within 12-24 months of plan adoption pending available funding
Incorporation into Existing Plans:	HCFPM Plans

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 3; Technically Feasible = 4; Administratively Possible = 5; Politically Acceptable = 4; Legal = 4; Economically Sound = 4; and Environmentally Sound = 5

Section 17: Mitigation Actions

Sour Lake – Action #10	
Proposed Action:	Educate residents and home builders on the importance of constructing and maintaining defensible space around new and existing homes to prevent or mitigate wildfire damage.
BACKGROUND INFORMATION	
Jurisdiction/Location:	Sour Lake Wildland Urban Interface
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce wildfire damage; improve individual participation in wildfire mitigation; improve safety through site design for future development; and reduce water use for firefighting.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Education and Awareness

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Wildfire
Effect on New/Existing Buildings:	Reduce risk to existing and new structures
Priority (High, Moderate, Low):	High
Estimated Cost:	\$40,000
Potential Funding Sources:	Hardin County, HCESD#5, local operating budget
Lead Agency/Department Responsible:	Sour Lake Administration
Implementation Schedule:	Within 12 months of plan adoption pending available funding
Incorporation into Existing Plans:	Community Wildfire Protection Plan

COMMENTS
<p>Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 5; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5</p>

Section 17: Mitigation Actions

Sour Lake – Action #11	
Proposed Action:	Develop local requirements for mobile home tie-downs and anchoring systems and build capacity to conduct periodic inspections to oversee proper implementation for future development.
BACKGROUND INFORMATION	
Jurisdiction/Location:	City of Sour Lake
Risk Reduction Benefit (Current Cost/Losses Avoided):	Reduce damages through improved building code requirements.
Type of Action (Local Plans and Regulations, Structure and Infrastructure projects, Natural System Protection, or Education and Awareness)	Local Plans and Regulations

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	Thunderstorm Wind, Hurricane, Tornado
Effect on New/Existing Buildings:	Reduce risk to existing and new structures
Priority (High, Moderate, Low):	Moderate
Estimated Cost:	\$40,000
Potential Funding Sources:	Hardin County, local operating budget
Lead Agency/Department Responsible:	Sour Lake Administration
Implementation Schedule:	Within 24-36 months of plan adoption pending available funding
Incorporation into Existing Plans:	Local Ordinances

COMMENTS
Additional Considerations: The following STAPLEE criteria were evaluated on a scale of 1 to 5 indicating the extent to which this action satisfies each consideration. (1= Does Not Satisfy 3 = Moderately Satisfies 5 = Strongly Satisfies) Socially Acceptable = 4; Technically Feasible = 5; Administratively Possible = 5; Politically Acceptable = 5; Legal = 5; Economically Sound = 5; and Environmentally Sound = 5

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PLAN MAINTENANCE PROCEDURES

The following is an explanation of how Hardin County, participating jurisdictions, and the general public will be involved in implementing, evaluating, and enhancing the Plan over time. The sustained hazard mitigation planning process consists of four main parts:

- Incorporation
- Monitoring and Evaluation
- Updating
- Continued Public Involvement

INCORPORATION

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

Process of Incorporation

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

Section 18: Plan Maintenance

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.

Hardin County and participating jurisdictions 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 goals and objectives of the Plan 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 each participating jurisdiction 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 amendments in light of the approved Plan Update. The planning team will review all comprehensive land use plans, capital improvement plans, annual budget reviews, emergency operations or management plans, transportation plans, and any building codes 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.

Hardin County is committed to supporting the cities, communities, and participating jurisdictions as they implement their mitigation actions. Hardin County and participating 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 mitigation action plan. Additionally, the County will work to advance the goals of this hazard mitigation plan through its routine, ongoing, long-range planning, budgeting, and work processes.

Table 18-1. Methods of Incorporation of the Plan

Planning Mechanism	Department/Title Responsible	Incorporation of Plan
Grant Applications	Hardin County: EMC Kountze: EMC Lumberton: City Manager Rose Hill Acres: Mayor Silsbee: EMC Sour Lake: City Manager	The Plan Update will be evaluated by Hardin County and participating jurisdictions when grant funding is sought for mitigation projects. If a project is not in the Plan Update, an amendment may be necessary to include the action in the Plan Update.
Annual Budget Review	Hardin County: EMC Kountze: EMC	Various departments and key personnel that participated in the planning process for

Section 18: Plan Maintenance

Planning Mechanism	Department/Title Responsible	Incorporation of Plan
	Lumberton: City Manager Rose Hill Acres: Mayor Silsbee: EMC Sour Lake: City Manager	Hardin County and participating jurisdictions 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.
Regulatory Plans	Hardin County: EMC Kountze: EMC Lumberton: City Manager Rose Hill Acres: Mayor Silsbee: EMC Sour Lake: City Manager	Currently, Hardin County and participating jurisdictions have regulatory plans in place, such as Emergency Management Plans, Continuity of Operations Plans, Economic Development, and 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 regulatory plans that are not currently in place.
Capital Improvement Plans	Hardin County: EMC Kountze: EMC Lumberton: City Manager Rose Hill Acres: Mayor Silsbee: EMC Sour Lake: City Manager	Hardin County and participating jurisdictions have a Capital Improvement Plan (CIP) in place. Prior to any revisions to the CIP, County and 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.
Floodplain Management Plans	Hardin County: Floodplain Administrator Kountze: Floodplain Manager Lumberton: Floodplain Manager Rose Hill Acres: Floodplain Manager Silsbee: Floodplain Manager Sour Lake: Floodplain Manager	Floodplain management plans include preventative and corrective actions to address the flood hazard. Therefore, the actions for flooding, and information found in Section 5 of this Plan Update discussing the people and property at risk to flood, will be reviewed and revised when Hardin County updates their management plans or develops new plans.

MONITORING AND EVALUATION

Periodic revisions of the Plan Update are required to ensure that goals, objectives, and mitigation actions are kept current. Revisions may be required to ensure the Plan Update is in compliance with federal and state

Section 18: Plan Maintenance

statutes and regulations. This section outlines the procedures for completing Plan revisions, updates, and review. Table 18-2 indicates the department and title of the party responsible for Plan monitoring, updating, and review of the Plan.

Table 18-2. Team Members Responsible for Plan Monitoring, Evaluating, Updating and Review of the Plan

JURISDICTION	TITLE
Hardin County	Emergency Management Coordinator
Kountze	Emergency Management Coordinator
Lumberton	City Manager
Rose Hill Acres	Mayor
Silsbee	Emergency Management Coordinator
Sour Lake	City Manager

Monitoring

Designated Planning Team members are responsible for monitoring, updating, and reviewing the Plan Update, as shown in Table 18-2. Individuals holding the title listed in Table 18-2 will be responsible for monitoring the Plan Update 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 if changes to the Plan Update are needed, such as recommending an action for funding. A summary of meeting notes will report the particulars involved in developing an action into a project.

Evaluation

As part of the evaluation process, the Planning Team will assess changes in risk; determine whether the implementation of mitigation actions is on schedule; determine whether there are any implementation problems, such as technical, political, legal, or coordination issues; and identify changes in land development or programs that affect mitigation priorities for each respective department or organization.

The Planning Team will meet on an annual basis to evaluate the Plan and identify any needed changes. The annual evaluation process will help to determine if any changes are necessary.

UPDATING

Plan Amendments

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

The County will review proposed amendments and vote to accept, reject, or amend the proposed change. Upon ratification, the amendment will be transmitted to TDEM.

In determining whether to recommend approval or denial of a Plan Update amendment request, the County 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, an increase or decrease in capability to address hazards, and changes to federal or state legislation.

The Plan review process provides the County and participating jurisdictions 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 Planning Team (Section 2, Table 2-1) 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 amendment process outlined herein. Upon completion of the review, update, and amendment 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 review and cyclical updates. Changes or suggestions to improve or update the Plan will provide opportunities for additional public input.

The public can review the Plan Update at the Hardin County Office of Emergency Management and participating jurisdictions, where the Plan Update will be maintained.

The Planning Team may also designate voluntary citizens from the County 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, status of grant applications, and project implementation. Local and social media outlets, such as Facebook and Twitter, will keep the public and stakeholders apprised of potential opportunities to fund and implement mitigation projects identified in the Plan Update.

