2017

Liberty County
Hazard Mitigation Plan

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Acronym List

RHMP	Regional Hazard Mitigation Plan
HMAP	Hazard Mitigation Plan
H-GAC	Houston-Galveston Area Council
FEMA	Federal Emergency Management Agency
TDEM	Texas Division of Emergency Management
TX	Texas
CRS	Community Rating System
NFIP	National Flood Insurance Program
HMGP	Hazard Mitigation Grant Program
CHARM	Community Health and Resource Management
mph	miles per hour
NOAA	National Oceanic and Atmospheric Administration
NSSL	National Severe Storm Laboratory
OEM	Office of Emergency Management
ArcGIS	Geographic Information System
RL	repetitive loss
KBDI	Keetch-Byram Drought Index
WUI	Wildland Urban Interface
FM	Farm to Market road
PHSI	Palmers Hydrological Severity Index
USDA	United States Department of Agriculture
LAL	Lightning Activity Levels
NCDC	National Climate Data Center
CDC	Centers for Disease Control and Prevention
NCEI	National Centers for Environmental Information
SPIA	Sperry-Piltz Iace Accumulation
NWS	National Weather Service
LEP	Linear Extensibility Percent
COLE	Coefficient of Linear Extent

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Part 1: Introduction

Part 1: INTRODUCTION

Liberty County's previous Hazard Mitigation Plan was adopted in 2006 and updated in 2011 as part of a seven-county Regional Hazard Mitigation Plan (RHMP). Due to new regulation and planning recommendations, Liberty County prepared a new countywide multi-jurisdictional Hazard Mitigation Plan (HMAP). Liberty County partnered with the Houston-Galveston Area Council (H-GAC) for both the 2006 and 2011 plans and continued this partnership during the development and adoption of the HMAP.

Image source: https://www.wikipedia.org/

History

On April 28, 2006, the Federal Emergency Management Agency (FEMA) and the Texas Division of Emergency Management (TDEM) approved the first RHMP. H-GAC prepared the regional plan in coordination with FEMA and TDEM to ensure it met all applicable state and federal requirements. H-GAC updated the RHMP in 2011 to re-assess vulnerabilities and increase the number and diversity of mitigation action items. The plan includes a more robust assessment of natural hazards, newly uncovered vulnerabilities, more advanced analysis techniques, and a more effective and informed mitigation strategy.

Purpose of Plan

The purpose of Liberty County's HMAP is to reduce the loss of life and property within the county and lessen the negative impacts of natural disasters. Vulnerability to several natural hazards has been identified through research, analysis, and public input. These hazards threaten the safety of residents and have the potential to damage or destroy both public and private property, disrupt the local economy, and impact the overall quality of life of individuals who live, work, and play in the county. While natural hazards cannot be eliminated, the effective reduction of a hazard's impact can be accomplished through thoughtful planning and action.

The concept and practice of reducing risks to people and property from known hazards is generally referred to as hazard mitigation. One of the most effective tools a community can use to reduce hazard vulnerability is developing, adopting, and updating a hazard mitigation plan as needed. A hazard mitigation plan establishes the broad community vision and guiding principles for reducing hazard risk, including the development of specific mitigation actions designed to eliminate or reduce identified vulnerabilities.

Scope of Plan

Liberty County is in the east-central region of Texas, and scope of the HMAP includes the following participating jurisdictions:

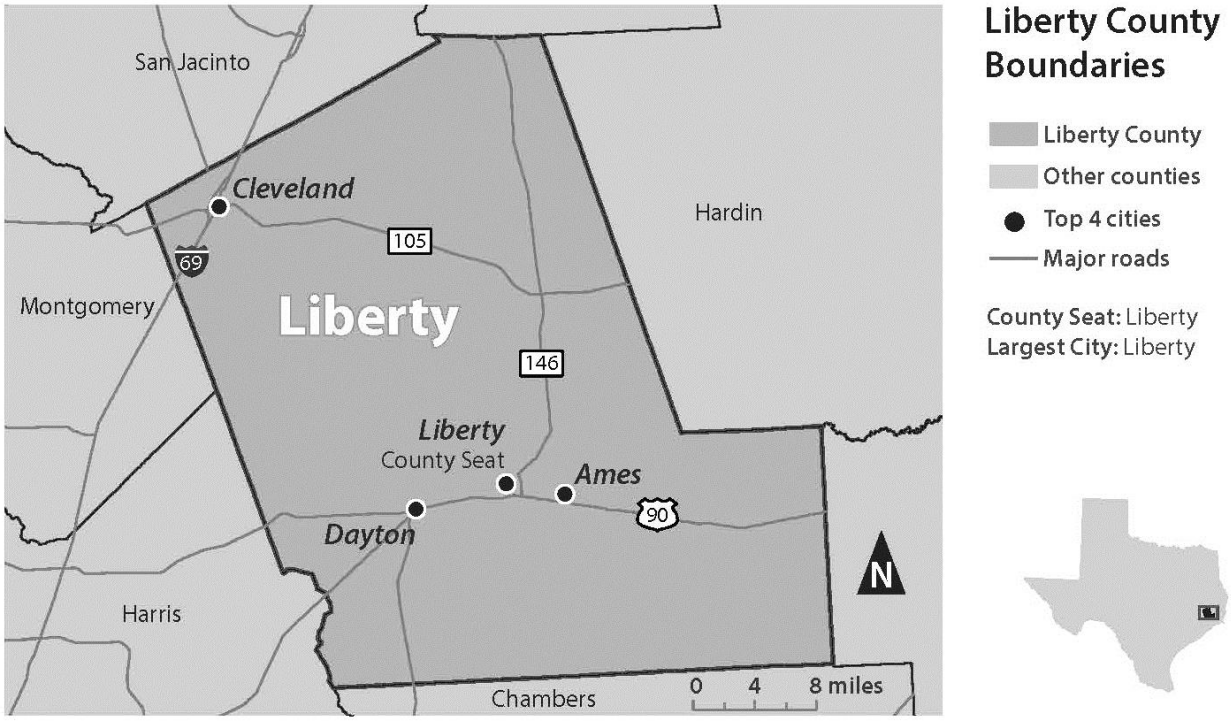
- Unincorporated Liberty County
- Ames
- Cleveland
- Daisetta
- Dayton
- Dayton Lakes
- Devers
- Hardin
- Kenefick
- Liberty
- North Cleveland
- Plum Grove

Presidential Declared Disasters

Liberty County has persevered through many natural disasters. The table below lists the presidential declared disasters that the County has experienced in recent history. Each disaster is costly and challenging. The goal of this HMAP is to reduce the impact of future disasters.

Year	Declaration Type	Title
1973	Major Disaster Declaration	Severe Storms and Flooding
1979	Major Disaster Declaration	Severe Storms, Tornadoes, and Flooding
1983	Major Disaster Declaration	Hurricane Alicia
1989	Major Disaster Declaration	Tropical Storm Allison
1989	Major Disaster Declaration	Severe Storms, tornadoes, and Flooding
1990	Major Disaster Declaration	Severe Storms, tornadoes, and Flooding
1991	Major Disaster Declaration	Severe Thunderstorms
1992	Major Disaster Declaration	Severe Storms and Flooding
1994	Major Disaster Declaration	Severe Thunderstorms and Flooding
1996	Emergency Declaration	Extreme Fire Hazards
1998	Major Disaster Declaration	Tropical Storm Charlie
1998	Major Disaster Declaration	TX-Flooding 10/18/98
1999	Emergency Declaration	Extreme Fire Hazard
2000	Emergency Declaration	TX - Stanley Mainline Fire - 09/04/00
2001	Major Disaster Declaration	TX- Tropical Storm Allison
2002	Major Disaster Declaration	Severe Storms, tornadoes, and Flooding
2005	Major Disaster Declaration	Hurricane Rita
2005	Major Disaster Declaration	Hurricane Katrina Evacuation
2006	Emergency Declaration	Extreme Wildfire Threat
2008	Major Disaster Declaration	Wildfires
2008	Major Disaster Declaration	Hurricane Ike
2015	Major Disaster Declaration	Severe Storms, Tornadoes Straight-line winds and Flooding
2016	Major Disaster Declaration	Severe Storms and Flooding
2017	Major Disaster Declaration	TX- Hurricane Harvey

Planning Area Map



The HMAP profiles the following hazards:

- Flooding
- Hurricanes and Tropical Storms
- Wildfire
- Drought
- Lightning
- Heat Events
- Hail
- Tornado
- Expansive Soils

The plan, developed in accordance with state and federal rules and regulations governing local hazard mitigation plans, was adopted by the participating jurisdictions and shall be routinely monitored and revised to maintain compliance with all state and federal regulations.

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Part 2: Planning Process

Part 2: PLANNING PROCESS

This section includes a description of the process used by H-GAC, the County, and participating jurisdictions to develop the 2017 HMAP.

Overview

Hazard mitigation planning can be described as the means to break the repetitive cycle of disaster loss. A core assumption of hazard mitigation is that pre-disaster investments will significantly reduce the demand for post-disaster assistance by alleviating the need for emergency response, repair, recovery, and reconstruction.

Hazard mitigation planning is the process of identifying natural hazards, understanding community capabilities and resources, identifying and assessing hazard vulnerability and risk, and determining how to minimize or manage those risks. In partnership with Liberty County, H-GAC approached the hazard mitigation planning process by establishing a Planning Team. The next step of the planning process was the assessment of hazards and how they can impact specific assets. H-GAC conducted a hazard analysis that was provided to the Planning Team and presented at a public meeting on October 19, 2017.

After hazard identification and analysis, communities considered their vulnerability to the identified threats. Crucial input from the participating jurisdictions and members of the public helped inform a vulnerability and risk assessment for the entire county. H-GAC used information gathered from meetings with the Planning Team, online participation and input from the participating jurisdictions, and natural hazard modeling techniques to produce a comprehensive vulnerability assessment.

The planning process culminated in a mitigation strategy, i.e. identification of specific mitigation actions, which when viewed, represents a comprehensive strategy to reduce the impact of hazards. The Planning Team met on December 18, 2017, to begin the process of developing an overarching mitigation strategy, and a long-term approach to update and maintain the HMAP. Specific mitigation actions are identified in this plan and included in Appendix E. Responsibility for each mitigation action is assigned to a specific individual, department or agency along with a schedule for its implementation. Plan Maintenance procedures (Part 8 of this plan) establish procedures to monitor progress, including the regular evaluation and enhancement of the Plan. Multijurisdictional coordination and integration of the HMAP into local planning mechanisms was also addressed. The established maintenance procedures ensure that the plan remains a dynamic and functional document over time.

Plan Development Resources

The Liberty County HMAP was developed using existing plans, studies, reports, and technical information. Materials and historic data were used to inform participants throughout the planning process, evaluate and analyze hazards, and develop the mitigation strategy.

Plan Development Resources: Existing Documents and Data	
FEMA Disaster Declarations	FEMA Flood Map Services
H-GAC Land Use & Demography Database	Houston-Galveston Area Regional Plan
State of Texas Hazard Mitigation Plan	NOAA Storm Event Database
US Census American Fact Finder	Texas A&M Forest Service Wildfire Reports
USGS Homeland Infrastructure Foundation-Level Data	USDA Census of Agriculture Reports
Liberty County Community Plan	2011 Regional Hazard Mitigation Plan

Plan Adoption

Liberty County's Commissioner Court adopted this HMAP on October 9 2018. The signed resolution can be found in Appendix E.

Planning Team

Liberty County and H-GAC established the Planning Team in Fall 2017 in preparation for the first public meeting and hazard mitigation planning workshop held on October 19, 2017. Members were asked to attend all public meetings in person but were provided an online alternative if they were unable to do so. Online materials, surveys, forms, and documentation are provided in Appendix A. Representatives from the County Office of Emergency Management served as liaisons between H-GAC and stakeholders, staff, and members of the public who were unable to attend the meetings.

Jurisdiction/ Agency Represented	Title	Contact Method
Liberty County	Emergency Management Coordinator	Email
Liberty County	Deputy Emergency Management Coordinator	Email
Liberty	Assistant Fire Chief	Email
Cleveland	City Manager	Email
Cleveland	Fire Chief	Email
Cleveland	Public Works Director	Email
Cleveland	Finance Director	Email
Cleveland	Police Chief	Email
Daisetta	City Manager	Email
North Cleveland	Mayor	Email
Ames	Mayor	Email
Dayton	Mayor	Email
Dayton Lakes	Mayor	Email
Devers	Mayor	Email
Hardin	Mayor	Email
Kenefick	Mayor	Email
Plum Grove	Mayor	Email

Stakeholders

There were a variety of stakeholders throughout the community and neighboring jurisdictions that were a part of the planning process; these stakeholders either attended meetings, contacted the planning team with their input or both. The chart below shows these stakeholders and their titles. Their input was utilized throughout the plan and specifically in the Hazard Analysis and Mitigation Strategy sections of this plan.

Stakeholder	Title	Contact Method
Texas A&M AgriLife	Extension Program Specialist	Email/ Hosted CHARM Meeting
Texas Department of State Health	Public Health Nurse	Email/ Attended CHARM Meeting
Liberty Dayton Hospital	CEO	Email/ Attended CHARM Meeting
U.S Army Corps of Engineers	Civil Engineer	Email/ Attended CHARM Meeting
State Representative	District Director	Email/ Attended CHARM Meeting
US Fish and Wildlife Service	Biologist	Email/ Attended CHARM Meeting
Chambers County	Emergency Management Coordinator	Email/ Phone Call

Meeting Dates & Details

A variety of meetings were held throughout the planning process of the HMAP. These are listed below. The public meeting on October 19th was advertised through press releases to local papers and through radio (See Appendix A for details). The CHARM meeting was open to all plan participants as well as stakeholders throughout the county; this meeting was advertised through email and phone calls to stakeholders and planning team members. Feedback from meetings was incorporated throughout the hazard analysis and mitigation strategy sections; meetings and the planning team helped identify or clarify vulnerabilities and mitigation actions throughout the jurisdictions.

The meetings followed shortly after Hurricane Harvey. Many residents and local staff were busy with recovery efforts at the time, and attendance was difficult. To ensure the public's ability to participate in the planning process, H-GAC hosted all HMAP-related materials online and advertised both the meetings and the website link (http://www.h-gac.com/community/community/hazard/liberty-county-hazard-mitigation.aspx).
Online surveys, resources, a mitigation action submittal portal, and a place to submit comments on the draft plan were made public on the H-GAC website (see Appendix A).

October 19, 2017: Hazard Mitigation Kickoff Meeting

H-GAC and the Planning Team hosted a public meeting at the Liberty County Jack Hartel Building on October 19, 2017. The purpose of the meeting was for H-GAC staff to gather feedback and input on the draft Hazard Analysis and discuss local vulnerabilities. The planning team and members of the community were given a presentation and provided large maps displaying the analysis of various hazards. Participants worked with H-GAC staff to improve the accuracy of the analysis and pinpoint the vulnerabilities of each hazard within their communities. Meeting participants also discussed their current ability to mitigate these threats and how to draft a mitigation action to address them. Prior to the meeting, community members and stakeholders were invited through press releases, public service announcements, and other advertisements. See Appendix A for the meeting agenda, attendee information, and press release.

December 18, 2017: Hazard Mitigation Strategy Meeting

H-GAC hosted a planning team meeting at its offices in Houston on December 18, 2017. The purpose of this meeting was to begin the development of a Mitigation Strategy and determine Plan Maintenance procedures. H-GAC staff gave a presentation on both topics and led a discussion about strategy development. Planning Team

members outlined a mitigation strategy and refined their mitigation actions. See Appendix A for the meeting agenda and attendee information

April 13, 2017: Community Health and Resource Management (CHARM) Workshops
The County had the opportunity to partner with Texas A&M's AgriLife to host a workshop for all jurisdictions in the county (https://tcwp.tamu.edu/charm/); members of the planning team attended as well as local stakeholders (See Appendix A for a complete sign-in sheet). The workshop utilized GIS to explore current conditions including data such as 100 year-floodplain and social vulnerability throughout the jurisdictions. After current conditions were presented, the workshop participants discussed what they wanted future land use to look like given the current conditions.

Planning Team Participation

The chart below shows which jurisdiction participated in each opportunity throughout the planning process.

Jurisdiction	Attended Kickoff Meeting	Attended CHARM Workshop	Online Participation
Unincorporated Liberty	x	x	x
Ames		x	
Cleveland	x	x	x
Daisetta	x	x	
Dayton		x	
Dayton Lakes			x
Devers			x
Hardin			x
Kenefick			x
Liberty	x	x	
North Cleveland	x	x	
Plum Grove		x	

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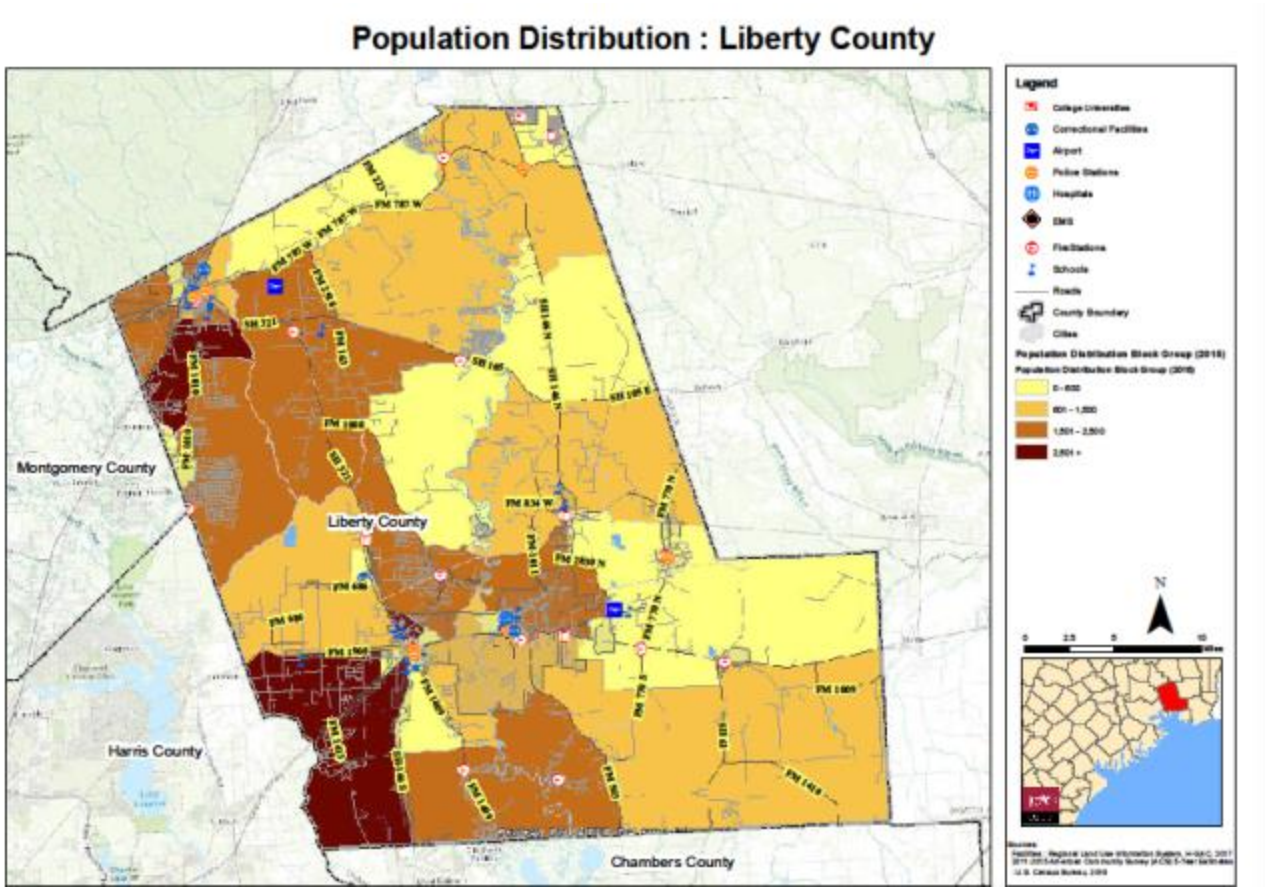
Part 3: County Profile

Part 3: COUNTY PROFILE

Liberty County is in the northeastern portion of the Houston metropolitan area, in the transition zone between the Texas' Gulf Coastal Plain and Piney Woods. Liberty County is divided approximately in half from north to south by the Trinity River, the primary waterway in the county, just downstream from the Lake Livingston dam. The east fork of the San Jacinto River flows through the northeast part of the county, just to the west of the City of Cleveland. The county's transportation corridors include U.S. Highway 90 and U.S. Highway 69 (which crosses the county in the far northwest). State Highways 146, 321, 1008, and 770, generally running north to south, are important to mobility in the county.

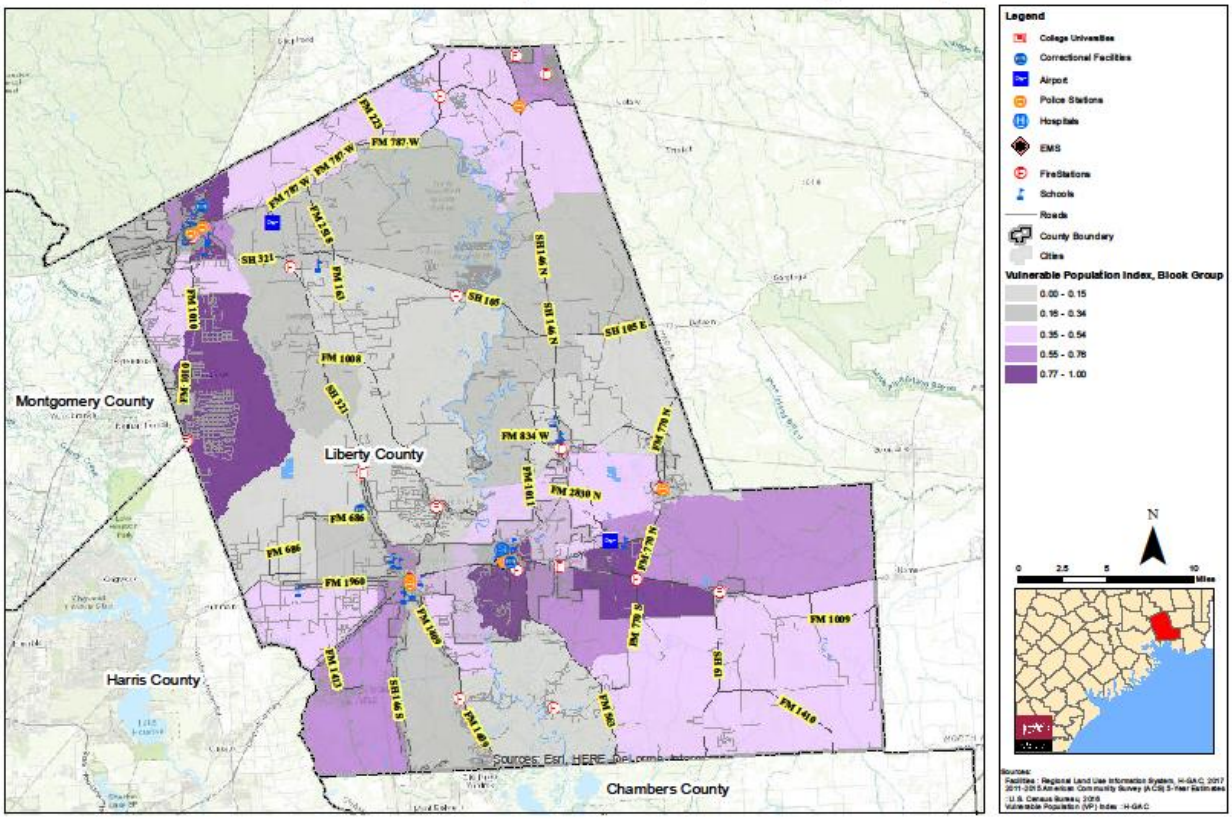
In 2016, 81,704 residents lived in Liberty County, and the county is expected to expand rapidly to 155,000 by 2040. Liberty, the county seat (9,175), Cleveland (8,095), and Dayton (7,734) are the three largest municipalities in the county. Liberty County is also home to the communities of Ames, Daisetta, Dayton Lakes, Devers, Hardin, North Cleveland, and Plum Grove. As shown on the map below, Dayton to the southwest and Cleveland to the northeast are the two most populous cities.



The largest employment sector of the county's is retail, followed by educational services. Four major corrections facilities also serve as major employers, providing over 1,000 jobs. Although 41-50 percent of the county's land is considered prime farmland, agricultural production is not as prevalent as it once was. Liberty County's rice production has decreased from more than 100 farmers in the 1970s to four producers today.[ii] The annual market value of agricultural production in 2012 was $34.9 million; cattle and lumber, along with rice, are the principal agricultural products.[iii]

Liberty County's median household income is $48,700 and residents spend about 49% of their earnings on costs related to transportation and housing. The county also has a much higher share of households living in RVs and mobile homes (31 percent) compared to the State of Texas with only 8 percent. The high prevalence of RVs and mobile homes partially explains why Liberty County has the lowest median home value in the region at $87,900.*

Vulnerable Population Map : Liberty County



The Vulnerable Population Index identifies areas throughout Liberty County that may not have the means or the resources to act when a natural disaster occurs in Liberty County. For the purposes of this plan, vulnerable populations include any households without a car, single female household with child/ children in the home, individuals living below the poverty line, individuals who are disabled, individuals who are Hispanic, individuals who are non-Hispanic, and non-white, and individuals 65 years and older. The areas in the county with the greatest proportion of these individuals is defined as the most vulnerable areas in Liberty County. On the map, the areas in dark purple (or dark grey if printed in black and white) are the areas that have greatest proportion of the vulnerable population in Liberty County. The map shows that Plum Grove to the northwest is the city that has the largest area of vulnerable population in Liberty County. The City of Liberty and Ames to the southwest also have a large proportion of vulnerable populations throughout the county. Defining and mapping vulnerable populations provides the opportunity to demonstrate where perhaps the most need is throughout Liberty County.

References

*The region includes Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston, Harris, Liberty, Matagorda, Montgomery, Walker, Waller and Wharton counties. [i] U.S. Census Bureau, 2014, OnTheMap Application, Longitudinal-Employer Household Dynamics Program [ii] The Vindicator, June 30, 2016. [iii] USDA Census of Agriculture

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Part 4: Hazard Identification

Part 4: HAZARD IDENTIFICATION

The State of Texas's Hazard Mitigation Plan has identified 5 major natural hazards that affect the region. These include hurricane, flood, wildfire, drought, and tornado[i]. The local planning team identified 9 natural hazards which could affect the county and local jurisdictions. These natural hazards are described below.

Flooding

Flooding is one of the most frequently occurring, destructive, and costly natural hazards facing Texas.[ii] There are two main categories for floods: general and flash flooding. General flooding is typically a long-term event that can last from a couple of days to weeks. This type of flooding is characterized by an overflow of water from an existing waterway, including rivers, streams, and drainage ditches. Flash flooding is an event that typically lasts a few minutes to less than 6 hours. Either type of flooding can destroy infrastructure, homes, and other structures, and pulling cars off roads. However, flash flooding is considered the most dangerous type of flooding, because of its "speed and the unpredictability"[iii]. Generally, the impact of flooding is intensified in urban areas because of less impervious surfaces and in suburban or rural areas because of building in vulnerable areas. While 100 and 500-year floodplains are identified throughout the county and local jurisdictions, flooding can occur outside of these areas.

Lightning

Lighting can be seen throughout thunderstorms, hurricanes, intense forest fires, and winter storms. Lightning occurs when positive and negative charges build within a cloud leading to a rapid discharge of electricity[iv]. While there are several types, lightning is typically classified as ground flashes or cloud flashes. One of the more common lightning strikes are cloud-to-ground lightning; these strikes are classified as ground flashes. Cloud-to-ground lighting starts as a channel of negative charge, called a stepped leader, zigzagging downward in roughly 50-yard segments in a forked pattern [v]

Lightning often strikes tall structures, such as trees and skyscrapers, but can also strike open fields or other areas depending on where the electrical charges form. Lightning causes an average of 80 deaths and 300 injuries each year in the United States.[7] In 2017, 16 people were killed by lightning in the United States, two of these deaths occurred in Texas, but not in the county. [vi]

Hail

Hail is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into balls of ice. To be considered hail, frozen precipitation needs to be at least .2 inches. Size of hail can range from pea-sized (1/4 inch in diameter) to softball-sized (4 ½ inches in diameter). Quarter sized hail (1 inch in diameter) and above is considered severe by NOAA's National Severe Storm Laboratory. Hail storms can result in significant damage to vehicles, buildings, and crops. Severe hail and hail swaths can result in an accumulation of hail on roadways and roofs, which may result in car accidents or roofs collapsing.[vii]. As of 2015, Texas had the highest level of hail loss claims throughout the country. According to the National Insurance Crimes Bureau, hail loss claims totaled 400,000 dollars in Texas from 2013 to 2015. However, damage from hail typically occurs in northern Texas rather than southern Texas.

Hurricanes and Tropical Storms

Tropical cyclones with sustained winds of 74 mph and above are classified as hurricanes. Hurricanes can reach wind speeds of 156 mph or more, which would be considered a category five on the Saffir-Simpson scale with potential for catastrophic damage. Hurricanes generally have a well-defined center, called the eye. Hurricane season is generally June 1st through November 30th each year.[viii] However, hurricanes can and have formed outside of this season. Hurricanes are one of the top natural hazards affecting the region, with flooding considered one of the main impacts from hurricanes [ix]

According to NOAA, tropical cyclones (rotating low-pressure weather systems that have organized thunderstorms, but no fronts) with sustain winds of at least 39 mph and no higher than 73 mph are classified as tropical storms. Tropical storms generally have ill-defined centers and slower moving winds than hurricanes.[12]

Hurricane Harvey is a recent example of the impact hurricanes and tropical storms have on the region, county, and local jurisdictions. Hurricane Harvey made landfall on August 25th, 2017 as a category four hurricane near Rockport, Texas; Hurricane Harvey traveled further inland as a tropical storm over the next few days. The tropical storm triggered general and flash flooding throughout the region with recorded rainfall measuring as high as 60.58 inches in the region. Flooding was seen throughout the county and local jurisdictions.

Tornado

Tornadoes are a violently rotating column of air touching the ground, usually attached to the base of a thunderstorm.[x] However, tornadoes have formed during hurricanes and tropical storms. Tornadoes form when there is a change in a storm's speed and direction. Tornadoes can have wind speeds that range from 40 mph to 300 mph and move at 10 mph to 20 mph. However, tornadoes typically last a few minutes. The damage seen from a tornado is largely due to the strength of the winds, but strong hail and lighting often accompany tornadoes.[xi]

Wildfire

Wildfires are any non-structure fire, except prescribed fires that occur in wildland areas, including prairies or forest. as many as 90 percent of wildfires in the United States are cause by humans and the other 10 percent are started by lava or lightning.[xii] In understanding that most wildfires are started by people, the Texas Forest Service assigns a high priority to year-round wildfire prevention activities that reduce risks to residents and property. Texas Forest Service prevention campaigns use radio, TV, print, and web-based products along with local outreach programs to increase wildfire awareness and deliver fire safety messages. Texas Forest Service works with local and county officials to keep them informed of fire danger and the likelihood of large damaging wildfires. In 2017, five Texans died due to wildfires in north Texas; Texas faced more than 21 million dollars in damages from wildfires throughout the state.[xiii]

Drought

Drought varies greatly in length and extent. High temperatures, high winds, and low humidity can worsen drought conditions and can make areas more susceptible to wildfire. Human demands and actions, such as farming and animal grazing, can also hasten drought-related impacts. There are typically four types of drought: meteorological, agricultural, hydrological, and socio-economic. Meteorological droughts are typically defined by the level of dryness over a given period. Hydrological droughts are defined by the decline of soil/ground water or stream flow or lake/ river levels. Agricultural droughts refer to the impact of low rainfall and storm water or reduced ground water or reservoir levels needed for agriculture. Socio-economic drought considers the impact of drought conditions on supply and demand of some economic goods such as grains.[18, xiv] There are a wide range of effects that can occur

from drought, including decreased land prices, loss of wetlands, increased energy demand, and increase of mental health disorders.[xv] Impacts seen in Texas from drought in the past, include wildfires, loss of agricultural crops including rice and wheat fields, and increase in energy cost and demand. [xvi]

Heat Events

While the National Weather Service defines excessive heat as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks, a Heat Event is more loosely defined. A heat event could be a period where the county experiences high temperatures which could affect residents particularly children and the elderly. According to the National Weather Service, the county particularly in summer months experiences typical daily temperatures more than 90 degrees and humidity more than 75 percent. These high temperatures mixed with high percentage of humidity can affect the elderly and children even though these are not above average temperatures for the county.

Expansive Soils

Expansive soils are soils and soft rock that tend to swell or shrink due to changes in moisture content. Expansive soils (bentonite, smectite, or other reactive clays) expand when the soil particles attract water and can shrink when the clay dries. Changes in soil volume present a hazard primarily to structures built on top of expansive soils. In Texas, most expansive soils are in band 200 miles west of the coastline, stretching approximately from Beaumont to Brownsville. These areas receive the most moisture and are also vulnerable to droughts, which can cause the soils to contract. Problems associated with expansive soils are sinking or broken foundations or ruptured pipelines. In the region, the problems associated with expansive soils typically occur during drought periods.[xvii]

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[iv] *NOAA National Severe Storms Laboratory*, Lightning FAQ, Retrieved from: www.nssl.noaa.gov/education/svrwx101/lightning/faq/

[v] *NOAA National Severe Storms Laboratory*, Thunderstorm Basics Retrieved from: www.nssl.noaa.gov/education/svrwx101/thunderstorms/.

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[viii] US Department of Commerce, National Oceanic and Atmospheric Administration. (2013, June 28) What Is a Hurricane? Retrieved from: oceanservice.noaa.gov/facts/hurricane.html.

US Department of Commerce, NOAA, National Weather Service, and NWS Drought Safety Home.

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[xvii] Geology. Expansive Soil and Expansive Clay. Retrieved from: geology.com/articles/expansive-soil.shtml.

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Part 5: Risk Assessment

Part 5: RISK ASSESSMENT

A Vulnerability Assessment is the process of identifying threats by natural hazards to the population and infrastructure. By identifying the greatest vulnerabilities within the County, it becomes possible to develop a Mitigation Strategy that effectively allocates resources for addressing the most serious vulnerabilities. For this assessment, the Planning Team conducted three main processes to identify the vulnerabilities within Liberty County:

- Cataloging critical and valuable assets within the County.
- Conducting a capability assessment.
- Assessing the County's vulnerability to each hazard and ranking these hazards according to degree of risk.

H-GAC maintains a database of critical facilities. During a public meeting on October 19, 2017, Liberty County officials reviewed and updated this list, including adding additional valuable assets within the community. Following this process, the Planning Team determined 461 facilities are critical or valuable assets. Through a Hazus analysis, the Planning Team also identified residential and commercial units. Appendix B contains a comprehensive list of the facilities. The full Hazus analysis is catalogued in Appendix C. A summary of the facilities is provided below.

Critical Facilities & Valuable Assets

Asset Description	Quantity
Schools	32
Dams	25
Electric Substation	10
EMS	8
Fire Station	8
Hospitals	3
Emergency Operation Center	1
Police Stations	5
Shelters & Housing Facilities	19
Toxic Release Inventory Facility	13
Correctional Facilities	4

Risk Assessment Survey

The Planning Team ranked the hazards by scoring the frequency, impact, and vulnerability of each. Impact and vulnerability ratings were weighted more heavily than frequency scores when determining overall risk. Additionally, communities described the loss or damage, and provided specific data that expand on the descriptions provided below.

