HAZARD MITIGATION PLAN

Polk County 2024

Keeping Polk County Ready

Prepared by:

LANGFORD COMMUNITY MANAGEMENT SERVICES EST. 1983

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SECTION 1: INTRODUCTION

Background

Polk County is in the East Texas Timberlands region on the eastern bank of the Trinity River, which flows into Lake Livingston. It is about 75 miles northeast of Houston, and the county seat is Livingston. Polk County is growing with a population increase of 19% or nearly 10,000 people from 2010 to 2023, underscoring the need to plan for future hazards to protect the growing number of people and properties. Polk County is susceptible to a wide range of natural hazards, including hurricanes, flooding, hail, extreme heat, drought, and wildfire.

The county has a hazard profile similar to many other East Texas communities. It deals with hurricanes and tropical storms from the Gulf Coast in the summer and fall and flash flooding events typically in the spring and summer. With climate change affecting weather patterns on the Texas coast, these and other hazards are forecast by national weather monitors to become more frequent and greater in magnitude.

These hazards can be life-threatening, destroy property, disrupt the economy, and lower the overall quality of life for individuals. Hazard mitigation 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. Hazard mitigation planning is 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.

This hazard mitigation plan is a framework for Polk County, including participating jurisdictions, to address hazard vulnerabilities by reducing the future impact of various hazards on people and property that exist today and in the foreseeable future.

Participation and Scope

The Polk County Hazard Mitigation Plan is a multi-jurisdictional plan covering one county, and five cities. The prior hazard mitigation plan for the area was the 2018 Polk County Multi-jurisdictional Hazard Mitigation Plan. This 2024 plan update also includes Polk County, the City of Corrigan, the City of Goodrich, the City of Livingston, the City of Onalaska, and the City of Seven Oaks.

Additional entities were invited to participate but chose to do so as stakeholders, rather than jurisdictions. These are listed in Section Two under Public and Stakeholder Involvement. Below is an example of outreach efforts to inform the public about the upcoming Hazard Mitigation Action Plan (HMAP) development process.

Polk County selected Langford Community Management Services (LCMS), through the proper procurement process, to guide the updating process and submit the Plan to FEMA. According to Company President and Owner Judy Langford, "The Hazard Mitigation Plan focus for FEMA includes a broad set of threats and how those pair up to community vulnerabilities. We investigated everything from flood events to hurricanes, tropical storms, severe storms, tornados, hail, lightning, drought, wildfire, extreme heat, and winter storms." The planning process included a Core Planning Team to develop specific mitigation strategies unique to each community. They reviewed the communities' capabilities, conducted a risk assessment, and identified the following information, which is included in the updated Plan. Once the jurisdictions adopt the FEMA-approved Plan, they will have procedures and guidelines in place for minimizing damages and preventing harm to citizens, and plans for reviewing the Plan annually. Additionally, they will be eligible to apply for funding to help pay for the necessary mitigation Actions.

Notice of mitigation planning efforts on county and city websites and the local newspaper,

The updated plan builds on the 2018 version, incorporating new capabilities, updated risk assessments, and mitigation actions.

The 2024 plan scope includes a detailed understanding of the planning area regarding existing capabilities, historical data, and future development patterns. Next, the area's vulnerability to different natural hazards has been studied thoroughly, resulting in a detailed hazard risk assessment. The assessment was used to assist the planning team in identifying and ranking mitigation activities based on their likelihood of reducing risk.

Purpose

The Mission Statement of the Plan is to *protect the people, property, economy, and quality of life in Polk County from hazards and disasters.*

The Plan was prepared by Langford Community Management Services on behalf of and with extensive input from representatives of Polk County and participating jurisdictions.

The purpose of the Plan is to minimize or eliminate long-term risks to human life and property from known hazards and to break the cycle of high-cost disaster response and recovery throughout Polk County.

To accomplish this, cost-effective hazard mitigation actions within the planning area are identified along with information critical to successful implementation such as estimated cost, responsible departments, funding sources, and timelines. In addition, an updated FEMA-approved hazard mitigation plan is a condition of eligibility for certain types of non-emergency disaster assistance, including funding for mitigation programs and projects.

A successful Hazard Mitigation Plan will:

1) Align risk reduction with other Federal, State, or community objectives**.**
2) Build or encourage partnerships for risk reduction involving government, organizations, businesses, and the public**.**
3) Communicate priorities to potential sources of funding**.**
4) Identify long-term, broadly supported strategies for risk reduction**.**
5) Review the Plan with core participants annually**.**
6) Identify implementation approaches that focus resources on the greatest risks and vulnerabilities; and
7) Increase education and awareness around threats, hazards, and vulnerabilities.

The Core Planning Team has identified 11 natural hazards to be addressed in the 2024 plan. Detailed information about these hazards and risks can be found in Section 4, while detailed risk

assessments for each hazard are discussed in Sections 5-16. The Plan's specific goals are identified in Section 17, with mitigation actions outlined in Section 18. Section 19 discusses the ongoing maintenance of the Plan, how information will be incorporated into existing plans (such as land use and ordinances), funding mechanisms, monitoring, and evaluation, annual and 5-year updates, and a commitment to involve the public continuously.

Authority

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, which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

SECTION 2: PLANNING PROCESS

Plan Preparation and Plan Development

Hazard mitigation is the effort to reduce loss of life and property by lessening the impact of disasters and is most effective when implemented under a comprehensive, long-term mitigation plan. Hazard mitigation planning involves coordination with various constituents and stakeholders to identify risks and vulnerabilities associated with natural disasters and develop long-term strategies for protecting people and property from future hazard events. Mitigation plans are key to breaking the cycle of disaster damage, reconstruction, and repeated damage. This section provides an overview of the planning process including the identification of the key steps of Plan development and a detailed description of how stakeholders and the public were involved.

1. **Organize the Planning Process and Resources** – At the start, the participating jurisdictions focus on assembling the resources needed for a successful mitigation planning process. This includes securing technical expertise, defining the planning area, and identifying key individuals, agencies, neighboring jurisdictions, businesses, and/or other stakeholders to participate in the process. The planning process for local and tribal governments must include opportunities for the public to comment on the plan.
2. **Assess Risks** – Next, the local government needs to identify the characteristics and potential consequences of hazards. It is important to understand what geographic areas each hazard might impact and what people, property, or other assets might be vulnerable.
3. **Develop a Mitigation Strategy** – The local government then sets priorities and develops long-term strategies for avoiding or minimizing the undesired effects of disasters. The mitigation strategy addresses how the mitigation actions will be implemented and administered.
4. **Adopt and Implement the Plan** – Once FEMA has received notification of the adoption from the governing body and approved the plan, the state, county, or local government

can bring the mitigation plan to life in a variety of ways, ranging from implementing specific mitigation projects to changing aspects of day-to-day organizational operations. To ensure success, the plan must remain a relevant, living document through routine maintenance. The local government needs to conduct periodic evaluations to assess changing risks and priorities and make revisions as needed.

Planning Team

Polk County, including participating jurisdictions, hired Langford Community Management Services to provide technical support and oversee the plan's development. The Polk County Multi-Jurisdictional Plan update was created using a direct representative model, where each participating jurisdiction chooses and sends a representative to represent their interests.

A local planning team was also established at the jurisdictional level, which was responsible for assembling representatives to participate in the meetings and complete relevant tasks. This group was primarily responsible for developing, and eventually implementing, the mitigation actions at the local level.

Figure 2-1: Planning Team and Process Diagram

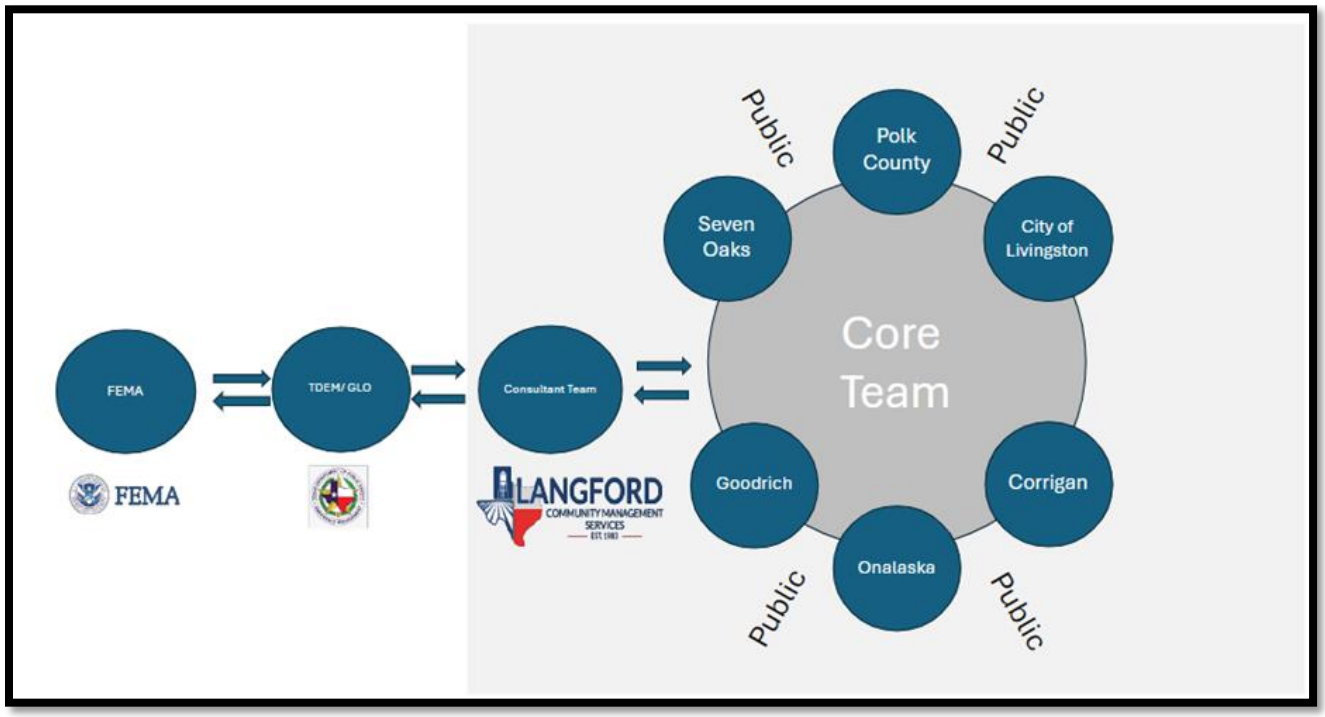


Figure 2-2: First Core Planning Team Meeting

The first Core Planning Team meeting was held on Tuesday, May 21st, 2024, in the Dunbar Gym at 1103 Dunbar Avenue in Livingston, Texas 77351. At this meeting, an overview of the planning process was discussed and what the responsibilities would be of each participating jurisdiction and their Core Team representative. Some of the responsibilities of the Core Team that were discussed include Capability Assessment Surveys, identifying critical facilities, providing a survey to the general public for community input, providing feedback regarding the identification of hazards, identifying mitigation goals, developing new mitigation actions, and ranking mitigation actions.

A sizeable and diverse group of community stakeholders was at the Core Planning Team meeting. Still, despite multiple advanced notices, not all municipal government Core Team Members had representatives at the meeting.

The meeting included a discussion on Plan stakeholders, options for engaging the public and developing a schedule for Plan development. Core Team members were asked to attend all workshops; any members who did not attend were given copies of the meeting materials and contacted by phone or e-mail.

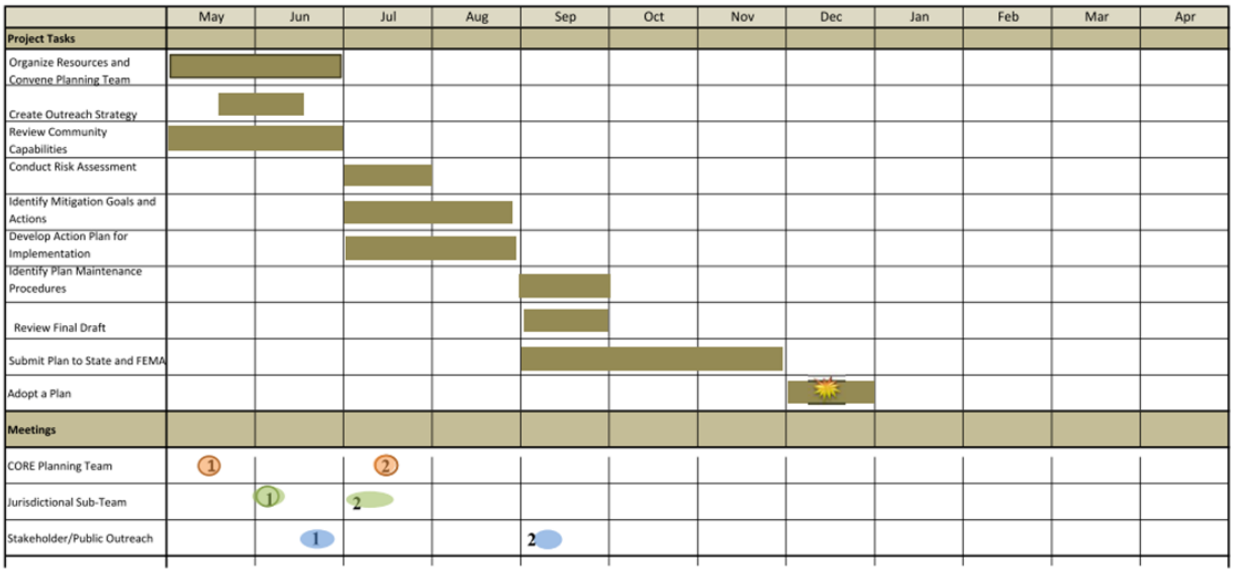
Table 2-1. Core Planning Team (2020 Census)

Entity/ Population	Position or Title	Department
Polk County (50,123)	Emergency Mgmt. Director (County Judge) Emergency Mgmt. Coordinator Precinct Commissioner Fire Marshal Floodplain Administrator 9-1-1 Mapping/GIS Administrator	Office of Emergency Management Precinct #1 and #3
City of Livingston (5,640)	City Secretary Fire Marshal	City Hall Livingston VFD
City of Corrigan (1,477)	City Secretary	Administration
City of Onalaska (3,020)	City Administrator	Administration
City of Goodrich (248)	City Secretary	City Hall
City of Seven Oaks (68)	Mayor of Seven Oaks	Administration
Holiday Lake Estates Volunteer Fire Department	Fire Chief	VFD
Trinity River Authority	Project Manager	Administration

TDEM	County Liaison Officer	State Emergency Management
Texas A&M Forest Service	Regional Fire Coordinator	State Forest Service
Goodrich ISD	Superintendent	Administration
Big Sandy ISD	Superintendent	Administration
Livingston ISD	Emergency Management Coordinator	Administration
Onalaska ISD	Technology Director	Administration
Leggett ISD	Superintendent	Administration
Corrigan-Camden ISD	Superintendent	Administration
Polk County Recovers	County Liaison	Long-Term Recovery Group

Project Schedule

Polk County Hazard Mitigation Plan Update, 2024



CORE Planning Team Meetings	
1	Introductions, planning process review, hazards review, capabilities assessment and prior mitigation actions review
2	Conduct local risk assessments and identify information gaps, identify mitigation goals and actions, and develop implementation plan
Jurisdictional Sub-Team	
1	Review basemaps, draft survey, create an outreach strategy and complete local capability assessments.
2	Input on mitigation goals and actions, implementation and maintenance procedures, and review and adopt final plan for submission to FEMA
Stakeholder/ Public Outreach Meetings	
1	Present basemaps, capability assessments, risk assessment, and draft mitigation actions for feedback and further development.
2	Opportunity to review and comment on final draft.

Resources and Existing Plans

Resources

Various resources were used to gather and analyze data on past hazard events and their impacts on the planning area to conduct hazard risk assessments. The preliminary findings of the hazard risk assessments were presented at Core Meeting 2 and then shared in their entirety with the participants to develop mitigation actions. The information obtained from these assessments facilitated discussions that helped participants develop actions for their respective communities.

Resources used for the assessments include the National Oceanic and Atmospheric Administration (NOAA, Texas Geographic Society, U.S. Geographic Society (USGS, U.S. Department of Health and Human Services, US Departments of Agriculture, FEMA, U.S. Army Corp of Engineers (USACE, Texas Water Development Board (TWDB, Texas A & M Forest Service, Texas Division of Emergency Management (TDEM, local reporting, and other sources).

Existing Plans

The following existing plans were used to develop background information and as a starting point for discussing past and current capabilities, hazards, and mitigation actions.

Countywide Plans

1) Polk County CWPP

Polk County Office of Emergency Management in collaboration with the local fire departments developed the 2020 Polk County Community Wildfire Protection Plan. Based on risk assessments of subdivisions across Polk County, the plan prioritizes the most threatened areas for fuel reduction and reduction of structural ignitability. The Polk County CWPP and its prioritized mitigation actions guided the development of new mitigation actions for this plan.

2) Polk County EDC Survey and Development Strategy

The Polk County Economic Development Council conducted surveys of residents, business owners, and elected officials to understand the perceived strengths and weaknesses of Polk County and develop a set of recommendations for future economic development in the county. With an understanding of the goals and strategies of Polk County EDC and the needs of community members, the stakeholders for this plan can plan for future development and preemptively mitigate the associated risks.

Public and Stakeholder Involvement

The process of hazard mitigation planning presents an opportunity for Polk County, along with the participating jurisdictions, water utility, stakeholders, and the general public, to assess and develop effective actions to mitigate the risk of loss of life and property damage that may result from a disaster occurring within or around the planning area. Public participation and stakeholder involvement in the Plan are critical to ensure that the components of the Plan are accurate and relevant to the needs of the community. The Planning Team develops a greater understanding of local concerns and legacy knowledge with input from individual citizens and the community as a whole. If citizens and stakeholders are involved it also imparts more credibility to the final Plan and increases the likelihood of successfully implemented mitigation actions.

Table 2-2. Plan Stakeholders

Chamber of Commerce	Mayor/ Chief Admin. Officer	City Council

Polk County	Grant & Contract Coordinator County Judge Environmental Enforcement Officer Sheriff Chief Appraiser Tax Assessor Office Manager Commissioner	Grants and Contracts Judge's Office Environmental Enforcement Office Sheriff's Office Appraisal District Tax Office Precincts 1,2,3,4
Polk County	Communications Officer	Sam Houston Electric
Alabama-Coushatta Tribe	Emergency Management Coordinator	Emergency Management
City of Livingston	Fire Marshall	Fire Marshall
CHI St. Luke's Health – Memorial Livingston	Director of Hospital Operations	Hospital
Goodrich	Mayor	City Administration
Corrigan	Mayor	City Administration
Onalaska	Mayor	City Administration
MTC-IAH Detention Facility	Senior Warden	MTC-IAH Detention Facility
Livingston-Polk County	Director	Chamber of Commerce
Texas	Assistant Supervisor Extension Agent	TXDOT Texas A&M AgriLife

		Extension Service
Texas Region 14	Homeland Security Director	DETCOG
United States	District Conservationist	USDA-NRCS
Polk County	Executive Director	Polk County Economic Development Committee
Lower Trinity Groundwater Conservation District	General Manager	Lower Trinity Groundwater Conservation District
TDCJ	Risk Manager	Polunsky Unit
Trinity River Authority	Assistant Project Manager – Operations (EMC)	Trinity River Authority
Entergy Electric	Customer Service Manager	Private Industry- Utilities
Allegiance Mobile HealthEMS	Director of Operations	Private Industry – Health
Escapees Care	Executive Director	Non-Profit – Health

The public input process can be viewed as three tiers of groups based on participation and responsibility for plan development and implementation.

The first tier is the Core Planning Team, which constitutes at least one representative from every participating jurisdiction. Their responsibilities and participation rates are the highest because they must attend every project schedule meeting. This includes Core Team Meetings, Jurisdictional Sub-Team Meetings, and Public Meetings. Two Core Planning Team Meetings were held throughout this plan's development with tasks assigned to each member.

The second tier was the Jurisdictional Sub-Teams comprised of more members from each participating community with the representative Core Team Member leading the meetings and

ensuring that tasks were completed. Jurisdictional Sub-Teams are comprised of a diverse group of local officials who have day-to-day responsibilities for emergency response and preparedness, development review and regulations, and departmental or legislative decision-making authority. This second tier had responsibilities associated with the specific tasks assigned to each of the two meetings scheduled for this group.

The first Jurisdictional Sub-Team meeting was virtually held on June 26, 2024, and consisted of a morning session for the City of Livingston, on July 1st, 2024, with the City of Onalaska and on Tuesday, July 2nd, with the Polk County Team.

The second Core Team meeting was held on **August 13th.** This meeting included a final review of the mitigation action plan for each community, a priority exercise for the actions in the plan, and the development of plan maintenance and implementation strategies.

Pok County and it's planning consultants ensured socially vulnerable populations were present in the planning process through engaging with stakeholder groups such as Escapees Care, that provide health care and housing resources for independent senior living in Polk County. Polk County also provided all engagement materials such as flyers for public meetings and the hazard mitigation survey in Spanish.

Tables 2-3. Jurisdictional Sub-Teams

County Team

Courtney Comstock	Emergency Management Coordinator	Polk County	Emergency Management
Chawna Reuter	Deputy Emergency Management Coordinator	Polk County	Emergency Management
Jessica Hutchins	Grant & Contract Coordinator	Polk County	Grants and Contracts
Sydney Murphy	County Judge	Polk County	Judge's Office
Linda Sloan	9-1-1 Addressing Coordinator/GIS Specialist	Polk County	Emergency Management
Hollie Oliver	Permit Inspector/Floodplain Administrator	Polk County	Permit Office

Bryon Miller	Environmental Enforcement Officer	Polk County	Environmental Enforcement Office
Byron Lyons	Sheriff	Polk County	Sheriff's Office
Chad Hill	Chief Appraiser	Polk County	Appraisal District
Tatum White	Tax Assessor-Collector	Polk County	Tax Office
Scott Ferguson	Communications Officer	Polk County	Sam Houston Electric
Guylene Robertson	Commissioner	Polk County	Precinct 1
Joy DeRaimo	Office Manager	Polk County	Precinct 1
Mark DuBose	Commissioner	Polk County	Precinct 2
Dana Murphy	Office Manager	Polk County	Precinct 2
Milton Purvis	Commissioner	Polk County	Precinct 3
Carol Loving	Office Manager	Polk County	Precinct 3
Jerry Cassidy	Commissioner	Polk County	Precinct 4
Kayla Pitts	Office Manager	Polk County	Precinct 4

Livingston Sub Team

Judy Cochran	Mayor	Livingston	City Administration
Bill Wiggins	City Manager	Livingston	City Administration
Matt Parrish	Chief	Livingston	Police Department
Lana Smith	Chief Operations Officer	Livingston ISD	School District

Onalaska Sub Team

James Arnett	Mayor	Onalaska	City Administration
Angie Stutts	City Administrator	Onalaska	City Administration
Anthony Roberts	Superintendent	Onalaska ISD	School District

Corrigan Sub-Team

Johnna Lowe Gibson	Mayor	Corrigan	City Administration
Darrian Hudman	City Manager	Corrigan	City Administration
Brian Aiken	Superintendent	Corrigan-Camden ISD	School District

Goodrich Sub-Team

Kelly Nelson	Mayor	Goodrich	City Administration
Felicia Garrett	City Secretary	Goodrich	City Administration
Daniel Barton	Superintendent	Goodrich ISD	School District

Seven Oaks Sub-Team

Centa Evans	**Mayor**	**Seven Oaks**	**Mayor's Office**
Dina Dickerson	City Secretary	Seven Oaks	Mayor's Office

Figure 2-3: Public Meeting at Dunbar Gym in Livingston, June 12th, 2024

One public outreach workshop conducted by Langford Community Management Services staff and one public plan review session was offered to gather input from a variety of subgroups, including local nonprofits, utility providers, Trinity River Authority officials, healthcare providers, nursing home operators, childcare providers, parents, teachers, Church leaders, and the public regarding hazard mitigation. The first workshop took place on June 12, 2024, in the City of Livingston, while the public plan review was held virtually over a two-week period. During these sessions, community members and stakeholders came together to identify the most threatening hazards to Polk County. They also aimed to locate critical infrastructure, low water crossings, and potential future residential development areas. The workshops were designed to allow communities to assess critical facilities, including vulnerable populations (nursing homes, hospitals, daycares), and provide feedback on general and specific weaknesses and areas at risk of natural hazards. Neighboring communities, as well as local and regional stakeholders, were invited to participate through email and phone. They were briefed on the planning process and informed about how they could collaborate with participating jurisdictions to seek future project funding for implementing mitigation projects relevant to their specific hazard risks.

The second core meeting was held on August 13th from 6pm til 8pm at the Senior Center in Livingston, TX. Core members finalized their community capabilities and mitigation actions in addition to completing the STAPLEE prioritization worksheet .

The following is a summary of findings from the public survey that was opened on the morning of May 15, 2024, and closed on August 29th, 2024. The survey, prepared in both English and Spanish, was announced at the first Core meeting in Livingston and was advertised in both languages on flyers, QR code leaflets, the county OEM website, city websites, social media, on local television news, by word of mouth by Core team members and local officials.

[Polk County Emergency Management asking residents to give input for Hazard Mitigation Plan (msn.com)]

Summary of Findings from the Survey: 96 total survey responses with zero manually entered.

1. Unincorporated Polk County represents 60% of respondents and the City of Livingston comprised one-fourth of respondents.
2. Floods were identified as the highest threat with over 32% of all responses, followed closely by hurricanes and tornadoes at 13.7%, and other (please specify) with wildfires, flooding, extreme heat, and hurricanes being named the second most threatening hazards.
3. Flood, Drought, Extreme Heat, Hurricanes, and Thunderstorms are the more prominent responses to the hazards that have been experienced or hazards expected to be experienced.
4. 81.25% of respondents responded that they are not located in a floodplain, with 12.5% not knowing if they were in a floodplain, and around 6.25% of respondents identified their home as being in a floodplain. 84% of respondents identified as not having flood insurance, with around 10.5% having purchased flood insurance and 5% not knowing if they had flood insurance. The primary reasons for not having flood insurance were because their house was elevated or otherwise protected (42%), their house was not located in a floodplain (35%), 15% said it was too expensive, and around 6.6% said they had never considered it.
5. A majority of respondents are extremely concerned about being impacted by a disaster at slightly over 55%. 38.5% of respondents are somewhat concerned and a little over 6% are not concerned at all.
6. The majority, nearly 55% of respondents, have taken steps to make their homes, businesses, or community more hazard-resistant; nearly 84% of respondents would like to know more about how to make their families and homes more resilient.
7. The Internet was identified as the most effective way for citizens to receive information regarding how to make their homes, businesses, and community more resistant to hazards, followed by mail and newspaper communication.
8. Contact by text or e-mail was identified by 60% of respondents as the best single way to alert the public to an imminent disaster. All of the above, including TV, internet, text, or social media was identified by

28% to alert the public to an imminent disaster, indicating less of a concern for the medium through which they're alerted.

9. The top mitigation activities favored by residents to be enacted by their governments were: Retrofit and strengthen essential facilities such as police, fire, emergency medical services, hospitals, schools, etc.; Retrofit infrastructure, such as elevating roadways and improving drainage systems; Work on improving the damage resistance of utilities (electricity, communications, water/wastewater facilities, etc.); and Replace inadequate or vulnerable bridges and roads. The mitigation actions identified as very important by respondents were improving emergency services (87.4%), Public Education about hazards (69%), and Structural Mitigation projects (63.6%).

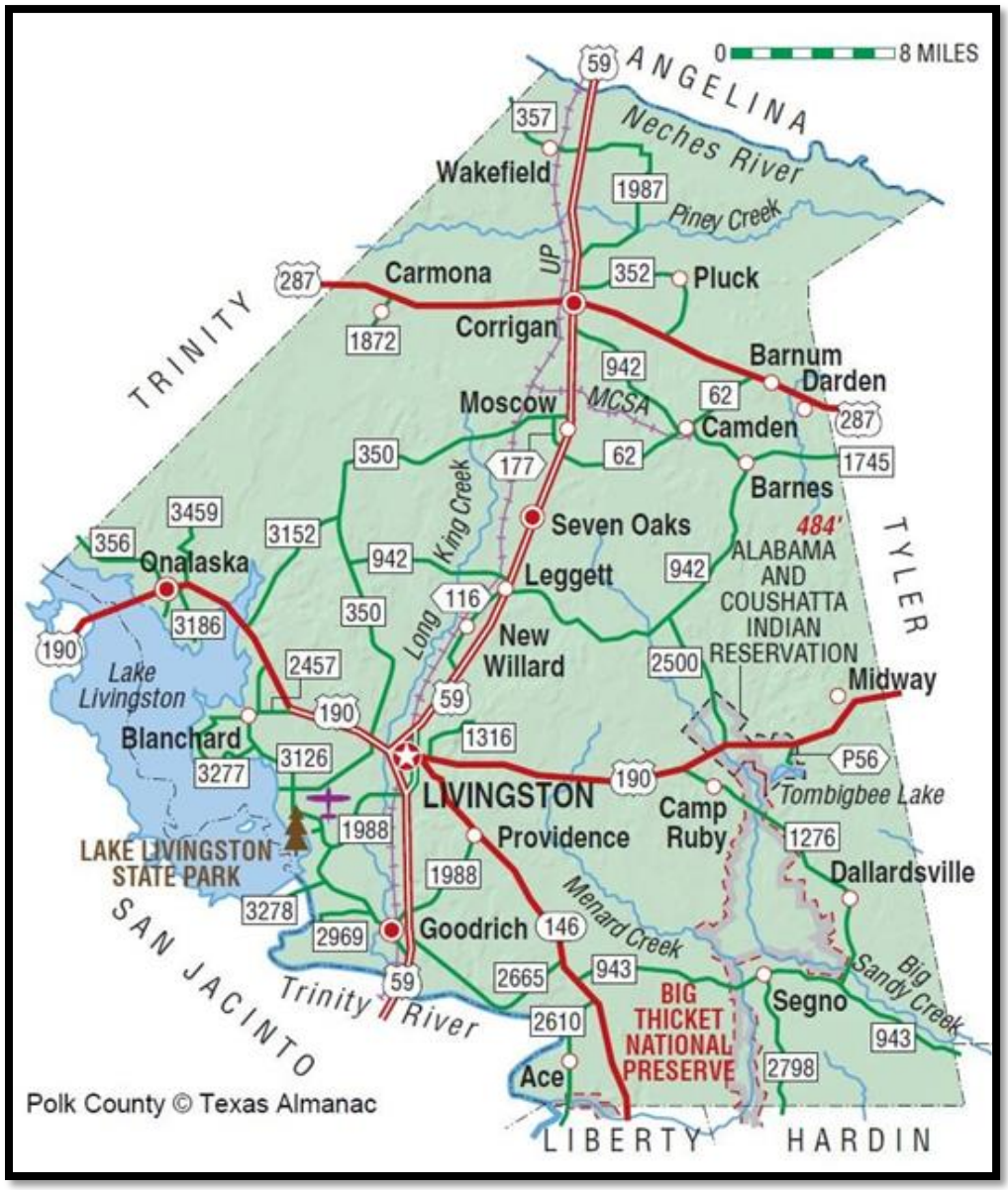
SECTION 3: PLANNING AREA PROFILE

This section provides a profile of the hazard mitigation planning area.

Polk County

Polk County is in the East Texas Timberlands region of Texas, bordered on the west by San Jacinto and Trinity County, on the north by Angelina County, on the east by Tyler County, and the south by Liberty and Hardin Counties. The City of Livingston, the county seat, is in the Southwest corner of the county, seventy miles northeast of Houston and seventy-five miles northwest of Beaumont. The City of Livingston is the county's largest city; other communities from largest to smallest population include Onalaska, Corrigan, Goodrich, and Seven Oaks. Polk County is comprised of 1,057 square miles of beautiful Piney Woods land. It has an elevation range of 100 to 300 feet above sea level. The terrain is heavily forested with sections of arable land, it is generally hilly in the northern region of the county and flatter in the Southern region of the county. Lake Livingston is a reservoir built in the late 1960s that has an area of 130 square miles of water with a 2.5-mile hydroelectric dam. The vegetation in Polk County consists mainly of stands of Pine and deciduous Hardwood trees. The topsoil is loamy in the Northern region of the county and sandier in the Southern region, with clay subsoils across the entire county.

Figure 3-1: Map of Polk County



A courthouse was erected first in 1854 in downtown Livingston. Despite being renovated in 1884, a new County Courthouse (see below) was built in 1923 and recently renovated for historical accuracy.

Figure 3-2: Polk County Courthouse, City of Livingston

The Western region of Polk County, about half of the total area, drains into the Trinity River through Long King, Menard, and Kickapoo Creeks. The Eastern half of the county drains into the Neches River through Big Sandy, Turkey, Piney, Shawnee, and Cypress Creeks. Most of the county is best suited for rangeland and wildlife habitat. The temperatures range from an average high of 93° F in July to an average low of 38° in January, the rainfall averages 54 inches per year, and there is an average of 205 sunny days a year.

Alabama-Coushatta Tribe of Texas

The Alabama-Coushatta Tribe of Texas were original inhabitants of the Alabama area. They lived as two distinct tribes, the Alabama tribe, and the Coushatta tribe, with nearly identical cultures within the Muscogee Creek Confederacy. With ongoing displacement throughout the 1830s, as the U.S. Government committed the atrocity known as the Trail of Tears, the Alabama-Coushatta tribes were promised land in 1836 through a treaty guaranteeing their military support for the territory of Texas and were subsequently instrumental in the Texas War of Independence from Mexico. In 1839, the Republic of Texas recognized the tribes' claims to land before Annexation into the United States. After 33 years, the Alabama-Coushatta Tribe of Texas was once again federally recognized in 1987, guaranteeing the tribe strong rights to sovereignty and allowing it to receive benefits through the Bureau of Indian Affairs.

The Alabama-Coushatta land includes seven acres within Polk County. They have their own emergency plan and a wildland fire department that manages the longleaf pine trees through controlled burns. Not only is this a land management action, but it also ensures their cultural practices tied to the land remain intact. The tribe is led by a tribal council, with a Principal Chief and Second Chief, serving as leaders to six council members. The Alabama-Coushatta Tribe manages an economic development LLC called A.C.T. Holdings, which is supported by two enterprises, the Naskila Casino and a 26-acre campground on Lake Tombigbee with a lodge, cabins, and RV and tent camping.

The Alabama-Coushatta Reservation maintains its own emergency management department and tribal hazard mitigation plan.

Economy

Polk County

Given Polk County's location in the Piney Woods ecoregion, the timber industry has been an important part of the local economy since improvements in milling technology during the Industrial Revolution led Polk County to be a leading timber-producing county in Texas, which has continued to this day. Ecotourism, ranching, farming, and starting with CHI St. Luke's Memorial, the medical industry, have been major industries for Polk County in the 21st century.

Livingston, Texas

Livingston, Texas, originally Springfield, TX founded in 1835 was officially established in June of 1846 as the Seat of the recently established Polk County, by a former Livingston, Tennessee resident who was granted land and willing to donate a portion to establish a city. The largest industries employing Livingstonians are Health Care and Social Assistance (23.3%), Retail trade (21.7%), and Accommodation and Food Services (19.4%).

Population 2020 Census	50,123
Change from 2010	10.4%
Area (sq. mi.)	1057 square miles
Altitude (ft)	68ft - 484 ft
Rainfall (in)	54 in
Jan. avg. min. (F^o)	38 (F^o)
July avg. max. (F^o)	93 (F^o)

Figure 3-2: City of Livingston, City Hall and Police Station Next to Polk County Summary Demographics

The retention and expansion of existing local businesses and the recruitment of new businesses are crucial factors in the creation, retention, and reinvestment of wealth for Polk County. The Polk County Economic Development Council has identified a key set of topics to continue to maintain and improve the state of their local economy. The key areas for enhancement are affordable utilities, housing, healthcare, high-speed internet access, and access to a skilled workforce. There are key actions that should be taken to remedy these weaknesses. Resilient infrastructure should be developed, focusing specifically on expanding Wi-Fi, road, and utility infrastructure. Healthcare providers should be partnered with to enhance access to affordable healthcare. Regulations should be adjusted to enhance access to both affordable housing and incentivize development. The county should also work on investing in workforce development programs.

The City of Corrigan was founded in 1881 when the railroad through Polk County was completed. It is in the North Central region of Polk County, about 100 miles Northeast of Houston. 95 businesses are employing 1,226 community members in Corrigan with the top three largest industries being manufacturing, educational services, and retail trade.

The City of Onalaska located 80 miles North of Houston, in Southwest Polk County was founded in 1840 and truly flourished when Lake Livingston was finished in 1969. Since then, it has become a primary vacation and retirement location in Polk County. It has 137 businesses within the city limits and employs 1,141 people. The largest industry by a significant amount is Construction, with Health Care and Other Services being the next two largest industries in Onalaska.

The City of Seven Oaks, located in Central Polk County and passed through by US 59 is 88 miles north of Houston and was founded along the East and West Texas Railway. There are four businesses that employ 30 people in Corrigan. Ninety percent of the local economy is comprised of Wholesale Trade, with Mining and Health Care being the second and third largest industries, respectively.

The City of Goodrich is 70 miles north of Houston in southern Polk County. Like other major communities in Polk County, it was founded due to the railroad's expansion, with Goodrich station named after a local landowner. Goodrich has 22 businesses employing 211 community members. The largest industries in Goodrich are food and accommodations, retail trade, and other services.

Population and Demographics

The 2023 Census count for Polk County is 52,583, of which 6,336 were residents of the City of Livingston, 3,276 were residents of the City of Onalaska, 1,693 were residents of Corrigan, 259 were residents of Goodrich, and 141 were residents of Seven Oaks. According to American Community Survey 5-Year survey estimates from 2023, the percentage of people in Texas living in poverty is around 14%, with just the City of Seven Oaks falling below that percentage at 11.3% living in poverty. All other communities and the county overall have higher-than-average rates of poverty.

Table 3-1: Population of Polk County and Participating Jurisdictions

Jurisdiction	2020	2023	Estimated Vulnerable or Sensitive Populations[5]			
	Census Population	Population Estimate[4]	Youth (Under 5)	Elderly (Over 65)	Below Poverty Level	Percentage of Low to Moderate Income
Polk County	50,123	52,583	2,553	9,477	8,624 (16.4%)	44%
City of Livingston	5,640	6,336	347	1,033	1,375 (21.7%)	65.7%
City of Onalaska	3,020	3,276	166	531	731 (22.3%)	53.1%
City of Corrigan	1,477	1,693	168	260	444 (26.2%)	41.6%
Goodrich	248	259	9	33	76 (29.3%)	35.5%
Seven Oaks	68	141	0	13	16 (11.3%)	46.2%
Alabama-Coushatta Reservation	679	681	71	53	114 (16.7%)	--

School Districts - Populations

Livingston Independent School District (ISD) is a public school district serving students from Pre-K through Grade 12 with one high school, one middle school, three elementary schools, and one primary school (prekindergarten and kindergarten), There are also two alternative education programs, the Livingston High School Academy, and the Polk County Alternative Education Program. The mission of Livingston ISD is "to provide an exemplary education that prepares students to become successful citizens."

Onalaska ISD is a public school district for the City of Onalaska which serves the community of Blanchard as well. There are two schools in Onalaska ISD: Onalaska Junior/Senior High School (grades 7-12) and Onalaska Elementary School (grades Pre-K-6).

Corrigan-Camden ISD is a public school district for the City of Corrigan. There are three schools in Corrigan-Camden ISD: Corrigan-Camden High School, Corrigan-Camden Junior High School, and Corrigan-Camden Elementary School. The Corrigan-Camden ISD's mission is to partner with their community to provide an exemplary education while developing honorable, productive citizens.

Goodrich ISD is a public school district for the City of Goodrich and south-central Polk County. The district has three schools all located on the same campus: Goodrich Elementary, Goodrich Middle, and Goodrich High School. The mission of Goodrich ISD is "...Ensuring all students are college, career, or military-ready citizens of exemplary character."

Big Sandy ISD is a public school district based in Dallardsville and consists of one school serving students of all grades in the area. Their mission is to "promote in all students a strong sense of academic achievement, positive self-image, and a desire to become responsible, productive citizens in our ever-changing society."

Leggett ISD is a public school district based in the community of Leggett which also serves some of the town of Seven Oaks. There are two schools in Leggett ISD: Leggett High (7-12) and Leggett Elementary (PK – 6). Table 3-2 below provides the population of employees, students, and vulnerable populations for each school district.

Table 3-2: ISD Population

ISD	Employees	Students	Children (under 5)	Staff with Outdoor Jobs
Livingston ISD	530	4,013	93	0
Onalaska ISD	215	1255	72	9
Corrigan-Camden ISD	NA	817	NA	25
Goodrich ISD	52	244	27	4
Big Sandy ISD	88	504	45	10
Leggett ISD	NA	219	NA	NA

Population Growth

The Polk County population estimate for 2020 was 50,123 people. This is a significant amount of growth from the 2010 Census count of 45,413. This estimate is produced by the U.S. Census Bureau using updated housing unit estimates to distribute county household population to the subcounty area based on housing unit change. Overall, Polk County and all participating jurisdictions, except for Goodrich experienced an increase in population between 2010 and 2023. The Census counts for 2010 and 2020, however, both show a population decrease for Corrigan (-9.6%), Seven Oaks (-38.7%), and Goodrich (-16.2%). Polk County had a 10.4% increase over that same time period suggesting that much of the growth was in the unincorporated county with some growth in Livingston and Onalaska. All communities experienced a growth in population from 2020 to 2023, resulting in net population growth for all communities from 2010 to 2023 except for Goodrich whose 4.4% growth did not make up for the 16.2% decline in the previous decade. Table 3-2 provides historic and projected population change rates in Polk County and all participating jurisdictions.

Table 3-3: Population Change

Jurisdiction	2010 Census	2020 Census	2023 Estimate	Pop. Change 2010 - 2020	% Change 2010-2020	Pop. Change 2010-2023	% Change 2010-2023	Pop. Change 2020 - 2023	% Change 2020 - 2023
Polk County	45,413	50,123	54,186	4,710	10.4%	5,123	11.3%	413	0.8%
City of Livingston	5,192	5,640	5,747	448	8.6%	1,144	22%	696	12.3%
Corrigan	1,634	1,477	1,693	-157	-9.6%	59	3.6%	216	14.6%
Onalaska	2,787	3,020	3,276	233	8.4%	489	17.5%	256	8.5%
Seven Oaks	111	68	141	-43	-38.7%	30	27%	73	107.4%
Goodrich	296	248	259	-48	-16.2%	-37	-12.5%	11	4.4%
Alabama-Coushatta Reservation	608	679	681	71	11.7%	74	12%	3	.3%

Population Projections

Population projections are a useful tool to understand how future growth and development may affect overall vulnerability to hazards. Planning and growth management efforts will guide city infrastructure investment away from hazard-prone areas as both occupied and vacant areas are considered for future development. Population projections from 2030 to 2080 are listed in Table 3-3 and are based on Texas Water Development Board (TWDB) demand projections used for the 2027 State Water Plan. Population projections are based on county-level 1.0 migration scenario projections from the Texas Demographic Center (TDC), which used migration rates between the 2010 and the 2020 decennial Census to project future growth. The population projections show an increase in population for the Polk County Planning Area of 15,098 persons over the 50-year period, or a 25.9% increase. However, growth has been slower from 2020-2023 for Polk County, so the 50-year projections may tell a different story once the 2030 decennial Census is taken into account. The TWDB does not maintain population projections for the communities of Seven Oaks and Goodrich.

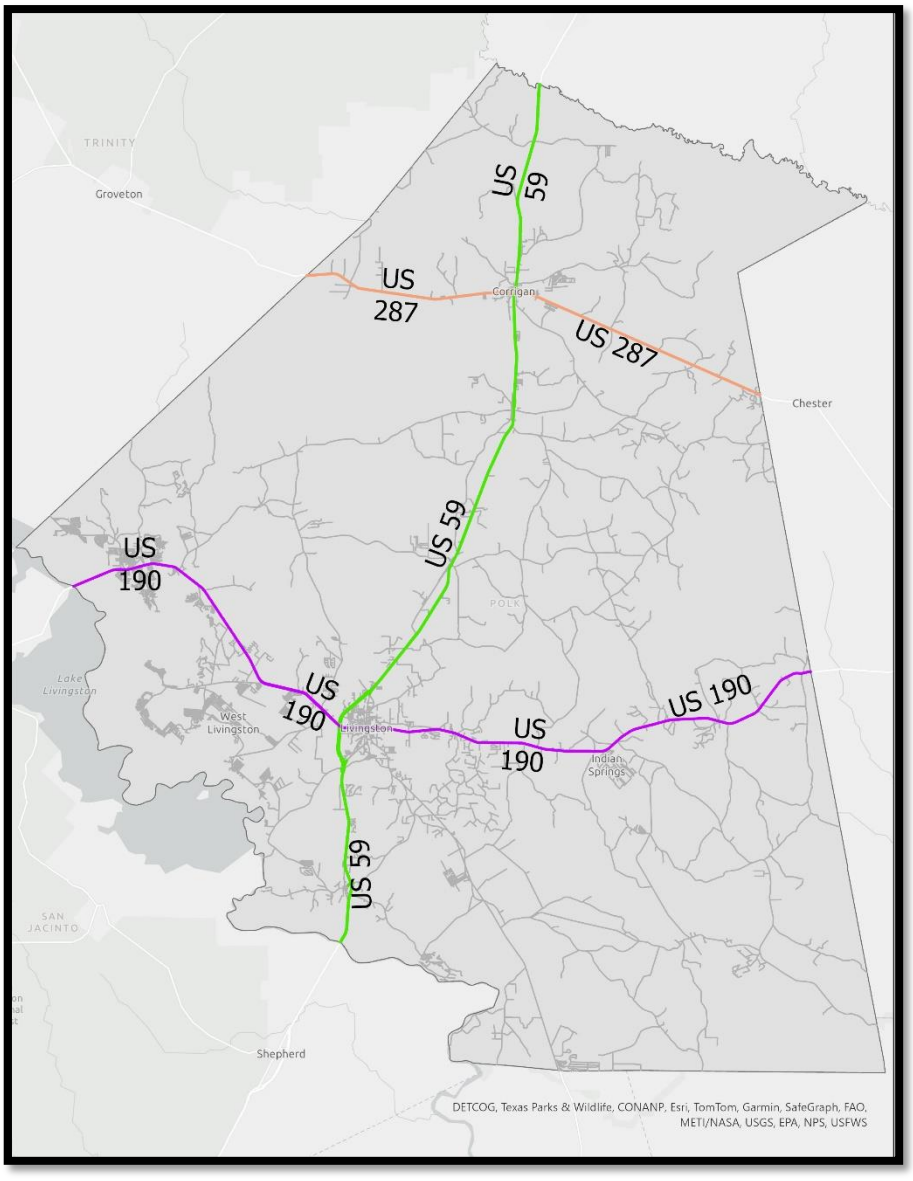
Table 3-4: TWDB Population Projections

Jurisdiction	P2030	P2040	P2050	P2060	P2070	P2080
Polk County	58,301	62,957	65,255	67,764	70,472	73,399
Livingston	6,638	7,189	7,462	7,759	8,085	8,443
Onalaska	3,627	3,939	4,093	4,261	4,446	4,648
Corrigan	1,409	1,519	1,572	1,630	1,688	1,744

Existing and Future Land Use and Development Trends

It is expected that residential growth will increase along the transportation corridors leading to Polk County along U.S. Routes 59, 190, and 287.

Figure 3-3: Polk County Major Transportation Corridors



Polk County

Through data provided by the Polk County Floodplain Management Office, we know the number of residential development permits issued and the number of subdivisions developed, in addition to the percentage of properties developed in the floodplain.

Table 3-4: Polk County Residential Permits and Subdivisions from 2019 - 2024

Year	Residential Permits Issued	Number of Residences in Floodplain	Subdivisions Developed
2019	699	12 (1.7%)	1
2020	703	42 (6%)	6
2021	892	30 (3.4%)	11
2022	949	6 (.6%)	12
2023	789	12 (1.5%)	3
2024	375	5 (1.3%)	4

The number of residential permits issued per year gradually increased from 2019 through 2022 with a reduction in residential permits issued in 2023. Through May of 2024, Polk County issued nearly half of the residential permits of 2023 with one more subdivision in the first five months than in all of 2023. The number of residences in a floodplain peaked in 2020 at 6% of residential development and has generally declined since then.

City of Livingston

The City of Livingston has experienced meaningful growth over the past 20 years. Their downtown district is centered around the intersection of Highway 59 and Highway 190. The City of Livingston has initiated a Main Street downtown revival program to protect local businesses through historic preservation, renovation, and economic development initiatives.

City of Onalaska

The City Center of Onalaska is located South of the Intersection of Highway 190 and County Road 356 with subdivisions clustering along Lake Livingston, CR 356, and FM 3459. The city hosts multiple locations for lakeside vacations, including an abundance of RV Parks, campsites, and cabins.

City of Corrigan

The City Center for Corrigan is at the intersection of Highway 59 and Route 287 with separate subdivisions clustered to the East and West of the center.

City of Goodrich

The City of Goodrich is south of the City of Livingston along Highway 59 and State Highway Loop 393. Goodrich has a more rural feel and has a historic downtown area with shops and restaurants celebrating their community history. They are actively seeking out economic development opportunities.

City of Seven Oaks

The City of Seven Oaks is a small community with a rural character. The development in the community is clustered North of Carrington on Cemetery Road along Highway 59.

Critical Facilities and Assets

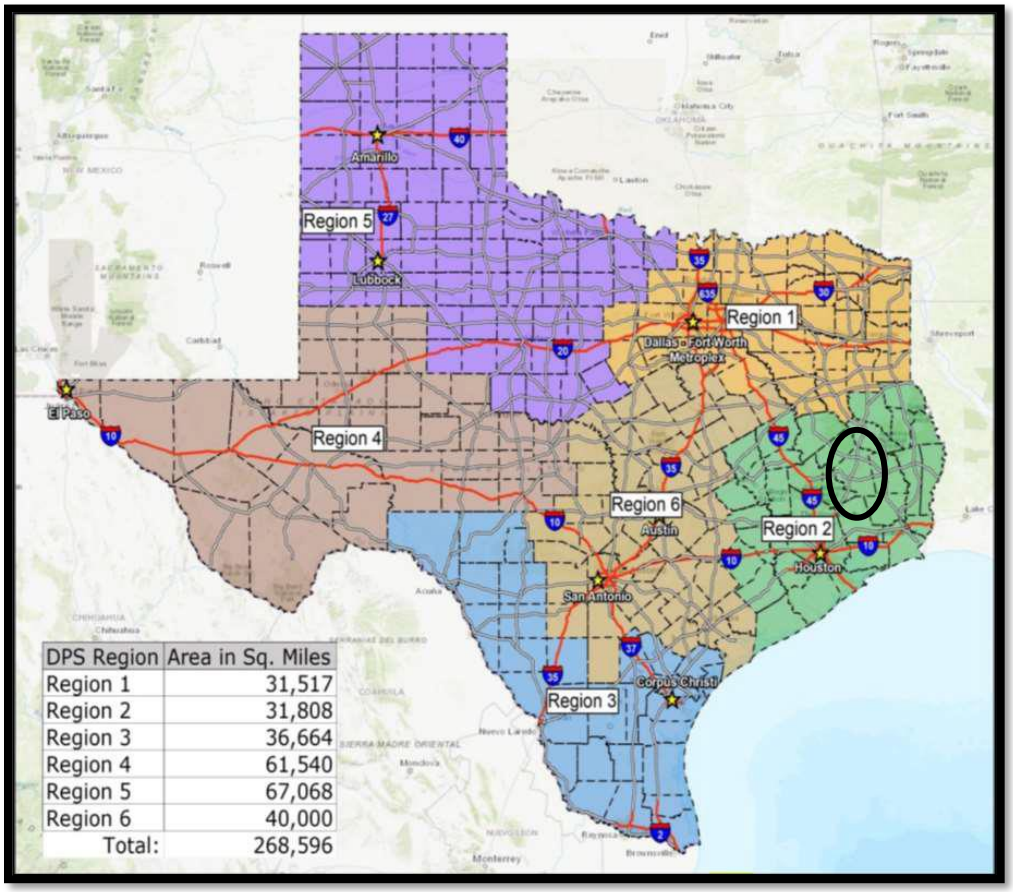
For certain activities and facilities, even a slight risk from a hazard event is too great a threat. FEMA defines these types of places as critical facilities; hospitals, fire stations, police stations, courthouses, communications, public schools, utility infrastructure, and similar facilities where essential programs/services are provided. These facilities should be given special consideration when formulating regulatory alternatives, floodplain management plans, and mitigation actions. A critical facility should not be located in a floodplain if at all possible and emergency plans should be developed to continue to provide services during a flood or hazard event. If located in a floodplain, a critical facility should be provided with a higher level of protection so that it can continue to function and provide services during and after a flood. Hazard mitigation actions to mitigate risk to critical facilities are included in this Plan by jurisdiction in Section 19 and a summary of critical facilities is provided in **Appendix D.**

SECTION 4: HAZARDS AND RISKS

Based upon a full review of the range of hazards suggested under FEMA planning guidance and input from Polk County Core Team members, 12 hazards have been identified as important to be addressed in the Polk County Hazard Mitigation Plan Update. These were chosen based upon a review of the State Hazard Mitigation Plan, a review of the historical record of disaster declarations for the Polk County planning area, historical incidents contained in the National Centers for Environmental Information (NCEI), and local records and accounts of magnitude and damages from different and distinct hazard events.

According to the State Hazard Mitigation Plan, Polk County is located within the Eastern portion of the Texas Division of Emergency Management Region 2 where floods, hurricanes, wildfire, and drought can be expected to dominate the hazard profile.

Figure 4-1: Texas State Texas Division of Emergency Management Regions



Source: Texas Division of Emergency Management

The increased risk for these specific hazards in the planning area is confirmed in the table below. Disaster declarations are made at the county level and are not specific to any one city or sub-area, however, it is illustrative for local emergency planners to understand the type and frequency of the hazards impacting the larger region. Keep in mind that the incidents listed are only those that had a level of impact sufficient to necessitate a disaster declaration and that hazards have affected the area more frequently than what the table may initially suggest. Statewide disaster declarations are not included in this list.

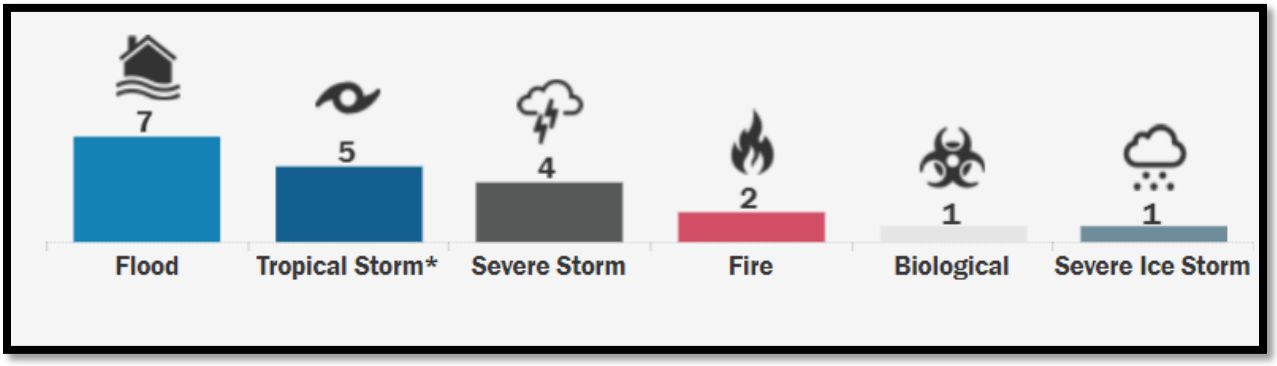
Table 4-1: Disaster Declarations in Polk County (Source: www.FEMA.gov)

Declaration Date	Disaster Number	Incident Subcategory
07/09/2024	4798	Hurricane
05/17/2024	4781	Flood
02/19/2021	4586	Severe Ice Storm
03/25/2020	4485	Biological
02/25/2019	4416	Flood
08/25/2017	4332	Hurricane
06/11/2016	4272	Flood
05/29/2015	4223	Severe Storm
09/09/2011	4029	Fire
09/13/2008	1791	Hurricane
01/11/2006	1624	Fire
09/24/2005	1606	Hurricane
06/09/2001	1379	Coastal Storm
10/21/1998	1257	Flood
08/26/1998	1239	Severe Storm
10/18/1994	1041	Flood
12/26/1991	930	Flood
05/02/1990	863	Severe Storm
05/19/1989	828	Severe Storm
07/11/1973	398	Flood

Since the U.S. Federal Government began issuing disaster declarations in 1953, Polk County has had 20 major disaster declarations where individual and/or public assistance has been approved. Based on Table 4-1 above, 13 of the 19 disaster declarations have been issued in the past 20 years (since 2002). The infographics below provide a summary of the type of hazard, year, and time of year in which it occurred.

The types of hazards that have had disaster declarations for the Polk County planning area since 1953 are shown in Figure 4-2 below.

Figure 4-2: Polk County Disaster Declarations Since 1953 by Type



The months during which disasters have been declared in the planning area are shown in Figure 4-3 below.

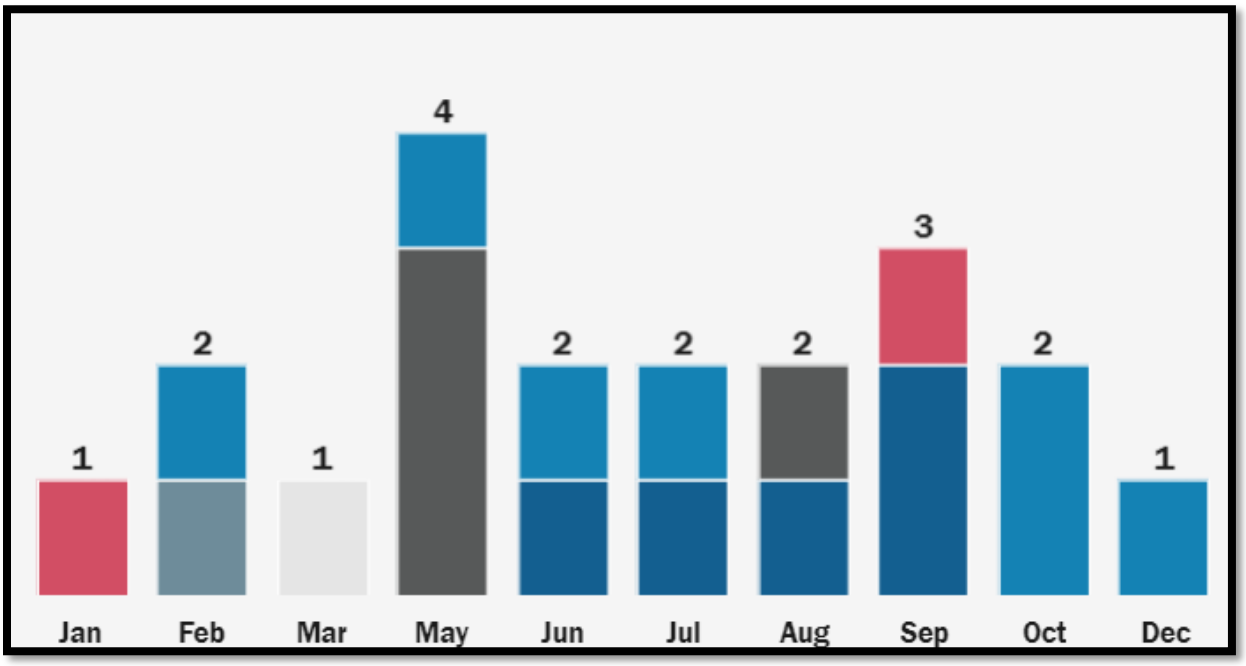


Figure 4-3: Polk County Disaster Declarations Since 1953 by Month of Occurrence.

The years in which disasters have been declared in the planning area are shown in Figure 4-4 below. Table 4-1 on the previous page can be used as a reference for more detail.

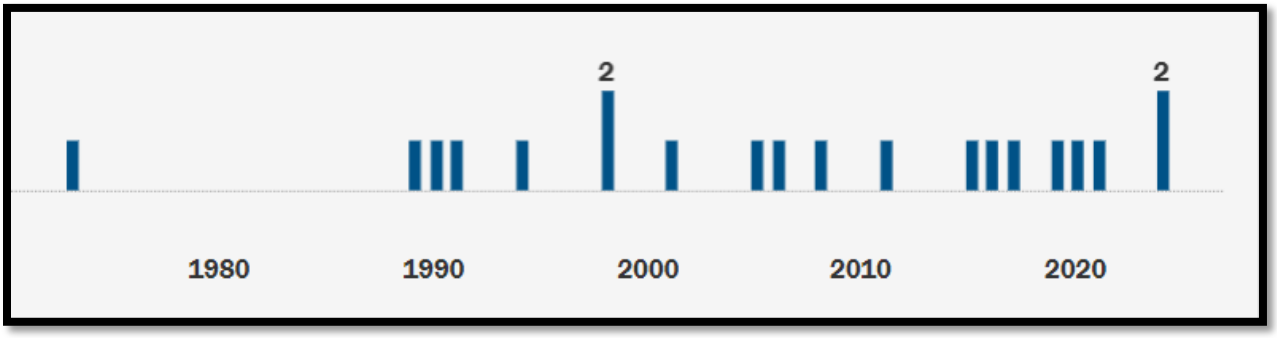


Figure 4-4 Disaster Declaration Timeline

Hazard Descriptions

The following 12 hazards are included in the State of Texas Hazard Mitigation Plan and are determined to be a risk to the planning area. Severe coastal flooding and coastal erosion were left off this list due to the distance of the subject area from the Texas Gulf Coast and no history of impact.