APPENDIX A: LOW RISK AND MAN-MADE HAZARDS

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OVERVIEW

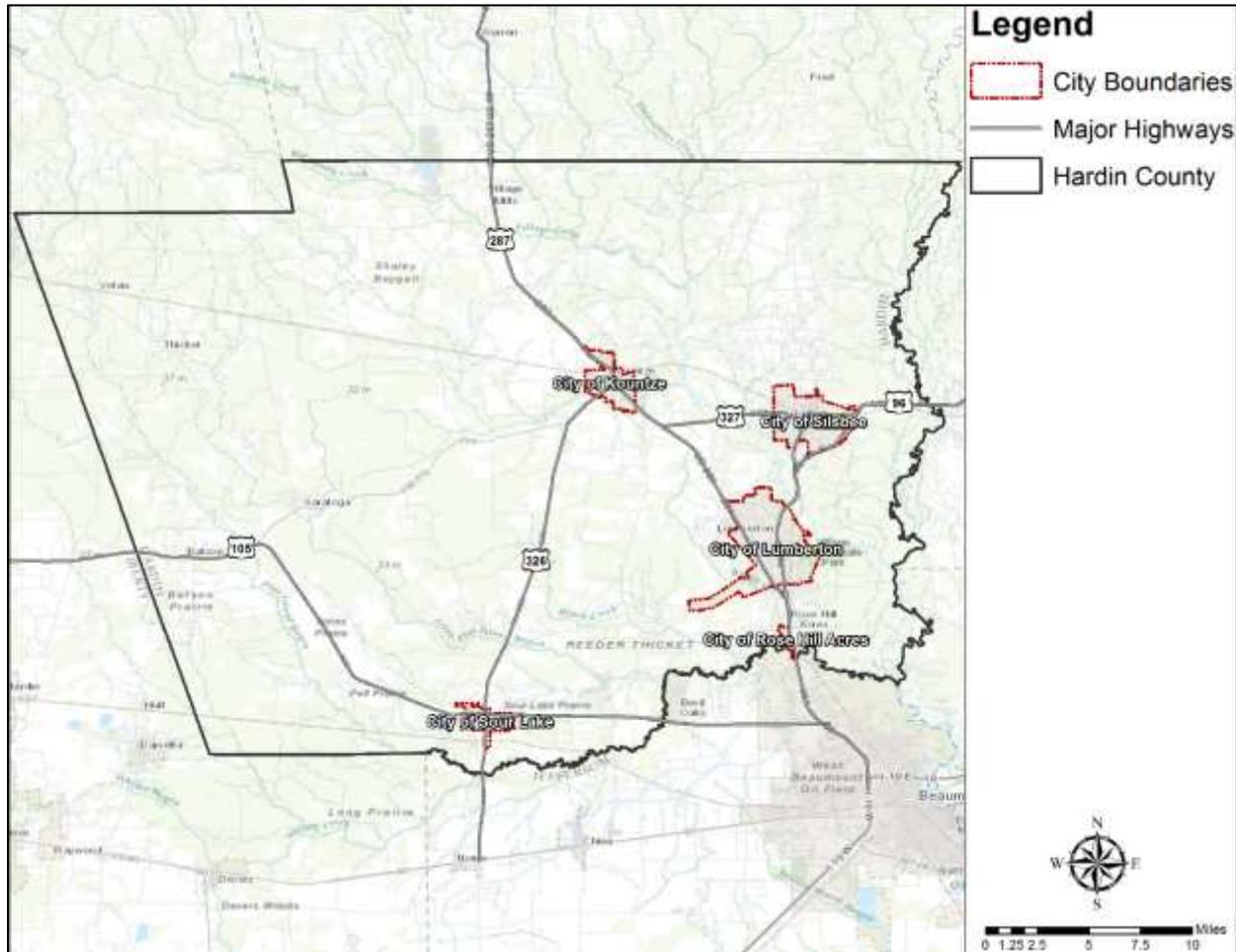
During the early stages of the planning process the team analyzed several natural and quasi-technological hazards that were considered low risk. These hazards include Earthquakes, Tsunamis, Geologic Hazards, and Dam Failure. In addition, the team reviewed technological hazards including Hazardous Material Incidents, Terrorism, and Water Contamination. A description of the hazard and Hardin County’s overall vulnerability to that hazard was developed. Annualized loss data is provided where available and impact is addressed looking at the warning time or potential speed of onset of the hazard.

None of these hazards have had reported damages to any of the critical facilities for the Hardin County planning area, therefore the planning area has not had any impact due to these hazards nor do they pose a risk to the critical services provided. In the intent of 44 CFR 201.6(c)(2)(i) & 44 CFR 201.6(c)(2)(iii) the intent is to, “To understand the potential and chronic hazards affecting the planning area in order to identify which hazard risks are most significant (...),”. Based on the intent, it is the participating jurisdictions belief that earthquakes, tsunamis, geologic hazards, and dam failure are not hazards that are most significant to the jurisdiction. During public outreach none of these hazards were a concern of the public population.

Study Area Definition

All areas of Hardin County and participating jurisdictions and entities are included. Figure A-1 shows the study area for the Hardin County HMAP Update 2017.

Figure A-1. Hardin County Study Area



HAZARD PROFILES, VULNERABILITY, AND IMPACT

Each low risk natural hazard includes a description of the hazard and a summary of the planning area’s risk. For each of the three technological hazards, a description of the hazard and Hardin County’s overall vulnerability to that hazard was developed. Impact is addressed looking at the warning time or potential speed of onset of the hazard. Impact statements are defined in Table A-1 below.

Table A-1. 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.

Appendix A: Low Risk and Man-made Hazards

POTENTIAL SEVERITY	DESCRIPTION
Major	Injuries and illnesses resulting in permanent disability. Complete shutdown of critical facilities for at least two 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 more than 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.

Technological hazards refers to the origins of incidents that can arise from human activities, such as the construction and maintenance of dams. Technological hazards are distinct from natural hazards primarily because they originate from human activity. Whereas the risks presented by natural hazards may be increased or decreased as a result of human activity, they are not inherently human-induced. Therefore, dam failure is classified as a quasi-technological hazard.

For the purposes of this risk assessment, technological hazards are events or incidents associated with the use of gas and oil pipeline and their manufacture, transportation, and storage. Water contamination, acts of terrorism, and the use of hazardous materials across all industries are also considered technological hazards.

The scope of this risk assessment assumes that hazardous material incidents and water contamination events addressed in this section would be accidental in nature and that their consequences are unplanned and unintended.

Geologic Hazard

A geologic hazard is a natural geologic event that can endanger human lives and threaten property and infrastructure. While these hazards are by definition a natural event, they can be caused or exacerbated by human activities. For the purpose of this hazard mitigation action plan update for Hardin County, geologic hazards include riverine erosion, landslides, and land subsidence (sinkholes). The U.S. Geological Survey (USGS) serves as the primary data and forecasting source for geologic hazards.

Riverine erosion is defined as downstream flow, shifting, or removal of sediment from a watershed. Caving river and stream banks are common associations with the migration of river channel alignment, and can threaten structures, undermine bridge foundations, and pose public safety risk.

Landslide is a general term used to describe the process of movement of material (e.g. soil, rock, mud, etc.) down a slope by falling, sliding, or flowing under the force of gravity. The major causes of landslides are earthquakes, volcanic eruptions, or extreme rain events. Landslides are commonly associated with areas of steep slopes, but can also occur in relatively level topography on un-retained constructed slopes and dirt

Appendix A: Low Risk and Man-made Hazards

embankments. Sloughing fill material can cause property and infrastructure damage and indirectly threaten public safety.

Land Subsidence can occur either gradually or dramatically (as in sinkhole occurrence) and refers to the loss of surface elevation due to the loss of subsurface support. Land subsidence can be caused by crustal deformation, sediment compaction, withdrawal of groundwater, hydrocarbons (crude oil and natural gas), geothermal fluids or minerals (Sulphur), or increased surface load associated with high-rise buildings.

All three geologic hazards were researched for historical occurrences. Impacts of geologic hazards in Hardin County are not widespread, and historically have been limited to minor land loss along creeks, tributaries, and rivers such as the Neches River. Probability of future events is considered unlikely. Due to relatively isolated occurrence of impacts and no recorded occurrence of damages, injuries or fatalities, the hazard is considered to have a negligible impact on the planning area and is therefore considered a nuisance.

Tsunami

The National Oceanic and Atmospheric Administration (NOAA) describes a tsunami as a series of ocean waves generated by sudden displacements in the sea floor, landslides, volcanic activity or other large, abrupt disturbance of the sea-surface. Tsunamis have reached heights of more than 100 feet. As the waves approach shallow coastal waters, they appear normal and the speed decreases. If the disturbance is close to the coastline, tsunamis can demolish coastal communities within minutes, and a large disturbance can cause inundation and destruction thousands of miles away from its epicenter.

The USGS monitors earthquakes through a network of seismic detectors. This information is critical to understand when a tsunami wave might be generated. The USGS and NOAA's National Ocean Service are responsible for providing ocean bathymetry, coastlines, and topography. This information is critical to understand when, where, and how a tsunami wave will come ashore. NOAA research data is used to develop models that forecast tsunami impacts and create inundation maps of modeled events. NOAA research provides the forecast models to the NOAA's Weather Service forecasters as well as the inundation models and maps to state planners, national planners, and emergency managers. NOAA monitors sea height through a network of buoys and tide gauges. This information is critical to understand the height a tsunami wave may be when it comes ashore. NOAA completed the original 6-buoy operational array in 2001 and expanded to a full network of 30 stations in March 2008 which includes the Gulf of Mexico.