Frequency Ratings	Impact Ratings	Vulnerability Ratings
Unlikely: Rare and isolated occurrences; Unlikely to occur within the next 5 years.	**Negligible:** Less than 10 percent of property and population impacted in the planning area.	**Low:** Hazard results in little to no damage, and negligible loss of property, services, and no loss of life. Planning area is not vulnerable to this hazard.
Likely: Frequent and regular occurrences; Likely to occur within the next 5 years.	**Limited:** 10 to 25 percent of property and population impacted in the planning area.	**Moderate:** Hazard results in some damage, and moderate loss of property, services, and potentially loss of life. Planning area is moderately vulnerable to this hazard.
Very Likely: Consistent and predictable occurrences; Likely to occur more than once in the next 5 years.	**Significant:** 25 to 75 percent of property and population impacted in the planning area.	**High:** Hazard results in extensive damage, and extensive loss of property, services, and potentially loss of life. Planning area is highly vulnerable to this hazard.
	Extensive: 75 to 100 percent of property and population impacted in the planning area.	**Extreme:** Hazard results in catastrophic damage, loss of property, services, and loss of life. Planning area is extremely vulnerable to this hazard.

Hazards Ranked by Risk

Each identified hazard poses a risk to Liberty County. Ranking the hazards from greatest to lowest risk allows the communities to prioritize their resources and focus efforts where they are most needed.

Risk Rating	Ranking	Hazards
High	1	Flooding
	2	Hurricanes and Tropical Storms
	3	Tornado
Moderate	4	Drought
	5	Lightning
	6	Heat Events
	7	Wildfire
Low	8	Expansive Soils
	9	Hail

Capability Assessment

The participating jurisdictions completed a capability assessment survey to collect data on hazards that affect communities, the communities' ability to mitigate damages from these hazards, and current plans or programs in place to help mitigate natural hazards. The Planning Team used this information to assess the risk within each community and to determine a strategy to integrate the HMAP into their current planning mechanisms.

AB: Annual Budget
DRP: Disaster Recovery Plan
CP: Comprehensive Land Use Plan
FMP: Floodplain Management Plan
SMP: Stormwater Management Plan
EOP: Emergency Operations Plan
COOP: Continuity of Operations Plan
REP: Radiological Emergency Plan
SARA: SARA Title III Emergency Response Plan
TP: Transportation Plan
REG-PL: Regional Planning
SO: Subdivision Ordinance
FDPO: Flood Damage Prevention Ordinance
MA: Mutual Aid Agreements
CRS: Community Rating System
CIP: Capital Improvements Plan (that regulates infrastructure in hazard areas)

Jurisdiction	DRP	CP	FMP	SMP	EOP	COOP	REP	SARA	TP	REG	SO	AB	MA	FDPO	CRS	CIP
Unincorporated Liberty County												X	X	X		
Ames												X	X			
Cleveland		X	X			X	X		X		X	X	X	X		X
Daisetta												X	X	X		
Dayton		X									X	X	X	X		
Dayton Lakes													X			
Devers													X			
Hardin												X	X	X		
Kenefick													X			
Liberty	X		X			X		X	X		X	X	X	X		X
North Cleveland													X			
Plum Grove													X			

Expand and Improve

Participating jurisdiction examined their existing authorities, policies, programs and resources. Participating jurisdictions then identified ways to improve upon and expand their existing authorities to support the mitigation strategy.

Jurisdiction	Capability Expansion Opportunities
Unincorporated Liberty County	Identified their local budget as a factor that decreases their capability to implement mitigation actions and reduce future damages. Liberty County will apply for state and federal funding to help fund mitigation actions that reduce the impact of natural hazards.
Ames	Need for technical staff and larger budget. Will apply for state and federal funding to help fund mitigation actions that reduce the impact of natural hazards.
Cleveland	Identified an almost out of date comprehensive plan as a weakness in helping create sound land use in the city. Will consider updating the current comprehensive plan.
Daisetta	Identified the local budget and lack of technical and city staff that can implement the mitigation strategy. Will apply for state and federal funding to help fund mitigation actions that reduce the impact of natural hazards.
Dayton	Have a strong technical staff, but need to increase public engagement of city planning. Implementing planning workshop meetings to discuss future growth of the city.
Dayton Lakes	Low local funding as a barrier for implementing projects. Will apply for state and federal funding to help fund mitigation actions that reduce the impact of natural hazards.
Devers	Devers will supplement their local budget by applying for state and federal funding to help fund mitigation actions that reduce the impact of natural hazards.
Hardin	Expand their NFIP compliance practices, send staff to continuing education courses.
Kenefick	Need for technical staff and larger budget. Will apply for state and federal funding to help fund mitigation actions that reduce the impact of natural hazards.
Liberty	Consider drafting and implementing an emergency operations plan.
North Cleveland	Need for technical staff and larger budget. Will apply for state and federal funding to help fund mitigation actions that reduce the impact of natural hazards.
Plum Grove	Identified low budget as a barrier to implanting projects and plans. Will apply for state and federal funding to help fund mitigation actions that reduce the impact of natural hazards.

2017

Part 6: Hazard & Vulnerability Assessment

Part 6: HAZARD & VULNERABILITY ANALYSIS

Introduction

After the potential hazards in the county were identified, the Planning Team reviewed historic data and conducted an analysis in ArcGIS for each hazard. This analysis was presented at the October 19, 2017, public meeting. At this meeting, stakeholders provided many firsthand accounts of damage caused by natural disasters. These reports were taken into consideration and included in the hazard analysis when possible. The result of that process has determined 9 different natural hazards require mitigation efforts. The maps and the discussion that follow are a compilation of data analysis, historic information, and public feedback.

2017

Part 6.1: Flooding

6.1 Flooding

Floodplains are the primary tool used by FEMA to determine areas at risk of flooding. The periodic flooding of lands adjacent to rivers, streams, and shorelines is a natural and inevitable occurrence that can be expected based upon established recurrence intervals. The recurrence interval of a flood is the average time interval, in years, that can be anticipated between flood events of a certain magnitude. Using the recurrence interval with land and precipitation modeling, forecasters can estimate the probability and likely location of flooding. These are expressed as floodplains. The most commonly used floodplain measurements are the 100-year floodplain and the 500-year floodplain. The 100-year floodplain has a 1-in-100 chance of flooding each year. The 500-year floodplain is estimated to have a 1-in-500 chance of occurring each year.

Flooding causes widespread and varying degrees of damage. The magnitude or extent of flood damage is expressed by using the maximum depth of flood water during a specific flood event. Structures inundated by 4-feet or more of flood water are considered an absolute loss. Other forms of loss such as roads, bridges, agriculture, services, or death or injury are also summarized by jurisdiction in this plan.

Historic Occurrences

Damage and occurrence data for Liberty County flood events is listed below. There were no reported injuries as the result of these events, but Liberty County reported one drowning death as the result of the October 16th, 2006 storm. There was reported crop damage in 2012 ($50,000) and in 2015 in October ($5,000). The monetary impact for Hurricane Harvey has yet to be determined.

Jurisdiction	Date	Property Damage	Notes
Countywide	5/19/2000	$10,000,000	US 90 water covered and closed for over 12 hours. Half the streets in Liberty covered with 1 to 2 feet of water with widespread street flooding in Dayton. At least 262 homes and 42 businesses damaged countywide, including half the homes in the Oak Forest subdivision in Liberty. From 60 to 80 people rescued. Several schools damaged by major flooding. Co-op observer in Liberty reported a storm total of 19.1 inches of rainfall, with 18.3 inches falling in only 5 hours.
Unincorporated	10/22/2000	$500,000	Several homes flooded in the Rye and Moss Hill areas. Portion of FM 787 washed out in Romayor. SH 146 flooded and closed to cars north of Moss Hill. Total of 8.5 inches of rainfall in Rye and 10 inches in Votaw.
Unincorporated	6/7/2001	$0	Flooding from the remnants of T.S. Allison.
Unincorporated	6/7/2001	$0	Flooding from the remnants of T.S. Allison
Unincorporated	6/9/2001	$0	Flooding from the remnants of T.S. Allison.
Cleveland	9/8/2002	$10,000	Many roads completely submerged just east of Cleveland.
Liberty	9/19/2002	$35,000	Flooding in Liberty and Dayton; portions of Hwy 90 closed in Liberty.
Countywide	10/28/2002	$100,000	Countywide flooding.
Plum Grove	11/17/2003	$225,000	6 to 7 homes flooded in Plum Grove with flooded roads in and around Hardin.
Cleveland	11/17/2004	$0	Many impassable roads in and around Cleveland.
Dayton	5/29/2005	$40,000	Highway 321 underpass flooded and closed with vehicles stranded in the area. Numerous streets and secondary roads flooded.
Hardin	12/14/2005	$5,000	Flooded streets in and around Hardin.
Liberty	6/19/2006	$0	Highway 90 flooded in the town of Liberty.
Cleveland	10/16/2006	$2,000	Heavy rain caused numerous roads to flood.
Unincorporated	10/16/2006	$10,000	The 25-year-old female driver of a vehicle drowned when she drove into a flooded ditch off of FM 1410. The vehicle turned upside down in the ditch.
Ames	10/18/2006	$55,000	Significant flooding across county with several roads closed due to high water. Report of one flooded subdivision (Big Thicket Lakes). Flooding reported on FM 834 between the towns of Hardin and Hull, on State Road 321 between Cleveland and Dayton, and on FM 563 south of the town of Liberty. Other road

			closures include, but are not limited to, portions of FM 2518, FM 163, and FM 787.
Cleveland	10/26/2006	$100,000	Four impassable roads in NW Cleveland; Joyce, Tony Tap, East Cherry Creek, and Meekins Roads were either closed or washed out due to flood waters. Two residential subdivisions were reported to be partially flooded.
Cleveland	10/26/2006	$12,000	Flash flooding was reported in and around Cleveland as secondary roads went under water.
Cleveland	10/26/2006	$6,000	FM 223 along with County Roads 2132 and 2212 were closed due to flooding.
Cleveland	10/26/2006	$17,000	Several roads in and around Cleveland remain closed due to flooding. FM 223 and Low Water Bridge Road near Cleveland, County Roads 2132 and 2212 along FM 787 remain closed due to high water.
Plum Grove	9/14/2008	0	County Road 304 was flooded near Highway 321.
Unincorporated	2/3/2012	$10,000	Heavy rainfall caused numerous road closures between the towns of Cleveland, Shepherd, and Segno. A rainfall total of 9.30 inches was recorded by a cooperative weather observer in the community of Ace.
Cleveland	9/18/2014	$0	Various streets are flooded in and around the Cleveland area.
Liberty	4/16/2015	$0	Flooding was reported between Liberty and Anahuac on FM 563, and between Liberty and Daisetta along FM 160 East.
Dayton	5/13/2015	$0	Roads were flooded in and around the Dayton area, including FM 321.
Cleveland	5/25/2015	$0	There were numerous roads flooded in Cleveland. Several roads were closed and impassable in Liberty.
Plum Grove	6/28/2015	$0	There was water over FM 1010 just north of the town of Plum Grove.
Dayton	10/31/2015	$700,000	High rainfall rates created flooding in both towns of Dayton and Liberty. The underpass at the intersection of US Highway 90 and FM 321, along with other streets in Dayton, were closed due to high water. The city of Liberty reported flood waters in six homes with numerous road closures due to high water.
Kenefick	5/26/2016	$400,000	Numerous roads and bridges under water. Damage estimated.
Countywide	8/27/2017	$0	Roadways SH 321 at US 90, the exit ramp at FM 1010 from the SH 105 and US 59 southbound were closed due to flooding. There was record level, major flooding along the Trinity River with numerous flooded roads near the river including FM 787. Many homes were flooded north of the town of Liberty. Major flooding was also observed on the east fork of the San Jacinto River that caused significant flooding in Cleveland, Williams and Plum Grove. Numerous homes and businesses along the Highway 59 feeder roads, various roads in the town of Liberty, Wallace Road off of Highway 146, FM 1725, FM 2090, CR 388, CR 381, CR 3880, CR 332, CR 3664, CR 361, CR 3610, CR 3611, CR 3661, CR 349, CR 3612 and CR 3600 were flooded.
Cleveland	8/28/2017	$0	Sections of FM 163 in Tarkington Prairie were inundated with flood waters.
Liberty	8/29/2017	$0	Portions of FM 563 were covered with high water and had become impassable.

Source: https://www.ncdc.noaa.gov/stormevents/

Liberty County Disaster Declarations

There have been several federally declared flood disasters in Liberty County since 1973. These events are considered the most significant flood events in Liberty County's recent history.

Declaration Date	Declaration Disaster Number	Description
7/11/1973	398	Severe Storms and Flooding
4/26/1979	580	Severe Storms Tornadoes and Flooding
5/19/1989	828	Severe Storms, Tornadoes and Flooding
5/2/1990	863	Severe Storms, Tornadoes and Flooding
12/26/1991	930	Severe Thunderstorms and Flooding
3/20/1992	937	Severe Storms and Flooding
10/18/1994	1041	Severe Storms, Tornadoes and Flooding
10/21/1998	1257	TX-Flooding
11/5/2002	1439	Severe Storms, Tornadoes and Flooding
6/29/2007	1709	Severe Storms, Tornadoes, Flooding
5/29/2015	4223	Severe Storms, Tornadoes, Flooding, and Straight-Line Winds
11/25/2015	4245	Severe Storms, Tornadoes, Flooding, and Straight-Line Winds
4/25/2016	4269	Severe Storms and Flooding
6/11/2016	4272	Severe Storms and Flooding
8/25/2017	4332	Severe Storms and Flooding

Source: https://www.FEMA.gov/

NFIP Participation

The National Flood Insurance Program (NFIP) is a voluntary program that aims to reduce the impacts of flooding by incentivizing communities to adopt and enforce floodplain management regulations. The NFIP provides affordable flood insurance for property owners, renters, and businesses in participating communities. This reduces the socio-economic impacts of flooding on communities through risk reduction via flood insurance and reduces the physical impacts of flooding through beneficial floodplain regulation.

NFIP Participants in Liberty County:

- Ames
- Cleveland
- Daisetta
- Dayton
- Dayton Lakes
- Devers
- Hardin
- Kenefick
- Liberty
- Liberty County
- Plum Grove

Each of the participating jurisdictions has a certified floodplain manager on staff, and/or function under the regulatory umbrella of Liberty County. To remain NFIP compliant, the CFM's office conducts jurisdiction wide permitting of new development, permit review, flood code enforcement, educate the public, and provide public assistance. The County CFM regulates new development by determining if the property in question is in a flood hazard area designated by FEMA by the legal description. The next step is to determine the flood elevation for new structures based on the FEMA data. All structures within the floodplain must obtain an elevation certificate and a No Rise Certificate. To improve flood mitigation efforts and enhance their NFIP program, all participating

jurisdictions will adopt and enforce stronger floodplain management regulations for new construction in Special Flood Hazard Areas (SFHAs). The County represents all participating jurisdictions except City of Dayton, City of Cleveland, and City of Liberty. Liberty's Fire Chief, Dayton's City Planner, and Cleveland's Fire Director represent their respective jurisdictions. While the County regulates the floodplain as described in the above paragraph, The City of Liberty, Dayton, and Cleveland adopted a Flood Damage Prevention Ordinance into their current city code to help regulate the development within the floodplain. These ordinances allow for jurisdiction wide permitting of new development, permit review, engineering review, and flood code enforcement. North Cleveland is not an active participant in the NFIP; as an incorporated residential subdivision they have few resources to enforce such policies.

Repetitive Loss Properties

Repetitive loss properties (RL) are properties that have received a minimum of two insurance payments of $1,000 or more from the NFIP within the last 10 years. Liberty County has a total of 333 RL properties, and severe repetitive loss properties totaling $ 3,855,951.77 in insurance payouts.

An exhaustive and comprehensive list of all RL properties are listed in Appendix D.

Jurisdiction	Residential RLPs	Non-residential RLPs	Total RLPs
Unincorporated Liberty County	15	0	15
Ames	0	0	0
Cleveland	56	3	59
Daisetta	1	0	1
Dayton	78	3	81
Dayton Lakes	4	0	4
Devers	0	0	0
Hardin	9	0	9
Kenefick	0	0	0
Liberty	44	8	52
North Cleveland	0	0	0
Plum Grove	0	0	0

Hazard Analysis & Vulnerability Identification

The hazard analysis uses historic hazard event data to determine the probability of an event occurring again within the next year. The analysis calculates the average number of events in each jurisdiction annually and then calculates the percent chance of the event occurring in a year.

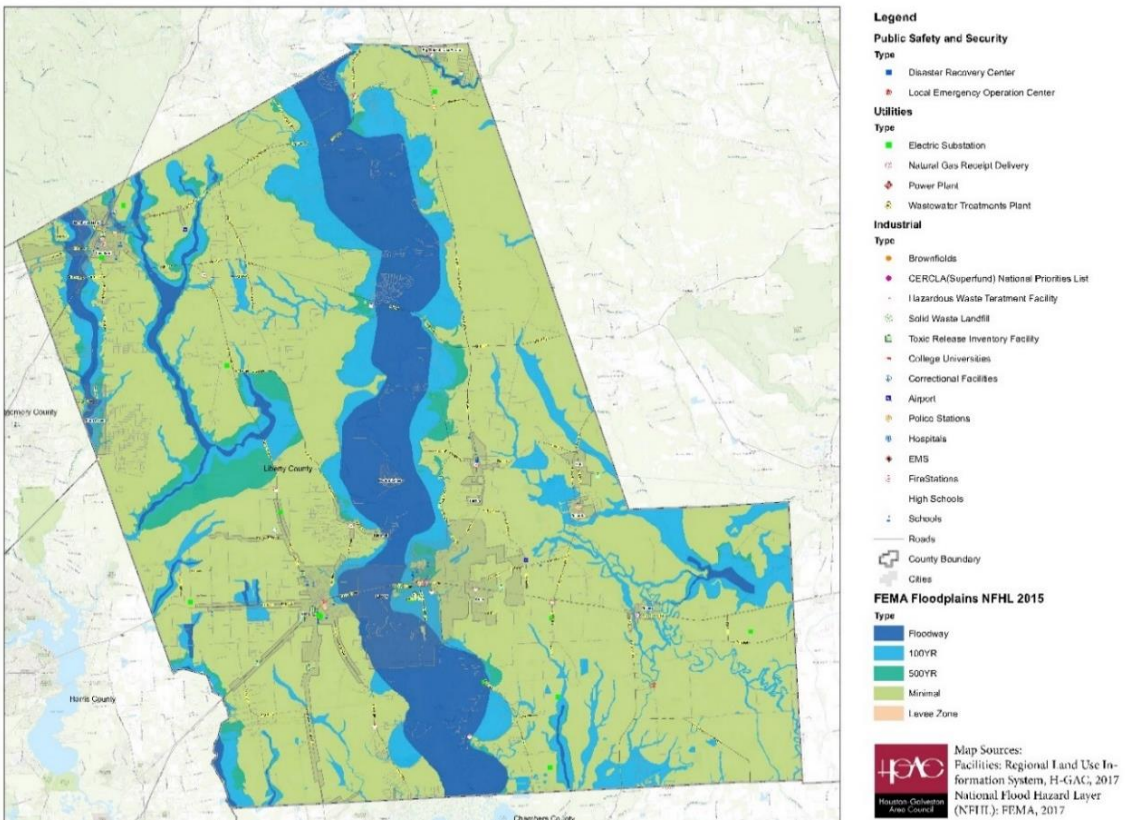
The hazard analysis also provides hazard extent data for each participating jurisdiction. The extent data is the most extreme data recorded during a storm or hazard event and represents the worst damage a jurisdiction has experienced in recent history and an estimate of what the jurisdiction could experience in the future. Information from stakeholders, FEMA, NOAA, and the Department of Homeland Security (DHS) are the sources of data for the analysis.

To identify vulnerabilities for each jurisdiction, this plan used the following methods:

- FEMA's Hazus analysis software
- GIS analysis of critical facilities in the floodplain; and
- Stakeholder identified vulnerabilities.

Hazus was used to determine the economic loss and calculate the buildings stock that's at risk of flooding in Liberty County. Shelter needs were also projected using this method. The complete HAZUS report is in Appendix C. H-GAC maintains a database of critical facilities in Liberty County. Using GIS, this plan identifies any critical assets located within the 100-year and 500-year floodplain. Stakeholders then provided valuable insight into additional vulnerabilities within their communities. These findings are provided in condensed charts for each jurisdiction.

Floodplains: Liberty County



Liberty County (Unincorporated)			
Planning Area (Sq. mi):	500	**Occurrences since 2000:**	8
Area Affected:	75 %	**Annual Event Average:**	.47
Probability: Likely; 47 percent chance the event will occur in a year			
Extent: According to past events the county has experienced 19 feet of floodwater; the county can experience 20 to 22 feet of water.			

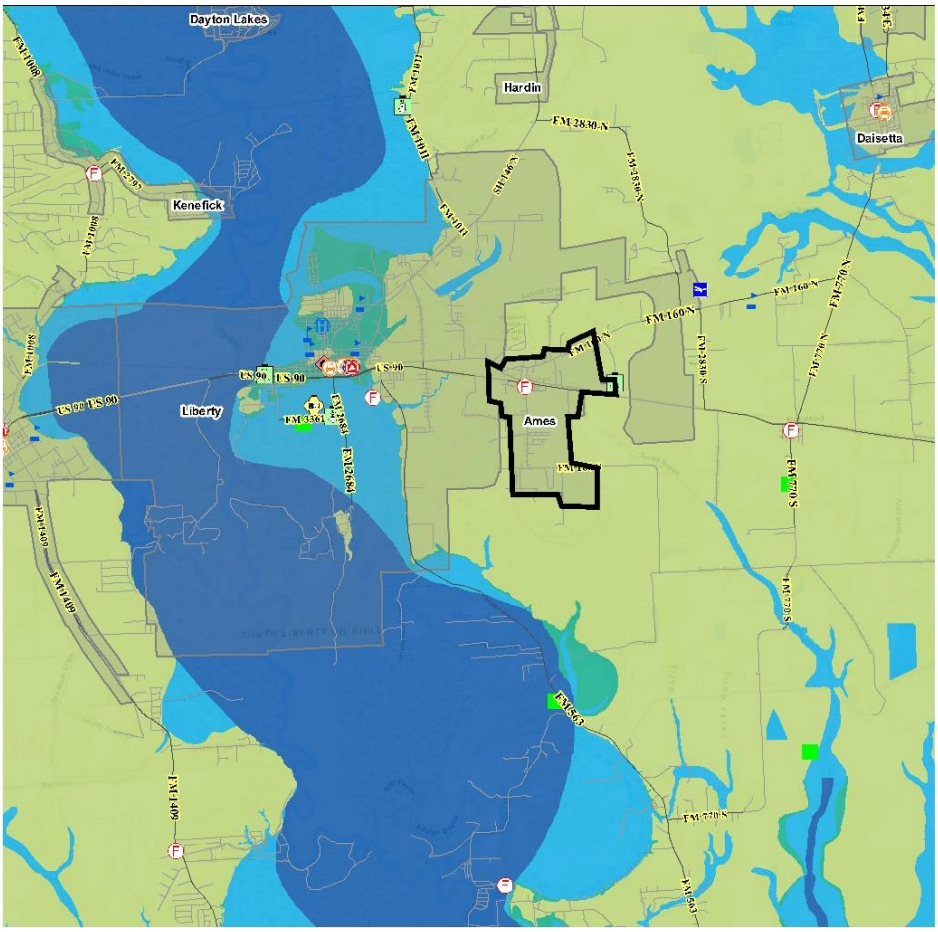
Identified Vulnerabilities:

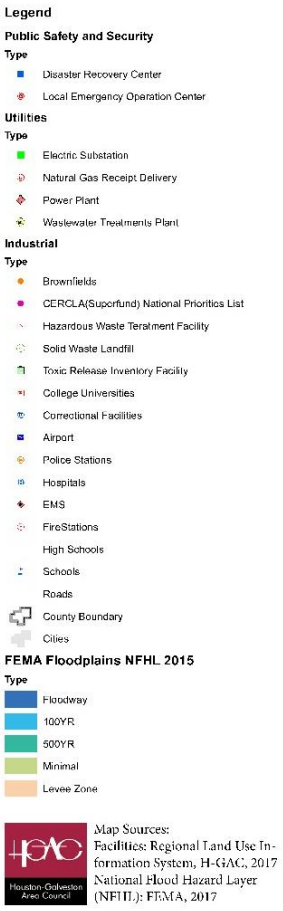
- Critical facilities including: 1 fire station, 1 shelter, 1 toxic release site, 1 EMS, 1 police station, and 1 school
- Vulnerable populations concentrated southeast of the county near Ames and northwest of the county near Cleveland
- Residents and structures near the east fork of the San Jacinto River
- Major roadways including Highway 146, FM 1725, FM 2090, CR 388, CR 381, CR 3880, CR 332, CR 3664, CR 361, CR 3610, CR 3611, CR 3661, CR 349, CR 3612 and CR 3600
- Dam and levee maintenance and age of dams and levees throughout the county

Identified Impacts:

- Vulnerable populations (defined in the Community Profile Section) include residents without cars, funds or other resources to evacuate in case of a flood event; significant injury, loss of life could occur because of the inability evacuate to dry land
- During past flood events roadways were impassable throughout the county due to high flood waters making it difficult or impossible to reach critical facilities or those most in need
- Significant property loss or damage creates a financial and economic loss for residents and the county

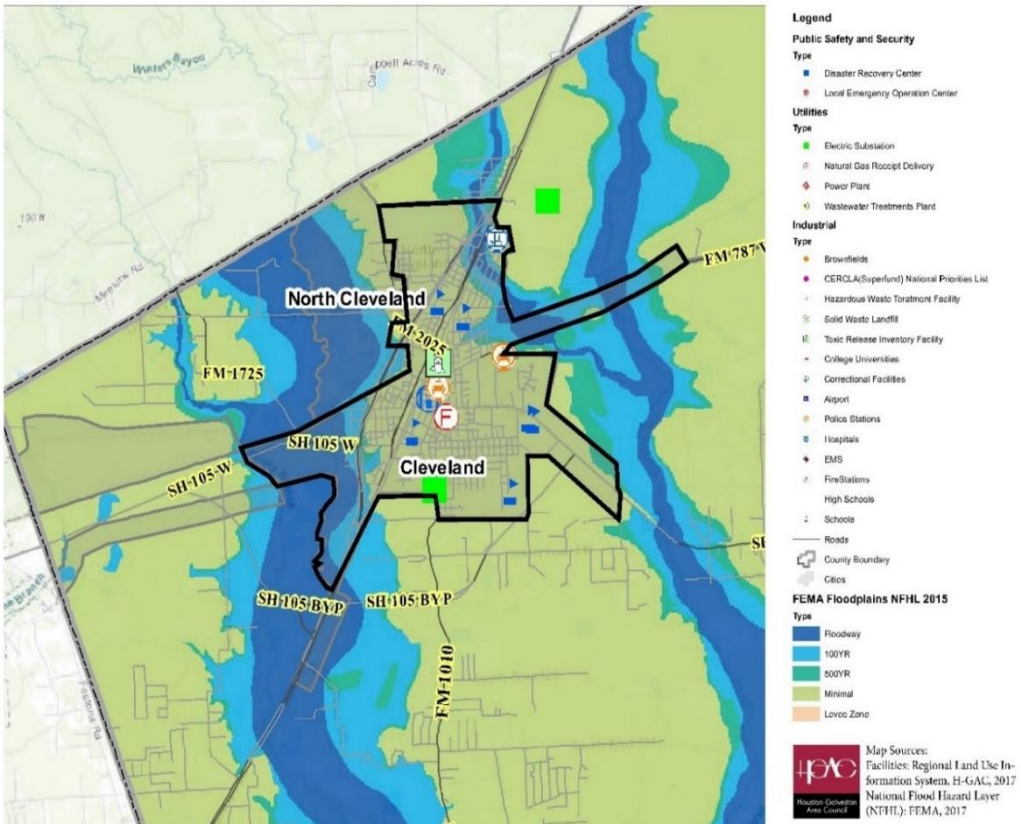
Floodplains: Ames





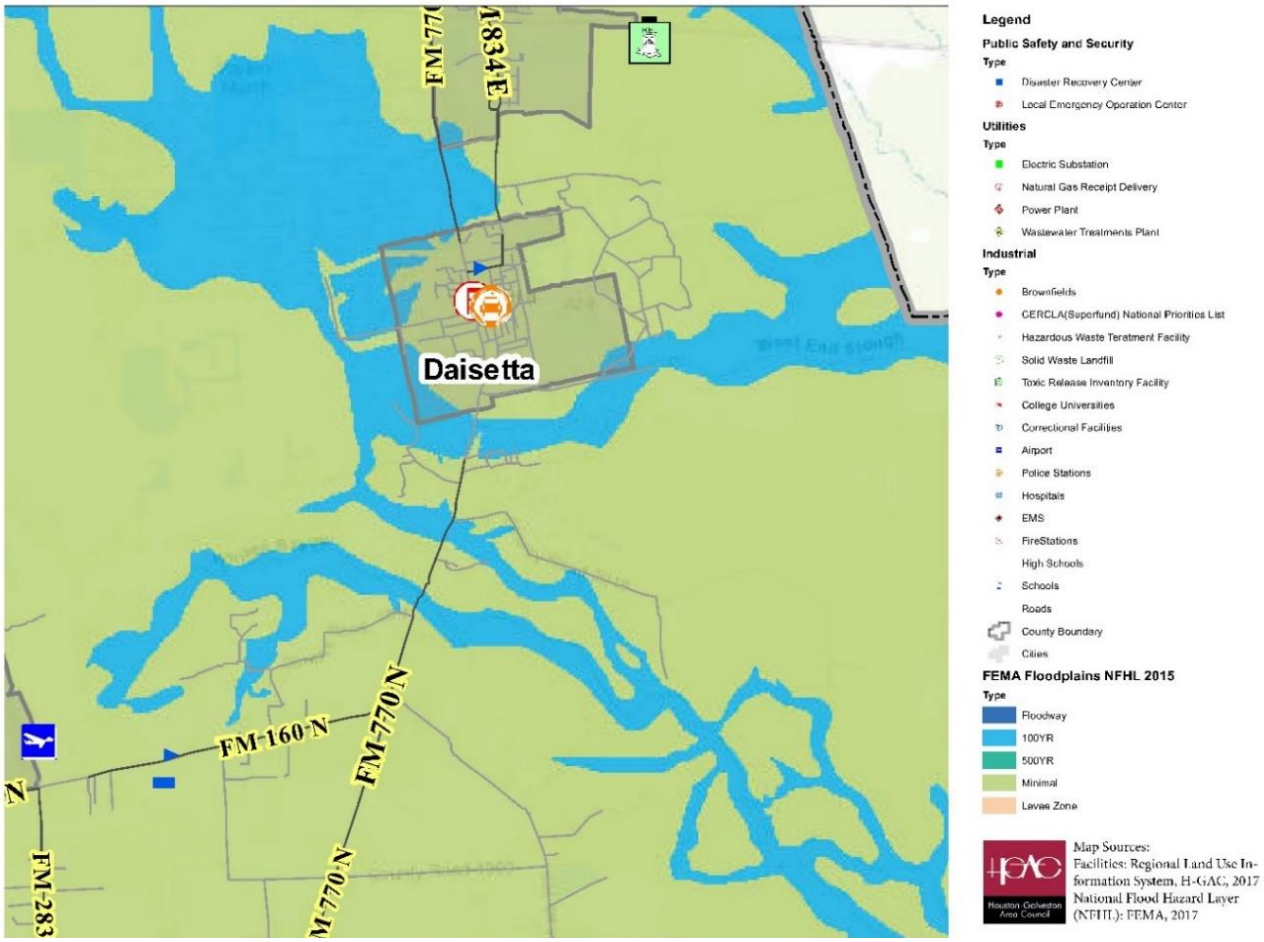
Ames			
Planning Area (Sq. mi):	3.17	**Occurrences since 2000:**	3
Area Affected:	15 %	**Annual Event Average:**	.18
Probability: Likely; 18 percent chance the event will occur in a year			
Extent: According to past events the county has experienced 4 feet of floodwater; the county can experience 6 to 8 feet of water.			
Identified Vulnerabilities: • Residents and homes in the northwest **Identified Impacts:** • During past flood events major roadways were impassable due to high flood waters making it difficult or impossible to reach critical facilities or those most in need. • Loss of life and/ or significant property loss or damage creates a financial loss for residents			

Floodplains: Cleveland



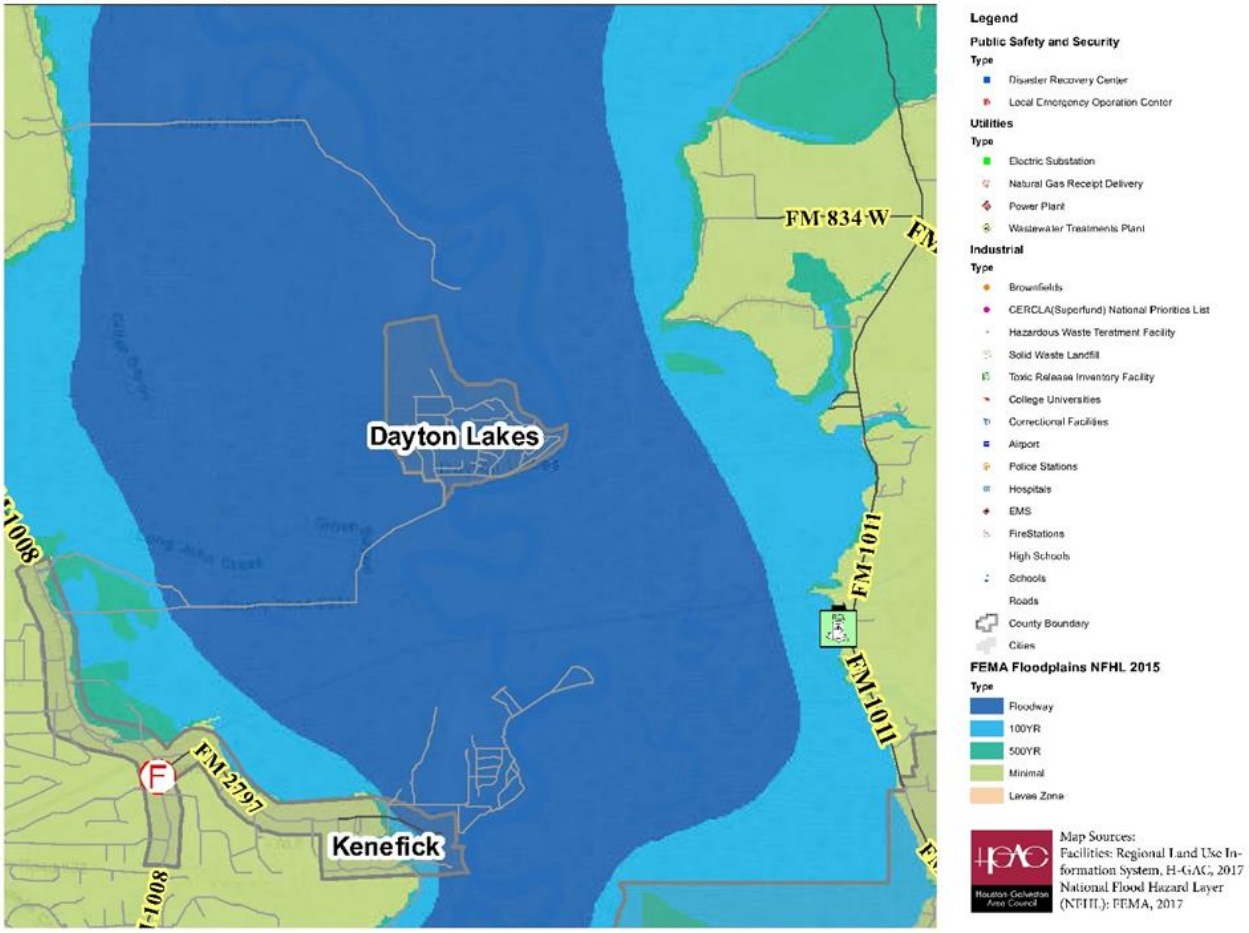
Cleveland			
Planning Area (Sq. mi):	4.8	**Occurrences since 2000:**	13
Area Affected:	15 %	**Annual Event Average:**	.77
Probability: Very Likely; 77 percent chance the event will occur in a year			
Extent: According to past events the county has experienced 4 feet of floodwater; the county can experience 6 to 8 feet of water.			
Identified Vulnerabilities: • Critical facilities including: 1 correctional facility, 2 fire stations, 1 electric substation, 1 EMS, 6 schools, 2 hospitals, 2 police stations, 5 shelters, 2 toxic release facilities, 1 water treatment plant-flooded with 5 feet of water in the past • Residential areas throughout the northeast and southwest of the city, 130 homes flooded in the past • 15-year-old generator at the City of Cleveland's police department • Roadways throughout the city including Joyce, Tony Tap, East Cherry Creek, and Meekins Roads and major roadways including FM 2518, FM 163, and FM 787, SH 105, US-59 **Identified Impacts:** • Loss of life or serious injury may occur in flooded subdivisions • During past flood events roadways were impassable throughout the county due to high flood waters making it difficult or impossible to reach critical facilities or those most in need • Significant property loss or damage creates a financial and economic loss for residents and the jurisdiction			