Table 4-2 Hazards Impactful to Polk County

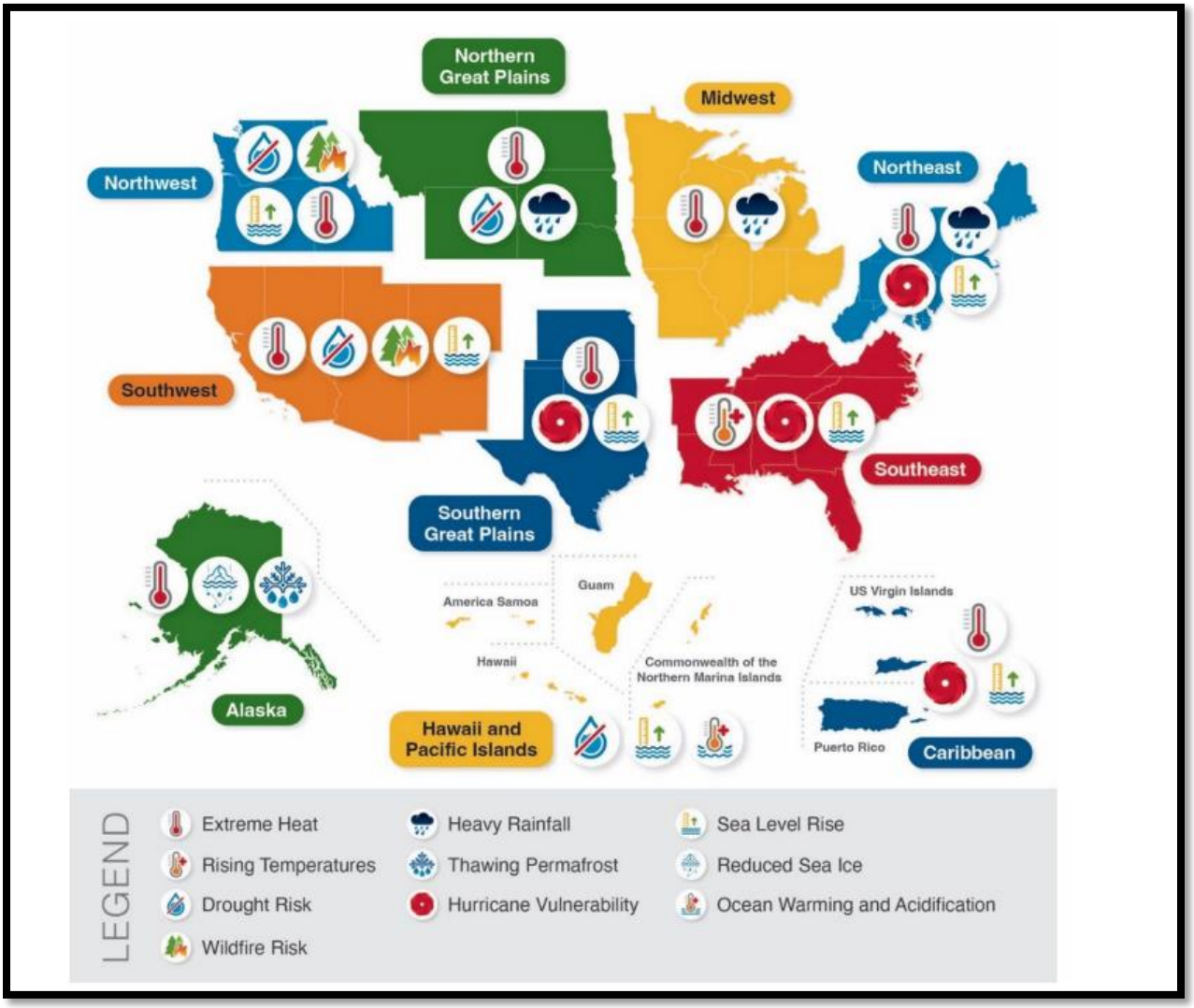
HAZARD	DESCRIPTION
	HYDROLOGIC
Drought	A deficiency in precipitation over an extended period, usually a season or more, results in a water shortage causing adverse impacts on vegetation, animals, and/or people.
Floods	Flooding is a general or temporary condition of partial or complete inundation of water, usually floodplains. A floodplain is an area of land susceptible to being inundated by floodwater from any source.
	ATMOSPHERIC
Extreme Heat	Extreme Heat is a condition when temperatures hover above local excessive heat criteria combined with high humidity levels.
Hailstorm	Hail is showery precipitation in the form of irregular pellets or balls of ice more than 5 mm (about 0.2 in) in diameter.

Hurricanes, Tropical Storms, and Depressions	A hurricane is a large rotating storm with high-speed winds that forms over warm waters in tropical areas. Hurricanes have sustained winds of at least 74 miles per hour and an area of low air pressure in the center called the eye. Hurricanes, tropical storms, and depressions are associated with heavy rainfall and inland flooding, storm surge, and high winds.
Lightning	These are sudden charges of electricity that develop from storms or excessive heat.
Severe Winter Storms	A condition when temperatures hover below freezing and can include ice, snow, and sleet.
Tornado	A tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground.
Windstorms	Severe windstorms can occur alone, or when accompanied by severe thunderstorms. Flying debris can cause major damage to utilities, infrastructure, and property.
	Other
Wildfire	Wildfires are unplanned, unwanted fires burning in a natural area, like a forest, grassland, or prairie. Buildings and human development that are susceptible to wildfires are considered the wildland-urban interface.
Dam Failure	A structural failure of a dam that results in the sudden, rapid, and often uncontrolled release of impounded water

Dam failure is a potential concern for Polk County because of the Lake Livingston Dam, but it cannot be discussed in this plan due to data deficiency. The data deficiency results from the Trinity River Authority prioritizing dam infrastructure security and maintaining highly restricted access to the data. Earthquakes and expansive soil have had negligible to no impact on the participating jurisdictions and the planning area as a whole, so they will not be discussed in the mitigation action plan for the next five years.

Natural Hazards and Climate Change

Climate change describes the rapid and relatively recent increase in global average temperatures that has helped drive a fivefold increase in the number of weather-related disasters in the last 50 years. Climate change means disasters are happening simultaneously, too.



Source: Climate Adaptation Planning: Guidance for Emergency Managers (fema.gov)

Figure 4-5 Climate Related Hazards by Region

With increasing global surface temperatures, the possibility of more droughts and increased intensity of storms will likely occur. As more water vapor evaporates into the atmosphere it becomes fuel for more powerful storms to develop. More heat in the atmosphere and warmer ocean surface temperatures can lead to increased wind speeds in tropical storms. Rising sea levels expose higher locations not usually subjected to the power of the sea and to the erosive forces of waves and currents.

Texas is considered one of the more vulnerable states in the U.S. to abrupt climate changes and to the impact of gradual climate changes to the natural and built environments. Texas is one of

the highest-ranked states in the U.S. concerning the frequency in which they experience natural and climate-driven disasters[1i]. Extreme heatwaves and hurricanes will become more frequent and coastal Texas will face significant sea-level rise. Megadroughts can trigger abrupt changes to regional ecosystems and the water cycle, drastically increase extreme summer temperature and fire risk, and reduce the availability of water resources, as Texas experienced during 2011-2012. Adapting to climate change through efforts like flood control measures or drought-resistant crops partially reduces climate change risks, although some limits to adaptation have already been reached.

Overview of Hazard Analysis

The hazard risk analysis methodology involves reviewing historical data and conducting statistical analysis on the impact of hazards in the planning area. To gather this information, we retrieved records from the National Centers for Environmental Information (NCEI) and the National Oceanic and Atmospheric Administration (NOAA) that were reported for Polk County. We also evaluated other local records whenever they were available.

Additionally, we used geographic information system (GIS) mapping software to identify and assess the risks for Polk County and other participating jurisdictions by evaluating community critical facilities and their vulnerability to hazards.

The Risk Assessment includes general parameters for each hazard, such as the location in the planning area, the expected extent or magnitude of the hazard, the frequency of its occurrence based on the number of historical events over the study period, the approximate annualized losses, a description of the general vulnerability, and a statement of the hazard's impact.

The Priority Risk Index definitions are defined in Table 4-3 below and were adapted from Brazos County OEM and North Carolina Emergency Management Division.

Table 4-3. Priority Risk Index Definitions

	Degree of Risk			Assigned Weighting Factor
	Level	**Criteria**	**Index Value**	
Probability	Unlikely	Event Possible in next 10 Years	1	30%
	Possible	Event possible in next 5 years	2	
	Likely	Event probable in next 3 years	3	
	Highly Likely	Event nearly certain to occur in the next year	4	
Impact (Impact is subdivided into 3 categories: social impact, property impact, and CIKR impact)	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more	4	
Spatial extent	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
Warning Time	More than 24 hours	Self-explanatory	1	10%
	12 to 24 hours	Self-explanatory	2	
	6 to 24 hours	Self-explanatory	3	

	Less than 6 hours	Self-explanatory	4	
Duration	Less than 6 hours	Self-explanatory	1	10%
	Less than 24 hours	Self-explanatory	2	
	Less than one week	Self-explanatory	3	
	More than one week	Self-explanatory	4	

Source: adapted from North Caroline Emergency Management Division

Table 4-4

	PROBABILITY	EXTENT	IMPACT					DURATION	WARNING TIME	PRI
			Social Impact		Property Impact	CIKR Impact		Incident Exposure		
Weights	*Probability 0.3*	*Spatial Extent 0.2*	*Historical Human*	*Possible Human*	*Extent of Damage*	*Duration of Shutdown*	*Average Impact 0.3*	*Duration of Exposure 0.1*	*Warning Time 0.1*	*Priority Risk Index*
Polk County	*P1: Prob*	*S1: Extent*	*H1: Extent*	*H2: Number*	*Pr1: Extent*	*CI1: Shutdown*	*Severity*	*D1: Duration*	*W1: Warning*	*PRI*
Drought	3	4	1	1	1	1	1.00	4	1	2.50
Flood	4	3	2	4	4	2	3.00	3	3	3.30
Extreme Heat	4	4	1	2	1	1	1.25	4	1	2.875
Hailstorms	4	2	1	2	1	1	1.25	1	3	2.375
Hurricanes/Tropical Storm	2	4	1	3	3	3	2.50	2	1	2.45
Lightning	4	1	1	1	1	1	1.00	1	2	2.00
Winter Storms	3	3	1	2	2	2	1.75	2	3	2.525
Extreme Winds	4	2	2	1	1	1	1.25	1	3	2.375
Tornado	3	2	4	4	4	3	3.75	1	4	2.925
Wildfires	4	2	1	2	2	1	1.50	2	4	2.65
Dam Failure	1	3	1	4	4	4	3.25	3	4	2.575

Table 4-5 summarizes deaths, injuries, property damage, crop damage, frequency of occurrence, and potential severity of all studied hazard events from 1999-2024 for the Polk County Planning area.

Hazard	Deaths	Injuries	Property Damage	Crop Damage	Frequency
Drought	0	0	$0	$0	Likely
Floods	0	0	$301,478,000	$50,000	Highly Likely
Extreme Heat	0	0	$0	$0	Highly Likely
Hailstorm	0	0	$362,000	$1,000	Highly Likely
Hurricanes, Tropical Storms, and Depressions	0	0	$126,260,000	$0	Possible
Lightning	0	0	$0	$0	Highly Likely
Severe Winter Storms	0	0	$1,000	$0	Likely
Tornado	3	34	$5,341,000	$0	Likely
Windstorms	0	1	$1,171,000	$10,000	Highly Likely
Wildfire	0	0	$100,000	$0	Highly Likely
Dam Failure	0	0	$0	$0	

Table 4-5: Polk County Hazard Impact Summary (1999-2024)

Source: NCEI Storm Events Database 1999 to 2024.

The 25-year hazard profile shows that floods have had an outsized impact on the planning area. Floods are the leading cause of property damage and crop damage and five deaths and ten injuries, at a minimum, have been attributed to floods. The second highest number of damages and injuries can be attributed to tornadoes. The total of all other hazard damages is 7.8% of the flood total. Based on the historical impact summary, flooding is the priority hazard from which to protect people and property in the Polk County planning area. This is followed by tornadoes, windstorms, hail, severe winter storms, and wildfires. All other hazards included in this analysis present a lower mitigation priority based on the historical severity of the impact.

SECTION 5: HURRICANE

Description

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. Hurricanes, along with Tropical Storms and Depressions, produce a variety of potential hazards including damaging winds, coastal flooding due to storm surge, severe storms with heavy rainfall and high winds, and even tornados.

The information in this section covers historical damage within Polk County associated with hurricanes, tropical storms, and depressions associated with severe winds. Tornadoes and flooding, other hazards associated with this hazard event, are addressed in Chapters 6 and 11, respectively. Severe winds threaten the lives of community members, their property, and the vital utilities that mainly fail due to flying debris or downed trees and power lines. Severe winds typically cause the greatest damage to structures of light construction, particularly manufactured homes.

Location

Hurricanes and tropical storms can occur throughout the planning area and are not confined to any geographic area; however, the likelihood of impact decreases the further a location is from the Texas coast. Polk County is approximately 65 miles away from the Gulf of Mexico at its closest point and has experienced dozens of storms going back to the 1800s, although the hurricanes are often weakened to tropical storms by the time they cross Polk County. The table below lists hurricanes or tropical storm events with a storm track (center of the storm) that crossed the planning area, listed in order of the reported event date. Storm tracks are categorized according to the Saffir-Simpson wind intensity scale with the category assigned as the “peak magnitude” of the storm at some time during its lifespan and not necessarily when the storm track crossed the planning area.

Table 5-1: Hurricane/TS/D Storm Track Events Table

Storm Name	Year	Dates	Category
Unnamed	1871	June 9th	Tropical Storm (TS)
Unnamed	1882	Sep 15th	Tropical Storm (TS)
Unnamed	1891	Jul 6th	Hurricane
Unnamed	1941	Sep 24th	Hurricane
Unnamed	1949	Oct 4th	Hurricane
Barbara	1954	Jul 30th	Tropical Storm (TS)
Unnamed	1955	Aug 28th	Tropical Storm (TS)
Bertha	1957	Aug 10th	Tropical Storm (TS)
Gerda	1958	Sep 21st	Tropical Storm (TS)
Debra	1959	Jul 26th	Hurricane
Carmen	1974	Sep 9th	Hurricane
Claudette	1979	Jul 25th	Tropical Storm (TS)
Bonnie	1986	Jun 26th	Hurricane
Allison	1989	Jun 27th	Tropical Storm (TS)
Jerry	1989	Oct 16th	Hurricane
Imelda	2019	Sept 18th	Tropical Storm (TS)

The map below shows the historical tracks of hurricanes through the planning area from 1842 to 2022. The category assigned to each storm on the map is its magnitude at the time it crossed into Polk County. Based on data provided by NOAA's National Climatic Data Center (NCDC) and the

FEMA National Risk Index, Polk County's hurricane risk is moderate when compared to areas closer to the Gulf and Atlantic coasts of Texas and the United States.

Figure 5-1: Polk County Hurricane/TS/D Storm Tracks

Source: *National Climatic Data Center (NCDC), International Best Track Archive for Climate Stewardship (IBTrACS) dataset.*

Extent

For Hurricanes, the extent can be expressed separately for flood, wind, and surge. Flooding is examined in the next section, but storm surge is not an issue for Polk County since it is located so far from the coast. For hurricane wind extent, the Saffir-Simpson Hurricane Wind Scale (SSHWS) scale is the scientific scale most often used to measure hurricane winds. The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require preventative measures. Wind speeds range from 39-73 mph for Tropical Storms and Tropical Depressions have wind speeds equal to or less than 38 mph.

Table 5-2: Saffir Simpson Wind Scale

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roofs, shingles, vinyl siding, and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (Major)	111-129 mph	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be

		unavailable for several days to weeks after the storm passes.
4 (Major)	130-156 mph	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with the loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (Major)	157 mph or higher	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

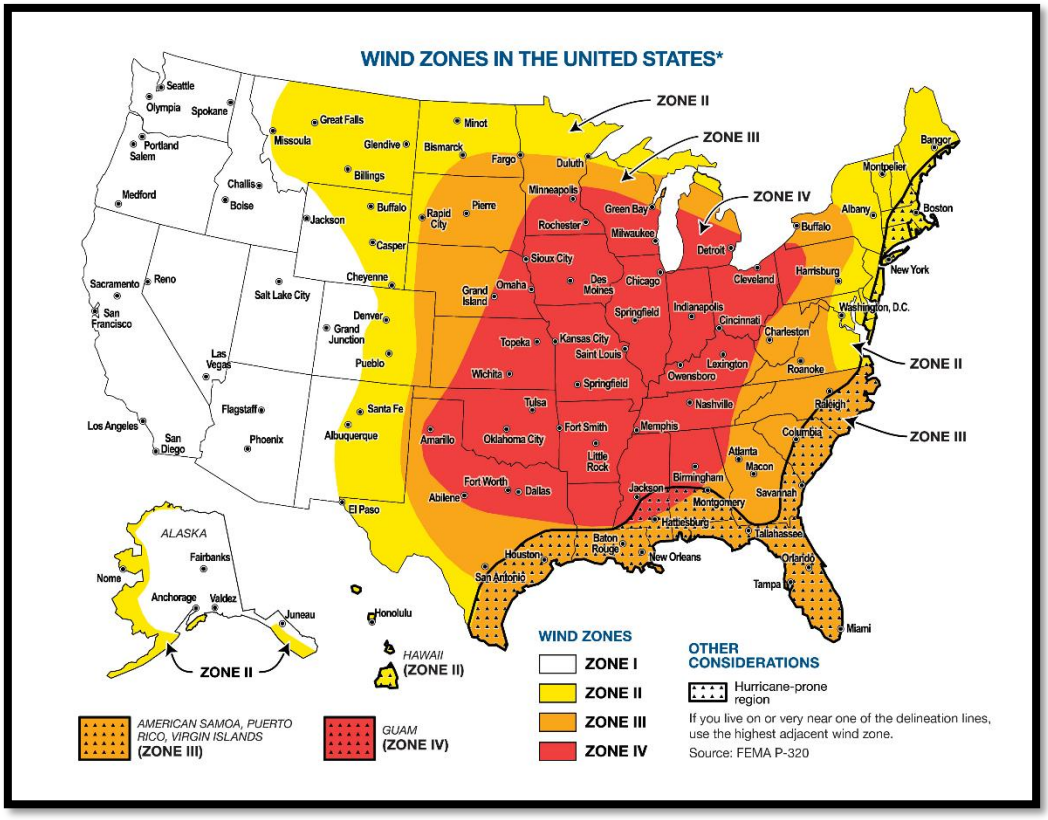


Figure 5-2: FEMA Wind Zone Map (www.FEMA.gov)

According to the FEMA Wind Zones Map used to determine building standards, Polk County is not in a hurricane-prone region. Based on the location and the historical storm tracks for hurricanes and tropical storms in the Polk County planning area, tropical storms are the key event to be mitigated.

Historical Occurrences

Hurricanes and Tropical Storms that had a direct path through the Polk County planning area, as well as tracks that went through adjacent counties yet still impacted the Polk County planning area, are identified in this section. Based on historical storm data provided by NOAA's National Climatic Data Center (NCDC), 67 Tropical Storm and Hurricane events have occurred in the planning area since 1842. Table 5-3 below lists the storms that have impacted the planning area. There have not been other historically significant storms that will be discussed below.

Table 5-3: Historical Hurricane/TS/D Impact Events Table, 1999-2024

Events	Magnitude	Injuries	Fatalities	Property Damage	Crop Damage
2	Hurricane	0	0	$123,000,000	$0
1	Tropical Storm	0	0	$3,260,000	$0

Significant Events

There have been multiple historically significant events impacting Polk County from 1999 through 2024: most notably Hurricane Rita (2005), Hurricane Ike (2008), Hurricane Harvey (2017), and Hurricane Beryl (2024) which are discussed further below.

Vulnerability and Impact

The proximity of Polk County to the Texas Coast makes this area very vulnerable to flooding from hurricane-brought rain and hurricane-force winds that cause damage across large areas. This exposes all buildings, facilities, and populations in the planning area equally to the impact of a hurricane or tropical storm. Damage to towers, trees, and underground utility lines from uprooted trees and fallen poles can cause damage to utility infrastructure, resulting in considerable disruption. Debris such as small items left outside, signs, roofing materials, and trees can become extremely hazardous in hurricanes and tropical storms and fierce winds can easily destroy poorly constructed buildings, barns, and mobile homes. Hurricanes and tropical storms also produce copious amounts of rain increasing the risk of flooding. This rain can overwhelm drainage systems as hurricanes and tropical storms that have weakened after making landfall can continue to drop significant quantities of water. The impacts on communities from a Category 5 storm can result in the complete destruction of houses, commercial property, and cropland. This would result in large-scale economic impacts and population displacement. Warning time for hurricanes, however, has lengthened due to modern early warning technology allowing the community time to reduce the impact of tropical storms and hurricanes.

Historic Hurricane Impacts

There have been four destructive hurricanes in Polk County over the past 25 Years: Hurricane Rita in 2005 and Hurricane Ike in 2008, Hurricane Harvey in 2017, and Hurricane Beryl in 2024

Hurricane Rita

polk3.gif (864×648) (weather.gov)

Hurricane Rita formed near the Bahamas and became a Category 5 Hurricane impacting the Caribbean but upon landfall along the Texas-Louisiana border, it was downgraded to a Category 3 Hurricane as it made landfall at Port Arthur and further weakened to a Category 1 Hurricane as it passed the Polk County area. Hurricane-force winds were experienced across Polk County, doing $3 million in damages, taking down trees and destroying homes and property. The hurricane-force winds caused a 1.5-foot storm surge and caused $20 million in damage to the Lake Livingston Dam.

Hurricane Ike

Hurricane Ike formed hundreds of miles west of Cape Verde and strengthened until reaching Cuba where it weakened to a Category 1 Hurricane but then restrengthened to a Category 2 Hurricane upon making landfall on Galveston Island and Port Bolivar. It continued North as a Category 2 Hurricane passing directly over Polk County and only weakened to a tropical storm West of Palestine Texas. Polk County experienced significant wind speeds which caused around $100 million in damages.

Hurricane Harvey

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PolkCountyToday.com

Hurricane Harvey formed a few hundred miles East of Barbados and stayed a tropical storm or depression as it moved through the Caribbean and across the Yucatan peninsula but rapidly strengthened to a Category 4 Hurricane as it made landfall in Port Aransas it slowly weakened while heading north to Smiley, Texas as a tropical depression when it was stalled and eventually reversed directions, and headed southwest before making landfall a second time just west of the Texas-Louisiana Border and heading northwest from Cameron, Louisiana. Polk County received a tremendous amount of rain, flooding many communities like Goodrich, parts of Livingston, the Holiday Lake Estates, and the Taylor Lake Estates. Polk County first responders made a major recovery effort to rescue community members stranded and isolated by the floodwaters.

Hurricane Beryl

Hurricane Beryl formed in the Atlantic Ocean and traveled through the Caribbean, reaching a maximum strength of Category 5 in the Eastern Caribbean Sea, before it weakened moving across the Yucatan Peninsula but subsequently strengthened to a Category 1 Hurricane as it made landfall near Matagorda, Texas before moving Northeast of Houston with winds between 45 and 70 mph. Anticipating significant impacts on Polk County, given the community had not finished recovering from the April 2024 Floods, Polk County OEM issued a local Declaration of Disaster to prepare what would be for Tropical Storm Beryl by the time it reached Polk County. Some residents were not able to receive updates on resources available to them such as cooling centers as Polk County recovered from tropical Storm Beryl and the associated power outages.

Vulnerability

The Polk County planning area features mobile and manufactured home parks which are more vulnerable to hurricane winds than site-built structures. In addition, manufactured and temporary housing is located sporadically throughout rural portions of the planning area which are also vulnerable to the hurricane hazard, but more prone to being isolated from essential needs and emergency services in the event of a disaster. Based on 2022 American Community Survey (ACS) estimates, there are 25,087 housing units in Polk County of which 22%, or 5,681 units, are mobile or manufactured homes. In addition, 9,805 (39%) of the housing units in the overall planning area were built before 1980. These structures are likely to have been built to less stringent standards than newer construction; therefore, they may be more susceptible to damage during significant events.

Table 5-4. Structures at Greater Risk by Jurisdiction

Jurisdictions	Total Housing Units	Mobile Housing Units	Housing Built Before 1980
Polk County*	25,087	5,681 (22 %)	9805 (39 %)
City of Livingston	861	94 (11 %)	462 (54 %)
City of Onalaska	1674	878 (22 %)	501(33 %)
City of Corrigan	885	112 (12.6 %)	584(64 %)
City of Goodrich	168	43 (25.6 %)	106 (63 %)
City of Seven Oaks	77	9 (11.7%)	57 (74%)

*County totals include all jurisdictions, ISDs, and unincorporated areas.

Source: 2022 American Community Survey 5-year estimate, selected housing characteristics

Based on the ACS 2022 data, the communities of Corrigan, Goodrich, and Seven Oaks are at higher risk of damage from hurricanes when considering the age of residential structures and the higher standard of building codes enacted after 1980. Onalaska and Goodrich are at a higher risk of damage from hurricanes when considering the number and ratio of manufactured homes.

Probability of Future Events

The probability of future events relies on measuring the number of previous occurrences of a hurricane or tropical storm event over the 180-year reporting period. Based on 67 occurrences of a hurricane or tropical storm in the planning area during this time, it is forecast that such a storm event will happen approximately once every 2 years. This frequency provides an unlikely probability that a hurricane or tropical storm will impact some portion of the planning area.

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

SECTION 6: FLOOD

Description

Floods are defined as the accumulation of water within a water body and the overflow of excess water into adjacent floodplain lands. When surface water runoff enters streams, rivers, or dry creek beds, riverine flooding conditions occur whenever the water carrying capacity of the water channel is compromised by excess runoff. Types of flooding include riverine flooding, coastal flooding, and shallow flooding. If the local basin drainage area is relatively flat, then slow-moving floodwater can last for days. In drainage areas with substantial slopes, or the channel is narrow and confined, rapidly moving and extremely high-water conditions, called a flash flood, can occur.

Common impacts of flooding include damage to personal property, buildings, and infrastructure; bridge and road closures; service disruptions; and injuries and fatalities. In this report, historical damage from flooding is reported here and in Chapter 1 (along with other hurricane-related damages).

Location

The Flood Damage Prevention Ordinance renewed in 2019 by Polk County uses the Digital Flood Insurance Rate Map (DFIRM) data provided by FEMA for Polk County, which delineates the

Special Flood Hazard Areas (SFHAs) as those at the highest risk of flooding. The DFIRM, however, only contains Zone A Designation. FEMA has recently released Estimated Base Flood Elevation data which updated floodplain area zones for Polk County and identifies .2% or a 500-Year floodplain in Polk County. Though not officially adopted, it is important to plan with the most accurate and future-looking flood hazard data.

Jurisdiction	Floodplain Type	Percent of Community Area	Total Percent in Floodplain
Corrigan	1% Annual	34.3%	37.8%
	.2% Annual	3.5%	
Goodrich	1% Annual	21.8%	30.8%
	.2% Annual	9.0%	
Seven Oaks	1% Annual	22.4%	24.3%
	.2% Annual	1.9%	
Livingston	1% Annual	21.7%	23.6%
	.2% Annual	1.9%	
Onalaska	1% Annual	8.1%	9.6%
	.2% Annual	1.5%	

Data Layer: FEMA's Estimated Base Flood Elevation (BFE) Viewer (usgs.gov) Analysis in ArcGIS Pro

We can see that the flood hazard is the most geographically extensive in the City of Corrigan, with 37.8% of the city boundaries being either the 100-year or 500-year floodplain. Goodrich at 30.8% with a much smaller population still has nearly one-third of their city area lying in the 100-year or 500-year floodplain as well. The cities with the largest populations, Onalaska has the smallest percentage of floodplain out of the communities in Polk County, at only 10% whereas Livingston and Seven Oaks have nearly ¼ of their municipal area covered by floodplains. Given the higher population density of Onalaska and Livingston, despite having the lowest percentage of city areas exposed to flood hazards, there may still be more lives at risk from flooding.

Figure 6-1: Polk County Floodplain Map

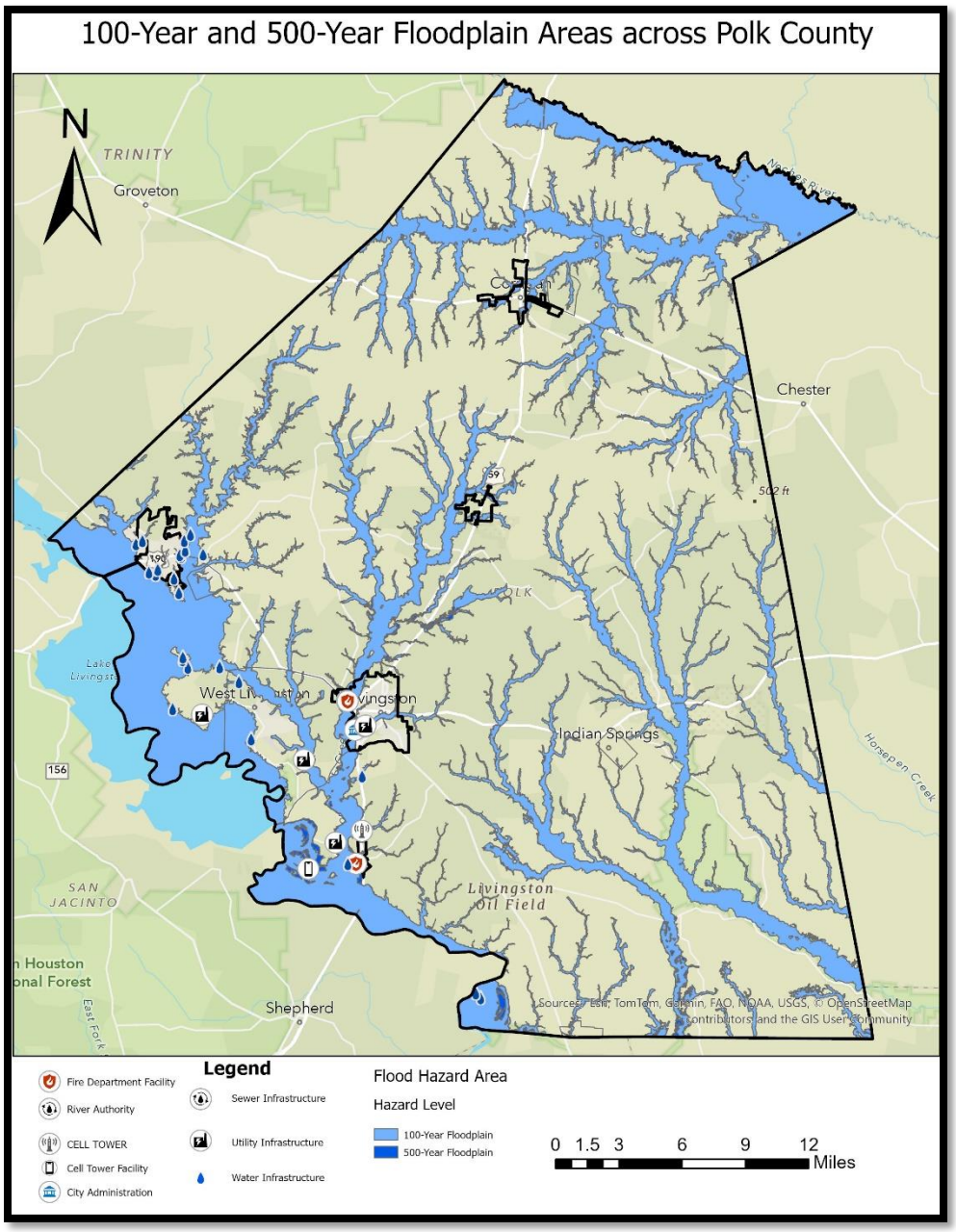


Figure 6-2: City of Livingston City Floodplain Map

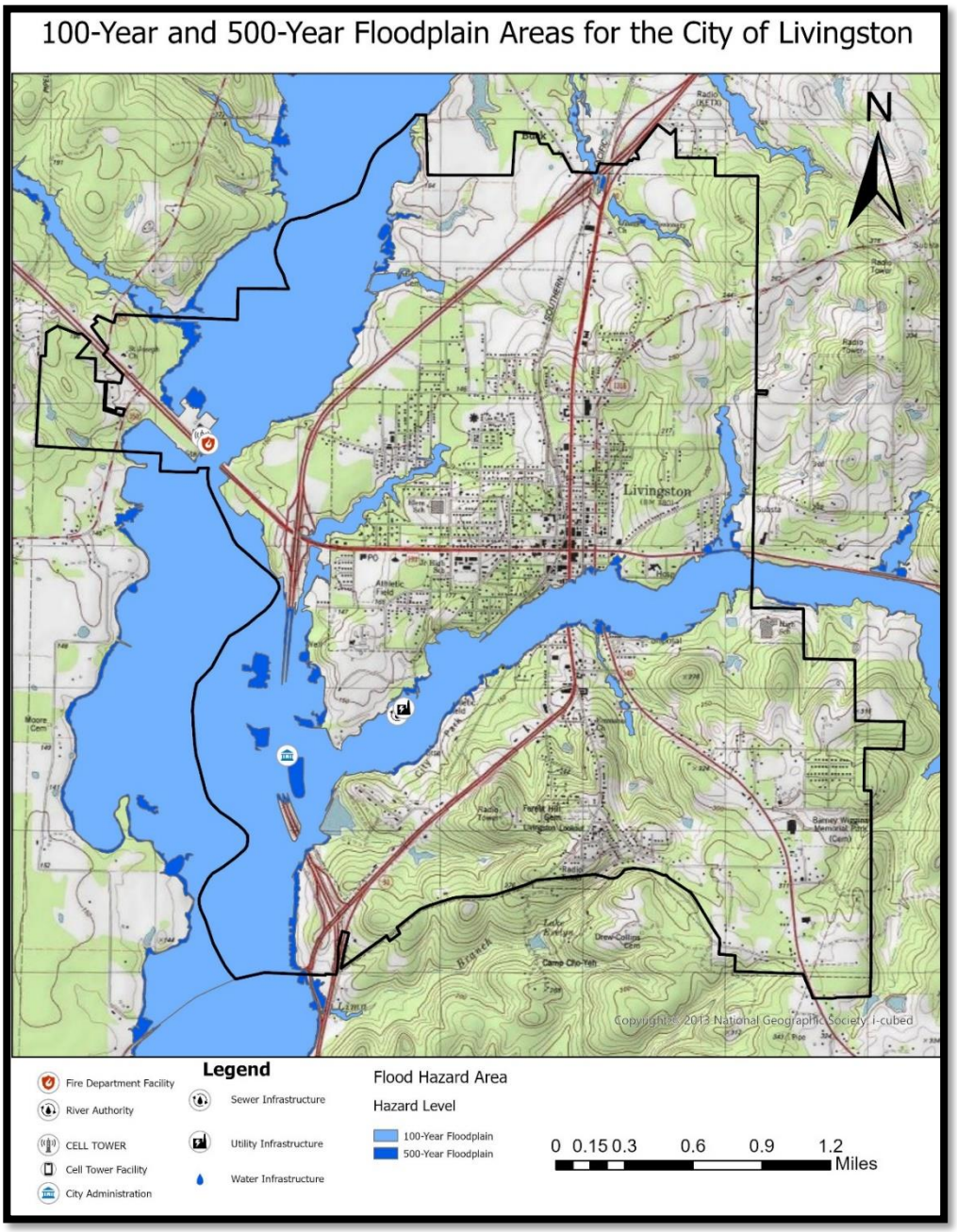


Figure 6-3: City of Onalaska Floodplain Map

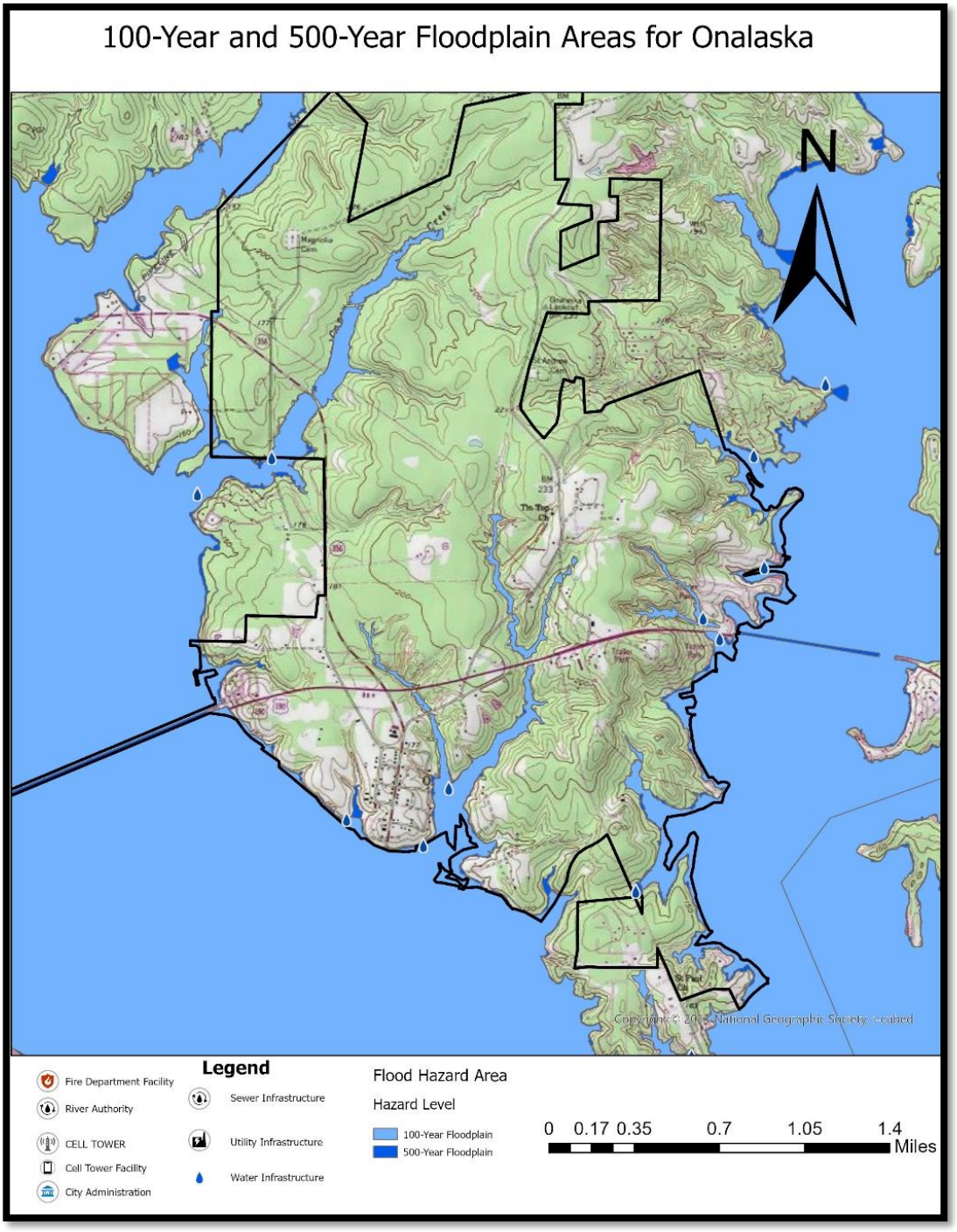


Figure- 6-4: City of Corrigan Floodplain Map

100-Year and 500-Year Floodplain Areas for Corrigan

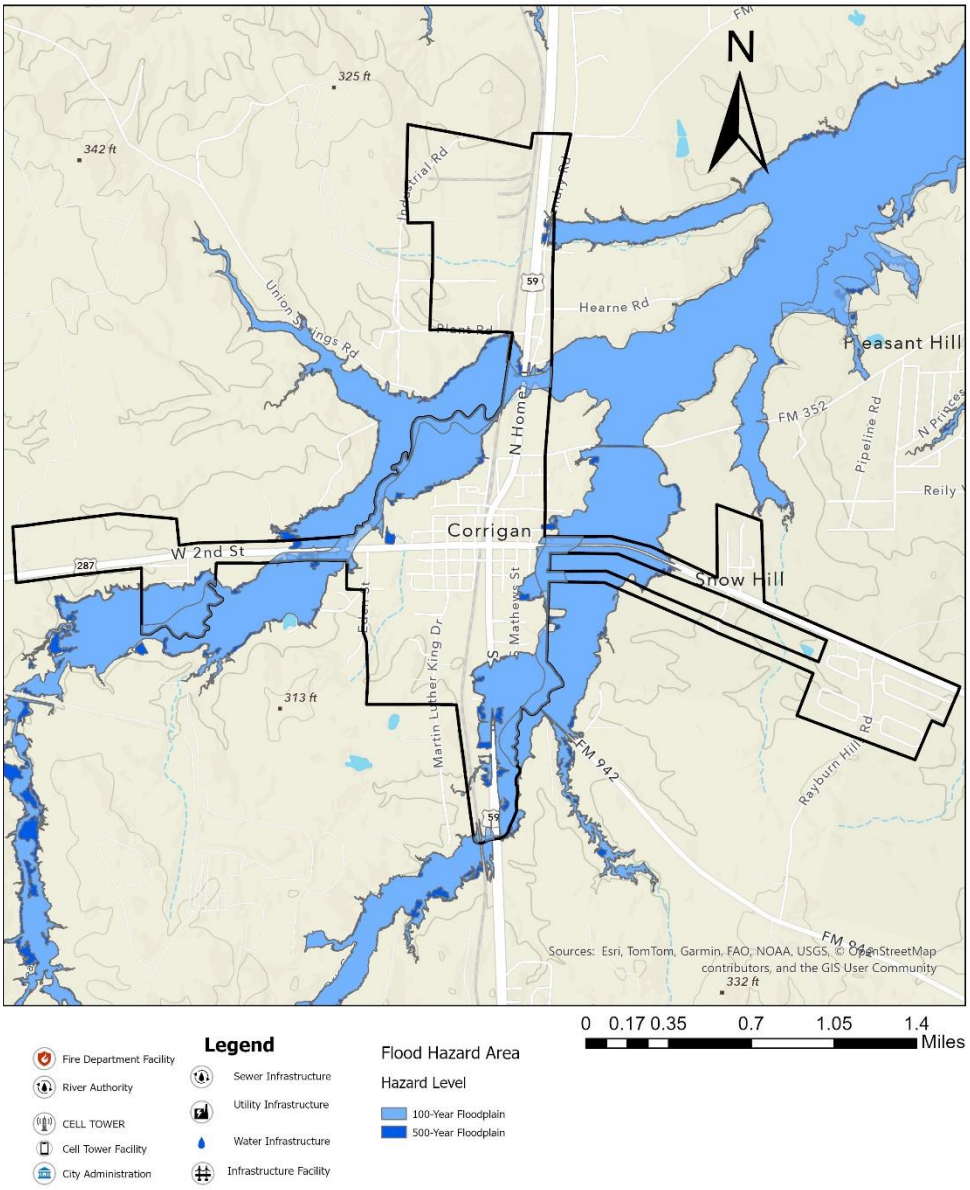


Figure 6-5: City of Seven Oaks Floodplain Map

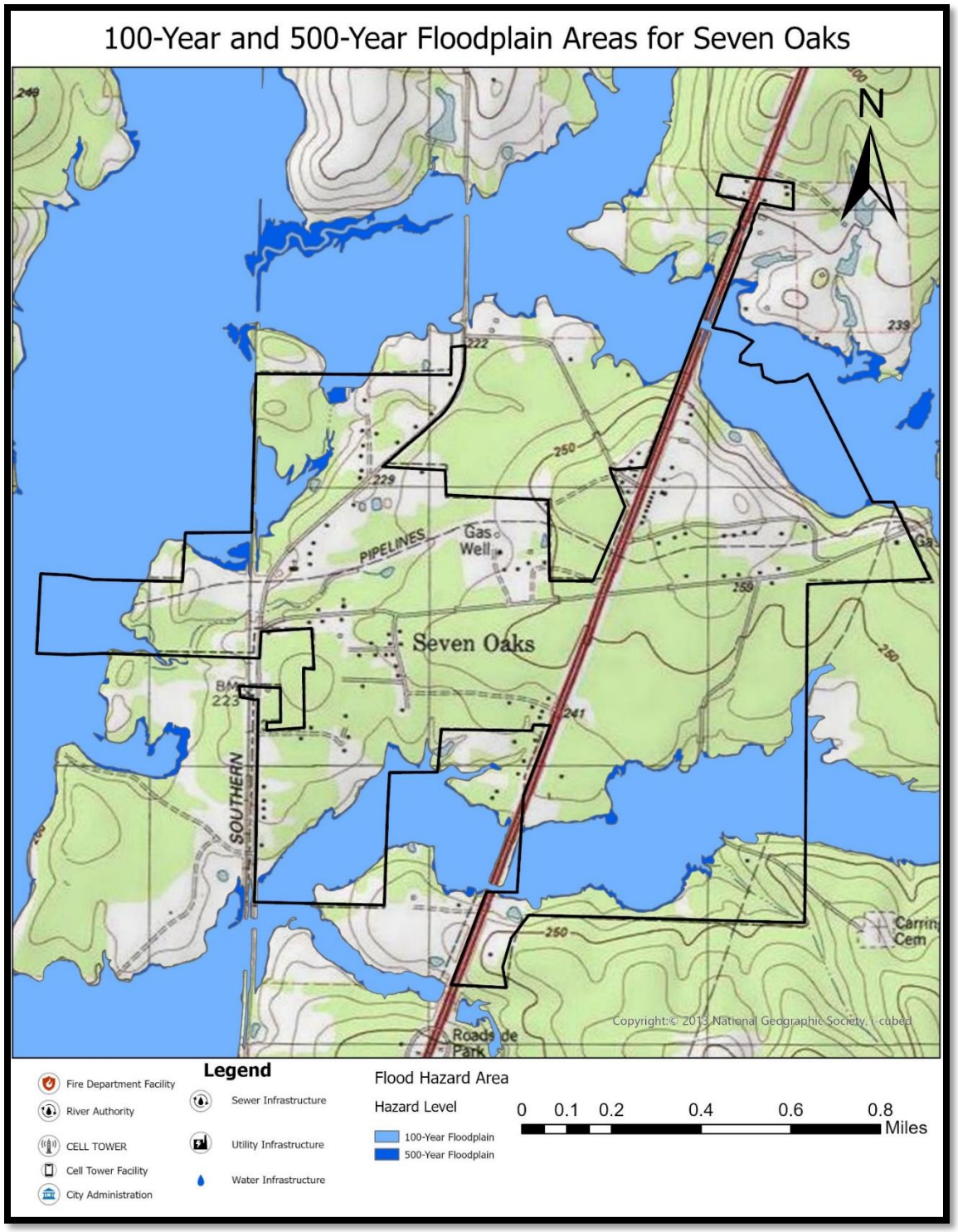
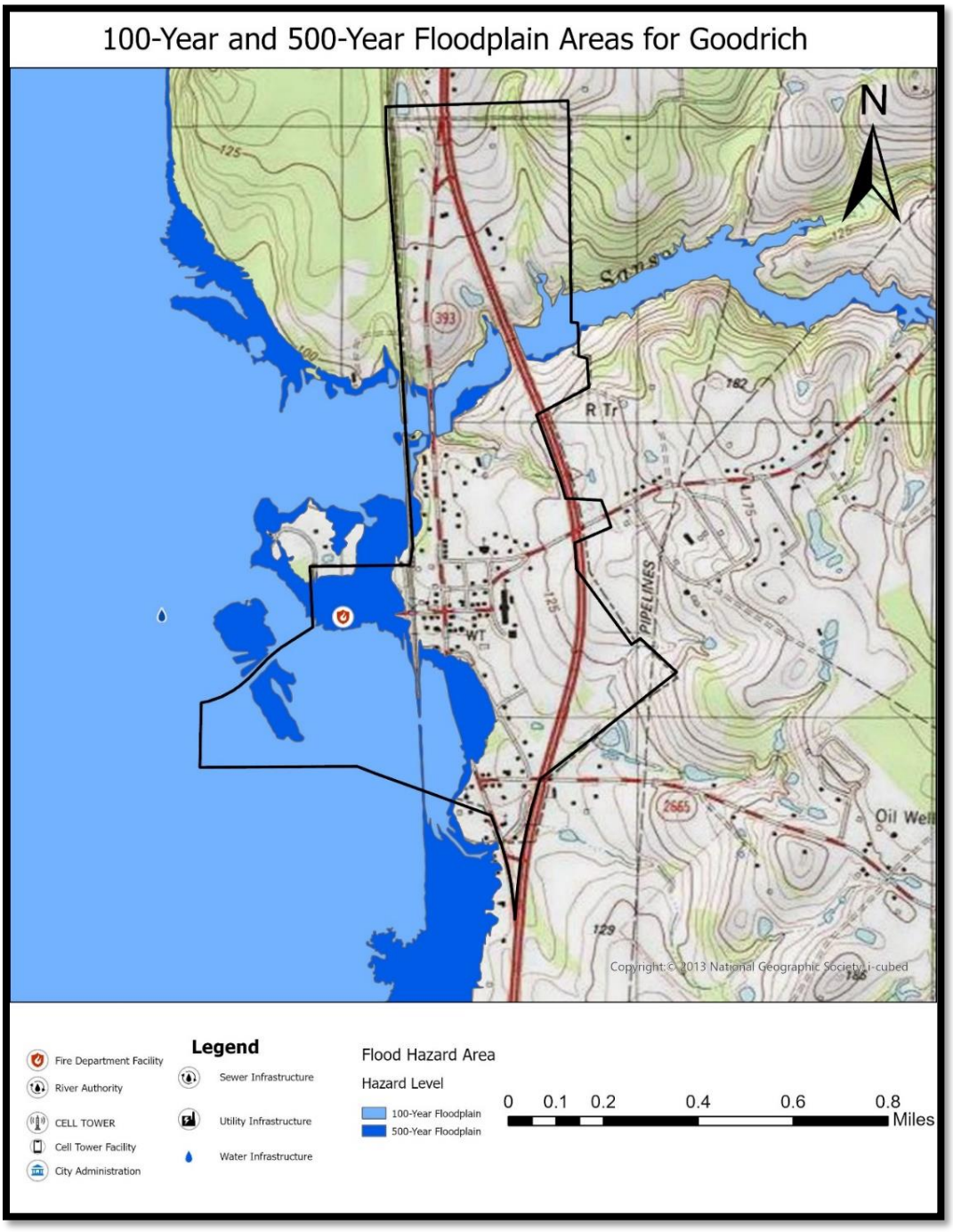


Figure 6-6: City of Goodrich Floodplain Map



Extent

Flood event severity is a complex science studied by hydrologists and engineers. The severity of a flood event is established by a combination of several factors including stream and river basin topography and physiography, precipitation, weather patterns, recent soil moisture conditions, and degree of vegetative clearing and impervious surface. Urbanization, due to its relationship to increased impervious cover, contributes to flood severity. Based on historical occurrences, floods events can last anywhere from a couple of hours to several days.

A flood zone provides a measure of a flood's intensity and magnitude. A base flood is defined by FEMA as a flood having a one percent chance of being equaled or exceeded in any given year. It is also known as the "100-year flood" or the "1% annual chance event". The base flood is the national standard used by the National Flood Insurance Program. Flood zones are delineated on Flood Insurance Rate Maps, and the depths of flooding can be interpreted from the summary data and profiles in the Flood Insurance Study. Flood depths may range from less than one foot to more than five feet in places, depending on the severity of the event (as measured in annual chance exceedance). Table 6-1 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 planning area and determine the intensity of a potential flood event.

Table 6-1: FEMA Flood Zone Categories

Floodway	A "Regulatory Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure that there are no increases in upstream flood elevations. For streams and other watercourses where FEMA has provided Base Flood Elevations (BFEs), but no floodway has been designated, the community must review floodplain development on a case-by-case basis to ensure that increases in water surface elevations do not occur or identify the need to adopt a floodway if adequate information is available.
Zone A	Areas with a 1% annual chance of flooding and a 26% 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 AE	Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.
Zone AO	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply.
0.2 SFHA	These are the areas that have a 0.2 percent chance of being equaled or exceeded in any given year.
Zone X	The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood, are Zone X.

Historical Occurrence

Historical evidence indicates that areas within the planning area are susceptible to flooding, especially in the form of flash flooding. It is important to note that only reported flood events 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 6-2 identifies historical flood events that resulted in damage, injuries, or fatalities within the planning area. Historical Data is provided by the Storm Prediction Center (NOAA), NCEI database for Polk County. There have not been any events recorded past the listed dates.

Table 6-2: Historical Flood Events, 1999-2024

Location	Date	Time	Deaths	Injury	Property Damage	Crop Damage
Countywide	3/13/1999	2:30AM	0	0	$0	$0
Countywide	3/13/1999	2:45 AM	0	0	$100,000	$0
Countywide	4/3/1999	6:00 PM	0	0	$25,000	$0

Countywide	4/3/1999	8:45 PM	0	0	$150,000	$0
Countywide	6/25/1999	7:45 AM	0	0	$25,000	$0
Countywide	6/25/1999	3:30 PM	0	0	$25,000	$0
Corrigan	11/6/2000	12:30 AM	0	0	$25,000	$0
North Portion	6/8/2001	6:00 AM	0	0	$0	$0
Countywide	11/4/2002	5:30 PM	0	0	$20,000	$0
Livingston	5/1/2004	8:30 AM	0	0	$500,000	$0
Livingston	5/1/2004	12:00 PM	0	0	$100,000	$0
Corrigan	5/13/2004	11:00 AM	0	0	$6,000	$0
Corrigan	10/24/2004	6:00 AM	0	0	$0	$0
Moscow	11/17/2004	6:30 PM	0	0	$0	$0
Dallardsville	7/26/2006	5:15 PM	0	0	$4,000	$0
Livingston	10/16/2006	8:45 AM	0	0	$50,000	$0
Goodrich	10/19/2006	1:00 AM	0	0	$24,000	$0
Corrigan	1/14/2007	2:00 AM	0	0	$0	$0
Moscow	5/3/2009	10:00 AM	0	0	$1000	$0
Moscow	5/3/2009	10:20 AM	0	0	$1000	$0
Barnes	5/3/2009	10:30 AM	0	0	$1000	$0
Onalaska	5/3/2009	10:45 AM	0	0	$1000	$0
Onalaska	10/29/2009	5:30 PM	0	0	$0	$0
Goodrich	2/3/2012	6:00 AM	0	0	$10,000	$50,000
Moscow	9/29/2013	9:30 AM	0	0	$0	$0
Barnes	10/31/2013	6:30 AM	0	0	$10,000	$0
Kickapoo	5/27/2015	4:00 AM	0	0	$0	$0
Blanchard	4/30/2016	5:00 AM	0	0	$0	$0

Corrigan	4/30/2016	6:00 AM	0	0	$0	$0
Goodrich	5/27/2016	5:00 AM	0	0	$500,000	$0
Onalaska	8/26/2017	12:15 AM	0	0	300,000,000	$0
Livingston	1/23/2024	9:45 PM	0	0	$0	$0

Significant Events

May 2016 Floods

In late May of 2016, Goodrich, and southern Polk County experienced flash flooding after a significant amount of rain from intense thunderstorms damaged 5 structures in Goodrich, in addition to roads in Corrigan and Eastern Polk County, totaling $500,00 in damages.

Hurricane Harvey, August 26, 2017

Harvey made landfall as a category four hurricane near Rockport, Texas during the evening of August 25th. The storm then weakened to a tropical storm and slowed, looping back and tracking over SE Texas then back over the Gulf of Mexico making a second landfall along the Louisiana coast during the early morning hours of August 30th. Slow-moving Hurricane Harvey produced very heavy rainfall and flooding over portions of Polk County. Major lowland flooding occurred near the Trinity River and areas upstream of Lake Livingston. There was high floodwater on roads FM 3126 and FM 356 along the eastern shore of Lake Livingston. The lowest homes and businesses in Onalaska are within close vicinity of the lake, Trinity River, and Long King Creek, which were flooded. Roads along the southern end of Lake Livingston such as FM 3278 were inaccessible, FM 3126, and W FM 1988 near Long King Creek were flooded. Major lowland flooding occurred on the Trinity River near Goodrich. A local state of disaster was declared by Polk County Judge Sydney Murphy prior to landfall in anticipation of Polk County needing state resources and assistance.

October 2018 - Trinity River Flooding

In mid-October 2018, the Polk County Office of Emergency Management issued a local disaster declaration in anticipation of quickly rising floodwaters and increased discharge from the Lake Livingston Dam. Route 66 near Taylor Lake Estates was flooded.

April 2024 – Floods

On the evening of April 28th through the 29th, Polk County received a tremendous amount of rain and experienced major flash flooding. Major roads including Highway 287 and Highway 59 were shut down by the floodwaters. Due to the significant amount of rainfall Polk County experienced, the Lake Livingston Dam had to increase its discharge significantly and the Polk County Office of Emergency Management issued a mandatory evacuation order for those living downhill from the dam and along the Trinity River. Emergency communications for Polk County OEM were shut down by the storms and the Dunbar Gym was opened as a shelter.

Probability of Future Events

FEMA states that flooding is the most common natural disaster in the United States, affecting every region and every state. Based on recorded historical occurrences and extent within the Polk planning area, 32 recorded flooding events in the 25-year reporting period provide a probability of occurrence of at least one event per year. This frequency supports a highly likely probability of future events, meaning that an event is probable in the next year.

Table 6-3: Frequency of Occurrence for Future Flood Events

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

Vulnerability and Impact

The flood hazard areas throughout Polk County are subject to periodic inundation, which may result in loss of life and property, reduction in health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief, all of which adversely affect public safety. Riverine Flooding has killed and injured more people than any other weather-related hazard and the greatest number of deaths is due to people driving into water going over roads. For this study, the location and proximity to the floodplain

or SFHA determines a property's vulnerability to a flood. Structures that lie along the banks of a waterway are the most vulnerable and are often repetitive loss structures. Future development is encouraged to be outside of the floodplain, although there are some critical facilities, homes, and businesses already located in the floodplain due to their development before current floodplain regulations.

Table 6-4: Critical Facilities in the 1% or 0.2% Annual Chance Floodplain by Jurisdiction

Jurisdiction	Critical Facilities
Polk County	7 Lift Stations, 4 Water Wells, 1 Transportation Infrastructure Facility, 1 Utility Facility, and 1 Sewage Plant
City of Livingston	1 Utility Facility, 1 Fire Training Facility, 1 Cell Tower
City of Onalaska	4 Lift Stations
City of Corrigan	None
City of Seven Oaks	None
City of Goodrich	1 Fire Department Facility
Alabama-Coushatta Reservation	1 Communication Tower

Flood losses are exacerbated by the cumulative effect of obstructions in floodplains. Occupancy of flood hazard areas is especially hazardous when development is inadequately elevated, flood-proofed, or otherwise protected from flood damage. Moreover, increased development in floodplains can increase flood heights and velocities making flooding more intense and widespread than predicted. Mitigation actions are included to address flood maintenance issues as well (Section 15), such as routinely clearing debris from roadside ditches and bridges. Expanding drainage culverts and stormwater structures to convey flood waters more adequately is critical to flood mitigation as well. Table 6-5 below shows Polk County dollar losses from January 1999 through March 2024.

Table 6-5: Polk County Impact from Flooding

Time Period	Deaths	Injuries	Property Damage	Crop Damage
Loss Summary, Polk County				

24-year Total	0	0	$301,578,000	$50,000
Per Year	0	0	$12,565,750	$2,083
Per Capita Dollar Losses (2023 Pop.)				
24-year Total	0	0	$5967	$1
Per Year	0	0	$248	4 ¢

Table 6-6 below distributes the countywide impacts presented previously in tables 6-3 amongst the various participating jurisdictions based on ratios of population and total area.

Table 6-6: Flood Losses by Jurisdiction 1999-2024

Jurisdiction	Est. Prop. Losses	Est. Crop Losses	Total Est. Losses
Polk County*	$362,000	$0	$362,000
Livingston	$650,000	$0	$650,000
Onalaska	$300,001,000	$0	$300,001,000
Corrigan	$31,000	$0	$31,000
Goodrich	$534,000	$50,000	$584,000
Seven Oaks	$0	$0	$0
Total Losses	$301,578,000	$50,000	$301,628,000

National Flood Insurance Program (NFIP) Participation

Polk County in addition to all the municipal governments: Livingston, Onalaska, Goodrich, Corrigan, and Seven Oaks are participants in the National Flood Insurance Program. The NFIP protects businesses and homeowners from devastating losses in the event of a flood hazard. 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 Polk County participate in CRS. It is the purpose of all NFIP jurisdictions participating in the Hazard Mitigation plan to continue to promote public health,

safety, and general welfare by minimizing public and private losses due to flood conditions in specific areas. These communities are guided by their local Floodplain Management Ordinance. They will continue to comply with NFIP requirements through their local permitting, inspection, and record-keeping requirements for new and substantially developed construction. The NFIP participating jurisdictions each have a floodplain manager; the city manager serves this role for the cities, and the emergency management coordinator serves this role for the counties.

Table 6-5: Repetitive Loss and Severe Repetitive Loss Properties

Jurisdiction	Number of Structures	Number of Losses
Polk County	14	55
City of Livingston	12	29
City of Corrigan	1	5
City of Onalaska	0	0
City of Goodrich	0	0
City of Seven Oaks	0	0
Total	27	89

There are 27 repetitive loss structures and eighty-nine severe repetitive loss properties as defined by the NFIP within the Polk County planning area.