According to the National Oceanic and Atmospheric Administration (NOAA), since 1900, over 200 tsunami events have affected the coasts of the United States and its territories, causing more than 500 deaths. Tsunami events are well documented in the Pacific Ocean Basin and have also occurred in the Gulf of Mexico. In 1991, a magnitude 7.6 earthquake in Costa Rica produced a six foot high tsunami that flooded nearly 1,000 feet inland on the Caribbean side of the country. The Caribbean also has a number of active submarine volcanoes and fault systems that are capable of producing large earthquakes like that in Haiti, which could generate a tsunami. There are no recorded occurrences of tsunami impacts in Hardin County.

Appendix A: Low Risk and Man-made Hazards

The National Tsunami Hazard Mitigation Program produced an assessment in August 2008 that assigned a “very low” hazard classification for the U.S. Gulf Coast based on previous frequency and local earthquake probability. Probability of future events is considered unlikely. Overall vulnerability to tsunami is considered very low based on the inland location of Hardin County and the remote potential for causal.

Earthquake

An earthquake is a sudden motion or trembling of the earth caused by an abrupt release of stored energy in the rocks beneath the earth’s surface. The energy released results in vibrations known as seismic waves that are responsible for the trembling and shaking of the ground during an earthquake. Ground motion is expressed as peak ground acceleration (PGA). PGA is expressed as a percent of gravity or “g.”

Earthquakes are typically described in terms of magnitude and intensity. The traditional measurement of amplitude of the seismic wave through the assignment of a single number to quantify the amount of seismic energy released by an earthquake is the Richter scale. The intensity of how strong the shock was felt at a particular location is the Modified Mercalli Intensity (MMI) scale. The scale quantifies the effects of an earthquake on the Earth’s surface, humans, objects of nature, and man-made structures. Table A-2 below is a combined earthquake magnitude and intensity comparison from the United States Geological Survey.

Table A-2. Earthquake Magnitude/Intensity Comparison¹

PGA (% g)	Magnitude (Richter)	Intensity (MMI)	Description
<0.17	1.0 - 3.0	I	I. Not felt except by a very few under especially favorable conditions.
0.17 - 1.4	3.0 - 3.9	II - III	II. Felt only by a few persons at rest, especially on upper floors of buildings. III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
1.4 - 9.2	4.0 - 4.9	IV - V	IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
9.2 - 34	5.0 - 5.9	VI - VII	VI. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.

¹ Source: Wald, D., et al., 1999, “Relationship between Peak Ground Acceleration, Peak Ground Motion, and Modified Mercalli Intensity in California,” *Earthquake Spectra*, v. 15, p. 557 – 564.

USGS Magnitude/Intensity Comparison http://earthquake.usgs.gov/learn/topics/mag_vs_int.php

Appendix A: Low Risk and Man-made Hazards

PGA (% g)	Magnitude (Richter)	Intensity (MMI)	Description
			VII. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
34 - 124	6.0 - 6.9	VII - IX	VIII. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
>124	7.0 and higher	VIII or higher	X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

There are no recorded earthquakes with epicenters in Hardin County, and the planning area is roughly 200 miles from the region of recent (minor) seismic activity in Northeast Texas. The annual probability for earthquakes capable of structural damage in the planning area is considered very low. The magnitude or intensity of a potential earthquake in the planning area based on historical data is an Intensity level of I or II (Table A-2). Based on the probability of future occurrences and magnitude/severity the overall vulnerability is considered low and the hazard is considered to have a negligible impact on the planning area.

Water Contamination

HAZARD PROFILE

Water Contamination is the introduction of point and non-point source pollutants into public ground and/or surface water supplies. Microbiological and chemical contaminants can enter water supplies. Chemicals can leach through soils from leaking underground storage tanks, feedlots, and waste disposal sites. Human wastes and pesticides can also be carried into surface waters during high water events.

The Environmental Protection Agency (EPA) is the federal agency authorized to protect the environment and public health. Congress writes the laws and the President signs them into law. The EPA is a regulatory agency with the duty to prepare administrative rules and procedures on how these laws and Presidential Executive Orders will be implemented and enforced.

The Clean Water Act establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under the Clean Water Act, the EPA has

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implemented pollution control programs. The Clean Water Act made it unlawful to discharge any pollutant from a point source into navigable waters, unless a permit was obtained. The EPA's National Pollution Discharge Elimination System (NPDES) permit program controls discharges.

Furthermore, the EPA is the federal authority to protect drinking water. The Safe Water Drinking Act was established to protect the quality of drinking water in the U.S. The law focuses on all water actually or potentially designed for drinking use, whether from above ground or underground sources. The Act authorizes the EPA to establish minimum standards to protect tap water and requires all owners or operators of public water systems to comply with these primary health related standards².

States must adopt rules that are at least as restrictive as the Clean Water Act and the Safe Water Drinking Act standards. The Texas Commission on Environmental Quality establishes State rules and regulations for public water systems and also specifies construction and operational standards for public water supply systems.

Disasters such as hurricanes and floods can disrupt drinking water supply and wastewater disposal systems. The Texas Commission on Environmental Quality provides guidance on remediation of public water supply systems after potential contamination due to natural disasters.

LOCATION

Potential and ongoing water contamination is present along all waterways and in the groundwater supply. Per a 2007 State Water Plan, Hardin County is part of the East Texas Regional Water Planning area comprised of all or parts of twenty counties. The principle surface water sources of the East Texas Region are the Sabine and Neches Rivers. For the East Texas Region, surface water accounts for 80-percent of the total existing water supply. Ground-water needs, including all municipal requirements in Hardin County, were met almost entirely from the Gulf Coast Aquifer.

EXTENT

In general, levels of water contamination can influence community health when considered severe. Accordingly, magnitude and severity of water contamination is considered Critical by the Team, with potential public safety risks present and the potential for extended loss of function for water processing facilities. The high concentration of facilities dealing with processing and shipping of hazardous materials in the planning area, low topographic gradient influencing river discharge rates and levels of dissolved oxygen, and relatively high total maximum daily load readings (TMDLs) in monitored surface water, all contribute to the magnitude and severity assessment by the Team.

HISTORICAL OCCURRENCES

According to the Evaluation of Water Resources of Orange and Eastern Jefferson Counties (Texas Water Development Board, 1990), the main ground-water quality problem is elevated chloride concentrations caused

² Source: EPA

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by saline-water encroachment in areas of concentrated pumpage; although from the late 1970's to 1988, chloride concentrations have not changed significantly due to decreased ground-water withdrawals.

PROBABILITY OF FUTURE EVENTS

Considering ongoing problems and previous water quality monitoring results, probability of future occurrence is considered highly likely.

VULNERABILITY AND IMPACT

Water contamination can have a “substantial” impact. Overall vulnerability for the planning area could result in multiple deaths during extreme contamination events.

Dam Failure

Portions of the Hardin County Hazard Mitigation Plan Update 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).

Hazardous Materials Incident (Fixed and Mobile)

HAZARD PROFILE

In a hazardous materials incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers, although this profile focuses on fixed sites. Weather conditions will directly affect how the hazard develops.

The location of the most concentrated and potentially hazardous materials in the planning area are: fixed industrial facilities including oil and gas wells and storage facilities, pipelines, large and small industrial complexes that use or process chemicals or petroleum products, highways, and railroads. Numerous other sources are also present across the planning area, including storage areas for insecticides, herbicides, and fertilizers, wrecking yards, retail fueling stations, and abandoned industrial facilities. With regard to pipeline locations, roughly one third (1/3) of the 367,000 linear miles of pipelines transporting hazardous materials in the State of Texas are located in the southeast region of the state. This concentration of pipelines in the region that includes Hardin County relates to a corresponding high probability of hazardous material transport accidents.

The Toxics Release Inventory (TRI) is a publicly available database from the federal Environmental Protection Agency (EPA) that contains information on toxic chemical releases and other waste management activities reported annually by certain covered industry groups, as well as federal facilities. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and expanded by the Pollution Prevention Act of 1990. Each year, facilities that meet certain activity thresholds must report their releases and other waste management activities for listed toxic chemicals to EPA and to their state or tribal entity. A facility must report if it meets the following three criteria:

- The facility falls within one of the following industrial categories: manufacturing; metal mining; coal mining; electric generating facilities that combust coal and/or oil; chemical wholesale distributors;

Appendix A: Low Risk and Man-made Hazards

petroleum terminals and bulk storage facilities; RCRA Subtitle C treatment, storage and disposal (TSD) facilities; and solvent recovery services.

- Have 10 or more full-time employee equivalents.
- Manufactures or processes more than 25,000 pounds or otherwise uses more than 10,000 pounds of any listed chemical during the calendar year. Persistent, bioaccumulative and toxic (PBT) chemicals are subject to different thresholds of 10 pounds, 100 pounds or 0.1 grams, depending on the chemical.