Floodplains: Daisetta



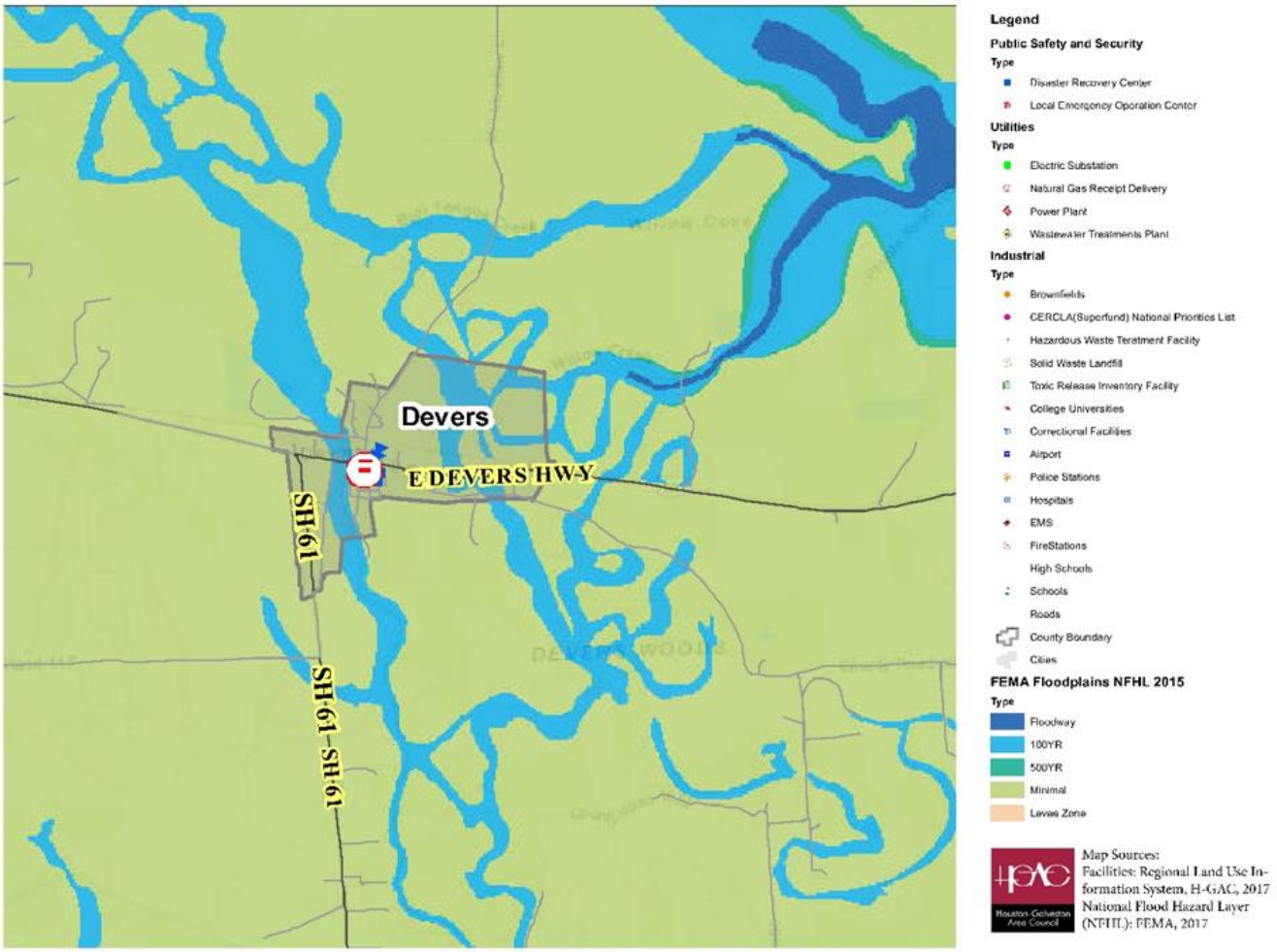
Daisetta			
Planning Area (Sq. mi):	1.47	**Occurrences since 2000:**	3
Area Affected:	15 %	**Annual Event Average:**	.18
Probability: Likely; 18 percent chance the event will occur in a year			
Extent: According to past events the county has experienced 4 feet of floodwater; the jurisdiction can experience 6 to 8 feet of water.			
Identified Vulnerabilities: • Critical facilities including: 1 electric substation, 1 EMS, 1 school, 1 police station, 1 shelter, 1 toxic release facility, 1 fire station • Residential areas throughout the northeast and southwest of the city • Roadways throughout the city throughout the northeast of the city **Identified Impacts:** • Loss of life or serious injury may occur in flooded subdivisions • During past flood events roadways were impassable throughout the county due to high flood waters making it difficult or impossible to reach critical facilities or those most in need • Significant property loss or damage creates a financial and economic loss for residents and the jurisdiction			

Floodplains: Dayton Lakes



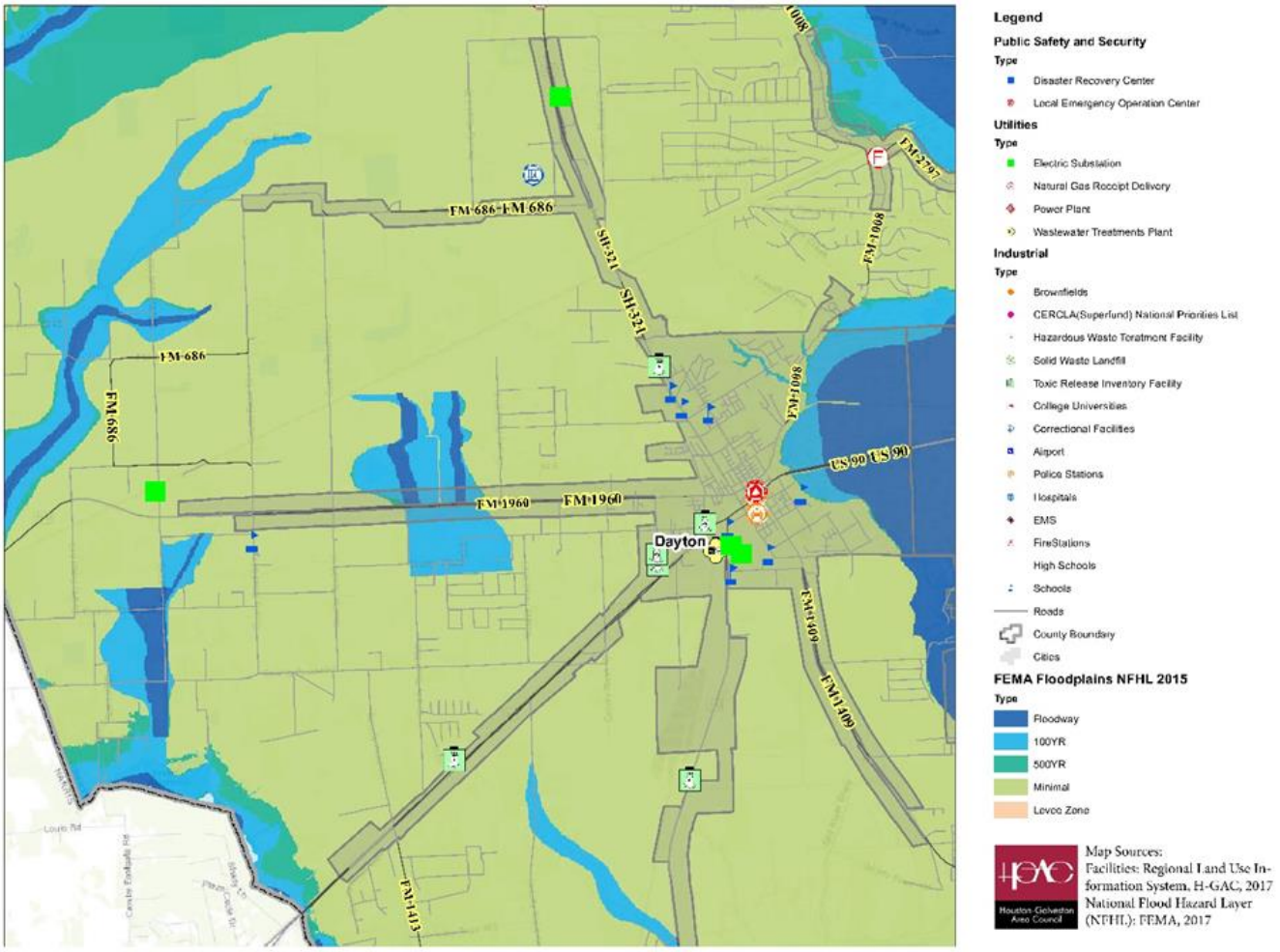
Dayton Lakes			
Planning Area (Sq. mi):	1	**Occurrences since 2000:**	6
Area Affected:	100 %	**Annual Event Average:**	.35
Probability: Likely; 35 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced 4 feet of floodwater; the jurisdiction can experience 6 to 8 feet of water.			
Identified Vulnerabilities: • Residential and commercial areas throughout the city **Identified Impacts:** • Loss of life or serious injury may occur in flooded subdivisions • Significant property loss or damage creates a financial and economic loss for residents and the jurisdiction. • Dependence on surrounding jurisdictions' first responders may lengthen response time and may increase the potential for serious injury or loss of life			

Floodplains: Devers



Devers			
Planning Area (Sq. mi):	1.85	**Occurrences since 2000:**	3
Area Affected:	20 %	**Annual Event Average:**	.18
Probability: Likely; 18 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced 4 feet of floodwater; the jurisdiction can experience 6 to 8 feet of water.			
Identified Vulnerabilities: • Critical facilities including: 1 fire station, 1 electric substation, 1 EMS, and 2 schools • Residential areas throughout the northeast and west of the city **Identified Impacts:** • Loss of life or serious injury may occur in flooded subdivisions • Significant property loss or damage creates a financial and economic loss for residents and the jurisdiction			

Floodplains: Dayton



Dayton			
Planning Area (Sq. mi):	11	**Occurrences since 2000:**	6
Area Affected:	30 %	**Annual Event Average:**	.35

Probability: Likely; 35 percent chance the event will occur in a year

Extent: According to past events the jurisdiction has experienced 4 feet of floodwater; the jurisdiction can experience 6 to 8 feet of water.

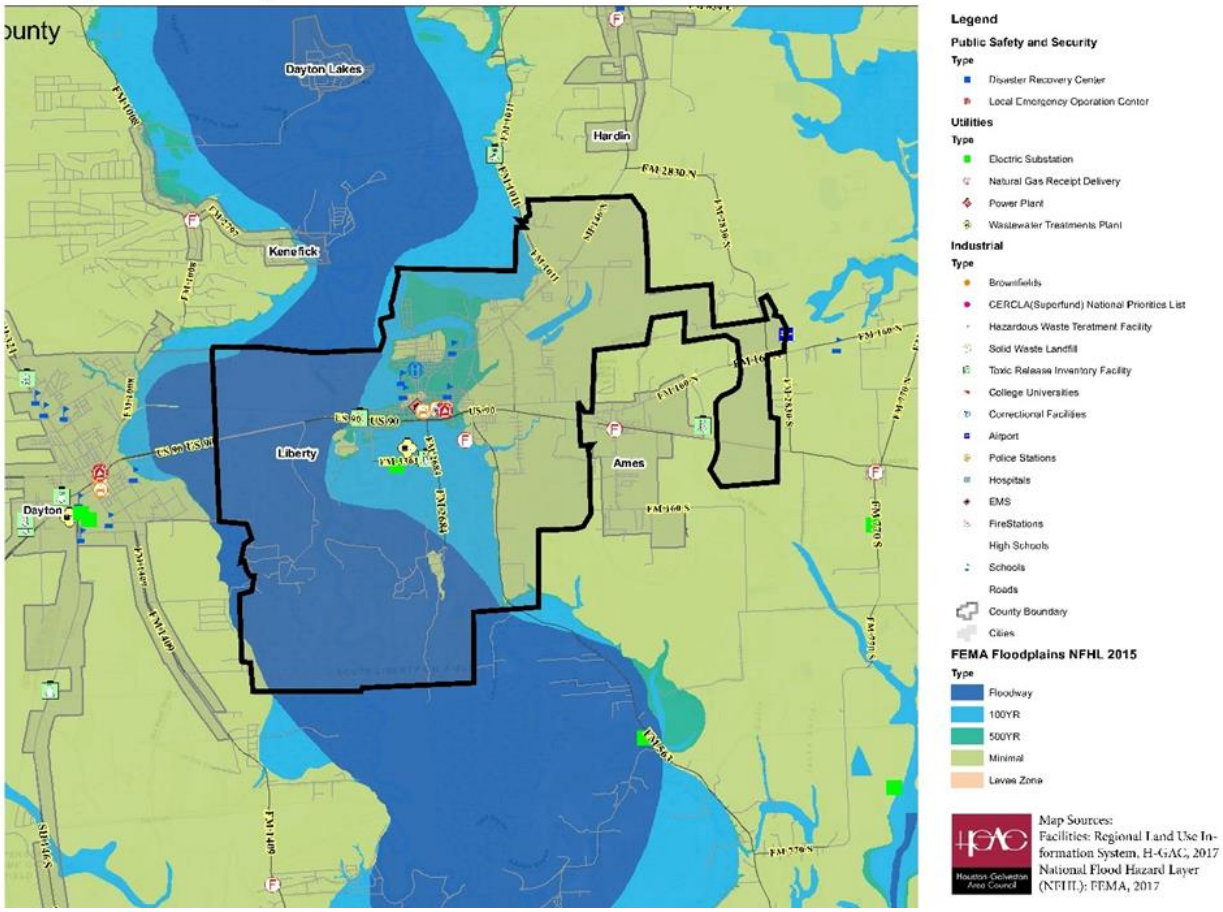
Identified Vulnerabilities:

- Critical facilities including: 2 correctional facilities, 2 fire stations, 3 electric substations, 2 EMS, 8 schools, 1 police station, 4 shelters, 6 toxic release sites, 1 waste water treatment facility
- Residential areas throughout the northeast and west of the city

Identified Impacts:

- Loss of life or serious injury may occur in flooded subdivisions
- Significant property loss or damage creates a financial and economic loss for residents and the jurisdiction

Floodplains: Liberty

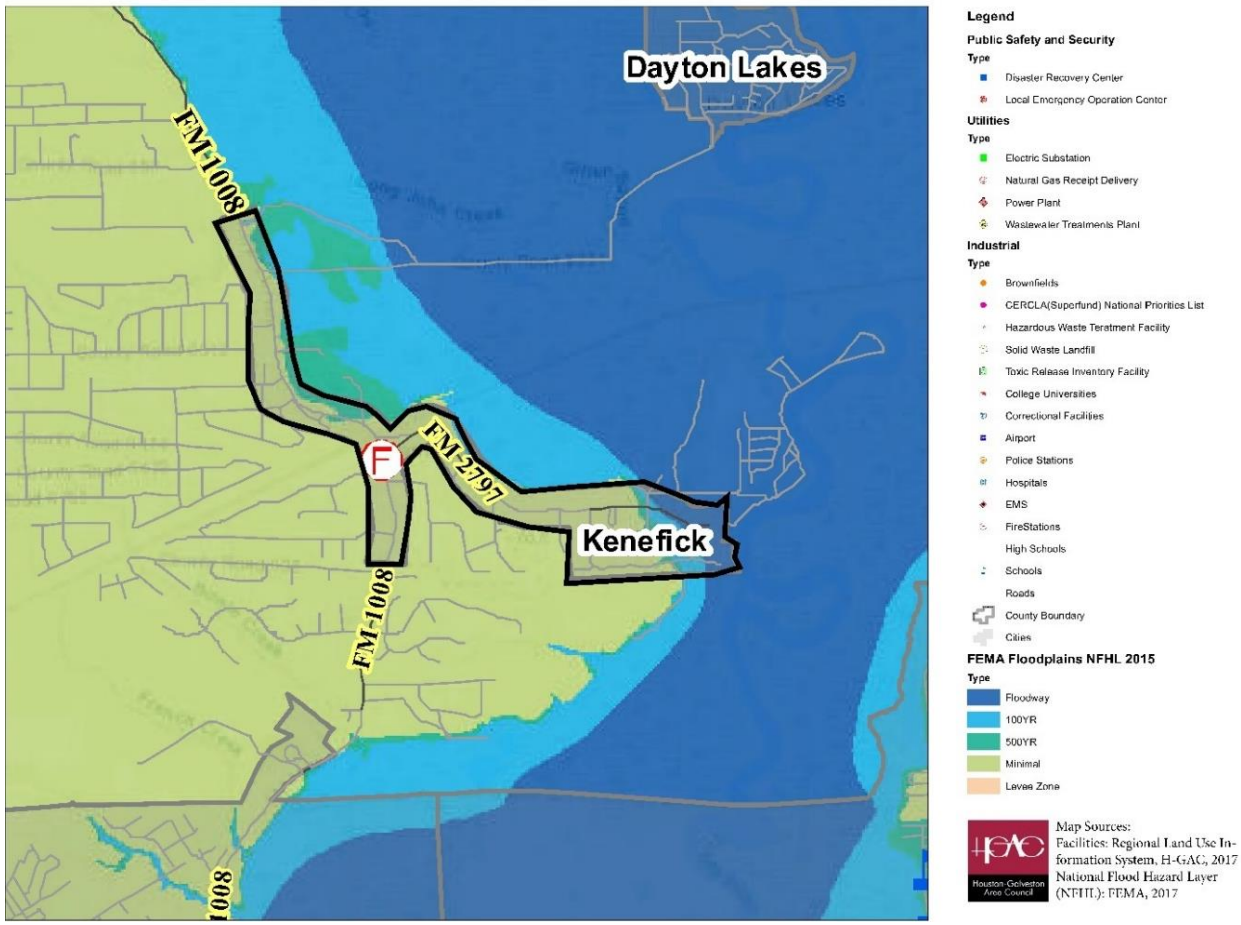


Liberty			
Planning Area (Sq. mi):	35.4	**Occurrences since 2000:**	6
Area Affected:	60 %	**Annual Event Average:**	.35
Probability: Likely; 35 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced 14 feet of floodwater; the jurisdiction can experience 16 to 18 feet of water.			
Identified Vulnerabilities: • Critical facilities including: 1 correctional facility, 2 EMS, 4 schools, 2 fire stations, 3 police stations, 7 shelters, 4 toxic release sites, 1 hospital, 1 EOC, 1 power plant, 1 waste water treatment plant-treatment plant flooded with 14 feet of water during past events and power plant flooded as well • 2 levee pump stations failed during past events • Main roadways including US 90 flooded **Identified Impacts:** • Loss of life, serious injury, and finical health may occur in flooded subdivisions and commercial areas • Water quality may suffer due to the waste water treatment plant flooding • First responder's response times may increase due to main roadways flooded. This may increase loss of life or serious injury			

Floodplains: Hardin

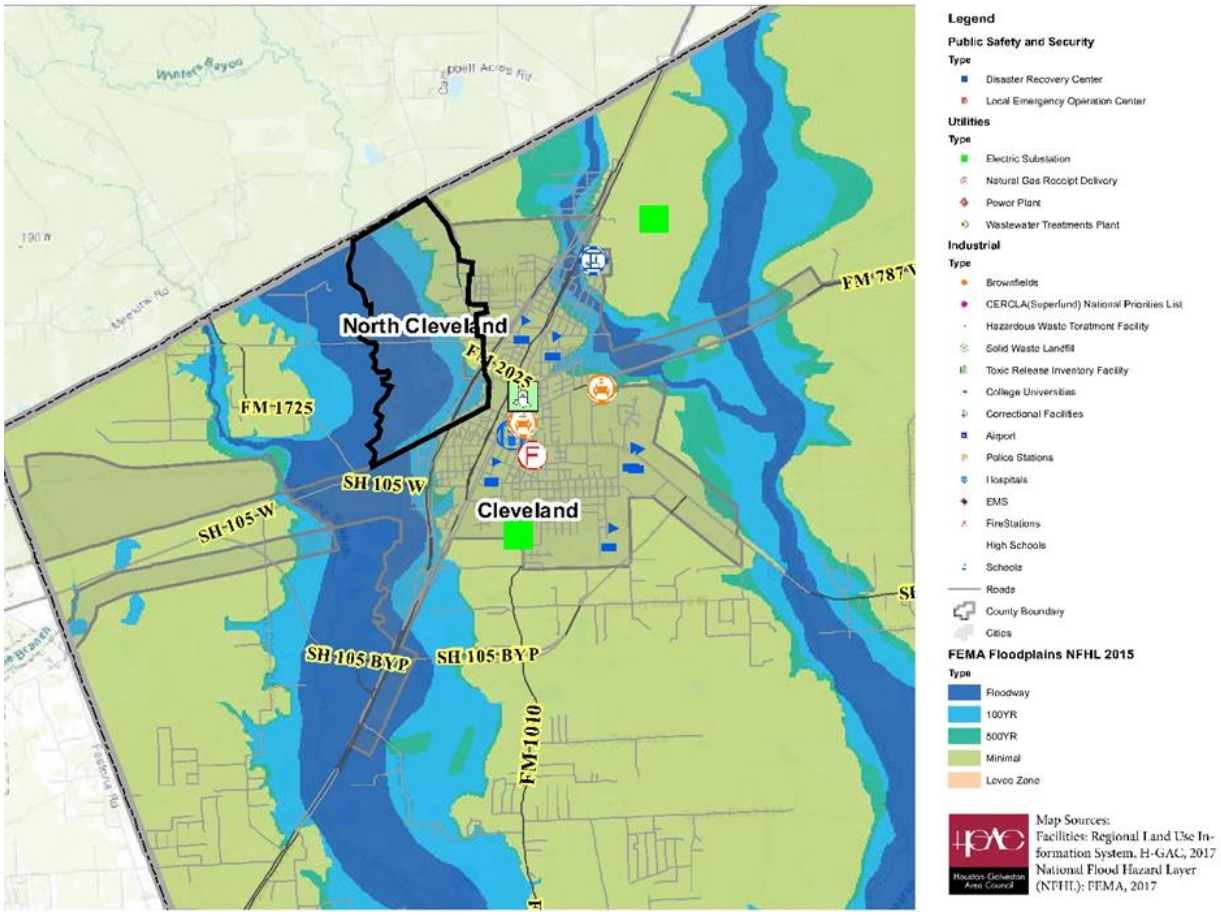
Hardin			
Planning Area (Sq. mi):	2.28	**Occurrences since 2000:**	5
Area Affected:	10 %	**Annual Event Average:**	.24
Probability: Likely; 24 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced 3 feet of floodwater; the jurisdiction can experience 5 to 7 feet of water.			
Identified Vulnerabilities: • Critical facilities including: 1 fire station and 3 schools **Identified Impacts:** • If a critical facility floods in the future this may delay first responders to getting to those in need which may increase loss of life or serious injury			

Floodplains: Kenefick



Kenefick			
Planning Area (Sq. mi):	1.5	**Occurrences since 2000:**	4
Area Affected:	10 %	**Annual Event Average:**	.24
Probability: Likely; 24 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced 4 feet of floodwater; the jurisdiction can experience 6 to 8 feet of water.			
Identified Vulnerabilities: • Residential and commercial areas in the east of the city • Critical facility including: 1 fire station **Identified Impacts:** • Loss of life, serious injury, and finical health may occur in flooded subdivisions and commercial areas • Dependence on surrounding jurisdictions' first responders may lengthen response time and may increase the potential for serious injury or loss of life			

Floodplains: North Cleveland



North Cleveland			
Planning Area (Sq. mi):	2	**Occurrences since 2000:**	4
Area Affected:	90 %	**Annual Event Average:**	.24

Probability: Likely; 24 percent chance the event will occur in a year

Extent: According to past events the jurisdiction has experienced 3 feet of floodwater; the jurisdiction can experience 4 to 6 feet of water.

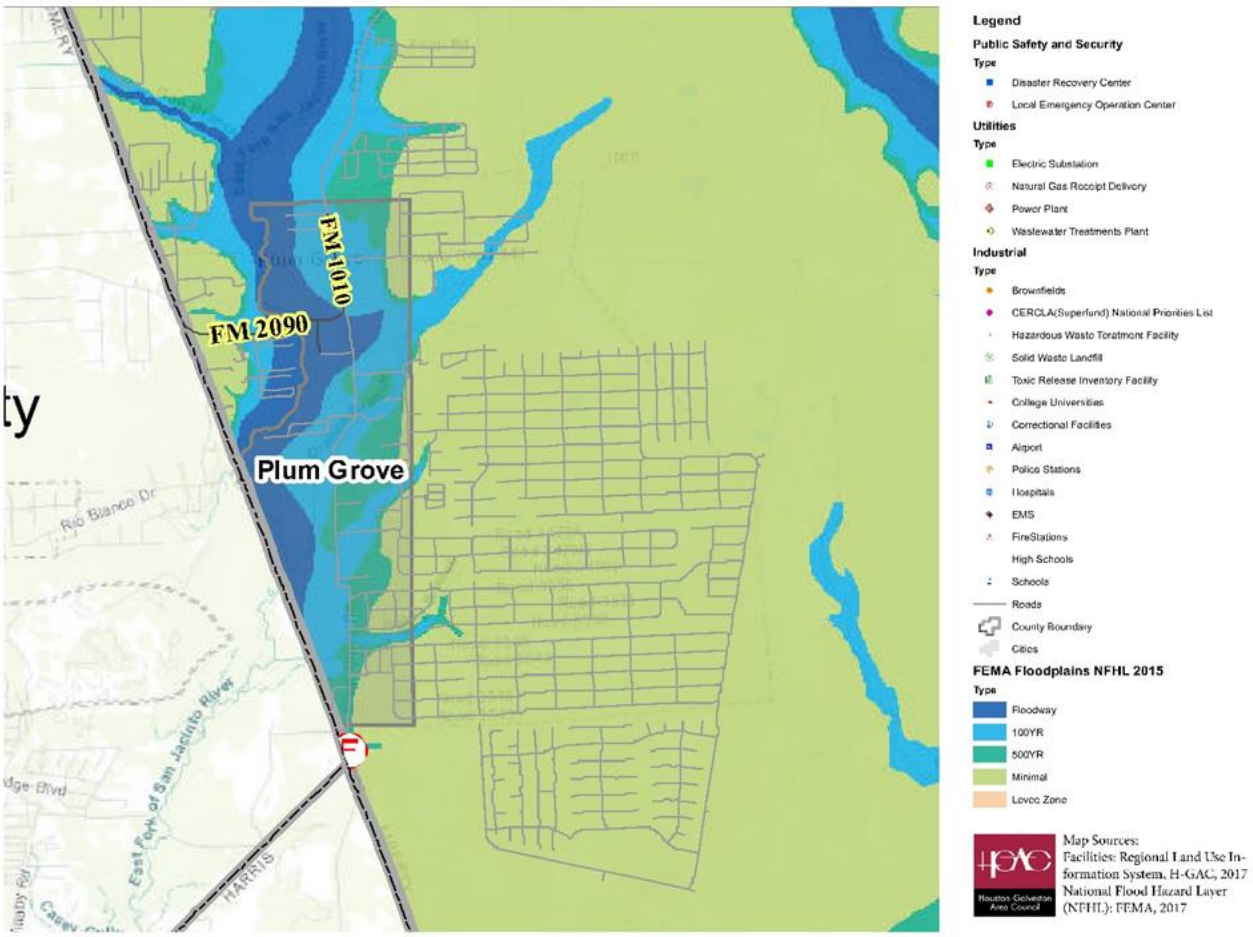
Identified Vulnerabilities:

- City's fire station flooded during past events
- Residential areas throughout the west of the jurisdiction are within the 100-year floodplain

Identified Impacts:

- Loss of life, serious injury, and finical health may occur in flooded subdivisions and commercial areas
- Dependence on surrounding jurisdictions' first responders may lengthen response time and may increase the potential for serious injury or loss of life

Floodplains: Plum Grove



Plum Grove			
Planning Area (Sq. mi):	7.3	**Occurrences since 2000:**	4
Area Affected:	90 %	**Annual Event Average:**	.24

Probability: Very Likely; 24 percent chance the event will occur in a year. Although there have only been 4 recorded events, the planning team identified this area as an area that continually floods

Extent: According to past events the jurisdiction has experienced 3 feet of floodwater; the jurisdiction can experience 4 to 6 feet of water.

Identified Vulnerabilities:

- The entire planning area continually floods even in normal rain events. During past significant events residents had to be rescued by helicopter
- Residential areas throughout the west of the jurisdiction are within the 100-year floodplain
- Critical facility including: 1 fire station

Identified Impacts:

- Loss of life, serious injury, and finical health may occur in flooded subdivisions
- Dependence on surrounding jurisdictions' first responders may lengthen response time and may increase the potential for serious injury or loss of life

2017

Part 6.2: Hurricanes & Tropical Storms

6.2 Hurricanes and Tropical Storms

The Saffir-Simpson Scale ranks hurricanes that are formed in the Atlantic Ocean and Northern Pacific Ocean east of the international date line. The scale considers winds and the amount of damages that could be sustained by the storm. Category 1 is the lowest category of storm, while Category 5 is the strongest. Tropical storms are tropical cyclones that have winds between 39 to 73 mph. While tropical cyclone winds do not reach the wind speeds for the Saffir-Simpson scale, according to the Beaufort Wind Scale, tropical storms are capable of producing winds that could break or uproot trees or create considerable structural damage.

Saffir- Simpson Scale		
Category	**Sustained Winds**	**Types of Damage Due to Hurricane Winds**
1	74-95 mph 64-82 kt. 119-153 km/h	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph 83-95 kt. 154-177 km/h	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 96-112 kt. 178-208 km/h	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 113-136 kt. 209-251 km/h	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months
5 (Major)	157 mph min. 137 kt. min. 252 km/h	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.

Beaufort Wind Scale		**1-min Wind speed**	**Effects on land**
0	**Calm**	0 - 1 mph	Calm. Smoke rises vertically.
1	**Light air**	1 - 3 mph	Smoke drift indicates wind direction and wind vanes cease moving.
2	**Light breeze**	3 - 7 mph	Wind felt on exposed skin. Leaves rustle and wind vanes begin to move.
3	**Gentle breeze**	7 - 12 mph	Leaves and small twigs constantly moving, light flags extended.
4	**Moderate breeze**	12 - 17 mph	Dust and loose paper raised. Small branches begin to move.
5	**Fresh breeze**	17 - 24 mph	Branches of a moderate size move. Small trees in leaf begin to sway.
6	**Strong breeze**	24 - 30 mph	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic bins tip over.
7	**Near gale**	30 - 38 mph	Whole trees in motion. Effort needed to walk against the wind.
8	**Gale**	38 - 46 mph	Some twigs broken from trees. Cars veer on road. Progress on foot is seriously impeded.
9	**Severe gale**	46 - 54 mph	Some branches break off trees, and some small trees blow over. Construction/temporary signs and barricades blow over.
10	**Storm**	54 - 63 mph	Trees are broken off or uprooted, saplings bent and deformed. Poorly attached asphalt shingles and shingles in poor condition peel off roofs.
11	**Violent storm**	63 - 73 mph	Widespread damage to vegetation. Many roofing surfaces are damaged; asphalt tiles that have curled up and/or fractured due to age may break away completely.
12	**Hurricane**	73 - 99 mph	Very widespread damage to vegetation. Some windows may break; mobile homes and poorly constructed sheds and barns are damaged. Debris may be hurled about.