SECTION 7: DROUGHT

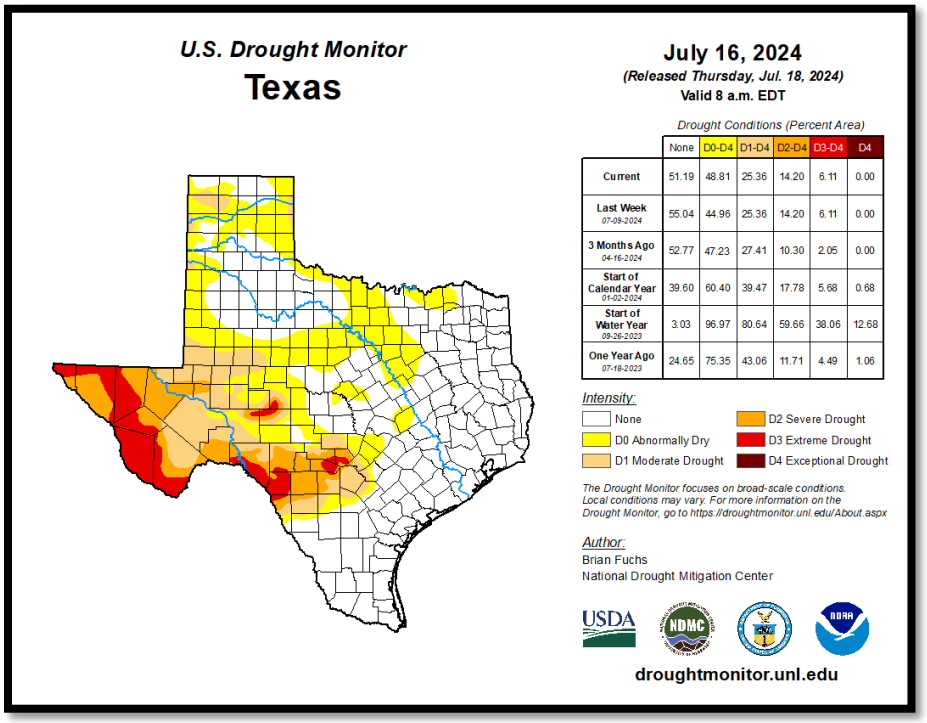
Description

Drought is a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. Droughts are defined as a moisture deficit at a magnitude high enough to have social, environmental, or economic effects and can become very prolonged and persist from one year to the next. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality. The Texas Hazard Mitigation Plan describes the climate of 2/3 of Texas Counties as arid or semi-arid with these Counties almost always in varying stages of drought.

Location

Droughts vary greatly in their intensity and duration and can occur regularly throughout Polk County, including all participating jurisdictions, equally. Drought is monitored nationwide by the National Drought Mitigation Center (NDMC) which provides the Drought Monitor map in Figure 7-1 showing the entirety of the planning area currently experiencing extreme drought (D3) conditions or exceptional drought (D4). The planning area has experienced exceptional drought conditions within the last fifteen years, particularly during the drought of summer 2011 when the entire state of Texas was in some level of drought (Figure 7.2).

Figure 7-1: US Drought Monitor, July 16th, 2024



Extent

The Palmer Drought Severity Index (PDSI) is based on precipitation and temperature and is used to measure the extent of drought. The index measures the moisture supply of the environment. The PDSI classifications vary roughly between -4.0 and +4.0 ranging from extremely dry to extremely wet periods. NOAA's United States Drought Monitor (USDM) Categories range from D0 to D4 according to the intensity of drought, and are based on several indicators, including the PDSI, and are used to describe broad-scale drought conditions across the United States.

Table 7-1 describes the basic PDSI classification descriptions and depicts the magnitude of drought with descriptions of possible impacts.

http://drought.unl.edu/whatis/indices.htm

Table 7-1: Drought Severity Classification

Category	Description	Possible Impacts	Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Going into drought: short-term dryness slows planting, growth of crops or pastures. Coming out of drought: some lingering water deficits pastures or crops not fully recovered	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30

D1	Moderate Drought	Some damage to crops, pastures Streams, reservoirs, or wells low, some water shortages developing, or imminent Voluntary water-use restrictions requested	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	Crop or pasture losses are likely. Water shortages common Water restrictions imposed	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	Major crop/pasture losses Widespread water shortages or restrictions	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses Shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

Based on the extent and location for historic and current drought conditions, the Polk County planning area can anticipate a range of drought from abnormally dry to exceptional, or D0 to D4 based on the USDM Drought Intensity Category.

The Keetch-Byram Drought Index is used by the Texas Forest Service to determine the fire potential based on daily water balance, precipitation, and soil moisture. Figure 7-3 shows the Keetch-Byram Drought Index rating classification for all of Texas and color-coded by County with a scale of 0 to 800 (low risk to high risk). Polk County is mostly in the 0-200 risk category with some smaller areas scoring between 200 to 400 at the time this report was written. The Keetch-Byram Drought Index is also discussed in relation to wildfires in section 13.

Figure 7-3: Keetch-Byram Drought Index

Figure 7-3: Keetch-Byram Drought Index

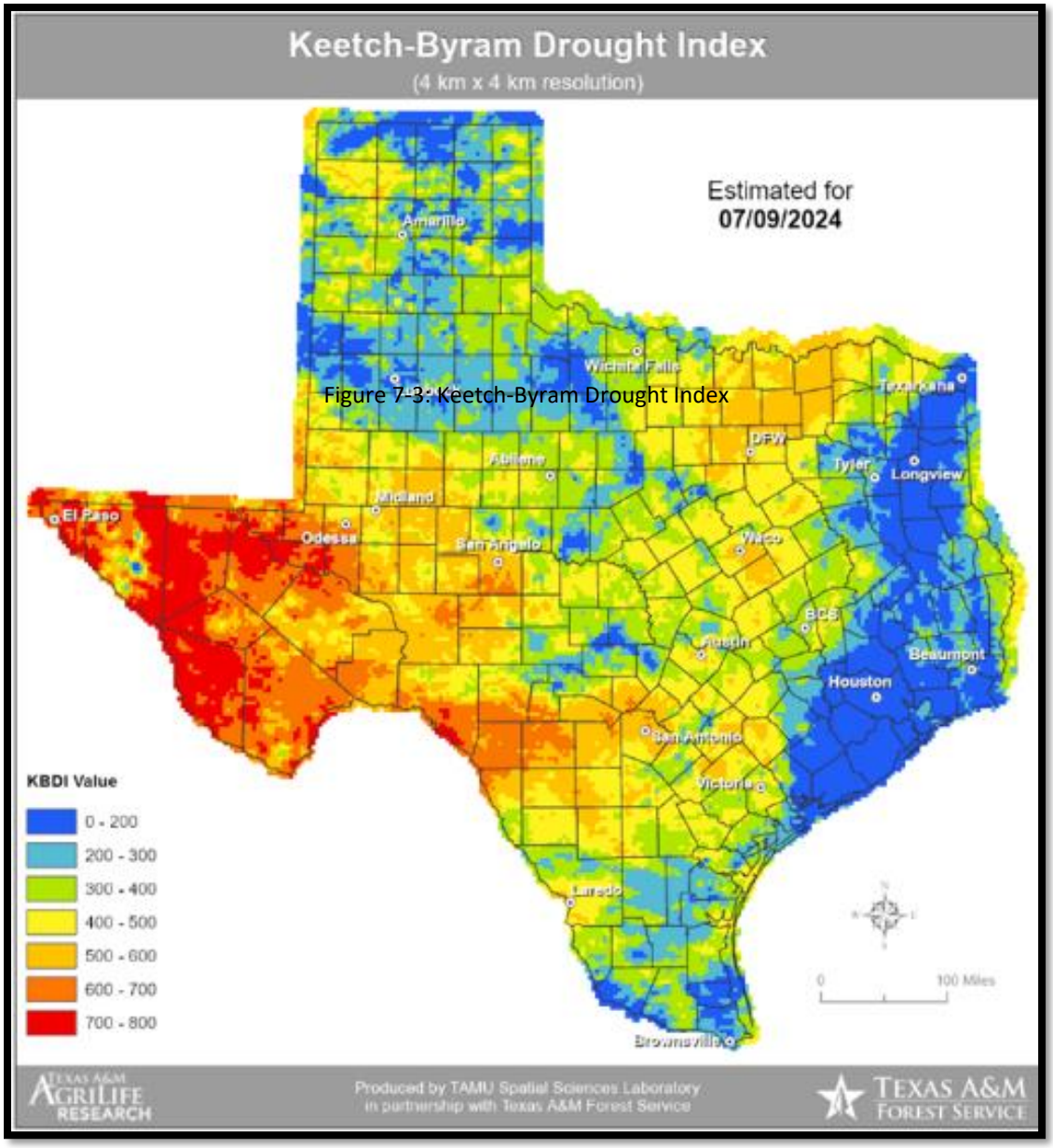


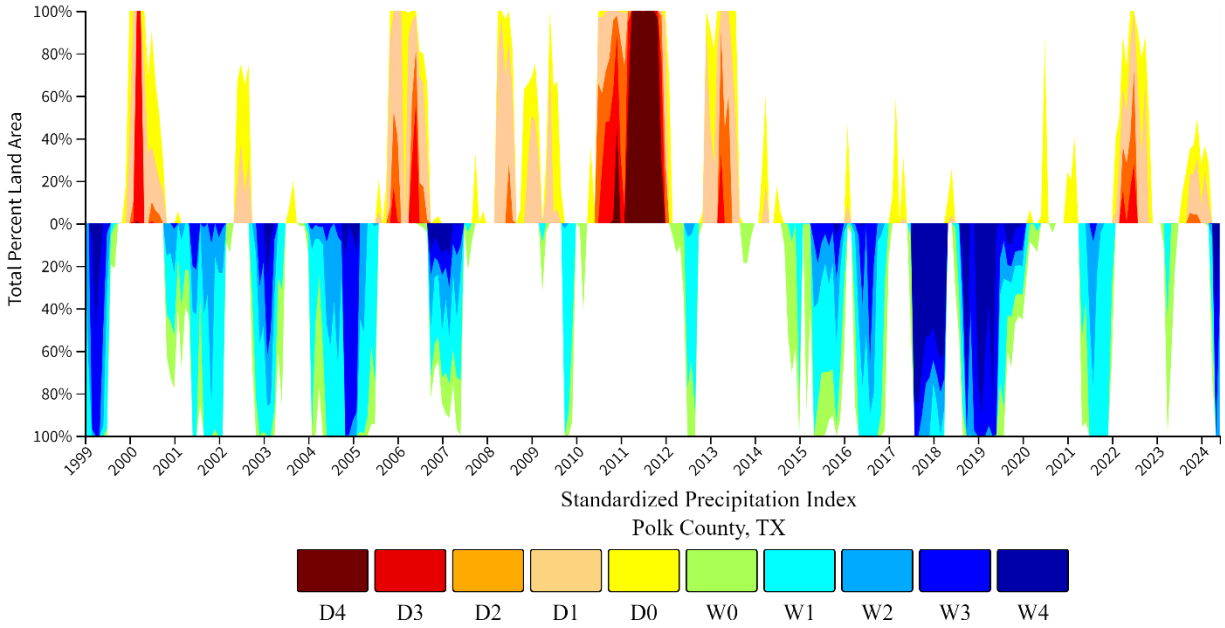
Figure 7-3: Keetch-Byram Drought Index

Historical Occurrences

Polk County has experienced two significant periods of extreme drought in the past. It is difficult to identify the start of prolonged droughts since they develop over an extended period. The

hydrological impacts of drought such as depleted reservoir and groundwater levels take longer still to develop.

Figure 7-4: Drought Index Timeline from 1999-2024



Significant Events

2006 Drought, Statewide

This drought resulted in over $4.1 billion in agricultural losses statewide.

February 2011 –February 2012, Statewide

The drought of 2011 in South Central Texas was the most severe one-year drought ever for Texas. Agricultural losses in the state due to the 2011 drought reached over $7 billion and threatened community safety by increasing wildfire risk and weakening the power grid. Polk County experienced drier-than-average conditions starting in 2008 and extending to 2013, with only two short durations of wetter weather conditions in the Winter of 2009 and Summer of 2012.

2022, Statewide

In 2022, 89% of the State of Texas was either experiencing an exceptional or extreme drought with an additional 8% of the state of Texas experiencing less extreme drought conditions. For

almost all of 2022, a significant portion was experiencing moderate drought conditions, with the worst drought conditions occurring in March through August.

The data used to assess the historical experience with drought for the planning area came from the NOAA's NCEI National Storms Database. This database contains extensive and authoritative information for weather-related events in the country from 1999 through 2024 (25 years). Agricultural producers such as farmers and ranchers purchase crop insurance to protect their yield in a natural disaster such as drought, hail, or flood. Historical crop damages are typically not found in the public record and are likely much higher than quantified by NCEI data due to agricultural losses being a transaction between the agricultural landowner and insurance policy holder. Furthermore, the extent of crop loss due to drought is difficult to quantify because a drought during a growing season can impact the next two years of crop production. Table 7-2 lists historical events that have occurred in Polk County as reported in the NCEI. There have not been any events recorded past the listed dates.

Table 7-2: Historical Occurrences of Drought in Polk County (1999-2024)

Date Range	Direct Injuries	Direct Fatalities	Property Damage	Crop Damage
August 1st-31st, 2000	0	0	0	0
September 1st – September 30th, 2000	0	0	0	0
June 14th, 2022 – June 30th, 2022	0	0	0	0
July 19th, 2022 – July 31st, 2022	0	0	0	0
August 1st – August 23rd, 2022	0	0	0	0
September 1st – September 30th, 2023	0	0	0	0
October 1st – October 31st, 2023	0	0	0	0

Data provided by the NOAA drought monitor also provides a perspective of historical occurrences of drought in the planning area by summarizing the percent of area in each drought category

weekly. The table below provides a summary of the number of weeks in each drought category or the magnitude of the drought that describes the drought condition for the majority of the county for each weekly period from January 4, 2000, to July 7, 2024. This nearly 24-year window of drought data provides a clear picture as to how often the occurrence of different drought categories can be expected in the future.

Table 7-3: Historical Drought Magnitude

Drought Category	Description	Polk County	
None	Normal to Wet Conditions	896	10%
D0	Abnormally Dry	623	19%
D1	Moderate Drought	419	13%
D2	Severe Drought	178	11%
D3	Extreme Drought	81	7%
D4	Exceptional Drought	52	40%
Total		1,202	100%

Probability of Future Events

Based on available records of historic events from NCEI, there have been seven (7) time periods of drought within a 25-year reporting period. This provides a probability of occurrence of one event every one to two years. Based on the drought monitor data for a 24-year reporting period, the planning area is in severe to exceptional drought approximately 58% of the time. This frequency supports a **likely** probability of future events occurring within the Polk County planning area which means that an event is probable in the next three years.

Frequency of Occurrence
Highly likely: Event probable in the next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in the next 10 years.

Vulnerability and Impact

Drought affects large areas creating vulnerability for people, animals, property, agriculture, and the environment. Over the entirety of the planning area the biggest impacts of drought are dead crops and grazing land, edible plants for animals, and even trees. This primarily affects farming and wildlife, but people can be directly impacted as well due to shortages of potable water supply. Communities will also ration the use of water during prolonged drought, particularly for lawn care, swimming pools, and irrigation. Drought is related to, and can exacerbate, the natural hazards of wildfires and extreme heat. Drought can contribute to the cause of wildfires due to dying vegetation serving as ignition fuel and can be intensified by extreme heat. The impacts of drought mostly affect water shortages and crop/livestock losses and do not typically extend to buildings and critical facilities.

The entire population of Polk County is vulnerable to water supply shortages which present widespread health risks since people can only survive a few days without water. Potable water is used for many essential functions such as drinking, bathing, heating and cooling systems, and some electricity production. This affects vulnerable populations more acutely such as children, older adults, and people with illnesses or fragile health conditions. Also, vulnerable populations that do not have adequate air conditioning units in their homes are more at risk for injury or death.

The planning area has a total population of 52,583 according to the 2023 ACS population estimate. Those over the age of 65 represent 18% (9477) of the total population and children under the age of 5 represent 4.9% (2553) of the total population. The total population of the county that is estimated to be below the poverty level is 16.4% (8624). Table 7-4 presents the 2021 American Community Survey population and age cohort estimates below.

Table 7-4: Populations at Greater Risk by Jurisdiction

Jurisdiction	Population 65 and Older	Population Under 5	Population Below Poverty Level
Polk County	9477	2553	8624
City of Livingston	926	347	1375

City of Onalaska	493	166	731
City of Corrigan	308	168	444
Goodrich	33	9	76
Seven Oaks	13	0	8

The environment of the Polk County planning area is also vulnerable to damage during drought. Through lack of food and water and habitat degradation, aquatic and terrestrial species both can experience significant reductions due to death and lower reproduction rates. Land can experience damage as well due to shrinking, subsidence, and erosion in some areas during extreme or prolonged drought.

Water is central to the ability of people to inhabit and transact commerce in a region and the economic impacts of drought can be significant, especially during prolonged drought. The ability to produce goods and provide services is dependent on direct and indirect access to clean water. Due to the interconnected nature of supply and production chains, the negative effects of droughts can have ripple effects on many industries and sectors of the economy. The overall impact of damage caused by periods of drought is dependent on its extent and duration. It is rare that drought alone leads to a direct risk to the health and safety of people in the Polk County planning area, however severe water shortages could lead to a direct risk to the health and safety of the population. The severity of the impact of a drought event can be mitigated by preparedness and planning by the community comprised of government, businesses, and citizens.

The National Drought Mitigation Center (NDMC) at the University of Nebraska-Lincoln developed the drought impact reporter to provide a national database of drought impacts by county. The number of impacts in ten distinct impact categories from 1999-2024 are provided below. Table 7-5 lists the drought impacts in Polk County based on reports received by the Drought Impact Reporter. These reports are predominantly provided by the media, but can also come from NWS, other agencies, CoCoRaHS, legacy reports, and user reports.

Table 7-5: Drought Impacts, 1999-2024

Polk County	
Agriculture	65
Business & Industry	3

Energy	2
Fire	20
General Awareness	NA
Plants & Wildlife	53
Relief, Response & Restrictions	20
Society & Public Health	3
Tourism & Recreation	2
Water Supply & Quality	21
County Impact Reports	88

Based on 25 years of data from the NCEI, the direct impacts of droughts in the Polk County planning area have resulted in no known property or crop losses and no known injuries and fatalities. The impact on the planning area from drought has been limited and negligible based on data reported to the NCEI from 1999-2024. Drought impact reports like those presented above, however, come from several different sources and provide a different perspective of the impact that drought can have on communities beyond direct monetary property or crop damages that typically aren't reported publicly. It is important to consider that crop damage information is rarely publicly reported, and water availability issues are not easily quantified so the impact is likely much more pronounced than the direct losses attributed to this hazard.

Historic Drought Impacts

No injuries, fatalities, property, or crop damage were reported in the 25-year period of analysis. Based on historical records, annual loss impacts and estimates are considered to be negligible.

Drought Impacts Forecast

No injuries, fatalities, property, or crop damage were reported in the 24-year period of analysis. Based on historical records, forecast impact estimates are considered to be negligible.

SECTION 8: WINDSTORMS

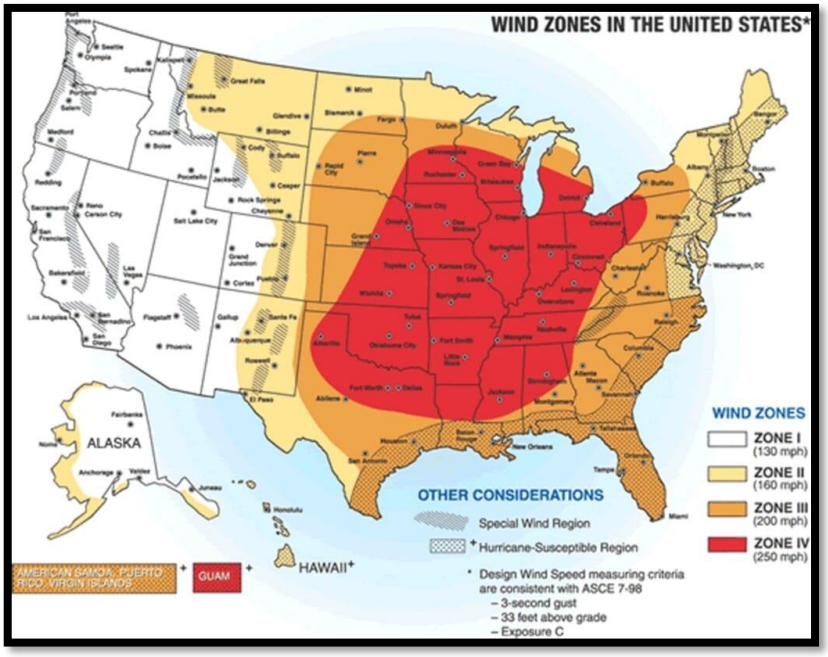
Description

Severe Wind can occur as straight-line events (derechos), or with other natural hazards including hurricanes and severe thunderstorms. According to the National Weather Service (NWS), a thunderstorm occurs when thunder accompanies rainfall. Thunderstorms create extreme wind events and are created when heat and moisture near the Earth's surface are transported to the upper levels of the atmosphere. The clouds, precipitation, and severe wind that become the thunderstorms are the result of this process. Straight-line winds can have gusts of 87 knots (100 mph) or more and 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

Thunderstorms are unpredictable and can occur anywhere in the planning area. Polk County, along with all participating jurisdictions, is equally at risk of thunderstorm winds. According to FEMA's Wind Zones map of the United States (Figure 8-1), the planning area falls under Wind Zone III, which is associated with winds that can reach up to 200 mph. This area is also situated near the coast, making it vulnerable to hurricanes.

Figure 8-1: FEMA wind zones in the United States



Source: FEMA & American Society of Civil Engineers (ASCE)

Extent

The extent or magnitude of a specific thunderstorm wind event is measured by the Beaufort Wind Scale, developed in 1805. Table 8-1 describes the Beaufort Wind Scale, with different intensities of wind events in terms of speed and effect, from calm to violent and destructive. Based on historical occurrences, the planning area is expected to experience a windstorm with a maximum magnitude of 200 MPHs.

Historical Occurrences

Historical occurrences of thunderstorm wind events with resulting damages that have impacted the Polk County planning area are shown below in Table 8-2. Only high wind events associated with thunderstorm wind are considered in this section. Wind damage associated with other hazards, such as tornados or hurricanes, is accounted for in other sections. From 1999-2024, there have been 64 thunderstorm wind events recorded in the NCEI storm events database that have impacted the Polk County planning area. The NCEI, organized under the National Oceanic and Atmospheric Administration, is the largest archive available for climate data, however, it is important to note that only incidents and damages reported to the NCEI have been factored into this risk assessment. Some occurrences appear multiple times due to reports from various locations throughout the planning area. There have not been any events recorded past the listed dates.

Table 8-2: Historical Thunderstorm-Wind Events, 1999-2024

Location	Begin Date	Magnitude	Death	Injuries	Property	Crops
Livingston	10/12/2001		0	0	$10000	$0
Livingston	5/17/1999		0	0	$25000	$0
Livingston	5/17/1999		0	0	$60000	$0
Goodrich	3/26/2000		0	0	$15000	$0
Countywide	11/5/2000		0	0	$50000	$0
Dallardsville	11/6/2000		0	1	$15000	$0
Countywide	11/6/2000		0	0	$50000	$0
Segno	1/29/2001		0	0	$15000	$0
Segno	5/21/2001		0	0	$7000	$0
Onalaska	3/18/2003	57	0	0	$10000	$0
Blanchard	3/18/2003	57	0	0	$6000	$0
Countywide	6/12/2003	53	0	0	$6000	$0
Lake Livingston Dam	6/12/2003	54	0	0	$3000	$0
Livingston	5/13/2004	55	0	0	$135000	$0
Onalaska	7/17/2004	50	0	0	$40000	$0
Livingston	7/25/2004	50	0	0	$20000	$0
Onalaska	10/4/2004	50	0	0	$0	$0
Alabama/Coushatta Res	10/4/2004	55	0	0	$0	$0
Countywide	11/23/2004	55	0	0	$20000	$0
Livingston	11/27/2004	55	0	0	$50000	$0
Livingston	3/31/2005	53	0	0	$4000	$0
Onalaska	8/22/2005	61	0	0	$15000	$0
Livingston Muni Airport	4/21/2006	55	0	0	$10000	$0
Livingston	2/16/2008	52	0	0	$15000	$0
Livingston	6/21/2008	52	0	0	$0	$0
Leggett	8/3/2008	54	0	0	$8000	$0
Livingston	2/1/2011	56	0	0	$15000	$3000
Providence Camp	4/26/2011	55	0	0	$2000	$0
Segno	4/26/2011	55	0	0	$10000	$0
Livingston	8/24/2011	55	0	0	3000	$0
Leggett	7/21/2012	52	0	0	$0	$0
Corrigan	7/21/2012	50	0	0	$0	$0
Blanchard	7/21/2012	52	0	0	$0	$0
Onalaska	7/21/2012	52	0	0	$0	$0
Livingston	2/10/2013	52	0	0	$3000	$0
Goodrich	2/21/2013	60	0	0	$10000	$0

Goodrich	2/21/2013	56	0	0	$4000	$0
Lake Livingston Dam	3/10/2013	67	0	0	$0	$0
Corrigan	3/10/2013	67	0	0	$5000	$0
Corrigan	6/6/2013	65	0	0	$8000	$0
Carmona	6/6/2013	60	0	0	$3000	$0
Livingston	6/6/2013	60	0	0	$5000	$0
Corrigan	6/22/2014	53	0	0	$6000	$0
Alabama/Coushatta Res	10/12/2014	59	0	0	$0	$0
Livingston	4/18/2015	52	0	0	$0	$0
Seven Oaks	4/27/2015	53	0	0	$7000	$0
Onalaska	5/11/2015	51	0	0	$0	$3000
Indian Village	4/27/2016	55	0	0	$0	$0
Corrigan	3/24/2017	55	0	0	$10000	$0
East Tempe	5/23/2017	54	0	0	$0	$0
Onalaska	3/18/2018	60	0	0	$20000	$0
Marston	3/18/2018	60	0	0	$12000	$0
Ace	7/5/2018	53	0	0	$0	3000
Corrigan	4/7/2019	50	0	0	$3000	$1000
Blanchard	1/10/2020	51	0	0	$13000	$0
Blanchard	1/10/2020	51	0	0	$17000	$0
Blanchard	1/10/2020	51	0	0	$26000	$0
Camp Ruby	5/11/2021	65	0	0	$200000	$0
Camp Ruby	5/11/2021	61	0	0	$150000	$0
Blanchard	4/26/2023	57	0	0	$0	$0
Moscow	4/26/2023	57	0	0	$0	$0
Corrigan	4/26/2023	57	0	0	$50000	$0
Seven Oaks	4/26/2023	57	0	0	$0	$0
Livingston Muni Airport	6/10/2023	52	0	0	$0	$0

SIGNIFICANT EVENTS

There have been 2 major thunderstorm wind events that have caused over $100,000 in damages to Polk County, but there have been dozens of thunderstorm wind events that have caused a total of $1,171,000 in damage to property and $10,000 to crops in Polk County from 1999 to 2024.

May 13th, 2004

A major thunderstorm with winds reaching 63mph struck Livingston in Polk County and took out a significant number of trees, one of which did $135,000 in damages to a home.

May 11th, 2021

A thunderstorm with wind speeds reaching 77 mph uprooted dozens of trees which fell on over 15 homes and trailers near Wilson Lake, doing $350,000 in property damage.

Probability of Future Events

Windstorms are most likely to strike during spring in March, April, and May. There is also a brief period in September when the likelihood of windstorm hazards increases. The Polk County planning area has experienced, on average, approximately one thunderstorm wind event every one to two years. Wind events categorized as Forces 10-12 on the Beaufort scale with hurricane-force winds have routinely impacted the area and is the level of windstorm hazard the area should mitigate for in the future. The probability of future events is highly likely, meaning that an event is probable within the next three years for the planning area.

Frequency of Occurrence
Highly likely: Event probable in the next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in the next 10 years.

Vulnerability and Impact

Thunderstorm winds exist at different strength levels and occur randomly throughout the planning area with the potential to cause injury and property damage. All people, animals, existing and future structures, and facilities in Polk County planning area could potentially be impacted and remain vulnerable to strong winds. A thunderstorm wind event can impact human health including injuries from windblown debris, direct injuries, traffic accidents, and in rare cases, fatalities. Debris from damaged structures can also cause damage to other buildings not directly impacted by the event. Infrastructure, such as power lines, poles, radio towers, water towers, and streetlights are vulnerable to the impacts of severe thunderstorm winds. In addition, street signs, garbage cans, outdoor furniture, storage sheds, roofs, vehicles, trees, and other objects commonly found outdoors are at risk. While these vulnerabilities do exist, the overall

impacts of thunderstorm wind are limited in scope and have not yet resulted in any reported injuries or fatalities.

The Polk County planning area features mobile and manufactured home parks which are more vulnerable to thunderstorm winds than site-built structures. These types of homes are also located in rural areas throughout the county, which could result in limited access to essential services and emergency aid in the event of a disaster. Based on 2022 American Community Survey estimates, there are 25,087 housing units in Polk County of which 22%, or 5,681 units, are mobile or manufactured homes. In addition, 9,805 (39%) of the housing units in the overall planning area were built before 1980. These structures are likely to have been built to less stringent construction standards than newer construction and could be more susceptible to damage during significant events.

Table 8-3. Structures at Greater Risk by Jurisdiction

Jurisdiction	Total Housing Units	Mobile Housing Units	Housing Built Before 1980
Polk County*	25,087	5,681 (22%)	9805 (39%)
City of Livingston	861	94 (11%)	462 (54%)
City of Onalaska	1674	878 (22%)	501 (33%)
City of Corrigan	885	112 (12.6%)	584 (64%)
City of Goodrich	168	43 (25.6%)	106 (63%)
City of Seven Oaks	77	9 (11.7%)	57 (74%)

*County totals include all jurisdictions, ISDs, in addition to unincorporated areas.

Source: 2022 American Community Survey 5-year estimate, selected housing characteristics

Based on the ACS 2022 data, the .

Historic Windstorm Impacts

Below is the summary table, 8-4, for Polk County that shows the 24-year column totals and the average annual (Per Year) losses in these categories. The bottom half of each table shows per capita dollar loss rates for the total and average annual losses. These rates are important measures for comparing losses between different areas. The average annual loss estimate of property and crops is $49,191 in Polk County.

Table 8-4: Polk County Loss Summary

Time Period	Fatalities	Injuries	Property Damage	Crop Damage
Loss Summary, Polk County				
24-year Total	0	0	$1,171,000	$10,000
Per Year	0	0	$48,791	$400
Per Capita Dollar Losses (2020 Census Pop)				
24-year Total	0	0	$23.40	$0.20
Per Year	0	0	$0.94	$0.01

SECTION 9: EXTREME HEAT

Description

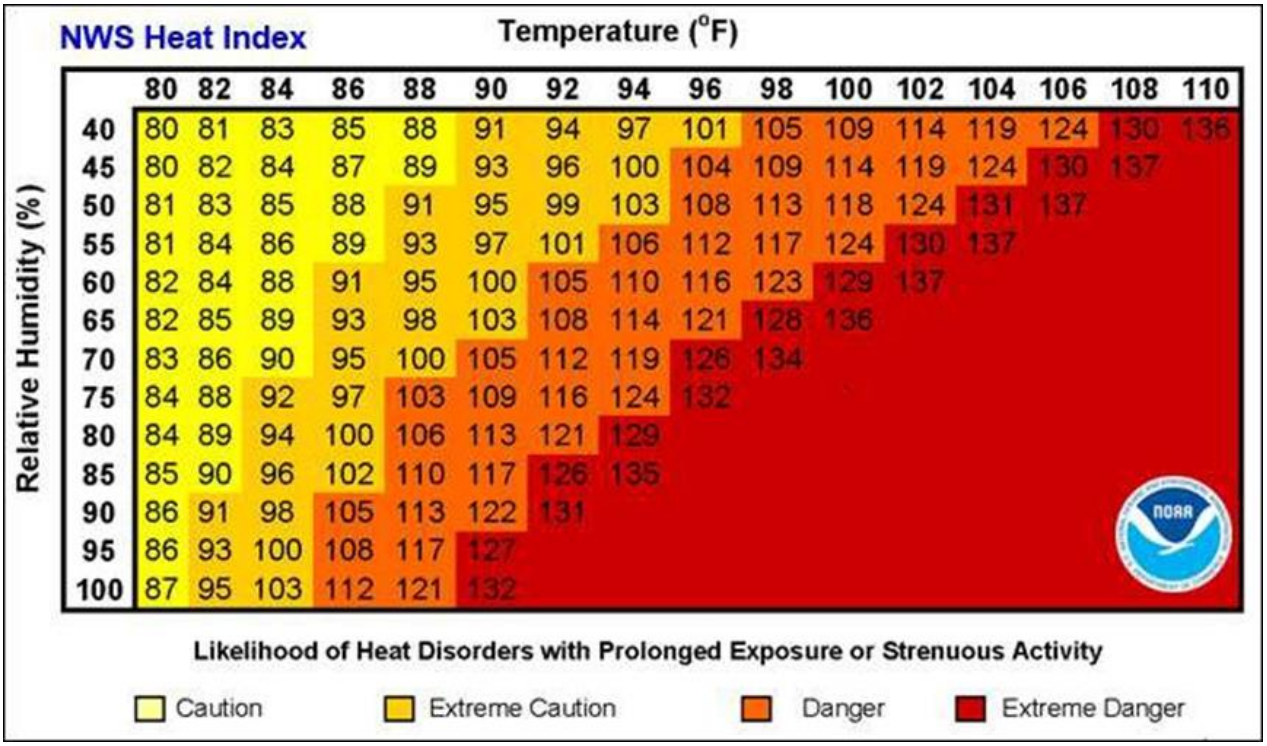
Extreme heat is a condition where temperatures exceed local average high temperatures by ten degrees or more for an extended period of time and is also characterized by high humidity levels. Extreme heat is a common occurrence in Texas during the summer months. Extended periods of extreme heat are called heat waves and can lead to illness and death, particularly among vulnerable populations. In fact, heat waves have been the top cause of U.S. weather fatalities, on average, over the past 30 years.[10] Texas had a particularly deadly year in 2011 when 203 heat-related deaths were reported. The major human risks associated with severe summer heat include heat cramps, sunburn, dehydration, fatigue, heat exhaustion, and heat stroke. Extreme heat can lead to power outages as heavy demands for air conditioning strain the power grid and prolonged exposure to excessive temperatures can damage crops and injure or kill livestock. As the Earth's climate warms overall heat waves are expected to become more frequent, longer, and more intense.[11]

Location

Extreme heat is not confined to any specific geographic area and can occur anywhere within the planning area. City residents can face a heightened risk to extreme heat because of warmer temperatures in cities from the urban heat island effect. The urban heat island effect is caused by large amounts of paved surfaces that absorb and re-radiate heat. The lack of green spaces and tree cover in these areas adds to the issue. Since Polk County does not have any large major metropolitan areas, the urban heat island effect is not as pronounced. This results in a negligible variance in extreme temperatures from heat waves in the unincorporated areas of the counties versus the incorporated areas.

Extent

The "Heat Index" is the relationship between temperature and relative humidity established by the National Oceanic Atmospheric Administration (NOAA) to measure magnitude or intensity of an extreme heat event. This index combines the effect of high temperatures with high humidity to determine how hot it feels outside. Figure 9.1 below describes the heat index as it relates to the likelihood of heat disorders due to prolonged exposure or strenuous activity. As an example, if the air temperature is 98°F and the relative humidity is 65%, the heat index, or how hot it feels, is 128°F. The red area indicates extreme danger, and the example above would fall into this category. Also, exposure to full sunshine can increase heat index values by up to 15°F since the heat index values in the chart below were devised for shady light wind conditions.



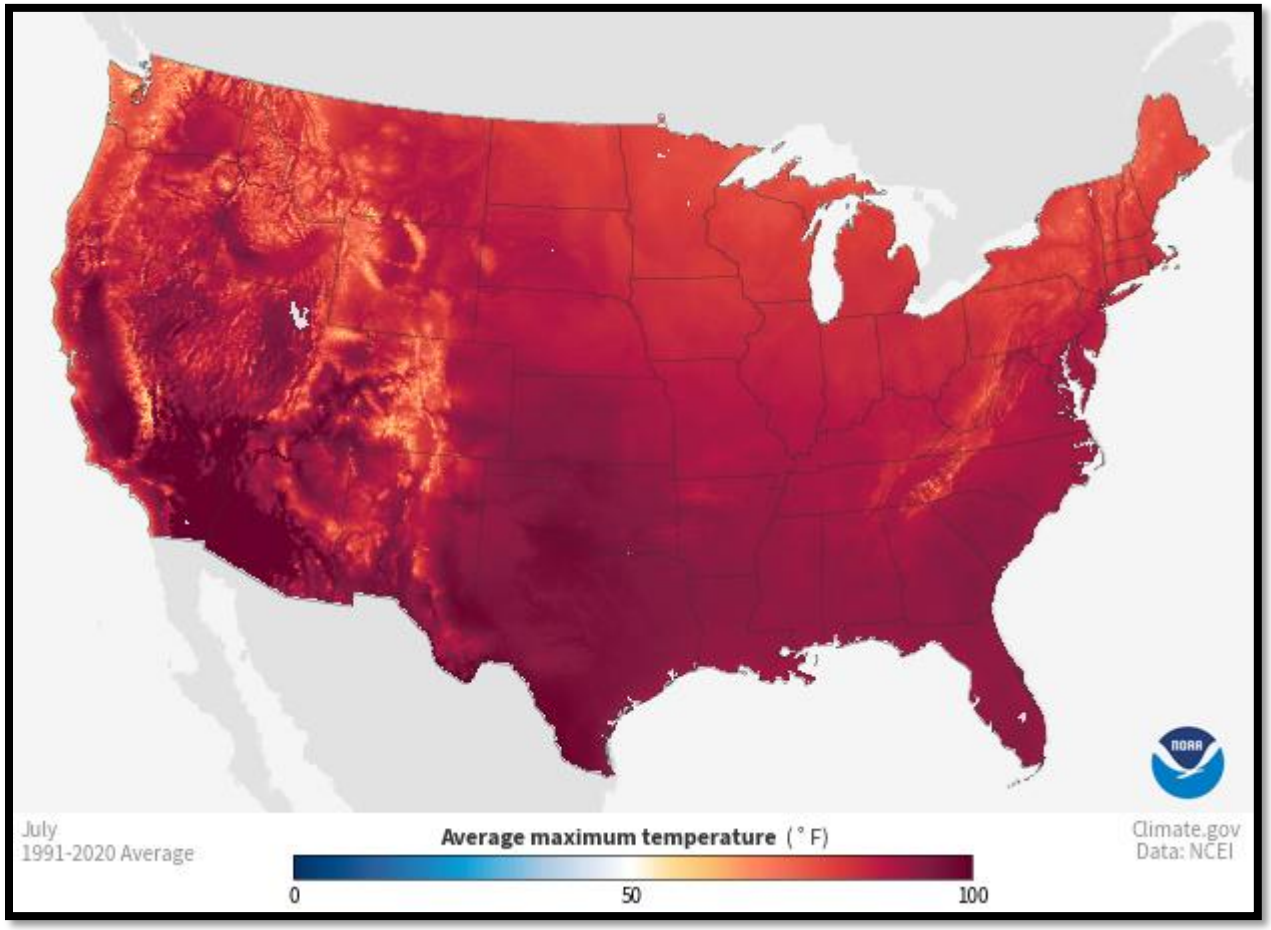
The likelihood of health disorders associated with ranges of heat index values are displayed below. The classifications of “Caution,” “Extreme Caution,” “Danger,” and “Extreme Danger” are associated with increasingly harmful effects on the body. Effects on the body depend on the magnitude or intensity of the event with the shaded rows in the table below (Table 9.1) corresponding to the colors in the chart above (Figure 9.1). The National Weather Service will initiate alert procedures when the Heat Index is expected to exceed 105°-110°F, depending on local climate, for at least two consecutive days.

Table 9-1: Heat Index and Warnings

Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

The hottest month of the year for the Polk County planning area is typically August with an average relative humidity of 65%. The National Oceanic and Atmospheric Administration (NOAA) provides the map below that shows the long-term average maximum temperature in each climate division across the contiguous United States for the month of August. This data is based on daily observations from 1981-2010. The planning area exhibits an average maximum temperature of 90-100°F or above based on historical data and has the potential to reach “dangerous” heat index levels at just 92°F and “extremely dangerous” heat index levels at 98°F.

Figure 9-2: Average Maximum Temperature, Contiguous United States, August 1981-2010



Based on the average maximum temperature (90-100°F) and the average relative humidity (65°F) in the Polk County planning area, extreme heat events to the extent of "Danger" and "Extreme Danger" should be mitigated to reduce threats to humans, livestock, and pets. When the heat index reaches a "Danger" classification, effects can include sunstroke, muscle cramps, heat exhaustion, and prolonged exposure can bring on heatstroke. When the heat index reaches an "Extreme Danger" classification, effects on the body can include all of the above in addition to increasing the risk of heat stroke and even death.

Table 9-2: Historical Excessive Heat Events Table, 1999-2024

Jurisdiction	Year	Month	Day	Injuries	Fatalities	Property Damage	Crop Damage
Polk County	1999	June	26th	0	0	$0	$0
Polk County	1999	August	1st	0	0	$0	$0
Polk County	2000	July	6th	0	0	$0	$0
Polk County	2000	August	29th	0	0	$0	$0
Polk County	2000	September	1st	0	0	$0	$0
Polk County	2009	June	24th	0	0	$0	$0
Polk County	2023	June	16th	0	0	$0	$0
Polk County	2023	June	25th	0	0	$0	$0
Polk County	2023	July	31st	0	0	$0	$0
Polk County	2023	August	5th	0	0	$0	$0
Polk County	2023	August	23rd	0	0	$0	$0
Polk County	2023	September	5th	0	0	$0	$0

Significant Events

There have been 12 heat events, with the five events from June 16th to August 23rd, 2023, being Extreme Heat events.

August 1999

In August of 1999, excessive heat plagued southeast Texas for the entire month of August. At Houston Intercontinental, high temperatures exceeded 100 degrees on 10 days out of the month, and 95 degrees on 29 out of the 31 days of the month. High-temperature records were set on 4 days out of the month, and record-high minimum temperatures were set on another 4 days. The

temperature of 105 degrees on the 20th was the hottest temperature recorded at Houston Intercontinental Airport since 1980.

July 2000

On July 6th-23rd, 2000, Excessive heat impacted southeast Texas for much of July, with temperatures ranging from 98 to 105 degrees Fahrenheit.

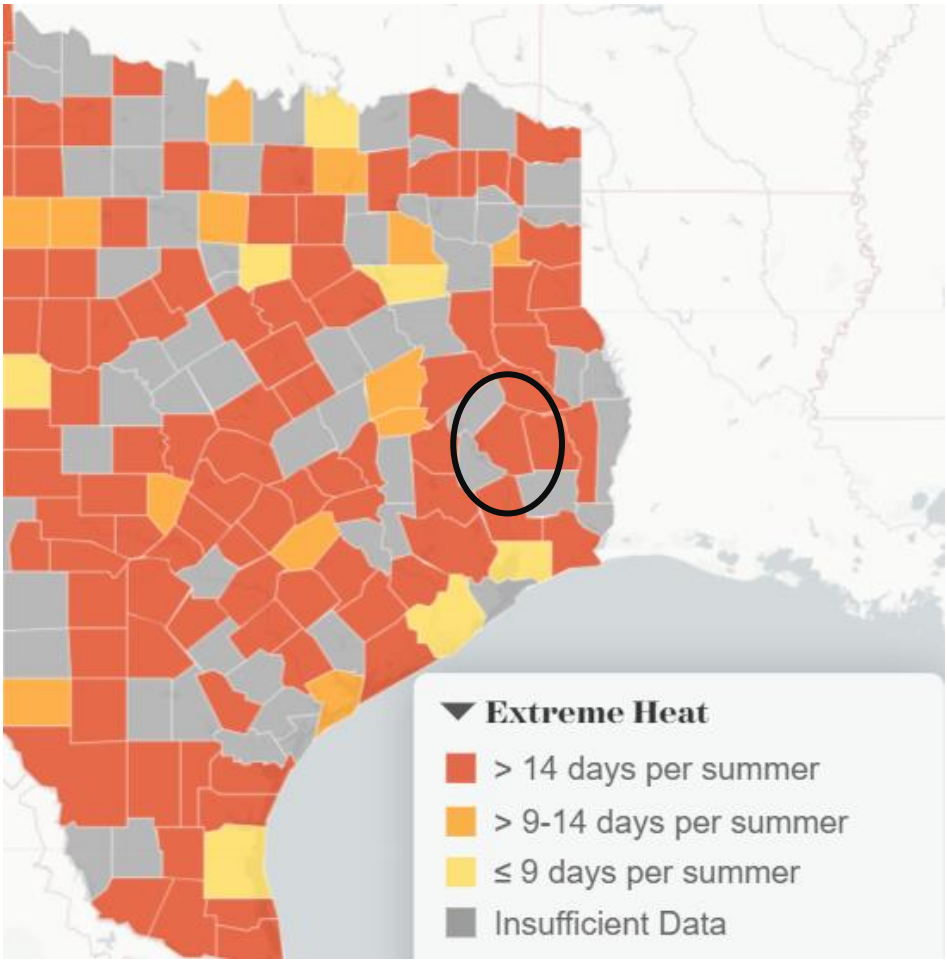
June-September 2023

Starting in mid-June and lasting until September 9th of 2023, there were large stretches of the summer with Excessive Heat Warnings indicating predicted temperatures of above 105 degrees Fahrenheit with lower-level heat advisories being sent out for many other days during that time period.

The map below provides an analysis of extreme heat events based on weather station records from the Global Historical Climatology Network (GHCN), formerly the National Climatic Data Center. With this analysis from the NRDC, “extreme heat days” are defined as those days from June 1st to August 31st in the years 2007 to 2016 on which the maximum temperature exceeded the 90th-percentile value. The June to August daily maximum temperatures from 1961 to 1990 were used as a reference period for the same monitoring station to calculate the 90th percentile. The 90th percentile value is among the more common ways to define extreme heat, and the map below is indicative of how the number of extreme heat days per summer period is changing over time.

Figure 9-3: Extreme Heat Days Per Summer, 2007-2016

Figure 9-3: Extreme Heat Days Per Summer, 2007-2016



https://www.nrdc.org/climate-change-and-health-extreme-heat#/map/detail/TX

Based on historical monitoring station data from 1961-1990, areas with more than 9 days of extreme heat per summer in the map above are experiencing more days of extreme heat than they did in the past. The map above depicts Polk County as having 9-14 days of extreme heat per summer. This analysis shows that the Polk County planning area is experiencing more heat days during the summer than it did in the past.

Data from the CDC can also help tell a story of how the number of extreme heat days to be expected each summer is increasing. The two maps below depict a 29-year period from 1981-2010 and 10 years from 2000-2010. The Polk County planning area is depicted within the white circle in Central Texas on the maps below.

Figure 9-4: 1981-2010 Average Heat Wave Days Based on Daily Maximum Heat Index for Texas

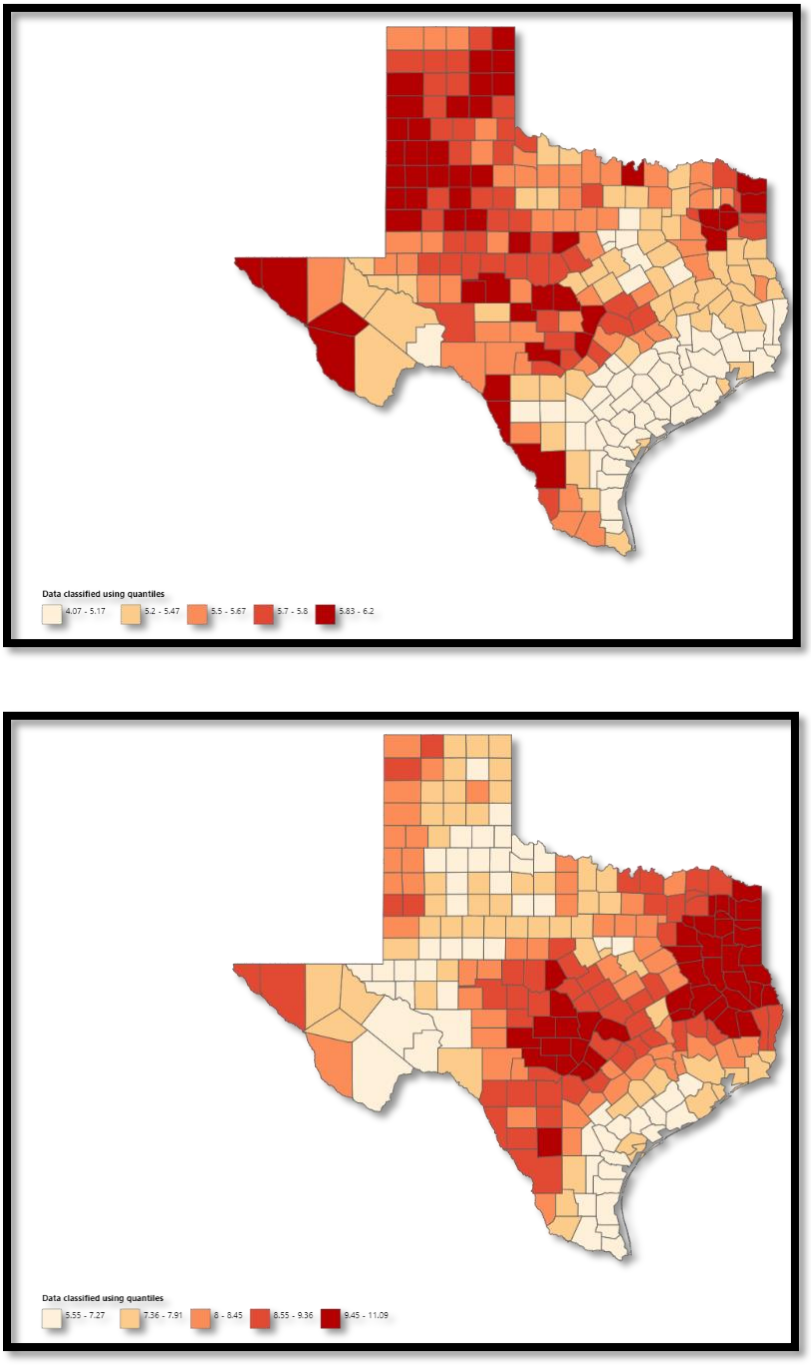


Figure 9-5: 2000-2010 Average heat wave days based on daily maximum heat index for Texas.

The Extreme Heat Events data available on the CDC WONDER website are county-level measures of the number of heat wave days in the months of May through September spanning the years

1981-2010. The CDC defines heat wave days as those that are 95th percentile of the daily maximum Heat Index. The number of heat wave days is computed at the county level and the choropleth map and associated legends show the average number of heat wave days occurring based on the selected time period and location.

Probability of Future Events

The planning area can expect 9-14 extreme heat days and at least one extreme heat event, or heat wave, each summer due to the warm, sunny, and humid subtropical climate in the Polk County planning area. The probability of the area experiencing at least one extreme heat event in the next year is **highly likely**.

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

The probability that the number of extreme heat days will continue to increase in the future is also highly likely. According to NOAA, the top ten warmest years on record (1880-2022) across the globe have all occurred within the past 12 years. The table below ranks the warmest years on record with land and ocean annually averaged measurements compiled from 1880-2017.

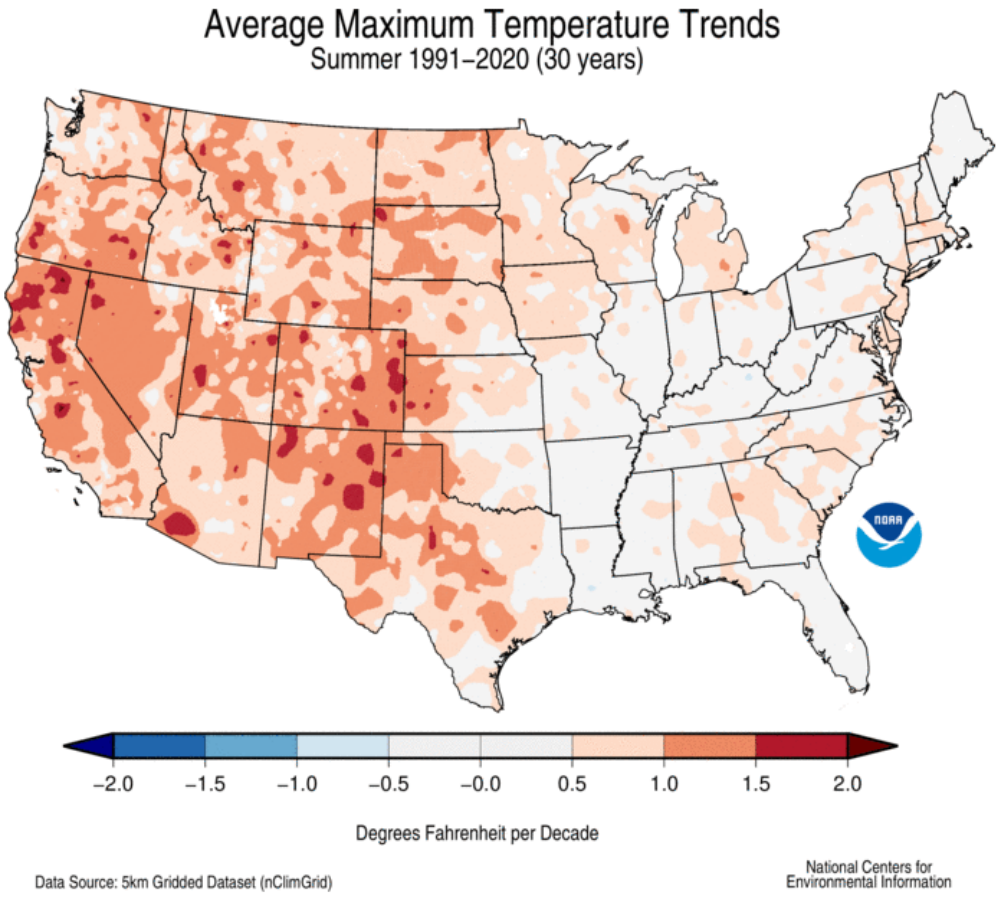
Table 9-2: Top ten warmest years, globally (NOAA, 1880-2022)

Rank: 1 = Warmest Period of Record: 1880–2022	Year	Anomaly °C	Anomaly °F
1	2016	0.99	1.78
2	2020	0.98	1.76
3	2019	0.94	1.69
4	2015	0.93	1.67
5	2017	0.91	1.64
6	2022	0.86	1.55
7	2021	0.84	1.51
8	2018	0.82	1.48
9	2014	0.74	1.33
10	2010	0.72	1.30

Source: "Global Climate Report – Annual 2022". NOAA. Retrieved 23 July 2024.

The average maximum temperature maps in Figure 9-6 are produced by the U.S. National Climatic Data Center and depict trends for the most recent complete 30-year period as well as the trend when looking at all recorded temperatures since 1896. The maps show average maximum temperature trends across the United States during the summer periods from 1991-2020 and 1896-2020 which show how trends from which forecasts are made can change drastically when looking at different periods of time. The Polk County planning area is in an area that can expect an increase of 0.5-1.5^{o}F in average maximum summer temperatures over the next century.

Figure 9-6: Average Maximum Temperature Trends, Summer 1991-2020 (30 years)



https://www.ncdc.noaa.gov/temp-and-precip/us-trends/

Vulnerability and Impacts

Residents of the area, especially vulnerable populations such as children under five and those over 65 should exercise caution by staying out of the heat for prolonged periods when a heat advisory or excessive heat warning is in effect. In addition to children and the elderly, the most vulnerable population to heat illnesses and casualties are the 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 so it is important for communities to get to know which immediate neighbors may be at the highest risk to health impacts from heat. Those working or remaining outdoors for extended periods of time and overweight individuals are also at higher risk.

It is never safe to leave a baby, child, disabled person, or pet in a locked car. Cars heat up quickly in the sun. This is true even in the winter, in fact, the first toddler death due to being left in a locked car in the U.S. in 2018 occurred in February. The graphic in Figure 9-7 below is produced by NOAA with tips on how to practice heat safety in different situations.

Figure 9-7: NOAA Heat safety tips

https://www.weather.gov/safety/heat

Higher heat index values (which combine temperature and humidity to describe perceived temperature) are expected to increase discomfort and aggravate health issues. Conversely, cold spells are expected to decrease. In most locations, scientists expect daily minimum temperatures—which typically occur at night—to become warmer at a faster rate than daily maximum temperatures.[12] This change will provide less opportunity to cool off and recover from daytime heat. As the region continues to warm overall, it will be important to educate the public about strategies to stay cool during extreme heat events and how to recognize and respond to heat-related illnesses.

SECTION 10: LIGHTNING

Description

Lightening is sudden charges of electricity that develop from storms or excessive heat. This massive electrostatic discharge can occur between electrically charged regions within clouds, or between a cloud and the Earth's surface. A bolt of lightning, or the visible sparks, can cause air temperatures surrounding the bolt to approach 50,000^{o}F causing rapid air expansion leading to thunder, which often accompanies lightning strikes. Lightning is most often affiliated with severe thunderstorms, and often strikes outside of heavy rain and can occur as far as ten miles away from any rainfall.

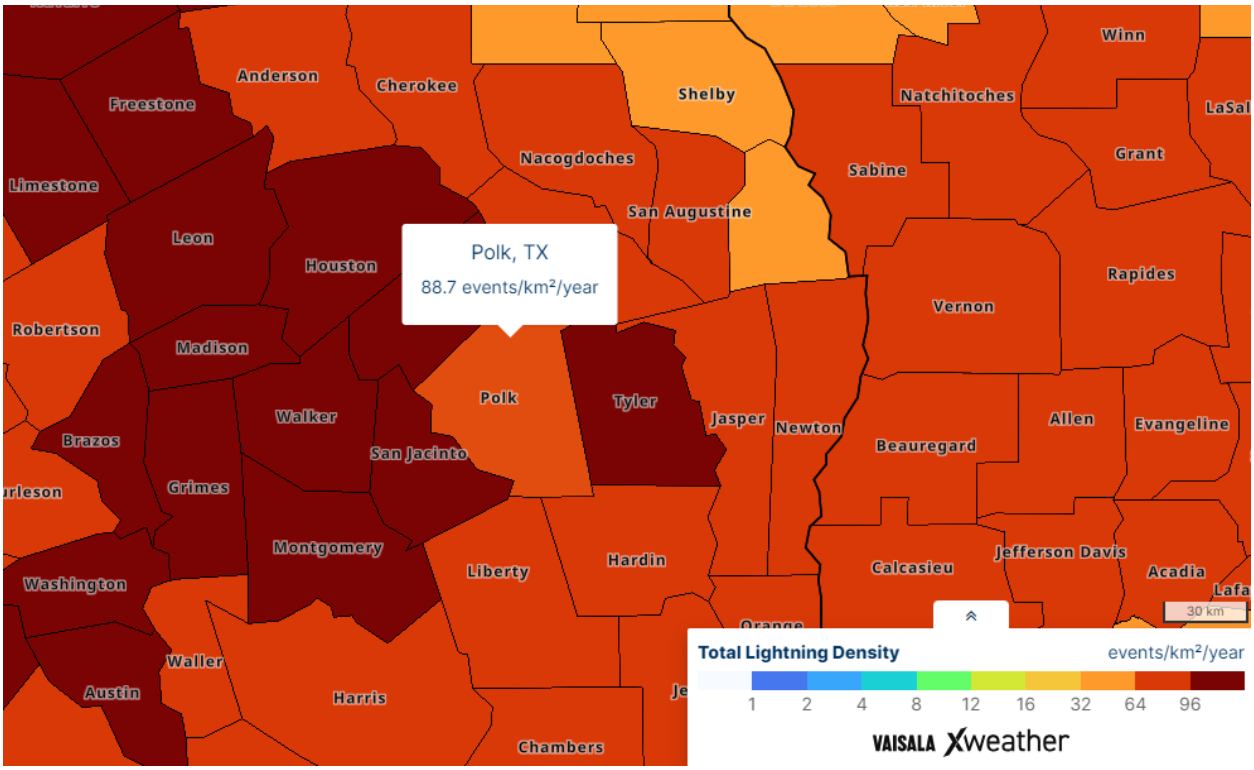
Location

The Polk County planning area is located in a region of the country that is very susceptible to lightning strikes. Lightning can occur at any location within the entire planning area, and it is assumed that all areas within Polk County are uniformly exposed to the threat of lightning due to the consistent geography and terrain found throughout.

Extent

Lightning's extent is defined in terms of the frequency of lightning strikes within a defined geographic area and a set time period. The Vaisala's U.S. National Lightning Detection Network lightning flash density map, Figure 10-1, shows the average number of lightning events per km2 per year. According to the map below, the Polk County planning area has a total lightning density of 88.7 events/km^2/year for the planning area from 2016-2022.

Figure 10-1. Total Lightning Density, 2016-2022



Source: https://interactive-lightning-map.vaisala.com/

A total lightning density of more than 64 events/km2/year in an area is considered to be a major severity and a total lightning density of more than 96 events/km2/year in an area is considered to be an extreme severity. Any lightning strike that causes death or property damage is likewise considered a major severity. The lightning hazard is considered to be a major severity for the planning area.

The magnitude of lightning hazard events can also be measured in terms of the number of strikes in a smaller interval of time. The Lightning activity levels (LALs) scale is used by NOAA to express the extent of lightning events and is on a scale of 1 to 6 along with descriptions of corresponding cloud and thunderstorm development. The LAL rankings scale reflects the frequency of lightning strikes from cloud to ground within a 15-minute interval. Lightning activity levels are described in more detail in Table 10-1 below.