Tier 2 data is a publicly available database from the Texas Department of State Health Services Tier 2 Chemical Reporting Program. Under the community right-to-know program laws upheld at the state and federal level, all facilities which store significant quantities of hazardous chemicals must share this information with state and local emergency responders and planners. Facilities in Texas share this information by filing annual hazardous chemical inventories with the state, with Local Emergency Planning Committees (LEPCs) and with local fire departments. The Texas Tier 2 Reports contain facility identification information and detailed chemical data about hazardous chemicals stored at the facility.

A facility must report if it meets the following criteria:

- Any company using chemicals that could present a physical or health hazard must report them, according to Tier 2 requirements.
- If an industry has an OSHA deemed hazardous chemical that exceeds the appropriate threshold at a certain point in time, that chemical must be reported. These chemicals may be on the list of 356 Extremely Hazardous Substances (EHS) or could be one of the 650,000 reportable hazardous substances (not on the EHS list). This reporting format is for a "snapshot in time." EHS chemicals have to be reported if the quantity is either greater than 500 pounds, or if the Threshold Planning Quantity (TPQ) amount is less than 500 pounds.

LOCATION

The locations of available TRI and Tier 2 toxic sites in the Hardin County planning area are shown below in Table A-5.

Table A-5. Toxic Sites in Hardin County³

JURISDICTION	FACILITY NAME	ADDRESS	NUMBER OF CHEMICALS
Silsbee	Clearstream Wastewater Systems INC	2987 Old Evalde Rd	1
Silsbee	Dragon Products North Silsbee Facility	972 FM 92 N	3
Silsbee	Dragon Silsbee South Facility	580 Willard Lake Rd	1
Silsbee	South Hampton Resources INC	7752 FM 418	12

³ Source: EPA Toxic Release Inventory

Appendix A: Low Risk and Man-made Hazards

EXTENT

From a hazardous materials incident, the micro-meteorological effects of the buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering-in-place can protect people and property from harmful effects. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time for hazardous materials incidents is minimal to none.

HISTORICAL OCCURRENCES

Hazardous materials are substances which if released or misused can cause death, serious injury, long-lasting health effects, and damage to structures, other properties, and the environment. Many products containing hazardous chemicals are used and stored in homes routinely. These products are also shipped daily on the nation's highways, railroads, waterways, and pipelines.

A total of 55 transportation incidents have been reported in the Hardin County planning area over the last 67 years. The data collected is from 1950 to 2016 and identifies the hazardous materials transportation incidents as in-transit, loading, and unloading of transport vehicles. A summary of reported events are listed in Table A-6 below by jurisdiction.

Table A-6. Hardin County Hazardous Material Incident Events by Jurisdiction⁴

JURISDICTION	NUMBER OF INCIDENTS	INJURIES	FATALITIES	PROPERTY AND CROP DAMAGE
Kountze	1	0	0	\$0
Lumberton	4	0	0	\$6,047
Rose Hill Acres	0	0	0	\$0
Silsbee	41	6	0	\$137,563
Sour Lake	8	0	0	\$436,690
Hardin County	1	0	0	\$0
TOTAL LOSSES	55	0	6	\$580,300

PROBABILITY OF FUTURE EVENTS

Based on the historic incident records, the frequency of occurrence is highly likely and an event is probable in the next year in the Hardin County planning area.

⁴ Damages reported in 2016 dollars.

Appendix A: Low Risk and Man-made Hazards

VULNERABILITY AND IMPACT

Hazardous materials or toxic releases can have a “substantial” impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage.

Terrorism

HAZARD PROFILE

The Federal Bureau of Investigation (FBI) categorizes terrorism in the United States as one of two types—domestic terrorism or international terrorism. Domestic terrorism involves groups or individuals whose terrorist activities are directed at elements of our government or population without foreign direction. International terrorism involves groups or individuals whose terrorist activities are foreign-based and/or directed by countries or groups outside of the United States, or whose activities transcend their national boundaries.

A terrorist attack can take several forms, depending on the technological means available to the terrorist, the nature of issue motivating the attack, and the points of weakness of the terrorist’s target. Bombings are the most frequently used terrorist method in the United States. A terrorist using a chemical or biological weapon is of particular concern to officials. Special training and equipment is needed in order to safely manage a Weapons of Mass Destruction incident.

Biological agents are infectious microbes or toxins used to produce illness or death in people, animals, or plants. Biological agents can be dispersed as aerosols or airborne particles. Terrorists may use biological agents to contaminate food or water, as they are extremely difficult to detect.

Chemical agents kill or incapacitate people, destroy livestock, or ravage crops. Some chemical agents are odorless and tasteless and are therefore difficult to detect. These chemical agents can have an immediate effect (a few seconds to a few minutes) or a delayed effect (several hours to several days).

The Department of Defense estimates that as many as 26 nations may possess chemical agents and/or weapons, and an additional 12 may be seeking to develop them. The Central Intelligence Agency reports that at least 10 countries are believed to possess or are currently conducting research on biological agents for weaponization.

Terrorist incidents – as with other natural and technological disasters – involve the application of one or more modes of harmful force to the built environment. These modes include contamination (as in the case of chemical, biological radiological or nuclear hazards), energy (explosives, arson, and even electromagnetic waves), or denial of service (sabotage, infrastructure breakdown, and transportation service disruption).

LOCATION

There is no distinct geographic boundary to the threat of terrorism. An event is possible throughout the Hardin County planning area.

EXTENT

The Homeland Security Advisory System, issued by the U. S. Department of Homeland Security, previously used a color-coded terrorism warning system that identified five threat levels. In 2011, the Department of Homeland Security (DHS) replaced the color-coded alerts of the Homeland Security Advisory System (HSAS) with the National Terrorism Advisory System (NTAS), designed to more effectively communicate information about terrorist threats by providing timely, detailed information to the American public.

NTAS now consists of two types of advisories: Bulletins and Alerts. DHS has added Bulletins to the advisory system to be able to communicate current developments or general trends regarding threats of terrorism. NTAS Bulletins permit the Secretary to communicate critical terrorism information that, while not necessarily indicative of a specific threat against the United States, can reach homeland security partners or the public quickly, thereby allowing recipients to implement necessary protective measures. Because DHS may issue NTAS Bulletins in circumstances not warranting a more specific warning, NTAS Bulletins provide the Secretary with greater flexibility to provide timely information to stakeholders and members of the public.

When there is specific, credible information about a terrorist threat against the United States, DHS will share an NTAS Alert with the American public when circumstances warrant doing so. The Alert may include specific information, if available, about the nature of the threat, including the geographic region, mode of transportation, or critical infrastructure potentially affected by the threat. Guidance may also be included in the Alert, such as steps that individuals and communities can take to protect themselves and help prevent, mitigate, or respond to the threat. The Alert may take one of two forms: (1) Elevated, if there is credible threat information, but only general information about timing and target such that it is reasonable to recommend implementation of protective measures to thwart or mitigate against an attack; or (2) Imminent, if the threat is believed credible, specific,

**Figure A-3. National
Terrorism Advisory System**



Appendix A: Low Risk and Man-made Hazards

and impending in the very near term. Terrorism Advisory System Alerts are described in Figure A-3.⁵

The Red Cross also issues Advisory System Recommendations for individuals, families, neighborhoods, schools, and businesses for each alert level. These may be found at: www.redcross.org.

Heightened periods for terrorism risk are based on intelligence and other information. A potential terrorist event could devastate the community physically, economically, and psychologically for many years to come. Warning time for terrorism is minimal to none.

HISTORICAL OCCURRENCES

The history of terrorism on United States soil includes the attacks of September 11, 2001, on the World Trade Center in New York and the Pentagon in Washington, D.C. and the ensuing anthrax attacks; the 1995 bombing of the Murrah Federal Building in Oklahoma City; and the bombing of the World Trade Center in 1993.

Hardin County has not experienced a terrorist act. While complete prevention of an attack may not be attainable, the County can lessen the likelihood and/or the potential effects of an incident. The County continues to improve its readiness to respond to a terrorist incident through participation in state and federal programs that provide training and equipment for agencies that would respond to a local terrorist incident, and in exercises that help to improve agency coordination and test local response plans.

PROBABILITY OF FUTURE EVENTS

The types, frequencies, and locations of many natural hazards are identifiable and, even in some cases, predictable, as the laws of physics and nature govern them. Malevolence, however, cannot be forecast with any accuracy. There is, therefore, some potential for most, if not all, types of intentional terrorist acts to occur anywhere and at any time.

VULNERABILITY AND IMPACT

There is no defined geographic boundary for a terrorist event. All of the population, buildings, critical facilities, infrastructure, lifelines, and hazardous materials facilities are considered exposed to the hazards of terrorism and could potentially be affected.

There are no past local events; therefore, all assets and facilities are potentially at risk to damages that may, for the most part, be secondary.