Source: https://www.nhc.noaa.gov/

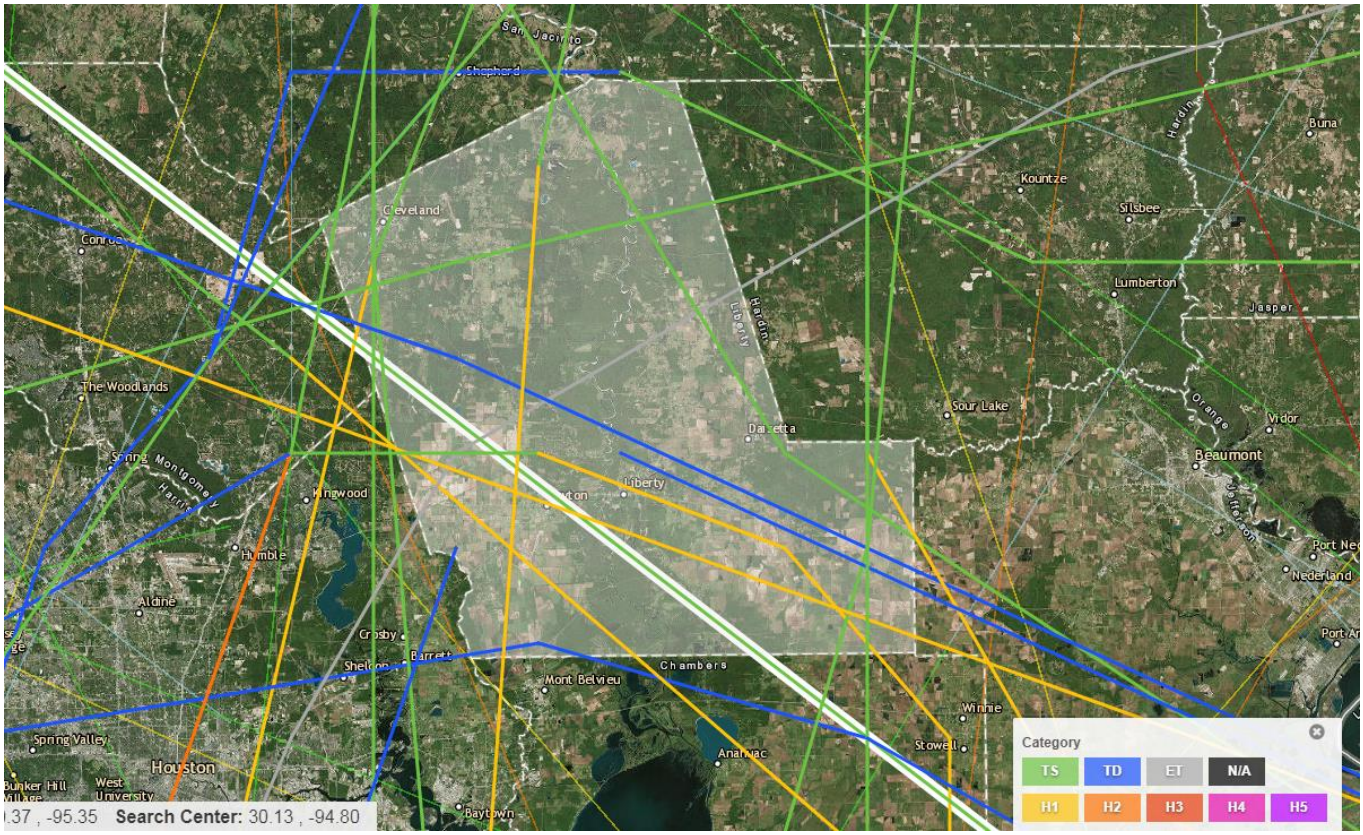
Historical Occurrence

Based on recorded data, 20 hurricanes and tropical storms had direct paths over Liberty County. Those hurricanes are denoted with an asterisk in the chart below. Several other hurricanes and tropical storms since 1940 are included in the list below. Hurricane Jerry is the most recent recorded and strongest Hurricane seen in the County; Hurricane Jerry was a Category 1 hurricane with top winds at 75 miles per hour wind.

Storm	Year	Property Damage	Storm (Continued)	Year (Continued)	Property Damage (Continued)
Unnamed*	1940	No Data Available	**Unnamed**	1980	No Data Available
Unnamed*	1941	No Data Available	**Unnamed***	1987	No Data Available
Unnamed	1942	No Data Available	**Allison***	1989	No Data Available
Unnamed*	1946	No Data Available	**Chantal***	1989	No Data Available
Bertha*	1957	No Data Available	**Jerry***	1989	No Data Available
Deborah*	1959	No Data Available	**Tropical Storm Charlie**	1998	$ 100,000
Cindy*	1963	No Data Available	**Tropical Storm Allison**	2001	$ 7,600,000
Unnamed*	1971	No Data Available	**Hurricane Rita**	2005	$7,000,000
Unnamed	1973	No Data Available	**Hurricane Ike**	2008	$220,000,000
Claudette	1979	No Data Available	**Tropical Storm Grace**	2009	$0

NCDC: https://www.ncdc.noaa.gov/stormevents/

NOAA: Historical Hurricane Tracks in Liberty County



Source: NOAA https://coast.noaa.gov/hurricanes/

Hazard Analysis & Vulnerability Identification

The hazard analysis uses historic hazard event data to determine the probability of an event occurring within a given year. The analysis calculates the average number of events in each jurisdiction annually and then calculates the percent chance of the event occurring within a year. The hazard analysis also provides hazard extent data for each participating jurisdiction. The extent data is the most extreme data recorded during a storm or hazard event and represents the worst damage a jurisdiction has experienced in recent history. Information from stakeholders, FEMA, NOAA, and the Department of Homeland Security (DHS) are the sources of data for the analysis.

To identify vulnerabilities for each jurisdiction, this plan used the following methods:

- FEMA's Hazus analysis software
- Stakeholder identified vulnerabilities
- American Community Survey (ACS, 5-year, 2016) Data on building stock and residents

Hazus was used to determine the economic loss and calculate the building stock at risk of hurricane damage in Liberty County. The complete Hazus report is in Appendix C. Stakeholders provided valuable insight into additional vulnerabilities within their communities. These findings are provided in condensed charts for each jurisdiction.

Liberty County (All participating jurisdictions)

Identified Vulnerabilities:

While participating jurisdictions identified flooding as one of the main effects of hurricanes, flooding is addressed in the first section. In this section vulnerabilities from hurricane winds are addressed. High winds can tear down powerlines, trees, barns, fences, and multitude of other debris can be blown into roadways and homes during the event.

Additionally, residences and commercial buildings could be damaged or destroyed due to events; older residential neighborhoods and structures without a permanent foundation were identified as one of the main vulnerabilities throughout the county. While current building codes address the vulnerability of wind damage to structures, older buildings (particularly residential buildings) were built when less stringent building codes were in place; therefore, older residential building and residences without a permanent foundation are a focus in this section.

- According to Hazus 697 commercial residential buildings are at risk
- According to Hazus 18,067 residential buildings are at risk
- According to Hazus 1,466 individuals will be displaced from their homes
- Based on the Hazus reports residential buildings in comparison to commercial buildings are most at risk of the effects of hurricanes throughout the county

Liberty County (All participating jurisdictions)

Identified Impacts:

- Downed powerlines could impact communication and daily active leading to a finical loss for the county, cities and individuals, and could impede first responders from reaching those in need or residents evacuating
- Strong winds could prevent first responders from traveling to assist individuals, because of unsafe driving conditions such as debris hitting emergency vehicles
- Critical facilities could sustain wind damage, potentially delaying first responders reaching those in need and city services after the event
- Economic and financial loss for cities and individuals including property loss:
    - According to Hazus there could be a potential of $ 4,742,664 in residential loss or 84 percent of total loss
    - According to Hazus there could be a potential of $565,805 in commercial property loss or 10 percent of total loss

Liberty County (Unincorporated)			
Planning Area (Sq. mi):	500	**Occurrences since 1989:**	17
Area Affected:	100 %	**Annual Event Average:**	.61
Probability: Very Likely; 61 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced a category 1 hurricane. The jurisdiction could expect a category 2 to category 3 hurricane.			

Identified Vulnerabilities:

- Critical facilities including: 1 fire station, 1 EMS, 1 shelter, 1 school, 1 police station, 1 toxic release site

Identified Impacts:

- Reliance on a single shelter, fire station and police station throughout the area may increase response time for first responders leading to a potential increase in serious injury or loss of life

Ames			
Planning Area (Sq. mi):	3.17	**Occurrences since 1989:**	8
Area Affected:	100 %	**Annual Event Average:**	.29
Probability: Likely; 29 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced a category 1 hurricane. The jurisdiction could expect a category 2 to category 3 hurricane.			
Identified Vulnerabilities: • 233 Residential buildings built before 1980 (56.2% of housing stock) • 89 Mobile Homes (21.5% of housing stock) • 4 Boats/ RVs/ Vans acting as main housing (1 % of housing stock) **Identified Impacts:** • Almost 79 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Cleveland			
Planning Area (Sq. mi):	4.8	**Occurrences since 1989:**	8
Area Affected:	100%	**Annual Event Average:**	.29
Probability: Likely; 29 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced a tropical storm. The jurisdiction could expect a category 1 to category 2 hurricane.			
Identified Vulnerabilities: • 2158 Residential buildings built before 1980 (70.9 % of housing stock) • 377 Mobile Homes (12.4% of housing stock) **Identified Impacts:** • Almost 84 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Daisetta			
Planning Area (Sq. mi):	1.47	**Occurrences since 1989:**	8
Area Affected:	100%	**Annual Event Average:**	.29
Probability: Likely; 29 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced a tropical storm. The jurisdiction could expect a category 1 to category 2 hurricane.			
Identified Vulnerabilities: • 266 Residential buildings built before 1980 (66.7 % of housing stock) • 98 Mobile Homes (25% of housing stock) **Identified Impacts:** • Almost 92 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Dayton Lakes			
Planning Area (Sq. mi):	1	**Occurrences since 1989:**	8
Area Affected:	100 %	**Annual Event Average:**	.29
Probability: Likely; 29 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced a category 1 hurricane. The jurisdiction could expect a category 2 to category 3 hurricane.			
Identified Vulnerabilities: • 43 Residential buildings built before 1980 (87.7 % of housing stock) • 2 Mobile Homes (4.1% of housing stock) **Identified Impacts:** • Almost 92 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Devers			
Planning Area (Sq. mi):	1.85	**Occurrences since 1989:**	8
Area Affected:	100 %	**Annual Event Average:**	.29
Probability: Likely; 29 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced a category 1 hurricane. The jurisdiction could expect a category 2 to category 3 hurricane.			
Identified Vulnerabilities: • 102 Residential buildings built before 1980 (65.5 % of housing stock) • 31 Mobile Homes (19.9% of housing stock) **Identified Impacts:** • Almost 86 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Dayton			
Planning Area (Sq. mi):	11	**Occurrences since 1989:**	8
Area Affected:	100 %	**Annual Event Average:**	.29
Probability: Likely; 29 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced a category 1 hurricane. The jurisdiction could expect a category 2 to category 3 hurricane.			
Identified Vulnerabilities: • 1,563 Residential buildings built before 1980 (55.6 % of housing stock) • 313 Mobile Homes (11.2% of housing stock) • 48 Boats/ RVs/ Vans acting as main housing (1.7 % of housing stock) **Identified Impacts:** • Almost 69 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Hardin			
Planning Area (Sq. mi):	2.28	**Occurrences since 1989:**	8
Area Affected:	100 %	**Annual Event Average:**	.29
Probability: Unlikely; 29 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced a tropical storm. The jurisdiction could expect a category 1 to category 2 hurricane.			
Identified Vulnerabilities: • 255 Residential buildings built before 1980 (63.2 % of housing stock) • 142 Mobile Homes (35.2 % of housing stock) • 3 Boats/ RVs/ Vans acting as main housing (.7 % of housing stock) **Identified Impacts:** • Almost 98 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Liberty			
Planning Area (Sq. mi):	35.4	**Occurrences since 1989:**	8
Area Affected:	100 %	**Annual Event Average:**	.29
Probability: Likely; 29 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced a category 1 hurricane. The jurisdiction could expect a category 2 to category 3 hurricane.			
Identified Vulnerabilities: • 2,948 Residential buildings built before 1980 (76.8 % of housing stock) • 413 Mobile Homes (10.8 % of housing stock) • 25 Boats/ RVs/ Vans acting as main housing (.7 % of housing stock) **Identified Impacts:** • Almost 90 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Kenefick			
Planning Area (Sq. mi):	1.5	**Occurrences since 1989:**	8
Area Affected:	100 %	**Annual Event Average:**	.29
Probability: Likely; 29 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced a category 1 hurricane. The jurisdiction could expect a category 2 to category 3 hurricane.			
Identified Vulnerabilities: • 98 Residential buildings built before 1980 (56.3 % of housing stock) • 90 Mobile Homes (51.7 % of housing stock) • 8 Boats/ RVs/ Vans acting as main housing (4.6 % of housing stock) **Identified Impacts:** • Approximately 100 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

North Cleveland			
Planning Area (Sq. mi):	2	**Occurrences since 1989:**	8
Area Affected:	100 %	**Annual Event Average:**	.29
Probability: Likely; 29 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced a tropical storm. The jurisdiction could expect a category 1 to category 2 hurricane.			
Identified Vulnerabilities: • 67 Residential buildings built before 1980 (69.1 % of housing stock) • 42 Mobile Homes (43.3 % of housing stock) • 10 Boats/ RVs/ Vans acting as main housing (10.3 % of housing stock) **Identified Impacts:** • Approximately 100 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Plum Grove			
Planning Area (Sq. mi):	7.3	**Occurrences since 1989:**	8
Area Affected:	100 %	**Annual Event Average:**	.29
Probability: Likely; 29 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced a category 1 hurricane. The jurisdiction could expect a category 2 to category 3 hurricane.			
Identified Vulnerabilities: • 101 Residential buildings built before 1980 (45.9 % of housing stock) • 57 Mobile Homes (25.9 % of housing stock) **Identified Impacts:** • Approximately 72 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

2017

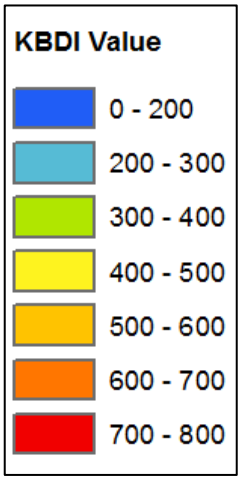
Part 6.3: Wildfire

6.3 Wildfire

A combination of the Keetch-Byram Drought Index (KBDI) and the Texas Wildfire Risk Assessment are used to assess the risk of wildfire. KBDI is an index that measures the daily water balance, precipitation, and moisture in the soil to determine the potential for wildfires. KBDI ranges from 0 to 800 units. Zero represents fully saturated soil or no indication of drought. A measurement of 800 is the maximum measurement for drought and indicates no moisture is present in the soil. In August 2011, the maximum KBDI value recorded in Liberty County was 792. The minimum KBDI value, 41, was recorded in September of 2017. KBDI conditions can change rapidly based on short-term weather conditions, so the most extreme values should be considered when addressing wildfire risk.

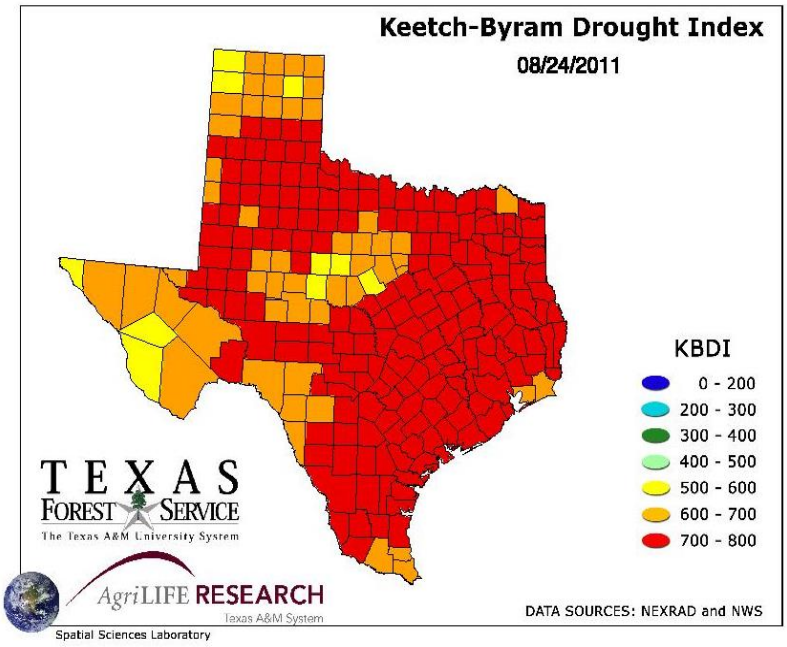
The Texas Wildfire Risk Assessment uses a variety of factors, such as fuels, vegetation, weather, and topography, to determine the fire potential of a specific land area. Particularly vulnerable are the Wildland Urban Interface (WUI) areas. These areas occur at the intersection of development and wildland. With continued population growth throughout the county, the WUI zones will become more abundant. Because most wildfires are caused by human activities, the intersection of WUI and drought are particularly dangerous.

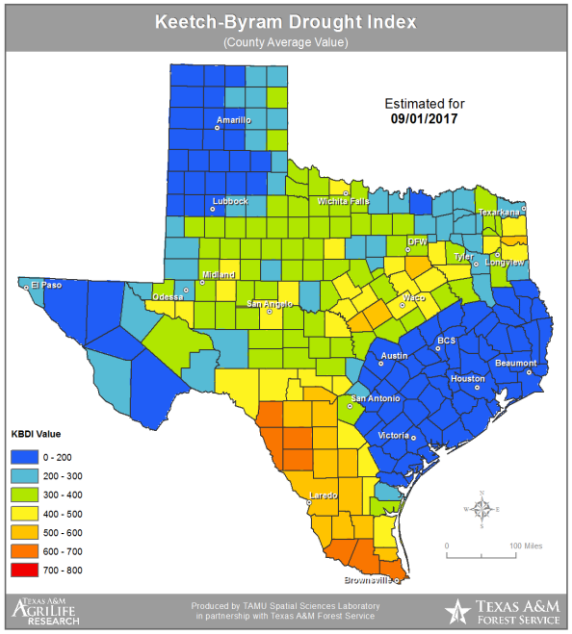
Wildland Fire Assessment System (WFAS) KBDI Value Scale:



Score	Description
0 - 200	Soil moisture and large class fuel moistures are high and do not contribute much to fire intensity. Typical of 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.

Source: https://twc.tamu.edu/kbdi





Historic Occurrences

The Texas A&M Forest Service tracks wildfire events, acres destroyed, and the initial ignition cause of the fire. Below is the historic data associated with any burns that caused recorded damage. Source: https://twc.tamu.edu/kbdi

Date	Acres Burned	Cause	Jurisdiction	Date (Cont.)	Acres Burned Cont.	Cause	Jurisdiction
2/17/2005	5	Miscellaneous	Unincorporated	**7/17/2009**	10	Lightning	Unincorporated
4/13/2005	4	Debris burning	Unincorporated	**7/22/2009**	2	Debris burning	Unincorporated
5/5/2005	8	Debris burning	Unincorporated	**7/27/2009**	14	Lightning	Unincorporated
7/2/2005	1	Debris burning	Unincorporated	**8/1/2009**	1	Railroads	Dayton
7/2/2005	1	Debris burning	Unincorporated	**8/4/2009**	5	Debris burning	Unincorporated
9/11/2005	1	Debris burning	Unincorporated	**8/7/2009**	10	Debris burning	Unincorporated
9/19/2005	0	Miscellaneous	Cleveland	**8/8/2009**	10	Debris burning	Unincorporated
9/20/2005	10	Debris burning	Unincorporated	**1/12/2010**	5	Debris burning	Unincorporated
9/21/2005	1	Debris burning	Unincorporated	**1/24/2010**	2	Debris burning	Unincorporated
9/29/2005	7	Incendiary	Unincorporated	**1/24/2010**	3	Debris burning	Unincorporated
9/29/2005	12	Incendiary	Unincorporated	**2/28/2010**	2	Debris burning	Unincorporated
9/29/2005	1	Incendiary	Unincorporated	**3/19/2010**	13	Debris burning	Unincorporated
9/29/2005	3	Incendiary	Unincorporated	**3/19/2010**	4	Debris burning	Unincorporated
10/1/2005	2	Smoking	Unincorporated	**4/14/2010**	1	Debris burning	Cleveland
10/7/2005	15	Debris burning	Unincorporated	**4/26/2010**	80	Incendiary	Unincorporated
10/9/2005	15	Debris burning	Unincorporated	**4/26/2010**	6	Debris burning	Unincorporated
10/16/2005	3	Debris burning	Unincorporated	**5/5/2010**	20	Incendiary	Unincorporated
10/19/2005	1	Debris burning	Unincorporated	**5/6/2010**	8	Incendiary	Unincorporated
10/20/2005	2	Debris burning	Unincorporated	**5/10/2010**	1	Power Lines	Unincorporated
10/21/2005	71	Campfire	Unincorporated	**10/4/2010**	7	Debris burning	Unincorporated
10/23/2005	2	Debris burning	Unincorporated	**10/4/2010**	21	Incendiary	Unincorporated
10/23/2005	290	Debris burning	Unincorporated	**10/28/2010**	5	Incendiary	Unincorporated
10/23/2005	9	Debris burning	Unincorporated	**10/30/2010**	1	Incendiary	Unincorporated
10/23/2005	7	Debris burning	Unincorporated	**11/6/2010**	1	Lightning	Unincorporated
10/23/2005	2	Debris burning	Unincorporated	**11/7/2010**	1	Debris burning	Unincorporated
10/23/2005	0	Debris burning	Unincorporated	**11/9/2010**	10	Incendiary	Unincorporated
10/24/2005	0	Debris burning	Unincorporated	**12/12/2010**	8	Incendiary	Unincorporated
10/24/2005	0	Debris burning	Kenefick	**12/13/2010**	26	Incendiary	Unincorporated
10/25/2005	1	Debris burning	Unincorporated	**12/21/2010**	40	Incendiary	Unincorporated
10/28/2005	5	Incendiary	Unincorporated	**12/24/2010**	140	Incendiary	Unincorporated
10/30/2005	1	Debris burning	Unincorporated	**1/3/2011**	20	Debris burning	Unincorporated
10/31/2005	1	Debris burning	Unincorporated	**1/6/2011**	1	Debris burning	Unincorporated
11/4/2005	0.2	Debris burning	Kenefick	**1/6/2011**	1	Debris burning	Unincorporated
11/5/2005	0.1	Debris burning	Unincorporated	**1/14/2011**	1	Power Lines	Unincorporated
11/12/2005	0.1	Debris burning	Unincorporated	**1/27/2011**	30	Debris burning	Unincorporated
11/18/2005	0.05	Debris burning	Unincorporated	**1/28/2011**	3	Debris burning	Unincorporated
11/19/2005	0.05	Debris burning	Unincorporated	**1/28/2011**	3	Incendiary	Unincorporated

11/19/2005	0.05	Debris burning	Unincorporated	**1/29/2011**	1	Power Lines	Unincorporated
11/19/2005	0	Debris burning	Unincorporated	**1/29/2011**	1	Debris burning	Unincorporated
11/29/2005	70	Miscellaneous	Unincorporated	**2/1/2011**	1	Power Lines	Unincorporated
12/1/2005	0.5	Debris burning	Kenefick	**2/1/2011**	1	Power Lines	Unincorporated
12/2/2005	0	Debris burning	Kenefick	**2/11/2011**	20	Miscellaneous	Unincorporated
12/11/2005	1	Debris burning	Kenefick	**2/12/2011**	20	Debris burning	Unincorporated
12/21/2005	0.25	Smoking	Unincorporated	**2/13/2011**	1	Debris burning	Unincorporated
12/22/2005	0.5	Debris burning	Unincorporated	**2/13/2011**	20	Debris burning	Unincorporated
12/22/2005	0	Debris burning	Unincorporated	**2/15/2011**	1	Miscellaneous	Unincorporated
12/23/2005	0.25	Smoking	Unincorporated	**2/18/2011**	30	Railroads	Unincorporated
12/23/2005	1.25	Debris burning	Unincorporated	**2/18/2011**	0.5	Debris burning	Unincorporated
12/24/2005	2	Debris burning	Unincorporated	**2/18/2011**	1	Debris burning	Unincorporated
12/24/2005	0.5	Debris burning	Unincorporated	**2/21/2011**	2	Debris burning	Ames
12/25/2005	8	Debris burning	Unincorporated	**2/23/2011**	50	Debris burning	Unincorporated
12/25/2005	2	Debris burning	Unincorporated	**2/23/2011**	0	Debris burning	Cleveland
12/25/2005	1.5	Debris burning	Unincorporated	**2/28/2011**	3	Miscellaneous	Unincorporated
12/25/2005	0.1	Miscellaneous	Unincorporated	**2/28/2011**	80	Miscellaneous	Unincorporated
12/26/2005	0.25	Debris burning	Unincorporated	**2/28/2011**	1	Debris burning	Unincorporated
12/27/2005	125	Incendiary	Unincorporated	**3/13/2011**	1	Debris burning	Unincorporated
12/29/2005	0.1	Debris burning	Unincorporated	**3/16/2011**	10	Incendiary	Unincorporated
12/31/2005	0.1	Debris burning	Unincorporated	**3/19/2011**	3	Debris burning	Unincorporated
12/31/2005	0.25	Debris burning	Kenefick	**3/20/2011**	1	Debris burning	Unincorporated
12/31/2005	0	Debris burning	Kenefick	**3/22/2011**	3	Power Lines	Kenefick
1/1/2006	5	Debris burning	Unincorporated	**3/28/2011**	3	Debris burning	Unincorporated
1/1/2006	0.5	Debris burning	Liberty	**4/4/2011**	8	Debris burning	Unincorporated
1/1/2006	0	Debris burning	Unincorporated	**4/7/2011**	2	Debris burning	Unincorporated
1/2/2006	0.1	Debris burning	Unincorporated	**4/10/2011**	1	Debris burning	Unincorporated
1/2/2006	25	Debris burning	Unincorporated	**4/16/2011**	30	Incendiary	Unincorporated
1/2/2006	0.1	Debris burning	Unincorporated	**4/16/2011**	5	Miscellaneous	Unincorporated
1/2/2006	1	Debris burning	Unincorporated	**4/16/2011**	10	Debris burning	Unincorporated
1/2/2006	0	Debris burning	Kenefick	**4/16/2011**	3	Debris burning	Unincorporated
1/3/2006	20	Equipment use	Unincorporated	**4/16/2011**	3	Debris burning	Unincorporated
1/3/2006	3	Debris burning	Unincorporated	**4/17/2011**	4	Debris burning	Unincorporated
1/3/2006	2	Miscellaneous	Unincorporated	**4/17/2011**	5	Miscellaneous	Unincorporated
1/3/2006	0.1	Debris burning	Unincorporated	**4/17/2011**	2	Debris burning	Unincorporated
1/3/2006	0.1	Debris burning	Kenefick	**4/25/2011**	5	Debris burning	Unincorporated
1/4/2006	1	Miscellaneous	Unincorporated	**4/30/2011**	1	Power Lines	Unincorporated
1/5/2006	0.25	Debris burning	Unincorporated	**5/5/2011**	13	Equipment use	Unincorporated
1/5/2006	1	Miscellaneous	Liberty	**5/6/2011**	10	Equipment use	Unincorporated
1/5/2006	0.5	Debris burning	Liberty	**6/1/2011**	30	Debris burning	Dayton
1/5/2006	0.5	Debris burning	Liberty	**6/2/2011**	25	Debris burning	Unincorporated
1/5/2006	0	Debris burning	Unincorporated	**6/3/2011**	50	Debris burning	Unincorporated
1/6/2006	0	Smoking	Unincorporated	**6/4/2011**	3	Debris burning	Unincorporated

1/6/2006	0.1	Debris burning	Liberty	**6/6/2011**	612	Lightning	Unincorporated
1/6/2006	0	Debris burning	Unincorporated	**6/7/2011**	80	Lightning	Unincorporated
1/7/2006	90	Miscellaneous	Unincorporated	**6/7/2011**	10	Debris burning	Unincorporated
1/7/2006	0.25	Debris burning	Unincorporated	**6/8/2011**	72	Incendiary	Unincorporated
1/7/2006	0	Miscellaneous	Dayton Lakes	**6/8/2011**	10	Lightning	Unincorporated
1/7/2006	0.25	Debris burning	Unincorporated	**6/8/2011**	10	Debris burning	Unincorporated
1/9/2006	0.25	Debris burning	Unincorporated	**6/9/2011**	78	Lightning	Unincorporated
1/9/2006	0.1	Debris burning	Liberty	**6/9/2011**	2	Debris burning	Unincorporated
1/13/2006	10	Miscellaneous	Liberty	**6/10/2011**	5	Debris burning	Unincorporated
1/17/2006	0.1	Railroads	Liberty	**6/10/2011**	1	Debris burning	Unincorporated
1/18/2006	0	Debris burning	Unincorporated	**6/14/2011**	2	Debris burning	Unincorporated
1/27/2006	0	Debris burning	Unincorporated	**6/16/2011**	1	Debris burning	Unincorporated
2/4/2006	10	Debris burning	Liberty	**6/18/2011**	1	Lightning	Unincorporated
2/4/2006	3	Debris burning	Liberty	**6/18/2011**	5	Debris burning	Unincorporated
2/5/2006	15	Debris burning	Unincorporated	**6/18/2011**	1	Debris burning	Unincorporated
2/6/2006	0.1	Debris burning	Unincorporated	**6/19/2011**	5	Debris burning	Unincorporated
2/7/2006	0.1	Miscellaneous	Unincorporated	**6/21/2011**	2	Power Lines	Cleveland
2/7/2006	0.1	Debris burning	Unincorporated	**6/21/2011**	5	Debris burning	Unincorporated
1/0/1900	7	Children	Unincorporated	**6/27/2011**	10	Debris burning	Unincorporated
2/8/2006	0.1	Debris burning	Unincorporated	**7/1/2011**	1	Debris burning	Dayton
2/8/2006	0.5	Miscellaneous	Unincorporated	**7/3/2011**	27	Lightning	Unincorporated
2/9/2006	0.1	Debris burning	Unincorporated	**7/4/2011**	8	Lightning	Unincorporated
2/9/2006	0.1	Debris burning	Unincorporated	**7/5/2011**	1	Equipment use	Unincorporated
2/9/2006	0.25	Power Lines	Unincorporated	**7/6/2011**	1	Debris burning	Unincorporated
2/12/2006	3	Debris burning	Liberty	**7/7/2011**	25	Lightning	Unincorporated
2/12/2006	0	Debris burning	Liberty	**7/8/2011**	1	Debris burning	Unincorporated
2/15/2006	0.37	Debris burning	Unincorporated	**7/12/2011**	5	Debris burning	Unincorporated
2/17/2006	0	Debris burning	Liberty	**7/14/2011**	14	Equipment use	Unincorporated
2/22/2006	0	Debris burning	Liberty	**7/15/2011**	96	Lightning	Unincorporated
2/27/2006	0	Debris burning	Liberty	**7/16/2011**	1	Debris burning	Unincorporated
2/28/2006	0.75	Debris burning	Liberty	**7/18/2011**	1	Debris burning	Unincorporated
3/1/2006	0.5	Debris burning	Unincorporated	**7/19/2011**	1	Debris burning	Unincorporated
3/3/2006	20	Miscellaneous	Unincorporated	**7/25/2011**	1	Debris burning	Unincorporated
3/4/2006	0.1	Debris burning	Unincorporated	**7/26/2011**	1	Debris burning	Unincorporated
3/4/2006	1	Debris burning	Unincorporated	**7/27/2011**	5	Lightning	Unincorporated
3/6/2006	0	Debris burning	Liberty	**7/27/2011**	5	Debris burning	Unincorporated
3/8/2006	1	Debris burning	Unincorporated	**7/29/2011**	1	Debris burning	Unincorporated
3/10/2006	0	Debris burning	Liberty	**7/31/2011**	35	Debris burning	Unincorporated
3/11/2006	0.25	Miscellaneous	Unincorporated	**8/1/2011**	5	Debris burning	Unincorporated
3/13/2006	0.25	Debris burning	Unincorporated	**8/22/2011**	7	Smoking	Unincorporated
3/13/2006	0.25	Debris burning	Unincorporated	**8/25/2011**	11	Lightning	Unincorporated
3/13/2006	5	Equipment use	Unincorporated	**9/2/2011**	4	Miscellaneous	Unincorporated
3/14/2006	2	Debris burning	Unincorporated	**9/14/2011**	3	Miscellaneous	Plum Grove

3/14/2006	20	Debris burning	Unincorporated	**9/30/2011**	1	Lightning	Unincorporated
3/14/2006	0	Miscellaneous	Unincorporated	**9/30/2011**	65	Lightning	Unincorporated
3/15/2006	0.25	Miscellaneous	Unincorporated	**10/1/2011**	1	Equipment use	Unincorporated
3/18/2006	5	Debris burning	Unincorporated	**11/18/2011**	0	Smoking	Unincorporated
3/21/2006	1	Miscellaneous	Unincorporated	**1/2/2012**	1	Debris burning	Unincorporated
3/25/2006	1	Debris burning	Unincorporated	**5/27/2012**	4	Debris burning	Unincorporated
3/27/2006	1	Debris burning	Unincorporated	**6/1/2012**	3	Miscellaneous	Cleveland
3/28/2006	0	Debris burning	Liberty	**6/2/2012**	1	Lightning	Unincorporated
4/12/2006	30	Incendiary	Unincorporated	**6/8/2012**	0.25	Miscellaneous	Cleveland
4/14/2006	5	Miscellaneous	Unincorporated	**6/13/2012**	6	Incendiary	Unincorporated
4/14/2006	1	Debris burning	Liberty	**8/27/2012**	2	Debris burning	Cleveland
4/15/2006	7	Miscellaneous	Unincorporated	**9/6/2012**	8	Debris burning	Unincorporated
5/27/2006	4	Debris burning	Unincorporated	**9/9/2012**	15	Lightning	Unincorporated
6/15/2006	14	Lightning	Unincorporated	**9/10/2012**	2	Debris burning	Unincorporated
9/29/2006	0.25	Debris burning	Unincorporated	**9/10/2012**	3	Incendiary	Unincorporated
10/7/2006	1	Debris burning	Unincorporated	**9/12/2012**	19	Power Lines	Unincorporated
3/3/2007	2	Debris burning	Unincorporated	**9/15/2012**	5	Miscellaneous	Cleveland
3/8/2007	70	Debris burning	Unincorporated	**9/23/2012**	3	Miscellaneous	Cleveland
9/19/2007	1	Debris burning	Unincorporated	**10/11/2012**	1	Children	Unincorporated
10/16/2007	0	Lightning	Unincorporated	**11/2/2012**	5	Miscellaneous	Unincorporated
10/29/2007	5	Miscellaneous	Unincorporated	**11/3/2012**	4	Debris burning	Unincorporated
11/5/2007	1	Miscellaneous	Unincorporated	**11/3/2012**	5	Debris burning	Plum Grove
1/7/2008	2	Miscellaneous	Cleveland	**11/8/2012**	6	Debris burning	Plum Grove
1/9/2008	1	Miscellaneous	Unincorporated	**11/14/2012**	80	Incendiary	Unincorporated
1/10/2008	10	Miscellaneous	Unincorporated	**11/16/2012**	1	Equipment use	Unincorporated
1/13/2008	10	Debris burning	Unincorporated	**11/19/2012**	1	Miscellaneous	Unincorporated
2/1/2008	1	Miscellaneous	Unincorporated	**11/22/2012**	0.25	Debris burning	Unincorporated
2/24/2008	30	Incendiary	Unincorporated	**11/24/2012**	4	Debris burning	Unincorporated
2/24/2008	1	Miscellaneous	Unincorporated	**11/25/2012**	8	Debris burning	Unincorporated
2/28/2008	1	Miscellaneous	Unincorporated	**11/25/2012**	1	Debris burning	Unincorporated
3/20/2008	6	Debris burning	Unincorporated	**12/9/2012**	0.01	Debris burning	Plum Grove
3/25/2008	15	Debris burning	Unincorporated	**1/11/2013**	3	Miscellaneous	Cleveland
3/27/2008	40	Debris burning	Unincorporated	**1/13/2013**	1	Miscellaneous	Cleveland
3/31/2008	1	Miscellaneous	Unincorporated	**1/24/2013**	0.25	Miscellaneous	Cleveland
4/6/2008	1	Miscellaneous	Unincorporated	**1/28/2013**	2	Miscellaneous	Cleveland
4/16/2008	1	Miscellaneous	Unincorporated	**3/1/2013**	3	Debris burning	Ames
6/8/2008	5	Debris burning	Unincorporated	**3/7/2013**	3	Debris burning	Unincorporated
6/25/2008	1	Debris burning	Unincorporated	**3/8/2013**	3	Debris burning	Devers
7/13/2008	20	Incendiary	Unincorporated	**3/11/2013**	27	Railroads	Unincorporated
7/13/2008	10	Incendiary	Unincorporated	**3/14/2013**	21	Debris burning	Unincorporated
7/13/2008	5	Incendiary	Unincorporated	**3/14/2013**	0.1	Debris burning	Unincorporated
7/13/2008	5	Incendiary	Unincorporated	**3/15/2013**	5	Miscellaneous	Unincorporated
7/13/2008	3	Incendiary	Unincorporated	**3/18/2013**	3	Miscellaneous	Unincorporated

7/18/2008	1	Lightning	Unincorporated	**3/25/2013**	17	Miscellaneous	Unincorporated
7/22/2008	20	Debris burning	Unincorporated	**4/29/2013**	7	Miscellaneous	Unincorporated
7/26/2008	1	Debris burning	Unincorporated	**5/5/2013**	28	Miscellaneous	Cleveland
7/30/2008	6	Debris burning	Unincorporated	**7/3/2013**	5	Debris burning	Unincorporated
8/2/2008	9	Debris burning	Unincorporated	**7/10/2013**	80	Debris burning	Unincorporated
8/2/2008	8	Debris burning	Unincorporated	**7/31/2013**	0.1	Miscellaneous	Unincorporated
10/1/2008	7	Power Lines	Unincorporated	**8/8/2013**	1.5	Debris burning	Cleveland
10/3/2008	20	Incendiary	Unincorporated	**8/24/2013**	2	Debris burning	Unincorporated
10/13/2008	120	Incendiary	Unincorporated	**9/1/2013**	1	Debris burning	Unincorporated
11/8/2008	10	Miscellaneous	Unincorporated	**9/13/2013**	2	Miscellaneous	Unincorporated
11/25/2008	25	Debris burning	Unincorporated	**9/17/2013**	3	Miscellaneous	Unincorporated
1/31/2009	37	Equipment use	Unincorporated	**10/10/2013**	2	Debris burning	Unincorporated
2/11/2009	299	Incendiary	Unincorporated	**1/17/2014**	48.5	Debris burning	Unincorporated
2/11/2009	299	Incendiary	Unincorporated	**1/18/2014**	18.4	Debris burning	Unincorporated
2/16/2009	100	Miscellaneous	Unincorporated	**1/21/2014**	2	Debris burning	Unincorporated
2/22/2009	1	Debris burning	Unincorporated	**1/21/2014**	2	Debris burning	Unincorporated
2/24/2009	1	Debris burning	Unincorporated	**3/7/2014**	15	Debris burning	Unincorporated
3/1/2009	2	Debris burning	Unincorporated	**3/12/2014**	35.6	Power Lines	Unincorporated
3/3/2009	1	Miscellaneous	Unincorporated	**5/2/2014**	3	Debris burning	Plum Grove
3/20/2009	1	Debris burning	Unincorporated	**5/3/2014**	46	Debris burning	Unincorporated
6/6/2009	0	Power Lines	Unincorporated	**5/4/2014**	4.8	Debris burning	Plum Grove
6/11/2009	3	Equipment use	Unincorporated	**5/4/2014**	2	Debris burning	Unincorporated
6/17/2009	1	Debris burning	Unincorporated	**9/5/2014**	3	Debris burning	Cleveland
6/18/2009	1	Debris burning	Unincorporated	**1/26/2015**	5.1	Debris burning	Unincorporated
6/19/2009	1	Debris burning	Unincorporated	**8/2/2015**	15	Incendiary	Unincorporated
6/19/2009	1	Debris burning	Unincorporated	**8/2/2015**	25	Debris burning	Unincorporated
6/20/2009	0.25	Debris burning	Unincorporated	**9/26/2015**	2.34	Debris burning	Unincorporated
6/21/2009	1	Power Lines	Unincorporated	**9/26/2015**	7.5	Debris burning	Unincorporated
7/3/2009	21	Lightning	Unincorporated	**9/26/2015**	1.6	Debris burning	Unincorporated
7/3/2009	5	Debris burning	Unincorporated	**10/7/2015**	8.4	Miscellaneous	Unincorporated
7/3/2009	2	Debris burning	Unincorporated	**10/14/2015**	54.08	Miscellaneous	Unincorporated
7/4/2009	10	Debris burning	Unincorporated	**10/17/2015**	2	Debris burning	Unincorporated

Liberty County Disaster Declarations

There have been five wildfire disaster declarations for Liberty County since 1953. These events are considered the most significant wildfire events in Liberty County's recent history.