Table 10-1: Lightning Activity Levels

LAL	Cloud and Storm Development	Lightning Strikes Per 15 Min
1	No thunderstorms.	0
2	Cumulus clouds are common but only a few reach the towering cumulus stage. A single thunderstorm must be confirmed in the observation area. The clouds produce mainly virga, but light rain will occasionally reach the ground. Lightning is very infrequent.	1-8
3	Towering cumulus covers less than two-tenths of the sky. Thunderstorms are few, but two to three must occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent.	9-15
4	Towering cumulus covers two to three-tenths of the sky. Thunderstorms are scattered and more than three must occur within the observation area. Moderate rain is common, and lightning is frequent.	16-25
5	Towering cumulus and thunderstorms are numerous. They cover more than three-tenths and occasionally obscure the sky. Rain is moderate to heavy, and lightning is frequent and intense.	➢ 25
6	Similar to LAL 3 except thunderstorms are dry.	9-15

Historical Occurrences

While lightning occurs quite frequently in the planning area, the only lightning data contained within NOAA Storm Data are lightning events that result in fatality, injury, and/or property and crop damage. There were no lightning events reported for the planning area according to the NOAA National Centers for Environmental Information (NCEI) data. Structural damages resulting from lighting events are considered severe with the risk of injury or death representing the greatest risk. There have not been any events recorded past the listed dates.

Table 10-2: Historical Lightning Events, NCEI 1999-2024

Location	Date	Fatalities	Injuries	Property Damage	Crop Damage
Polk County	-	0	0	0	0

Significant Events

No significant lightning events have been recorded for the Polk County planning area.

Texas A&M Forest Service (Wildfires Caused by Lightning)

Lightning occurrences and damage are not well documented in the NCEI data but other sources and accounts from the Core planning team members indicate that lightning strikes occur frequently in the planning area. The Texas A&M Forest Service maintains a wildfire occurrence database based on state and local reports. The local reports are based on a voluntary online fire department reporting system that is used by both paid and volunteer fire departments. Table 10-3 lists wildfires caused by lightning strikes recorded by the Texas Forest Service from 2005 to 2021 within the planning area.

Table 10-3: Texas A&M Forest Service (TFS), Wildfire Ignition History 2005-2021

Location	Date	Name	Responder	Area Burned (Acres)
Polk	8/18/2006	133 Chimney Valley Road	Polk VFD	5
Polk	7/18/2009	Guess	North	300
Polk	7/23/2009	Red Rock Ranch Fire	Central	40
Polk	7/22/2011	RR 1323	Willow City	40
Polk	9/19/2011	Grape Creek Fire	Central	33
Polk	9/26/2011	Telephone Pole	Marble Falls VFD	0.5
Polk	9/27/2011	Crabapple Rd.	Willow City	0.5
Polk	9/27/2011	Jacoby	Willow City	0.25
Polk	9/29/2011	Trainer West	Sisterdale VFD	0

Polk	10/1/2011	Polk Co.	Willow City	1.5
Polk	4/14/2014	Lightning Strike	Round Mountain VFD	3
Polk	9/10/2015	Jack Road Fire	Round Mountain VFD	1.5
Polk	6/4/2018	Lightning Strike	Round Mountain VFD	1
Polk	7/7/2020	1386	Henly VFD	0.01
Polk	8/25/2020	Comanche Creek	Central	406

Source: Texas Wildfire Risk Assessment Portal (TWRAP)

Probability of Future Events

With limited reported incidents in the planning area, the team utilized the most current lightning flash density estimate developed by Vaisala, Figure 10-1, for the risk assessment. The most current lightning flash density estimate indicates a probability of occurrence of approximately 88.7 lightning events per square kilometer per year. Polk County is 1,057 square miles or 2737.6 square kilometers. The Vaisala flash density estimate combined with the total area produces an estimate of approximately 242, 772 flashes per year. A **highly likely** probability of occurrence for future lightning events in the Polk County planning area is supported by this frequency. This means that an event is probable in the next year.

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

Vulnerability and Impact

Lightning strikes are random making all property and people within the Polk County planning area vulnerable to the impact of lightning. Lightning can also be responsible for damage to

buildings, electrical systems, forest and/or wildfires, and damage to infrastructure such as power transmission lines and communication towers. Lightning is attracted to tall metal structures making water towers, electric power stations, and power poles particularly vulnerable to strikes. Lightning strikes can disrupt communication systems, including telephone and internet services, which can impact emergency response times and communication between businesses and customers. Lightning strikes can cause power outages that can affect large areas and cause disruption to businesses, transportation, and other essential services. The damage caused by lightning strikes can have a significant economic impact on cities, particularly in areas where businesses and tourism are major industries. Damage to buildings and electrical equipment can result in costly repairs and downtime. Lightning strikes can cause fires that can spread quickly and cause extensive damage to buildings and surrounding areas and are a cause of wildfires making agricultural land vulnerable as well. Agricultural losses from this hazard can be extensive.

Lightning strikes can also pose a risk to public safety, particularly in outdoor areas such as parks, sports fields, and other public spaces. The peak lightning season in the State of Texas is from June to August; however, the most fatalities occur in July as fatalities occur most often when people are outdoors, working, or participating in some form of recreation. Moving inside will decrease a person's vulnerability to injury or death due to lightning strikes.

Communities can take steps to mitigate the impact of lightning strikes by implementing lightning protection systems, maintaining electrical infrastructure, and educating the public on lightning safety measures. Doing so can minimize the risks associated with lightning strikes and ensure the safety and well-being of their residents and visitors.

SECTION 11: TORNADOES

Description

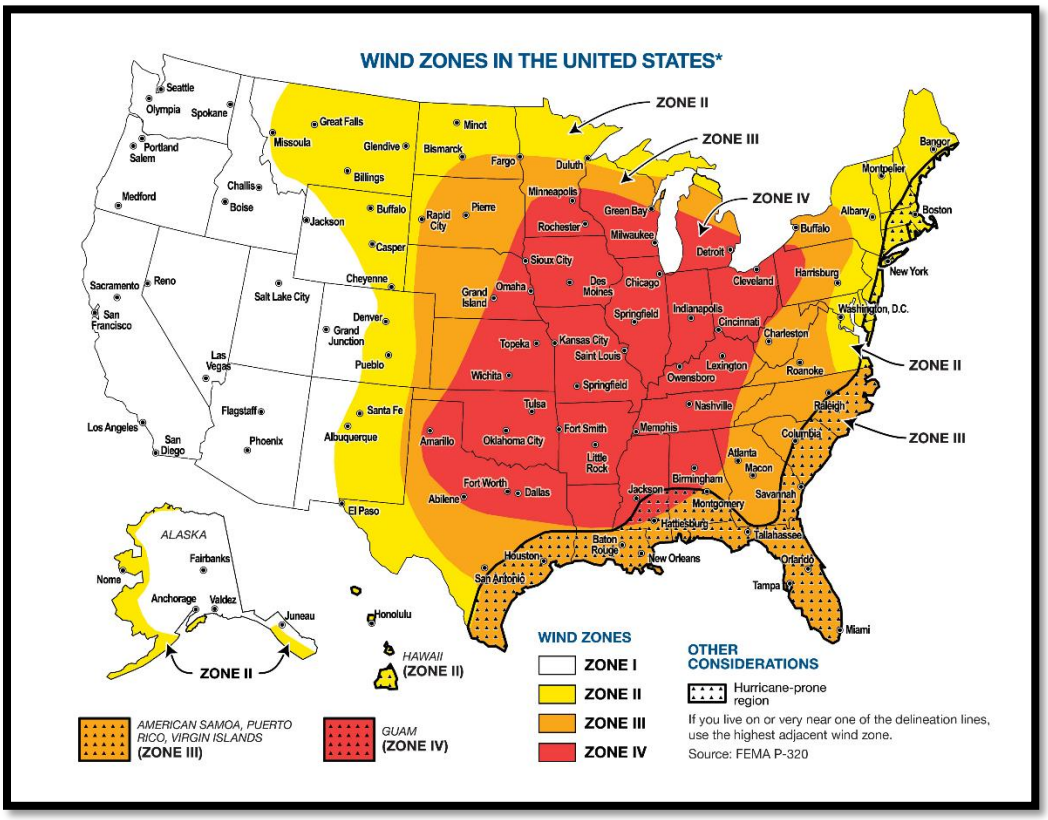
A tornado is a narrow, violently rotating column of air that extends from the base of a cumulonimbus cloud to the ground. Tornadoes, among the most violent storms on the planet, are capable of tremendous destruction with wind speeds that can reach as high as 250-300mph. Typically, the vortex of air will remain suspended in the atmosphere and be visible as a funnel cloud. If the lower tip of the vortex touches the ground, however, the path of the tornado will often leave destruction in its wake and can be more than one mile wide and 50 miles long. Supercell thunderstorms, created when horizontal wind shears (winds moving in different directions at different altitudes) begin to rotate the storm, can produce the most extreme and powerful tornadoes. The economic and financial impacts of a tornado event on a community can be devastating depending on the scale of the event and the population density of the area that

is hit. The damage caused in the aftermath of a tornado event can be minimized with collaborative preparedness and pre-event planning by the government, businesses, and citizens.

Location

Tornadoes do not have any specific geographic boundary and can occur uniformly throughout the planning area. Polk County is located in Wind Zone III along the Texas Gulf Coast (Figure 11-1), where tornado winds can be as high as 200 mph.

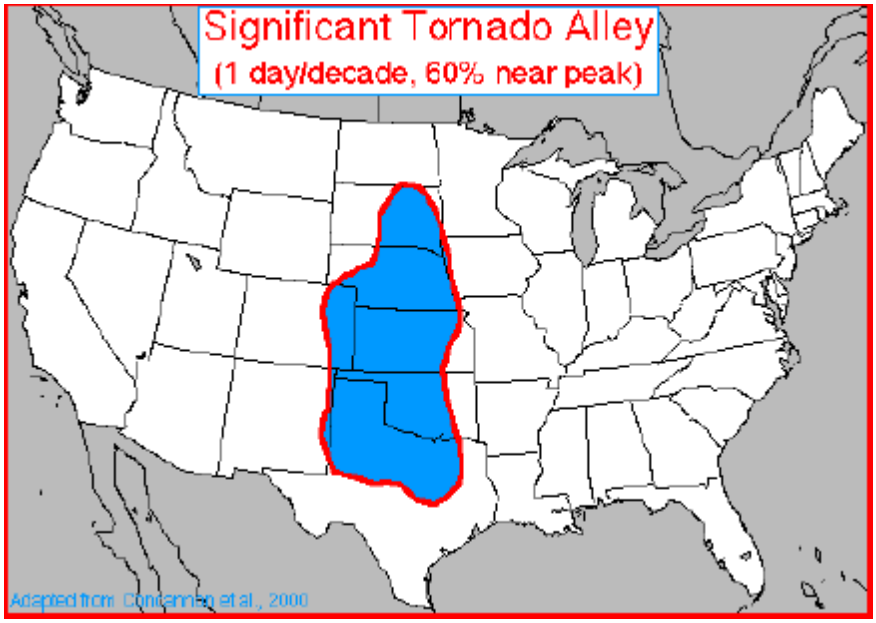
Figure 11-1: United States Wind Zones



www.fema.gov/plan/prevent/saferoom/tsfs02_wind_zones.shtm

Tornado Alley refers to an area in the southern plains of the central United States that experiences a higher-than-normal frequency of tornadoes each year due to weather patterns and geography. This area extends from central Texas to northern Iowa, and from central Kansas and Nebraska east to Western Ohio (Figure 11-2). Tornadoes in this region typically occur in late spring and occasionally in the early fall. The Polk County planning area is 50- 100 miles south of the southern border of Tornado Alley.

Figure 11-2: Tornado Alley



Source: https://www.ncdc.noaa.gov/file/1535

Extent

Tornado events prior to 2007 follow the original Fujita scale, Table 11-1 on the following page. The current measure of the extent of tornado damage is the enhanced Fujita scale and it took effect on February 1st, 2007. The scale ranges from EF0, generally weak tornadoes with the ability to do minor damage, to EF5, tornadoes with winds in excess of 200mph and the ability to do devastating damage to areas they come in contact with. Tornados can range from weak to violent and typically cause the greatest damage to structures of light construction, such as single-family, manufactured, and mobile homes.

Table 11-1: The Fujita Tornado Scale

Scale	Wind speed estimate (mph)	Potential damage	Example of damage
F0	40-72	Light damage.	Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage.	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving vehicles pushed off the roads; attached garages may be destroyed.
F2	113-157	Significant damage.	Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; high-rise windows broken and blown in; light-object missiles generated.

F3	158-206	Severe damage.	Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forests uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage.	Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown, and large missiles generated.
F5	261-318	Incredible damage.	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile-sized missiles fly through the air farther than 100 meters (110 yards); trees debarked; steel-reinforced concrete structures badly damaged and skyscrapers toppled.

Source: https://www.spc.noaa.gov/faq/tornado/f-scale.html

Table 11-2: The Enhance Fujita Tornado Scale

Scale	Wind speed estimate (mph)	Potential damage	Example of damage
EF0	65–85	Minor damage.	Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.
EF1	86-110	Moderate damage.	Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111–135	Considerable damage.	Considerable damage. Roofs torn off from well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off the ground.

EF3	136–165	Severe damage.	Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations are badly damaged.
EF4	166–200	Devastating damage.	Well-constructed and whole-frame houses are completely leveled; cars and other large objects are thrown, and small missiles are generated.
EF5	>200	Incredible damage.	Strong-framed, well-built houses leveled off foundations are swept away; steel-reinforced concrete structures are critically damaged; tall buildings collapse or have severe structural deformations; some cars, trucks, and train cars can be thrown approximately 1 mile (1.6 km).

Source: https://www.spc.noaa.gov/efscale/ef-scale.html

The Enhanced Fujita Scale has 28 Damage Indicators (DI), or types of structures and vegetation, each with a varying number of Degrees of Damage (DoD). Larger degrees of damage done to the damage indicators correspond to higher wind speeds. Each damage indicator has a unique Degree of Damage scale, summarized in Table 11-3. For example, damage indicator two, One and Two-family Residences, Degree of Damage Scale is provided as Figure 11-3. For Degree of Damage Scales for the remaining Damage Indicators refer to the National Oceanic and Atmospheric Administration website. http://www.spc.noaa.gov/faq/tornado/ef-scale.html

Table 11-3: Degrees of Damage Scale

1	Small barns or farm outbuildings (SBO)	8
2	One- or two-family residences (FR12)	10
3	Manufactured home – single-wide (MHSW)	9
4	Manufactured home – double wide (MHDW)	12
5	Apartments, condominiums, townhouses [three stories or less] (ACT)	6
6	Motel (M)	10
7	Masonry apartment or motel building (MAM)	7
8	Small retail building [fast-food restaurants] (SRB)	8
9	Small professional buildings [doctor's office, branch banks] (SPB)	9
10	Strip mall (SM)	9
11	Large shopping mall (LSM)	9
12	Large, isolated retail building [K-Mart, Wal-Mart] (LIRB)	7
13	Automobile showroom (ASR)	8
14	Automobile service building (ASB)	8
15	Elementary school [single-story; interior or exterior hallways] (ES)	10
16	Junior or senior high school (JHSH)	11
17	Low-rise building [1–4 stories] (LRB)	7
18	Mid-rise building [5–20 stories] (MRB)	10
19	High-rise building [more than 20 stories] (HRB)	10

20	Institutional building [hospital, government, or university building] (IB)	11
21	Metal building system (MBS)	8
22	Service station canopy (SSC)	6
23	Warehouse building [tilt-up walls or heavy-timber construction] (WHB)	7
24	Electrical transmission lines (ETL)	6
25	Free-standing towers (FST)	3
26	Free-standing light poles, luminary poles, flag poles (FSP)	3
27	Trees: hardwood (TH)	5
28	Trees: softwood (TS)	5

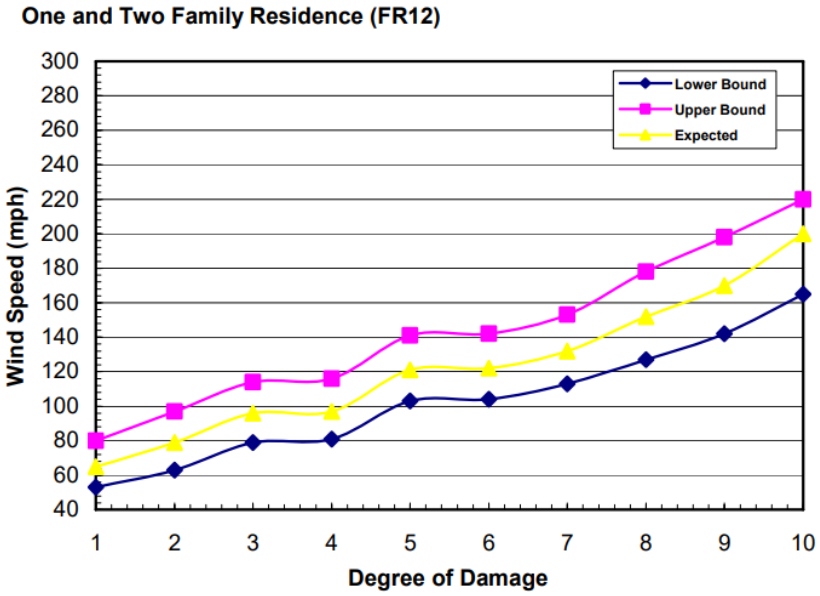
Figure 11-3: One and Two-Family Residences Degree of Damage Indicator

Typical Construction

- Asphalt shingles, tile, slate or metal roof covering
- Flat, gable, hip, mansard or mono-sloped roof or combinations thereof
- Plywood/OSB or wood plank roof deck
- Prefabricated wood trusses or wood joist and rafter construction
- Brick veneer, wood panels, stucco, EIFS, vinyl or metal siding
- Wood or metal stud walls, concrete blocks or insulating-concrete panels
- Attached single or double garage

DOD*	Damage description	Exp**	LB	UB
1	Threshold of visible damage	65	53	80
2	Loss of roof covering material (<20%), gutters and/or awning; loss of vinyl or metal siding	79	63	97
3	Broken glass in doors and windows	96	79	114
4	Uplift of roof deck and loss of significant roof covering material (>20%); collapse of chimney; garage doors collapse inward or outward; failure of porch or carport	97	81	116
5	Entire house shifts off foundation	121	103	141
6	Large sections of roof structure removed; most walls remain standing	122	104	142
7	Exterior walls collapsed	132	113	153
8	Most walls collapsed in bottom floor, except small interior rooms	152	127	178
9	All walls collapsed	170	142	198
10	Destruction of engineered and/or well constructed residence: slab swept clean	200	165	220

* DOD is degree of damage **Wind Speed values are in mph



The tornadic events in the Polk County planning area have been between EF0 and EF1 (Table 11-4). However, because Polk County is in Wind Zone III, the planning area could experience anywhere from an EF0 to an EF4. Therefore, the range of intensity that the planning area would be expected to mitigate is a tornado event that would be a low to severe risk, an EF0 to EF3.

Historical Occurrences

Table 11-4 lists historical tornado events in the planning area from 1999-2024 that were reported to the NCEI or NOAA. The impact of each tornado event in Polk County is listed by date with additional impact information related to the specific jurisdiction of touchdown, the magnitude of the event, total dollar losses related to crop and property damage, injuries, and fatalities. There have not been any events recorded past the listed dates.

Table 11-4: Historical Tornado Events by Jurisdiction, 1999 – 2024

Location	Date	Magnitude	Death	Injuries	Property Damage	Crop Damage
Onalaska	10/13/3001	F1	0	0	$25,000	$0
Corrigan	03/30/2002	F0	0	0	$20,000	$0
Livingston	06/12/2003	F0	0	0	$0	$0

Lake Livingston Dam	11/23/2004	F0	0	0	$5,000	$0
Segno	04/29/2006	F0	0	0	$200,000	$0
Alabama/Coushatta Res	04/25/2007	Ef0	0	0	$0	$0
Livingston	05/03/2007	Ef0	0	0	$0	$0
Onalaska	04/25/2011	Ef0	0	0	$1,000	$0
Soda	02/10/2013	Ef0	0	1	$50,000	$0
East Tempe	07/15/2017	Ef0	0	0	$40,000	$0
Onalaska	04/22/2020	Ef3	3	33	$5,000,000	$0

Source: NCEI Storm Events Database

Table 11-5: Historical Tornado Events Magnitude Summary, 1999 - 2006

Number of Events	Magnitude (Fujita Scale)						
	N/A	F0	F1	F2	F3	F4	F5
5	0	5	1	0	0	0	0

Table 11-6: Historical Tornado Events Magnitude Summary, 2007-2024

Number of Events	Magnitude (Enhanced Fujita Scale)						
	N/A	EF0	EF1	EF2	EF3	EF4	EF5
6	0	5	0	0	1	0	0

The locations of previous occurrences from 1950 through 2017 in the planning area are shown in Figure 11-5. This map displays historic tornado tracks, the distance traveled, and the direction of they traveled. Only reported tornadoes were plotted and factored into the risk

assessment, however, several occurrences have likely gone unreported over the past 67 years.

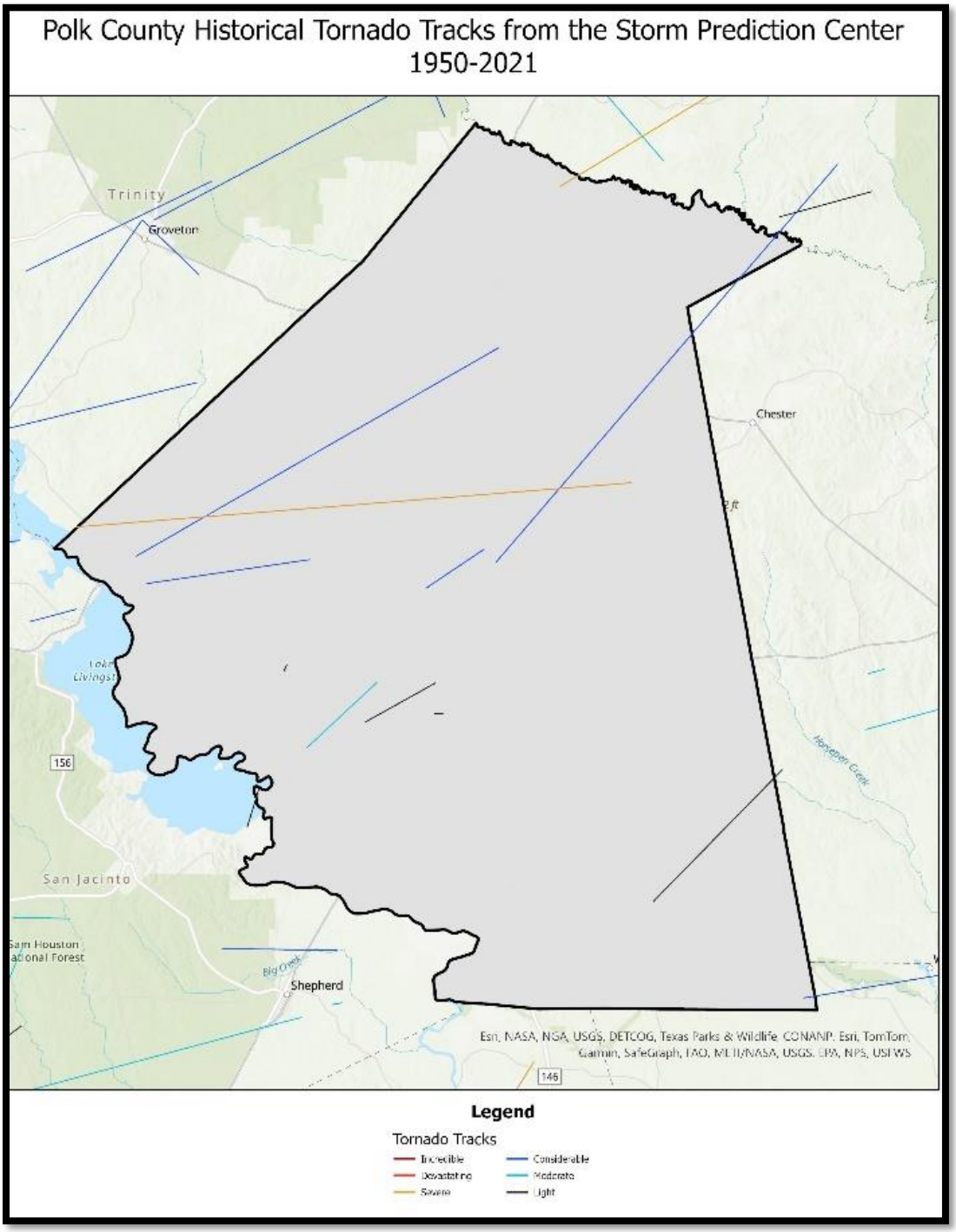


Figure 11-4: Historic Tornado Tracks 1950-2021, Distance Travelled, Magnitude, and Direction

Significant Event

April 22nd, 2020

A tornado touched down on the eastern shore of Lake Livingston, just NW of Onalaska then moved Southeast across the town then East-Southeast across Polk County. Some of the most significant damage was in the Paradise Acres area of Onalaska where winds reached up to 140 mph leading to confirmed EF3 damage. The tornado killed three and injured 33 in Onalaska with 291 homes affected and 46 destroyed. It was slightly more than a quarter-mile wide as it moved across the town. The tornado continued a general east-northeastward track across rural Polk County growing in size and destroying trees and scattered structures. It then crossed Highway 59 near Seven Oaks, where EF2 damage was surveyed, including the destruction of two mobile homes and damage to hardwood trees. The tornado remained in rural areas until it ended very close to Barnes in northeast Polk County. This was the deadliest single tornado for the NWS Houston-Galveston forecast area since Nov 15th, 1987, when a tornado also killed three in Madison County. This tornado caused over $5,000,000 in damage to Polk County.

Only one other Tornado in the period of analysis has injured a person, when on February 10th, 2023, a tornado resulting from a thunderstorm touched down and injured a man in a mobile home, this tornado produced $50,000 of EF0 Damage.

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

According to historical records, there were 12 events in a 25-year reporting period in the planning area. This provides a probability of occurrence of approximately once every three years for the Polk County planning area. This frequency supports a **likely** probability of future events for the planning area, including all participating jurisdictions, meaning that an event is probable in the next five years.

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

Vulnerability and Impact

All existing and future buildings, facilities, and populations in the Polk County planning area are considered to be vulnerable to tornados and could potentially be impacted. High wind velocity, wind-blown debris, lightning, and large hail are typically the cause of damage done by a tornado. The high winds and flying debris can cause roofs to collapse, windows to shatter, and walls to crumble. Tornadoes can also cause significant damage to buildings, roads, bridges, and other infrastructure in cities. First responders and those needing to evacuate an area may encounter blocked roads as a result of the debris rendering some areas inaccessible or inescapable. Tornadoes can have a significant impact on the local economy as well, causing damage to businesses and homes, as well as disrupting transportation and causing productivity losses. The psychological trauma of experiencing a tornado, losing property or loved ones, or being displaced from one's home can have lasting effects on mental health.

Tornadoes pose a severe threat to communities as they often result in power outages, which could cause health and safety risks to vulnerable populations who rely on electricity for medical necessities, as well as patients in hospitals. Power outages can also disrupt electricity supply to neighborhoods and even entire cities, causing problems with heating, cooling, lighting, and communication. Anyone in the path of a tornado can incur serious injuries or even fatalities. Falling trees, branches, utility lines, poles, and flying debris pose safety risks, and people caught in the open or unable to take adequate cover are at the highest risk of injury or death. Certain buildings and structures are more prone to damage than others from the high wind velocity associated with tornado events. The three most susceptible types of structures to tornado damage are:

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

The Polk County planning area features mobile and manufactured home parks. Because manufactured and temporary housing is located sporadically throughout rural portions of the planning area, they are not only vulnerable to tornado hazards but more prone to being isolated from essential needs and emergency services in the event of a disaster. Additionally, any structures built prior to 1980 are likely to have been built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant events.

Table 11-8: Structures at Greater Risk by Jurisdiction

Jurisdiction	Total Housing Units	Mobile Housing Units	Housing Built Before 1980
Polk County*	25,087	5,681 (22 %)	9805 (39%)
City of Livingston	861	94 (11 %)	462 (54%)
City of Onalaska	1674	878 (22 %)	501(33%)
City of Corrigan	885	112 (12.6 %)	584(64%)
City of Goodrich	168	43 (25.6 %)	106 (63%)
City of Seven Oaks	77	9 (11.7%)	57 (74%)

Based on the ACS 2022 data, the City of Goodrich is at the highest risk considering the significant percentage of Mobile Housing Units and the third highest percentage of housing units built before 1980. All other communities except for Onalaska have at least half of their housing units built before 1980, constituting a significant vulnerability for these communities.

Historic Tornado Impacts

The summary table on the following page, 11-9, shows the 25-year property and crop damage totals as well as the average annual (Per Year) losses summarizing historic tornado impacts. The bottom half of the table shows per capita dollar loss rates for the total and average annual losses. These rates are important measures for comparing losses between different hazards and areas. The average annual loss estimate of property and crops is $213,640 for Polk County.

Table 11-9, Polk County Loss Summary

Time Period	Fatalities	Injuries	Property Damage	Crop Damage
Loss Summary, Polk County				
25-year Total	3	34	$5,341,000.00	$0
Per Year	.12	1.36	$213,640.00	$0
Per Capita Dollar Losses				
25-year Total	0	0	$106.00	$0
Per Year	0	0	$4.24	$0

Since weather varies from year to year, forecasts of specific years are less likely to be true (less reliable) than these totals and averages for the period. The second summary table shows per capita dollar loss rates based on 2020 Census population counts. This is an important measure for comparing historical losses between different hazards and areas. Table 11-10 below displays the tornado losses by jurisdictions within the planning area.

Table 11-10: Tornado Losses by Jurisdiction 1999-2024

Jurisdiction	Est. Prop. Losses	Est. Crop Losses	Total Est. Losses
Polk Co.	$295,000	$0	$295,000

Onalaska	$5,026,000	$0	$5,026,000
Livingston	$0	$0	$0
Alabama Coushatta Reservation	$0	$0	$0
Corrigan	$20,000	$0	$20,000

*Unincorporated Areas, ISD, and other district losses are included in County Totals

SECTION 12: HAILSTORMS

Description

Hail is showery precipitation in the form of irregular pellets or balls of ice that typically measure 0.2 inches and six inches in diameter. It is a particularly damaging form of frozen precipitation resulting from thunderstorms, with the size of the hail being a direct result of the size and severity of the storms. Hail is produced when warm air rapidly rises into the upper atmosphere and the air mass is cooled. Frozen droplets within the cooled air mass accumulate to form ice crystals that then fall to the Earth as precipitation. The strength of the updraft is dependent on heating on the surface of the Earth with larger temperature gradients between the upper atmosphere and the surface responsible for increased suspension time and, therefore, increased hailstone size.

Location

Hailstorms are not confined to any specific geographic location and can vary greatly in size, location, intensity, and duration. As a result, all areas within the Polk County planning area are equally at risk of hail.

Extent

The NCEI Intensity Scale, depicted in Table 12-1, shows how the intensity category of a hailstorm depends on hail size and the potential damage it could cause. The intensity scale 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. The National Weather Service (NWS) classifies a storm as “severe” if there is hail one inch in diameter (approximately the size of a quarter) or greater, based on radar intensity or as seen by observers. Based on historical data, hail of up to 2.5 inches can be expected in the planning area.

Table 12-1: Hail Intensity and Magnitude

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 - 1.2	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 Polk County area may experience hailstorms ranging from an H0 to an H10 based on previous occurrences for the area discussed further below. The planning area can plan to mitigate storms ranging from hard hail (low risk) to super hailstorms (high risk), the latter potentially leading to widespread destruction of glass, and roofs, and potential risk of injuries.

Historical Occurrences

Historical evidence for Polk County suggests that the entire planning area is vulnerable to hail events. Historical events with reported damage, injuries, or fatalities are shown in Table 12-2 below. A total of 64 reported historical hail events impacted Polk County during the 25-year period from 1999 through 2024. These reported events may not represent all hail events to have occurred during this time since they were only the events reported to NCEI and NOAA databases. There have not been any events recorded past the listed dates.

Table 12-2: Historical Hail Events

Community	Date	Hail Size	Injuries	Deaths	Property Damage	Crop Damage
Corrigan	1/22/1999	1.75 In.	0	0	$15,000.00	$0
Onalaska	2/27/1999	0.75 In.	0	0	$3,000.00	$0
Lake Livingston Dam	2/27/1999	1.75 In.	0	0	$15,000.00	$0
Corrigan	4/3/1999	0.75 In.	0	0	$10,000.00	$0
Corrigan	5/2/1999	1.00 In.	0	0	$15,000.00	$0
Moscow	4/7/2000	0.75 In.	0	0	$10,000.00	$0
Alabama/Coushatta Res	4/16/2001	1.75 In.	0	0	$15,000.00	$0
Livingston	10/12/2001	0.75 In.	0	0	$2,000.00	$0
Corrigan	3/25/2002	1.50 In.	0	0	$25,000	$0
Livingston	3/30/2002	0.75 In.	0	0	$5,000.00	$0
Livingston	8/3/2002	0.75 In.	0	0	$3,000.00	$0
Corrigan	8/26/2002	1.00 In.	0	0	$5,000.00	$0
Livingston	12/23/2002	0.75 In.	0	0	$3,000.00	$0
Livingston	2/21/2003	0.75 In.	0	0	$5,000.00	$0
Moscow	2/21/2003	0.75 In.	0	0	$5,000.00	$0
Livingston	2/21/2003	0.75 In.	0	0	$5,000.00	$0
Onalaska	2/23/2003	0.75 In.	0	0	$5,000.00	$0
Corrigan	2/23/2003	1.00 In.	0	0	$8,000.00	$0
Moscow	4/20/2003	1.75 In.	0	0	$3,000.00	$0
Lake Livingston Dam	6/12/2003	1.00 In.	0	0	$2,000.00	$0
Onalaska	4/7/2004	1.50 In.	0	0	$50,000.00	$0
Onalaska	4/10/2004	1.75 In.	0	0	$30,000.00	$0
Goodrich	4/10/2004	1.75 In.	0	0	$5,000.00	$0

Alabama/Coushatta Res	4/10/2004	1.75 In.	0	0	$20,000.00	$0
Alabama/Coushatta Res	5/31/2004	0.75 In.	0	0	$6,000.00	$0
Camden	3/19/2005	0.88 In.	0	0	$2,000.00	$0
Corrigan	3/22/2005	0.88 In.	0	0	$4,000.00	$0
Livingston	3/22/2005	0.75 In.	0	0	$4,000	$0
Livingston	5/29/2005	0.88 In.	0	0	$4,000.00	$0
Onalaska	8/22/2005	1.75 In.	0	0	$50,000.00	$0
Livingston	4/21/2006	1.00 In.	0	0	$5,000.00	$0
Livingston	5/10/2006	1.75 In.	0	0	$25,000.00	$0
Livingston	5/10/2006	0.75 In.	0	0	$ 4,000.00	$0
Onalaska	8/17/2006	1.00 In.	0	0	$ 8,000.00	$0
Livingston	5/3/2007	1.75 In.	0	0	$0	$0
Seven Oaks	5/11/2008	0.75 In.	0	0	$0	$0
Alabama/Coushatta Res	10/22/2008	0.75 In.	0	0	$1,000.00	$0
Lake Livingston Dam	5/3/2009	0.75 In.	0	0	$1,000.00	$0
Livingston	5/26/2009	1.00 In.	0	0	$1,000.00	$0
Corrigan	6/3/2009	0.75 In.	0	0	$0	$0
Moscow	6/3/2009	0.88 In.	0	0	$ 0	$0
Corrigan	8/25/2009	1.75 In.	0	0	$5,000.00	$0
Providence Camp	1/30/2011	1.75 In.	0	0	$0	$0
New Hope	4/4/2012	1.00 In.	0	0	$1,000.00	$0
Providence Camp	4/4/2012	1.00 In.	0	0	$1,000.00	$1,000.00
Corrigan	5/21/2013	1.00 In.	0	0	$0	$0
Corrigan	6/6/2013	0.75 In.	0	0	$0	$0
Livingston	3/28/2014	1.00 In.	0	0	$0	$0
Alabama/Coushatta Res	4/16/2015	1.00 In.	0	0	$0	$0
Onalaska	5/11/2015	0.75 In.	0	0	$0	$0
Leggett	1/8/2016	1.75 In.	0	0	$5,000.00	$0
Blanchard	5/1/2016	0.88 In.	0	0	$0	$0
Corrigan	4/26/2017	0.75 In.	0	0	$0	$0
Corrigan	4/26/2017	1.25 In.	0	0	$0	$0
Blanchard	3/18/2018	1.75 In.	0	0	$0	$0
Marston	3/18/2018	1.25 In.	0	0	$0	$0
Leggett	3/18/2018	1.00 In.	0	0	$0	$0
Onalaska	5/9/2019	4.50 In.	0	0	$0	$0

Onalaska	5/9/2019	1.75 In.	0	0	$0	$0
Camp Ruby	5/11/2021	1.00 In.	0	0	$4,000.00	$0
Blanchard	5/11/2021	1.00 In.	0	0	$0	$0
Moscow	4/26/2023	0.88 In.	0	0	$0	$0
Seven Oaks	4/26/2023	0.88 In.	0	0	$0	$0
Kickapoo	2/11/2024	1.50 In.	0	0	$0	$0

Figure 12-2 below plots this historical evidence by locating past hail events in the Polk County planning area where latitude and longitude were available.

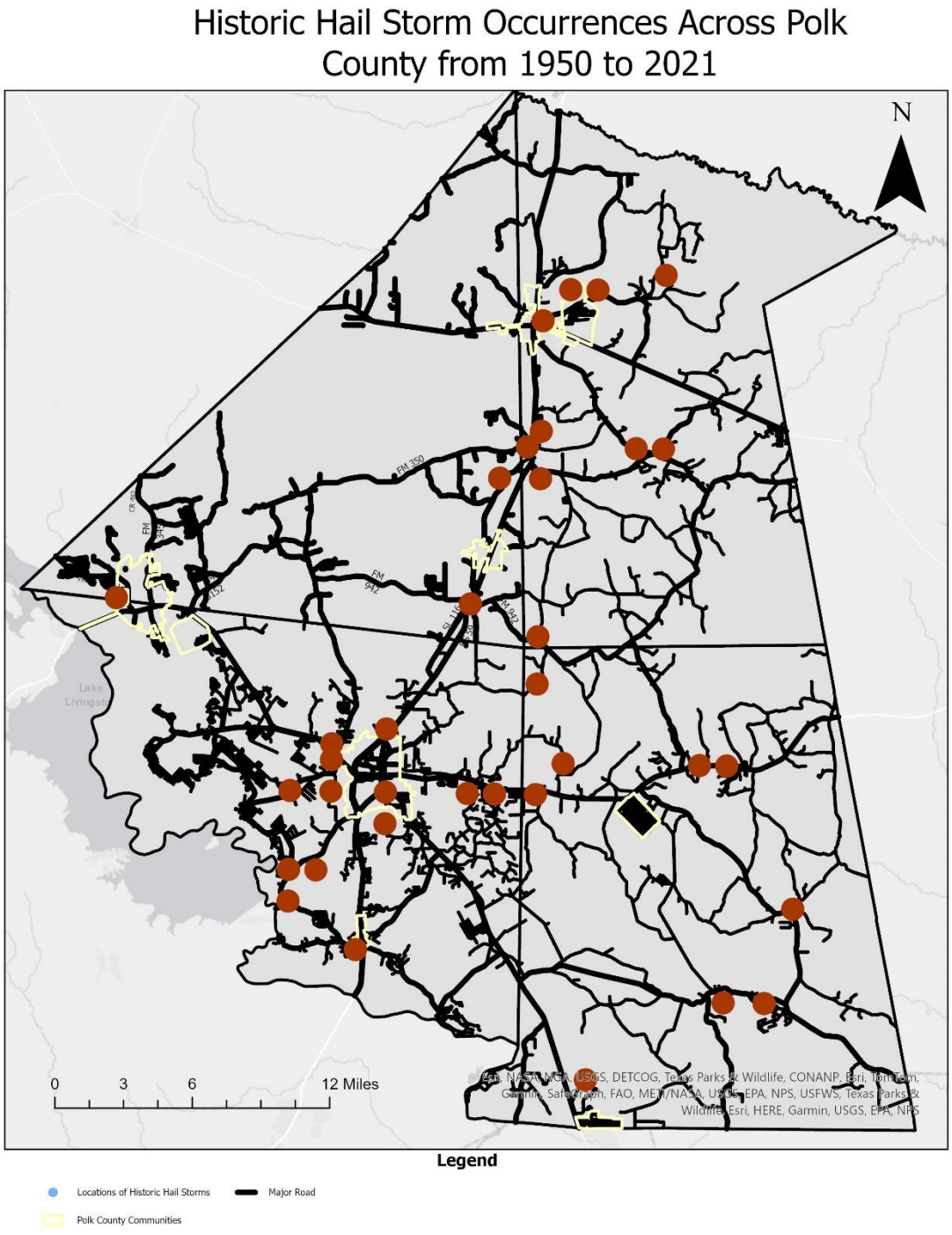


Figure 12-2: Significant Events

While there have been no documented deaths or injuries related to hailstorms in Polk County, all core plan members except for Seven Oaks and other plan stakeholders such as the Alabama-

Coushatta Reservation, and the Lake Livingston dam have experienced a combined $395,000 in damages from hail over the past 25 years. Almost all reported hailstorms have been at H5 magnitude or lower, with one hailstorm reporting tennis to softball-sized hail in early May of 2019.

Probability of Future Events

Based on available records of historic events there were 58 events in a 25-year reporting period for the Polk County planning area. This provides a probability of at least one event every year. This frequency supports a **highly likely** probability of future events meaning that an event is probable somewhere in the planning area in the next year.

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

Vulnerability and Impact

Hail can cause significant injury to humans and has been fatal in some circumstances. People could be struck by hail, falling trees, and branches. Also, hail could cause power outages, which could cause health and safety risks to more vulnerable populations in the planning area. The most common impacts of hailstorms are on crops, trees, and landscaping since even small hail can tear plants apart in a short amount of time. Vehicles, roofs of buildings, and homes are also commonly damaged by hail. Older structures not built to current codes may be more susceptible to hail damage than newer structures. HVAC and electrical service systems, particularly those on roofs, at schools, and critical facilities would be vulnerable and could also be damaged.

The Polk County planning area features mobile and manufactured home parks which are more vulnerable to hailstorms than site-built structures. In addition, manufactured and temporary housing is located sporadically throughout rural portions of the planning area which are also vulnerable to the hailstorm hazard and more prone to being isolated from essential needs and emergency services in the event of a disaster. Also, structures built prior to 1980 are likely to have been built to lower or less stringent construction standards than newer construction and may be more susceptible to damage during significant events.

Table 12-3: Structures at Greater Risk by Jurisdiction

Jurisdiction	Total Housing Units	Mobile Housing Units	Housing Built Before 1980
Polk County*	25,087	5,681 (22 %)	9805 (39%)
City of Livingston	861	94 (11 %)	462 (54%)
City of Onalaska	1674	878 (22 %)	501(33%)
City of Corrigan	885	112 (12.6 %)	584(64%)
City of Goodrich	168	43 (25.6 %)	106 (63%)
City of Seven Oaks	77	9 (11.7%)	57 (74%)

*County totals include all jurisdictions, ISDs, and ESDs, in addition to unincorporated areas. Source: 2022 American Community Survey 5-year estimate, selected housing characteristics.

Based on the ACS 2022 data, the City of Goodrich is at the highest risk considering the significant percentage of Mobile Housing Units and the third highest percentage of housing units built before 1980. All other communities except for Onalaska have at least half of their housing units built before 1980, constituting a significant vulnerability for these communities. To mitigate the risks associated with the impacts of hailstorms, it is important to have early warning systems in place, build structures that can withstand high-velocity impacts from hail, and establish emergency response plans to quickly respond to disasters.

Historic Hailstorm Impacts

The summary table below, 12-4, shows the 25-year property and crop damage totals as well as the average annual (Per Year) losses summarizing historic hailstorm impacts. The bottom half of the table shows per capita dollar loss rates for the total and average annual losses. These rates are important measures for comparing losses between different hazards and areas. The average annual loss estimate of property and crops is $15,840 for Polk County.

Table 12-4, Polk County Loss Summary

Time Period	Fatalities	Injuries	Property Damage	Crop Damage
Loss Summary, Polk County				
25-year Total	0	0	$395,000	$1000

Per Year	0	0	$15,800	$40
Per Capita Dollar Losses				
25-year Total	0	0	$7.90	$0
Per Year	0	0	$0.32	$0

Since weather varies from year to year, forecasts of specific years are less likely to be true (less reliable) than these totals and averages for the period. The second summary table shows per capita dollar loss rates based on 2020 Census population counts. This is an important measure for comparing historical losses between different hazards and areas. Table 12-5 below displays the hailstorm losses by jurisdictions within the planning area.

Table 12-5: Hailstorm Losses by Jurisdiction 1999-2024

Jurisdiction	Est. Prop. Losses	Est. Crop Losses	Total Est. Losses
Polk Co.	$91,000	$1000	$92,000
City of Onalaska	$146,000	$0	$146,000
City of Seven Oaks	$0	$0	$0
City of Corrigan	$87,000	$0	$87,000
City of Goodrich	$5,000	$0	$5,000
City of Livingston	$0	$0	$0

*Unincorporated communities are included in County Totals

SECTION 13: WILDFIRE

Description

Wildfires are unplanned, unwanted fires burning uncontrolled in a natural area rich with vegetative fuels, like a forest, grassland, or prairie. Meteorological conditions such as high temperatures, low humidity, droughts, and high wind increase wildfire risk. Sparks from agricultural, industrial, or automobile activity are often the cause of wildfires with humans the most common source of initial ignition. Wildfires can also be naturally ignited by lightning strikes as a part of the natural management of forest ecosystems. While wildfires can occur any time of year, they are especially likely over the spring and summer months, when fuel is often dry so flames can move unchecked through a highly vegetative area.

Source: http://texasforestservice.tamu.edu

Location

Wildfires are most likely to occur in open grasslands but are not confined to any specific geographic location and can vary greatly in terms of size, location, intensity, and duration. The populated, urban areas of the planning area are less likely to experience large, sweeping fires. The more rural and sparsely populated unincorporated areas of Polk County are more vulnerable to large sweeping wildfire events. The threat to people and property is greatest in the wildland-urban interface/intermix, however, the entire planning area of Polk County is at risk for wildfires.

Extent

The likelihood that a wildfire event will occur in the planning area is measured using the Keetch Byram Drought Index (KBDI) and the Texas Forest Service's Fire Intensity Scale (FIS). The KBDI describes the potential for wildfire based upon weather conditions such as daily water balance, precipitation, and soil moisture (Table 13-1). The index ranges from 0-800 with a score of 0 indicating no moisture depletion and a score of eight hundred representing completely dry conditions.

Table 13-1, Keetch Byram Drought Index (KBDI)

KBDI Score Range	Description
0-200	Soil moisture and large-class fuel moisture are high and do not contribute much to fire intensity. Typical early spring following winter precipitation.
200-400	Fuels are beginning to dry and contribute to wildfire intensity. Heavier fuels will still not readily ignite and burn. This is often seen in late spring or early summer.
400-600	Lower litter and duff layers contribute to fire intensity and will burn actively. Wildfire intensity begins to increase significantly. Larger fuels could burn or smolder for several days. This is often seen in late summer and early fall.
600-800	Often associated with more severe drought with increased wildfire occurrence. Intense, deep-burning fires with extreme intensities can be expected. Live fuels can also be expected to burn actively at these levels.

The average KBDI values for the planning area is approximately 445 and is the average extent to be mitigated (Table 13-2). Based on Figure 13-1 below, the Polk County planning area exhibits values in the 700-800 range throughout its entirety as of the time of this report. At these levels, often associated with more severe drought, fire intensity, and occurrence increases significantly, and fires readily burn in all directions. The KBDI is a good measure of the readiness of fuels to ignite in the event of a wildfire. Drought or extreme weather conditions can greatly influence the KDBI in a short period of time so current KBDI should always be monitored to more accurately assess risk. The figure and data below are provided by the Texas Weather Service at Texas A&M Department of Ecosystem Science and Management and the following website can be regularly checked for updated information.

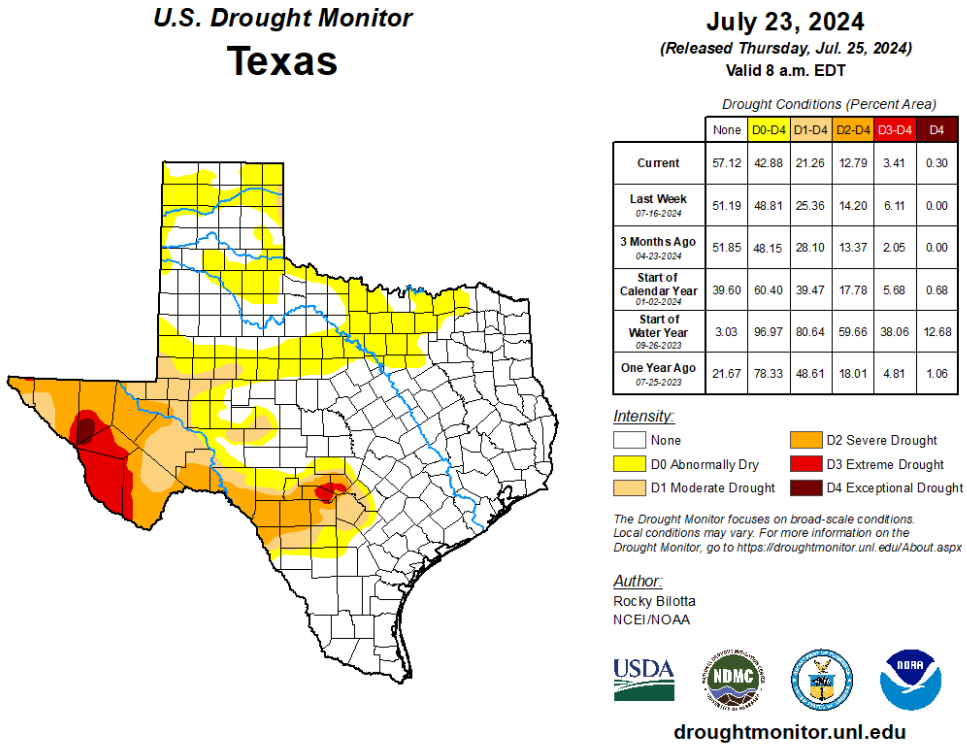


Figure 13-1, KBDI for the State of Texas on 7/23/2024

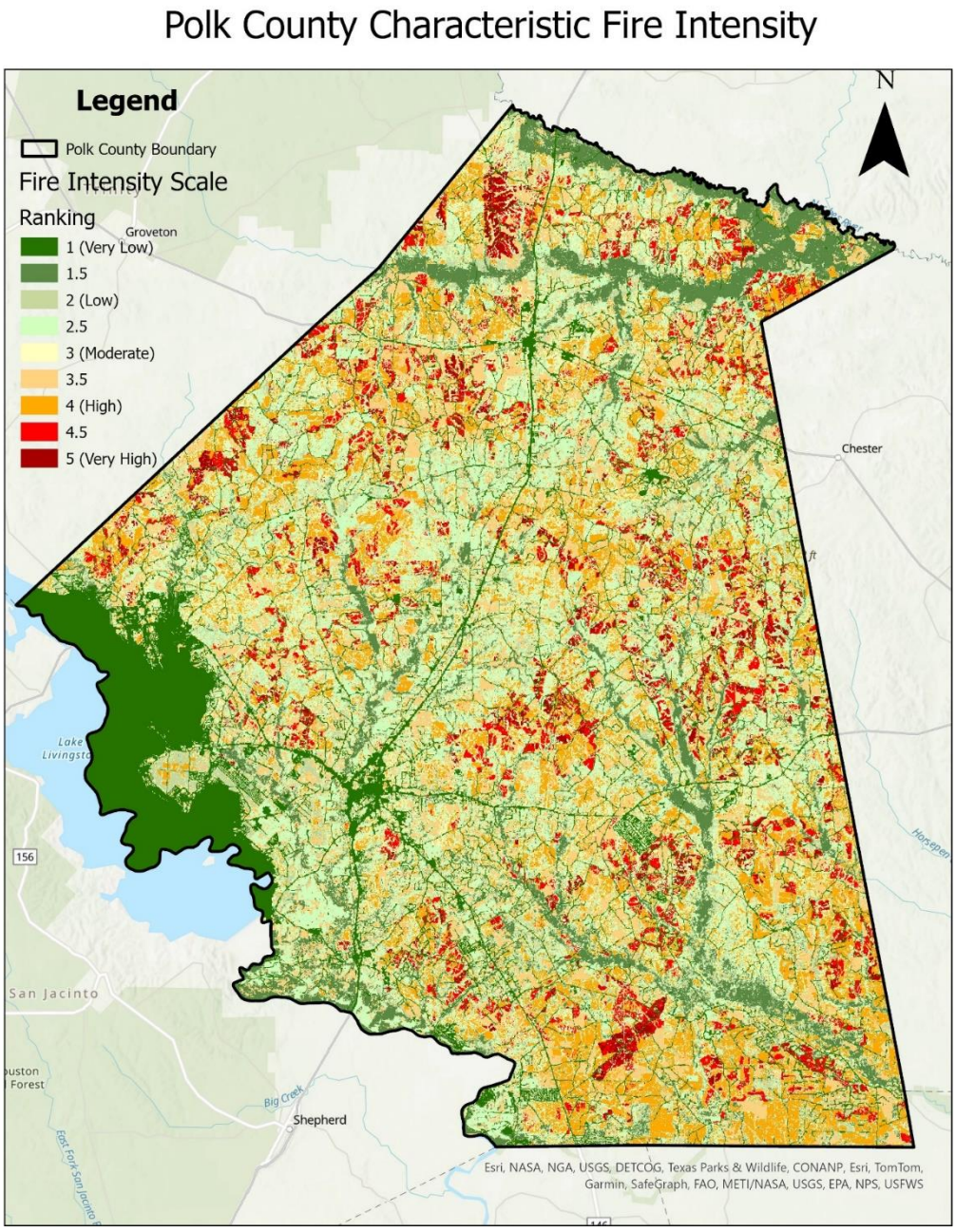
The Texas Wildfire Risk Assessment Portal (TXWRAP) is the primary mechanism for the Texas A&M Forest Service to deploy risk information and create awareness about wildfire issues across the state. www.TexasWildfireRisk.com The tool uses the Fire Intensity Scale (FIS) layer to determine the potential fire intensity for the specified location. FIS quantifies potential fire intensity based on high to extreme weather conditions, fuels, and topography. It is similar to the Richter scale for earthquakes, providing a standard scale to measure potential wildfire intensity by magnitude. FIS consists of five classes where the order of magnitude between classes is ten-fold. The minimum class, Class 1, represents very low wildfire intensities and the maximum class, Class 5, represents very high wildfire intensities.

- **Class 1, Very Low:** Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and nonspecialized equipment.

- **Class 2, Low:** Small flames, usually less than two feet long; small amount of very short-range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
- **Class 3, Moderate:** Flames up to eight feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
- **Class 4, High:** Large Flames, up to 30 feet in length; short-range spotting common; medium range spotting. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.
- **Class 5, Very High:** Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

The Fire Intensity Scale evaluates the potential fire behavior for an area, regardless of if any fires have occurred there in the past. This additional information allows local officials and mitigation planners to quickly identify areas where dangerous fire behavior potential exists in relation to nearby homes or other valued assets. **The wildfire risk for the Polk County planning area is moderate to high based on the characteristic wildfire intensity scale.**

Figure 13-2, Polk County Characteristic Fire Intensity Scale



Source: https://wrap.texaswildfirerisk.com/Map/Pro/#project-areas

Livingston	5% = or > FIS 4
Fire Intensity Scale	Percent of Community
1 (Very Low)	47.6%
1.5	3.3%
2 (Low)	6.6%
2.5	19.2%
3 (Moderate)	10.9%
3.5	7.3%
4 (High)	4.7%
4.5	0.2%
5 (Very High)	0.1%

Onalaska	11.5% = or > FIS 4
Fire Intensity Scale	Percent of Community
1 (Very Low)	44.6%
1.5	0.2%
2 (Low)	1.3%
2.5	16.3%
3 (Moderate)	14.6%
3.5	11.5%
4 (High)	9.1%
4.5	0.9%
5 (Very High)	1.5%

Corrigan	4.4% = or > FIS 4
Fire Intensity Scale	Percent of Community
1 (Very Low)	55.9%
1.5	2.1%
2 (Low)	5.4%
2.5	14.8%
3 (Moderate)	10.1%
3.5	7.3%
4 (High)	3.4%

Seven Oaks	4.2% = or > FIS 4
Fire Intensity Scale	Percent of Community
1 (Very Low)	20.0%
1.5	5.0%
2 (Low)	10.3%
2.5	30.1%
3 (Moderate)	11.7%
3.5	18.6%
4 (High)	3.2%

4.5	0.9%
5 (Very High)	0.1%

4.5	0.1%
5 (Very High)	0.9%

Goodrich	.9% = FIS 4
Fire Intensity Scale	**Percent of Community**
1 (Very Low)	53.4%
1.5	12.4%
2 (Low)	4.6%
2.5	14.2%
3 (Moderate)	5.6%
3.5	8.7%
4 (High)	0.9%

Based on the Fire Intensity Scale (FIS) data from TxWrap, Onalaska has the greatest percentage of municipal areas that is at High or greater FIS ranking, at 11.5% of the city at a significant risk of wildfire.

Historical Occurrences

The NCEI storm events database carries limited information on wildfire occurrence information with damage estimates of impacts, injuries, or fatalities in the planning area from 1999 to 2024. There have not been any Significant Events recorded.

Significant Events

June 17th 2011, The Bearing Fire

Starting in Polk County due to a spark from a wheel bearing and then moving northwest, the Bearing Fire spread rapidly due to the aforementioned 2011 drought and burned 23,000 acres including huge areas of timber stands worth between $12 to 18 million dollars. Twenty-five trailers at the Four Corners Hunting Club in Polk County were destroyed by the Bearing fire.

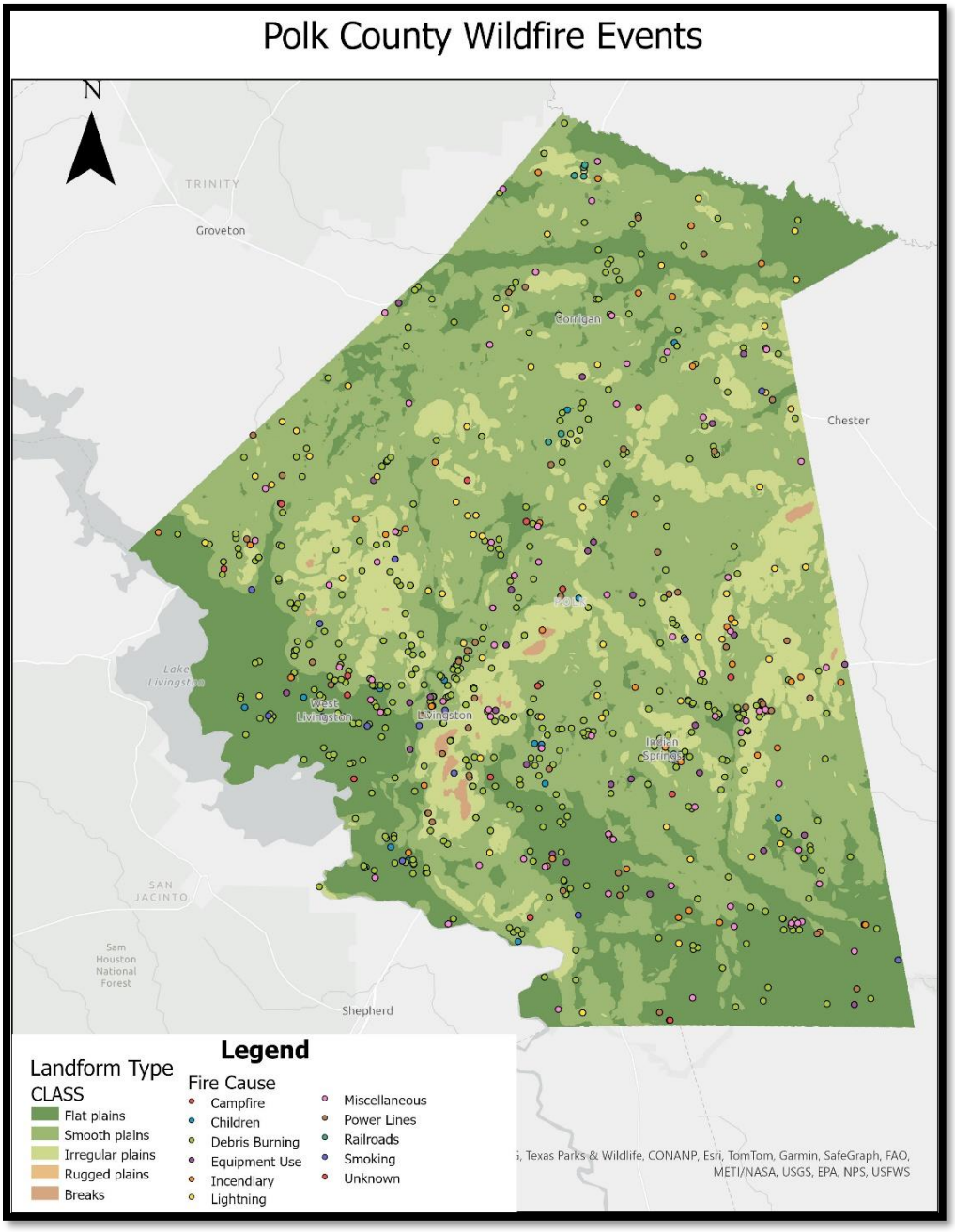


Figure 13-4: Historical Ignitions from 2005-2021

Table 13-3 below lists the ignition causes for all wildfires in the planning area between 2005-2021, the number of times of each unique ignition cause, and the percentage of total ignitions.