Terrorist events can have a “substantial” severity of impact. They can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage.

⁵ Source: Department of Homeland Security, <https://www.dhs.gov/national-terrorism-advisory-system>

APPENDIX B: PLANNING TEAM

Planning Team Members 1
 Stakeholders 2

PLANNING TEAM MEMBERS

The Hardin County Plan Update 2017 (Plan or Plan Update), was organized using a direct representative model. An Executive Planning Team from Hardin County and 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 is comprised of stakeholders who were invited to provide Plan Update input. Public outreach efforts and meeting documentation is provided in Appendix F.

Table B-1. Executive Planning Team

ORGANIZATION	TITLE
City of Kountze	Emergency Management Coordinator
City of Lumberton	City Manager
City of Rose Hill Acres	Mayor
City of Silsbee	Emergency Management Coordinator
City of Silsbee	Assistant Emergency Management Coordinator
City of Sour Lake	City Manager
City of Sour Lake	Police Chief
Hardin County	Emergency Management Coordinator
Hardin County	Floodplain Administrator
South East Texas Regional Planning Commission	Homeland Security and Emergency Management Planning Director

STAKEHOLDERS

The following groups listed in Table B-2 represent a list of organizations invited to stakeholder meetings, public meetings, and workshops throughout the planning process and include: non-profit organizations, private businesses, universities, and legislators. 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 Update. For a list of attendees at meetings, please see Appendix F¹.

Table B-2. Stakeholders

AGENCY/ORGANIZATION	TITLE
Lamar University	Assistant Professor
RPS	Senior Consulting Engineer
South East Texas Disaster Recovery Group	Executive Director
Texas State Senate	Texas State Senator
Texas House of Representatives	Texas US Representatives
United Way	Executive Director
Colonial Pipeline	Manager
Local Emergency Planning Committee	Chairperson
City of Beaumont	Community Manager
City of Beaumont	Emergency Management Assistant
City of Beaumont	Emergency Specialist
City of Beaumont Police Department	Assistant Chief
City of China	City Secretary
City of Nederland Police Department	Assistant Chief
City of Nome	City Secretary
City of Port Arthur	Senior Planner
City of Port Arthur Development Services	Director
City of Port Arthur Fire Department	Emergency Management Coordinator
City of Port Arthur Police Department	Emergency Management Coordinator

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

Appendix B: Planning Team

AGENCY/ORGANIZATION	TITLE
City of Port Neches Fire Department	Emergency Management Coordinator
City of Taylor Landing	Mayor
Jefferson County	Assistant Emergency Management Coordinator
City of Vidor Police Department	Chief
City of West Orange Public Works	Manager
City of West Orange Public Works	Supervisor
Orange County Economic Development Center	Director
Orange County Emergency Services District #1	Chief
Orange County Emergency Services District #2	Chief
Orange County Environmental Health	Director
Orange County Human Resources	Director
Orange County Information Technology	Director
Orange County Maintenance Department	Director
Orange County Public Health	Public Health Emergency Preparedness Planner
Orange County Sheriff	Captain
Orange County Water Control #1	Finance Director
South East Texas Regional Planning Commission	Homeland Security and Emergency Management Planning Director
Vidor Independent School District Police Department	Sergeant
Vidor Independent School District Police Department	Interim Director

APPENDIX C: PUBLIC SURVEY RESULTS

Overview	1
Public Survey Results	2

OVERVIEW

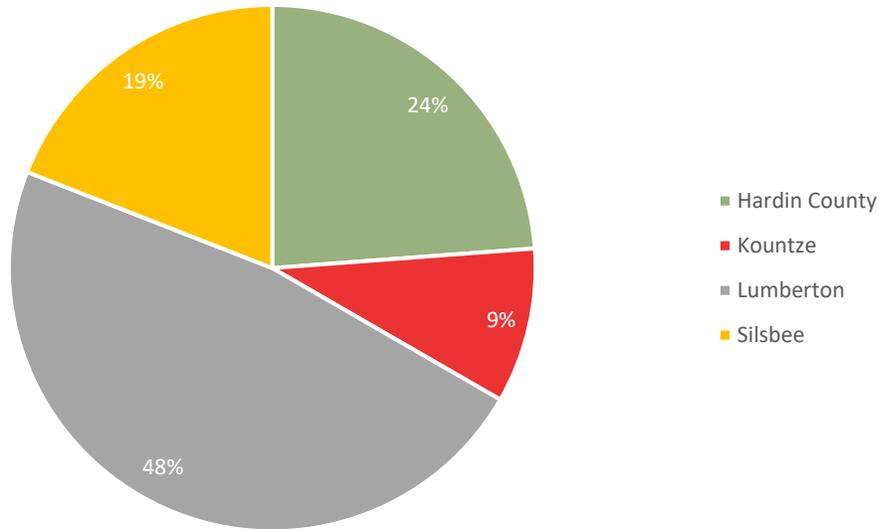
Hardin County prepared a public survey that requested public opinion on a wide range of questions relating to natural hazards. The survey was made available on websites including the SETPRC website. This survey link was also distributed at public meetings and stakeholder events throughout the planning process.

A total of 21 surveys were collected, the results of which are analyzed 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.

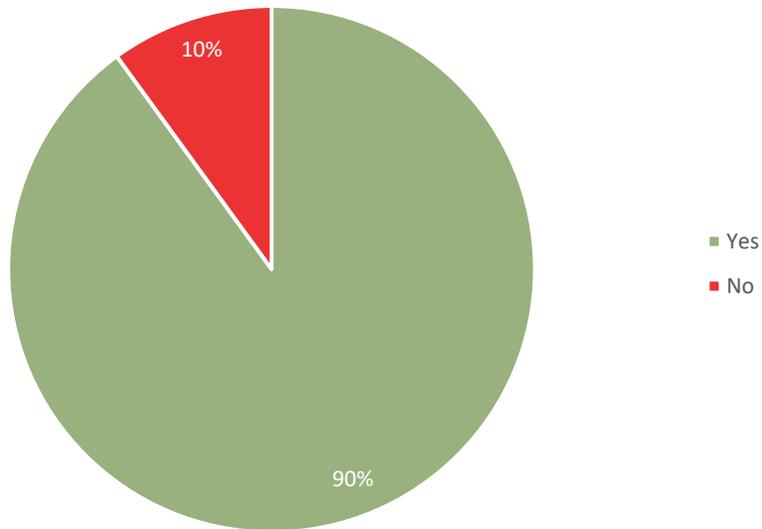
The following survey results depict the percentage of responses for each answer. Similar responses have been summarized for questions that did not provide a multiple-choice answer or that required an explanation.