Date	Title	Disaster Number
2/23/1996	Extreme Fire Hazard	3117
9/1/1999	Extreme Fire Hazard	3142
9/4/2005	TX - Stanley Mainline Fire	2329
3/14/2008	Wildfires	3284
1/11/2006	Extreme Wildfire Threat	1624

Hazard Analysis & Vulnerability Identification

The hazard analysis uses historic hazard event data to determine the probability of an event occurring again within a given year. The analysis calculates the average number of events in each jurisdiction annually and then calculates the percent chance of the event occurring within a year.

The hazard analysis also provides hazard extent data for each participating jurisdiction. The extent data is the most extreme data recorded during a storm or hazard event and represents the worst damage a jurisdiction has experienced in recent history. The extent data also includes an estimate of what the jurisdiction could experience in the future. Information from stakeholders, Texas Forest Service, FEMA, and NOAA are the sources of data for the analysis. The analysis identified all structures, agricultural land, and gross acreage located within the 500 to 800 KBDI zones.

To identify vulnerabilities for each jurisdiction, this plan used the following methods:

- American Community Survey (5-year, 2016) data on residential structures
- GIS analysis of residential structures within 500 to 800 KBDI zones; neither stakeholders or the GIS analysis identified any critical facilities located in the 500 to 800 KBDI zones.
- Stakeholder identified vulnerabilities

Liberty County (All Participating Jurisdictions)

Identified Vulnerabilities:

Wildfires have the potential to greatly impact agriculture throughout the county. Additionally, residential, public, and commercial buildings can be damaged or destroyed throughout the county. While residential building information is available per jurisdiction, data on agricultural lands was only found on a countywide level.

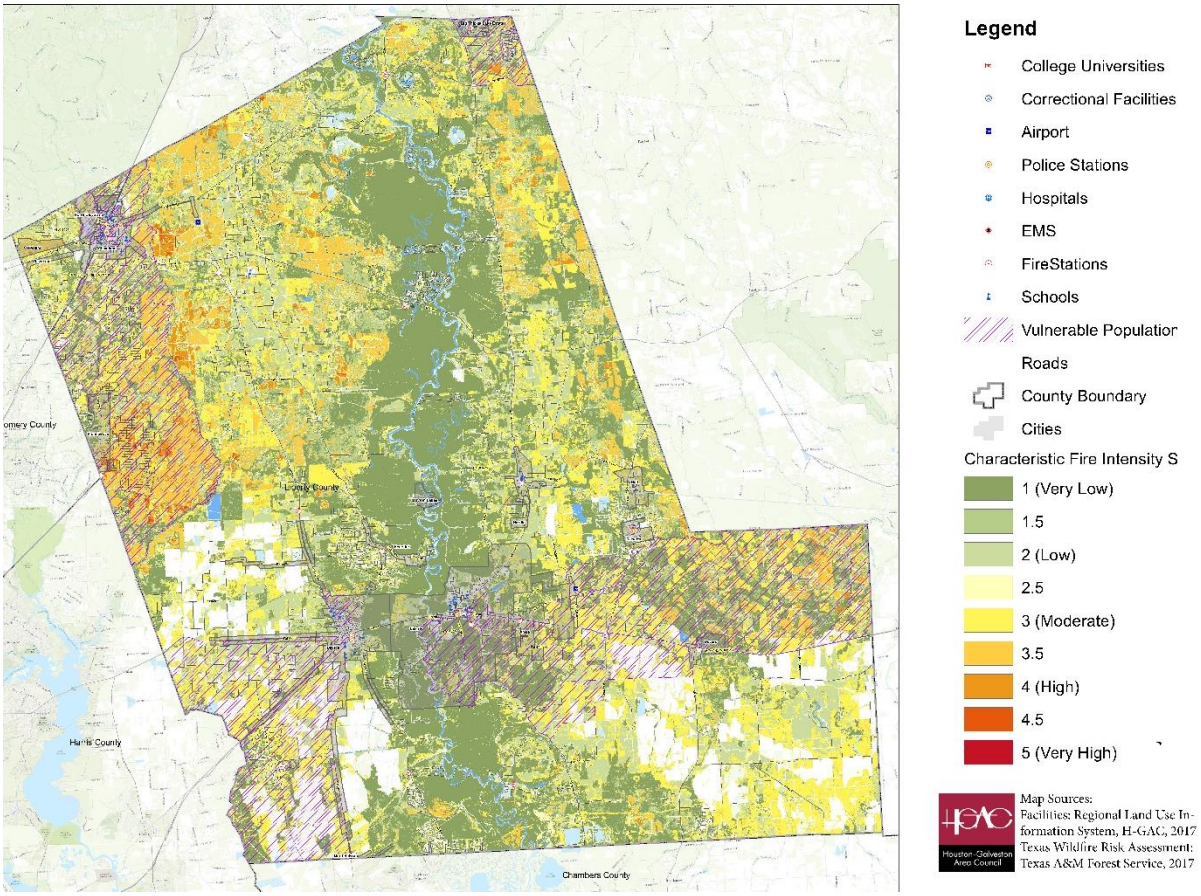
In addition to agriculture and property loss, wildfires can negatively impact air quality; children and individuals 65 and above are more vulnerable to injuries or serious illness due to poor air quality throughout the county. These populations are identified in each jurisdiction.

- 286,793 acres in total throughout the county in farmland
- Residential, commercial, and public buildings (identified by jurisdiction below)
- Residents and visitors 18 years and younger and individuals 65 years old or older (Identified by jurisdiction below)

Identified Impacts:

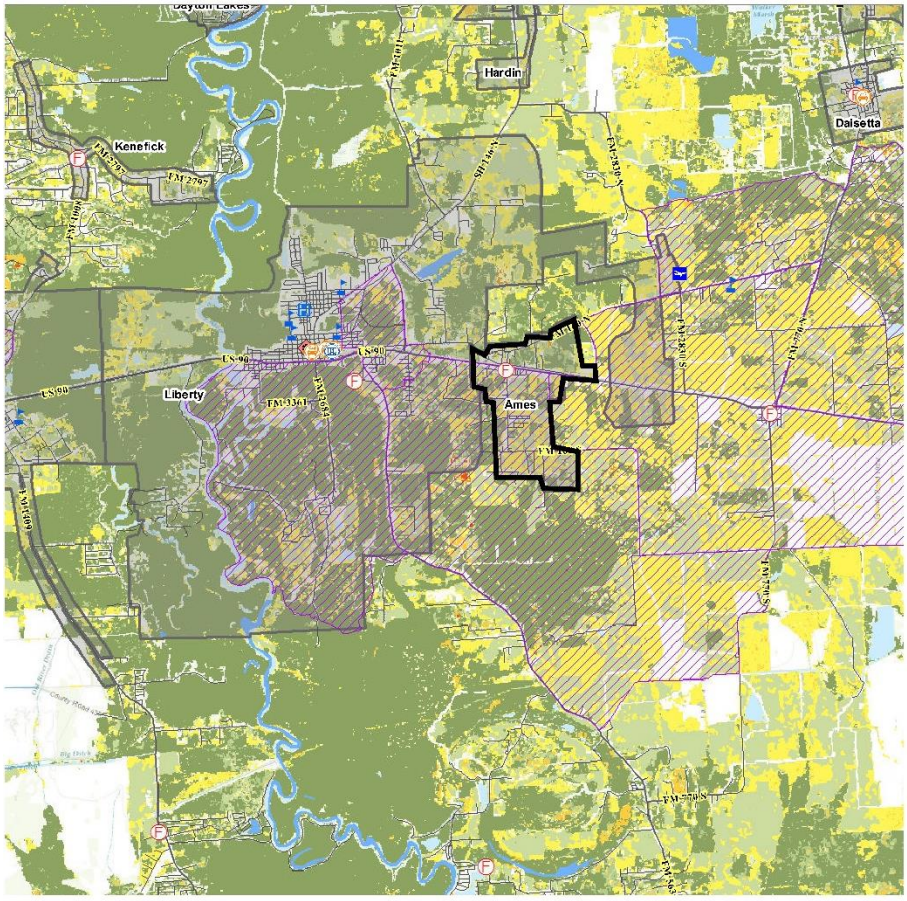
- Loss of farmland and revenue from farming (accounting for 34,939,000 dollars in revenue) could create an economic loss for the county and financial loss for farmers or local business owners who depend on farms
- Residential and commercial property loss throughout the county (identified by local jurisdictions below) creating a finical/ economic loss for residents and the jurisdictions
- Significant injury or loss of life particularly for children and older individuals (identified by local jurisdiction below)

Wildfire Risk Assessment: Liberty County



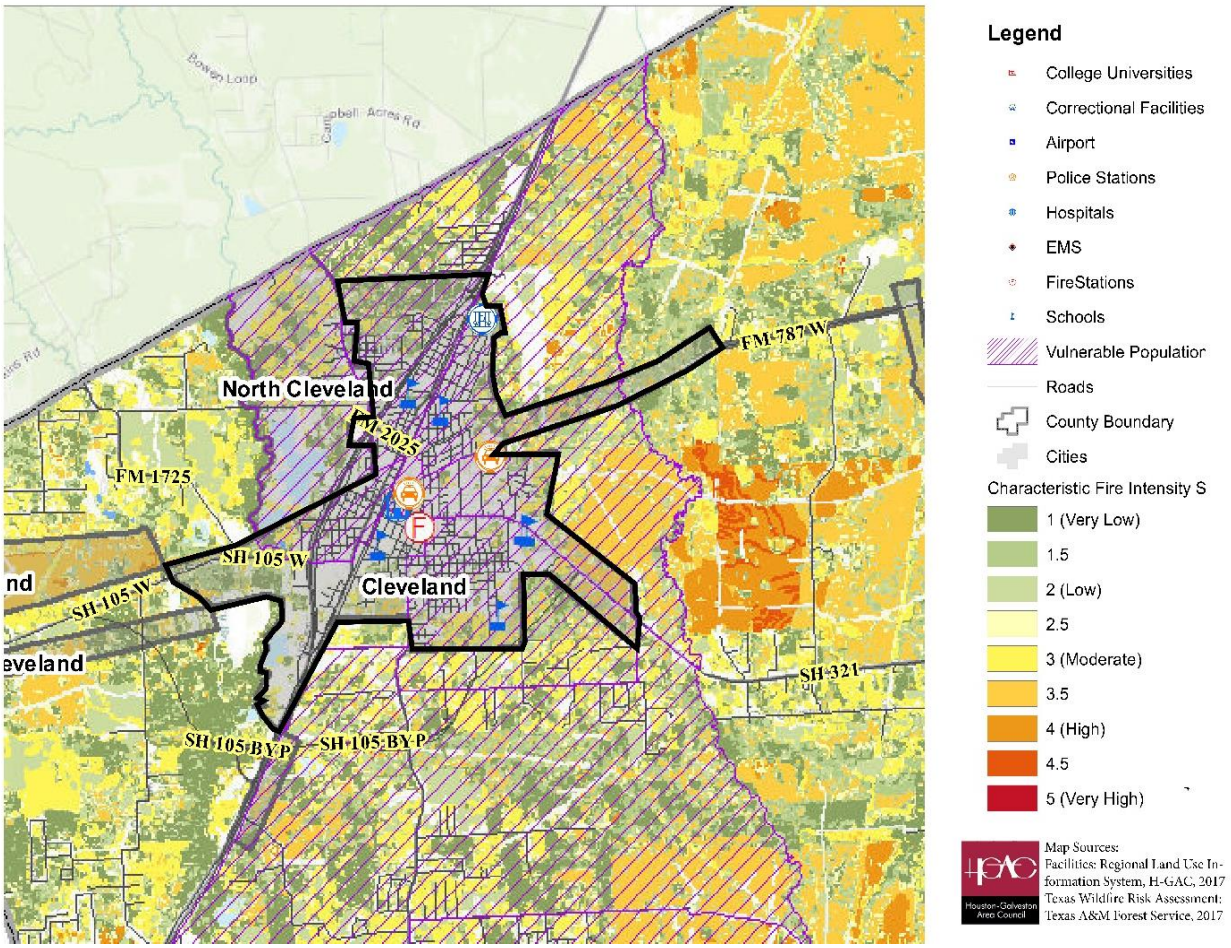
Liberty County (Unincorporated)			
Planning Area (Sq. mi):	500	**Occurrences since 2005:**	337
Area Affected:	50 %	**Annual Event Average:**	28
Probability: Very Likely; 100 percent chance event will occur in a year			
Extent: The largest wildfire in the past 12 years has been a 290-acre fire. The jurisdiction can expect a 300 to 320-acre fire.			
Identified Vulnerabilities: • Reliance on neighboring jurisdictions' and county healthcare and first responder's systems **Identified Impacts:** • Residential and commercial property loss throughout the county • Increased response times which may lead to greater injuries, loss of life, or property loss			

Wildfire Risk Assessment: Ames



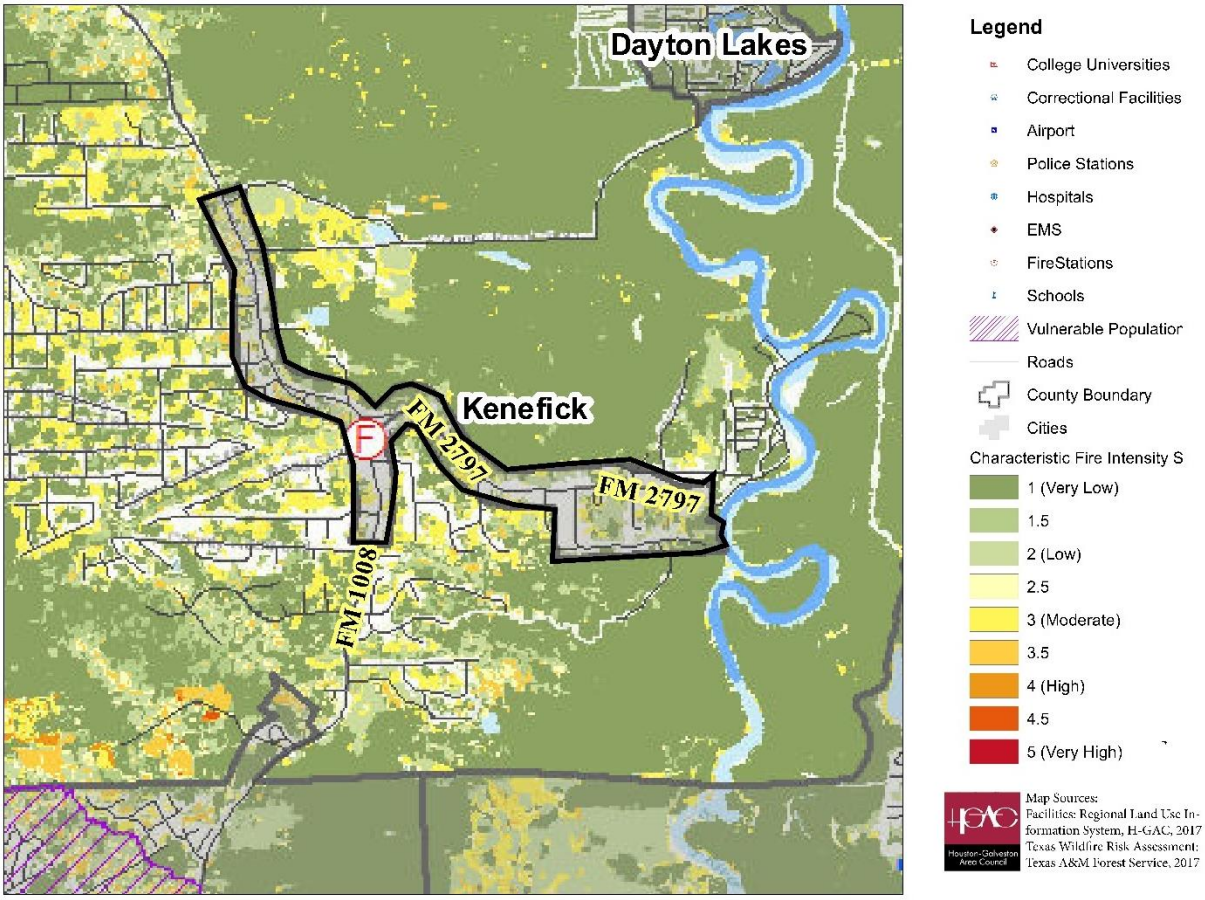
Ames			
Planning Area (Sq. mi):	3.17	**Occurrences since 2005:**	2
Area Affected:	20 %	**Annual Event Average:**	.17
Probability: Likely; 17 percent chance the event will occur in a year			
Extent: The largest wildfire in the past 12 years has been a 3-acre fire. The jurisdiction can expect a 6 to 8-acre fire.			
Identified Vulnerabilities: • 414 residential structures at risk • 35.5 percent of population are individuals 18 years and younger (472 children) • 8.7 percent of population are individuals 65 and older (115 older individuals) **Identified Impacts:** • 45 percent of the total population may face serious illness or health conditions due to poor air quality • Residential and commercial property loss throughout the jurisdiction			

Wildfire Risk Assessment: Cleveland



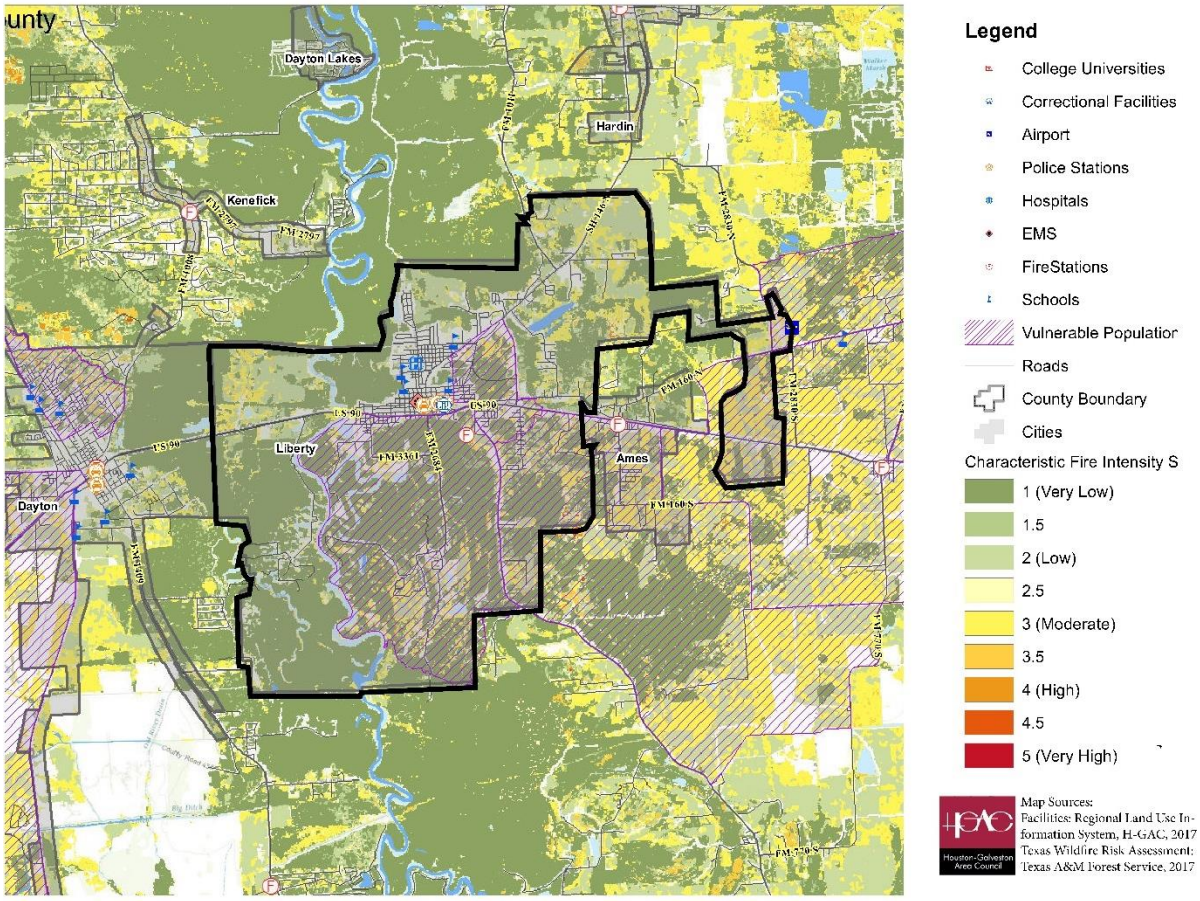
Cleveland			
Planning Area (Sq. mi):	4.8	**Occurrences since 2005:**	17
Area Affected:	60%	**Annual Event Average:**	1.42
Probability: Very Likely**:** 100 percent chance the event will occur in a year			
Extent: The largest wildfire in the past 12 years has been a 28-acre fire. The jurisdiction can expect a 30 to 35-acre fire.			
Identified Vulnerabilities: • 3,043 residential structures at risk • 30 percent of population are individuals 18 years and younger (2,364 children) • 11 percent of population are individuals 65 and older (867 older individuals) **Identified Impacts:** • 41 percent of the total population may face serious illness or health conditions due to poor air quality • Residential and commercial property loss throughout the jurisdiction			

Wildfire Risk Assessment: Kenefick



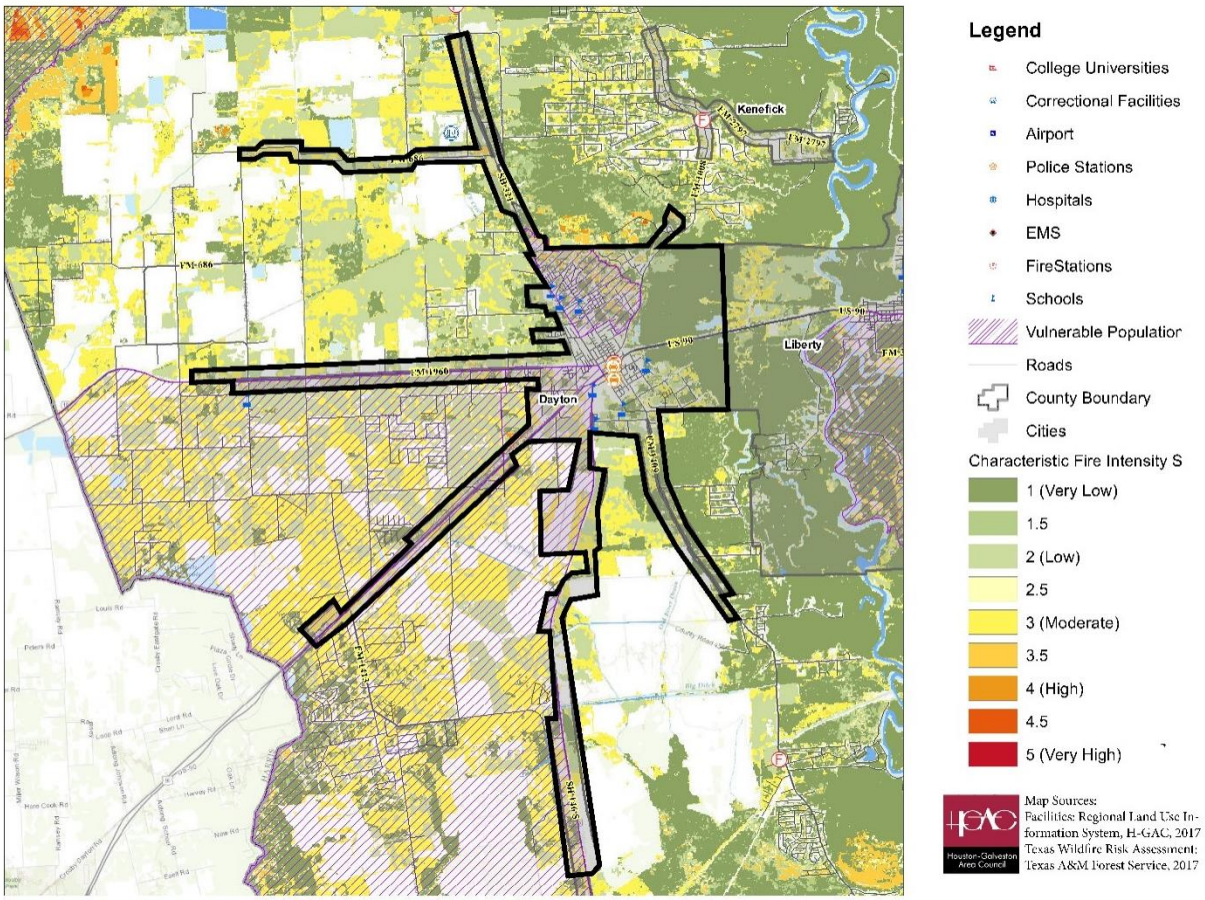
Kenefick			
Planning Area (Sq. mi):	1.5	**Occurrences since 2005:**	10
Area Affected:	10 %	**Annual Event Average:**	.83
Probability: Very Likely; 83 percent chance the event will occur in a year			
Extent: The largest wildfire in the past 12 years has been a 3-acre fire. The jurisdiction can expect a 5 to 8-acre fire.			
Identified Vulnerabilities: • 174 residential structures at risk • 30 percent of population are individuals 18 years and younger (152 children) • 11 percent of population are individuals 65 and older (59 older individuals) **Identified Impacts:** • 41 percent of the total population may face serious illness or health conditions due to poor air quality • Residential and commercial property loss throughout the jurisdiction			

Wildfire Risk Assessment: Liberty



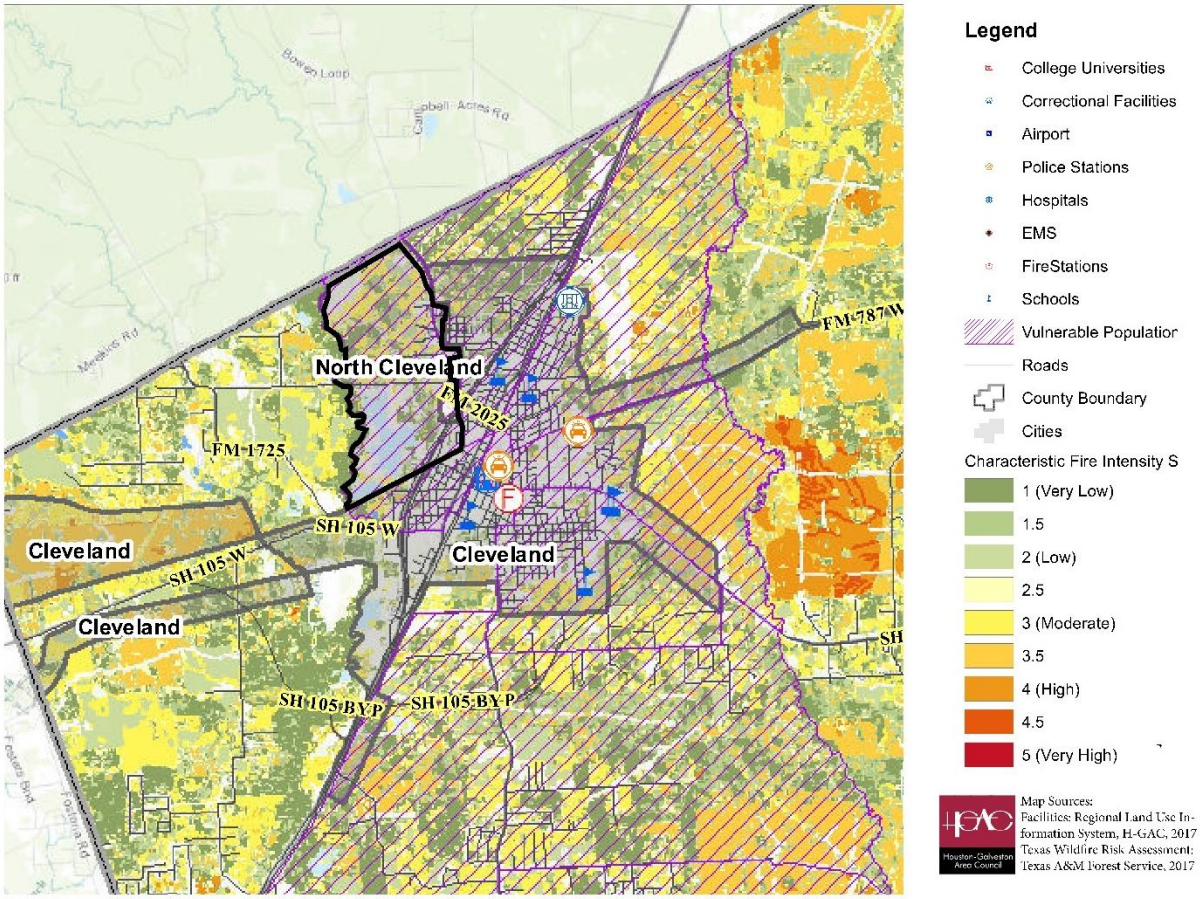
Liberty			
Planning Area (Sq. mi):	35.4	**Occurrences since 2005:**	20
Area Affected:	100 %	**Annual Event Average:**	1.67
Probability: Very Likely; 100 percent chance the event will occur in a year			
Extent: The largest wildfire in the past 12 years has been a 10-acre fire. The jurisdiction can expect a 15 to 20-acre fire.			
Identified Vulnerabilities: • 3,837 residential structures at risk • 26.8 percent of population are individuals 18 years and younger (2,395 children) • 16.4 percent of population are individuals 65 and older (1,466 older individuals) **Identified Impacts:** • 43 percent of the total population may face serious illness or health conditions due to poor air quality • Residential and commercial property loss throughout the jurisdiction			