Table 13-3, Wildfire ignition causes from 2005-2021.

Ignition Cause	Count	% of Total
Campfire	6	.78%
Children	17	2.23%
Debris burning	465	61%
Equipment Use	31	4.1%
Incendiary	41	5.4%
Lightning	58	7.6%
Miscellaneous	71	9.3%
Power Lines	42	5.5%
Railroads	6	.78
Smoking	15	1.96%
Unknown	10	1.3%
Grand Total	762	100%

Source: Texas Wildfire Risk Assessment Portal (TxWRAP)

Probability of Future Events

Based on reported historical occurrences of wildfire, 762 wildfire events occurred in a 16-year reporting period for Polk County. This data establishes an approximate probability of occurrence of 47 events per year. This frequency supports a **highly likely** probability of future events, meaning a wildfire event is highly probable within the next year. The risk of future wildfires with greater impact on people and property will increase if existing development patterns continue into the wildlands.

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.

Unlikely: Event possible in next 10 years.

Vulnerability and Impact

Populations and structures that are most susceptible to wildfire risk are located in the wildland-urban interface and/or intermix (WUI). WUI fires occur in areas where the built environment meets undeveloped wildland or vegetative fuels. Natural vegetation provides the fuel for wildfires in natural uninhabited areas, while WUI fires consume both vegetation and materials from the built environment.

The severity of the impact of major wildfire events can be substantial. Such events have caused deaths and injuries, damaged or destroyed property and critical facilities, and disrupted infrastructure and services. The severity of impact is gauged by homes and structures lost, acreage burned, and the number of resulting injuries and fatalities. The vulnerability of the jurisdictions in the planning area to wildfire events is increased where critical facilities are in the WUI as they are more likely to sustain damage from the hazard event.

Figure 13-6: Wildland Urban Interface, City of Livingston

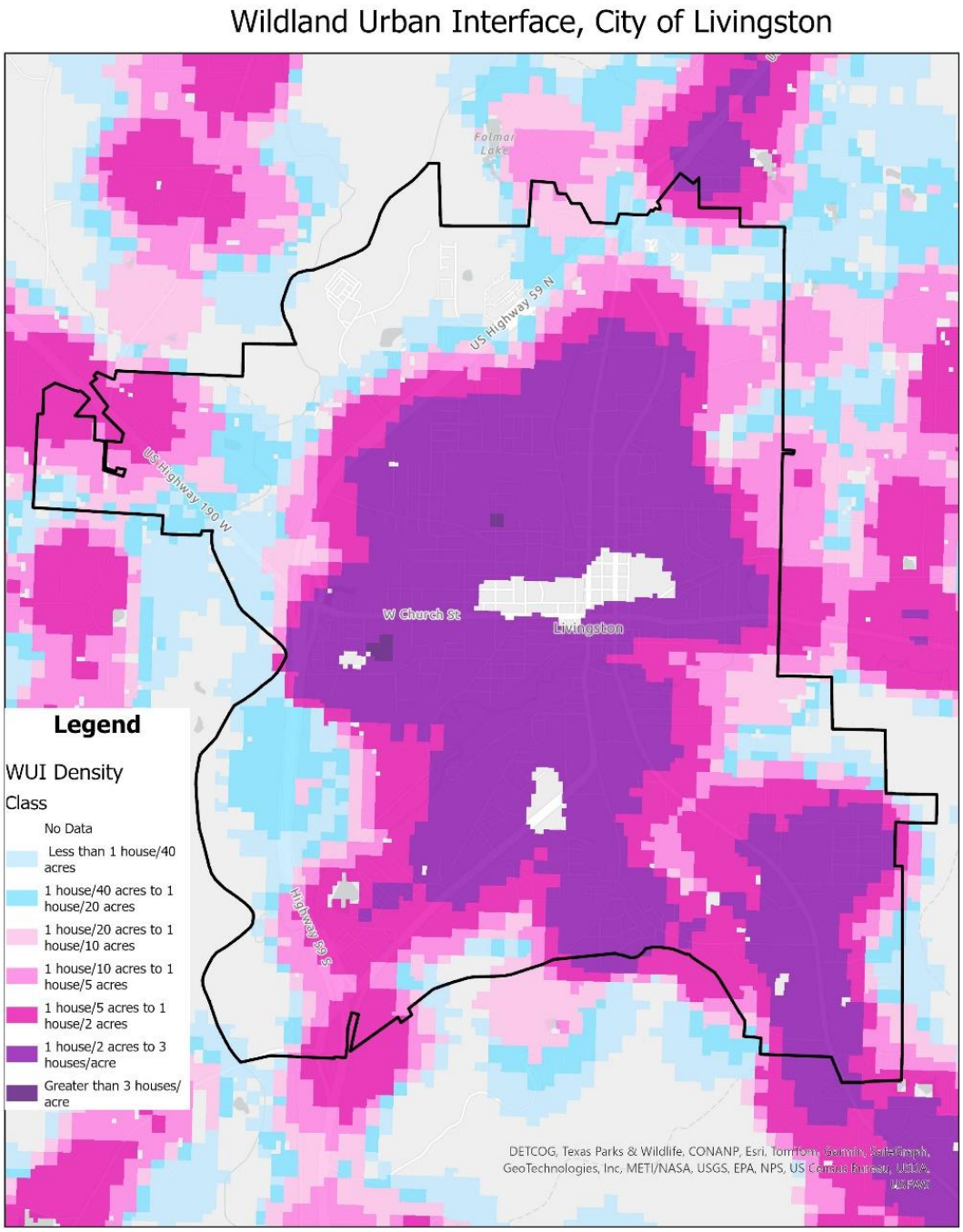


Figure 13-7: Wildland Urban Interface, City of Onalaska

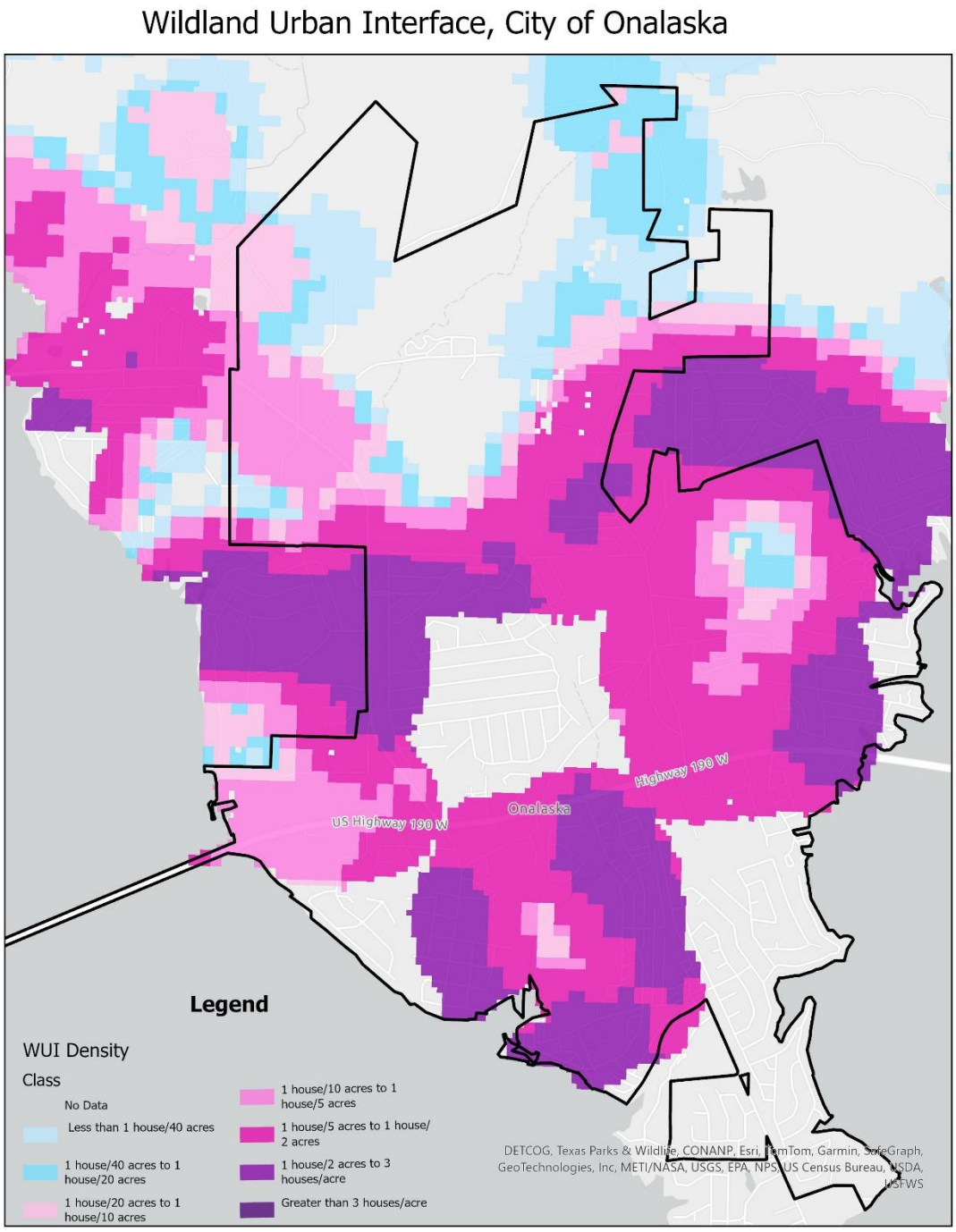


Figure 13-8: Wildland Urban Interface, City of Corrigan

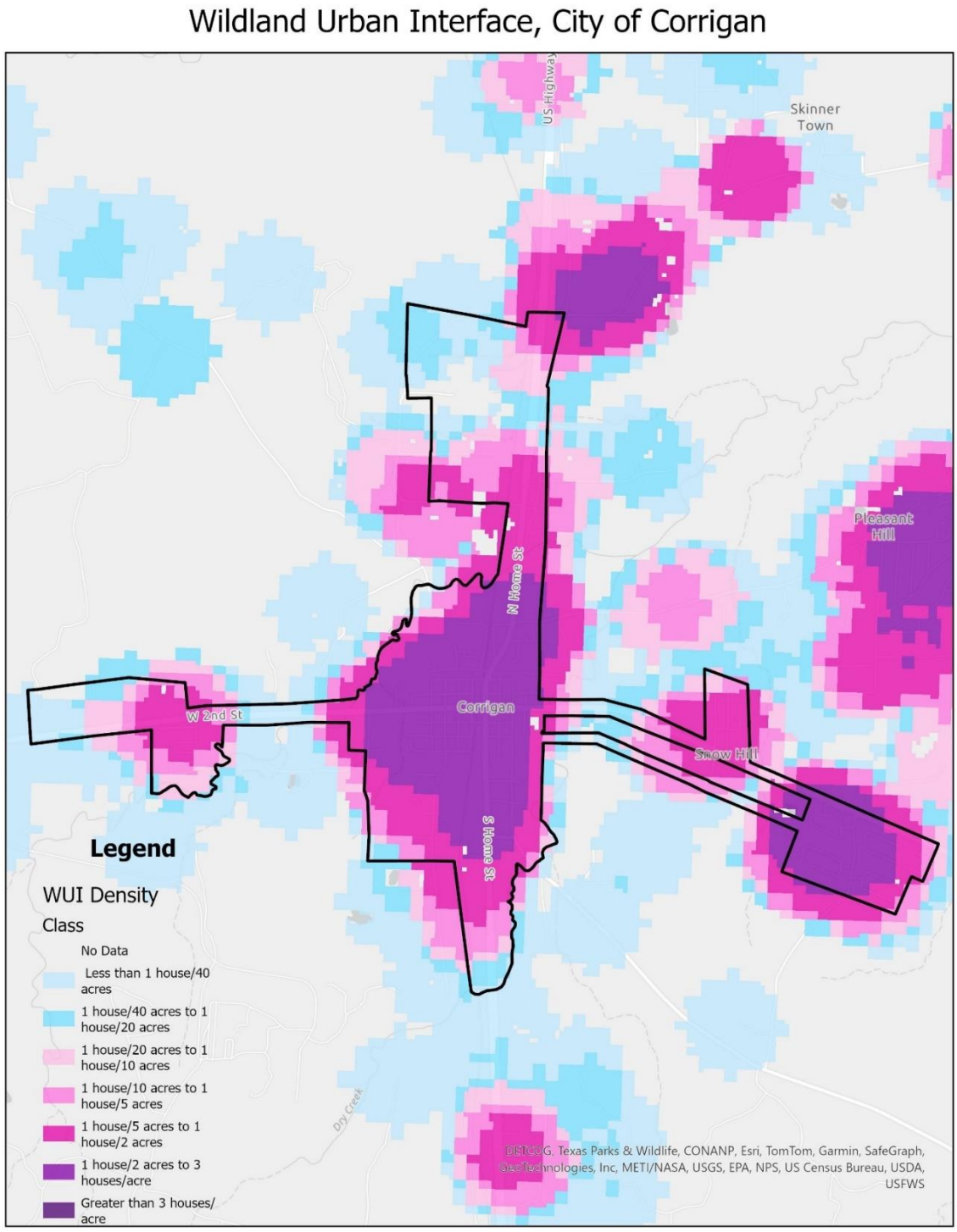
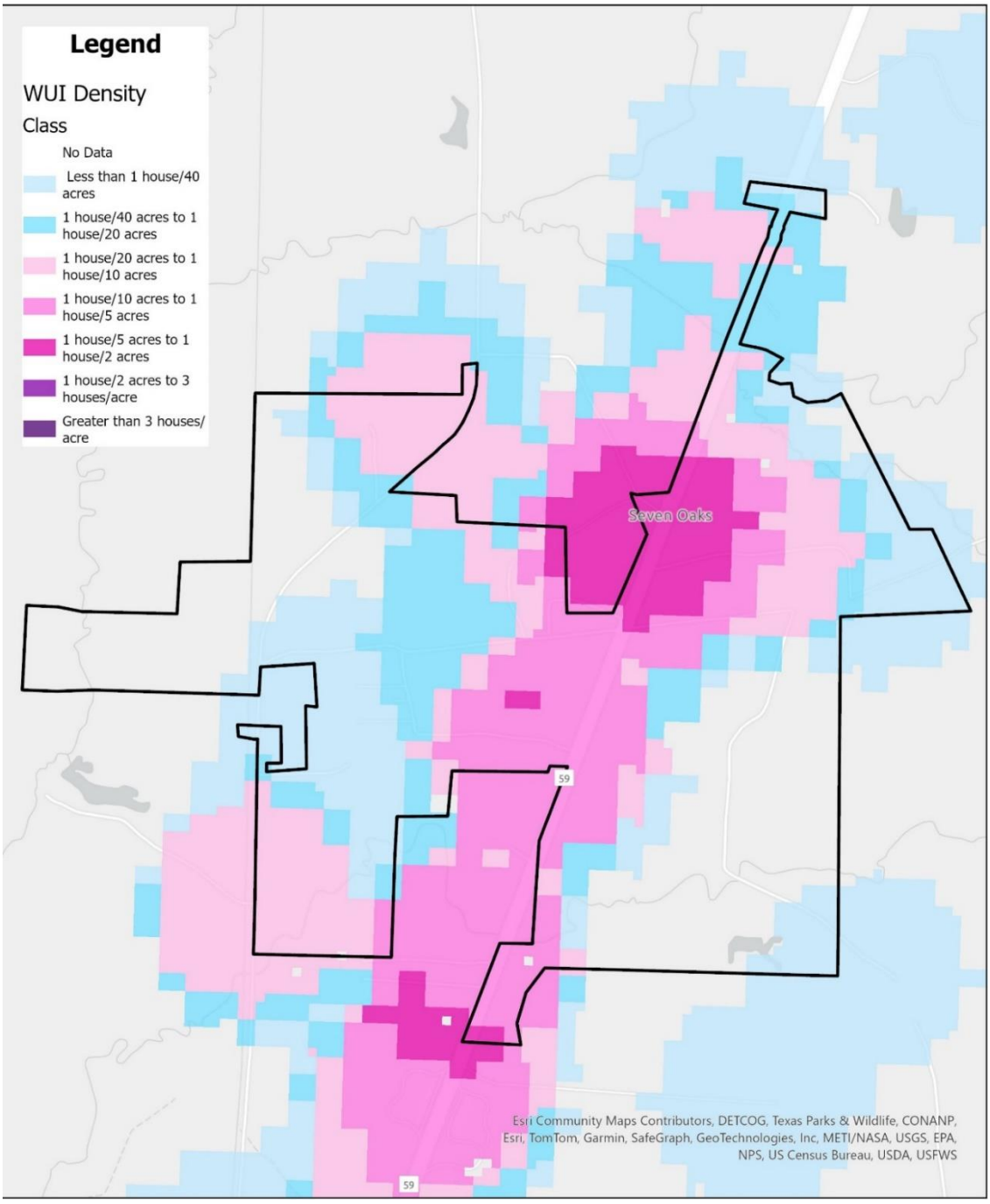


Figure 13-8: Wildland Urban Interface, City of Seven Oaks

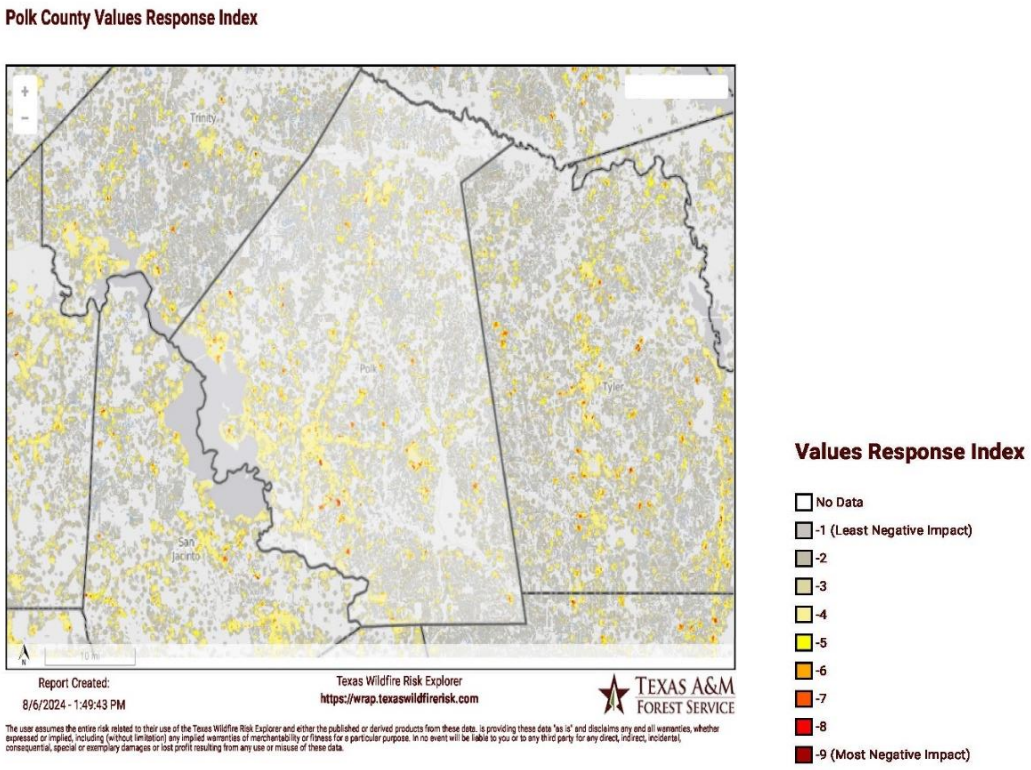
Wildland Urban Interface, City of Seven Oaks



The Wildland Urban Interface (WUI) Response Index layer is a rating of the potential impact of a wildfire on people and their homes. The key input, WUI, reflects housing density (houses per

acre) consistent with Federal Register National standards. The location of people living in the Wildland Urban Interface and rural areas is key information for defining potential wildfire impacts to people and homes. Figure 13-8 on the following page shows Polk County and the threat of wildfire across the planning area based on this response function modeling approach. The most negative impacts can be seen affecting the fringe of the more populated areas within the county such as the cities of Livingston and Goodrich

Figure 13-8: Wildland Urban Interface (WUI) Value Response Index



Source: https://wrap.texaswildfirerisk.com

The Community Risk Assessment layer is a tool that helps to evaluate the potential risk of home loss caused by wildfires. This assessment considers several factors, such as the construction of the home and the surrounding environment. The communities are classified into four hazard ratings: Low, Moderate, High, or Extreme, based on their level of vulnerability. The map legend in the upper right corner provides information about the symbols associated with each hazard ranking, which reveals that Polk County has areas with a Moderate to High total hazard ranking.

The rating is assigned based on NFPA 1144 Standards for Reducing Structure Ignition Hazards from Wildland Fire. Each community is visited by a fire professional and rated using a standardized form to have a consistent measure of risk across the state. Each risk assessment rates a community on characteristics of predominant vegetation, defensible space, possible structure-to-structure ignition, slope, topography, history of wildfire occurrence, exposure to southern plains wildfire outbreak, roofing materials, debris on roof, ventilation and soffits, gutters, building construction, wooden attachments, windows, and utilities. The risk assessment looks at the chances of a home surviving a wildfire without fire department intervention, this is because during large wildfire incidents fire departments can be overwhelmed and not able to place a fire engine on every home to protect it.

The Community Risk Assessment Layer provides fire planners with an “on-the-ground” review of communities within the wildland-urban interface. This can help them prioritize mitigation efforts and target outreach opportunities.

The impacts from a wildfire on the Polk County planning area would be severe based on the overall moderate to high-risk rating. Includes would be air quality degradation due to the wildfire producing large amounts of smoke and other pollutants. This situation can cause health problems for residents, especially those with respiratory issues. If the wildfire is severe enough, or close enough to populated areas, it can result in the need for evacuations. Evacuation can be a traumatic experience for many people, especially if they must leave their homes and possessions behind, including pets. Wildfires often harm or destroy homes, businesses, and other buildings, leading to significant property damage. They can cause power outages, which can disrupt normal life and can cause economic impacts, especially to places that depend on tourism or agriculture. The loss of power and disruption to normal life can result in financial losses for businesses and individuals.

To reduce these vulnerabilities and impacts, cities can take steps to prepare for wildfires, such as creating evacuation plans, conducting regular fire drills, implementing building codes and other regulations to reduce fire risk, and working with fire departments to improve fire suppression and response capabilities.

SECTION 14: SEVERE WINTER STORMS

Description

A severe winter storm event is when temperatures hover below freezing, and precipitation includes freezing ice, snow, and sleet. Strong winds often accompany severe winter storms and combine with freezing precipitation to produce a low wind chill. Severe winter storms may include snowstorms, blizzards, cold waves, and ice storms. Snowstorms include four or more inches of snow in a 12-hour period. Blizzards are characterized by low temperatures and strong winds in excess of 35 mph with large amounts of drifting snow. A cold wave is a winter cold front with a drastic drop in temperature. An ice storm occurs when rain falls out of the warm and moist upper layers of the atmosphere into a cold and dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces. If a half inch of rain freezes on trees and utility wires, damage can occur, especially if accompanied by high winds. Half an inch is used as the criteria before an icing event is categorized as an “ice storm.” Winter storm events are generally mild and short-lived in the Central Texas region. Figure 14-1 below lists the types of severe winter storms that can impact the planning area and a description of the winter weather conditions that accompany the severe weather alert issued by the National Weather Service (NWS).

Table 14-1: Extent Scale – Winter Weather Alerts

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 are usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.

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

Severe winter storm events are not confined to specific geographic boundaries and vary in intensity and duration. All existing and future buildings, facilities, and populations in the Polk County planning area are considered to be uniformly exposed to a winter storm hazard and could potentially be impacted.

Extent

The extent or magnitude of a severe winter storm is measured on an intensity scale from "Mild" to "Severe" based on temperature ranges and snow accumulation levels. Table 14-1, Magnitude of Severe Winter Storms, is an index developed by the National Weather Service (NWS). This table should be referenced with the wind chill factor, Figure 14-2, to better determine the intensity of a winter storm. Based on past events, the planning area can expect to experience severe winter storms with extreme intensity in the future.

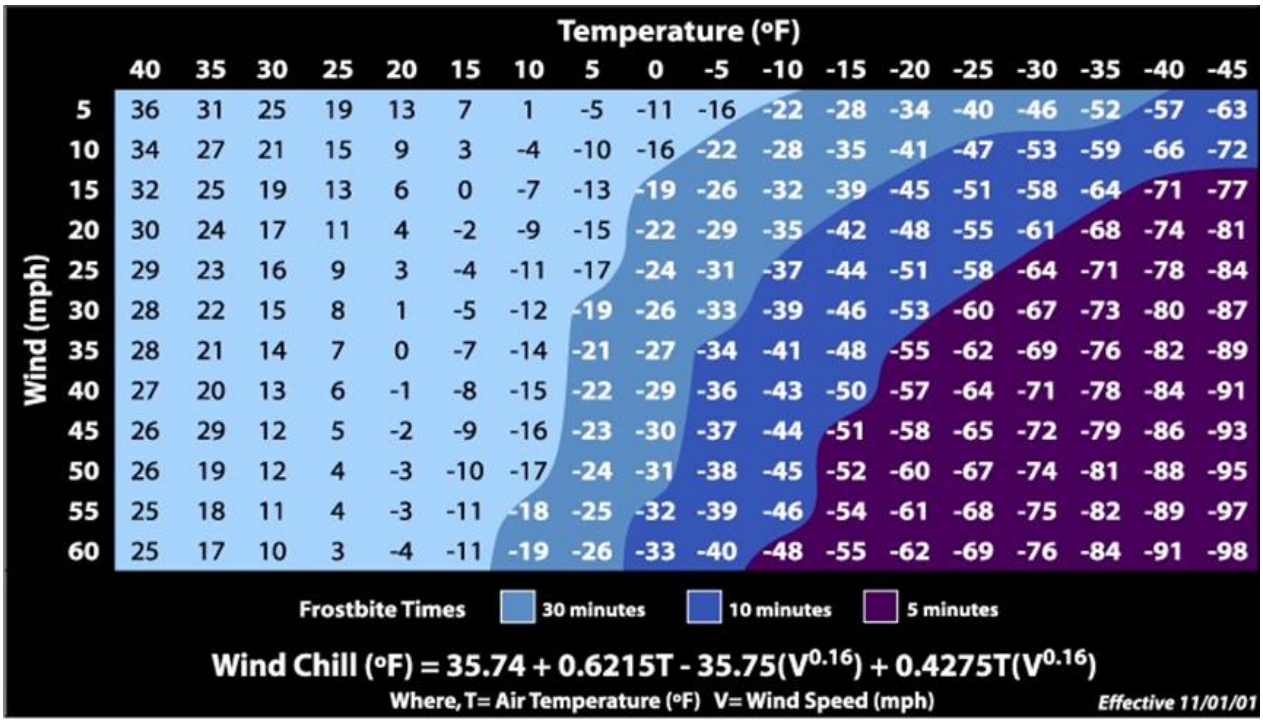
Table 14-2: Magnitude of Severe Winter Storms

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 by 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

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 30° day would feel just as cold as a calm day with 0° temperatures. Figure 14-2 is a chart for calculating wind chill using the wind speed and air temperature. Please note that it is not applicable in calm winds or when the temperature is over 50°F.

Figure 14-1: Wind Chill Chart



Historical Occurrences

Based on NCEI data, from 1999 through March 2024, the Polk County planning area experienced six severe winter events in the form of winter storms, winter weather, and heavy snow. No injuries or fatalities were reported for the following severe winter events.

Table 14-3: Historical Occurrences of Severe Winter Weather Events

Location	Date	Event Type	Fatalities	injuries	Property Damage	Crop Damage
Polk (Zone)	1/16/2007	Ice Storm	0	0	$1,000	$0
Polk (Zone	2/04/2011	Ice Storm	0	0	$0	$0
Polk (Zone)	1/23/2014	Winter Storm	0	0	$0	$0
Polk (Zone)	1/28/2014	Winter Weather	0	0	$0	$0
Polk (Zone)	1/10/2021	Winter Storm	0	0	$0	$0

Polk (Zone)	2/14/2021	Winter Storm	0	0	$0	$0

Significant Events

2007 Winter Storm

A significant cold front produced a significant amount of freezing rain across Texas, leading to the widespread accumulation of ice across Polk County roads, bridges, and roofs, resulting in $1,000 of property damage.

Winter Storm Uri

From February 14th to the 17th, 2021, Winter Storm Uri wreaked havoc across the State of Texas, dropping 1-3 inches of snow and sleet on Polk County.

Probability of Future Events

According to historical records, the Polk County planning area experiences approximately one winter storm event every 2-3 years. The probability of a future winter storm event occurring in the planning area is **likely**, with a winter storm likely to occur within the next three years.

Frequency of Occurrence
Highly likely: Event probable in next year.
Likely: Event probable in the next 3 years.
Occasional: Event possible in the next 5 years.
Unlikely: Event possible in next 10 years.

Vulnerability and Impact

All infrastructure, critical facilities, populations, and buildings in the Polk County planning area are vulnerable to severe winter events. Winter weather such as ice hazards and extremely cold temperatures, as well as snow, present a risk to the planning area.

Populations of people and animals are subject to direct health risks from extended exposure to cold air and precipitation. Animals, such as pets and livestock, typically cannot survive the effects of direct exposure to severe winter weather and should be provided shelter. In addition, House fires can occur more frequently during winter storm events due to increased and improper use of alternative heating sources which can cause injury or death. Moreover, house fires during winter storms present a greater danger because some areas may not be easily accessible due to

icy roads, and water supplies may freeze and impede firefighting efforts. The people most at risk of the effects of severe winter storms are children younger than five and older adults over 65. Vulnerable populations 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.

The planning area has a total population of 52,583 according to the 2023 ACS population estimate. Those over the age of 65 represent 18% (9477) of the total population and children under the age of 5 represent 4.9% (2553) of the total population. The total population of the county that is estimated to be below the poverty level is 16.4% (8624). Table 14-4 presents the 2021 American Community Survey population and age cohort estimates below.

Table 14-4: Populations at Greater Risk by Jurisdiction

Jurisdiction	Population 65 and Older	Population Under 5	Population Below Poverty Level
Polk County	9477	2553	8624
City of Livingston	926	347	1375
City of Onalaska	493	166	731
City of Corrigan	308	168	444
Goodrich	33	9	76
Seven Oaks	13	0	8

Source: 2022 American Community Survey (Note: County totals include both incorporated and unincorporated areas

Public and private infrastructure is also vulnerable to severe winter storms. These events can disrupt electric service for long periods of time. In addition, extended periods of freezing temperatures can cause water pipes to freeze and crack. The buildup of ice can cause power lines and tree limbs to break under the weight, potentially causing damage to property or the electric grid. During these times of ice and snow accumulation, response times will increase until public works road crews are able to clear roads of ice, snow, and other obstructions.

Historic Severe Winter Storm Impacts

A total of $1,000 of property damage was reported over the 24-year period of analysis. Based on historical records, annual loss impacts and estimates are considered to be negligible.

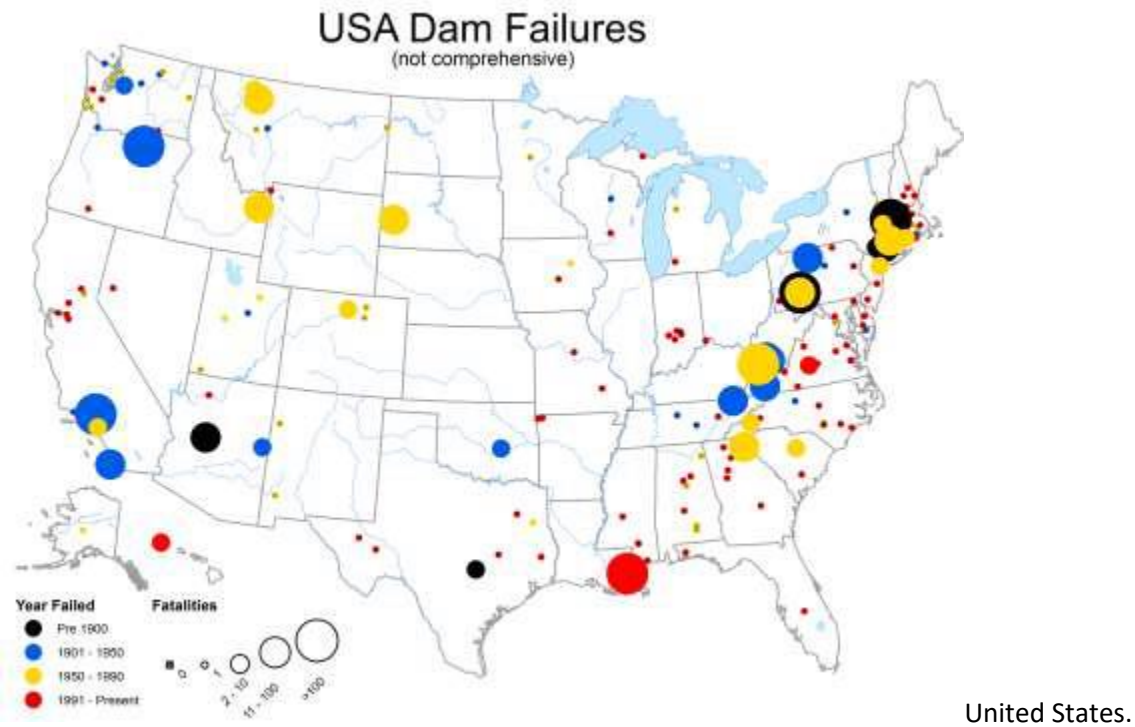
SECTION 15: DAM FAILURE

Description

Dams are water storage, control, or diversion structures that impound water upstream in reservoirs. Benefits provided by dams include water supplies for drinking, irrigation, and industrial uses. Dams also provide flood control, hydroelectric power, recreation, and navigation. At the same time, dams also represent a risk to public safety. Dams require ongoing maintenance, monitoring, safety inspections, and sometimes even rehabilitation to continue safe service.

Figure 15-1 Lake Livingston Dam

Dam failure can take several forms, including a collapse of or breach in the structure. Hundreds of dam failures have occurred throughout U.S. history. These failures have caused immense property and environmental damage and have taken thousands of lives. As the nation's dams age and population increase, the potential for deadly dam failures grows. No one knows precisely how many dam failures have occurred in the U.S., but they have been documented in every state. From January 2005 through June 2013, state dam safety programs reported 173 dam failures and 587 "incidents" - episodes that, without intervention, would likely have resulted in dam failure. The graphic below depicts the history of dam failures throughout the US.



United States.

Figure 15-2: Dam Failure Incidents Across the U.S.

Source: damsafety.org/dam-failures

In the event of a dam failure, the energy of the water stored behind the dam is capable of causing rapid and unexpected flooding downstream, resulting in loss of life and substantial property damage. A devastating effect on water supply and power generation could be expected as well. The causes of dam failures are many but they are most likely to happen for one of five reasons.

1. **Overtopping** caused by water spilling over the top of a dam. Overtopping of a dam is often a precursor of dam failure. National statistics show that overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest account for approximately 34% of all U.S. dam failures. Overtopping can happen after

periods of prolonged rainfall and flooding for which the dam was not designed or failure of upstream dams in the same drainage basin.

2. **Foundation Defects**, including settlement and slope instability, cause about 30% of all dam failures.

3. **Cracking** caused by movements like the natural settling of a dam.

4. **Inadequate maintenance and upkeep**.

5. **Piping** is when seepage through a dam is not properly filtered and soil particles continue to progress and form sink holes in the dam. [See an animation of a piping failure.] Another 20% of U.S. dam failures have been caused by piping (internal erosion caused by seepage). Seepage often occurs around hydraulic structures, such as pipes and spillways; through animal burrows; around roots of woody vegetation; and through cracks in dams, dam appurtenances, and dam foundations.

Location

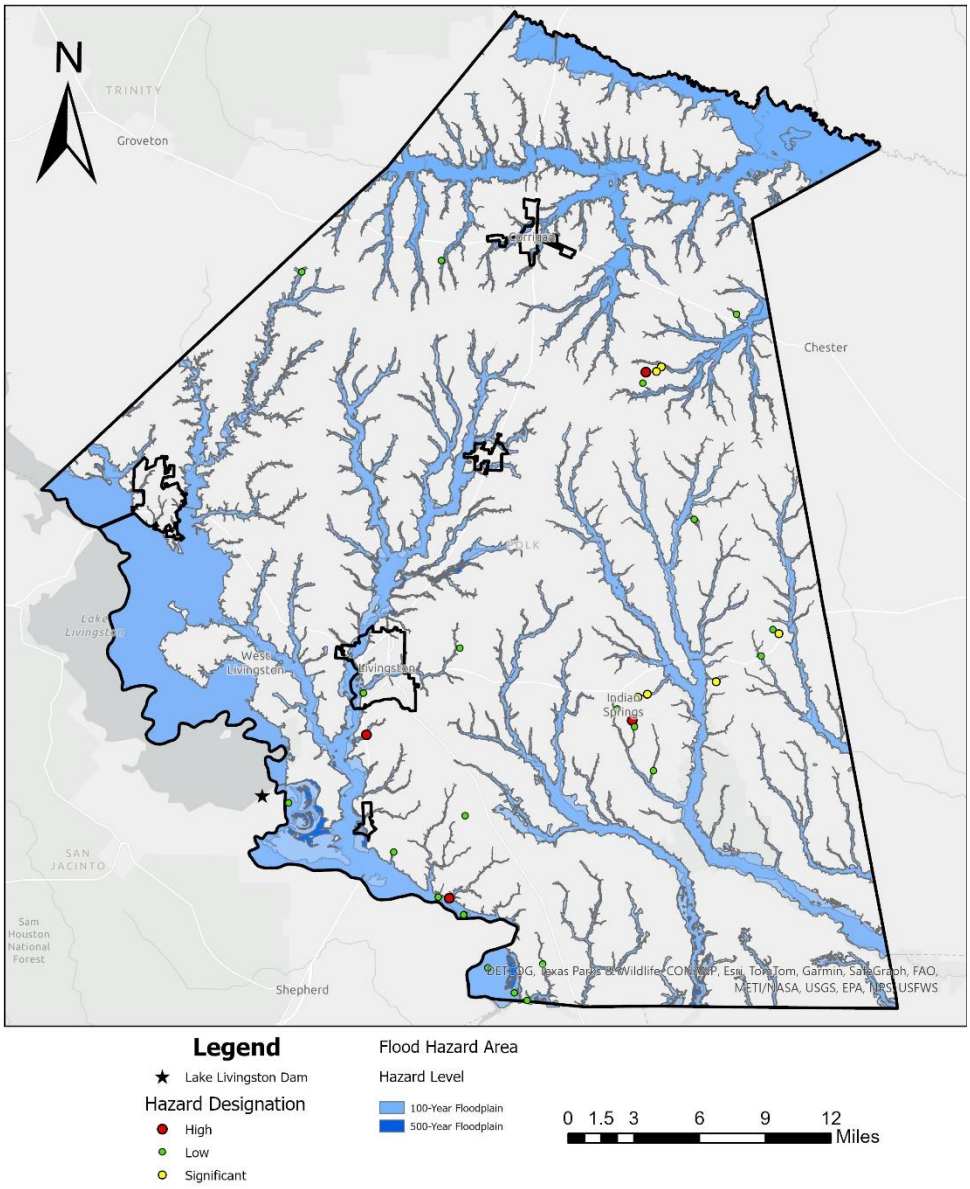
Figures 15-3 and 15-4, provide a summary and illustrate general locations for each dam in the planning area. Currently, there are seven dams located in the Polk County planning area: four are classified as “high-hazard”, six as “significant-hazard”, twenty-three as “low-hazard” dams, zero as “undetermined,” and zero as “not available.”

Figure 15-3: Dam Summary for Polk County, Texas

33 Total Dams	**63 years** Average Dam Age	**100%** High Hazard Potential Dams with an EAP	**0%** Federally Regulated Dams
		0% Dams with Hydropower	**100%** State-Regulated Dams

Figure 15-4: Dam Locations in Polk County, Texas

Dam Locations By Hazard Classification in Polk County



The survey of dams within the Polk County planning area is presented in Table 15-1 below. The survey provides the dam's name, the year built, height of dam, maximum storage in acre feet of the impoundment, and the hazard potential.

Table 15-1: Polk County Dam Survey

Dam Name	State Regulated Dam	Federally Regulated Dam	Hazard Potential Classification	EAP Prepared	Year Completed	Height (Ft.)	Normal Storage (Acre Ft.)
6 Lakes Estates Lake No 4 Dam	No	No	Low	Not Required	1968	10	78
Barnum Lake Dam	No	No	Low	Not Required	1960	14	60
Carmona Lake Dam	No	No	Low	Not Required	1955	18	90
Cj Gerlach Dam	No	No	Low	Not Required	1960	19	280
Devils Lake Dam	No	No	Low	Not Required	1958	19	106
Dogwood Lake Dam	No	No	Low	Not Required	1965	35	209
Duke Lake Dam	Yes	No	Low	Not Required	1955	17	648
Forest Springs Lake Dam	No	No	Low	Not Required	1966	35	154
Hardwood Pond Dam	No	No	Low	Not Required	1900	21	218
Hickory Springs Lake Dam	No	No	Low	Not Required	1965	17	155
Holiday Lake Dam	No	No	Low	Not Required	NA	10	80
Hortense Lake Dam	No	No	Low	Not Required	1955	18	60
Lake Connie Jean Dam	No	No	Low	Not Required	1965	20	280
Lake Dickens Dam	No	No	Low	Not Required	1962	35	85
Lake Donna Dam	No	No	Low	Not Required	1963	21	145
Lake Mark Dam	No	No	Low	Not Required	1964	23	290
Lake Thunderbird Dam	Yes	No	Low	Not Required	NA	20	93
Laurent Lake Dam	No	No	Low	Not Required	1953	15	150

Paces Creek Dam	No	No	Low	Not Required	1965	20	148
Sally Lake Dam	No	No	Low	Not Required	1966	19	193
Sleepy Hollow Lake Dam	No	No	Low	Not Required	1964	43	287
Taylor Lake Dam	Yes	No	Low	Not Required	1958	14	1450
Wilson Lake Dam	No	No	Low	Not Required	1965	20	160
Champion Clean Water Pond Dam	No	No	Significant	Yes	1996	12	40
Double A Lake 1 Dam	No	No	Significant	Not Required	1942	15	164
Georgia Pacific Pond No 7	No	No	Significant	Yes	1995	20	90
Lake Downs Dam	No	No	Significant	Not Required	1963	26	65
Lake Tomahawk Dam	No	No	Significant	Not Required	1957	26	169
Tombigbee Lake Dam	Yes	No	Significant	No	1971	33	300
Lake Londa Lynn Dam	Yes	No	High	Yes	1966	23	905
Lakeside Village Estates Lake Dam	Yes	No	High	Yes	1964	30	537
Pine Pond Dam	Yes	No	High	Yes	1900	15	139
Wild Indian Lake Dam	Yes	No	High	Yes	1963	17	186
Livingston	Yes	Yes - FERC	High	Yes	1969	90	3,208,450

All census blocks within five miles of a dam with a maximum storage capacity of 100,000 acre- feet or more are considered at risk of potential dam failure hazards. For dams with a maximum storage capacity between 10,000- and 100,000-acre feet, all census blocks within three miles are considered to be at risk to potential dam failure hazards. For dams with a maximum storage capacity of less than 10,000 acre-feet, all census blocks within one mile are considered to be at risk from potential dam failure hazards.

The five high hazard dams within the planning area represent max storage capacities of 3,208.450 acre-feet, 905 acre-feet, 537 acre-feet, 186-acre feet and 139-acre feet, far less than the 10,000-acre feet maximum threshold for the one-mile distance stated above suggesting that the downstream census

blocks that would be at risk would be much less than a mile. With residential and commercial developments located downstream of the dams, all populations are considered to be at risk if a dam failure occurs.

The number of census blocks at risk as they relate to dam size is to be used only as a rough guide. Inundation maps based on hydraulic and hydrologic modeling can be used to provide precise risk from dam failure. The owners of the high hazard dams in Polk County all have the mandated Emergency Action Plans prepared, but there are difficulties in accessing these documents to know if engineering studies have been conducted to provide accurate maps.

Extent

The extent or magnitude of a dam failure event is described in terms of the classification of damages that could result from a dam's failure; not the probability of failure. The National Interagency Committee on Dam Safety defines high hazard dams as those where failure or mis-operation would cause loss of human life. Low hazard potential dams are those at which failure or mis-operation probably would not result in loss of human life but would cause limited economic and/or environmental losses. Losses would be limited mainly to the owner's property.

Classifications for dam failure extent are found in Table 15-2 below.

Table 15-2: Dam Hazard Classification Criteria Source: Federal Guidelines for Dam Safety

Hazard Potential Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low	None expected	Low and generally limited to owner
Significant	None expected	Yes
High	Probable. One or more expected	Yes (but not necessary for this classification)

Table 15-3: Extent for Polk County and Participating Jurisdictions

Jurisdiction	Dams and Classification	Extent Classification	Level of Intensity to Mitigate
Polk County (Unincorporated)	33 Total: 5 – High Hazard 6 – Significant Hazard 22 – Low Hazard	High	Dam failure presents a high threat to unincorporated Polk County. **There are 4 High Hazard Dams in Polk County that pose a major threat to human life.** 1) Lake Londa Lynn Dam The Lake Londa Lynn Dam is owned by the Holiday Lake Estates Civic Club Inc. and is an earthen dam in the Holiday Lake subdivision community. There is a data deficiency that does not currently allow for the accurate understanding of the location, depth, extent, and flow rate of the floodwater that would be released from this facility in the event of a dam failure. An analysis will be done in the next 5 years to better understand the specific downstream impacts this dam may have on the Holiday Lake community in Polk County. In the interim, the extent of the 1% and .2% annual chance floodplain along Drews Landing Rd. and County Rd. In the event of a dam failure, flood damage is expected to be greatest to the residences along the northeastern edge of Holiday Lake potentially reaching the structures along River Road. 2) Lakeside Village Estates Lake Dam

			The Lakeside Village Estates Lake Dam is owned by the Lakeside Village Property Owners Association and is an earthen dam in the Lakeside Village subdivision. There is a data deficiency that does not currently allow for the accurate understanding of the location, depth, extent, and flow rate of the floodwater that would be released from this facility in the event of a dam failure. An analysis will be done in the next 5 years to better understand the specific downstream impacts this dam may have on the Lakeside Village community in Polk County. In the interim, the extent of the 1% and .2% annual chance floodplain along Lake Drive. In the event of a dam failure, flood damage is expected to be greatest to the residences along Crooked Creek and Lake Drive, with impacts to US Highway 59 and traffic driving on that stretch of the road. 3) Pine Pond Dam The Pine Pond Dam is owned by Georgia Pacific Wood Products South LLC and is an earthen dam likely used for fire protection. There is a data deficiency that does not currently allow for the accurate understanding of the location, depth, extent, and flow rate of the floodwater that would be released from this facility in the event of a dam failure. An analysis will be done in the next 5 years to better understand the specific downstream impacts this dam may have on the Lakeside Village community in Polk County. In the interim, the extent of the 1% and .2% annual chance floodplain along Lake Drive. In the event of a dam failure, flood damage is expected to be greatest to the 12 addressed locations along W.T. Carter and Piney Pt., with impacts also to the workers of the Georgia-Pacific Production plant. 4) Wild Indian Lake Dam The Wild Indian Lake Dam is owned by Indian Springs Lake Estates Inc. and is an earthen dam in the Indian Springs subdivision. There is a data

			deficiency that does not currently allow for the accurate understanding of the location, depth, extent, and flow rate of the floodwater that would be released from this facility in the event of a dam failure. An analysis will be done in the next 5 years to better understand the specific downstream impacts this dam may have on the Lakeside Village community in Polk County. In the interim, the extent of the 1% and .2% annual chance floodplain along Buffalo Run W. In the event of a dam failure, flood damage is expected to be greatest to the residences along Gordon Drive. 5) Lake Livingston Dam The Lake Livingston Dam is on the border of Polk and San Jacinto County and a dam inundation event would pose a major risk to life and property in unincorporated Polk County. **Given this topic's sensitive nature, exact details about the area of inundation can only be accessed through contact with the Polk County Office of Emergency Management.** **There are 6 Significant Hazard Dams in Polk County:** 1) Champion Clean Water Pond Dam The Champion Clean Water Pond Dam is an earthen dam also owned by Georgia Pacific Wood Products South LLC. With only a capacity of 40 acre-feet, it is estimated to have no impact on human life but could threatened economic or environmental assets along Farm to Market Road 942. There is a data deficiency that does not currently allow for the accurate understanding of the location, depth, extent, and flow rate of the floodwater that would be released from this facility in the event of a dam failure. While there is currently no threat to life from this dam, an analysis will be done in the next 5 years to better understand the specific downstream

			impacts this dam may have on the area, should development, especially of subdivisions, increase. 2) Double A Lake 1 Dam The Double A Lake 1 Dam is owned by Charles Wells and is an earthen dam used for recreational purposes. Given its significant hazard ranking it could damage the surrounded uninhabited property along Farm to Market Road 1276 and Mitzi Lane. There is a data deficiency that does not currently allow for the accurate understanding of the location, depth, extent, and flow rate of the floodwater that would be released from this facility in the event of a dam failure. While there is currently no threat to life from this dam, an analysis will be done in the next 5 years to better understand the specific downstream impacts this dam may have on the area, should development, especially of subdivisions, increase. 3) Georgia Pacific Pond No 7 Georgia Pacific Pond No. 7 is an earthen dam also owned by Georgia Pacific Wood Products South LLC. With only a capacity of 90 acre-feet, it is estimated to have no impact on human life but could threaten economic or environmental assets for the Georgia Pacific factory. There is a data deficiency that does not currently allow for the accurate understanding of the location, depth, extent, and flow rate of the floodwater that would be released from this facility in the event of a dam failure. While there is currently no threat to life from this dam, an analysis will be done in the next 5 years to better understand the specific downstream impacts this dam may have on the area, should development, especially of subdivisions, increase. 4) Lake Downs Dam Lake Downs Dam is an earthen dam owned by Indian Springs Lake Estates and is in Fair Condition. It's along Big Sandy Creek and given the significant hazard designation, it would impact the Indian Springs property but not pose a threat to

			health for any inhabitants. There is a data deficiency that does not currently allow for the accurate understanding of the location, depth, extent, and flow rate of the floodwater that would be released from this facility in the event of a dam failure. While there is currently no threat to life from this dam, an analysis will be done in the next 5 years to better understand the specific downstream impacts this dam may have on the area, should development, especially of subdivisions, increase. 5) Lake Tomahawk Dam The Lake Tomahawk Dam is an earthen damowned by the San Jacinto Baptist Association used for recreational purposes for the Lake Tomahawk Christian Retreat Center which hosts retreats and camps. Given the lack of residential structures south of Lake Tomahawk Dam, it poses no risk to life but could damage the retreat center's property. There is a data deficiency that does not currently allow for the accurate understanding of the location, depth, extent, and flow rate of the floodwater that would be released from this facility in the event of a dam failure. While there is currently no threat to life from this dam, an analysis will be done in the next 5 years to better understand the specific downstream impacts this dam may have on the area, should development, especially of subdivisions, increase. 6) Tombigbee Lake Dam The Tombigbee Lake Dam is owned by the Alabama-Coushatta Tribe which maintains its own hazard mitigation plan and their infrastructure is not addressed in this plan. The 22 Low Hazard Dams in unincorporated Polk County are all isolated from populated areas (at least a mile from city limits) and have a relatively low volume of water, and until development patterns change, there is little need to profile the dams in future hazard mitigation plans.

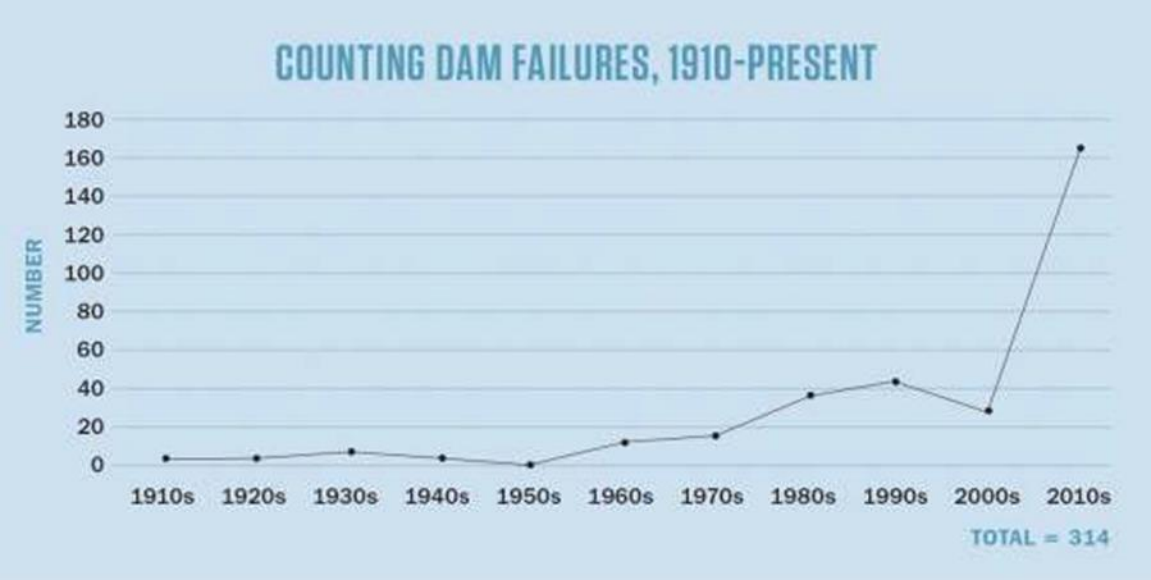
City of Goodrich	1 - High Hazard	High	Given the absence of dams in the city limits there is no opportunity for structural mitigation of dams within the city limits. **Due to the proximity of the City of Goodrich to the Lake Livingston Dam, the city is at significant risk of dam inundation if a Lake Livingston dam failure occurs. Given the sensitive nature of this topic, exact details concerning the area of inundation can only be accessed through contact with the Polk County Office of Emergency Management**
City of Onalaska	No Dams in City Limits or Within 1 Mile of City Limits	None	Given the absence of dams in the city limits or within 1 mile of city limits, there is no need to mitigate dam hazards related to the dams listed above.
City of Livingston	1 – Low Hazard 1- High Hazard	Low	The Lake Thunderbird Dam is a low-hazard dam owned by the Wiggins Land Company of Texas. Due to the distance from a population center and relatively small water storage area in proximity to undeveloped land along Choates Creek, there is a very low threat from the Lake Thunderbird Dam. **Due to the proximity of the City of Onalaska to the Lake Livingston Dam, the city is at risk of dam inundation if a Lake Livingston dam failure occurs. Given the sensitive nature of this topic, exact details concerning the area of inundation can only be accessed through contact with the Polk County Office of Emergency Management**
City of Corrigan	No Dams in City Limits or Within 1 Mile of City Limits	None	Given the absence of dams in the city limits or within 1 mile of city limits, there is no need to mitigate dam hazards related to the dams listed above.

City of Seven Oaks	No Dams in City Limits or Within 1 Mile of City Limits	None	Given the absence of dams in the city limits or within 1 mile of city limits, there is no need to mitigate dam hazards related to the dams listed above.

Historical Occurrences

Texas dams earn a "D" grade from the American Society of Civil Engineers. Of the approximately 300 dam failures in Texas since 1910, half have occurred in the last nine years.

Figure 15-5: Texas Dam Failures, 1910-2019



Source: Texas Observer

Many of the dams in the planning area are classified as small dams and their failure has the capacity to cause physical and economic harm. A federal study found that from 1960-1998 dam failures accounted for 300 fatalities that occurred nationally and more than 85 percent were caused by dams less than 50 feet in height. In Texas, almost half of all dams are considered too small to regulate, and they are exempt from inspections and oversight.

Based on an investigation by the Texas Observer,

"This investigation found that the vast majority of failures in Texas involve dams that impound less than 1,000 acre-feet. Despite their size, many small dams are ticking time bombs, according to safety experts. Big dams are usually owned by government agencies such as river authorities, which have money for upgrades and are regulated by TCEQ. Small dams are typically owned by individuals, homeowners' associations and cash-strapped counties that can't afford expensive improvements." [13]

SIGNIFICANT EVENTS

There have been no significant dam failure events in the Polk County planning area. However, after significant rain and flooding events in April and May of 2024, the Lake Livingston Dam spillway was adversely impacted, the dam was put on potential failure watch, and repairs were initiated. There was no immediate danger of failure or breach, but the impact of heavy rains on dam infrastructure became a greater concern.

Table 16-4: Dam Inspections, Condition Assessments, and EAP Revisions for Significant and High Hazard Dams

Dam Name	Last Inspection Date	Condition Assessment	Condition Assessment Date	Date of Last EAP Revision
Champion Clean Water Pond Dam	7/1/2009	Not Rated	Not Rated	1/03/2011
Double A Lake 1 Dam	9/12/2017	Not Rated	9/12/2022	NA
Georgia Pacific Pond No 7	7/30/2009	Not Rated	7/30/2014	1/3/2011
Lake Downs Dam	9/12/2017	Not Rated	9/12/2022	NA
Lake Tomahawk Dam	9/29/2009	Not Rated	9/29/2014	NA
Tombigbee Lake Dam	9/21/2022	Satisfactory	01/31/2023	No EAP
Lake Londa Lynn Dam	9/22/2022	Fair	5/21/2022	07/31/2018
Lakeside Village Estates Lake Dam	9/22/2022	Satisfactory	02/17/2023	05/08/2015

Pine Pond Dam	9/21/2022	Fair	2/16/2023	03/23/2023
Wild Indian Lake Dam	9/22/2022	Poor	2/17/2023	05/11/2010

Probability of Future Events

According to historical records, from 1999-2024 the Polk County planning area has experienced 0 dam failures. The probability of a dam failure event occurring in the planning area is **unlikely**, with a dam failure event probable in the next 10 years.

Frequency of Occurrence	
Highly likely:	Event probable in next year.
Likely:	Event probable in next 3 years.
Occasional:	Event possible in next 5 years.
Unlikely:	Event possible in next 10 years.

Vulnerability and Impact

All areas that are directly downstream of one of the 34 in the planning area are vulnerable to a breach. The impact of dam failure on a significant portion of the unincorporated Polk County planning area is **"High,"** however, the cities of Onalaska, Corrigan, and Seven Oaks receive a "**Low**" dam failure impact rating. Goodrich and Livingston receive an impact of **"High"** due to the unique location downstream of a high-capacity high-hazard potential dam. The extent of the impact is dependent on the severity of the dam failure, the size of the storage area, dam height, rain/flood conditions, and a host of other factors. 22 of the dams in the planning area are considered low-hazard dams based on their size, but as discussed in this section, low-hazard dam failures have caused documented loss of life and significant economic impact in the past. If a dam failure is extensive, a large amount of water would enter the downstream waterways forcing them out of their banks. There may be significant environmental effects, resulting in flooding that could disperse debris and hazardous materials downstream that can damage local ecosystems. If the event is severe, debris carried downstream can block traffic flow, cause power outages, disrupt local utilities, such as water and wastewater, and could result in school closures.

The 5 high-hazard dams relevant to the planning area could have a high impact on the downstream community of Polk County, its infrastructure, riverine systems, and even downstream dams. Areas directly downstream and within the City of Goodrich and Livingston would need to be immediately evacuated in the event of Lake Livingston's failure or if failure were imminent. There are many other unincorporated communities that would need to be evacuated in the event of a dam failure of one of the remaining 4 high-hazard dams in Polk County.