PUBLIC SURVEY RESULTS

1. Please state the jurisdiction (city and community) where you reside.

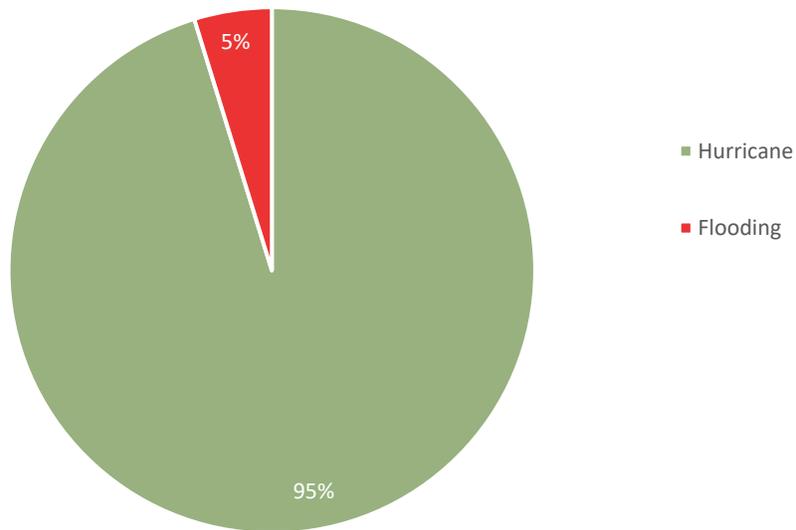


2. A. Have you ever experienced or been impacted by a disaster?

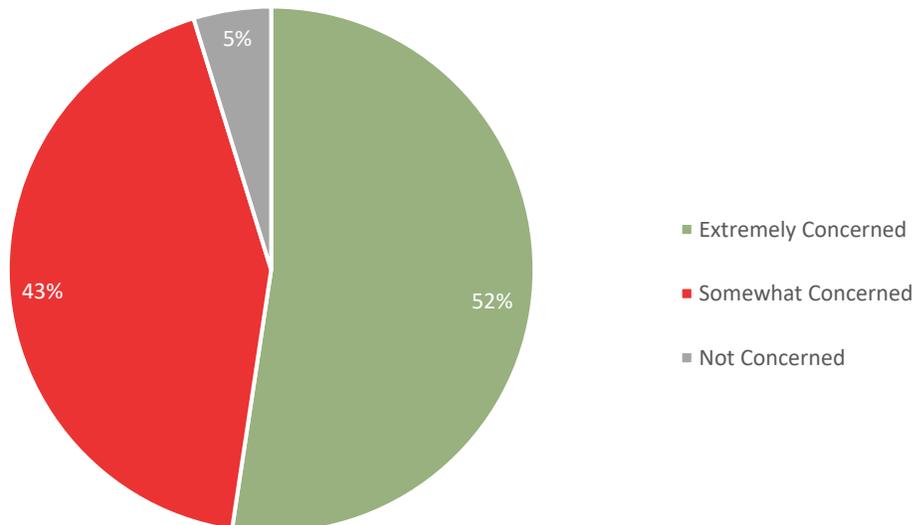


Appendix C: Public Survey Results

2. B. If “Yes”, please explain:

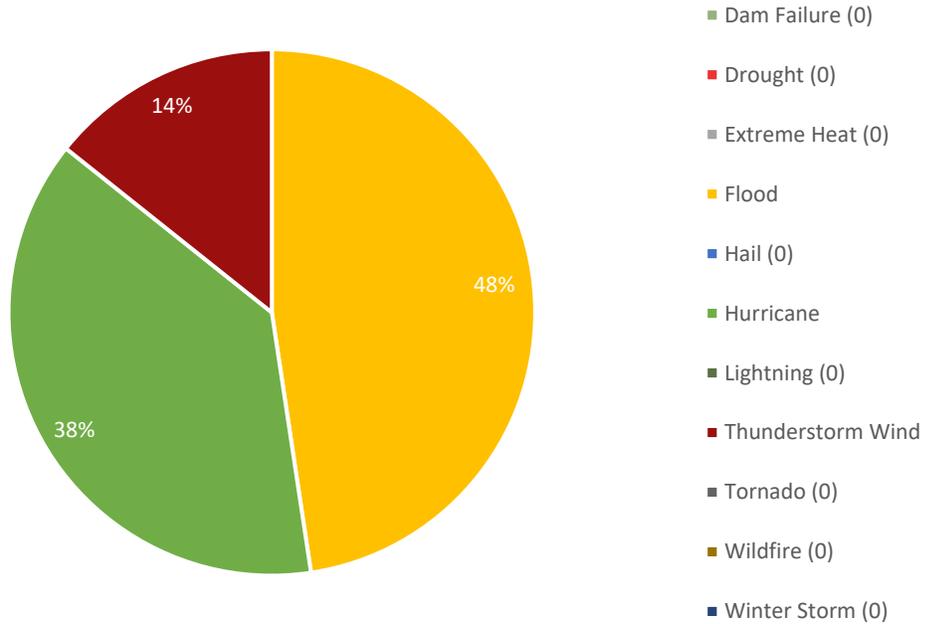


3. How concerned are you about the possibility of your community being impacted by a disaster?

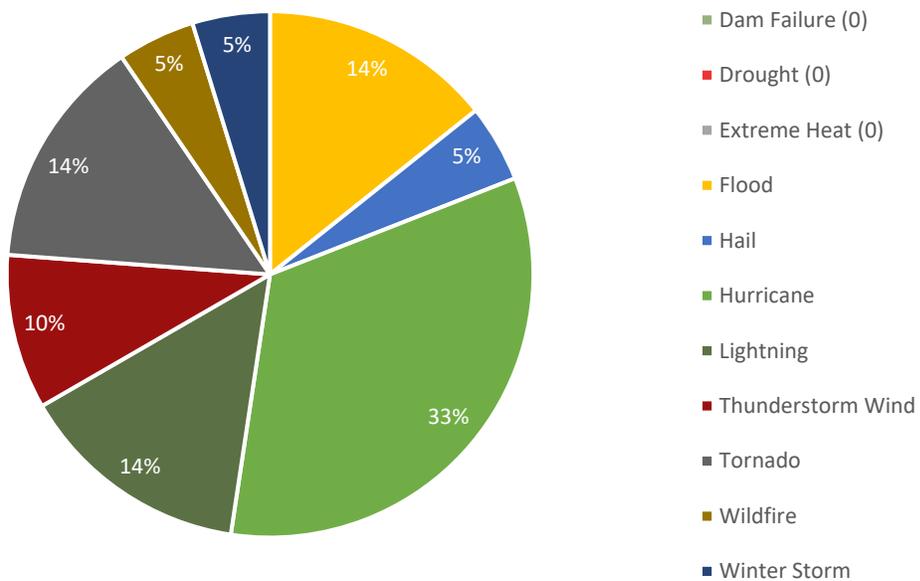


Appendix C: Public Survey Results

4. Please select the one hazard you think is the highest threat to your neighborhood:

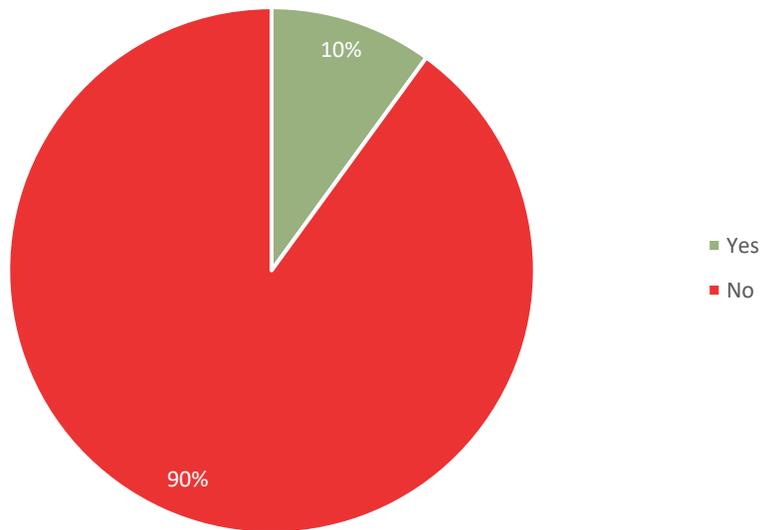


5. Please select the one hazard you think is the second highest threat to your neighborhood:

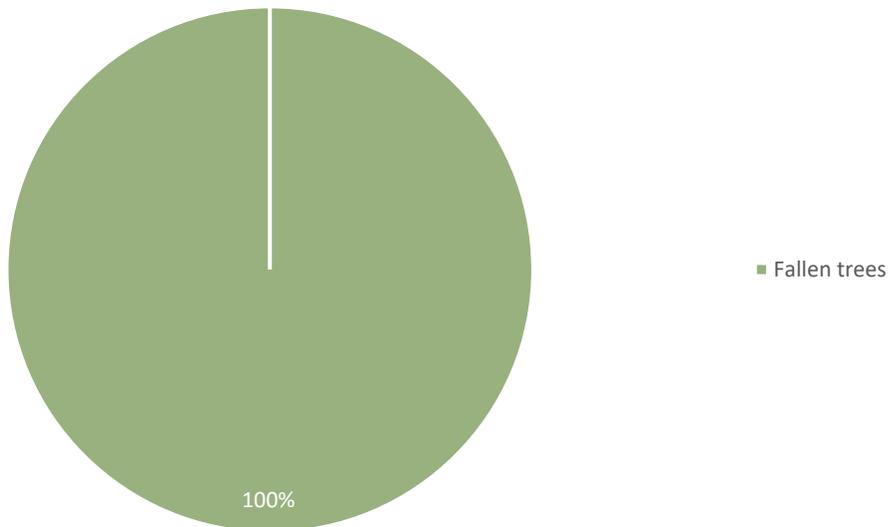


Appendix C: Public Survey Results

6. A. Are there hazards not listed above that you think is a wide-scale threat to your neighborhood?

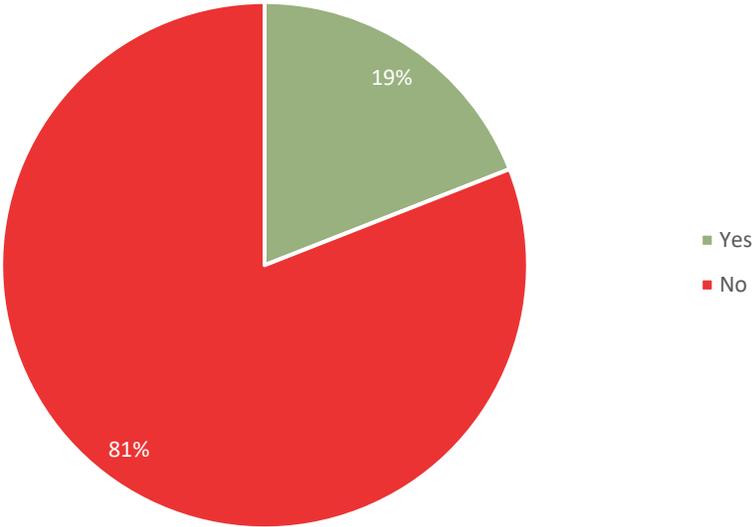