Wildfire Risk Assessment: Dayton



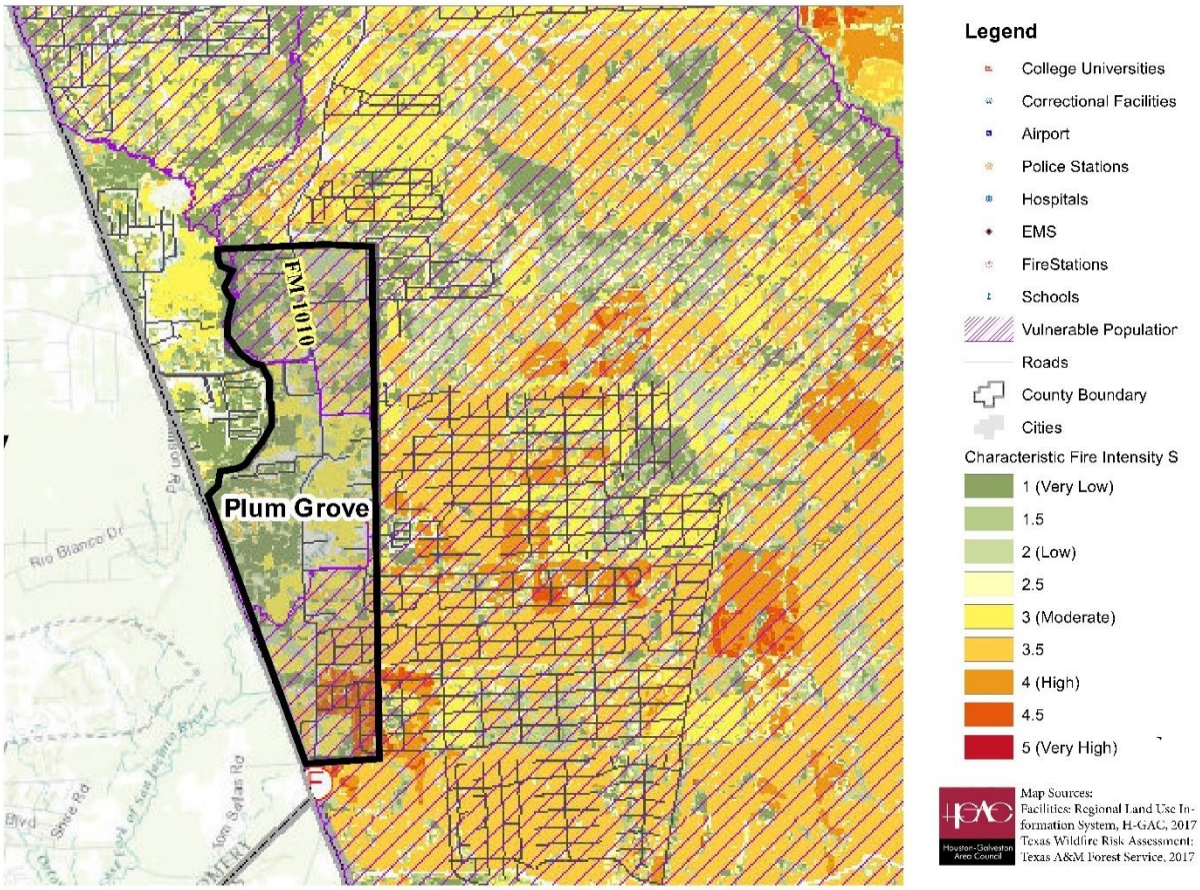
Dayton			
Planning Area (Sq. mi):	11	**Occurrences since 2005:**	3
Area Affected:	100 %	**Annual Event Average:**	.25
Probability: Likely; 18 percent chance the event will occur in a year			
Extent: The largest wildfire in the past 12 years has been a 30-acre fire. The jurisdiction can expect a 35 to 40-acre fire.			
Identified Vulnerabilities: • 3,807 residential structures at risk • 30 percent of population are individuals 18 years and younger (2,256 children) • 11 percent of population are individuals 65 and older (832 older individuals) **Identified Impacts:** • 41 percent of the total population may face serious illness or health conditions due to poor air quality • Residential and commercial property loss throughout the jurisdiction			

Wildfire Risk Assessment: North Cleveland



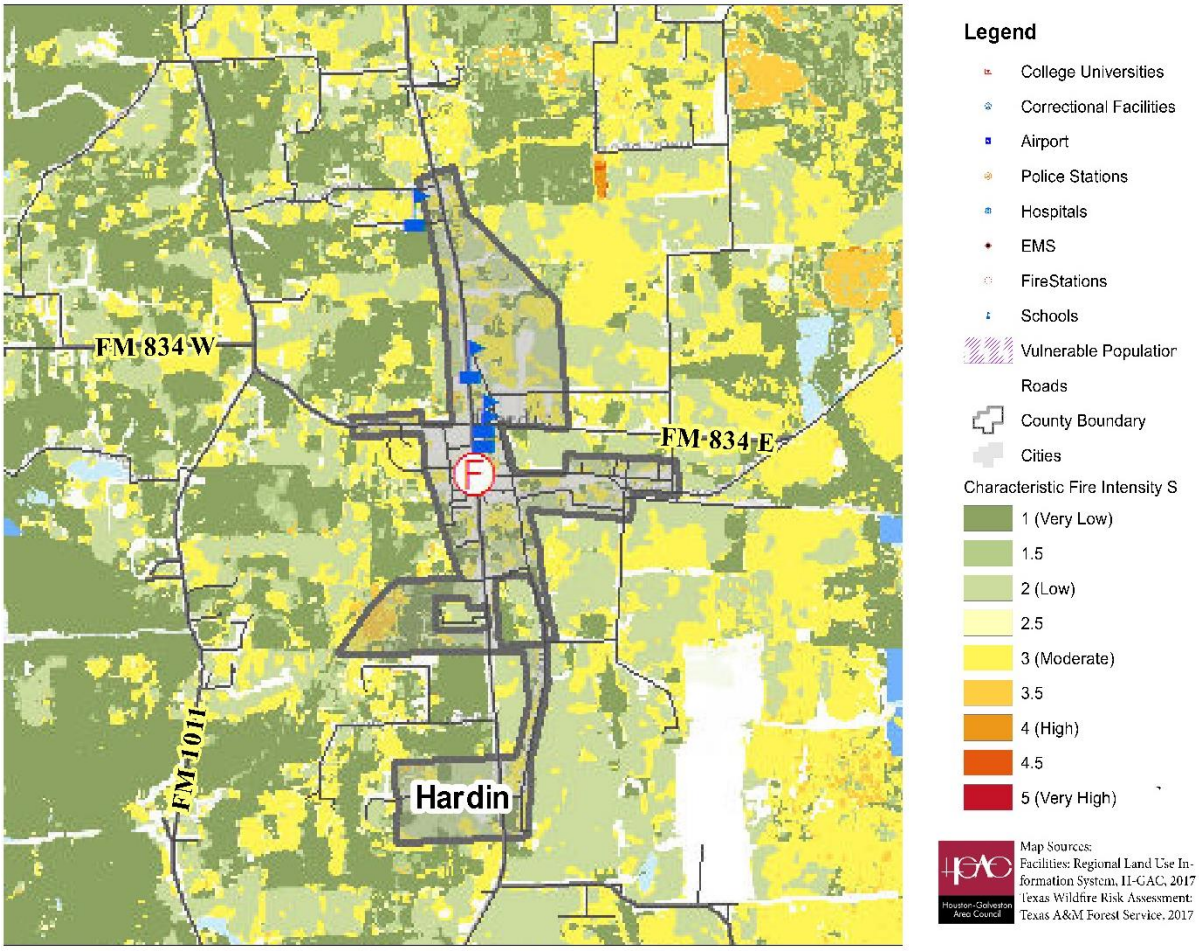
North Cleveland			
Planning Area (Sq. mi):	2	**Occurrences since 2005:**	5
Area Affected:	15 %	**Annual Event Average:**	.18
Probability: Likely; 18 percent chance the event will occur in a year			
Extent: The largest wildfire in the past 12 years has been a 30-acre fire. The jurisdiction can expect a 35 to 40-acre fire.			
Identified Vulnerabilities: • 97 residential structures at risk • 38 percent of population are individuals 18 years and younger (97 children) • 25 percent of population are individuals 65 and older (66 older individuals) **Identified Impacts:** • 63 percent of the total population may face serious illness or health conditions due to poor air quality • Residential and commercial property loss throughout the jurisdiction			

Wildfire Risk Assessment: Plum Grove



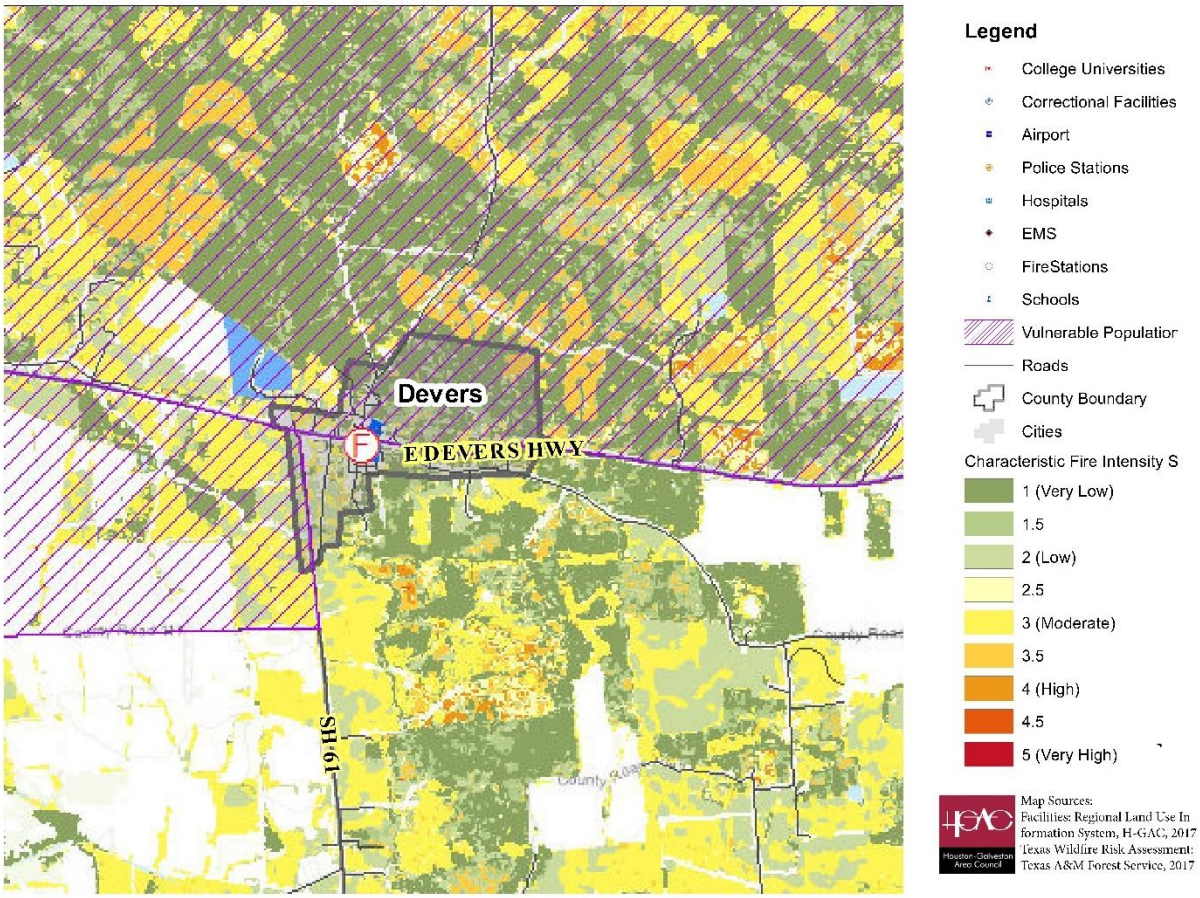
Plum Grove			
Planning Area (Sq. mi):	7.3	**Occurrences since 2005:**	6
Area Affected:	100 %	**Annual Event Average:**	.5
Probability: Likely; 50 percent chance the event will occur in a year			
Extent: The largest wildfire in the past 12 years has been a 5-acre fire. The jurisdiction can expect a 6 to 10-acre fire.			
Identified Vulnerabilities: • 220 residential structures at risk • 27 percent of population are individuals 18 years and younger (121 children) • 25 percent of population are individuals 65 and older (111 older individuals) **Identified Impacts:** • 52 percent of the total population may face serious illness or health conditions due to poor air quality • Residential and commercial property loss throughout the jurisdiction			

Wildfire Risk Assessment: Hardin



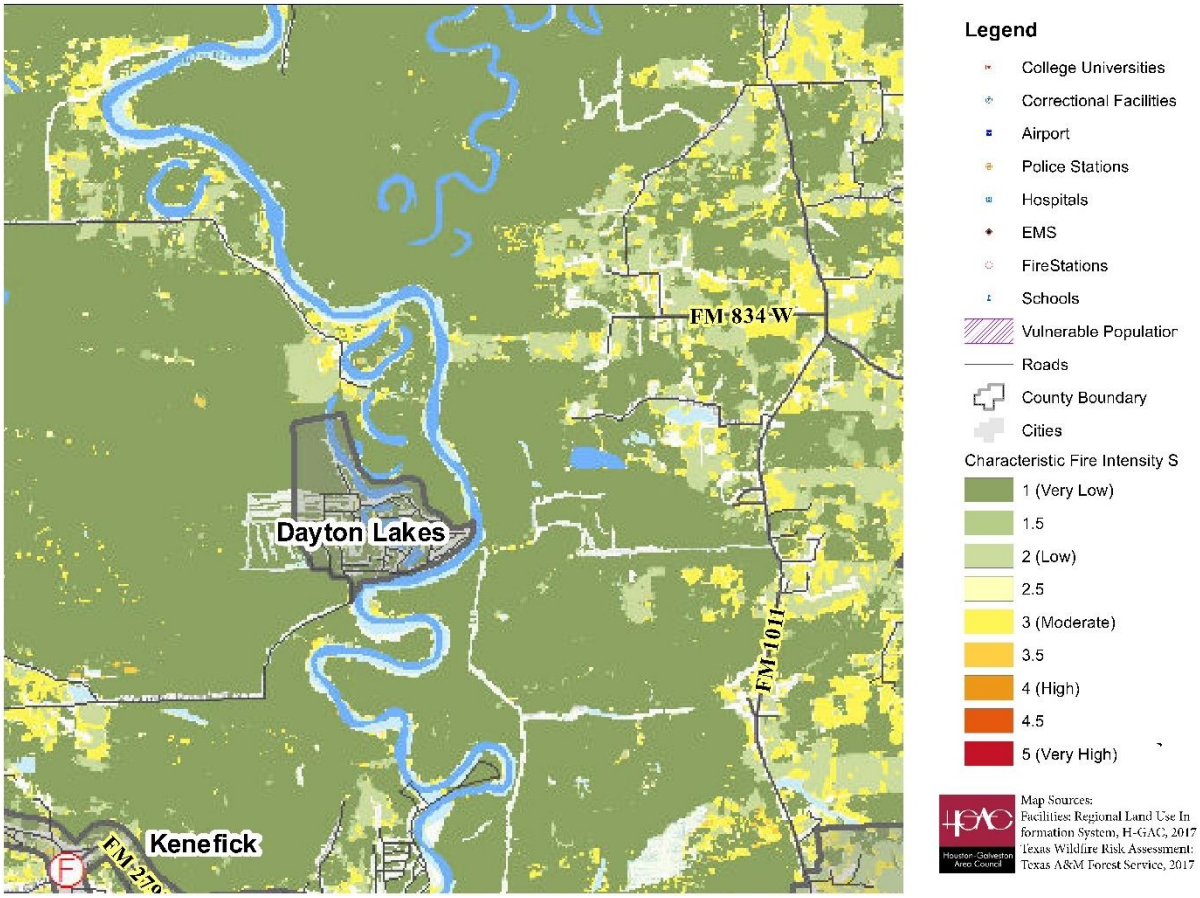
Hardin			
Planning Area (Sq. mi):	2.28	**Occurrences since 2005:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although there are no recorded events in the jurisdiction, Kenefick is nearby. Perhaps the probability is similar: Very Likely; 83 percent chance the event will occur in a year			
Extent: Similarly, Kenefick's extent is: The largest wildfire in the past 12 years has been a 3-acre fire. The jurisdiction can expect a 5 to 8-acre fire.			
Identified Vulnerabilities: • 403 residential structures at risk • 29 percent of population are individuals 18 years and younger (252 children) • 20 percent of population are individuals 65 and older (178 older individuals) **Identified Impacts:** • 49 percent of the total population may face serious illness or health conditions due to poor air quality • Residential and commercial property loss throughout the jurisdiction			

Wildfire Risk Assessment: Devers



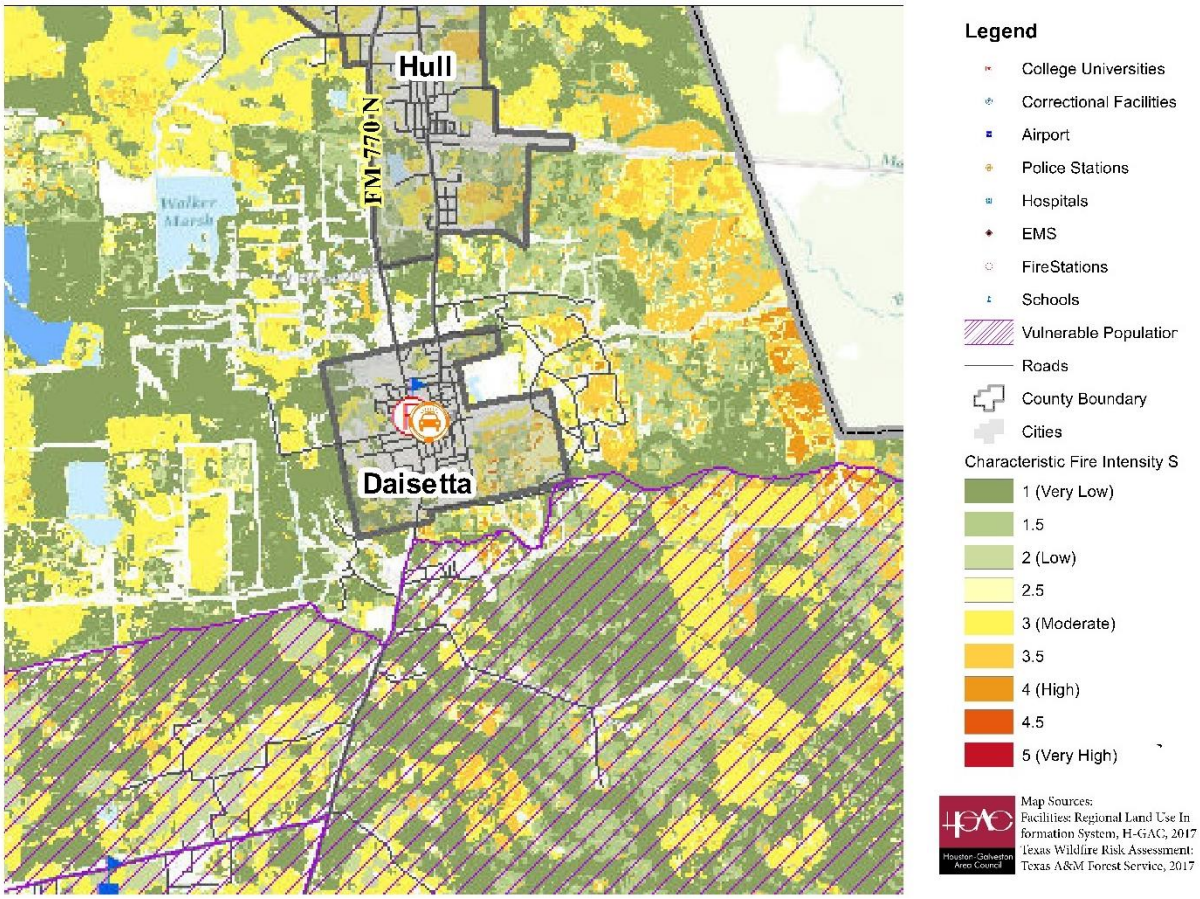
Devers			
Planning Area (Sq. mi):	1.85	**Occurrences since 2005:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although there are no recorded events in the jurisdiction, Ames is nearby. Perhaps the probability is similar: Likely; 17 percent chance the event will occur in a year			
Extent: Similarly, Ames' extent is: The largest wildfire in the past 12 years has been a 3-acre fire. The jurisdiction can expect a 6 to 8-acre fire.			
Identified Vulnerabilities: • 156 residential structures at risk • 19.9 percent of population are individuals 18 years and younger (69 children) • 18.5 percent of population are individuals 65 and older (64 older individuals) **Identified Impacts:** • 43 percent of the total population may face serious illness or health conditions due to poor air quality • Residential and commercial property loss throughout the jurisdiction			

Wildfire Risk Assessment: Dayton Lakes



Dayton Lakes			
Planning Area (Sq. mi):	1	**Occurrences since 2005:**	0
Area Affected:	3 %	**Annual Event Average:**	0
Probability: Although there are no recorded events in the jurisdiction, Kenefick is nearby. Perhaps the probability is similar: Very Likely; 83 percent chance the event will occur in a year			
Extent: Similarly, Kenefick's extent is: The largest wildfire in the past 12 years has been a 3-acre fire. The jurisdiction can expect a 5 to 8-acre fire.			
Identified Vulnerabilities: • 49 residential structures at risk • 18.6 percent of population are individuals 18 years and younger (13 children) • 53.9 percent of population are individuals 65 and older (38 older individuals) **Identified Impacts:** • 73 percent of the total population may face serious illness or health conditions due to poor air quality • Residential and commercial property loss throughout the jurisdiction			

Wildfire Risk Assessment: Daisetta



Daisetta			
Planning Area (Sq. mi):	1.47	**Occurrences since 2005:**	1
Area Affected:	100%	**Annual Event Average:**	.036
Probability: Although there are no recorded events in the jurisdiction, Ames is nearby. Perhaps the probability is similar: Likely; 17 percent chance the event will occur in a year			
Extent: Similarly, Ames' extent is: The largest wildfire in the past 12 years has been a 3-acre fire. The jurisdiction can expect a 6 to 8-acre fire.			
Identified Vulnerabilities: • 400 residential structures at risk • 25 percent of population are individuals 18 years and younger (190 children) • 16 percent of population are individuals 65 and older (124 older individuals) **Identified Impacts:** • 41 percent of the total population may face serious illness or health conditions due to poor air quality • Residential and commercial property loss throughout the jurisdiction			

2017

Part 6.4: Drought

6.4 Drought

The Palmers Hydrological Drought Severity Index (PHDI) is the typical way extent of drought is observed throughout the United States. This regional index considers dry and wet spells over an extended period to calculate the range in the Index. The greater the number the more extreme the drought in a specific area.

Drought has particularly adverse effects on agriculture and can lead to wildfires. The most extreme conditions reported in the county occurred in 2000. The county's PHDI rating was < -4.0 (Extreme Drought) from August 2000 through September 2000. There were periods of severe and extreme drought preceding and following this period from August 2010 through April 2014. However, these events are not reflected in the historical occurrences.

Palmers Drought Severity Index	
< -4.0	Extreme Drought
-3.99 to -3.0	Severe Drought
-2.99 to -2.0	Moderate Drought
-1.99 to -1.0	Mild Drought
-0.99 to -0.5	Incipient Drought
-0.49 to 0.49	Near Normal
0.5 to 0.99	Incipient Moist Spell
1.0 to 1.99	Moist Spell
2.0 to 2.99	Unusual Moist Spell
3.0 to 3.99	Very Moist Spell
> 4.0	Extreme Moist Spell
Source: https://www.ncdc.noaa.gov/	

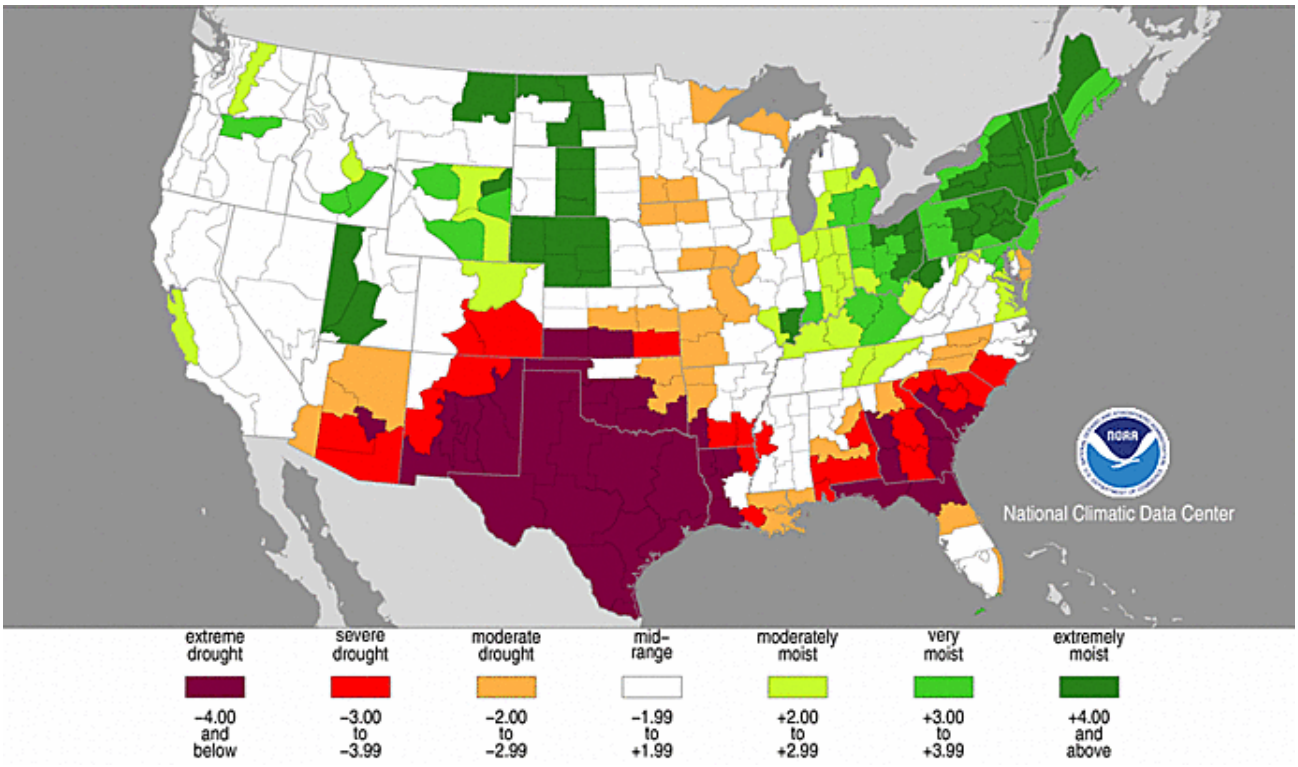
Historic Occurrence

In Liberty County's recent history, there have been two major droughts causing wildfires. This information is listed below at the county level. There is no county-level data available for property and agricultural losses for the most recent and most extreme drought event.

Date	Notes
8/1/2000	Severe drought continued across southeast Texas through the month of August. Rainfall for the month of August averaged only 30 to 50 percent of normal across southeast Texas. Several cities were placed under water rationing with large crop losses were noted across the area. Wildfires became increasingly common, especially toward the end of the month. Drought losses in dollars will be computed at the end of the summer growing season.
9/1/2000	Severe drought continued across southeast Texas through September 2000. The combination of excessive heat and dryness caused many wildfires to burn during the first week of the month. Water rationing continued during the first half of the month in several small communities. Water line breaks and small grass fires were a common problem across southeast Texas, especially at the beginning of the month. By the end of September, damage estimates for the season to cotton, wheat, and forage crops and increased irrigation reached $102.3 million for southeast Texas.
10/1/2011	No notes were recorded for this event from the NCDC. However, the map directly below demonstrates the extent of the drought in 2011. Additionally, 5.2 billion dollars in agriculture loss throughout the state of Texas was reported during this event. (http://twri.tamu.edu/publications/txh2o/fall-2011/timeline-of-droughts-in-texas/)

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

Palmers Drought Severity Index: October 2011



Map source: https://www.ncdc.noaa.gov/

Hazard Analysis & Vulnerability Identification

The hazard analysis uses historic hazard event data to determine the probability of an event occurring again within a given year. The analysis calculates the average number of events in each jurisdiction annually and then calculates the percentage of that event occurring within a year.

The hazard analysis also provides hazard extent data for each participating jurisdiction. The extent data is the most extreme data recorded during a storm or hazard event and represents the worst damage a jurisdiction has experienced in recent history. Information from stakeholders, USDA, CDC, and NOAA are the sources of data for the analysis.

To identify vulnerabilities for each jurisdiction, this plan used the following methods:

- GIS analysis of vulnerable populations
- USDA agriculture production projections; and
- Stakeholder identified vulnerabilities

All Participating Jurisdictions			
Area Impacted:	Drought is not contained to a boundary and is measured by region through the Palmers Drought Severity Index. Consequently, it can arise equally in all participating jurisdictions and in the unincorporated areas of the county.	**Occurrences since 2000**	3
		Annual Event Average	.18
Probability: 18 % chance that an event will occur within a year			
Extent: As shown above through the Palmers Drought Severity Index maps, drought can vary greatly in terms of extent and duration. Based on the historical events in the county, all participating jurisdictions can expect moderate to extreme drought throughout the planning area. The planning area can expect to see extreme drought in the future.			
Identified Vulnerabilities: • Drought can greatly affect agriculture production. While Liberty County has a diverse economy, agriculture remains a prominent part of the economy. Crops represent 42% of agriculture production and cattle 58 %. In total, agriculture represents 34,939,000 dollars for the county annually. **Identified Impacts:** • The potential loss of crops and the loss of revenue for local farmers and the entire county may impact economic standing and mental wellbeing of farmers and those taking a financial loss from the occurrence.			

2017

Part 6.5: Lightning

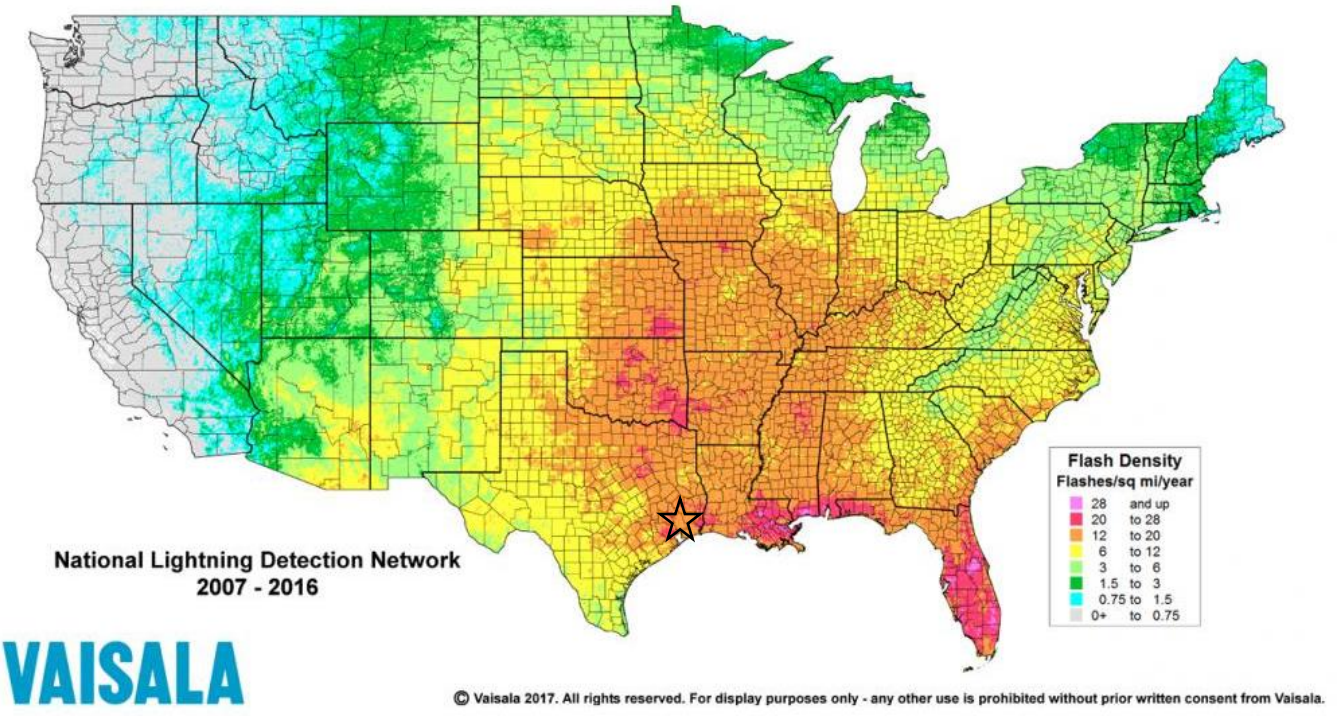
6.5 Lightning

There are two typical ways the magnitude of lightning is measured. The first is through the Lightning Activity Levels (LAL) grid. The National Oceanic and Atmospheric Administration (NOAA) considers how many cloud to ground strikes occur over a given period as well as rainfall to measure the amount of lighting activity occurring.

LAL	Cloud & Storm Development	Lighting Strikes/15 per minute
1	No thunderstorms	None
2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 clouds to ground strikes in a five-minute period.	1 to 8
3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 clouds to ground strikes in a 5-minute period.	9 to 15
4	Scattered thunderstorms. Moderate rain is commonly produced Lightning is frequent, 11 to 15 clouds to ground strikes in a 5-minute period	16 to 25
5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 clouds to ground strikes in a 5-minute period.	Greater than 25
6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.	Greater than 25

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

The second method is through the National Lightning Detection Network by Vaisala. This Network works by recording when lightning strikes the ground, considering the location, time, and polarity of the strike. According to this Network, Liberty County is rated 12-20 flashes per square mile per year.



Source: https://www.vaisala.com/en. Star notes general location of Liberty County

Historic Occurrences

National Climatic Data Center (NCDC) records from 2000-2017 confirm one reported lightning strike in Liberty County in the jurisdiction of Hardin causing $8,000 property damage on November 21, 2007. This strike caused a large crude oil tank fire. No deaths or injuries were reported.

From 2005-2017 NCDC reported 22 wildfires were caused by lightning strikes. All strikes were recorded in unincorporated Liberty County. Property damage, loss of life, and injuries were attributed to the wildfires and are captured in Section 6.3.

Hazard Analysis & Vulnerability Identification

The hazard analysis uses historic hazard event data to determine the probability of an event occurring again within the next year. The analysis calculates the average number of events in each jurisdiction annually and then calculates the percent chance of the event occurring within a year.

The hazard analysis also provides hazard extent data for each participating jurisdiction. The extent data is the most extreme data recorded during a storm or hazard event and represents the worst damage a jurisdiction has experienced in recent history. Information from stakeholders, Texas Forest Service, and NOAA are the sources of data for the analysis.

To identify vulnerabilities for each jurisdiction, this plan used the following methods:

- American Community Survey (ACS 5-year 2016) Data on structures
- GIS analysis of structures and critical facilities exposed to lightning damage; and
- Stakeholder identified vulnerabilities

Extent

The magnitude of lightning was not recorded for each historical event; not all participating jurisdictions have a history of all lightning strikes that may have occurred in their jurisdiction; and lighting flashes per event for each jurisdiction was not found. Due to these data limitations and considering that lightning is not contained to a particular geographic area or jurisdiction, extent for the entire county was estimated; NOAA's Severe Weather Data Inventory does provide a history of flashes per event on the county level. According to NOAA’s Severe Weather Data Inventory the entire planning area saw an approximate average of 17 flashes of lighting per event between 2000 to 2017.

Liberty County (All Jurisdictions)

Identified Vulnerabilities:

As described in the hazard identification section, lightning can strike anywhere, but is more likely to strike tall trees and structures, and in open fields. As noted in the historical occurrences above, lighting can cause serious injury to residents and property in these places. Lightning can also cause wildfires that could destroy or damage residential, commercial, public property or agricultural lands. Additionally, lightning could hit a structure directly and cause a structural fire. In considering this, vulnerabilities throughout the county include:

- Agricultural and parkland areas throughout the county including the Trinity National Wildlife Refuge
- Residential buildings throughout the county (identified below by jurisdiction)
- Communication towers (no data was found for the exact number of towers throughout the county)
- Critical facilities throughout the county (identified below by jurisdiction)

Liberty County (All Jurisdictions)

Identified Impacts:

- Residential, commercial, and public property loss throughout the county due to wildfires or structural fires started by lightning
- In total, 286,793 acres throughout the county in farmland at risk if a lightning strike causes a wildfire (accounting for 34,939,00 dollars in revenue). Leading to financial and economic loss for individual farmers and the county
- Lightning striking a communication tower may lead to a loss of communication for a particular jurisdiction or for a large portion of the county. This could lead to an inability to reach people in need.
- In the instance that lightning does strike a critical facility without a generator or the generator does not work, critical facilities could lose power. This may slow down first responders and allow for greater loss of life, injury, or property damage particularly when lighting is accompanied by flooding or other hazardous events

Liberty County (Unincorporated)			
Planning Area (Sq. mi):	500	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although there have been no recorded events in the jurisdiction the probability may be similar to Hardin; the only jurisdiction that has had a lightning strike in the county. Hardin's probability is: Unlikely; 6 percent chance the event will occur in a year.			
Extent: According to NOAA's Severe Weather Data Inventory the entire planning area could see more than 17 flashes of lighting per event			
Identified Vulnerabilities: • Critical facilities including: 1 fire station, 1 shelter, 1 toxic release site, 1 EMS, 1 police station, and 1 school • Residential property throughout the planning area- particularly older buildings **Identified Impacts:** • 6 critical facilities could lose power or catch on fire if lightning strikes; this may slow down first responders and allow for greater loss of life, injury, or property damage particularly when lighting is accompanied by flooding or other hazardous events.			