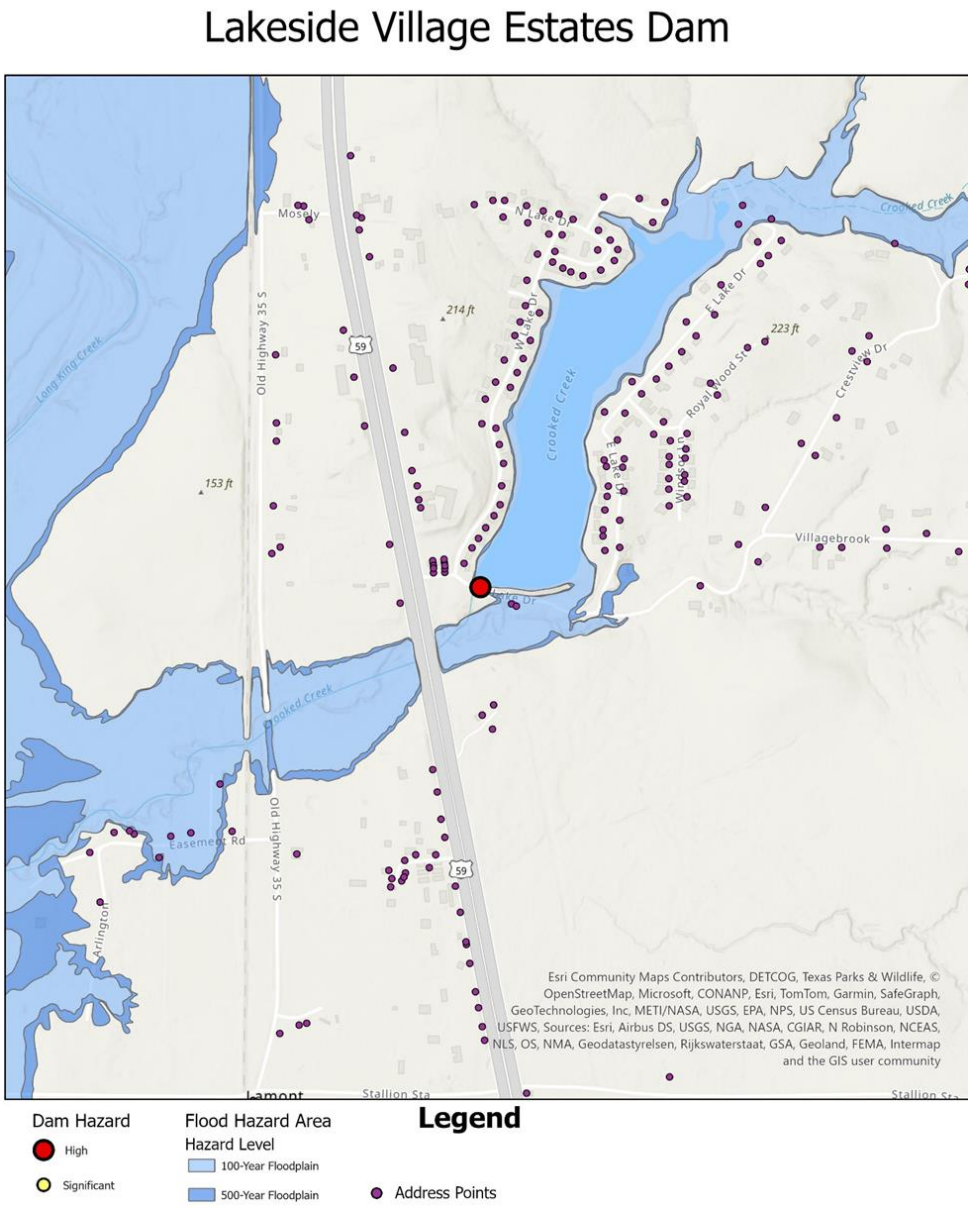


Figure 15-6: Lakeside Village Estates Dam

Figure 15-7: Wild Indian Lake Dam

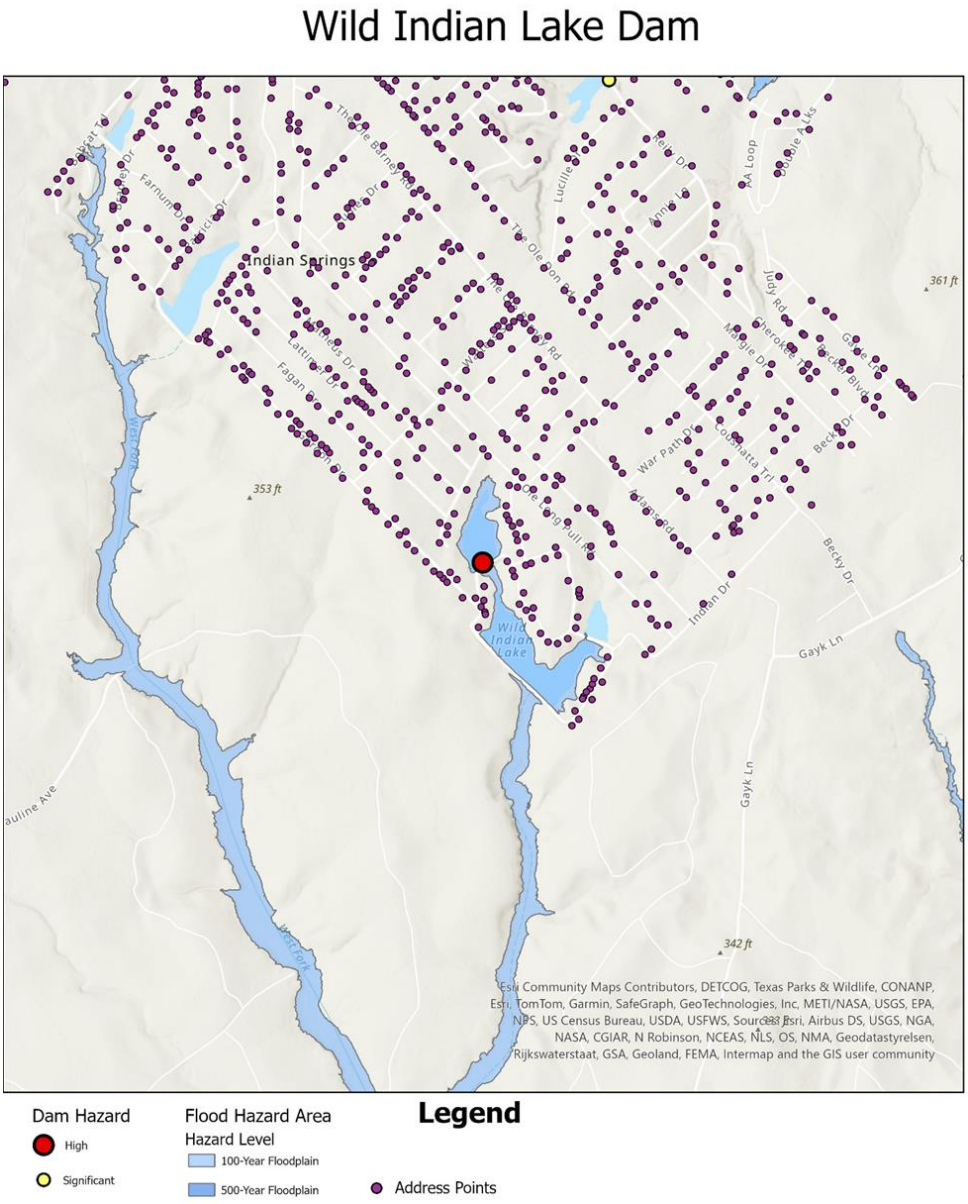


Figure 15-8 : Londa Lynn Lake Dam

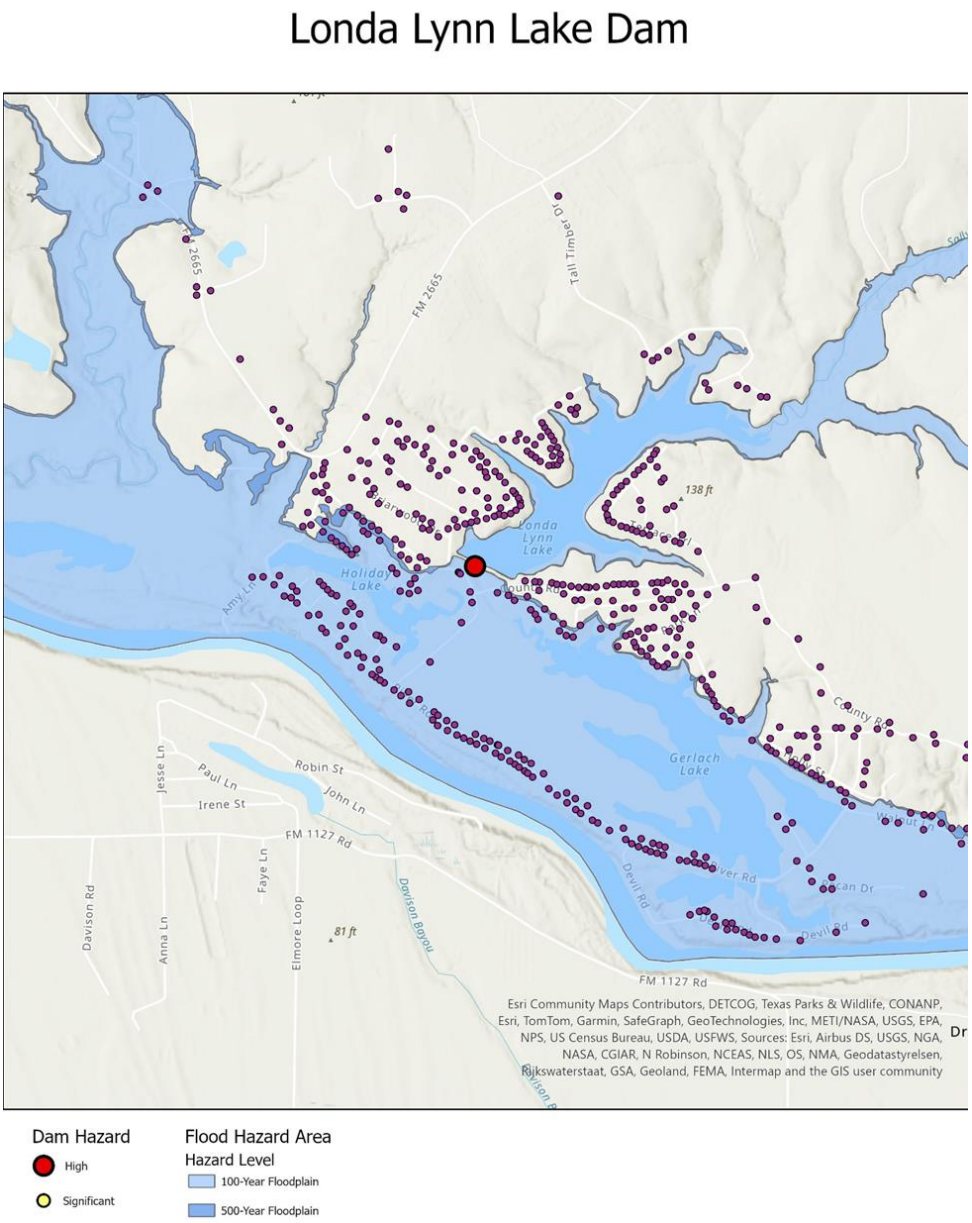
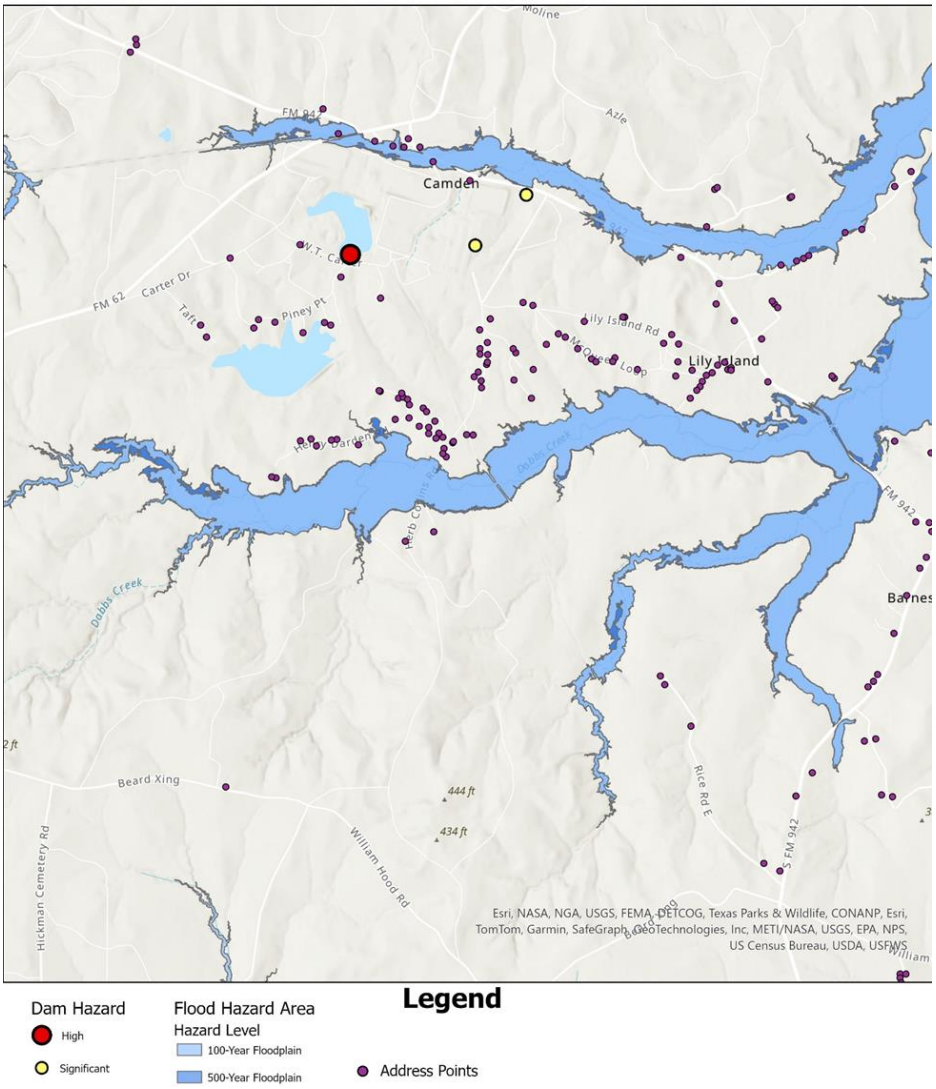


Figure 15-9: Pine Pond Dam

Pine Pond Dam



Annualized loss estimates for dam failure are not available nor is there a breakdown of potential dollar losses for critical facilities, infrastructure and lifelines, or hazardous materials facilities. For the dams that are regulated, the State of Texas assigns a rating based on the condition of the dam during the last inspection.

Any individual dam has a very specific area that will be impacted by a catastrophic failure. The 34 dams identified can directly threaten the lives of people and animals in

the inundation zone below the dam. The impact from any catastrophic failure would be like that of a flash flood with loss of life possible and injuries from debris carried by the flood. As the size of the dam increases and the proximity to the public and/or critical infrastructure increases, the probability of damage to the economy increases as well. For these reasons, creating mitigation actions to remove or protect people and structures from the path of destruction is necessary in order to minimize impact from dam failure.

The following is an excerpt from the American Society of Civil Engineers' 2017 Infrastructure Report Card detailing the importance of public safety and proper maintenance:

"In order to improve public safety and resilience, the risk and consequences of dam failure must be lowered. Progress requires better planning for mitigating the effects of failures; increased regulatory oversight of the safety of dams; improving coordination and communication across governing agencies; and the development of tools, training, and technology. Dam failures not only risk public safety, they also can cost our economy millions of dollars in damages. Failure is not just limited to damage to the dam itself. It can result in the impairment of many other infrastructure systems, such as roads, bridges, and water systems. When a dam fails, resources must be devoted to the prevention and treatment of public health risks as well as the resulting structural consequences."

Dam safety inspections fall to the Dam Safety Program managed by the Texas Commission on Environmental Quality (TCEQ). The Commission currently focuses its inspection program of existing dams primarily on high and significant hazard dams as required by rule in 30 TAC §299.42(a)(2). According to the rule, high and significant hazard dams and large, low hazard dams are scheduled to be inspected every five years, while small and intermediate dams, and low hazard dams, are only to be inspected at the request of an owner, as a result of a complaint, at the request of someone other than the owner, following an emergency such as a flooding event, or, for determining the hazard classification.

SECTION 16: MITIGATION STRATEGY

The overall mitigation strategy is to reduce and eliminate the long-term risk of loss of life and property damage from the full range of disasters affecting the planning area. The success of this strategy is dependent on three main components: mitigation goals, mitigation actions, and an action plan for implementation. These building blocks provide the framework to identify, prioritize, and implement actions to reduce risk to hazards. The goals describe long-term outcomes the communities want to achieve. Objectives are broad but more measurable and connect goals with the actual mitigation actions. The actions are specific actions that the local government will take to reduce the risk of hazards, and the action plan describes how the action items will be prioritized and implemented. Each jurisdiction involved in this multi-jurisdictional plan update had the opportunity to prioritize and implement action plans based on their priorities and vulnerabilities.

Because the State Hazard Mitigation Plan (SHMP) provides the State's overall strategy for reducing risk and allocating resources, the team chose to align the plan's goals to the State plan's vision, objectives, and plan goal to better integrate the two. An excerpt from the 2018 State of Texas Hazard Mitigation states that,

"The successful implementation of the Texas Hazard Mitigation Strategy requires a strong partnership between many partners at all levels of government, public, private sector, and non-governmental organizations. Effective hazard mitigation begins with individual citizens who are ultimately responsible for making risk-informed decisions regarding their personal safety and the safety of their family and home. Local governments work to identify hazards and understand the vulnerabilities and risks associated with these hazards. This work by local governments informs the citizenry and local officials so that they may develop effective strategies and policies to reduce or eliminate the long-term risk these hazards present to their communities. The state must also work to identify hazards and understand the collective vulnerability and risk these hazards present to Texas communities in order to craft effective strategies, public policy, and programs that support local government in risk management. Ultimately, the state's success at implementing an effective hazard mitigation program that reduces the long-term risk for natural hazards in Texas depends on the success of local government, as this is where the impacts of hazards are most acutely experienced. Therefore, helping local governments achieve success with their mitigation strategies is the primary focus of the Texas Hazard Mitigation Program.

Objectives

- Implement an effective comprehensive statewide hazard mitigation plan.
- Support local and regional mitigation projects and priorities.
- Increase public and private sector awareness to increase support for hazard mitigation in Texas.
- Support mitigation initiatives and policies that protect the state's cultural, economic, and natural resources.

Plan Goal

The objective of SHMP is to establish a framework for the state of Texas to administer an effective mitigation program to prevent the catastrophic impact to people and property from natural hazards.

The goals for this plan update were created through reviewing the 2023 State Hazard Mitigation Plan's goals and objectives in addition to the previous Polk County Hazard Mitigation Plan's goals and objectives.

Polk County Mitigation Goals and Objectives

- ❖ Goal 1: Reduce vulnerability to natural hazards that cause injury or loss of life

- Objective 1.1: Develop and implement education programs that will increase property owners' and developers' awareness of natural hazards.

- Objective 1.2: Develop and conduct outreach programs to increase the number of local, county, and regional activities implemented by public and private sector organizations

- Goal 2: Reduce vulnerability to natural hazards that cause property damage;

  - Objective 2.1: Reduce insurance losses and repetitive claims for chronic hazard events while promoting insurance coverage for catastrophic hazards. Focus resources on activities involving property owners and that assist in protecting homes, structures, or property from natural hazards.

- Goal 3: Reduce vulnerability to natural hazards that cause the degradation of natural resources.

  - Objective 3.1: Evaluate and make recommendations for county guidelines and permitting processes in addressing natural hazard mitigation and development in vulnerable areas. Link watershed planning, natural resource management, and land use planning with natural hazard mitigation activities to protect vital habitat and water quality.

  - Objective 3.2: Preserve and rehabilitate natural systems to serve natural hazard mitigation functions.

- Goal 4: Reduce vulnerability to natural hazards of critical facilities and infrastructure

  - Objective 4.1: Establish a policy to encourage mitigation for critical facilities, services, and infrastructure. Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, businesses, and industry.

- Goal 5: Minimize the suffering, including loss of life and injuries, and damages to property, environment, economy, and infrastructure, which result from natural hazard events.

- Objective 5.1: Reduce adverse environmental, natural resource, and economic impacts from hazard events. Polk County, through the myriad of integrated agencies, will continue to pursue mitigation of hazards, particularly during the phase of recovery following significant incidents, but also through pre-disaster projects and initiatives. Hazards and natural disasters will continue to affect the lives of the people of Polk County, but effective mitigation will allow our communities to be more resilient and to minimize the impacts of hazards.

- Objective 5.2: Promote and support rehabilitation of at-risk dams. "The County does not own dams." Dam owners should do emergency planning and seek resources to rehabilitate at-risk dams." The TCEQ 's Dam Safety Program's goals are to have Emergency Action Plans, have studies to determine the hydraulic adequacy on file with TCEQ, and to inspect every five years for 100% of all high and significant dams. Additionally, that the dams are upgraded if needed to meet the required PMF percentage.

- Objective 5.3: Reduce interruption of critical services and activities during and immediately following a hazard event. The Risk Assessment describes numerous natural hazards that can lead to an interruption of critical services such as power, water, sewage, communications, or first responder support. Mitigation efforts shall prioritize, when able, projects to help prepare providers to minimize or mitigate the loss of these critical services. Success will be evidenced by improved resilience, enabling communities to absorb significant impacts with minimal loss to critical services.

- Goal 6: Create a stable environment for business and investment in Polk County through proactive and integrated hazard mitigation.

  - Objective 6.1: Support mitigation activities that promote economic growth. Economic development and community resilience must be mutually supportive, ensuring that one does not place unmitigated risk upon the other. Actions and activities in alignment with the Polk County Hazard Mitigation Plan goals will continue to emphasize protection of natural and economic resources including agriculture, livestock, fuels and the myriad technology, research, service and innovation sectors.

- Objective 6.2: Promote state agency partnerships to effectively implement mitigation actions. Partnership and synergy across agencies throughout the state is the key to achieving mutually beneficial goals and objectives of a strong, resilient Polk County. Polk County Emergency Management will continue to work to establish or uphold existing partnerships with agencies such as TDEM, GLO, TWDB, PUC, Texas A&M AgriLife, TCEQ, TAMFS, TxDOT, TPWD, DPS, IDRT, and many others.
- Objective 6.3: Enhance coordination between local, state, tribal, and federal agencies. Polk County will integrate and involve at every opportunity with additional partners throughout the spectrum of stakeholders. Most importantly, as we coordinate with all interested parties, the capability to enhance awareness, learn lessons, and achieve efficiency in planning will accelerate. Strengthen communication and coordinate participation in and between public agencies, citizens, non-profit organizations, business, and industry. Document the process and resources that will reduce the administrative burden on the requestors/recipients of grant funds.

- Goal 7: Support Polk County in making itself safer from hazards.
  - Objective 7.1: Enrich mitigation efforts by building collaborative partnerships between citizens, non-governmental organizations, local, state, tribal and federal agencies. Promote leadership within public agencies to implement natural hazard mitigation activities.

  - Objective 7.2: Attain participation and funding to implement mitigation activities by creating a dynamic document, which is continually updated and revised. All stakeholders with an interest in building community resilience to future incidents, or aiding those recovering from recent damage, are encouraged to participate in planning and executing mitigation efforts. This hazard mitigation plan generates transparency of the mitigation process. Collaboration throughout the process ensures all ideas are evaluated, resources are optimized, and community ownership of solutions is achieved.

  - Objective 7.3: In all aspects of mitigation planning, give heightened attention, awareness, and proactive measures to include underserved and disadvantaged communities in mitigation planning processes. Assertive attention to, and expanded participation from, frontline communities will advance goals to save lives and reduce public risk and exposure, particularly for high-risk populations,

from natural, technological, and human-caused hazard events. The most at-risk communities are often not well represented in mitigation planning efforts. The State Polk County seeks to ensure inclusive opportunities for all to participate in planning, including socially vulnerable communities.

- Objective 7.4: Ensure mitigation support is accessible to all at-risk populations. The risk assessments, hazard profiles, and vulnerabilities analysis contained in Section 4, as well as the detailed studies compiled for local hazard mitigation plans, identify those communities most at-risk in a multitude of hazard scenarios. State agencies, including NGOs, first responders, response and recovery planners, and resource providers must be engaged and ready to support not only in the immediate aftermath, but in the collective effort to rebuild impacted communities and strive to make at-risk populations more resilient.
- Objective 7.5: Support outreach to underserved, disadvantaged and socially vulnerable groups. Integration into our communities will bring increased avenues to make the public aware of mitigation plans, training events, in-person or virtual forums, and opportunities for community feedback on local mitigation planning. As with integration of local, state, federal and tribal agencies and stakeholders, allowing the underserved, disadvantaged and socially vulnerable groups a voice will increase the likelihood of support to adopted mitigation actions.

SECTION 17: MITIGATION ACTIONS

The mitigation actions developed by the Core Team, Jurisdictional sub-teams, and community stakeholders are presented in this section for Polk County and all participating jurisdictions. Core Team members and Jurisdictional sub-team members met for two mitigation workshops in July 2024 and August 2024 to develop mitigation actions for each of the natural hazards described in the Plan; Sections 5-15.

This began with a review of mitigation actions from the prior 2018 Polk County Hazard Mitigation Plan to assess whether they had been completed and if not, whether they were still relevant. The Action items with an “N” in the New Action column are those that have been carried over from the previous plan. New actions were developed with unique insight from planning team members, community and regional plans, capital improvement plans, and mitigation ideas developed by FEMA and the Texas Department of Emergency Management (TDEM).

Based on local input, the following action items from the previous 2018 plan were completed and those that were not carried forward from that plan were discarded due to lack of continued relevance. The actions below were listed in the prior 2018 Polk County Hazard Mitigation Plan and are listed as completed. On-going actions or those that have not been completed but that have been considered applicable to this current planning effort are listed in the tables in the following pages and included with any new actions adopted for this hazard mitigation planning effort.

Polk County	
ACTION: Install lightning warning systems for outdoor venues.	
No Longer Necessary	This action is not applicable to Polk County, it was a multi-jurisdiction action.
ACTION: Remove limbs from trees that overhang power lines.	
No Longer Necessary	County is not responsible for ROW maintenance.
ACTION: Replace windows in courthouse with glass that will withstand hurricane force winds.	
Action No Longer Necessary	Action will never be completed due to historic preservation standards.
ACTION: Secure furniture to walls in city and county buildings.	
No Longer Necessary	Earthquakes are not a relevant hazard to Polk County,there is no history of earthquakes impacting Polk County in any way.
ACTION: Adopt building code requirements for county/city buildings to ensure all future construction will withstand a 4.2 earthquake.	
No Longer Necessary	Earthquakes are not a relevant hazard to Polk County, there is no history of earthquakes impacting Polk County in any way.
City of Goodrich	
ACTION: Defensible space projects around water tower.	
Action Completed	
ACTION: Install multiple culverts under Pennington Road.	
Action Completed	
ACTION: Update and adopt building code with more stringent requirements for wind resistant building techniques.	

No Longer Necessary	The action was not relevant to the local jurisdiction, just the county
ACTIONS: Secure furniture to walls in city and county buildings	
No Longer Necessary	Earthquakes are not a relevant hazard to Polk County, there is no history of earthquakes impacting Polk County in any way.
ACTION: Adopt building code requirements for county/city buildings to ensure all future construction will withstand a 4.2 earthquake.	
No Longer Necessary	Earthquakes are not a relevant hazard to Polk County, there is no history of earthquakes impacting Polk County in any way.
ACTION: Elevate and reinforce roadways and bridges prone to inundation from flooding. Projects may include general road elevation; upgrading culverts and installing headwalls; upgrades and reinforcement of bridges and bridge footings; etc.	
Action Completed	The stormwater management infrastructure has been upgraded

City of Livingston	
Action: Educate the public on actions they can take to mitigate tornado damage to their private property.	
Action Completed	Educational outreach conducted.
City of Onalaska	
Action: Enlarge culvert and elevate roadbed on Hickory Hollow at Impala Drive	
No Longer Relevant	City is unable to complete the action due to lack of jurisdictional control over the road.
ACTION: Adopt city policy and replace city/county landscaping with drought resistant plants.	
No Longer Relevant	There are no city facilities that have vegetation or landscaping that can become drought resistant.
Action: Remove limbs from trees that overhang power lines.	
No Longer Relevant	The City of Onalaska is not responsible for maintaining ROWs within city boundaries.
City of Seven Oaks	
Action: Remove limbs from trees that overhang power lines.	

No Longer Relevant	The City of Seven Oaks is not responsible for maintaining ROWs within city boundaries.
Action: Install lightning warning systems for outdoor venues	
No Longer Relevant	No outdoor venues exist in Seven Oaks to have lightning warning systems installed.

The Core Planning Team then took the draft mitigation actions back to their respective departments to get feedback and develop them further with input from local staff and officials responsible for their implementation. The goals listed in Section 17 were used as guidance while considering such factors as existing and future growth, the hazard risk assessments, individual community priorities, critical facilities, and unique community vulnerabilities.

Mitigation action types include, *Local plans and regulations, Structural projects, Natural systems protection, and Education programs.* Additional information provided for each mitigation action includes the jurisdictional department responsible for implementation, estimated cost, potential funding sources, timeline for implementation, and benefit to the community based on the cost and resources to implement the action.

An action that is ranked as "High" indicates that it will be implemented as soon as funding is made available from both local budgets and through grants. A "Medium" action is one that may not be implemented right away depending on the cost and how well or how many community members are served. A "Low" action is one whose benefit is hard to quantify in relation to the cost but is still considered of value to the community and is to be implemented when funds and resources are available.

Mitigation Action Plan

The mitigation action plan is a method to prioritize mitigation actions and assign departmental responsibility, ensuring a higher rate of successful action implementation and administration. Each jurisdiction has multiple authorities to implement the mitigation strategy including, but also limited to, local planning and zoning, public works efforts, emergency management, tax authority, building codes and ordinances, and legislative and managerial.

All of the mitigation actions, both new and old, in this section were prioritized primarily based on FEMA's Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLE+E) criteria. These criteria are considered necessary for the successful and enduring

implementation of each action. Each participating jurisdiction in the plan had an opportunity to discuss and consider each of the criteria as they related to each individual action and rate them from 1 to 5. The total scores from the STAPLE+E exercises were then used to assign an overall priority to each mitigation action for each of the participating jurisdictions. In addition to the STAPLE+E exercise, jurisdictions analyzed each action in terms of which department or agency will be responsible for the administration of the action, action timeline, potential funding sources, and the overall costs, measuring whether the potential benefit to be gained from the action outweighed the costs associated with it.

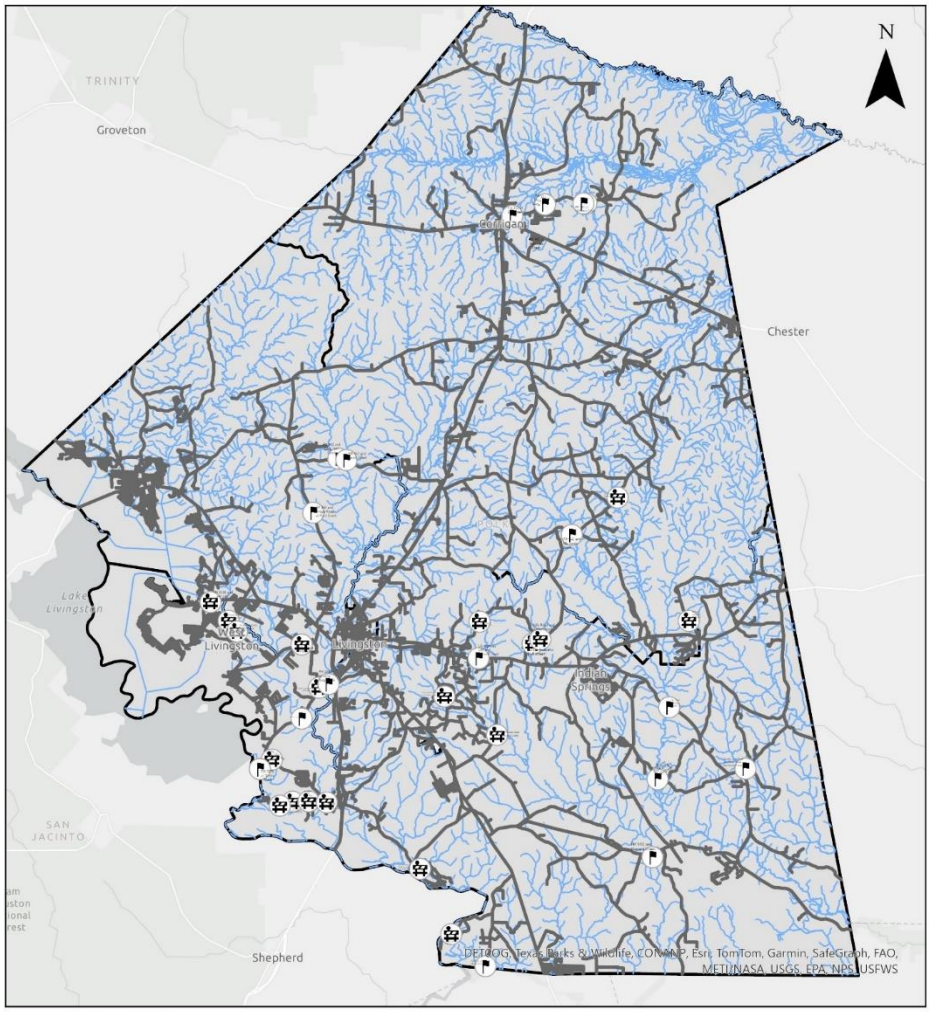
Polk County Mitigation Actions

Action Number	Mitigation Action	Hazard(s) Addressed	Associated Goal	Action Type	Lead Agency / Responsible Department	Potential Funding	Timeline	Cost Estimate	Priority (L, M, H)	New or Ongoing?	STAPLEE Score
1	Educate the public in water saving techniques.	Drought	1.1		Polk County OEM, AgriLife (Master Naturalists)	HMGP, budget	24 months	$5,000	H	New Action	40
2	Hazard hardening retrofit for county facilities. Activities may include but are not limited to impact-resistant windows, plumbing reinforcement and insulation.	Winter Storm	4.1		County Facilities Directors	HMGP, CDBG	60 Months	$500,000	H	New Action	40
3	Educate the public about the dangers of lightning and how to access lightning-hazard information when engaging in outdoor activities.	Lightning	4.1		County Facilities Directors	HMGP, CDBG	60 Months	$500,000	H	New Action	40
4	Establish cooling centers in public facilities.	Extreme heat	4.1		County Facilities Directors/Polk County OEM	HMGP, budget	24 months	$50,000	H	New Action	37
5	Purchase and install a generator for the Onalaska shelter	Winter Storm, Extreme Heat, Hurricane	4.1, 7.3		County EMC	HMGP	12 Months	$100,000	H	New Action	35
6	Educate the public to learn how to prepare for floods	Flood	1.1		Polk County OEM	HMGP, CDBG	24 months	$5,000	H	New Action	35
7	Educate the public to teach them how to harden and retrofit their properties to prepare for hurricanes.	Hurricane	1.1		Polk County OEM	HMGP, CDBG	24 months	$5,000	H	New Action	35
8	Educate the public about the dangers of tornadoes and how to prepare for tornados.	Tornado	1.1		Polk County OEM	HMGP, CDBG	24 months	$5,000	H	New Action	35
9	Hazard hardening retrofit for county facilities. Activities may include but are not limited to hardscaping of surrounding areas, and retrofitting with flame-resistant siding and roofing.	Wildfire	4.1		County Facilities Directors	HMGP, CDBG	60 Months	$500,000	H	New Action	35
10	Educate the public about the dangers of extreme heat and how to prevent heat-related illness	Extreme Heat	1.1		Polk County OEM,	HMGP, CDBG	24 months	$5,000	H	New Action	35
11	Install generators for all County critical facilities.	Winter Storm	4.1		Polk County OEM	HMGP, CDBG, budget	60 months	$500,000	M	New Action	34
12	Install lightning warning systems for outdoor venues. Relevant facilities are the Bit Sandy ISD and leggett ISD Baseball Fields and the county owned park at 538 Recreational Road in Livingston	Lightning	1.2,1		Polk County OEM	HMGP, budget	24 months	$150,000 – $200,000	M	New Action	34
13	Install roof tie down straps on Precinct 4 barn and outbuildings.	Tornado, T-Storm Wind, Hurricane	4.1		Precinct 4	HMGP, budget	36 months	$50,000 – $60,000	M	New Action	33
14	Educate the public in methods to harden their property against fire.	Wildfire	1.1		Polk County OEM	HMGP, budget	36 months	$5,000	M	Ongoing	32
15	Work with FEMA to develop detailed FIRMs to more accurately map flooding risk from all sources.	Flood, Hurricane; NFIP Compliance	6.3,7.1		Polk County, Floodplain Administration, NWS	Future Structures	12 months	$1,000,000 – 2,000,000	M	New Action	32
16	Enlarge culvert under Route 66 past Taylor Lake Estates.	Flood	2.1,4.1		Precinct 1	HMGP, FMA, CDBG, budget	24 months	$50,000 – $60,000	M	Ongoing	31
17	Retrofit Precinct 3 wood frame office and outbuildings to withstand higher strength wind.	Tornado, T-Storm Wind, Hurricane	4.1		Precinct 3	HMGP, budget	48 months	$500,000 – $600,000	M	New Action	31
18	Elevate and reinforce roadways and bridges prone to inundation from flooding. Projects may include general road elevation; upgrading culverts and installing headwalls; upgrades and reinforcement of bridges and bridge footings; etc. ***See project lists below***	Flood, Hurricane, Dam Failure	4.1		Polk County, TDEM, FEMA, TXDOT	HMGP, TXDOT,	60 months	$1,000,000 – 5,000,000	M	New Action	31
19	Educate the public about the dangers of windstorms and how to prepare for them.	Thunderstorm Wind	1.1		Polk County OEM, County Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	31
20	Restore areas that have been washed away and stabilize riverbank in Taylor Lake Estates subdivision.	River bank erosion	3.2		Polk County OEM	HMGP, FMA, budget, EWP grant funding	36 months	$500,000 – $750,000	M	New Action	30
21	Adopt policy and replace county landscaping with drought resistant plants.	Drought	3.1,3.2		Polk County OEM	HMGP, budget	24 months	$50,000-60,000	L	New Action	29

22	Hazard hardening retrofit for county. Activities may include but are not limited to: flood proofing.	Flood	4.1		County Facilities Directors	HMGP, CDBG	60 Months	$500,000	L	New Action	29
23	Hazard hardening retrofit for county facilities. Activities may include flood proofing, impact-resistant windows, storm shutters, roof straps, structural bracing	Hurricane	4.1		County Facilities Directors	HMGP, CDBG	60 Months	$500,000	L	New Action	29
24	Hazard hardening retrofit for county facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps, and structural bracing.	Tornado	4.1		County Facilities Directors	HMGP, CDBG	60 Months	$500,000	L	New Action	29
25	Hazard hardening retrofit for county facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps.	Thunderstorm Wind	4.1		County Facilities Directors	HMGP, CDBG	60 Months	$500,000	L	New Action	29
26	Hazard hardening retrofit for county facilities. Activities may include but are not limited to impact-resistant windows, storm shutters,	Hail	4.1		County Facilities Directors	HMGP, CDBG	60 Months	$500,000	L	New Action	29
27	Educate the public about how to prepare for winter storms.	Winter Storm	1.1		Polk County OEM, County Facilities Directors	HMGP, CDBG	24 months	$5,000	L	New Action	28
28	Hazard hardening retrofit for county facilities. Activities may include but are not limited to: low-flow plumbing fixtures plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	Drought	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	L	New Action	28
29	Educate the public about the dangers of hail and how to protect their family and property from hail damage.	Hail	1.1		Polk County OEM, City Administrators	HMGP, CDBG	24 months	$5,000	L	New Action	28
30	Hazard hardening retrofit for county facilities. Activities may include but are not limited to low-flow plumbing fixtures, plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	Extreme Heat	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	L	New Action	28
31	Acquire property in low-lying areas along the Trinity River and below the Lake Livingston dam that consistently flood.	Flood, Dam Failure	2.1,3.1		Polk County OEM	HMGP, FMA, budget	36 months	$500,000	L	New Action	26
32	Acquire property on River Road in Holiday Lake Estates that consistently floods or are threatened by Trinity River bank erosion.	River bank erosion	2.1, 3.1		Polk County OEM	HMGP, FMA, budget	24 months	$250,000	L	ongoing	26
33	Improve Broadband Access in Polk County	All Hazards	4.1		Polk County Judge's Office	ARPA, Budget	60 Months	$500,000	M	Ongoing	NA
34	Create defensible space around County/public facilities.	Wildfire	2.1,7.5		Polk County OEM	HMGP, CDBG, CWPP	60 months	$500,000--$600,000	L	County jurisdiction only	21
35	Install electric and regular flood gauges on flood-prone creeks and in low water crossing areas. See Table and Map Below	Floods	4.1		Polk County OEM	HMGP, CDBG, budget	24 months	$75,000	L	County jurisdiction only	21

Action 35: Flood Gauge Map and Table

Water Level Gauge Installation Locations



Legend

- Electronic Gauges in Rivers
- Low Water Crossing Flood Gauges

POLK COUNTY REPETITIVE FLOODING EVENTS

2016 THROUGH 2024

POTENTIAL ELECTRONIC GUAGE AND GUAGE LOCATIONS

APPROXIMATE LOCATION	PCT	ELECTRONIC GAUGE (EG) GUAGE (G)	SUBDIVISION	# OF EVENTS	BRIDGE	WATERWAY	FLOODPLAIN
Drews Landing Rd @ Dam	1	G	Holiday Lake Est.	5	Yes	Londa Lynn Lake	Yes
FM 2610	1	EG	Six Lakes	3	Yes	Menard Crk	Yes
FM 2969	1	G	Between Goodrich & River Lake Est	3	No	Between Long King Crk & Trinity River	Yes
Fm 2969 @ Ellis Grimes Rd	1	G		3	No	West of Long King Crk runoff	Yes
FM 3278	1	EG		3	Yes	Trinity River	Yes
Kate Lowe Rd	1	G		4	No	West of Long King Crk runoff	No
Mangum Rd @ Shadycrest	1	G		4	No	South of W Tempe Crk	Yes
Mangum Rd @ Sundance Trl	1	G		3	No	South of W Tempe Crk - 4 ft water over road	No
S FM 1988 @ W FM 1988 @ FM 3278	1	g		2	Yes on 3278	Trinity River	Yes
S FM 1988 south of Mt Rose Church Rd	1	EG		5	Yes	Tempe Crk	Yes

APPROXIMATE LOCATION	PCT	ELECTRONIC GAUGE (EG) GUAGE (G)	SUBDIVISION	# OF EVENTS	BRIDGE	WATERWAY	FLOODPLAIN
W FM 1988 @ El Camino	1	G	Siesta Country 3&5	3	Yes	Long King Crk	Yes
FM 350 S @ Pridgen Rd	1 @ 2	G	Woodway Acres & Wiggins Village 1	2	No	East of East Tempe Crk runoff	No
FM 3126 @ FM 2457	2	G	At Blanchard Baptist Church	6	No		Yes
Route 66	2		Past Taylor Lake Est	1	No	Trinity River	Yes
FM 350 N @ Bridge Rd	2 & 3	EG		2	Yes X 5	Plum, Long Tom, Meadow, Barnett, Long King Crks	Yes
W FM 942 @ between FM 350 N and Hwy 59 N	2 & 3	EG		6	Yes X 4	Big Sandy, Barnett & Long Tom Crks	Yes
E FM 942 @ Baskin Loop	3	EG		5	Yes	Big Sandy Crk	Yes
E FM 942 @ S Clamon Rd	3	G		7	Yes	Hickman Crk	Yes
FM 352 @ Living Ln	3	EG	Reily Village 1-2	2	Yes	Bear Crk runoff	Yes
FM 352 east of Powell Rd	3	EG	Just past City of Corrigan	4	Yes X 2	Dry Creek	Yes
FM 352 west of Nine Bridge Rd	3	EG		5	Yes X 2	McManus Crk	Yes
Midway Loop W	3	G		3	Yes	East of Mill Creek	No
County Line Rd @ Dillon Rd	4	EG		3	Yes	Kimball Crk	Yes
Darden Rd	4	G		2	Yes	Bluff Stream	No
Duff Rd	4			4	Yes X 2	Menard Crk	Yes
FM 1276 near Bubba	4	EG		4	Yes	Big Sandy Crk	Yes
FM 943 near Holly Grove Rd	4	EG		4	Yes	Menard Crk	Yes

APPROXIMATE LOCATION	PCT	ELECTRONIC GAUGE (EG) GUAGE (G)	SUBDIVISION	# OF EVENTS	BRIDGE	WATERWAY	FLOODPLAIN
Kelley Rd @ Darden Rd	4	G		2	Yes	Bluff Stream	No
Kelley Rd @ Nettles Cemetery Rd	4	G		1	Yes	Beeck Creek	Yes
Plantation Dr; Tom Cummings Rd; Mill Gate Rd	4		Southland Plantation	2	Yes X 2	Turkey Crk x 2	Yes
S FM 1988 @ Thomas Supply	4	EG		4	Yes	Long King Crk	Yes
Sunflower Rd @ Monroe Lilley Rd	4	EG		4	Yes	Big Sandy Crk	Yes
US Hwy 190 E @ Menard Creek Subdivision	4	EG	Menard Creek & Easton Oaks	3	Yes	Menard Crk	Yes

PRECINCT 1 ROAD & BRIDGE

Areas/Roads needing elevation and drainage work.

- Little Siesta
- Big Siesta
- Monterey
- El Camino
- Oak Terrace
- Tullos
- Ford Road
- Gibson
- Oilfield
- Hillbilly Heaven (and widened)
- Birdshow
- San Randolph
- Windham Ranch Rd
- MR Service Whole
- My Row Rd
- Marceaux Rd
- Lake Shore
- Lake Livingston Estates
- Kate Lowe Rd
- Tempe Timbers
- Piney Trk
- Riverlake Estates
- Ellis Grimes
- Route 66
- Leah Rd
- Tree Monkey
- Bradshaw
- Sundance
- H. Armitage
- Lakeshore II
- Tempe Timber
- Ann Blvd
- Canvasback Dr
- Mangum
- Shelter Cove
- Nugent's Cove
- Drew's Landing
- Holiday Lakes
- Barrett's Landing Rd
- Lakeview

Bridges & Levees

- Taylor Lakes
- Holiday Lakes

Ditches Cleared

- Taylor Lakes
- Holiday Lakes
- Magnolia
- Forester Retreat
- Pine Shadows
- Nugent's Cove

City of Onalaska Mitigation Actions

Action Number	Mitigation Action	Hazard(s) Addressed	Associated Goals	Action Type	Lead Agency Responsible Department	Potential Funding	Timeline	Cost Estimate	Priority (L, M, H)	New or Ongoing?	Staplee Score
1	Establish cooling centers in public facilities.	Extreme heat	4.1		City Administrator	HMGP, budget	36 months	$200,000	H	New Action	40
2	Upgrade and expand implementation of natural hazard warning systems and methods, focusing on lakefront fire departments. This may include but is not limited to: warning sirens and speakers.	Flood, Hurricane, Tornado, Thunderstorm Wind, Wildfire, Winter Storm, Lightning, Drought, Earthquake, Hail, Extreme Heat	1.2		City Administration	HMGP, CDBG	36 months	$200,000	H	New Action	38
3	Educate the public about the dangers of wildfires and how to prepare their families and houses for wildfires	Wildfire	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	H	New Action	38
4	Educate the public to mitigate wind damage to vulnerable housing, especially mobile homes.	Tornado, Thunderstorm Winds, Hurricane	1.1		City Administrator	HMGP, budget	24 months	$5,000	L	New Action	37
5	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps, and structural bracing.	Tornado	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	H	New Action	37
6	Educate the public about the dangers of tornadoes and how to prepare for tornados.	Tornado	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	H	New Action	37
7	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters,	Hail	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	H	New Action	37
8	Install generators for all City critical facilities.	Winter Storm	4.1		City Administrator	HMGP, CDBG, budget	60 months	$250,000	H	Ongoing	36
9	Elevate and reinforce roadways prone to inundation from flooding. Projects may include general road elevation; upgrading culverts and installing headwalls; upgrades and reinforcement of bridges and bridge footings; etc.	Flood, Hurricane	2.1		City Administrator, TDEM, FEMA, TXDOT	HMGP, TXDOT	60 months	$4,000,000	H	new Action	35
10	Educate the public to teach them how to harden and retrofit their properties to prepare for hurricanes.	Hurricane	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	H	New Action	35
11	Hazard hardening retrofit for city facilities. Activities may include but are not limited to low-flow plumbing fixtures, plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	Extreme Heat	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	H	New Action	35
12	Work with FEMA to develop detailed FIRMs to more accurately map flooding risk from all sources.	Flood, Hurricane; NFIP Compliance	3.1,6.3,7.1		City Administrator, Floodplain Administration, NWS	NFIP, FEMA	12 months	$1,000,000 – 2,000,000	M	New Action	34
13	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps.	Thunderstorm Wind	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	34
14	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, plumbing reinforcement and insulation.	Winter Storm	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	34
15	Educate the public about how to prepare for winter storms.	Winter Storm	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	34
16	Educate the public in water saving techniques.	Drought	1.1		City Administrator	HMGP, budget	24 months	$5,000	L	New Action	33
17	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: flood proofing.	Flood	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	33
18	Defensible space project around timber plantation south of Onalaska Loop.	Wildfire	3.2,2.1		City Administrator	HMGP, budget, CWDG	60 months	$50,000 – $60,000	H	Ongoing	32
19	Hazard hardening retrofit for city facilities. Activities may include but are not limited to hardscaping of surrounding areas, and retrofitting with flame-resistant siding and roofing.	Wildfire	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	32
20	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: grounding systems, surge protection, data back-up systems.	Lightning	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	32

21	Educate the public to learn how to prepare for floods	Flood	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	31
22	Educate the public about the dangers of lightning and how to monitor lightning activity and stay safe.	Lightning	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	31
23	Educate the public about the dangers of hail and how to protect individuals, families, and their property from hailstorms	Hail	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	31
24	Educate the public about how to prepare for heatwaves and avoid heat-related illness	Extreme Heat	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	31
25	Improve Community Broadband Access	Flooding, Extreme Heat	5.3		City Administrators	HMGP, CDBG	36 Months	$500,000	M	New Action	31
26	Provide generators and/or fans to citizens with medical needs that require electricity or cooling equipment.	Extreme Heat	7.3,7.5,1.2		City Administrator	budget	12 months	$150,000 – $160,000	L	New Action	30
27	Acquire property at 395 Shawnee to prevent future flooding.	Flood	2.1,3.1		City Administrator	HMGP, budget	Ongoing	$100,000	L	Ongoing	28
28	Install lightning warning systems for outdoor venues.	Lightning	5.1, 1.2		City Administrator	HMGP, budget	24 months	$150,000 – $200,000	M	New Action	27
29	Install lightning rods and grounding systems.	Lightning	4.1		City Administrator	HMGP, budget	12 months	$50,000 – $60,000 per facility	M	New Action	27
30	Hazard hardening retrofit for city facilities. Activities may include flood proofing, impact-resistant windows, storm shutters, roof straps, structural bracing	Hurricane	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	L	New Action	24
31	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: low-flow plumbing fixtures plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	Drought	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	L	New Action	24

City of Corrigan Mitigation Actions

Action Number	Mitigation Action	Hazard(s) Addressed	Associated Goal(s)	Action Type	Lead Agency, Responsible Department	Potential Funding	Timeline	Cost Estimate	Priority (L,M,H)	New or Ongoing?	STAPLEE Score
1	Upgrade and modernize text-enabled warning system.	Flood, Hurricane, Tornado, Thunderstorm Wind, Wildfire, Winter Storm, Lightning, Drought, Earthquake, Hail, Extreme Heat	1.2		Polk County OEM, City Administration, DECOG	HMGP, CDBG	24 months	$5,000	H	New Action	40
2	Educate the public on wildfire safety and the benefits of creating defensible space.	Wildfire	1.1		City Administrator	HMGP,CWDG , CDBG, budget	24 months	$5,000	H	New Action	40
3	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: floodproofing, structural elevation, drainage improvements.	Flood	4.1		City Facilities Directors	HMGP,CDBG	60 Months	$500,000	H	New Action	40
4	Hazard hardening retrofit for city facilities. Activities may include flood proofing, impact-resistant windows, storm shutters, roof straps, structural bracing	Hurricane	4.1		City Facilities Directors	HMGP,CDBG	60 Months	$500,000	H	New Action	40
5	Educate the public about the dangers of tornadoes and how to prepare for tornados.	Tornado	1.1		City Administrators	HMGP,CDBG	24 months	$5,000	H	New Action	40
6	Educate the public about the dangers of windstorms and how to prepare for them.	Thunderstorm Wind	1.1		City Administrators	HMGP,CDBG	24 months	$5,000	H	New Action	40
7	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, plumbing reinforcement and insulation.	Winter Storm	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	H	New Action	40
8	Educate the public about how to prepare for winter storms.	Winter Storm	1.1		City Administrators	HMGP,CDBG	24 months	$5,000	H	New Action	40
9	Educate the public about the dangers of lightning and how to monitor lightning activity and stay safe.	Lightning	1.1		City Administrators	HMGP,CDBG	24 months	$5,000	H	New Action	40

10	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters,	Hail	4.1		City Facilities Directors	HMGP,CDBG	60 Months	$500,000	H	New Action	40
11	Educate the public about how to prepare for heatwaves and avoid heat-related illness	Extreme Heat	1.1		City Administrators	HMGP,CDBG	24 months	$5,000	H	New Action	40
12	Create and maintain wildfire-defensible space around the city library, lift stations, and wastewater treatment plant.	Wildfire	4.1		City Administrator	HMGP, CDBG, budget, CWDG	60 months	$100,000	H	New Action	38
13	Install lightning warning systems for outdoor venues.	Lightning	1.1,1.2		City Administrator	HMGP,budget	36 months	$150,000 – $200,000	H	New Action	38
14	Install additional lightning rods and grounding systems.	Lightning	4.1		City Administrator	HMGP, budget	24 months	$50,000 – $60,000 per facility	H	Ongoing	38
15	Hazard hardening retrofit for city facilities. Activities may include but are not limited to hardscaping of surrounding areas, and retrofitting with flame-resistant siding and roofing.	Wildfire	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	H	New Action	38
16	Adopt a site review ordinance requiring the inclusion of stormwater management infrastructure.	Tornado, Hurricane, T-storm Wind	3.1		City Administrator	HMGP, budget	18 months	$5,000	H	New Action	36
17	Create a detention pond to address flooding on W. Fifth St., Voss St., W Third St., W First St., and W Front St.	Flood	2.1		Public Works	HMGP, BRIC, FMA, CDBG, budget	36 months	$750,000	H	New Action	36
18	Elevate and reinforce Union Springs Road to prevent inundation from flooding. Project may include general road elevation; upgrading culverts and installing headwalls; upgrades and reinforcement of bridges and bridge footings; etc.	Flood, Hurricane	2.1		TDEM, FEMA, TXDOT	HMGP, TXDOT, TWDB	60 months	$1,000,000 – 5,000,000	H	New Action	36
19	Adopt city policy and replace city landscaping with drought-resistant plants to prevent soil erosion and foundation issues	Drought	3.1		City Administrator	HMGP, budget	24 months	$50,000-60,000	M	New Action	32
20	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps, and structural bracing.	Tornado	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	32
21	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, and roof straps.	Thunderstorm Wind	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	32
22	Educate the public about the dangers of hail and how to protect individuals, families, and their property from hailstorms	Hail	1.1		City Administrators	HMGP, , CDBG	24 months	$5,000	M	New Action	32
23	Hazard hardening retrofit for city facilities. Activities may include but are not limited to low-flow plumbing fixtures, plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support, and expansion joints.	Extreme Heat	4.1		City Facilities Directors	HMGP, , CDBG	60 months	$500,000	M	New Action	32
24	Educate the public to teach them how to harden and retrofit their properties to prepare for hurricanes.	Hurricane	1.1		City Administrators	HMGP,CDBG	24 months	$5,000	M	New Action	30
25	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: low-flow plumbing fixtures plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	Drought	4.1		City Facilities Directors	HMGP, , CDBG	60 Months	$500,000	M	New Action	30
26	Educate the public in water-saving techniques.	Drought	1.1		City Administrator	HMGP, budget	24 months	$5,000	L	New Action	28
27	Educate the public to learn how to prepare for floods	Flood	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	L	New Action	28
28	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: grounding systems, surge protection, data back-up systems.	Lightning	4.1		City Facilities Directors	HMGP, , CDBG	60 Months	$500,000	L	New Action	28
29	Increase capacity of drainage canal behind high school baseball field to prevent flooding school property.	Flood	2.1,4.1		ISD	HMGP, FMA, CDBG, budget	36 month	$250,000	L	New Action	26

City of Goodrich Mitigation Actions

Action Number	Mitigation Action	Hazard Addressed	Associated Goal	Action Type	Lead Agency Responsible Department	Potential Funding	Timeline	Cost Estimate	Priority (L, M, H)	New or Ongoing?	STAPLEE SCORE
1	Initiate public education campaign to improve the community's understanding and access to information to guide and facilitate activities they can undertake which improve level of protection for their homes, their property and improve their safety and resiliency to natural hazards.	Flood, Hurricane, Tornado, Thunderstorm Wind, Wildfire, Winter Storm, Lightning, Drought, Earthquake, Hail, Extreme Heat	1.1		City Administrators	HMGP, CDBG	6 Months	$250,000 – $300,000	H	New Action	45
2	Fix flooding issue downhill of the Sam Loggins Road culvert	Flood	2.1		City Administrator	HMGP, budget	48 month	$100,000	H	New Action	45
3	Repair the bridge on Old 35 S over Sampson Creek due to recent damage from flooding in April 2024	Flood	4.1		City Administrator	HMGP, budget	48 month	$400,000	H	New Action	45
4	Remove limbs from trees that overhang power lines.	Winter Storm	1,2,2.1		City Administrator	HMGP, budget	60 months	$5,000	H	Ongoing	45
5	Purchase and install generators at the Community Center and the critical lift station.	Winter Storm,Extreme Heat,Hail,Wildfires, Flood, Hurricane	4.1		City Administrator	HMGP, CDBG, budget	60 months	$500,000	M	New Action	32
6	Install Weather Station at City Hall	Lightning/Hurricanes/Flooding	4.1		City Administrator	HMGP, budget	18 months	$2,000	M	New Action	32
7	Educate and communicate to the public the risk of Dam Failure and evacuation procedures	Dam Failure	1.1		Goodrich City Administrators	budget, OOG, CDBG	24 months	$5,000	M	New Action	31
8	Purchase and install natural hazard warning systems, with 1 Warning Siren at FD/City Hall and a 2nd location.	Flood, Hurricane, Tornado, Thunderstorm Wind, Wildfire, Winter Storm, Lightning, Drought, Earthquake, Hail, Extreme Heat	1, 1.2		City Administration	HMGP, CDBG	24 months	$2,000,000 – $3,000,000	L	New Action	17
9	Maintain defensible space around all critical facilities especially lift stations and wastewater treatment plants.	Wildfire	3.2,4.1		City Administrator	HMGP, CDBG, budget, CWDG	60 months	$5,000	L	Ongoing	17
10	Establish cooling centers in public facilities. - School has generator just powers cafeteria	Extreme heat	4.1		City Administrator	HMGP, budget	24 months	$10,000	L	New Action	17
10	Establish cooling centers in public facilities. - School has generator just powers cafeteria	Extreme heat	4.1		City Administrator	HMGP, budget	24 months	$10,000	L	New Action	17
11	Adopt city policy and replace city/county landscaping with drought-resistant plants. -	Drought	3.1, 3.2		City Administrator	HMGP, budget	24 months	$25,000	L	New Action	17
12	Conduct an Evacuation Exercise for Lake Livingston Dam Failure	Dam Failure	1.1,1.2,2.1,5.2		Goodrich City Emergency Personnel, Polk County OEM	budget, DECOG, OOG	12 months	$2,500	L	New Action	17
13	Construction of New City Hall and Volunteer Fire Department Building Phase 1: Architectural/Engineering Study and Building Design	Tornado/Hurricane	4.1		Goodrich City Administrators	HMGP, TWDB, CDBG, budget, municipal bond	60 months	$250,000	L	New Action	10
14	Construction of New City Hall and Volunteer Fire Department Building Phase 2: Construction	Tornado/Hurricane	4.1		Goodrich City Administrators	HMGP, TWDB, CDBG, budget, municipal bond	60 months	1,750,000	L	New Action	10

City of Livingston Mitigation Actions

Action Number	Mitigation Action	Hazard(s) Addressed	Associated Goal	Action Type	Lead Agency Responsible Department	Potential Funding	Timeline	Cost Estimate	Priority (L,M,H)	New or Ongoing?	STAPLEE Score
1	Remove limbs from trees that overhang power lines.	Winter Storm	2, 5.3		City Administrator	HMGP, FEMA, City Budget	12 months	$150K-$200K	H	Ongoing	34
2	Phase I: Implement actions to stabilize slopes susceptible to erosion. Planting vegetation and bank stabilization, sloping or grading techniques, terracing hillsides, or installing riprap boulders or geotextile fabric.	Soil Erosion	3.2		City Administrator	FEMA (BRIC), TDEM/HMGP,City Budget	36 months	$500,000	H	New Action	32
3	Phase I: Upgrade natural hazard warning systems and methods. This may include but is not limited to: upgraded and modernized text-enabled warning systems, warning sirens and speakers, televised warnings, reverse 911, remote sensing devices with automated alerts.	Flood, Hurricane, Tornado, Thunderstorm Wind, Wildfire, Winter Storm, Lightning, Drought, Earthquake, Hail, Extreme Heat	1.2		City Administration	GLO, TDEM	24 months	$500,000	H	New Action	32
4	Expand Broadband Services throughout the community	Winter Storms	5.3		City Administrator	HMGP, City Budget, FEMA	12 months	$200,000	L	New Action	31
5	Phase I: Install generators in priority City critical facilities.	Winter Storm	4.1		City Administrator, Public Works	HMGP, CDBG, City Budget	60 months	$500,000	M	New Action	30
7	Educate the public in water saving techniques.	Drought	1.1		City Administrator	HMGP, budget	24 months	$5,000	M	New Action	29
8	Work with FEMA to develop detailed FIRMs to more accurately map flooding risk from all sources	Flood, Hurricane; NFIP Compliance	3.1,6.3,7.1		Floodplain Administration, NWS	NFIP, FEMA	24 months	$1,000,000	M	New Action	29
9	Education program aimed at teaching citizens, public agencies, private property owners and business owners how to mitigate wildfire risk to their property.	Wildfire	1.1		City Administrator	HMGP, COG, City Budget	24 months	$5,000	M	New Action	28
10	Establish an educational program to teach citizens how to mitigate flood damage to their property.	Flood	1.1		Public Works	HMGP, FMA, COG	24 months	$5,000	H	New Action	28
11	Wildfire Fuel Reduction Projects	Wildfire	2.1,3.2		City Administrator, City Fire Chief	HMGP, BRIC, CDBG, CWPP, City Budget	36 months	$2M-$4M	M	Ongoing	28
12	Install lightning warning systems for outdoor venues.	Lightning	1.2,5.1		City Administrator	HMGP, City Budget	24 months	$300K-$500K	M	New Action	28
13	Phase I: Install lightning rods and grounding systems (4 of 8 facilities).	Lightning	4.1		City Administrator	HMGP, FEMA, City Budget	36 months	$1,200,000 ($300K per location)	M	New Action	28
14	Phase 1: Elevate and reinforce priority roadways and bridges prone to inundation from flooding and low-water crossings. Projects may include general road elevation, upgrading culverts and installing headwalls, upgrading and reinforcing bridges and bridge footings, etc.	Flood, Hurricane, Flash Floods, Thunderstorms	2.1		TDEM, FEMA, TXDOT	HMGP, FEMA, TXDOT,	60 months	$10,000,000	M	New Action	28
15	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: flood proofing.	Flood	4.1		City Facilities Directors	HMGP, CDBG	48 Months	$500,000	M	New Action	28
16	Hazard hardening retrofit for city facilities. Activities may include flood proofing, impact-resistant windows, storm shutters, roof straps, structural bracing	Hurricane	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	28

17	Educate the public to teach them how to harden and retrofit their properties to prepare for hurricanes.	Hurricane	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	28
18	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps.	Thunderstorm Wind	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	28
19	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, plumbing reinforcement and insulation.	Winter Storm	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	28
20	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: low-flow plumbing fixtures, plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	Drought	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	28
21	Educate the public about water-saving techniques.	Drought	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	28
22	Educate the public about how to prepare for heatwaves and avoid heat-related illness	Extreme Heat	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	28
23	Adopt city policy and replace city/county landscaping with drought resistant plants.	Drought	3.1		City Administrator	HMGP, COG, TPWD, City Budget	24 months	$150,000	L	New Action	27
24	Educate the public about how to prepare for winter storms.	Winter Storm	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	27
25	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: grounding systems, surge protection, data back-up systems.	Lightning	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	27
26	Hazard hardening retrofit for city facilities. Activities may include but are not limited to low-flow plumbing fixtures, plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	Extreme Heat	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	27
27	Educate the public on the risks of lightning and how they can mitigate damage/injury to themselves and their property.	Lightning	1.1		City Administrator	HMGP, COG, City Budget	24 months	$5,000	H	New Action	26
28	PHASE I: Install windows and doors in city buildings to withstand hurricane-force winds.	Hurricane	4.1		Public Works	HMGP, City Budget	24 months	$600K-$800K	L	New Action	26
29	Perform engineering study to identify at-risk locations for streambed slope erosion.	Soil erosion	3.1		City Administrator	HMGP, FEMA (BRIC), City Budget, TPWD	24 months	$250,000	M	New Action	26
30	Educate the public on techniques to mitigate streambed erosion on privately owned property.	Soil Erosion	1.1		City Administrator	HMGP, City Budget	36 months	$5,000	H	New Action	26
31	Establish cooling centers in public facilities.	Extreme heat	4.1		City Administrator	HMGP, BRIC, City Budget	12 months	$250,000	M	New Action	26
32	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps, and structural bracing.	Tornado	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	26
33	Install Solar Streetlights where no streetlights exist.	Winter Storms, Thunderstorms, Drought	5.3		City Administrator, Public Works	HMGP, CDBG	60 months	$200,000	L	New Action	25
34	Create Master Drainage Plan with GIS.	Flood	3.1		Public Works	HMGP, TWDB, GLO, FEMA, FMA	24 months	$100,000	H	New Action	23

35	Construct interior safe rooms in priority public buildings (up to seven buildings).	Tornado	4.1, 1.2		City Administrator	HMGP, FEMA, TDEM, GLO	60 months	$8,000,000	L	New Action	23
36	Hazard hardening retrofit for city facilities. Activities may include but are not limited to hardscaping of surrounding areas, and retrofitting with flame-resistant siding and roofing.	Wildfire	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	L	New Action	23
37	Defensible space projects around neighborhoods west of Livingston off 190 (ETJ).	Wildfire	1,2.1,3.2		City Administrator	HMGP, FEMA (BRIC), budget	24 months	$1,500,000	L	New Action	22
38	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps.	Hail	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	L	New Action	20
39	Educate the public about the dangers of windstorms and how to prepare for them.	Thunderstorm Wind	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	L	New Action	19
40	Educate the public about the dangers of hail and how to protect individuals, families, and their property from hailstorms	Hail	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	L	New Action	16

City of Seven Oaks Mitigation Actions

Action Number	Mitigation Action	Hazard(s) Addressed	Associated Goal	Action Type	Lead Agency and Responsible Department	Potential Funding	Timeline	Cost Estimate	Priority (L, M, H)	Completed or Ongoing?	STAPLEE SCORE
1	Public education on wildfire defensible space.	Wildfire	1.1		Mayor	HMGP, budget, DECOG	24 months	$5,000	H	Ongoing	27
2	Construct new culverts and drainage ditches along city streets Camp Road, Pickens Loop, Franklin Road, Austin Street, and Hunt Street.	Flood	2,1		Mayor	HMGP, budget, DECOG	48 months	$500,000	H	New Action	25
3	Work with FEMA and Polk County OEM to develop detailed FIRMs to more accurately map flooding risk from all sources.	Flood, Hurricane, NFIP Compliance	6.3, 7.1		City Administrator, Floodplain Administration, NWS	NFIP, FEMA	60 months	$300,000	H	New Action	24
4	Purchase and install a generator to establish City Hall as a cooling and warming center.	Extreme heat, Winter Storm	4.1, 7.3		City Administrator	HMGP, budget	24 months	$100,000	H	New Action	24
5	Install weather information station on City Hall	Lightning Hurricane Flooding	4.1		City Administrator	HMGP, budget	12 months	$2,000	L	New Action	24
6	Hazard hardening retrofit for county/city facilities. Activities may include flood proofing, impact-resistant windows, storm shutters, roof straps, structural bracing	Hurricane	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	24
7	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps, and structural bracing.	Tornado	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	24
8	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: grounding systems, surge protection, data back-up systems.	Lightning	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	24
9	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: low-flow plumbing fixtures plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	Drought	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	24
10	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters,	Hail	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	24
11	Install a fire hydrant to protect City hall	Wildfire	4.1		City Administrator	HMGP, CDBG, budget	24 months	$300,000	M	New Action	23
12	Educate the public in water saving techniques.	Drought	1.1		City Administrator	HMGP, budget	24 months	$5,000	M	New Action	23
13	Educate the public to learn how to prepare for floods	Flood	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	23
14	Educate the public to teach them how to harden and retrofit their properties to prepare for hurricanes.	Hurricane	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	23
15	Educate the public about the dangers of tornadoes and how to prepare for tornados.	Tornado	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	23
16	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps.	Thunderstorm Wind	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	23
17	Educate the public about the dangers of windstorms and how to prepare for them.	Thunderstorm Wind	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	23
18	Hazard hardening retrofit for county/city facilities. Activities may include but are not limited to hardscaping of surrounding areas, and retrofitting with flame-resistant siding and roofing.	Wildfire	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	23
19	Educate the public about how to prepare for winter storms.	Winter Storm	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	23

20	Educate the public about the dangers of lightning and how to monitor lightning activity and stay safe.	Lightning	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	23
21	Educate the public about the dangers of hail and how to protect individuals, families, and their property from hailstorms	Hail	1.1		City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	23
22	Hazard hardening retrofit for city facilities. Activities may include but are not limited to low-flow plumbing fixtures, plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	Extreme Heat	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	M	New Action	23
23	Educate the public about how to prepare for heatwaves and avoid heat-related illness	Extreme Heat	1.1		Polk County OEM, City Administrators	HMGP, CDBG	24 months	$5,000	M	New Action	23
24	Upgrade and expand implementation of natural hazard warning systems and methods. The primary improvement needed is to install a Warning Siren on City Hall	Flood, Hurricane, Tornado, Thunderstorm Wind, Wildfire, Winter Storm, Lightning, Drought, Earthquake, Hail, Extreme Heat	1.2		City Administration	HMGP, CDBG	36 months	$300,000	L	New Action	22
25	Adopt city policy and replace city landscaping with drought-resistant plants.	Drought	3.1		City Administrator	HMGP, budget	24 months	$25,000	L	New Action	22
26	Hazard hardening retrofit for county/city facilities. Activities may include but are not limited to: flood proofing.	Flood	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	H	New Action	22
27	Hazard hardening retrofit for county/city facilities. Activities may include but are not limited to impact-resistant windows, plumbing reinforcement and insulation.	Winter Storm	4.1		City Facilities Directors	HMGP, CDBG	60 Months	$500,000	L	New Action	22
28	Update and adopt building code with more stringent requirements for wind resistant building techniques.	Tornado	3.1		Mayor	HMGP, budget	18 months	$5,000	L	New Action	20
29	Elevate and reinforce roadways and bridges prone to inundation from flooding. Projects may include general road elevation; upgrading culverts and installing headwalls; upgrades and reinforcement of bridges and bridge footings; etc.	Flood, Hurricane	2.1		City Administrator, TDEM, FEMA, TXDOT	HMGP, TXDOT,	60 months	$1,000,000 – 5,000,000	L	New Action	20

SECTION 18: PLAN MAINTENANCE

This section describes how Polk County, including participating jurisdictions, will implement the Plan and continue to evaluate and enhance it over time. As indicated in the previous section, each action has been assigned to a specific department within the jurisdiction. In order to ensure that the Plan remains current and relevant, the following plan maintenance procedures will be addressed:

1. Ensure the mitigation strategy remains current and that actions are implemented according to the timeline.

2. Develop an ongoing mitigation program throughout the community for each participating jurisdiction and work together at the county level to update and review the plan.