6. B. If "Yes", please explain:

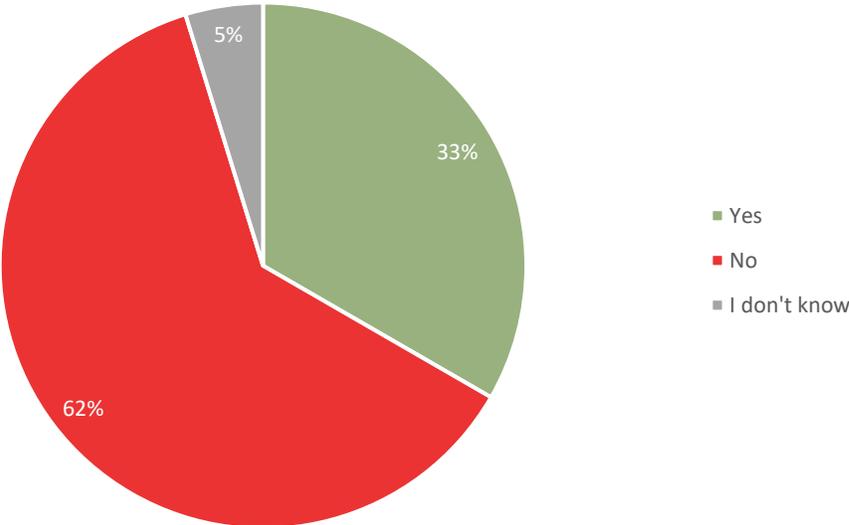


Appendix C: Public Survey Results

7. Is your home located in a floodplain?

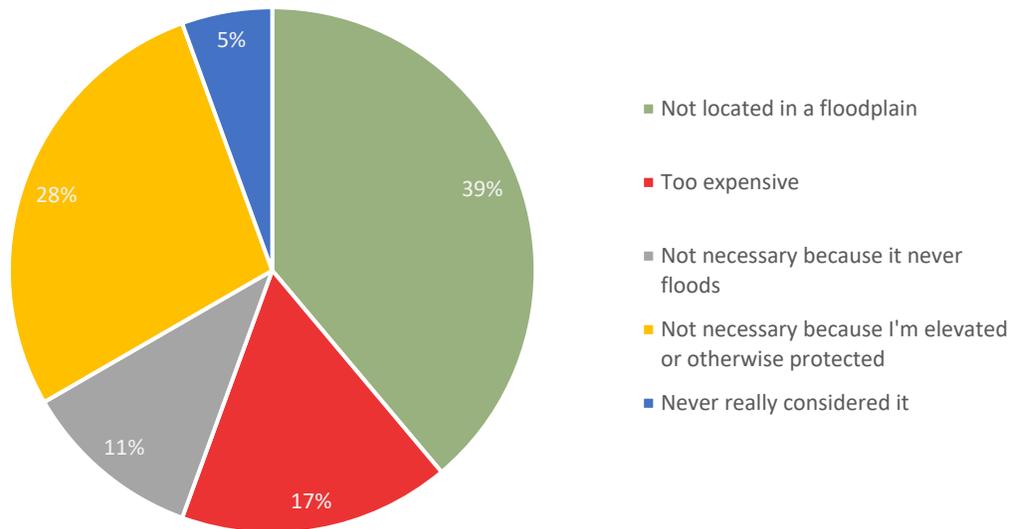


8. Do you have flood insurance?

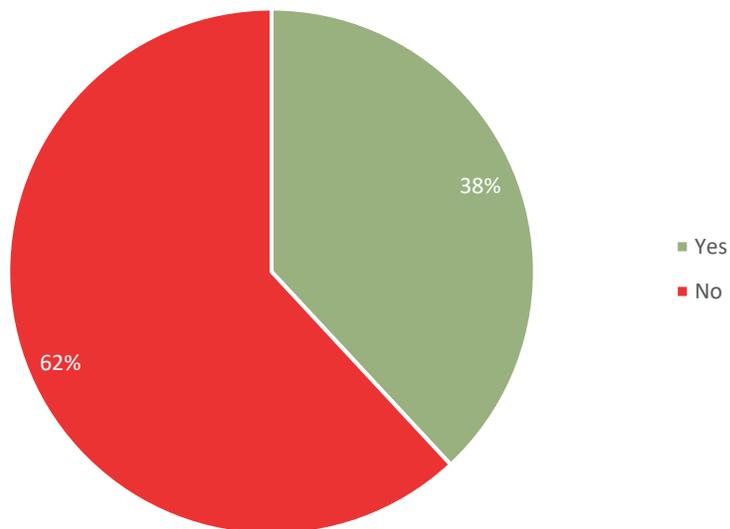


Appendix C: Public Survey Results

9. If you do not have flood insurance, why not?

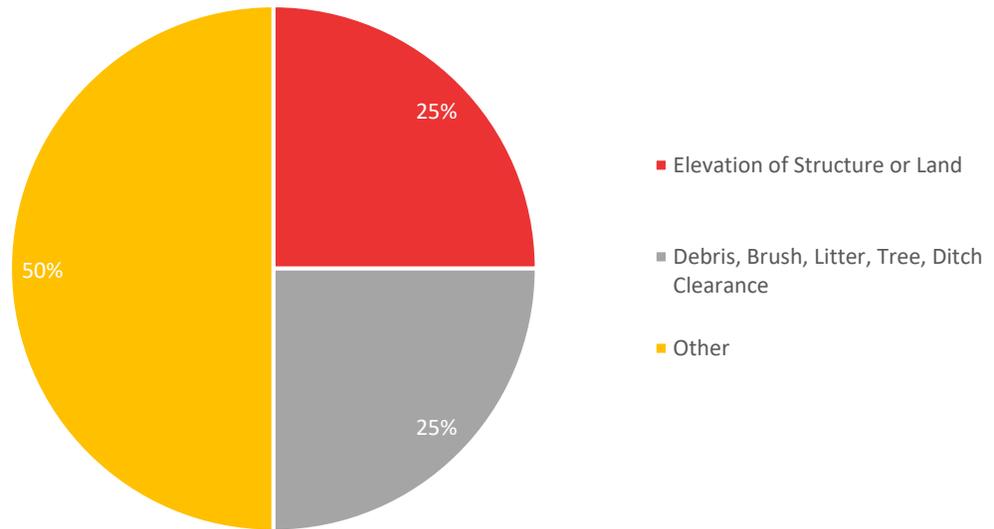


10. A. Have you taken any actions to make your home or neighborhood more resistant to hazards?

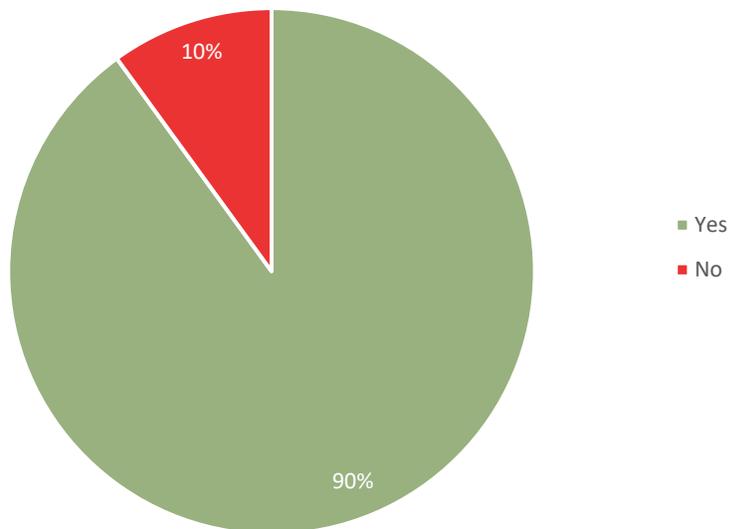


Appendix C: Public Survey Results

10. B. What have you done?

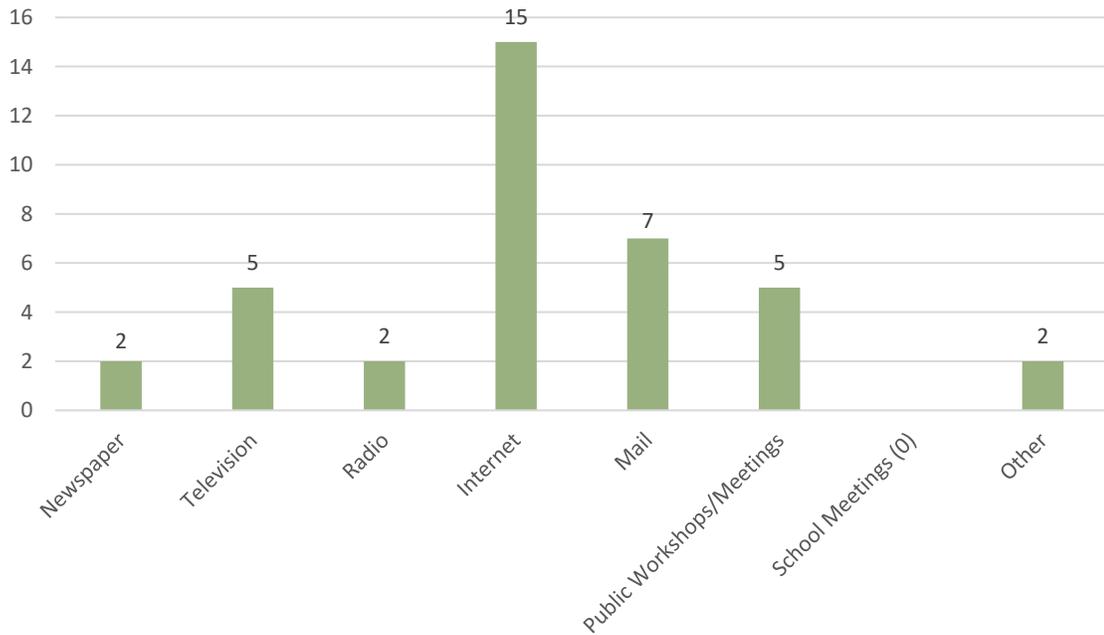


11. Are you interested in making your home or neighborhood more resistant to hazards?

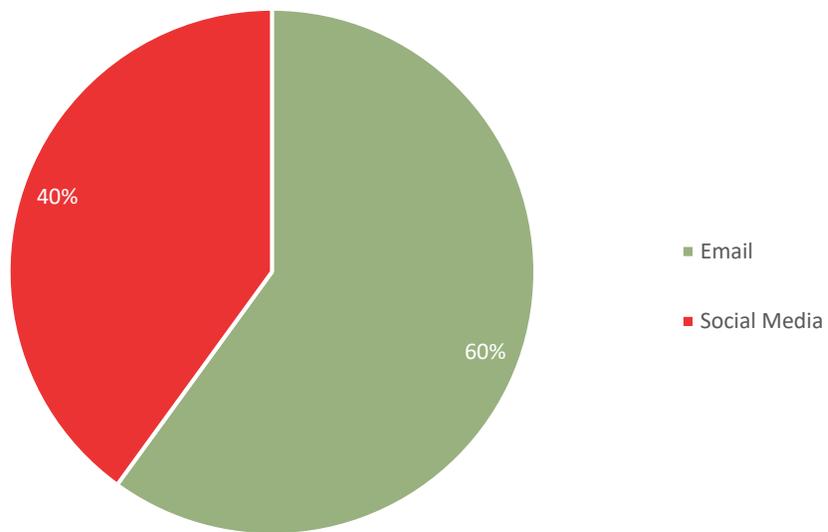


Appendix C: Public Survey Results

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

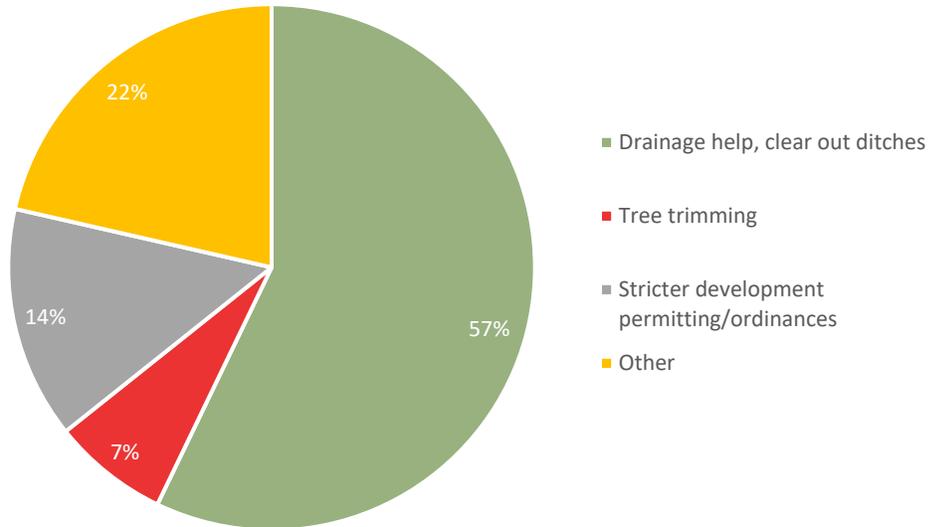


12. B. If "Other", please specify.

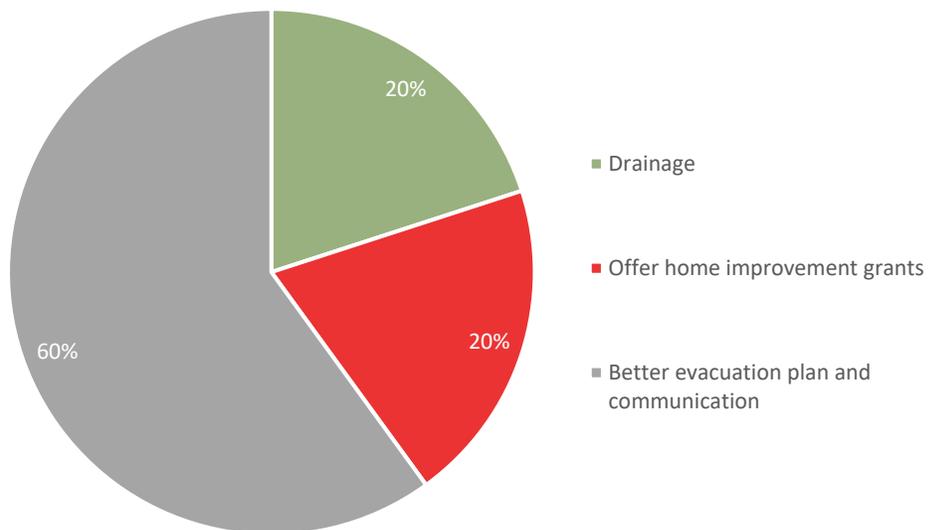