Ames			
Planning Area (Sq. mi):	3.17	**Occurrences since 2000:**	0
Area Affected:	100%	**Annual Event Average:**	0
Probability: Although there have been no recorded events in the jurisdiction the probability may be similar to Hardin; the only jurisdiction that has had a lightning strike in the county. Hardin's probability is: Unlikely; 6 percent chance the event will occur in a year.			
Extent: According to NOAA's Severe Weather Data Inventory the entire planning area could see more than 17 flashes of lighting per event			
Identified Vulnerabilities: • 414 residential structures at risk • No critical facilities **Identified Impacts:** • 1 critical facility could lose power or catch on fire if lightning strikes; this may slow down first responders and allow for greater loss of life, injury, or property damage particularly when lighting is accompanied by flooding or other hazardous events. • Damage to homes caused by lightning may lead to a financial loss for residents and/ or injury or loss of life in a house fire or electrical shock			

Cleveland			
Planning Area (Sq. mi):	4.8	**Occurrences since 2000:**	0
Area Affected:	100%	**Annual Event Average:**	0
Probability: Although there have been no recorded events in the jurisdiction the probability may be similar to Hardin; the only jurisdiction that has had a lightning strike in the county. Hardin's probability is: Unlikely; 6 percent chance the event will occur in a year.			
Extent: According to NOAA's Severe Weather Data Inventory the entire planning area could see more than 17 flashes of lighting per event			
Identified Vulnerabilities: • 3,043 residential structures at risk • Critical facilities including: 1 correctional facility, 2 fire stations, 1 electric substation, 1 EMS, 6 schools, 2 hospitals, 2 police stations, 5 shelters, 2 toxic release facilities, 1 water treatment plant **Identified Impacts:** • 34 critical facilities could lose power or catch on fire if lightning strikes; this may slow down first responders and allow for greater loss of life, injury, or property damage particularly when lighting is accompanied by flooding or other hazardous events. • Damage to homes caused by lightning may lead to a financial loss for residents and/ or injury or loss of life in a house fire or electrical shock			

Kenefick			
Planning Area (Sq. mi):	1.5	**Occurrences since 2000:**	0
Area Affected:	100%	**Annual Event Average:**	0
Probability: Although there have been no recorded events in the jurisdiction the probability may be similar to Hardin; the only jurisdiction that has had a lightning strike in the county. Hardin's probability is: Unlikely; 6 percent chance the event will occur in a year.			
Extent: According to NOAA's Severe Weather Data Inventory the entire planning area could see more than 17 flashes of lighting per event			
Identified Vulnerabilities: • 174 residential structures at risk • Critical facility including: 1 fire station **Identified Impacts:** • Damage to homes caused by lightning may lead to a financial loss for residents and/ or injury or loss of life in a house fire or electrical shock			

Liberty			
Planning Area (Sq. mi):	35.4	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although there have been no recorded events in the jurisdiction the probability may be similar to Hardin; the only jurisdiction that has had a lightning strike in the county. Hardin's probability is: Unlikely; 6 percent chance the event will occur in a year.			
Extent: According to NOAA's Severe Weather Data Inventory the entire planning area could see more than 17 flashes of lighting per event			
Identified Vulnerabilities: • 3,837 residential structures at risk • Critical facilities including: 1 correctional facility, 2 EMS, 4 schools, 2 fire stations, 3 police stations, 7 shelters, 4 toxic release sites, 1 hospital, 1 EOC, 1 power plant, 1 waste water treatment plant **Identified Impacts:** • 37 critical facilities could lose power or catch on fire if lightning strikes; this may slow down first responders and allow for greater loss of life, injury, or property damage particularly when lighting is accompanied by flooding or other hazardous events. • Damage to homes caused by lightning may lead to a financial loss for residents and/ or injury or loss of life in a house fire or electrical shock			

North Cleveland			
Planning Area (Sq. mi):	2	**Occurrences since 2000:**	0
Area Affected:	100%	**Annual Event Average:**	0
Probability: Although there have been no recorded events in the jurisdiction the probability may be similar to Hardin; the only jurisdiction that has had a lightning strike in the county. Hardin's probability is: Unlikely; 6 percent chance the event will occur in a year.			
Extent: According to NOAA's Severe Weather Data Inventory the entire planning area could see more than 17 flashes of lighting per event			
Identified Vulnerabilities: • 97 residential structures at risk • Critical Facilities: 1 fire station **Identified Impacts:** • Damage to homes caused by lightning may lead to a financial loss for residents and/ or injury or loss of life in a house fire or electrical shock			

Dayton			
Planning Area (Sq. mi):	11	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although there have been no recorded events in the jurisdiction the probability may be similar to Hardin; the only jurisdiction that has had a lightning strike in the county. Hardin's probability is: Unlikely; 6 percent chance the event will occur in a year.			
Extent: According to NOAA's Severe Weather Data Inventory the entire planning area could see more than 17 flashes of lighting per event			
Identified Vulnerabilities: • 2,807 residential structures at risk • Critical facilities including: 2 correctional facilities, 2 fire stations, 3 electric substations, 2 EMS, 8 schools, 1 police station, 4 shelters, 6 toxic release sites, 1 waste water treatment facility **Identified Impacts:** • 39 critical facilities could lose power or catch on fire if lightning strikes; this may slow down first responders and allow for greater loss of life, injury, or property damage particularly when lighting is accompanied by flooding or other hazardous events. • Damage to homes caused by lightning may lead to a financial loss for residents and/ or injury or loss of life in a house fire or electrical shock			

Plum Grove			
Planning Area (Sq. mi):	7.3	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although there have been no recorded events in the jurisdiction the probability may be similar to Hardin; the only jurisdiction that has had a lightning strike in the county. Hardin's probability is: Unlikely; 6 percent chance the event will occur in a year.			
Extent: According to NOAA's Severe Weather Data Inventory the entire planning area could see more than 17 flashes of lighting per event			
Identified Vulnerabilities: • 220 residential structures at risk • Critical facility including: 1 fire station **Identified Impacts:** • Damage to homes caused by lightning may lead to a financial loss for residents and/ or injury or loss of life in a house fire or electrical shock			

Hardin			
Planning Area (Sq. mi):	2.28	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although there have been no recorded events in the jurisdiction the probability may be similar to Hardin; the only jurisdiction that has had a lightning strike in the county. Hardin's probability is: Unlikely; 6 percent chance the event will occur in a year.			
Extent: According to NOAA's Severe Weather Data Inventory the entire planning area could see more than 17 flashes of lighting per event			
Identified Vulnerabilities: • 403 residential structures at risk • Critical facilities including: 1 fire station and 3 schools **Identified Impacts:** • 6 critical facilities could lose power or catch on fire if lightning strikes; this may slow down first responders and allow for greater loss of life, injury, or property damage particularly when lighting is • accompanied by flooding or other hazardous events. • Damage to homes caused by lightning may lead to a financial loss for residents and/ or injury or loss of life in a house fire or electrical shock			

Devers			
Planning Area (Sq. mi):	1.85	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although there have been no recorded events in the jurisdiction the probability may be similar to Hardin; the only jurisdiction that has had a lightning strike in the county. Hardin's probability is: Unlikely; 6 percent chance the event will occur in a year.			
Extent: According to NOAA's Severe Weather Data Inventory the entire planning area could see more than 17 flashes of lighting per event			
Identified Vulnerabilities: • 156 residential structures at risk • Critical facilities including: 1 fire station, 1 electric substation, 1 EMS, and 2 schools **Identified Impacts:** • 6 critical facilities could lose power or catch on fire if lightning strikes; this may slow down first responders and allow for greater loss of life, injury, or property damage particularly when lighting is accompanied by flooding or other hazardous events. • Damage to homes caused by lightning may lead to a financial loss for residents and/ or injury or loss of life in a house fire or electrical shock			

Dayton Lakes			
Planning Area (Sq. mi):	1	**Occurrences since 2000:**	0
Area Affected:	100%	**Annual Event Average:**	0
Probability: Although there have been no recorded events in the jurisdiction the probability may be similar to Hardin; the only jurisdiction that has had a lightning strike in the county. Hardin's probability is: Unlikely; 6 percent chance the event will occur in a year.			
Extent: According to NOAA's Severe Weather Data Inventory the entire planning area could see more than 17 flashes of lighting per event			
Identified Vulnerabilities: • 49 residential structures at risk **Identified Impacts:** • Damage to homes caused by lightning may lead to a financial loss for residents and/ or injury or loss of life in a house fire or electrical shock			

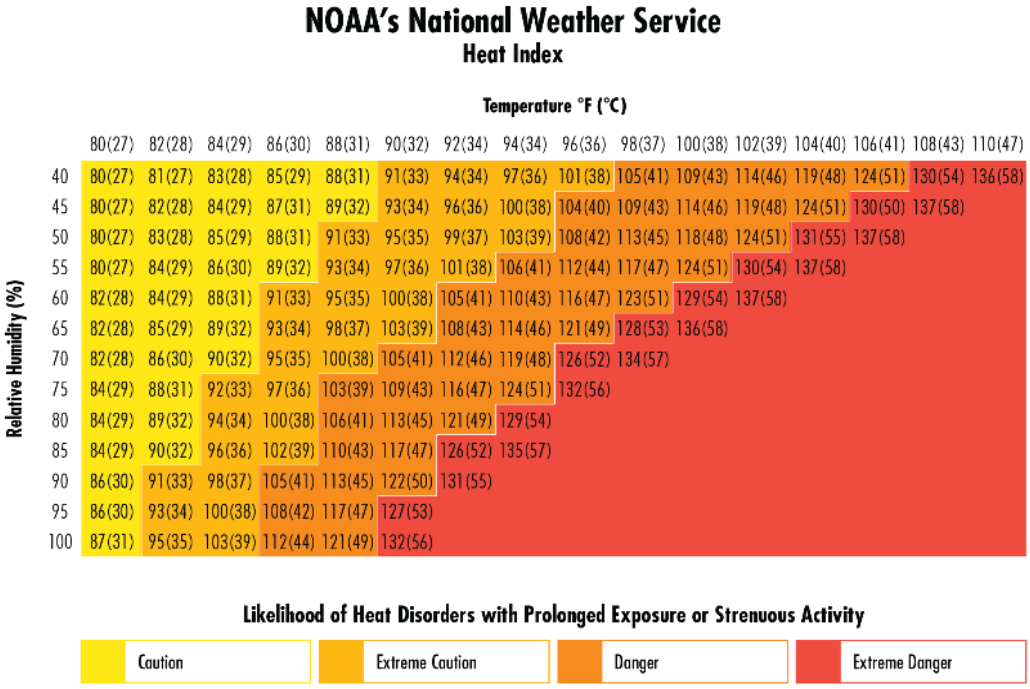
Daisetta			
Planning Area (Sq. mi):	1.47	**Occurrences since 2000:**	0
Area Affected:	100%	**Annual Event Average:**	0
Probability: Although there have been no recorded events in the jurisdiction the probability may be similar to Hardin; the only jurisdiction that has had a lightning strike in the county. Hardin's probability is: Unlikely; 6 percent chance the event will occur in a year.			
Extent: According to NOAA's Severe Weather Data Inventory the entire planning area could see more than 17 flashes of lighting per event			
Identified Vulnerabilities: • 400 residential structures at risk • Critical facilities including: 1 electric substation, 1 EMS, 1 school, 1 police station, 1 shelter, 1 toxic release facility, 1 fire department **Identified Impacts:** • 13 critical facilities could lose power or catch on fire if lightning strikes; this may slow down first responders and allow for greater loss of life, injury, or property damage particularly when lighting is accompanied by flooding or other hazardous events. • Damage to homes caused by lightning may lead to a financial loss for residents and/ or injury or loss of life in a house fire or electrical shock			

2017

Part 6.6: Heat Events

6.6 Heat Events

Fatalities or major impacts on human health occurring when ambient weather conditions meet heat advisory criteria are reported using the Heat Index (NCDC).



Historic Occurrence

June to August are the months that Liberty County could experience severe heat, with average temperatures between 90 and 100 degrees. According to NOAA's database no deaths were reported between 1950 to 2017 due to Heat Events, but the heat index reached dangerous levels on four dates. The highest temperatures reported in the county were above 105 degrees over several days in 2000 and 2009.

Date	Direct Deaths	Direct Injuries	Property Damage	Crop Damage	Notes
7/6/2000	0	0	0	0	Excessive heat impacted southeast Texas for much of the month of July. High temperatures ranged from 98 to 105 degrees daily during a 2-week period. Only traces of rainfall were observed during this period. Of the 19 heat related deaths reported during this period, 17 were in Harris County and 2 were in Galveston County. No deaths were reported in Liberty.
8/29/2000	0	0	0	0	Excessive heat occurred over southeast Texas during the last 3 days of August. High temperatures reached well over 100 degrees over inland areas. All 3 heat related deaths were in Harris County. No deaths were reported in Liberty.
9/1/2000	0	0	0	0	A record setting heat wave continued over southeast Texas through the first week of September 2000. A heat wave with temperatures of this duration and magnitude is unprecedented for southeast Texas. All 5 heat related deaths occurred in Harris County, none occurred in Liberty County.
6/24/2009	0	0	0	0	Hot, humid conditions led to heat indices above 105 degrees for several days in late June.

Hazard Analysis & Vulnerability Identification

The hazard analysis uses historic hazard event data to determine the probability of an event occurring within a given year. The analysis calculates the average number of events in each jurisdiction annually and then calculates the percent chance of the event occurring within a year. The hazard analysis also provides hazard extent data for each participating jurisdiction. The extent data is the most extreme data recorded during a storm or hazard event and represents the worst damage a jurisdiction has experienced in recent history. Information from stakeholders, FEMA, NOAA, and the Department of Homeland Security (DHS) are the sources of data for the analysis.

To identify vulnerabilities for each jurisdiction, this plan used the following methods:

- FEMA's Hazus analysis software
- Stakeholder identified vulnerabilities
- American Community Survey (ACS, 5-year, 2016) Data on building stock and residents

<table>
<tr><th colspan="3">All Participating Jurisdictions</th></tr>
<tr><td rowspan="2">Area Affected: Heat events are not contained to a specific boundary and past events are measured by county; this event can arise in all participating jurisdictions equally.</td><td>Occurrences since 2000:</td><td>4</td></tr>
<tr><td>Annual Event Average:</td><td>.24</td></tr>
<tr><td colspan="3">Probability: Very* Likely; A 24 percent chance of the event happening in the next year.

*Although the probability based on past occurrences appears low, participating jurisdictions at the public meeting voiced that all jurisdictions experience high temperatures and humidity particularly during summer months.</td></tr>
<tr><td colspan="3">Extent: Based on past occurrences recorded above, the highest temperature recorded for the planning area is above 105 degrees. The planning area can see temperatures above 110 degrees Fahrenheit to 120 degrees Fahrenheit.</td></tr>
<tr><td colspan="3">Vulnerabilities: While heat events have the potential to damage buildings and crops, vulnerable populations are most at risk in the county during these events. According to the Centers for Disease Control and Prevention (CDC), adults over 65 years of age, infants, children, individuals with chronic illnesses, low-income, outdoor workers, and athletes are the most vulnerable populations to heat related illnesses.

• Individuals throughout the county 18 years old or younger and 65 years and above
• Farmland throughout the county (631,021 acres in total)
• Any critical facility acting as a cooling facility or any correctional facility that may lose power due to brown outs due to high power demand</td></tr>
<tr><td colspan="3">Impacts:

• 631,021 acres in total throughout the county in farmland (accounting for 118,236,00 dollars in revenue) may be impacted resulting in financial loss for farmers and the county as a whole
• Serious illness or loss of life throughout the county</td></tr>
</table>

Liberty County (Unincorporated)			
Planning Area (Sq. mi):	500	**Occurrences since 2000:**	4
Area Affected:	100 %	**Annual Event Average:**	.24
Probability: Likely; A 24 percent chance of the event happening in the next year.			
Extent: Based on past occurrences recorded above, the highest temperature recorded for the planning area is above 105 degrees. The planning area can see temperatures above 110 degrees Fahrenheit to 120 degrees Fahrenheit.			
Identified Vulnerabilities: • Critical facilities including: 1 fire station, 1 shelter, 1 toxic release site, 1 EMS, 1 police station, and 1 school **Identified Impacts:** • Reliance on a single shelter, fire station and police station throughout the area may increase response time for first responders leading to a potential increase in serious injury or loss of life			

Ames			
Planning Area (Sq. mi):	3.17	**Occurrences since 2000:**	4
Area Affected:	100 %	**Annual Event Average:**	.24
Probability: Likely; A 24 percent chance of the event happening in the next year.			
Extent: Based on past occurrences recorded above, the highest temperature recorded for the planning area is above 105 degrees. The planning area can see temperatures above 110 degrees Fahrenheit to 120 degrees Fahrenheit.			
Identified Vulnerabilities: • 35.5 percent of population are individuals 18 years and younger (472 children) • 8.7 percent of population are individuals 65 and older (115 older individuals) • No Critical Facilities **Identified Impacts:** • 44 percent of the total population may face serious illness or health conditions due to high temperatures and humidity			

Cleveland			
Planning Area (Sq. mi):	4.8	**Occurrences since 2000:**	4
Area Affected:	100%	**Annual Event Average:**	.24
Probability: Likely; A 24 percent chance of the event happening in the next year.			
Extent: Based on past occurrences recorded above, the highest temperature recorded for the planning area is above 105 degrees. The planning area can see temperatures above 110 degrees Fahrenheit to 120 degrees Fahrenheit.			
Identified Vulnerabilities: • 30 percent of population are individuals 18 years and younger (2,364 children) • 11 percent of population are individuals 65 and older (867 older individuals) • Critical facilities including: 1 correctional facility, 2 fire stations, 1 electric substation, 1 EMS, 6 schools, 2 hospitals, 2 police stations, 5 shelters, 2 toxic release facilities, 1 water treatment plant **Identified Impacts:** • 41 percent of the total population may face serious illness or health conditions due to high temperatures and humidity			

Daisetta			
Planning Area (Sq. mi):	1.47	**Occurrences since 2000:**	4
Area Affected:	100%	**Annual Event Average:**	.24
Probability: Likely; A 24 percent chance of the event happening in the next year.			
Extent: Based on past occurrences recorded above, the highest temperature recorded for the planning area is above 105 degrees. The planning area can see temperatures above 110 degrees Fahrenheit to 120 degrees Fahrenheit.			
Identified Vulnerabilities: • 25 percent of population are individuals 18 years and younger (190 children) • 16 percent of population are individuals 65 and older (124 older individuals) • Critical facilities including: 1 electric substation, 1 EMS, 1 school, 1 police station, 1 shelter, 1 toxic release facility, and 1 fire station **Identified Impacts:** • 41 percent of the total population may face serious illness or health conditions due to high temperatures and humidity			

Dayton Lakes			
Planning Area (Sq. mi):	1	**Occurrences since 2000:**	4
Area Affected:	100 %	**Annual Event Average:**	.24
Probability: Likely; A 24 percent chance of the event happening in the next year.			
Extent: Based on past occurrences recorded above, the highest temperature recorded for the planning area is above 105 degrees. The planning area can see temperatures above 110 degrees Fahrenheit to 120 degrees Fahrenheit.			
Identified Vulnerabilities: • 18.6 percent of population are individuals 18 years and younger (13 children) • 53.9 percent of population are individuals 65 and older (38 older individuals) • No Critical facilities **Identified Impacts:** • 72.5 percent of the total population may face serious illness or health conditions due to high temperatures and humidity			

Devers			
Planning Area (Sq. mi):	1.85	**Occurrences since 2000:**	4
Area Affected:	100 %	**Annual Event Average:**	.24
Probability: Likely; A 24 percent chance of the event happening in the next year.			
Extent: Based on past occurrences recorded above, the highest temperature recorded for the planning area is above 105 degrees. The planning area can see temperatures above 110 degrees Fahrenheit to 120 degrees Fahrenheit.			
Identified Vulnerabilities: • 19.9 percent of population are individuals 18 years and younger (69 children) • 18.5 percent of population are individuals 65 and older (64 older individuals) • Critical facilities including: 1 fire station, 1 electric substation, 1 EMS, and 2 schools **Identified Impacts:** • 38.5 percent of the total population may face serious illness or health conditions due to high temperatures and humidity			

Dayton			
Planning Area (Sq. mi):	11	**Occurrences since 2000:**	4
Area Affected:	100 %	**Annual Event Average:**	.24
Probability: Likely; A 24 percent chance of the event happening in the next year.			
Extent: Based on past occurrences recorded above, the highest temperature recorded for the planning area is above 105 degrees. The planning area can see temperatures above 110 degrees Fahrenheit to 120 degrees Fahrenheit.			
Identified Vulnerabilities: • 30 percent of population are individuals 18 years and younger (2,256 children) • 11 percent of population are individuals 65 and older (832 older individuals) • Critical facilities including: 2 correctional facilities, 2 fire stations, 3 electric substations, 2 EMS, 8 schools, 1 police station, 4 shelters, 6 toxic release sites, 1 waste water treatment facility **Identified Impacts:** • 41 percent of the total population may face serious illness or health conditions due to high temperatures and humidity			

Hardin			
Planning Area (Sq. mi):	2.28	**Occurrences since 2000:**	4
Area Affected:	100 %	**Annual Event Average:**	.24
Probability: Likely; A 24 percent chance of the event happening in the next year.			
Extent: Based on past occurrences recorded above, the highest temperature recorded for the planning area is above 105 degrees. The planning area can see temperatures above 110 degrees Fahrenheit to 120 degrees Fahrenheit.			
Identified Vulnerabilities: • 29 percent of population are individuals 18 years and younger (252 children) • 20 percent of population are individuals 65 and older (178 older individuals) • Critical facilities including: 1 fire station and 3 schools **Identified Impacts:** • 49 percent of the total population may face serious illness or health conditions due to high temperatures and humidity			

Liberty			
Planning Area (Sq. mi):	35.4	**Occurrences since 2000:**	4
Area Affected:	100 %	**Annual Event Average:**	.24
Probability: Likely; A 24 percent chance of the event happening in the next year.			
Extent: Based on past occurrences recorded above, the highest temperature recorded for the planning area is above 105 degrees. The planning area can see temperatures above 110 degrees Fahrenheit to 120 degrees Fahrenheit.			
Identified Vulnerabilities: • 26.8 percent of population are individuals 18 years and younger (2,395 children) • 16.4 percent of population are individuals 65 and older (1,466 older individuals) • Critical facilities including: 1 correctional facility, 2 EMS, 4 schools, 2 fire stations, 3 police stations, 7 shelters, 4 toxic release sites, 1 hospital, 1 EOC, 1 power plant, 1 waste water treatment plant **Identified Impacts:** • 46 percent of the total population may face serious illness or health conditions due to high temperatures and humidity			

Kenefick			
Planning Area (Sq. mi):	1.5	**Occurrences since 2000:**	4
Area Affected:	100 %	**Annual Event Average:**	.24
Probability: Likely; A 24 percent chance of the event happening in the next year.			
Extent: Based on past occurrences recorded above, the highest temperature recorded for the planning area is above 105 degrees. The planning area can see temperatures above 110 degrees Fahrenheit to 120 degrees Fahrenheit.			
Identified Vulnerabilities: • 30 percent of population are individuals 18 years and younger (152 children) • 11 percent of population are individuals 65 and older (59 older individuals) • Critical facility including: 1 fire station **Identified Impacts:** • 41 percent of the total population may face serious illness or health conditions due to high temperatures and humidity			

North Cleveland			
Planning Area (Sq. mi):	2	**Occurrences since 2000:**	4
Area Affected:	100 %	**Annual Event Average:**	.24
Probability: Likely; A 24 percent chance of the event happening in the next year.			
Extent: Based on past occurrences recorded above, the highest temperature recorded for the planning area is above 105 degrees. The planning area can see temperatures above 110 degrees Fahrenheit to 120 degrees Fahrenheit.			
Identified Vulnerabilities: • 38 percent of population are individuals 18 years and younger (97 children) • 25 percent of population are individuals 65 and older (66 older individuals) • Critical Facilities: 1 fire station **Identified Impacts:** • 63 percent of the total population may face serious illness or health conditions due to high temperatures and humidity			

Plum Grove			
Planning Area (Sq. mi):	7.3	**Occurrences since 2000:**	4
Area Affected:	100 %	**Annual Event Average:**	.24
Probability: Likely; A 24 percent chance of the event happening in the next year.			
Extent: Based on past occurrences recorded above, the highest temperature recorded for the planning area is above 105 degrees. The planning area can see temperatures above 110 degrees Fahrenheit to 120 degrees Fahrenheit.			
Identified Vulnerabilities: • 27 percent of population are individuals 18 years and younger (121 children) • 25 percent of population are individuals 65 and older (111 older individuals) • Critical facility including: 1 fire station **Identified Impacts:** • 52 percent of the total population may face serious illness or health conditions due to high temperatures and humidity			

2017

Part 6.7: Hail

6.7 Hail

NOAA's National Centers for Environmental Information (NCEI) intensity scale for hail is the typical way to measure the extent for hail storms. This scale considers the size of an individual piece of hail. A hail storm is considered severe if hail reaches one inch in diameter or roughly the size of a quarter.

Size	Hail Diameter (Inches)	Description
H0	1/4	Pea Size
H1	1/2	Small Marble Size
H2	¾	Penny or Large Marble Size
H3	7/8	Nickel Size
H4	1	Quarter Size
H5	1 ¼	Half Dollar Size
H6	1 ½	Walnut or Ping Pong Ball Size
H7	1 ¾	Golfball Size
H8	2	Hen Egg Size
H9	2 ½	Tennis Ball Size
H10	2 ¾	Baseball Size
H11	3	Teacup Size
H12	4	Grapefruit Size
H13	4 ½	Softball Size

Source: https://www.ncei.noaa.gov/

Historic Occurrences

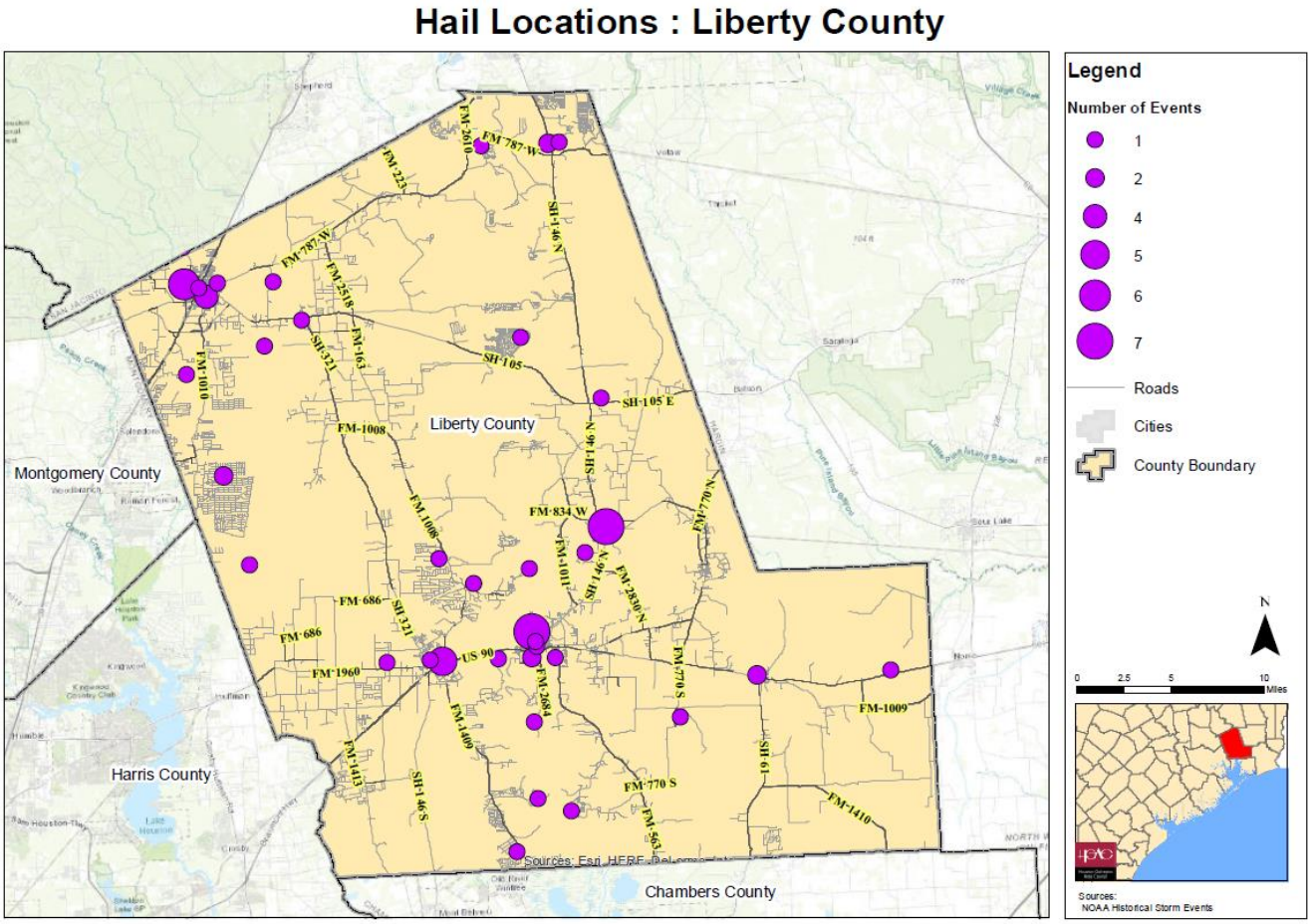
Since 2000, Liberty County experienced 36 hail events. Eleven were considered severe (quarter sized and above). Golf ball sized hail or size H7 is the largest size hail the County experienced, with four of the nine events having a magnitude of 1 ¾ inches. There was no recorded deaths, injuries, or crop damage in the past 17 years from hail.

Jurisdiction	Date	Magnitude	Property Damage	Jurisdiction	Date	Magnitude	Property Damage
Cleveland	3/26/2000	0.75	$10,000	**Liberty**	5/29/2005	1.75	$12,000
Devers	3/26/2000	0.75	$10,000	**Hardin**	11/21/2007	0.75	$5,000
Cleveland	4/2/2000	1	$15,000	**Cleveland**	12/20/2007	1	$ -
Liberty	4/2/2000	0.75	$10,000	**Cleveland**	6/25/2008	0.75	$ -
Hardin	4/23/2000	0.75	$10,000	**Cleveland**	3/27/2009	1	$1,000
Plum Grove	3/14/2001	0.75	$5,000	**Cleveland**	3/27/2009	1.75	$15,000
Hardin	5/12/2001	0.75	$2,000	**Dayton**	3/27/2009	1.75	$3,000
Dayton	12/13/2001	0.75	$ -	**Liberty**	3/27/2009	1.75	$4,000
Dayton	2/14/2003	0.75	$1,000	**Dayton**	4/17/2009	0.75	$ -
Hardin	2/14/2003	0.75	$1,000	**Liberty**	4/17/2009	0.75	$-
Cleveland	2/21/2003	0.75	$5,000	**Kenefick**	5/30/2010	1.75	$5,000
Cleveland	2/21/2003	0.75	$5,000	**Cleveland**	5/25/2011	3	$ -
Cleveland	2/21/2003	1.25	$8,000	**Cleveland**	5/25/2011	4	$10,000
Hardin	6/2/2003	1.75	$3,000	**Liberty**	4/2/2012	1	$2,000
Hardin	6/2/2003	1.75	$3,000	**Cleveland**	5/22/2013	1.75	$7,000
Plum Grove	4/10/2004	0.88	$10,000	**Liberty**	6/6/2013	1.75	$ -
Cleveland	6/4/2004	0.75	$10,000	**Cleveland**	10/12/2014	1.25	$-
Hardin	5/29/2005	1.75	$10,500	**Hardin**	4/29/2017	1	$-

Source: https://www.ncdc.noaa.gov/stormevents/

Hail Location Map

Location and quantity of hail events that have occurred throughout the County from 2002 to present.



Hazard Analysis & Vulnerability Identification

The hazard analysis uses historic hazard event data to determine the probability of an event occurring again within a given year.

The hazard analysis also provides hazard extent data for each participating jurisdiction. The extent data is the most extreme data recorded during a storm or hazard event and represents the worst damage a jurisdiction has experienced in recent history. Information from stakeholders, ACS, and NOAA are the sources of data for the analysis.

To identify vulnerabilities for each jurisdiction, this plan used the following methods:

- American Community Survey (ACS, 2016, 5-year) data on residential buildings
- GIS analysis of structures and critical facilities exposed to hail damage; and
- Stakeholder identified vulnerabilities

Liberty County (Unincorporated)			
Planning Area (Sq. mi):	500	**Occurrences since 2000:**	4
Area Affected:	100 %	**Annual Event Average:**	.24
Probability: Although the jurisdiction has no recorded events, the jurisdiction is near Cleveland. Perhaps the jurisdiction's probability is similar to Cleveland's: Very Likely; A 82 percent chance of the event happening in the next year.			
Extent: Similarly, Cleveland's extent is: According to past events, the jurisdiction has recorded 4-inch hail (H12); the jurisdiction could see H13 hail in the future.			
Identified Vulnerabilities: • Critical facilities including: 1 fire station, 1 shelter, 1 toxic release site, 1 EMS, 1 police station, and 1 school • Vulnerable populations (Identified in Part 3) throughout the county **Identified Impacts:** • Reliance on a single shelter, fire station and police station throughout the area may increase response time for first responders during car accidents leading to a potential increase in serious injury or loss of life • Damage to critical facility equipment, including ambulances or fire trucks, left out in the open may impede first responders leading to an increase in serious injury, loss of life, or financial loss for the jurisdiction • A financial loss for individuals whose property is damaged due to hail			

Ames			
Planning Area (Sq. mi):	3.17	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0

Probability: Although the jurisdiction has no recorded events, the jurisdiction is near Cleveland. Perhaps the jurisdiction's probability is similar to Cleveland's: Very Likely; A 82 percent chance of the event happening in the next year.

Extent: Similarly, Cleveland's extent is: According to past events, the jurisdiction has recorded 4-inch hail (H12); the jurisdiction could see H13 hail in the future.

Identified Vulnerabilities:

- 414 residential structures at risk
- No Critical facilities

Identified Impacts:

- Reliance on other jurisdiction's first responders may impede response time and lead to increase loss of life or serious injury
- Financial loss for individuals whose homes or cars are damaged due to the event
- Economic or financial loss for the jurisdiction due to public facilities that may be damaged

Cleveland			
Planning Area (Sq. mi):	4.8	**Occurrences since 2000:**	14
Area Affected:	100%	**Annual Event Average:**	.82

Probability: Very Likely; A 82 percent chance of the event happening in the next year.