3. Integrate short and long-term mitigation objectives into community officials' daily roles and responsibilities.
4. Continue public involvement and maintain momentum with education programs and materials, routine publication of accomplishments, and briefings to decision-makers of the Plan's progress.

Table 20-1 indicates the department or title responsible for this action. Each participating jurisdiction determines the department or title of personnel responsible for the implementation of mitigation strategies and the development of procedures.

Table 20-1: Team Members Responsible for Plan Maintenance

Jurisdiction/Entity	Title
Polk County	**Emergency Management Coordinator**
City of Livingston	City Manager
City of Onalaska	City Administrator
City of Corrigan	City Manager
City of Goodrich	Mayor
City of Seven Oaks	Mayor

Incorporation

Following the adoption and approval of the Plan, Polk County, including participating jurisdictions, will implement actions they have developed and prioritized in the plan based on funding availability and continuing public input. A timeline is provided with each action and is used to assess whether actions are being completed on time based on the date of plan adoption. Potential funding sources are also listed for each action in Section 18 and described in more detail below. Additional funding sources can include federal disaster declarations and other non-federal grant sources.

Local Funding: This is funding that the community can allocate in the budget process and with other local funding mechanisms such as impact fees and drainage utility fees. This funding can be used entirely for specific hazard mitigation activities and projects or can be used as a match to leverage federal and state funding.

BRIC: The Building Resilient Infrastructure and Communities (BRIC) grant program supports states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. The program's guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large infrastructure projects; maintaining flexibility; and providing consistency.

CWDG: The Community Wildfire Defense Grant Program, or CWDG, is intended to help at-risk local communities and Tribes plan for and reduce the risk of wildfire. This program, which was authorized by the Bipartisan Infrastructure Law, prioritizes at-risk communities in an area identified as having high or very high wildfire hazard potential, are low-income, or have been impacted by a severe disaster that affects the risk of wildfire. More details on these three priorities can be found in the Notices of Funding Opportunity (NOFOs) below. The program provides funding to communities for two primary purposes:

- Develop and revise Community Wildfire Protection Plans (CWPP).
- Implement projects described in a Community Wildfire Protection Plan that is less than ten years old.

The CWDG Grant Program also helps communities in the wildland urban interface (WUI) implement the three goals of the National Cohesive Wildland Fire Management Strategy.

HMGP: The purpose of Hazard Mitigation Grant Programs is to help communities implement hazard mitigation measures following a Presidential Major Disaster Declaration in the areas of the state, tribe, or territory requested by the Governor or Tribal Executive. The key purpose of this grant program is to enact mitigation measures that reduce the risk of loss of life and property from future disasters.

Methods of Incorporation of the Plan

Once per year at a minimum, participating Core team members will conduct a review of plans and policies in place and analyze the need for amendments based on the approved plan. Team members will incorporate any mitigation policies and actions into these plans and policies as appropriate, then seek approval from Commissioners Court and/or City Councils, as appropriate. The plans and policies that will require review include emergency operations or management plans, capital improvement plans, comprehensive land use and future growth plans, transportation plans, annual budgeting, and any building codes that guide and control development in a way that will contribute to the goals of this mitigation plan to reduce long- term risk to life and property from all hazards.

A list of regulatory and planning capabilities currently available to the jurisdictions can be found in **Appendix A**. In the process of integrating the mitigation actions into new and existing planning mechanisms, the participating jurisdictions will do the following:

Grant Applications	Hazard mitigation grant funding will be sought as a way to fund eligible action items as the funding is awarded. If a need for additional action items is presented, an amendment will be necessary to include the action in the plan.
Annual Budget Review	The Plan and mitigation actions will be reviewed annually to determine any funding needs to be included during the budget process and will involve various departments and team members that participated in the planning process. Local funds match requirements for grants will be considered by the appropriate department such as engineering, planning, code enforcement, and others to achieve the mitigation action based on the timeline.
Floodplain Management Plans and Watershed Studies	These types of plans include preventative and corrective actions to address the flood hazard.
Regulatory Plans and Future Growth Plans	Both Polk County, including participating jurisdictions, have regulatory plans in place that are in need of updating from time to time. This Hazard Mitigation Action Plan Update will be consulted when County and City departments review or revise their current regulatory planning mechanisms and growth plans such as land development and building codes, comprehensive plans, and capital improvement plans.

Periodic annual tracking of the Plan is required to ensure that the mitigation actions are implemented over the 5-year cycle and that the Plan is kept current based on the latest information about hazards and their impacts. The team members designated by department and jurisdiction in Table 18-1 are responsible for monitoring, evaluating, and updating the Plan for their participating jurisdiction. The planning team will convene on an annual basis or when other

plans are being developed, reviewed or updated. In addition to annual monitoring, the Plan will be similarly reviewed immediately after extreme weather events including but not limited to state and federally declared disasters.

Monitoring

The Plan in its entirety, will be monitored, including but not limited to continued public participation, plan evaluation method, plan update methods, action prioritization, administration of identified mitigation actions, risk assessment, and incorporation into other planning mechanisms. Responsibilities of annual monitoring include working with various city and county departments to ensure that the identified mitigation actions get incorporated into existing plans and policies and that mitigations actions that are funded by City Councils and the County Commissioners' Court get implemented. These mitigation action status updates will include a feasibility assessment for implementation and funding for the remaining time left in the 5-year mitigation action planning cycle.

Planning team meetings for *monitoring* the plan will include a **sign-in sheet** to record attendance and a **brief report** that identifies policies and actions in the plan that have been successfully implemented since its adoption. The report will also document the steps to be followed to develop action items into a policy or project that has not yet been completed and how the plan has been incorporated into other planning mechanisms.

Evaluation

As part of the annual tracking of the Plan, Core Planning Team members will evaluate changes in risk and hazard data associated with the planning area to determine if there are any needed changes to mitigation action timelines, prioritization, or if any action needs to be amended, added, or deleted. This is an opportunity to detect if there are any new obstacles to the implementation of actions such as funding, political, legal, or coordination within departments such as changes in departmental programs and goals that may affect mitigation priorities.

The Plan evaluation is also an opportunity to review the effectiveness of public participation and outreach efforts and to update or expand upon those efforts. The effectiveness of public participation can be measured with surveys, number of website hits, number of people in attendance, and number of materials printed. The annual evaluation process is necessary to make any necessary amendments to the plan to keep the plan relevant and most effective in mitigating the identified hazards in the Plan. Team meetings for *evaluating* the plan will include a **sign-in sheet** to record attendance and a **brief report** that identifies any changes to the Plan or to the local jurisdiction's implementation process needed for continued success.

Updating

The designated Core Planning Team member from each community evaluating the Plan will prepare annual reports that will be used to keep the Plan updated and keep them on file. Major changes to mitigation actions or the overall direction of the Plan or the policies contained within the Plan are subject to formal adoption by each city and the amendment will be submitted to TDEM. To determine whether to recommend approval or denial of a Plan amendment request, each County, City, or Special District will consider the following factors:

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

This annual Plan Maintenance process enables Polk County, including participating jurisdictions, to keep its Hazard Mitigation Plan relevant based on the latest information, capabilities, needs, and community input. The process also provides an opportunity to ensure that mitigation actions meet the goals in this Plan and that they are implemented in the manner they were intended. This is a valuable opportunity to identify mitigation actions in the annual report that were not successful and to recommend the removal of those that are no longer needed.

Five-Year Review and Update

The Plan will be thoroughly reviewed by Planning Team members at the end of three years from the approval date to determine whether there have been any significant changes in the area that may require updating, amending, or deleting parts of the Plan. It is wise to begin considering plan updates in advance of the five-year deadline due to the timelines for grant funding, Plan reviews, and to ensure eligibility. Oftentimes, the timelines for grant and planning cycles can be in excess of a year to apply and receive funding.

The 5-year Plan review allows for evaluating successful and unsuccessful mitigation actions, documenting losses avoided, and considering factors affecting the Plan. Necessary revisions will be summarized and integrated into the existing plan or reserved for the 5-year plan update. The revised or new Plan will be submitted to TDEM and FEMA for final review and approval.

Continued Public Involvement

Input from the stakeholders and public was an integral part of the preparation of this Plan and will continue as the Plan is reviewed, revised, and updated. This Plan will be posted on the websites of Polk County, and participating jurisdictions, where the public will be invited to review and provide feedback via e-mail. Core Planning Team members are tasked with notifying stakeholders and community members when the annual review of the plan is undertaken.

The Planning team may also develop a voluntary citizen/stakeholder advisory group comprised of members from throughout the planning area to provide feedback on an annual basis. It is vital that the public and stakeholders maintain a vested interest in the Plan in order to keep the Plan relevant as it relates to the broader community's sustained health, safety, and welfare. Media such as websites, social media, local newspapers, and radio stations will be used to notify the public of any maintenance or periodic review activities taking place.

Public participation is critical to creating a plan that is enduring and one that has meaning to the community. The direct involvement of local officials and the public has been and will continue to be sought during the development, implementation, and maintenance phases of this Polk County Hazard Mitigation Plan Update.

APPENDIX A: CAPABILITY ASSESSMENT

Planning and regulatory capabilities are identified as the most impactful to how a municipality or utility can plan and develop in a way that is disaster resilient. The most critical capabilities related to planning and development such as Capital Improvement Programs, subdivision ordinances, comprehensive plans, transportation plans, and zoning codes are already in place for the cities of Polk and Johnson City. As is typical of smaller communities, many critical municipal functions and roles are carried out by people who are required to wear "many hats" as part of their job description. This strategy can be cost-effective for cash-strapped municipalities, but it often leads to roles being carried out by those who may be experts in one area or field and not necessarily the secondary and tertiary roles they are needed for. This also leads to the requirement to contract with outside consultants who may be experts in specific areas but do not always have the local knowledge and background that can be critical to success. This would require local focus on these items such as hiring planning, GIS, and building official personnel or developing these capabilities with grants and other means. Studies also need to be conducted to thoroughly identify gaps in capabilities and make comparisons to communities of similar size and economy. The communities throughout the planning area currently utilize engineering and grant writing consultants who are meeting these capability needs. Fiscal mechanisms to fund growth also need to be explored throughout the planning area such as drainage utility fees and impact fees. Lastly, educational programs and literature related to hazard mitigation should be strengthened within all municipalities which includes close coordination with the local school districts.

Polk County Multi-Hazard Mitigation Action Plan Update
Community Capabilities Table

	Capabilities	Polk County		City of Livingston	City of Onalaska	City of Goodrich	City of Seven Oaks	City of Corrigan		
Planning and Regulatory	Comprehensive Plan			PC		✓				The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan	✓		✓		✓				
	Transportation Plans	✓				✓				
	Emergency Operation Plans	✓		✓	PC	✓		✓		
	Continuity of Operations Plan	✓				✓				
	Stormwater Management Plan					✓				
	Zoning ordinances					PC				
	Building Codes (follow fire codes)	✓		✓	✓	PC		✓		
	Subdivision Ordinance (Court Order)	✓		PC	✓	PC				
	Floodplain Ordinance (Court Order)	✓		PC	✓					
Administrative and Technical	Engineers	✓		✓		✓		✓		This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners			✓		✓		✓		
	GIS Analysts	✓								
	Building inspectors	✓	✓	✓		PC		✓		
	Emergency managers	✓		✓	✓	PC		✓		
	Grant writers			✓	✓	✓		✓		
	Chief Building Official				✓	PC				
	Floodplain Administrator	✓			✓					
Financial	CDBG	✓		✓	✓			✓		The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program			✓	✓	✓				
	Stormwater utility fees				✓			✓		
	Development impact fees			✓	✓					
Education and Outreach	School programs			✓	✓					The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities			✓		✓				
	Storm Ready communities	✓				✓				
	Hazard awareness campaigns	✓				✓				
	Public Information Officer	✓		✓	✓	✓		✓		
	Community newsletter					✓				

Polk County Multi-Hazard Mitigation Action Plan Update
Community Capabilities Table

	Capabilities	Polk County		City of Livingston	City of Onalaska	City of Goodrich	City of Seven Oaks	City of Corrigan		
Planning and Regulatory	Comprehensive Plan			PC						The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan			✓						
	Transportation Plans			X						
	Emergency Operation Plans			✓						
	Continuity of Operations Plan			X						
	Stormwater Management Plan			X						
	Zoning ordinances			X						
	Building Codes (follow fire codes)			✓						
	Subdivision Ordinance (Court Order)			PC						
	Floodplain Ordinance (Court Order)			PC						
Administrative and Technical	Engineers			✓						This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners			✓						
	GIS Analysts			X						
	Building inspectors			✓						
	Emergency managers			✓						
	Grant writers			✓						
	Chief Building Official			X						
	Floodplain Administrator			X						
Financial	CDBG			✓						The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program			✓						
	Stormwater utility fees			X						
	Development impact fees			✓						
Education and Outreach	School programs			✓						The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities			✓						
	Storm Ready communities			X						
	Hazard awareness campaigns			X						
	Public Information Officer			✓						
	Community newsletter			X						

Polk County Multi-Hazard Mitigation Action Plan Update
Community Capabilities Table

	Capabilities	Polk County		City of Livingston	City of Onalaska	City of Goodrich	City of Seven Oaks	City of Corrigan		
Planning and Regulatory	Comprehensive Plan							✓		The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan							✗		
	Transportation Plans							✗		
	Emergency Operation Plans							✓		
	Continuity of Operations Plan							✗		
	Stormwater Management Plan							✗		
	Zoning ordinances							N/A		
	Building Codes (follow fire codes)							✓		
	Subdivision Ordinance (Court Order)							✗		
	Floodplain Ordinance (Court Order)							✓		
Administrative and Technical	Engineers							✓	→ Contract	This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners							✓	→ Contract	
	GIS Analysts							✗		
	Building inspectors							✓	→ Not Licensed	
	Emergency managers							✓		
	Grant writers							✓	→ Contract	
	Chief Building Official							✗		
	Floodplain Administrator							✗		
Financial	CDBG							✓		The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program							✗		
	Stormwater utility fees							✓		
	Development impact fees							✗		
Education and Outreach	School programs							✗		The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities							✗		
	Storm Ready communities							✗		
	Hazard awareness campaigns							✗		
	Public Information Officer							✓		
	Community newsletter							✗		

Polk County Multi-Hazard Mitigation Action Plan Update
Community Capabilities Table

	Capabilities	Polk County		City of Livingston	City of Onalaska	City of Goodrich	City of Seven Oaks	City of Corrigan		
Planning and Regulatory	Comprehensive Plan						PC			The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan						PC			
	Transportation Plans						PC			
	Emergency Operation Plans						PC			
	Continuity of Operations Plan						PC			
	Stormwater Management Plan						PC			
	Zoning ordinances						PC			
	Building Codes (follow fire codes)						PC			
	Subdivision Ordinance (Court Order)						PC			
	Floodplain Ordinance (Court Order)						PC			
Administrative and Technical	Engineers						PC			This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners						PC			
	GIS Analysts						PC			
	Building inspectors						PC			
	Emergency managers						PC			
	Grant writers						PC			
	Chief Building Official						PC			
	Floodplain Administrator						PC			
Financial	CDBG						PC			The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program						PC			
	Stormwater utility fees						PC			
	Development impact fees						PC			
Education and Outreach	School programs						PC			The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities						PC			
	Storm Ready communities						PC			
	Hazard awareness campaigns						PC			
	Public Information Officer						PC			
	Community newsletter						PC			

Polk County Multi-Hazard Mitigation Action Plan Update
Community Capabilities Table

	Capabilities	Polk County		City of Livingston	City of Onalaska	City of Goodrich	City of Seven Oaks	City of Corrigan		
Planning and Regulatory	Comprehensive Plan						X			The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan						X			
	Transportation Plans						X			
	Emergency Operation Plans						X			
	Continuity of Operations Plan						X			
	Stormwater Management Plan						X			
	Zoning ordinances						X			
	Building Codes (follow fire codes)						X			
	Subdivision Ordinance (Court Order)						X			
	Floodplain Ordinance (Court Order)						X			
Administrative and Technical	Engineers						X			This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners						X			
	GIS Analysts						X			
	Building inspectors						X			
	Emergency managers						X			
	Grant writers						X			
	Chief Building Official						X			
	Floodplain Administrator						X			
Financial	CDBG						X			The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program						X			
	Stormwater utility fees						X			
	Development impact fees						X			
Education and Outreach	School programs						X			The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities						X			
	Storm Ready communities						X			
	Hazard awareness campaigns						X			
	Public Information Officer						X			
	Community newsletter						X			

Polk County Multi-Hazard Mitigation Action Plan Update
Community Capabilities Table

	Capabilities	Polk County		City of Livingston	City of Onalaska	City of Goodrich	City of Seven Oaks	City of Corrigan		
Planning and Regulatory	Comprehensive Plan					✓				The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan					✓				
	Transportation Plans					✓				
	Emergency Operation Plans					✓				
	Continuity of Operations Plan					✓				
	Stormwater Management Plan					✓				
	Zoning ordinances					PC				
	Building Codes (follow fire codes)					PC				
	Subdivision Ordinance (Court Order)					PC				
	Floodplain Ordinance (Court Order)					PC				
Administrative and Technical	Engineers			Grant Writer						This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners			Grant Writer						
	GIS Analysts									
	Building inspectors					PC				
	Emergency managers					PC				
	Grant writers					✓				
	Chief Building Official					PC				
	Floodplain Administrator									
Financial	CDBG									The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program					✓				
	Stormwater utility fees					X				
	Development impact fees					X				
Education and Outreach	School programs									The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities					✓				
	Storm Ready communities					✓				
	Hazard awareness campaigns					✓				
	Public Information Officer					✓				
	Community newsletter					✓				

Polk County

Polk County Multi-Hazard Mitigation Action Plan Update
Community Capabilities Table

	Capabilities	Polk County		City of Livingston	City of Onalaska	City of Goodrich	City of Seven Oaks	City of Corrigan		
Planning and Regulatory	Comprehensive Plan									The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan	✓								
	Transportation Plans	✓								
	Emergency Operation Plans	✓								
	Continuity of Operations Plan	✓								
	Stormwater Management Plan									
	Zoning ordinances									
	Building Codes (follow fire codes)	✓								— Public building fire codes
	Subdivision Ordinance (Court Order)	✓								
	Floodplain Ordinance (Court Order)	✓								
Administrative and Technical	Engineers	✓								contract This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners									
	GIS Analysts	✓								
	Building inspectors. Firemarshal inspects Public buildings									
	Emergency managers	✓								
	Grant writers									
	Chief Building Official									
	Floodplain Administrator	✓								
Financial	CDBG	✓								The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program	✓								
	Stormwater utility fees									
	Development impact fees									
Education and Outreach	School programs									The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities									
	Storm Ready communities	✓								
	Hazard awareness campaigns	✓								
	Public Information Officer	✓								
	Community newsletter									

Polk County Multi-Hazard Mitigation Action Plan Update
Community Capabilities Table

	Capabilities	Polk County		City of Livingston	City of Onalaska	City of Goodrich	City of Seven Oaks	City of Corrigan		
Planning and Regulatory	Comprehensive Plan				X					The planning and regulatory mechanisms that guide growth and development and emergency plans
	Economic Development Plan				X					
	Transportation Plans				X					
	Emergency Operation Plans				DC					
	Continuity of Operations Plan				X					
	Stormwater Management Plan				X					
	Zoning ordinances				X					
	Building Codes (follow fire codes)				✓					
	Subdivision Ordinance (Court Order)				✓					
	Floodplain Ordinance (Court Order)				✓					
Administrative and Technical	Engineers				✓					This refers to staff, skills, and tools a community has. So provide staff numbers and any credentials or certificate trainings in reference to hazard mitigation
	Planners				X					
	GIS Analysts				X					
	Building inspectors				✓					
	Emergency managers				✓					
	Grant writers				✓					
	Chief Building Official				✓					
	Floodplain Administrator				✓					
Financial	CDBG				✓					The resources that a jurisdiction has access to or is eligible to use to fund mitigation efforts
	Capital Improvement Program				✓					
	Stormwater utility fees				✓					
	Development impact fees				✓					
Education and Outreach	School programs				✓					The programs and methods already in place that could be used to implement mitigation activities
	Firewise communities				X					
	Storm Ready communities				X					
	Hazard awareness campaigns				X					
	Public Information Officer				✓					
	Community newsletter				X					

APPENDIX B: PRIORITY RANKING FORMS

City of Livingston STAPLEE Prioritization Form

LANGFORD COMMUNITY MANAGEMENT SERVICES

Hazard Mitigation Plan Prioritization
Exercise

STAPLEE Ranking - Jurisdiction: **Livingston**

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values: Within next 2 years --> Immediate (I); 2-3 years --> Near (N); 3-5 years --> Short (S); More than 5 years -->Long (L)

Action Number	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
1	Education program aimed at teaching citizens, public agencies, private property owners and business owners how to mitigate wildfire risk to their property.	4	4	4	4	3	4	5			28	S
2	Defensible space projects around neighborhoods west of Livingston off 190 (EIP).	3	3	3	4	3	3	3			22	L
3	Create Master Drainage Plan with GIS.	4	3	2	4	3	3	4			23	S
4	Establish an educational program to teach citizens how to mitigate flood damage to their property.	4	4	4	5	3	4	4			28	S
5	Educate the public on the risks of lightning and how they can mitigate damage/injury to themselves and their property.	4	4	3	4	3	4	4			26	S
6	Expand Broadband Services throughout the community	5	4	4	5	4	5	4			31	N
7	Construct interior safe rooms in priority public buildings (up to seven buildings).	4	3	3	3	4	3	3			23	S
8	PHASE I: Install windows and doors in city buildings to withstand hurricane-force winds.	4	4	4	4	4	3	3			26	L
9	Perform engineering study to identify at-risk locations for streambed slope erosion.	4	4	3	4	3	4	4			26	S
10	Phase I: Implement actions to stabilize slopes susceptible to erosion. Planting vegetation and bank stabilization, sloping or grading techniques, terracing hillsides, or installing riprap boulders or geotextile fabric.	5	4	4	4	4	4	5			30	S
11	Educate the public on techniques to curb gully streambed erosion on privately owned property.	4	3	3	4	4	4	4			26	L
12	Phase I: Upgrade natural hazard warning systems and methods. This may include but is not limited to: upgraded and modernized text-enabled warning systems, warning sirens and speakers, text-based warnings, reverse 911, remote emailing devices with automated alerts.	5	5	5	5	4	4	4			32	I
13	Wildfire Fuel Reduction Projects	4	4	4	4	4	4	4			28	N
14	Establish cooling centers in public facilities.	5	4	3	4	4	3	3			26	S
15	Adopt city policy and replace city-owned landscaping with drought resistant plants.	4	4	3	4	4	4	4			27	S

LANGFORD COMMUNITY MANAGEMENT SERVICES

Hazard Mitigation Plan Prioritization
Exercise

STAPLEE Ranking - Jurisdiction: **Livingston**

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values: Within next 2 years --> Immediate (I); 2-3 years --> Near (N); 3-5 years --> Short (S); More than 5 years -->Long (L)

Action Number	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
16	Remove limbs from trees that overhang power lines.	5	5	5	5	4	5	5			34	I
17	Phase I: Install generators in priority City critical facilities. Install lightning warning systems for outdoor venues.	5	5	4	4	4	4	4			30	N
18	Phase I: Install lightning rods and grounding systems (4 of 8 facilities).	4	4	4	4	4	4	4			28	N
19	Educate the public in water saving techniques.	5	4	4	4	4	4	4			29	I
20	Phase 1: Elevate and reinforce priority roadways and bridges prone to inundation from flooding and low-water crossings. Projects may include general road elevation, upgrading culverts and installing headwalls, upgrading and reinforcing bridges and bridge footings, etc.	4	4	4	4	4	4	4			28	N
21	Work with FEMA to develop detailed FIRMs to more accurately map flooding risk from all sources	5	4	4	4	4	4	4			29	N
22	Install Solar Streetlights where no streetlights exist.	4	3	3	4	3	4	4			25	L
23	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: flood proofing.	4	4	4	4	4	4	4			28	S
24	Hazard hardening retrofit for city facilities. Activities may include Flood proofing, impact-resistant windows, storm shutters, roof straps, structural bracing.	4	4	4	4	4	4	4			28	S
25	Educate the public to teach them how to harden and retrofit their properties to prepare for hurricanes.	3	4	3	4	4	4	4			26	S
26	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps, and structural bracing.	4	4	4	4	4	4	4			28	L
27	Educate the public about the dangers of windstorms and how to prepare for them.	3	3	2	3	3	2	3			19	L
28	Hazard hardening retrofit for city facilities. Activities may include but are not limited to hardscaping of surrounding areas, and retrofitting with fierce-resistant siding and roofing.	4	3	3	3	4	3	3			23	S
29	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, plumbing reinforcement and insulation.	4	4	4	4	4	4	4			28	S

LANGFORD COMMUNITY MANAGEMENT SERVICES EST. 1983

Hazard Mitigation Plan Prioritization Exercise

STAPLEE Ranking - Jurisdiction: **Livingston**

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values:
Within next 2 years --> Immediate (I)
2-3 years --> Near (N)
3-5 years-->Short (S)
More than 5 years-->Long (L)

ID	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE
30	Educate the public about how to prepare for winter storms.	4	4	4	4	3	4	4			27
31	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: grounding systems, surge protection, data back-up systems.	4	3	3	4	4	4	4			27
32	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: low-flow plumbing fixtures, plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	4	4	4	4	4	4	4			28
33	Educate the public about water-saving techniques.	4	4	4	4	4	4	4			28
34	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps.	3	3	2	3	3	3	3			20
35	Educate the public about the dangers of hail and how to protect individuals, families, and their property from hailstorms	3	2	2	2	3	2	2			16
36	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: low-flow plumbing fixtures, plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	4	4	3	4	4	4	4			27
37	Educate the public about how to prepare for heatwaves and avoid heat-related illness	4	4	4	4	4	4	4			28

LANGFORD COMMUNITY MANAGEMENT SERVICES EST. 1983

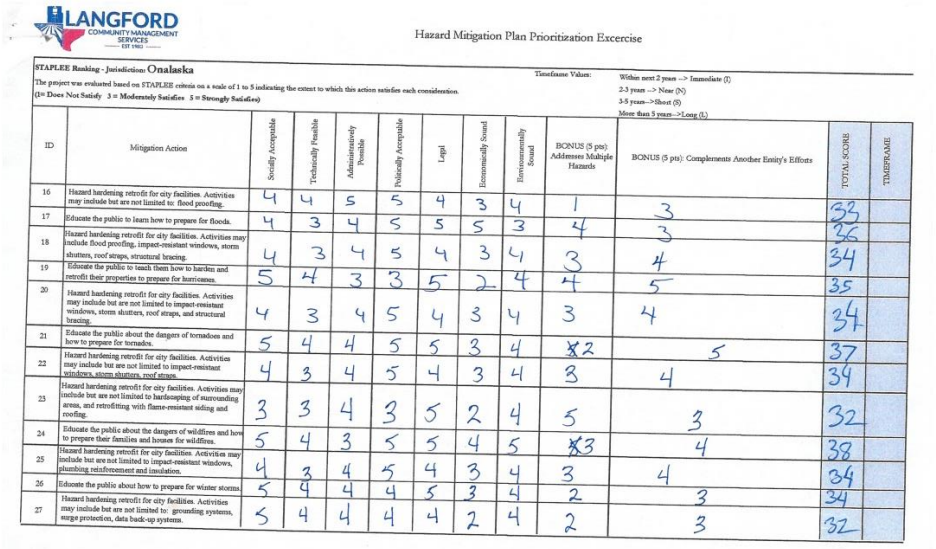
Hazard Mitigation Plan Prioritization Exercise

STAPLEE Ranking - Jurisdiction: **Onalaska**

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values:
Within next 2 years --> Immediate (I)
2-3 years --> Near (N)
3-5 years-->Short (S)
More than 5 years-->Long (L)

Action Number	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
1	Acquire property at 395 Shawnee to prevent future flooding.	5	4	4	3	2	3	5	1	1	28	
2	.Defensible space project around timber plantation south of Onalaska Loop.	3	5	5	4	3	4	2	2	4	32	
3	Educate the public to mitigate wind damage to vulnerable housing, especially mobile homes.	4	4	3	3	4	5	5	5	4	37	
4	PProvide generators and or fans to citizens with medical needs that require electricity or cooling equipment.	5	3	4	5	4	1	2	4	4	30	
5	Elevate and reinforce roadways and bridges prone to inundation from flooding. Projects may include general road elevation upgrading culverts and installing headwalls upgrades and reinforcement of bridges and bridge footings etc.	5	3	3	5	4	2	3	5	5	35	
6	Work with FEMA to develop detailed FIRMs to more accurately map flooding risk from all sources.	5	3	3	5	4	3	5	3	3	34	
7	Upgrade and expand implementation of natural hazard warning systems and methods, focusing on la effout fire departments. This may include but is not limited to: warning sirens and speakers.	5	4	4	4	3	4	4	5	5	38	
8	Establish cooling centers in public facilities.	5	5	4	5	5	3	4	4	5	40	
9	Install generators for all City critical facilities.	5	5	4	4	5	2	3	4	4	36	
10	Install lightning warning systems for outdoor venues.	4	4	3	4	5	1	4	1	1	27	
11	Install lightning rods and grounding systems.	5	3	4	2	5	1	5	1	1	27	
12	Educate the public in water saving techniques.	3	5	4	2	5	3	5	2	4	33	
13	Educate the public about the dangers of lightning and how to monitor lightning activity and stay safe.	5	3	4	3	5	4	5	1	1	31	
14	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: low-flow plumbing fixtures plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	4	3	2	1	5	1	4	2	2	24	
15	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters.	5	5	5	2	5	3	4	5	3	37	



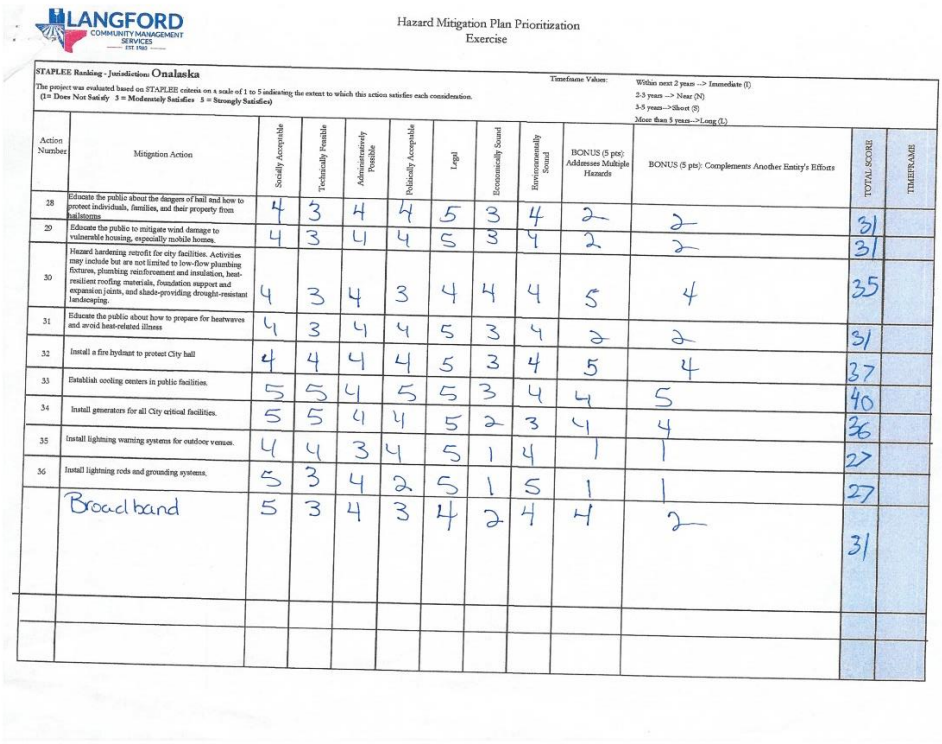
Hazard Mitigation Plan Prioritization Excercise

STAPLEE Ranking - Jurisdiction: Onalaska

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values: Within next 2 years --> Immediate (I); 2-3 years --> Near (N); 3-5 years-->Short (S); More than 5 years-->Long (L)

ID	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
16	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: flood proofing.	4	4	5	5	4	3	4	1	3	33	
17	Educate the public to learn how to prepare for floods.	4	3	4	5	5	5	3	4	3	36	
18	Hazard hardening retrofit for city facilities. Activities may include flood proofing, impact-resistant windows, storm shutters, roof straps, structural bracing.	4	3	4	5	4	3	4	3	4	34	
19	Educate the public to teach them how to harden and retrofit their properties to prepare for hurricanes.	5	4	3	3	5	2	4	4	5	35	
20	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps, and structural bracing.	4	3	4	5	4	3	4	3	4	34	
21	Educate the public about the dangers of tornadoes and how to prepare for tornados.	5	4	4	5	5	3	4	x2	5	37	
22	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps.	4	3	4	5	4	3	4	3	4	34	
23	Hazard hardening retrofit for city facilities. Activities may include but are not limited to hardscaping of surrounding areas, and retrofitting with flame-resistant siding and roofing.	3	3	4	3	5	2	4	5	3	32	
24	Educate the public about the dangers of wildfires and how to prepare their families and houses for wildfires.	5	4	3	5	5	4	5	x3	4	38	
25	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, plumbing reinforcement and insulation.	4	3	4	5	4	3	4	3	4	34	
26	Educate the public about how to prepare for winter storms.	5	4	4	4	5	3	4	2	3	34	
27	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: grounding systems, surge protection, data back-up systems.	5	4	4	4	4	2	4	2	3	32	



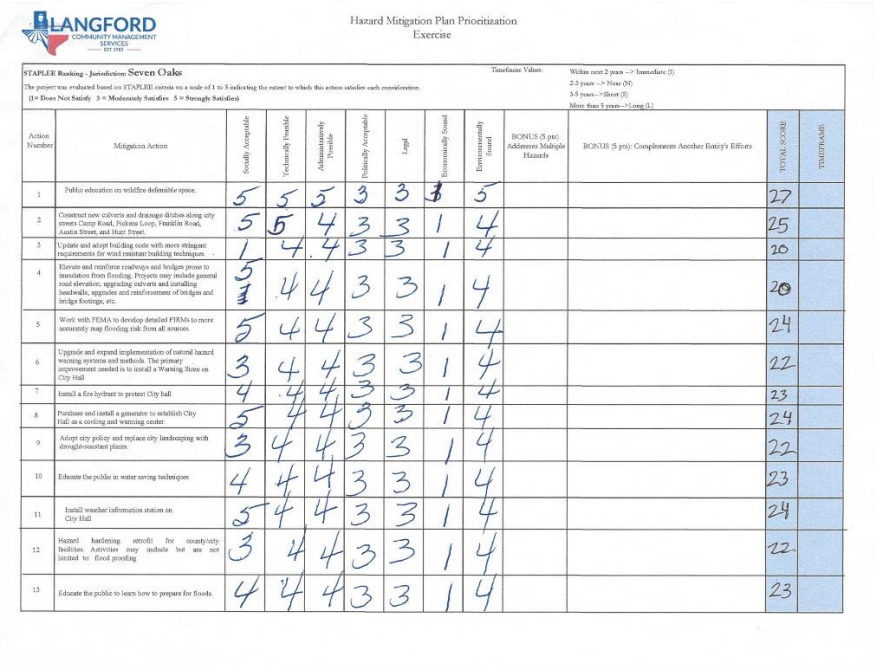
Hazard Mitigation Plan Prioritization Exercise

STAPLEE Ranking - Jurisdiction: Onalaska

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values: Within next 2 years --> Immediate (I); 2-3 years --> Near (N); 3-5 years-->Short (S); More than 5 years-->Long (L)

Action Number	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
28	Educate the public about the dangers of hail and how to protect individuals, families, and their property from hailstorms.	4	3	4	4	5	3	4	2	2	31	
29	Educate the public to mitigate wind damage to vulnerable housing, especially mobile homes.	4	3	4	4	5	3	4	2	2	31	
30	Hazard hardening retrofit for city facilities. Activities may include but are not limited to low-flow plumbing fixtures, plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	4	3	4	3	4	4	4	5	4	35	
31	Educate the public about how to prepare for heatwaves and avoid heat-related illness	4	3	4	4	5	3	4	2	2	31	
32	Install a fire hydrant to protect City hall	4	4	4	4	5	3	4	5	4	37	
33	Establish cooling centers in public facilities.	5	5	4	5	5	3	4	4	5	40	
34	Install generators for all City critical facilities.	5	5	4	4	5	2	3	4	4	36	
35	Install lightning warning systems for outdoor venues.	4	4	3	4	5	1	4	1	1	27	
36	Install lightning rods and grounding systems.	5	3	4	2	5	1	5	1	1	27	
	Broadband	5	3	4	3	4	2	4	4	2	31	



Hazard Mitigation Plan Prioritization Exercise

STAPLEE Ranking - Jurisdiction: Seven Oaks

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values: Within next 2 years --> Immediate (I); 2-3 years --> Near (N); 3-5 years-->Short (S); More than 5 years-->Long (L)

Action Number	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
1	Public education on wildfire defensible space.	5	5	5	3	3	1	5			27	
2	Construct new culverts and drainage ditches along city streets Camp Road, Pollens Levy, Franklin Road, Austin Street, and Hunt Street.	5	5	4	3	3	1	4			25	
3	Update and adopt building code with more stringent requirements for wind resistant building techniques.	1	4	4	3	3	1	4			20	
4	Elevate and reinforce roadways and bridges prone to inundation from flooding. Projects may include general road elevation; upgrading culverts and installing headwalls, upgrades and reinforcement of bridges and bridge footings, etc.	5 1	4	4	3	3	1	4			20	
5	Work with FEMA to develop detailed FIRMs to more accurately map flooding risk from all sources.	5	4	4	3	3	1	4			24	
6	Upgrade and expand implementation of natural hazard warning systems and methods. The primary improvement needed is to install a Warning Siren on City Hall	3	4	4	3	3	1	4			22	
7	Install a fire hydrant to protect City hall	4	4	4	3	3	1	4			23	
8	Purchase and install a generator to establish City Hall as a cooling and warming center.	5	4	4	3	3	1	4			24	
9	Adopt city policy and replace city landscaping with drought-resistant plants.	3	4	4	3	3	1	4			22	
10	Educate the public in water saving techniques	4	4	4	3	3	1	4			23	
11	Install weather information station on City Hall	5	4	4	3	3	1	4			24	
12	Hazard hardening retrofit for county/city facilities. Activities may include but are not limited to flood proofing.	3	4	4	3	3	1	4			22	
13	Educate the public to learn how to prepare for floods.	4	4	4	3	3	1	4			23	

Hazard Mitigation Plan Prioritization Excercise

STAPLEE Ranking - Jurisdiction: Seven Oaks

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values: Within next 2 years --> Immediate (I); 2-3 years --> Near (N); 3-5 years-->Short (S); More than 5 years-->Long (L)

ID	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
14	Hazard hardening retrofit for county/city facilities. Activities may include flood proofing, impact-resistant windows, storm shutters, roof straps, structural bracing	5	4	4	3	3	1	4			24	
15	Educate the public to teach them how to harden and retrofit their properties to prepare for hurricanes.	4	4	4	3	3	1	4			23	
16	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps, and structural bracing.	5	4	4	3	3	1	4			24	
17	Educate the public about the dangers of tornadoes and how to prepare for tornadoes.	4	4	4	3	3	1	4			~~24~~ 23	
18	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps	4	4	4	3	3	1	4			23	
19	Educate the public about the dangers of windstorms and how to prepare for them.	4	4	4	3	3	1	4			23	
20	Hazard hardening retrofit for county/city facilities. Activities may include but are not limited to hardscaping of surrounding areas, and retrofitting with flame-resistant siding and roofing.	4	4	4	3	3	1	4			23	
21	Hazard hardening retrofit for county/city facilities. Activities may include but are not limited to impact-resistant windows, plumbing reinforcement and insulation.	3	4	4	3	3	1	4			22	
22	Educate the public to prepare for winter storms	4	4	4	3	3	1	4			23	

Website

LANGFORD COMMUNITY MANAGEMENT SERVICES — EST 1983

Hazard Mitigation Plan Prioritization Excercise

STAPLEE Ranking - Jurisdiction: Seven Oaks

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values:
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ID	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
23	Educate the public to prepare for winter storms	4	4	4	3	3	1	4			23	
24	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: grounding systems, surge protection, data back-up systems.	5	4	4	3	3	1	4			24	
25	Educate the public about the dangers of lightning and how to monitor lightning activity and stay safe.	4	4	4	3	3	1	4			23	
26	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: low-flow plumbing fixtures plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	5	4	4	3	3	1	4			24	
27	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters.	5	4	4	3	3	1	4			24	
28	Educate the public about the dangers of hail and how to protect individuals, families, and their property from hailstorms	4	4	4	3	3	1	4			23	
29	Hazard hardening retrofit for city facilities. Activities may include but are not limited to low-flow plumbing fixtures, plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	4	4	4	3	3	1	4			23	
30	Educate the public about how to prepare for heatwaves and avoid heat-related illness	4	4	4	3	3	1	4			23	

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LANGFORD COMMUNITY MANAGEMENT SERVICES — EST 1983

Hazard Mitigation Plan Prioritization Exercise

STAPLEE Ranking - Jurisdiction: Corrigan

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values:
Within next 2 years --> Immediate (I)
2-3 years --> Near (N)
3-5 years-->Short (S)
More than 5 years-->Long (L)

Action Number	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
1	Create and maintain wildfire-defensible space around the city library, lift stations, and wastewater treatment plant.	5	5	5	5	5	3	5	5		38	I
2	Increase capacity of drainage canal behind high school baseball field to prevent flooding school property.	5	1	3	5	1	3	3	5		26	N
3	Construct drainage ditched along city streets Camp Road, Pickens Loop, Franklin Road, Austin Street, and Hunt Street.	These aren't our streets									NA	NA
4	Adopt a site review ordinance requiring the inclusion of stormwater management infrastructure.	5	3	5	5	5	3	5	5		36	I
5	Create a detention pond to address flooding on W. Fifth St., Yoa St., W Third St., W First St., and W Front St.	5	3	5	5	5	3	5	5		36	I
6	Elevate and reinforce Union Springs Road to prevent inundation from flooding. Project may include general road elevation; upgrading culverts and installing headwalls; upgrades and reinforcement of bridges and bridge footings; etc.	5	3	5	5	5	3	5	5		36	N
7	Upgrade and modernize text-enabled warning system.	5	5	5	5	5	5	5	5		40	I
8	Educate the public on wildfire safety and the benefits of creating defensible space.	5	5	5	5	5	5	5	5		40	I
9	Adopt city policy and replace city landscaping with drought-resistant plants to prevent soil erosion and foundation issues	3	5	5	3	5	5	5	1		32	N
10	Install lightning warning systems for outdoor venues.	5	5	5	5	5	3	5	5		38	N
11	Install additional lightning rods and grounding systems.	5	5	5	5	5	3	5	5		38	N
12	Hazard hardening retrofit for city facilities. Activities may include but are not limited to hardscaping of surrounding areas, and retrofitting with flame-resistant siding and roofing.	5	3	3	3	5	3	1	5		28	N
13	Educate the public about how to prepare for winter storms.	5	5	5	5	5	5	5	5		40	I
14	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: grounding systems, surge protection, data back-up systems.	5	3	3	3	5	3	1	5		28	N

Hazard Mitigation Plan Prioritization Exercise

STAPLEE Ranking - Jurisdiction: Corrigan

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15	Educate the public about the dangers of lightning and how to monitor lightning activity and stay safe.	5	5	5	5	5	5	5	5		40 H	
16	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: low-flow plumbing fixtures plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	5	1	3	3	5	3	5	5		30 S	
17	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters,	5	5	5	3	5	1	3	5		32 M	
18	Educate the public about the dangers of hail and how to protect individuals, families, and their property from hailstorms	5	5	5	5	5	5	5	5		40 M	
19	Hazard hardening retrofit for city facilities. Activities may include but are not limited to low-flow plumbing fixtures, plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support, and expansion joints.	5	3	5	3	5	1	5	5		32 H	
20	Educate the public about how to prepare for heatwaves and avoid heat-related illness.	5	5	5	5	5	5	5	5		40 M	
21	Adopt city policy and replace city landscaping with drought resistant plants.	5	5	5	3	5	5	5	5		38 S	
22	Educate the public in water saving techniques.	5	5	5	5	5	5	5	5		40 O	
23	Install generators for all City critical facilities.	5	5	5	5	5	5	5	5		40 M	
24	Hazard hardening retrofit for city facilities. Activities may include but are not limited to: floodproofing, structural elevation, drainage improvements.	5	5	5	5	5	5	5	5		40 M	
25	Educate the public to learn how to prepare for floods.	5	5	5	5	5	5	5	5		40 M	
26	Hazard hardening retrofit for city facilities. Activities may include flood proofing, impact-resistant windows, storm shutters, roof straps, structural bracing	5	5	5	3	5	3	5	5		36 M	
27	Educate the public to teach them how to harden and retrofit their properties to prepare for hurricanes.	5	5	5	5	5	5	5	5		40 M	

Hazard Mitigation Plan Prioritization Excercise

STAPLEE Ranking - Jurisdiction: Corrigan

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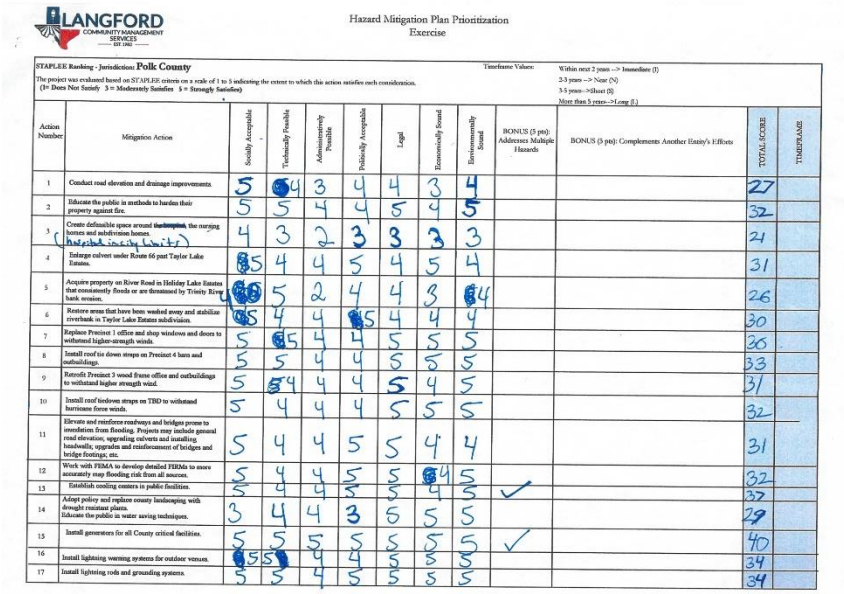
28	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps, and structural bracing.	5	5	5	3	5	3	5	5		36 H	
29	Educate the public about the dangers of tornadoes and how to prepare for tornados.	5	5	5	5	5	5	5	5		40 M	
30	Hazard hardening retrofit for city facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, and roof straps.	5	5	5	3	5	3	5	5		36 H	
31	Educate the public about the dangers of windstorms and how to prepare for them.	5	5	5	5	5	5	5	5		40 M	



Hazard Mitigation Plan Prioritization Exercise

STAPLEE Ranking - Jurisdiction: Polk County

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values:
Within next 2 years --> Immediate (I)
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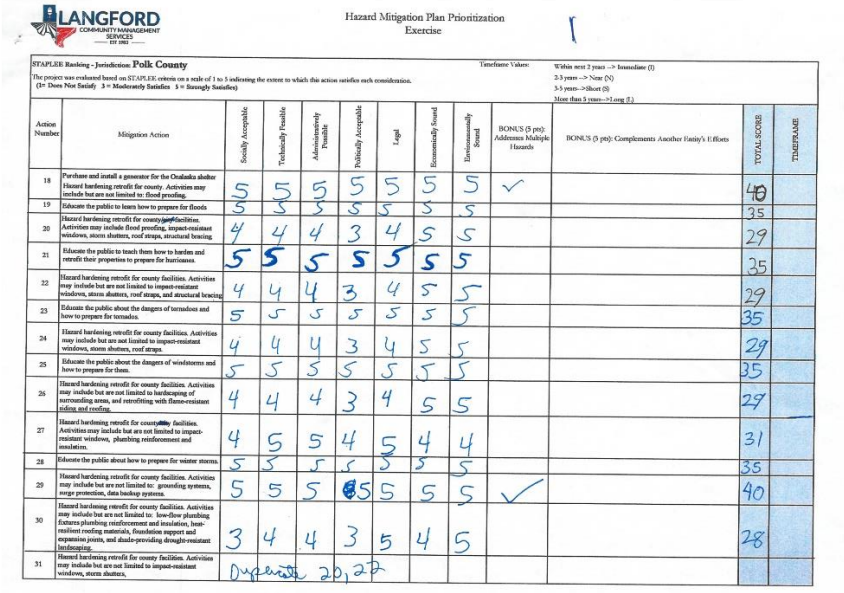
3-5 years-->Short (S)
More than 5 years-->Long (L)

Action Number	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
1	Conduct road elevation and drainage improvements.	5	4	3	4	4	3	4			27	
2	Educate the public in methods to harden their property against fire.	5	5	4	4	5	4	5			32	
3	Create defensible space around the hospital, the nursing homes and subdivision homes. (Neighborhood Watch)	4	3	2	3	3	3	3			21	
4	Enlarge culvert under Route 66 past Taylor Lake Estates.	5	4	4	5	4	5	4			31	
5	Acquire property on River Road in Holiday Lake Estates that consistently floods or are threatened by Trinity River bank erosion.	5	5	2	4	4	3	4			26	
6	Restore areas that have been washed away and stabilize riverbank in Taylor Lake Estates subdivision.	5	4	4	5	4	4	4			30	
7	Replace Precinct 1 office and shop windows and doors to withstand higher-strength winds.	5	5	4	4	5	5	5			36	
8	Install roof tie down straps on Precinct 4 barn and outbuildings.	5	5	4	4	5	5	5			33	
9	Retrofit Precinct 3 wood frame office and outbuildings to withstand higher strength wind.	5	4	4	4	5	4	5			31	
10	Install roof tiedown straps on TBD to withstand hurricane force winds.	5	4	4	4	5	5	5			32	
11	Elevate and reinforce roadways and bridges prone to inundation from flooding. Projects may include general road elevation; upgrading culverts and installing headwalls; upgrades and reinforcement of bridges and bridge footings; etc.	5	4	4	5	5	4	4			31	
12	Work with FEMA to develop detailed FIRMs to more accurately map flooding risk from all sources.	5	4	4	5	5	4	5			32	
13	Establish cooling centers in public facilities.	5	4	4	5	5	4	5	✓		37	
14	Adopt policy and replace county landscaping with drought resistant plants. Educate the public in water saving techniques.	3	4	4	3	5	5	5			29	
15	Install generators for all County critical facilities.	5	5	5	5	5	5	5	✓		40	
16	Install lightning warning systems for outdoor venues.	5	5	4	4	5	5	5			34	
17	Install lightning rods and grounding systems.	5	5	4	5	5	5	5			34	



Hazard Mitigation Plan Prioritization Exercise

STAPLEE Ranking - Jurisdiction: Polk County

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values:
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Action Number	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
18	Purchase and install a generator for the Onalaska shelter Hazard hardening retrofit for county. Activities may include but are not limited to: flood proofing.	5	5	5	5	5	5	5	✓		40	
19	Educate the public to learn how to prepare for floods	5	5	5	5	5	5	5			35	
20	Hazard hardening retrofit for county facilities. Activities may include flood proofing, impact-resistant windows, storm shutters, roof straps, structural bracing.	4	4	4	3	4	5	5			29	
21	Educate the public to teach them how to harden and retrofit their properties to prepare for hurricanes.	5	5	5	5	5	5	5			35	
22	Hazard hardening retrofit for county facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps, and structural bracing.	4	4	4	3	4	5	5			29	
23	Educate the public about the dangers of tornadoes and how to prepare for tornados.	5	5	5	5	5	5	5			35	
24	Hazard hardening retrofit for county facilities. Activities may include but are not limited to impact-resistant windows, storm shutters, roof straps.	4	4	4	3	4	5	5			29	
25	Educate the public about the dangers of windstorms and how to prepare for them.	5	5	5	5	5	5	5			35	
26	Hazard hardening retrofit for county facilities. Activities may include but are not limited to hardscaping of surrounding areas, and retrofitting with flame-resistant siding and roofing.	4	4	4	3	4	5	5			29	
27	Hazard hardening retrofit for county facilities. Activities may include but are not limited to impact-resistant windows, plumbing reinforcement and insulation.	4	5	5	4	5	4	4			31	
28	Educate the public about how to prepare for winter storms.	5	5	5	5	5	5	5			35	
29	Hazard hardening retrofit for county facilities. Activities may include but are not limited to: grounding systems, surge protection, data backup systems.	5	5	5	5	5	5	5	✓		40	
30	Hazard hardening retrofit for county facilities. Activities may include but are not limited to: low-flow plumbing fixtures plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant hardscaping.	3	4	4	3	5	4	5			28	
31	Hazard hardening retrofit for county facilities. Activities may include but are not limited to impact-resistant windows, storm shutters,	Duplicate 20, 27										