Appendix C: Public Survey Results

13. In your opinion, what are some steps your local government could take to reduce or eliminate the risk of future hazard damages in your neighborhood?

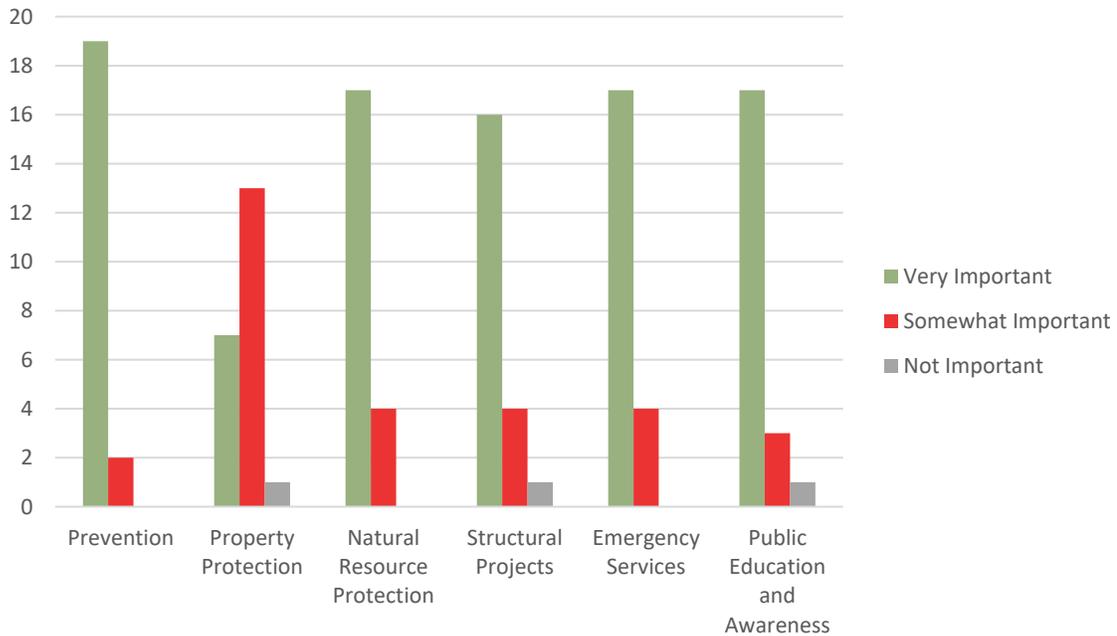


14. Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?



Appendix C: Public Survey Results

15. A number of community-wide activities can reduce the risk from hazards. In general, these activities fall into one of the following six broad categories. Please tell us how important you think each one is for your community to consider pursuing.



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.

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.

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.

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.

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.

APPENDIX D: CRITICAL FACILITIES

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

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