LANGFORD COMMUNITY MANAGEMENT SERVICES — EST. 1980

Hazard Mitigation Plan Prioritization Excercise

STAPLEE Ranking - Jurisdiction: **Polk County**

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values:
Within next 2 years --> Immediate (I)
2-3 years --> Near (N)
3-5 years-->Short (S)
More than 5 years-->Long (L)

ID	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
32	Educate the public about the dangers of hail and how to protect their family and property from hail damage.	4	4	4	4	4	4	4			28	
33	Hazard hardening retrofit for county facilities. Activities may include but are not limited to low-flow plumbing fixtures, plumbing reinforcement and insulation, heat-resilient roofing materials, foundation support and expansion joints, and shade-providing drought-resistant landscaping.	Dup of 30										
34	Educate the public about the dangers of extreme heat and how to prevent heat-related illness.	5	5	5	5	5	5	5			35	
35	Install Flood Gauges on Flood prone Creeks and in low-water crossing areas	5	5	4	5	5	4	4			32	

Hazard Mitigation Plan Prioritization Exercise   >15 M

LANGFORD

STAPLEE Ranking - Jurisdiction: **Goodrich**

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values:
Within next 2 years --> Immediate (I)
2-3 years --> Near (N)
3-5 years-->Short (S)
More than 5 years-->Long (L)

Action Number	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
1	Initiate public education campaign to improve the community's understanding and access to information to guide and facilitate activities they can undertake which improve level of protection for their homes, their property and improve their safety and resiliency to natural hazards.	5	5	5	5	5	5	5	5	5 H	45	I
2	Fix Flooding Issue Downhill of Sam Loggins Road Culvert	5	5	5	5	5	5	5	5	5 H	45	I
3	Repair the bridge on Old 35 S over Sampson Creek due to recent damage from flooding in April 2024.	5	5	5	5	5	5	5	5	5 H	45	I
4	Purchase and Install natural hazard warning systems, with 1 Warning Siren at FD/City Hall and a 2nd location TBD	1	1	1	1	1	1	1	5	5 M	17	I
5	Maintain defensible space around all critical facilities especially lift stations and wastewater treatment plants.	1	1	1	1	1	1	1	5	5 M	17	I
6	Establish cooling centers in public facilities. - School has generator just powers cafeteria	1	1	1	1	1	1	1	5	5 M	17	N
7	Adopt city policy and replace city/county landscaping with drought-resistant plants.	1	1	1	1	1	1	1	5	5 M	17	I
8	Remove limbs from trees that overhang power lines.	5	5	5	5	5	5	5	5	5 H	45	I
9	Adopt city policy and replace city/county landscaping with drought resistant plants.	5	5	5	5	5	5	5	5	5 H	45	I
10	Purchase and install generators at the Community Center and the critical lift station.	3	3	3	3	3	3	3	5	5 H	32	N
11	Install Weather Station at City Hall	3	3	3	3	3	3	3	5	5 H	32	N
12	Elevate and reinforce roadways and bridges prone to inundation from flooding. Projects may include general road elevation; upgrading culverts and installing headwalls; upgrades and reinforcement of bridges and bridge footings; etc.	3	3	3	3	3	3	3	5	5 H	32	N
13	Construction of New City Hall and Volunteer Fire Department Building Phase 1: Architectural/Engineering Study and Building Design	0	0	0	0	0	0	0	5	5 L	10	L
14	Construction of New City Hall and Volunteer Fire Department Building Phase 2: Construction	0	0	0	0	0	0	0	5	5 L	10	L
15	Conduct an Evacuation Exercise for Lake Livingston Dam Failure	1	1	1	1	1	1	1	5	5	17	N

LANGFORD COMMUNITY MANAGEMENT SERVICES EST. 1983

Hazard Mitigation Plan Prioritization Excercise

STAPLEE Ranking - Jurisdiction: **Goodrich**

The project was evaluated based on STAPLEE criteria 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)

Timeframe Values:
Within next 2 years --> Immediate (I)
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3-5 years-->Short (S)
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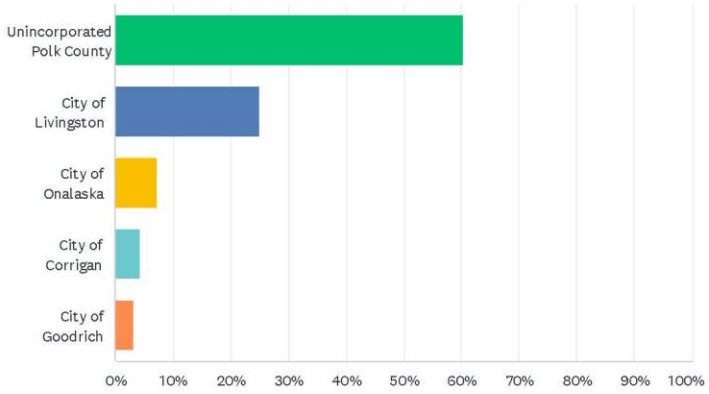
ID	Mitigation Action	Socially Acceptable	Technically Feasible	Administratively Possible	Politically Acceptable	Legal	Economically Sound	Environmentally Sound	BONUS (5 pts): Addresses Multiple Hazards	BONUS (5 pts): Complements Another Entity's Efforts	TOTAL SCORE	TIMEFRAME
16	Educate and communicate to the public the risk of Dam Failure and evacuation procedures	3	3	3	3	3	3	3	5	5 H	31	S

Appendix C: Public Engagement Survey Results

Polk County Hazard Mitigation Plan Update

Q1 Please tell us where you live

Answered: 96 Skipped: 0

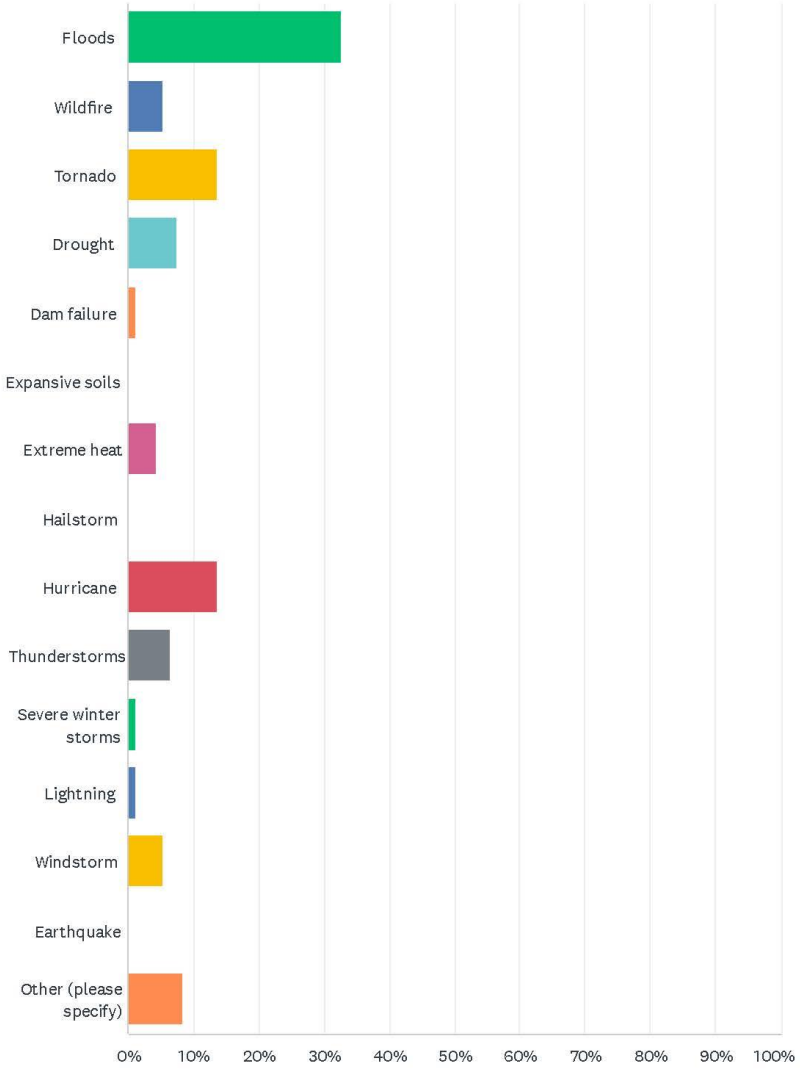


ANSWER CHOICES	RESPONSES	
Unincorporated Polk County	60.42%	58
City of Livingston	25.00%	24
City of Onalaska	7.29%	7
City of Corrigan	4.17%	4
City of Goodrich	3.13%	3
TOTAL		96

Polk County Hazard Mitigation Plan Update

Q2 Please select the hazard you think is the highest threat to you, your business and/or your community. (Please check only one)

Answered: 95 Skipped: 1



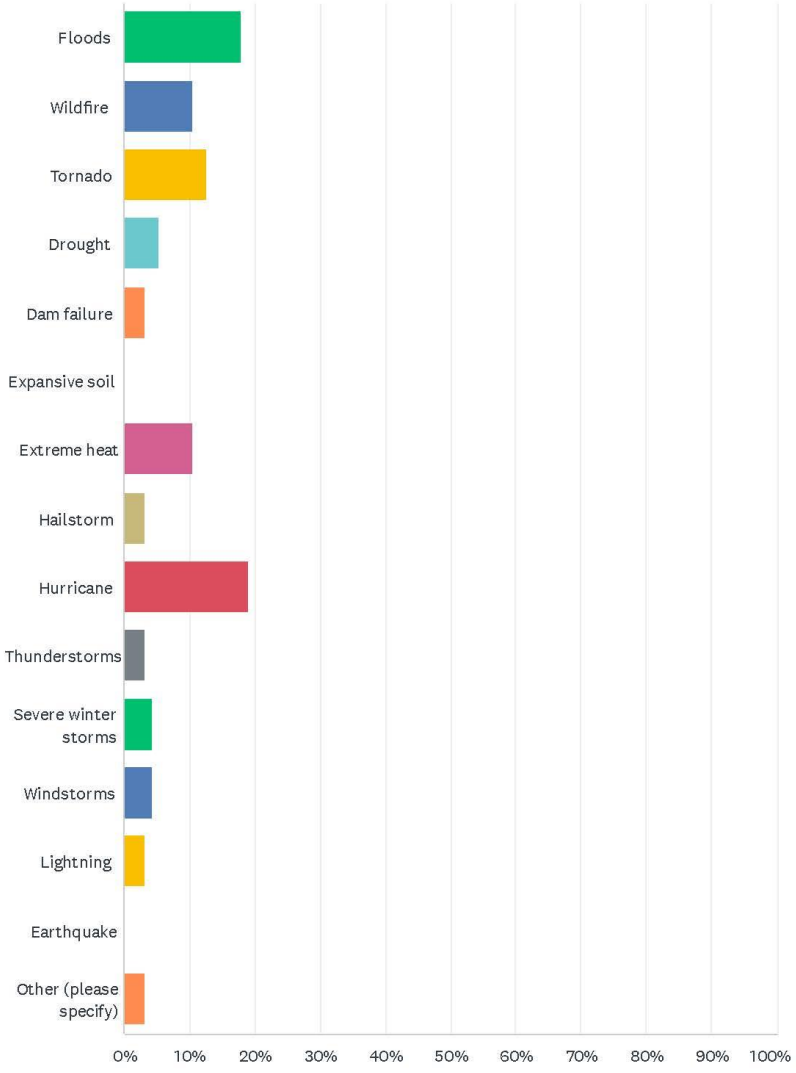
Polk County Hazard Mitigation Plan Update

ANSWER CHOICES	RESPONSES	
Floods	32.63%	31
Wildfire	5.26%	5
Tornado	13.68%	13
Drought	7.37%	7
Dam failure	1.05%	1
Expansive soils	0.00%	0
Extreme heat	4.21%	4
Hailstorm	0.00%	0
Hurricane	13.68%	13
Thunderstorms	6.32%	6
Severe winter storms	1.05%	1
Lightning	1.05%	1
Windstorm	5.26%	5
Earthquake	0.00%	0
Other (please specify)	8.42%	8
TOTAL		95

Polk County Hazard Mitigation Plan Update

Q3 Please select the hazard you think is the second highest threat to you, your business and/or your community. (Please check only one)

Answered: 95 Skipped: 1



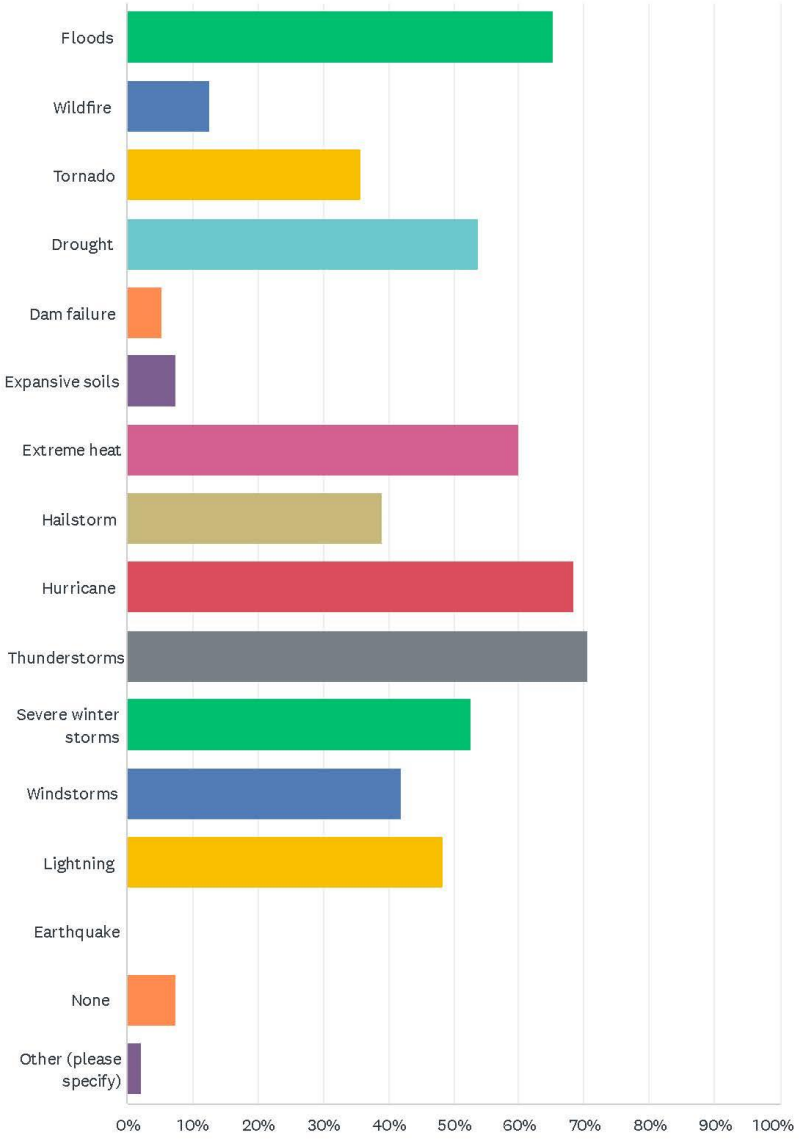
Polk County Hazard Mitigation Plan Update

ANSWER CHOICES	RESPONSES	
Floods	17.89%	17
Wildfire	10.53%	10
Tornado	12.63%	12
Drought	5.26%	5
Dam failure	3.16%	3
Expansive soil	0.00%	0
Extreme heat	10.53%	10
Hailstorm	3.16%	3
Hurricane	18.95%	18
Thunderstorms	3.16%	3
Severe winter storms	4.21%	4
Windstorms	4.21%	4
Lightning	3.16%	3
Earthquake	0.00%	0
Other (please specify)	3.16%	3
TOTAL		95

Polk County Hazard Mitigation Plan Update

Q4 While living here in Polk County, have you experienced a disaster? (please check all that apply)

Answered: 95 Skipped: 1



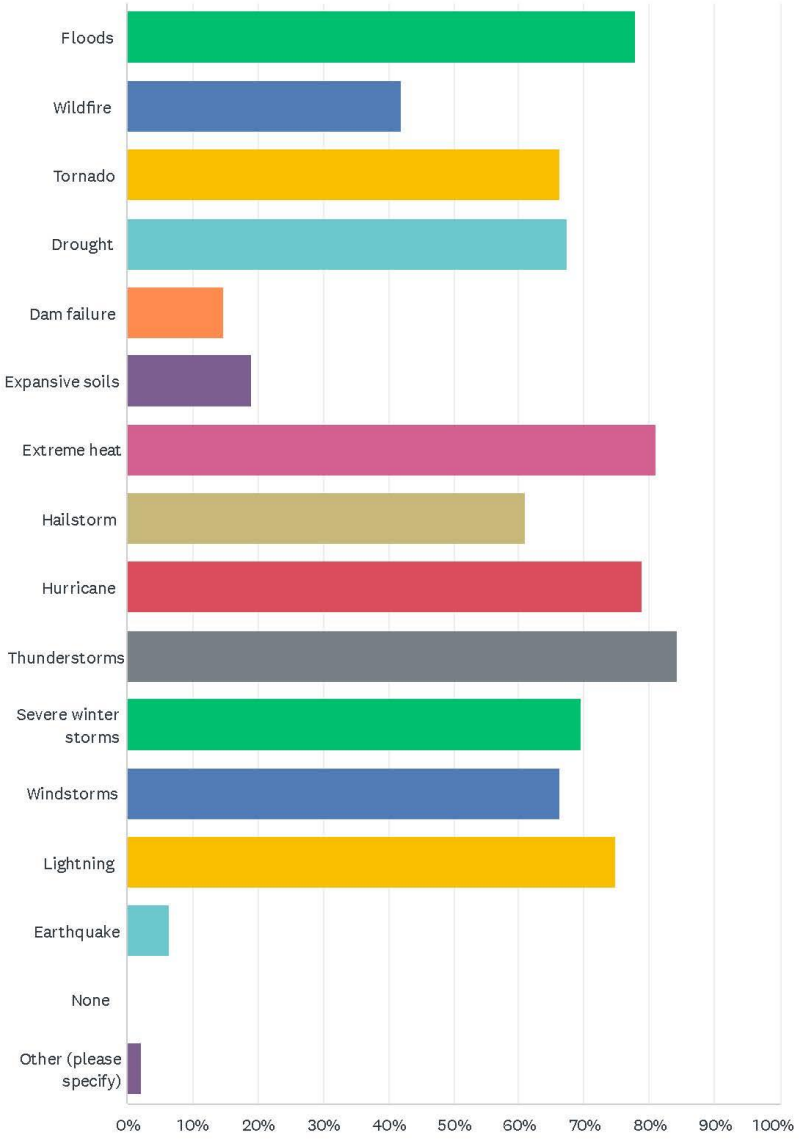
Polk County Hazard Mitigation Plan Update

ANSWER CHOICES	RESPONSES	
Floods	65.26%	62
Wildfire	12.63%	12
Tornado	35.79%	34
Drought	53.68%	51
Dam failure	5.26%	5
Expansive soils	7.37%	7
Extreme heat	60.00%	57
Hailstorm	38.95%	37
Hurricane	68.42%	65
Thunderstorms	70.53%	67
Severe winter storms	52.63%	50
Windstorms	42.11%	40
Lightning	48.42%	46
Earthquake	0.00%	0
None	7.37%	7
Other (please specify)	2.11%	2
Total Respondents: 95		

Polk County Hazard Mitigation Plan Update

Q5 Which of the following are likely to occur in your area at least once in your lifetime? (please check all that apply)

Answered: 95 Skipped: 1



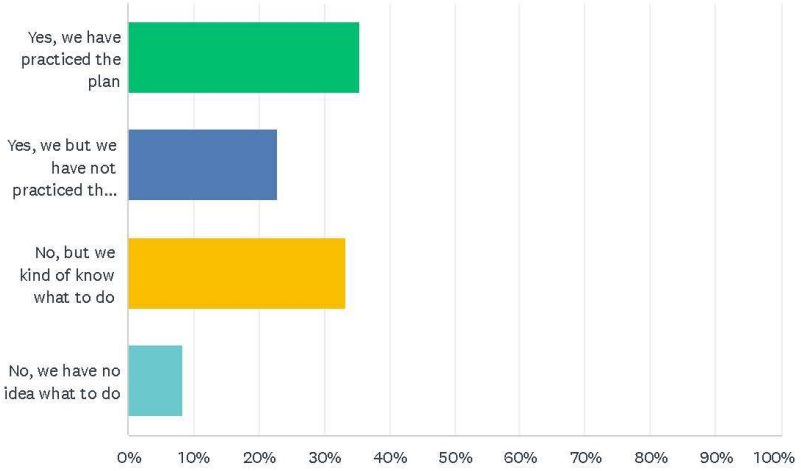
Polk County Hazard Mitigation Plan Update

ANSWER CHOICES	RESPONSES	
Floods	77.89%	74
Wildfire	42.11%	40
Tornado	66.32%	63
Drought	67.37%	64
Dam failure	14.74%	14
Expansive soils	18.95%	18
Extreme heat	81.05%	77
Hailstorm	61.05%	58
Hurricane	78.95%	75
Thunderstorms	84.21%	80
Severe winter storms	69.47%	66
Windstorms	66.32%	63
Lightning	74.74%	71
Earthquake	6.32%	6
None	0.00%	0
Other (please specify)	2.11%	2
Total Respondents: 95		

Polk County Hazard Mitigation Plan Update

Q6 My household has a plan in the event of a disaster such as a flood, tornado, etc.

Answered: 96 Skipped: 0

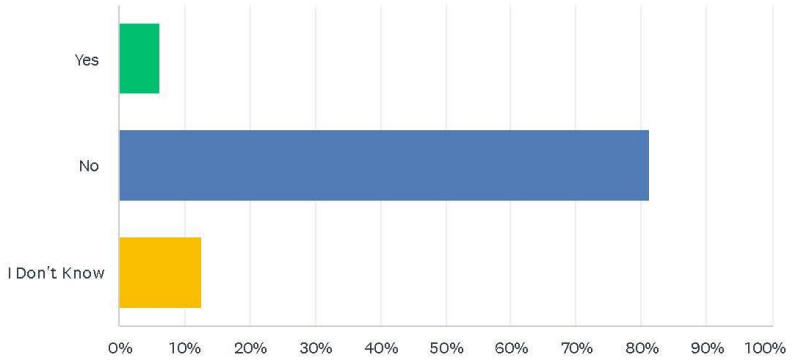


ANSWER CHOICES	RESPONSES	
Yes, we have practiced the plan	35.42%	34
Yes, we but we have not practiced the plan	22.92%	22
No, but we kind of know what to do	33.33%	32
No, we have no idea what to do	8.33%	8
TOTAL		96

Polk County Hazard Mitigation Plan Update

Q7 Is your home located in a floodplain?

Answered: 96 Skipped: 0

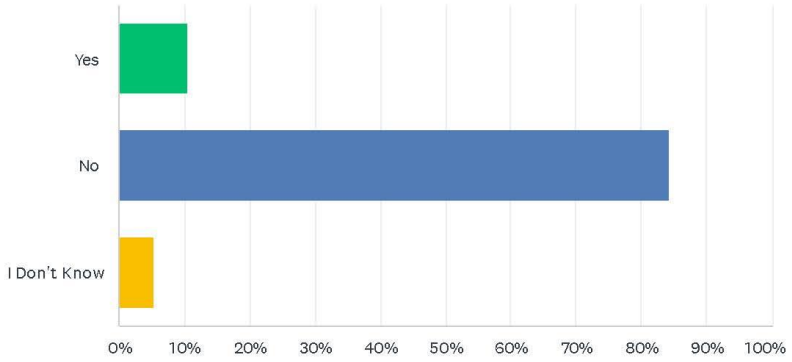


ANSWER CHOICES	RESPONSES	
Yes	6.25%	6
No	81.25%	78
I Don't Know	12.50%	12
TOTAL		96

Polk County Hazard Mitigation Plan Update

Q8 Do you have flood insurance?

Answered: 95 Skipped: 1

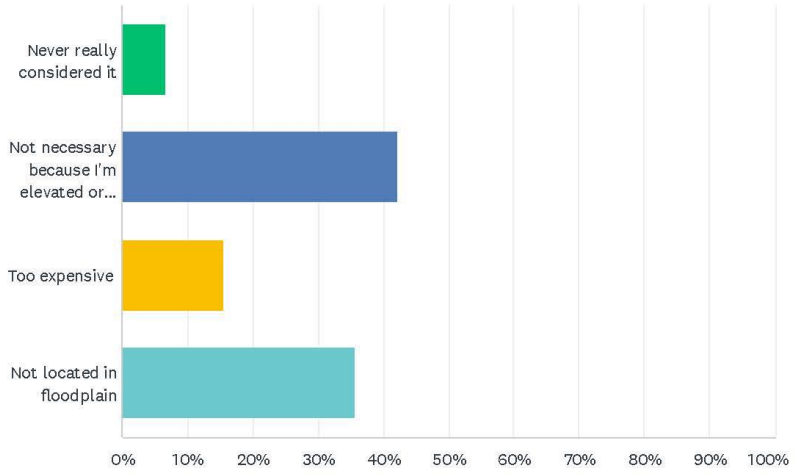


ANSWER CHOICES	RESPONSES	
Yes	10.53%	10
No	84.21%	80
I Don't Know	5.26%	5
TOTAL		95

Polk County Hazard Mitigation Plan Update

Q9 If you do not have flood insurance, why not?

Answered: 90 Skipped: 6

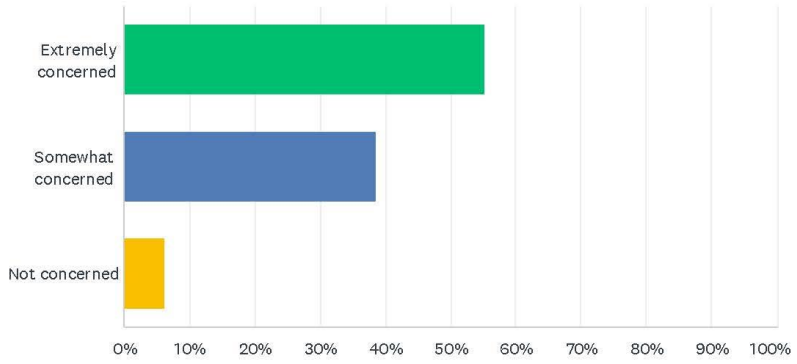


ANSWER CHOICES	RESPONSES	
Never really considered it	6.67%	6
Not necessary because I'm elevated or otherwise protected	42.22%	38
Too expensive	15.56%	14
Not located in floodplain	35.56%	32
TOTAL		90

Polk County Hazard Mitigation Plan Update

Q10 How concerned are you about the possibility of you or your community being impacted by a disaster?

Answered: 96 Skipped: 0

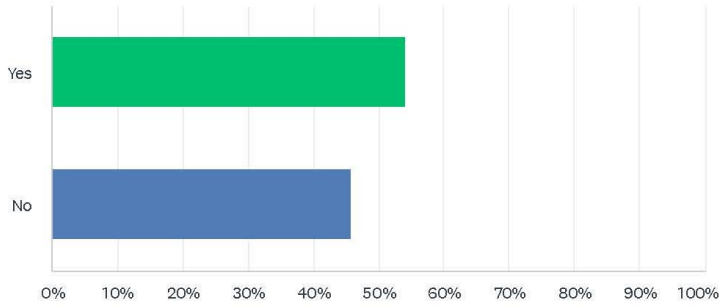


ANSWER CHOICES	RESPONSES	
Extremely concerned	55.21%	53
Somewhat concerned	38.54%	37
Not concerned	6.25%	6
TOTAL		96

Polk County Hazard Mitigation Plan Update

Q11 Have you taken any actions to make your home, business and/or community more resistant to hazards?

Answered: 94 Skipped: 2



ANSWER CHOICES	RESPONSES	
Yes	54.26%	51
No	45.74%	43
TOTAL		94

Polk County Hazard Mitigation Plan Update

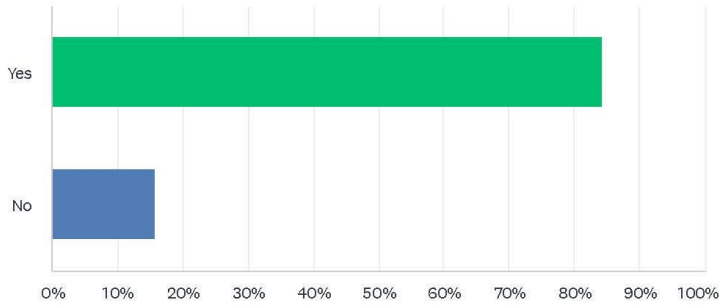
Q12 If "Yes", please described the action you have taken:

Answered: 57 Skipped: 39

Polk County Hazard Mitigation Plan Update

Q13 Are you interested in making your home, business and/or community more resistant to hazards?

Answered: 95 Skipped: 1

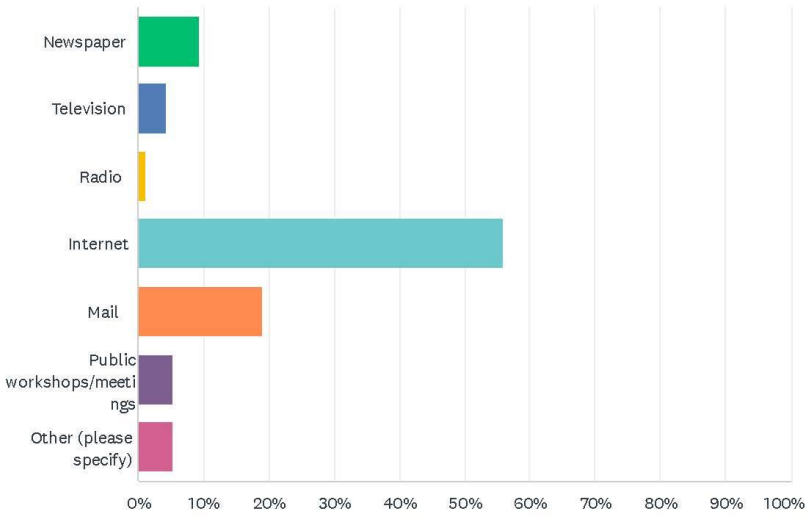


ANSWER CHOICES	RESPONSES	
Yes	84.21%	80
No	15.79%	15
TOTAL		95

Polk County Hazard Mitigation Plan Update

Q14 What is the most effective way for you to receive information about how to make your home, business and/or community more resistant to hazards?

Answered: 95 Skipped: 1

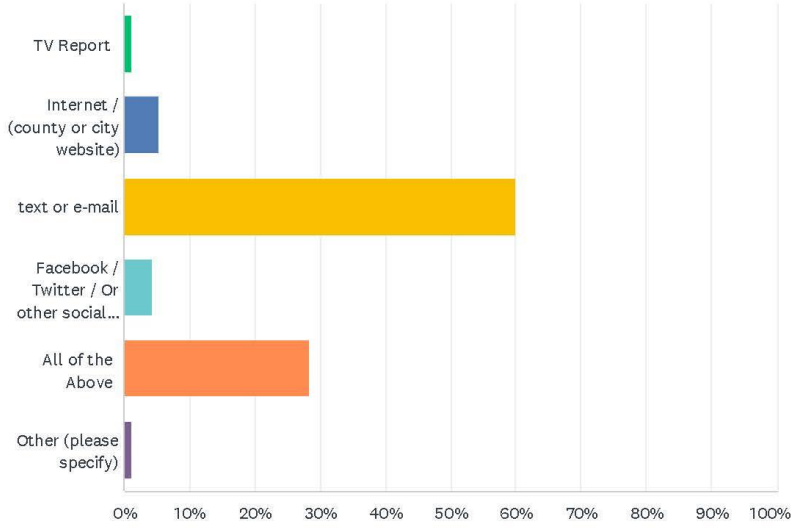


ANSWER CHOICES	RESPONSES	
Newspaper	9.47%	9
Television	4.21%	4
Radio	1.05%	1
Internet	55.79%	53
Mail	18.95%	18
Public workshops/meetings	5.26%	5
Other (please specify)	5.26%	5
TOTAL		95

Polk County Hazard Mitigation Plan Update

Q15 Which of the following would be the best way to alert you and your household to an imminent disaster?

Answered: 95 Skipped: 1

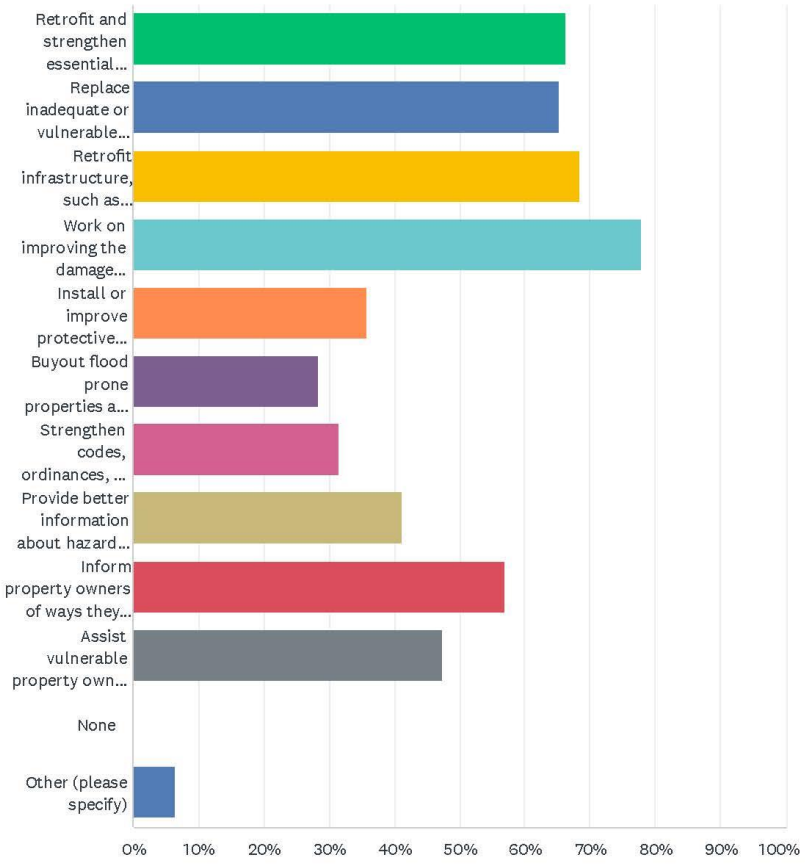


ANSWER CHOICES	RESPONSES	
TV Report	1.05%	1
Internet / (county or city website)	5.26%	5
text or e-mail	60.00%	57
Facebook / Twitter / Or other social media	4.21%	4
All of the Above	28.42%	27
Other (please specify)	1.05%	1
TOTAL		95

Polk County Hazard Mitigation Plan Update

Q16 Which of the following mitigation activities do you believe your local government should employ to reduce or eliminate the risk of future hazard damages in your neighborhood and/or community. (Please check all that apply)

Answered: 95 Skipped: 1



Polk County Hazard Mitigation Plan Update

ANSWER CHOICES	RESPONSES	
Retrofit and strengthen essential facilities such as police, fire, emergency medical services, hospitals, schools, etc.	66.32%	63
Replace inadequate or vulnerable bridges and roads.	65.26%	62
Retrofit infrastructure, such as elevating roadways and improving drainage systems.	68.42%	65
Work on improving the damage resistance of utilities (electricity, communications, water / wastewater facilities, etc.).	77.89%	74
Install or improve protective structures, such as floodwalls and levees or individual/community saferooms.	35.79%	34
Buyout flood prone properties and maintain as open-space.	28.42%	27
Strengthen codes, ordinances, and plans to require higher hazard risk management standards.	31.58%	30
Provide better information about hazard risk and high-hazard areas.	41.05%	39
Inform property owners of ways they can mitigate damage to their properties.	56.84%	54
Assist vulnerable property owners with securing funding to mitigate impacts to their property(s).	47.37%	45
None	0.00%	0
Other (please specify)	6.32%	6
Total Respondents: 95		

Polk County Hazard Mitigation Plan Update

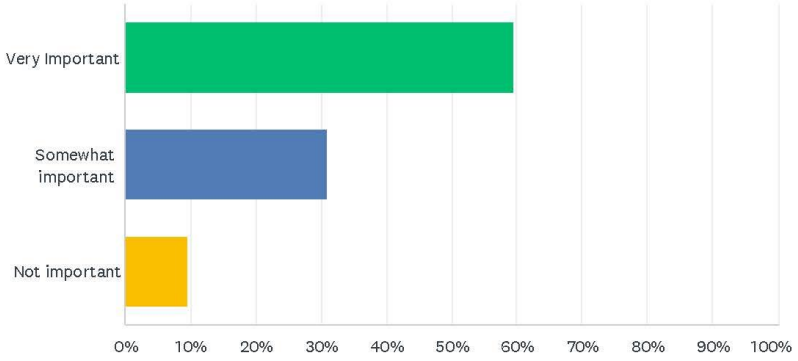
Q17 Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?

Answered: 47 Skipped: 49

Polk County Hazard Mitigation Plan Update

Q18 Prevention of Hazards is any administrative or regulatory action that influences the way land is developed and buildings are built. Some examples include planning and zoning, building codes, open space prevention, and flood plain regulation. Please rank how important you believe it is for your community to pursue the prevention of hazards .

Answered: 94 Skipped: 2

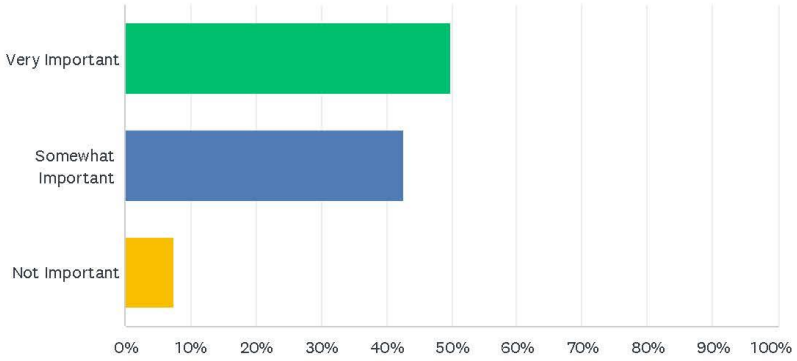


ANSWER CHOICES	RESPONSES	
Very Important	59.57%	56
Somewhat important	30.85%	29
Not important	9.57%	9
TOTAL		94

Polk County Hazard Mitigation Plan Update

Q19 Reducing community risks from hazards can also include property protection. This involves actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevations, structural retrofits and storm shutters. How important is it to you that your community should pursue property protection?

Answered: 94 Skipped: 2

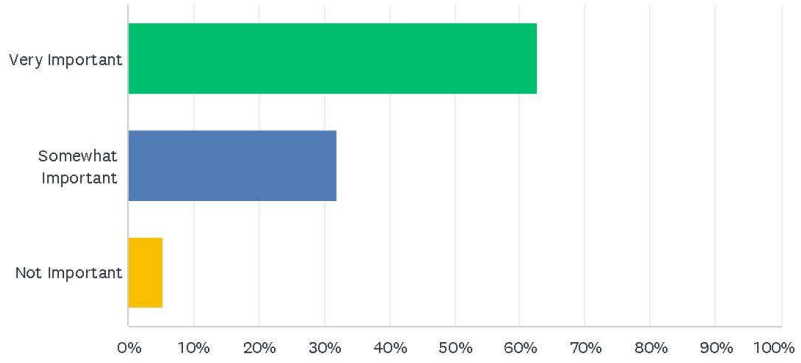


ANSWER CHOICES	RESPONSES	
Very Important	50.00%	47
Somewhat Important	42.55%	40
Not Important	7.45%	7
TOTAL		94

Polk County Hazard Mitigation Plan Update

Q20 Reducing community risks from hazards can also include natural resource protection. This kind of protection is in addition to minimizing hazard losses, preserve or restoring the functions of natural systems. Some examples include flood plain protection, habitat preservation, slope stabilization, riparian buffers and forest management. Do you believe this is important for your community to pursue? Please rank below.

Answered: 94 Skipped: 2

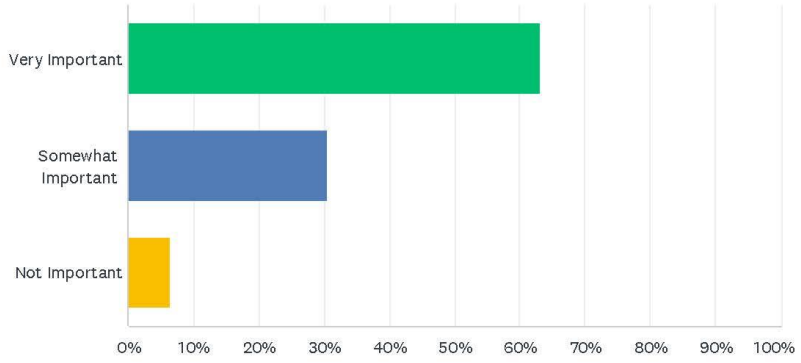


ANSWER CHOICES	RESPONSES	
Very Important	62.77%	59
Somewhat Important	31.91%	30
Not Important	5.32%	5
TOTAL		94

Polk County Hazard Mitigation Plan Update

Q21 Structural Projects can also help to reduce hazards.These actions are 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 modifications, retaining walls and storm sewers. Do you believe this is important for your community to pursue? Please rank below.

Answered: 95 Skipped: 1

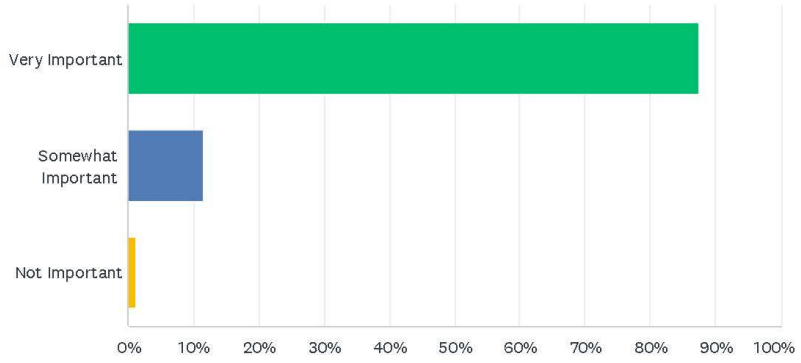


ANSWER CHOICES	RESPONSES	
Very Important	63.16%	60
Somewhat Important	30.53%	29
Not Important	6.32%	6
TOTAL		95

Polk County Hazard Mitigation Plan Update

Q22 Emergency Services are actions that protect people and property during and immediately after a hazard event . Some examples include warning systems, evacuation planning, emergency planning, emergency response training and protection of critical emergency facilities/system. Do you believe this is important for your community to pursue? Please rank below.

Answered: 95 Skipped: 1

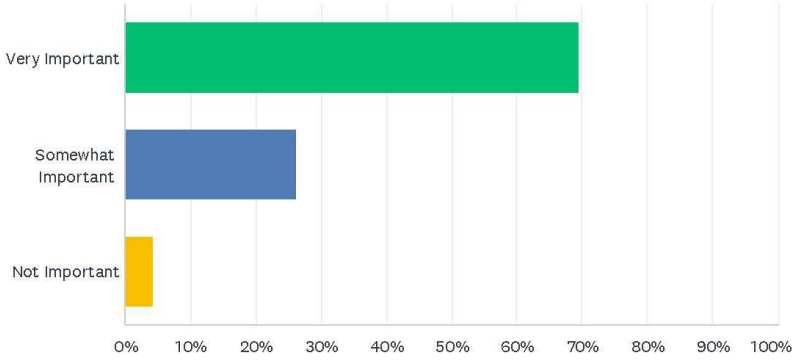


ANSWER CHOICES	RESPONSES	
Very Important	87.37%	83
Somewhat Important	11.58%	11
Not Important	1.05%	1
TOTAL		95

Polk County Hazard Mitigation Plan Update

Q23 Public Education and Awareness are actions to inform citizens about hazards and the techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials and demonstration events. Do you believe this is important for your community to pursue? Please rank below.

Answered: 95 Skipped: 1



ANSWER CHOICES	RESPONSES	
Very Important	69.47%	66
Somewhat Important	26.32%	25
Not Important	4.21%	4
TOTAL		95

Polk County Hazard Mitigation Plan Update

Q24 If you would like to be notified of upcoming public meetings for the Polk County Hazard Mitigation Plan Update, please leave your name and email below. Thank you for your time!Name:

Answered: 33 Skipped: 63

APPENDIX D: CRITICAL FACILITIES

The list and location of critical and vulnerable facilities will be kept and maintained by the Emergency Management Coordinators for Polk County. This list is provided in the form of an ArcGIS geodatabase and a Microsoft Excel spreadsheet with location and contact information. The table below is a summary of critical facilities that are vulnerable to hazards based on location and magnitude.

Polk County

One Airport Facility, Six Medical Facilities, Fifteen Educational Facilities, Nine Fire Department Facilities, One Hundred and Twenty-Six Communication Facilities and Structures, Three Police and Correctional Facilities, One Hundred and Sixty-Two Utility Facilities and Structures,

City of Livingston

Seven Medical Facilities, Eleven Educational Facilities, Three Fire Department Facilities, Three Police Facilities, Four Utility Facilities, Seven Communication Facilities, One Mass Care Emergency Shelter, Three Municipal Administrative Facilities

City of Onalaska

Thirty-one Utility Facilities and Structures, Seven Educational Facilities, One Police Station, One Fire Department Facility, Two Communication Facilities, and Four Municipal Administrative Facilities

City of Corrigan

Five Utility Facilities and Structures, One Medical, Six Educational Facilities, One Fire Department, Three Municipal Administrative Facilities, and One Police Station,

City of Seven Oaks

Two Utility Facilities and One Communications Structure

City of Goodrich

One Fire Department Facility, One Educational Facility, Three Utility Facilities, One Communication Facility

APPENDIX E: MEETING DOCUMENTATION

Core Stakeholder Meeting

Thank you for Coming

Please Sign In

POLK CO. - Meeting I
May 21, 2024, 9:30am - 11:30am
Dunbar Gym: 1103 Dunbar Avenue,
Livingston, TX 77351

Name	Representing	Email	Phone
Guylene Robertson	Polk Co. Pct 1		936-365-2222
Billy S. Wiggins	City of Livingston	citymanager@livingstontx.gov	936-327-4311
Hollie Oliver	Floodplain Admin		936-327-6820
Bryon Miller	Environmental		936-252-6614
Gary Ashmore	LTBCD Groundwater	groundwater@livingston.net	936-252-0911
John Tarver	Polk Cnty EDC	jtarver@eastex.net	936-537-5628
Mark Cunningham	DETCOG	mcunningham@detcog.gov	936-240-1141
Tim Kramer	TDEM	Timothy.Kramer@TDEM.Texas.gov	936-239-9469
John Fugate	Polk County Fire Marshal	Firemarshal@co.polk.tx.us	936-239-3389
Scott Ferguson	San Houston Electric	sferguson@samhouston.net	936-329-4376
James Perkins	IAH	james.perkins@mtctrains.com	936-967-8005
Matt Parrish	LPD	chief@livingstontx.gov	936-327-3117
Linda Sloan	Emergency Mgmt	GIS	
Jason Minchew	St. Luke's Health Memorial	jason.minchew@commonspirit.org	936-329-8400
Sujay Mondal	TxDOT	sujay.mondal@txdot.gov	432-290-9383
Courtney Comstock	Polk County OEM	courtney.comstock@co.polk.tx.us	936-327-682
Byron A. Lyons	P.C.S.O.	bablyons@polkcountyso.net	936-327-6810
Andy Lowrie	PCSO.	Andy.lowrie@co.polk.tx.us	936-327-6810
Johanna Lowe Gibson	City of Corrigan	johannalowe75939@yahoo.com	936-635-7
Darrell Gibson	City of Corrigan	darrellgibson4371@yahoo.com	936-635-217
Jerry Cassity	Polk County Commissioner	jerrycassity@yahoo.com	936-329-26
Mark Dubose	Polk County Commissioner Pct. 2	mark.dubose@co.polk.tx.us	936 646-5929

Thank you for Coming

Please Sign In

POLK CO. - Mee
May 21, 2024, 9
Dunbar Gym: 1
Livingston, TX 7

Name	Representing	Email	
Chauna Reuter	Polk OEM	Deputy EMC	
Lori Ennis	MTC/ IAH	lori.ennis@mtctrains.com	936-
Justin Cook	Allegiance Mobile Health/ Synergy	justincook@allmh.com	936-3
AJ Rose	Allegiance Mobile Health	angela.rose@allmh.com	911
Jacob Rue	Big Sandy ISD	jrue@bigsandyisd.net	936-5
Darrian Hudman	City of Corrigan	citymanager@cityofcorrigan.com	936-39
James Henagan	TxDOT	james.henagan@TxDOT.gov	936-6
Melissa Gadis	Polk County Records LTRS	polkcountyrecorders@gmail.com	

Thank you for Coming

Please Sign In

POLK CO. - Meeting I
May 21, 2024, 9:30am - 11:
Dunbar Gym: 1103 Dunbar
Livingston, TX 77351

Name	Representing	Email	Phone
Lara Smith	Livingston ISD	larasmith@livingstonisd.com	936.328.

Thank You for Coming!

Please Sign In

POLK CO. - Public Outreach
June 12, 2024, 11:30am - 11:30am
Dunbar Gym: 1103 Dunbar Avenue,
Livingston, TX 77351

Name	Representing	Email	Phone
Ricky Taylor	Texan EMS	ROHJKAE@yahoo.com	936-239-7273
Dee Couch	Polk Co Aging	aging@co.polk.tx.us	936.327.6830
Emmalee Reuter	citizen	Emmaleereuter@livingstonisd.com	936-933-0884
Tim Kramer	TDEM	Timothy.Kramer@TDEM.texas.gov	936 239 8464
Jon Clingaman Jr	TDEM	Jon.Clingaman@TDEM.Texas.Gov	936-208-3270
Sonja Reece	SHECO	sreece@samhouston.net	936-328-1217
Nacole Walker	SHECO	nwalker@samhouston.net	936-328-1306
Scott Ferguson	SHECO	sferguson@samhouston.net	936-329-4376
Bill S. Wiggins	City of Livingston	citymanager@livingstontx.gov	(936) 327-4311
Skip Strauss	ARES/RACES/SKYWARN	skip.w5txt@gmail.com	713 865 2217
Pam Mitt[illegible]	District Clerk Office	pam.mitt[illegible]@co.polk.tx.us	936-327-6814
Lisa Roberts, CFM	District Clerk.	lisa.roberts@co.polk.tx.us	936-327-6814
Christine Wright	Gentiva Hospice	wrightchristine4546@yahoo	936-433-5203
Josh Mohler	City Of Livingston	firemarshal@livingstontx.gov	936 933 0355
Clarisa Nava	ACCHD	cnava@acchd.us	936 238-0767
Missy Thompson	Crow Therapies	hr@crowtherapies.com	936-328-8148
[illegible] Howard	Crow Therapies	accounting@crowtherapies.com	832-691-3939
Jay Burks	Polk County	jay.burks@co.polk.tx.us	936-327-6808
Mark DuBose	Polk County / Commissioner Pct 2	mark.dubose@co.polk.tx.us	936 646 5929
Lexie Motley	Catholic Charities	lmotley@CCSETX.org	409-924-4415
Lana Smith	Livingston ISD	lanasmith@livingstonisd.com	936.328.2104
Linda Sloan	EDC		
Louis Ploth	Polk County	louis.ploth@co.polk.tx.us	936-327-6811
Jason Minchew	St. Luke's Health Livingston	jason.minchew@commonspirit.org	936-329-8400

Public Outreach Meeting 1

Thank You for Coming!

Please Sign In

POLK CO. - Pu
June 12, 2024
Dunbar Gym:
Livingston, TX

Name	Representing	Email	
RAY McCoppin	ARES EC SAN JACINTO	RAY.N5SRF@GMAIL	
DAVE CONDIT	ESCAPEES CARE	CAREFD@ESCAPEES.COM	
Nicole Fischer	Polk County	Maint.off-mgr@co.polk	327
MATT PARRISH	Livingston Police	Chief@livingstontx.gov	327
MARTY DRAKE	Livingston Police	lieutenant@Livingstontx.gov	
Laura Henderson	Escapees CARE	Caremt@escapees.com	936
Heather Clark	Catholic Charities	hclark@ccsetx.org	409-
Joanna Brown	CCL	joanna.brown@co.polktx.us	936-
Melissa Gates	Polk County Recovers	polkcountyrecovers@gmail.com	
Kayla Pitts	Pct 4 R+B	kayla.pitts@co.polktx	936

Thank You for Coming!

Please Sign In

POLK CO. - Public Outreach
June 12, 2024, 11:30am - 11:30am
Dunbar Gym: 1103 Dunbar Avenue, Livingston, TX 77351

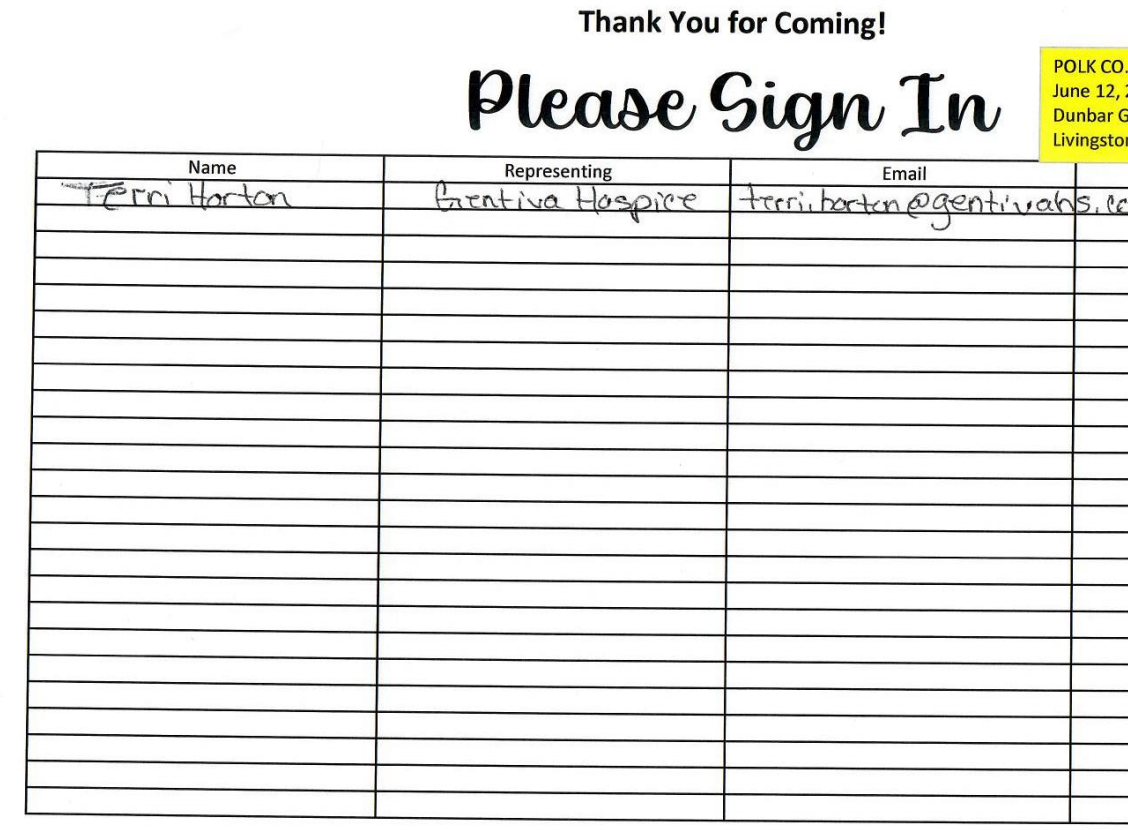
Name	Representing	Email	Phone
JOSHUA GRANT	SELF	info@vote-grant.com	832-492-0891
Gary Litton	SETRAC	Gary.litton@setrac.org	832-849-731[illegible]
Pam Gleason	Polk County Recorders	mspamgleason@aol.com	713-345-[illegible]
Charles Stephens Jr.	"	chasn4x2@aol.com	314-606-00[illegible]
Gregory Motte	Polk County Sheriff's Office	gregorymotte@gmail.com	936-933-1743
JR. Chance	Oakleaf Water & Gas	JR@oakleafwater[illegible]	936-328-185[illegible]
Tim Sutowich	Bradford @ Brookside	02maint@centex.com	253-948-7532
Mike Courtney	Center 2 Hope	mike@center2hope.polk.org	307-256-8[illegible]
Dan Reilly	NWS	dan.reilly@noaa.gov	832-226-9380
Emily Wooten	Polk County Enterprise	editor@polkenterprise.com	936-329-1787
Judy Burchfield	Escapees Care Center	carefn@escapees.com	936-328-9929
Chad Holton	TRA	holtonc@trinityra.com	936-661-0673
Hollie Oliver	Floodplain Admin- Polk	hollie.oliver@co.polk.tx.us	936-328-1346
JEFF WOLF	HIGHLINE	jeff.wolf@highlinefact.com	9362520[illegible]

Thank You for Coming!

Please Sign In

POLK CO. - Public Out
June 12, 2024, 11:30
Dunbar Gym: 1103 D
Livingston, TX 77351

Name	Representing	Email	
Dan Crawford	Gentiva Hospice	Joseph.Crawford@gentivaHs.com	936
Guylene Robertson	Pct 1 Polk Co		
Brandon Mosley	TPWD - D3/D3	Brandon.mosley@tpwd.texas.gov	936-



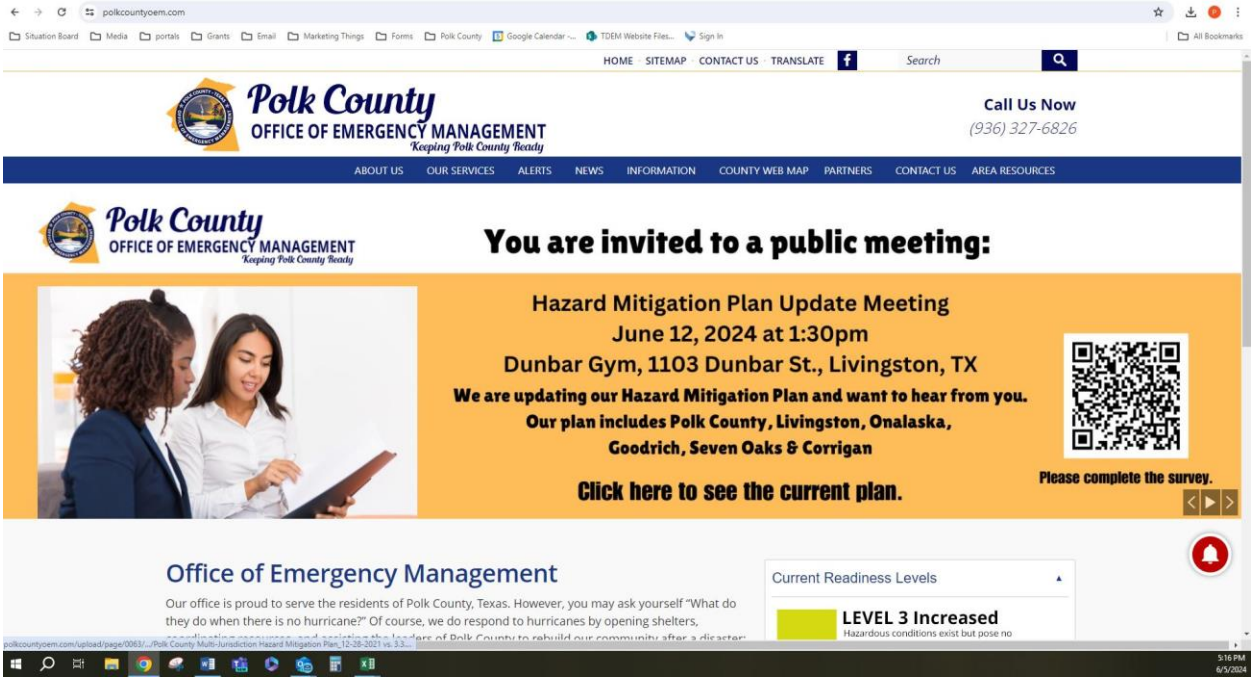
Thank You for Coming!

Please Sign In

POLK CO.
June 12, 2
Dunbar G
Livingsto

Name	Representing	Email
Terri Horton	Gentiva Hospice	terri.horton@gentivahs.co

Public Outreach Meeting Advertisements



Polk County 2nd Stakeholder Meeting Sign In Sheet

Thank You for Coming!

Please Sign In

POLK CO. - Core Team
August 13, 6pm-8pm
Senior Center, Livingston, TX 77351

Name	Representing	Email	Phone
Elain Hardy	Seven Oaks	chardy912 @ gmail.com	936 232-9030
Mayor Evans	7 Oaks	~~[illegible]~~ Centa@gmail.com	936 219-0999
Dina Dickerson	7 Oaks	dina.dickerson@yahoo.[illegible]	936 233-1858
[illegible]	Corrigan	citymanager@cityofcorrigan.com	936-398-4126
Kelly Nelson Mayor	Goodrich	wkNelson1984@yahoo.com	936-425-1079
Bobby Wright	Goodrich		713-823-2428
Sydney MURPHY	Polk		
Chawna Reiter	OEM		937-327-6826
Linda Sloan	OEM		" " "

ⁱ [Texas - State Climate Summaries 2022 (ncics.org)]