Extent: According to past events, the jurisdiction has recorded 4-inch hail (H12); the jurisdiction could see H13 hail in the future.

Identified Vulnerabilities:

- 3,043 residential structures at risk
- Critical facilities including: 1 correctional facility, 2 fire stations, 1 electric substation, 1 EMS, 6 schools, 2 hospitals, 2 police stations, 5 shelters, 2 toxic release facilities, 1 water treatment plant

Identified Impacts:

- Damage to critical facilities and equipment including uncovered emergency vehicles may impede response time and lead to increase loss of life or serious injury
- Financial loss for individuals whose homes or cars are damaged due to the event
- Economic loss for the jurisdiction due to public facilities that may be damaged

Daisetta			
Planning Area (Sq. mi):	1.47	**Occurrences since 2000:**	0
Area Affected:	100%	**Annual Event Average:**	0

Probability: Although the jurisdiction has no recorded events, the jurisdiction is near Cleveland. Perhaps the jurisdiction's probability is similar to Cleveland's: Very Likely; A 82 percent chance of the event happening in the next year.

Extent: Similarly, Cleveland's extent is: According to past events, the jurisdiction has recorded 4-inch hail (H12); the jurisdiction could see H13 hail in the future.

Identified Vulnerabilities:

- 400 residential structures at risk
- Critical facilities including: 1 electric substation, 1 EMS, 1 school, 1 police station, 1 shelter, 1 toxic release facility, and 1 fire station

Identified Impacts:

- Damage to critical facilities and equipment including uncovered emergency vehicles may impede response time and lead to increase loss of life or serious injury
- Financial loss for individuals whose homes or cars are damaged due to the event
- Economic loss for the jurisdiction due to public facilities that may be damaged

Dayton Lakes			
Planning Area (Sq. mi):	1	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0

Probability: Although the jurisdiction has no recorded events, the jurisdiction is near Cleveland. Perhaps the jurisdiction's probability is similar to Cleveland's: Very Likely; A 82 percent chance of the event happening in the next year.

Extent: Similarly, Cleveland's extent is: According to past events, the jurisdiction has recorded 4-inch hail (H12); the jurisdiction could see H13 hail in the future.

Identified Vulnerabilities:

- 49 residential structures at risk
- No Critical facilities

Identified Impacts:

- Financial loss for individuals whose homes or cars are damaged due to the event
- Economic loss for the jurisdiction due to public facilities that may be damaged
- Reliance on other jurisdiction's first responders may impede response time and lead to increase loss of life or serious injury

Devers			
Planning Area (Sq. mi):	1.85	**Occurrences since 2000:**	1
Area Affected:	100 %	**Annual Event Average:**	.06
Probability: Unlikely; A 6 percent chance of the event happening in the next year.			
Extent: According to past events, the jurisdiction has recorded 3/4-inch hail (H2); the jurisdiction could see H3 to H4 hail in the future.			
Identified Vulnerabilities: • 156 residential structures at risk • Critical facilities including: 1 fire station, 1 electric substation, 1 EMS, and 2 schools **Identified Impacts:** • Damage to critical facilities and equipment including uncovered emergency vehicles may impede response time and lead to increase loss of life or serious injury • Financial loss for individuals whose homes or cars are damaged due to the event • Economic loss for the jurisdiction due to public facilities that may be damaged			

Dayton			
Planning Area (Sq. mi):	11	**Occurrences since 2000:**	4
Area Affected:	100 %	**Annual Event Average:**	.24
Probability: Likely; A 24 percent chance of the event happening in the next year.			
Extent: According to past events, the jurisdiction has recorded 1 3/4-inch hail (H7); the jurisdiction could see H8 to H9 hail in the future.			
Identified Vulnerabilities: • 2,807 residential structures at risk • Critical facilities including: 2 correctional facilities, 2 fire stations, 3 electric substations, 2 EMS, 8 schools, 1 police station, 4 shelters, 6 toxic release sites, 1 waste water treatment facility **Identified Impacts:** • Damage to critical facilities and equipment including uncovered emergency vehicles may impede response time and lead to increase loss of life or serious injury • Financial loss for individuals whose homes or cars are damaged due to the event • Economic loss for the jurisdiction due to public facilities that may be damaged			

Hardin			
Planning Area (Sq. mi):	2.28	**Occurrences since 2000:**	8
Area Affected:	100 %	**Annual Event Average:**	.48
Probability: Likely; A 48 percent chance of the event happening in the next year.			
Extent: According to past events, the jurisdiction has recorded 1 3/4-inch hail (H7); the jurisdiction could see H8 to H9 hail in the future.			
Identified Vulnerabilities: • 403 residential structures at risk • Critical facilities including: 1 fire station and 3 schools **Identified Impacts:** • Damage to critical facilities and equipment including uncovered emergency vehicles may impede response time and lead to increase loss of life or serious injury • Financial loss for individuals whose homes or cars are damaged due to the event • Economic loss for the jurisdiction due to public facilities that may be damaged			

Liberty			
Planning Area (Sq. mi):	35.4	**Occurrences since 2000:**	6
Area Affected:	100 %	**Annual Event Average:**	.35
Probability: Likely; A 35 percent chance of the event happening in the next year.			
Extent: According to past events, the jurisdiction has recorded 1 3/4-inch hail (H7); the jurisdiction could see H8 to H9 hail in the future.			
Identified Vulnerabilities: • 3,837 residential structures at risk • Critical facilities including: 1 correctional facility, 2 EMS, 4 schools, 2 fire stations, 3 police stations, 7 shelters, 4 toxic release sites, 1 hospital, 1 EOC, 1 power plant, 1 waste water treatment plant **Identified Impacts:** • Damage to critical facilities and equipment including uncovered emergency vehicles may impede response time and lead to increase loss of life or serious injury • Financial loss for individuals whose homes or cars are damaged due to the event • Economic loss for the jurisdiction due to public facilities that may be damaged			

Kenefick			
Planning Area (Sq. mi):	1.5	**Occurrences since 2000:**	1
Area Affected:	100 %	**Annual Event Average:**	.06
Probability: Unlikely; A 6 percent chance of the event happening in the next year.			
Extent: According to past events, the jurisdiction has recorded 3/4-inch hail (H2); the jurisdiction could see H3 to H4 hail in the future.			
Identified Vulnerabilities: • 174 residential structures at risk • Critical facility including: 1 fire station **Identified Impacts:** • Damage to critical facilities and equipment including uncovered emergency vehicles may impede response time and lead to increase loss of life or serious injury • Financial loss for individuals whose homes or cars are damaged due to the event • Economic loss for the jurisdiction due to public facilities that may be damaged			

North Cleveland			
Planning Area (Sq. mi):	2	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although the jurisdiction has no recorded events, the jurisdiction is near Cleveland. Perhaps the jurisdiction's probability is similar to Cleveland's: Very Likely; A 82 percent chance of the event happening in the next year.			
Extent: Similarly, Cleveland's extent is: According to past events, the jurisdiction has recorded 4-inch hail (H12); the jurisdiction could see H13 hail in the future.			
Identified Vulnerabilities: • 97 residential structures at risk • Critical Facilities: 1 fire station **Identified Impacts:** • Financial loss for individuals whose homes or cars are damaged due to the event • Economic loss for the jurisdiction due to public facilities that may be damaged			

Plum Grove			
Planning Area (Sq. mi):	7.3	**Occurrences since 2000:**	2
Area Affected:	100 %	**Annual Event Average:**	.12
Probability: Likely; 12 percent chance the event will occur in a year			
Extent: According to past events, the jurisdiction has recorded .88-inch hail (H3); the jurisdiction could see H4 to H5 hail in the future.			
Identified Vulnerabilities: • 220 residential structures at risk • Critical facility including: 1 fire station **Identified Impacts:** • Financial loss for individuals whose homes or cars are damaged due to the event • Economic loss for the jurisdiction due to public facilities that may be damaged			

2017

Part 6.8: Tornado

6.8 Tornado

Before 2007, tornadoes were ranked through the Fujita Scale. The Enhanced Fujita Scale replaced the Fujita Scale in 2007 and is a set of wind estimates (not measurements) based on damage. The higher the number the more intense the tornado. Both the Fujita Scale and the Enhanced Fujita Scale are below.

Fujita Scale			Enhanced Fujita Scale		
Scale	**Fastest 1/4 mile (mph)**	**3 second gust (mph)**	**EF Number**	**3 Second Gust (mph)**	**Typical Damage**
F0	40-72	45-78	0	65-85	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
F1	73-112	79-117	1	86-109	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
F2	113-157	118-161	2	110-137	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-207	162-209	3	138-167	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 blown away some distance.
F4	208-260	210-261	4	168-199	Devastating damage. Whole frame houses Well-constructed houses and whole frame houses completely leveled; cars thrown, and small missiles generated.
F5	261-318	262-317	5	200-234	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly more than 109 yards; high-rise buildings have significant structural deformation; incredible phenomena will occur.

Source: http://www.spc.noaa.gov/

Historic Occurrences

Recorded data from NCDC is listed below. The only reported crop damage in the past 17 years was in 2017 when $7,000 in crop damage was reported in incorporated Liberty County. No deaths were reported. However, one injury was reported in Cleveland in October 2011.

Jurisdiction	Date		Property Damage ($)	Notes
Dayton	5/19/2000	F0	25,000	Trees down.
Dayton	10/12/2001	F0	40,000	Sheriff's office reported a tornado touched down near FM 686 and FM 321 and moved east toward Highway 90. Damage to a business and the roof of a trailer was reported, as well as trees and power lines down.
Dayton	11/26/2001	F0	20,000	A tornado touched down in Dayton, at Highway 321 and FM 1008, damaging a county equipment barn roof on Sawmill Road, and ripping down power lines.
Dayton	10/28/2002	F1	185,000	Four mobile homes sustained damage with one receiving major damage.
Liberty	12/23/2002	F0	30,000	Building damaged.
Unincorporated	6/2/2003	F0	0	No damage.
Unincorporated	10/9/2003	F0	1,000	Tornado downed power lines across Highway 90.
Unincorporated	11/17/2003	F0	10,000	Tornado downed some trees as it touched down along Highway 563.
Unincorporated	11/17/2003	F1	30,000	Tornado downed trees and severely damaged a garage.
Dayton	7/7/2004	F0	3,000	Tornado touchdown in wooded area between FM 1409 and FM 146 in the Westlake area.
Liberty	11/23/2004	F0	0	This tornado occurred over open land and caused no damage.
Unincorporated	4/29/2006	F0	5,000	Tornado downed trees and power lines along CR2863 in the Horseshoe Lakes Estates Subdivision near Rye.
Liberty	4/29/2006	F1	60,000	Tornado caused extensive damage along CR 143 off of FM 563. Major roof damage to area homes with numerous trees and power lines down.
Cleveland	3/27/2009	EF0	35,000	There was a brief tornado in Cleveland in which witnesses observed a funnel cloud with swirling dust and debris at the surface. A loosely-attached roof was lifted from a business and carried 50 yards into a hospital parking lot. The windows of another business were blown out.
Unincorporated	5/25/2011	EF0	0	Tornado that was observed by the public caused little or no damage.
Kenefick	5/25/2011	EF0	5,000	Tornado downed trees that blocked some streets on FM 1008.
Cleveland	10/12/2011	EF0	25,000	Tornado touchdown near FM 163 and SH 321. Damage was intermittent along a path from that point to near the intersection of FM 2286 and FM 2287 where a trailer was overturned and one woman was injured.
Kenefick	6/27/2014	EF0	15,000	A brief tornado downed trees that caused minor damage to a home, its carport and garage.
Cleveland	6/27/2014	EF0	0	The local law enforcement reported a tornado just east of the municipal airport.
Unincorporated	12/27/2014	EF0	10,000	Tornado damage was found approximately one mile west of CR 2117 and SH 146. There was damage to trees and power lines. One roof was torn off a mobile home.
Unincorporated	3/29/2017	EF0	0	An EF-0 tornado downed large trees along County Road 3740.

Source: https://www.ncdc.noaa.gov/stormevents/

Hazard Analysis & Vulnerability Identification

The hazard analysis uses historic hazard event data to determine the probability of an event occurring again within a given year. The analysis calculates the average number of events in each jurisdiction annually and then calculates the percent chance of the event occurring within a year.

The hazard analysis also provides hazard extent data for each participating jurisdiction. The extent data is the most extreme data recorded during a storm or hazard event and represents the worst damage a jurisdiction has experienced in recent history. Information from stakeholders and NOAA are the sources of data for the analysis.

To identify vulnerabilities for each jurisdiction, this plan used the following methods:

- American Community Survey (5-year, 2016)
- GIS analysis of structures exposed to tornado damage; and
- Stakeholder identified vulnerabilities.

Liberty County (All participating jurisdictions)

Identified Vulnerabilities:

Similar to the hurricane section, this section identifies vulnerabilities from high winds. High winds can tear down powerlines, trees, barns, fences, and multitude of other debris can be blown into roadways and homes during the event.

Additionally, residences and commercial buildings could be damaged or destroyed due to wind events; older residential neighborhoods and structures without a permanent foundation were identified as one of the main vulnerabilities throughout the county. While current building codes address the vulnerability of wind damage to structures, older buildings (particularly residential buildings) were built when less stringent building codes were in place; therefore, older residential building and residences without a permanent foundation are a focus in this section.

- Critical facilities and older structures throughout the county (Identified by jurisdiction below)
- Smaller communities that rely on the county or surrounding jurisdiction's first responders

Identified Impacts:

- Downed powerlines could impact communication and daily active leading to a finical loss for the county, cities and individuals, and could impede first responders from reaching those in need or residents evacuating
- Strong winds could prevent first responders from traveling to assist individuals, because of unsafe driving conditions such as debris hitting emergency vehicles
- Critical facilities could sustain wind damage, potentially delaying first responders reaching those in need and city services during and after the event
- Economic and financial loss for cities and individuals including property loss

Liberty County (Unincorporated)			
Planning Area (Sq. mi):	500	**Occurrences since 2000:**	8
Area Affected:	100 %	**Annual Event Average:**	.47
Probability: Likely; 47 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced an F1 tornado; the jurisdiction could experience an EF2 to EF3 in the future			
Identified Vulnerabilities: • Critical facilities including: 1 fire station, 1 EMS, 1 shelter, 1 school, 1 police station, 1 toxic release site **Identified Impacts:** • Reliance on a single shelter, fire station and police station throughout the area may increase response time for first responders leading to a potential increase in serious injury or loss of life			

Ames			
Planning Area (Sq. mi):	3.17	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although the jurisdiction has no recorded events, the jurisdiction is near Dayton. Perhaps the jurisdiction's probability is similar: Likely; 29 percent chance the event will occur in a year			
Extent: Similarly, Dayton's extent is: According to past events the jurisdiction has experienced an F1 tornado; the jurisdiction could experience an EF2 to EF3 in the future			
Identified Vulnerabilities: • 233 Residential buildings built before 1980 (56.2% of housing stock) • 89 Mobile Homes (21.5% of housing stock) • 4 Boats/ RVs/ Vans acting as main housing (1 % of housing stock) • No Critical Facilities **Identified Impacts:** • Almost 79 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Cleveland			
Planning Area (Sq. mi):	4.8	**Occurrences since 2000:**	3
Area Affected:	100%	**Annual Event Average:**	.18
Probability: Likely; 18 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced an EFO tornado. The jurisdiction could expect an EF1 to EF2 tornado.			
Identified Vulnerabilities: • 2,158 Residential buildings built before 1980 (70.9 % of housing stock) • 377 Mobile Homes (12.4% of housing stock) **Identified Impacts:** • Almost 84 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction. • Critical facilities including: 1 correctional facility, 2 fire stations, 1 electric substation, 1 EMS, 6 schools, 2 hospitals, 2 police stations, 5 shelters, 2 toxic release facilities, 1 water treatment plant			

Daisetta			
Planning Area (Sq. mi):	1.47	**Occurrences since 2000:**	0
Area Affected:	100%	**Annual Event Average:**	0
Probability: Although the jurisdiction has no recorded events, the jurisdiction is near Dayton. Perhaps the jurisdiction's probability is similar: Likely; 29 percent chance the event will occur in a year			
Extent: Similarly, Dayton's extent is: According to past events the jurisdiction has experienced an F1 tornado; the jurisdiction could experience an EF2 to EF3 in the future			
Identified Vulnerabilities: • 266 Residential buildings built before 1980 (66.7 % of housing stock) • 98 Mobile Homes (25% of housing stock) • Critical facilities including: 1 electric substation, 1 EMS, 1 school, 1 police station, 1 shelter, 1 toxic release facility, 1 fire department **Identified Impacts:** • Almost 92 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Dayton Lakes			
Planning Area (Sq. mi):	1	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although the jurisdiction has no recorded events, the jurisdiction is near Dayton. Perhaps the jurisdiction's probability is similar: Likely; 29 percent chance the event will occur in a year			
Extent: Similarly, Dayton's extent is: According to past events the jurisdiction has experienced an F1 tornado; the jurisdiction could experience an EF2 to EF3 in the future			
Identified Vulnerabilities: • 43 Residential buildings built before 1980 (87.7 % of housing stock) • 2 Mobile Homes (4.1% of housing stock) • No critical facilities **Identified Impacts:** • Almost 92 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Devers			
Planning Area (Sq. mi):	1.85	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although the jurisdiction has no recorded events, the jurisdiction is near Dayton. Perhaps the jurisdiction's probability is similar: Likely; 29 percent chance the event will occur in a year			
Extent: Similarly, Dayton's extent is: According to past events the jurisdiction has experienced an F1 tornado; the jurisdiction could experience an EF2 to EF3 in the future			
Identified Vulnerabilities: • 102 Residential buildings built before 1980 (65.5 % of housing stock) • 31 Mobile Homes (19.9% of housing stock) • Critical facilities including: 1 fire station, 1 electric substation, 1 EMS, and 2 schools **Identified Impacts:** • Almost 86 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Dayton			
Planning Area (Sq. mi):	11	**Occurrences since 2000:**	5
Area Affected:	100 %	**Annual Event Average:**	.29
Probability: Likely; 29 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced an F1 tornado; the jurisdiction could experience an EF2 to EF3 in the future			
Identified Vulnerabilities: • 1,563 Residential buildings built before 1980 (55.6 % of housing stock) • 313 Mobile Homes (11.2% of housing stock) • 48 Boats/ RVs/ Vans acting as main housing (1.7 % of housing stock) • Critical facilities including: 2 correctional facilities, 2 fire stations, 3 electric substations, 2 EMS, 8 schools, 1 police station, 4 shelters, 6 toxic release sites, 1 waste water treatment facility **Identified Impacts:** • Almost 69 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Hardin			
Planning Area (Sq. mi):	2.28	**Occurrences since 2000:**	2
Area Affected:	100 %	**Annual Event Average:**	.07
Probability: Although the jurisdiction has no recorded events, the jurisdiction is near Dayton. Perhaps the jurisdiction's probability is similar: Likely; 29 percent chance the event will occur in a year			
Extent: Similarly, Dayton's extent is: According to past events the jurisdiction has experienced an F1 tornado; the jurisdiction could experience an EF2 to EF3 in the future			
Identified Vulnerabilities: • 255 Residential buildings built before 1980 (63.2 % of housing stock) • 142 Mobile Homes (35.2 % of housing stock) • 3 Boats/ RVs/ Vans acting as main housing (.7 % of housing stock) • Critical facilities including: 1 fire station and 3 schools **Identified Impacts:** • Almost 69 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Liberty			
Planning Area (Sq. mi):	35.4	**Occurrences since 2000:**	3
Area Affected:	100 %	**Annual Event Average:**	.18
Probability: Likely; 18 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced an F1 tornado; the jurisdiction could experience an EF2 to EF3 in the future			
Identified Vulnerabilities: • 2,948 Residential buildings built before 1980 (76.8 % of housing stock) • 413 Mobile Homes (10.8 % of housing stock) • 25 Boats/ RVs/ Vans acting as main housing (.7 % of housing stock) • Critical facilities including: 1 correctional facility, 2 EMS, 4 schools, 2 fire stations, 3 police stations, 7 shelters, 4 toxic release sites, 1 hospital, 1 EOC, 1 power plant, 1 waste water treatment plant **Identified Impacts:** • Almost 90 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Kenefick			
Planning Area (Sq. mi):	1.5	**Occurrences since 2000:**	1
Area Affected:	100 %	**Annual Event Average:**	.06
Probability: Unlikely; 6 percent chance the event will occur in a year			
Extent: According to past events the jurisdiction has experienced an EF0 tornado; the jurisdiction could experience an EF1 to EF2 in the future			
Identified Vulnerabilities: • 98 Residential buildings built before 1980 (56.3 % of housing stock) • 90 Mobile Homes (51.7 % of housing stock) • 8 Boats/ RVs/ Vans acting as main housing (4.6 % of housing stock) • Critical facility including: 1 fire station **Identified Impacts:** • Approximately 100 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

North Cleveland			
Planning Area (Sq. mi):	2	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although the jurisdiction has no recorded events, the jurisdiction is near Dayton. Perhaps the jurisdiction's probability is similar: Likely; 29 percent chance the event will occur in a year			
Extent: Similarly, Dayton's extent is: According to past events the jurisdiction has experienced an F1 tornado; the jurisdiction could experience an EF2 to EF3 in the future			
Identified Vulnerabilities: • 67 Residential buildings built before 1980 (69.1 % of housing stock) • 42 Mobile Homes (43.3 % of housing stock) • 10 Boats/ RVs/ Vans acting as main housing (10.3 % of housing stock) • Critical Facilities: 1 fire station **Identified Impacts:** • Approximately 100 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

Plum Grove			
Planning Area (Sq. mi):	7.3	**Occurrences since 2000:**	0
Area Affected:	100 %	**Annual Event Average:**	0
Probability: Although the jurisdiction has no recorded events, the jurisdiction is near Dayton. Perhaps the jurisdiction's probability is similar: Likely; 29 percent chance the event will occur in a year			
Extent: Similarly, Dayton's extent is: According to past events the jurisdiction has experienced an F1 tornado; the jurisdiction could experience an EF2 to EF3 in the future			
Identified Vulnerabilities: • 101 Residential buildings built before 1980 (45.9 % of housing stock) • 57 Mobile Homes (25.9 % of housing stock) • Critical facility including: 1 fire station **Identified Impacts:** • Approximately 72 percent of the housing stock was either built before 1980 or does not have a permanent foundation; this may lead to an increase in home damage, a financial loss for residents, and potential increase in serious injuries or loss of life throughout the jurisdiction.			

2017

Part 6.9: Expansive Soils

6.9 Expansive Soils

The chart below shows the Linear Extensibility Percent (LEP) and Coefficient of Linear Extent (COLE) to show the Shrink-Swell Class of expansive soils. COLE is a test frequently used to characterize expansive soils. COLE is a measure expressed as a fraction of the change in a soil sample dimension from the moist to dry state. The LEP is a measure expressed as a percentage of the change in a soil sample dimension from the moist to dry state. The Shrink-Swell Class is found in comparing these two measurements. A Moderate to Very High rating marks soils that have the potential to contract and expand, leading to broken foundations and water pipes, for example.

Shrink-Swell Class	Linear Extensibility Percent (LEP)	Coefficient of Linear Extent (COLE)
Low	3	0.03
Moderate	3 to 6	.03-.06
High	6 to 9	.06-.09
Very High	Greater than or equal to 9	Greater than or equal to 0.09

Source: https://www.nrcs.usda.gov

Liberty County Expansive Soils Data

Jurisdiction	Low Swelling Potential	Moderate Swelling Potential	High Swelling Potential
Unincorporated Liberty County	15%	15%	70%
Ames	45%	15%	45%
Cleveland	75%	25%	5%
Daisetta	5%	5%	90%
Liberty	60%	20%	20%
Dayton	10%	50%	40%
Dayton Lakes	15%	15%	70%
Devers	30%	60%	10%
Hardin	70%	20%	10%
Kenefick	15%	15%	30%
North Cleveland	80%	10%	10%
Plum Grove	80%	15%	5%

Historic Occurrences

There have been no reported past occurrences of soil subsidence throughout the entire county.

Hazard Analysis & Vulnerability Identification

The hazard analysis provides hazard extent data for each participating jurisdiction. The extent data is the most extreme data recorded during a storm or hazard event and represents the worst damage a jurisdiction has experienced in recent history. Information from stakeholders, USDA's Natural Resource Conservation Services**,** and H-GAC's critical facilities database were used for this analysis.

To identify vulnerabilities for each jurisdiction, this plan used the following methods:

- GIS analysis of structures within the high to very high shrink swell classes; and
- Stakeholder identified vulnerabilities.

High to Very High shrink swell classes marks soils that have the potential to contract and expand. This can lead to broken foundations and water pipes, and will be used to measure the area effected in the hazard impact analysis.

Liberty County (All Jurisdictions)

Identified Vulnerabilities:

Broken foundations and water pipes in commercial and residential buildings and public property. While newer buildings can be impacted; older buildings including critical facilities and homes are more likely to be impacted; this is due to older buildings being exposed to numerous weather events and seasons, having building standards that do not take expansive soils into account, and the lack of engineering solutions to mitigate expansive soils in the past. Therefore, the vulnerabilities focus on older buildings in each of the jurisdictions.

Identified Impacts:

Jurisdictions can be impacted by expensive financial costs to repair foundations and water lines for public facilities. School districts, home owners, and business owners could also be impacted by broken pipes, cracked foundations, and other structural repairs caused by expanding and contracting soils. Pipes in critical facilities may also lead to a loss of service, or damaged roads/bridges can increase response time to get to someone in need.

Liberty County (Unincorporated)

Planning Area (Sq. mi):	500	**Occurrences since 2000:**	0
Area Affected:	70 %	**Annual Event Average:**	0

Probability: Likely; Although there have been no past recorded occurrences the type of soil is still present throughout the jurisdiction.

Extent: The county has experienced high shrink swell class in the past; the county could experience high shrink swell class in the future.

Identified Vulnerabilities:

- Critical facilities including: 1 fire station, 1 EMS, 1 shelter, 1 school, 1 police station, 1 toxic release site

Identified Impacts:

- Critical facilities and homes throughout the jurisdiction could experience cracked foundations and pipes leading to a financial loss for the county and residents throughout the planning area

Ames			
Planning Area (Sq. mi):	3.17	**Occurrences since 2000:**	0
Area Affected:	45%	**Annual Event Average:**	0

Probability: Likely; Although there have been no past recorded occurrences the type of soil is still present throughout the jurisdiction.

Extent: The jurisdiction has experienced high shrink swell class in the past; the jurisdiction could experience high shrink swell class in the future.

Identified Vulnerabilities:

- 414 residential structures at risk
- No Critical Faculties

Identified Impacts:

- Public buildings and homes throughout the jurisdiction could experience cracked foundations and pipes leading to a financial loss for the jurisdiction and residents throughout the planning area

Cleveland			
Planning Area (Sq. mi):	4.8	**Occurrences since 2000:**	0
Area Affected:	75%	**Annual Event Average:**	0

Probability: Likely; Although there have been no past recorded occurrences the type of soil is still present throughout the jurisdiction.

Extent: The jurisdiction has experienced high shrink swell class in the past; the jurisdiction could experience high shrink swell class in the future.

Identified Vulnerabilities:

- 3,043 residential structures at risk
- Critical facilities including: 1 correctional facility, 2 fire stations, 1 electric substation, 1 EMS, 6 schools, 2 hospitals, 2 police stations, 5 shelters, 2 toxic release facilities, 1 water treatment plant

Identified Impacts:

- Critical facilities and homes throughout the jurisdiction could experience cracked foundations and pipes leading to a financial loss for the jurisdiction and residents throughout the jurisdiction

Kenefick			
Planning Area (Sq. mi):	1.5	**Occurrences since 2000:**	0
Area Affected:	30%	**Annual Event Average:**	0
Probability: Likely; Although there have been no past recorded occurrences the type of soil is still present throughout the jurisdiction.			
Extent: The jurisdiction has experienced high shrink swell class in the past; the jurisdiction could experience high shrink swell class in the future.			
Identified Vulnerabilities: • 174 residential structures at risk • Critical facility including: 1 fire station **Identified Impacts:** • Homes throughout the jurisdiction could experience cracked foundations and pipes leading to a financial loss for the jurisdiction and residents throughout the jurisdiction			

Liberty			
Planning Area (Sq. mi):	35.4	**Occurrences since 2000:**	0
Area Affected:	20 %	**Annual Event Average:**	0
Probability: Likely; Although there have been no past recorded occurrences the type of soil is still present throughout the jurisdiction.			
Extent: The jurisdiction has experienced high shrink swell class in the past; the jurisdiction could experience high shrink swell class in the future.			
Identified Vulnerabilities: • 3,837 residential structures at risk • Critical facilities including: 1 correctional facility, 2 EMS, 4 schools, 2 fire stations, 3 police stations, 7 shelters, 4 toxic release sites, 1 hospital, 1 EOC, 1 power plant, 1 waste water treatment plant **Identified Impacts:** • Critical facilities and homes throughout the jurisdiction could experience cracked foundations and pipes leading to a financial loss for the jurisdiction and residents throughout the jurisdiction			

North Cleveland			
Planning Area (Sq. mi):	2	**Occurrences since 2000:**	0
Area Affected:	10%	**Annual Event Average:**	0
Probability: Likely; Although there have been no past recorded occurrences the type of soil is still present throughout the jurisdiction.			
Extent: The jurisdiction has experienced high shrink swell class in the past; the jurisdiction could experience high shrink swell class in the future.			
Identified Vulnerabilities: • 97 residential structures at risk • Critical Facilities: 1 fire station **Identified Impacts:** • Homes throughout the jurisdiction could experience cracked foundations and pipes leading to a financial loss for the jurisdiction and residents throughout the jurisdiction			

Dayton			
Planning Area (Sq. mi):	11	**Occurrences since 2000:**	0
Area Affected:	40 %	**Annual Event Average:**	0
Probability: Likely; Although there have been no past recorded occurrences the type of soil is still present throughout the jurisdiction.			
Extent: The jurisdiction has experienced high shrink swell class in the past; the jurisdiction could experience high shrink swell class in the future.			
Identified Vulnerabilities: • 2,807 residential structures at risk • Critical facilities including: 2 correctional facilities, 2 fire stations, 3 electric substations, 2 EMS, 8 schools, 1 police station, 4 shelters, 6 toxic release sites, 1 waste water treatment facility **Identified Impacts:** • Critical facilities and homes throughout the jurisdiction could experience cracked foundations and pipes leading to a financial loss for the jurisdiction and residents throughout the jurisdiction			

Plum Grove			
Planning Area (Sq. mi):	7.3	**Occurrences since 2000:**	0
Area Affected:	5 %	**Annual Event Average:**	0
Probability: Likely; Although there have been no past recorded occurrences the type of soil is still present throughout the jurisdiction.			
Extent: The jurisdiction has experienced high shrink swell class in the past; the jurisdiction could experience high shrink swell class in the future.			
Identified Vulnerabilities: • 220 residential structures at risk • Critical facility including: 1 fire station **Identified Impacts:** • Homes throughout the jurisdiction could experience cracked foundations and pipes leading to a financial loss for the jurisdiction and residents throughout the jurisdiction			

Hardin			
Planning Area (Sq. mi):	2.28	**Occurrences since 2000:**	0
Area Affected:	10 %	**Annual Event Average:**	0
Probability: Likely; Although there have been no past recorded occurrences the type of soil is still present throughout the jurisdiction.			
Extent: The jurisdiction has experienced high shrink swell class in the past; the jurisdiction could experience high shrink swell class in the future.			
Identified Vulnerabilities: • 403 residential structures at risk • Critical facilities including: 1 fire station, 1 EMS, 4 schools **Identified Impacts:** • Critical facilities and homes throughout the jurisdiction could experience cracked foundations and pipes leading to a financial loss for the jurisdiction and residents throughout the jurisdiction			

Devers			
Planning Area (Sq. mi):	1.85	**Occurrences since 2000:**	0
Area Affected:	10 %	**Annual Event Average:**	0

Probability: Likely; Although there have been no past recorded occurrences the type of soil is still present throughout the jurisdiction.

Extent: The jurisdiction has experienced high shrink swell class in the past; the jurisdiction could experience high shrink swell class in the future.

Identified Vulnerabilities:

- 156 residential structures at risk
- Critical facilities including: 1 fire station, 1 electric substation, 1 EMS, 2 schools

Identified Impacts:

- Critical facilities and homes throughout the jurisdiction could experience cracked foundations and pipes leading to a financial loss for the jurisdiction and residents throughout the jurisdiction

Dayton Lakes			
Planning Area (Sq. mi):	1	**Occurrences since 2000:**	0
Area Affected:	10%	**Annual Event Average:**	0

Probability: Likely; Although there have been no past recorded occurrences the type of soil is still present throughout the jurisdiction.

Extent: The jurisdiction has experienced high shrink swell class in the past; the jurisdiction could experience high shrink swell class in the future.

Identified Vulnerabilities:

- 49 residential structures at risk

Identified Impacts:

- Public structures and residential property throughout the jurisdiction could experience cracked foundations and pipes leading to a financial loss for the jurisdiction and residents throughout the jurisdiction

Daisetta			
Planning Area (Sq. mi):	1.47	**Occurrences since 2000:**	0
Area Affected:	5%	**Annual Event Average:**	0
Probability: Likely; Although there have been no past recorded occurrences the type of soil is still present throughout the jurisdiction.			
Extent: The jurisdiction has experienced high shrink swell class in the past; the jurisdiction could experience high shrink swell class in the future.			
Identified Vulnerabilities: • 400 residential structures at risk • Critical facilities including: 1 electric substation, 2 EMS, 1 school, 6 police stations, 1 shelter, 1 toxic release facility, 1 fire department **Identified Impacts:** • Homes throughout the jurisdiction could experience cracked foundations and pipes leading to a financial loss for the jurisdiction and residents throughout the jurisdiction			

2017

Part 7: Mitigation Strategy

Part 7: MITIGATION STRATEGY

The planning process, hazard analysis, and vulnerability assessment serve as a foundation for a meaningful hazard mitigation strategy. The mitigation strategy provides an outline for how the county and the local jurisdictions aim to address and reduce the risks associated with the natural hazards identified in the HMAP and reduce the potential impact on residents and structures identified through the Vulnerability Analysis. The mitigation strategy is divided into three sections the mission statement, goals and objectives, and the mitigation action plan. The mission statement provides the overall purpose of the mitigation strategy and the HMAP. The goals and objectives provide milestones for how the county aims to meet this purpose. The mitigation action plan details specific mitigation actions, or projects, programs, and polices the county aims to meet these goals and objectives.

Mission Statement

The HMAP aims to implement new policies, programs, and projects to reduce the risks and impacts associated with natural hazards, including public education and partnerships between local officials and residents.

Mitigation Goals

Based on the planning process and the vulnerability assessment, the planning team developed the following goals and objectives. The goals and objectives explain what is to be achieved through implementing the HMAP. These goals and objectives work with the mitigation actions to outline what the county aims to accomplish in the next five years.

Goal

Reduce the loss of life and personal and public property due to natural hazards

Objective

Develop and implement educational programs for residents and government officials addressing the importance of county mitigation projects and the need to incorporate new and improve existing local ordinances

Objective

Collaborate with public and private partners throughout the county to create and implement local ordinances and county level programs that act to minimize effects of hazards

Goal

Improve drainage throughout the county to reduce the impact of flooding and erosion on residents and structures

Objective

Acquire property within the 100 and 500-year floodplain throughout the county to reduce the impact of flooding

Objective

Widen existing culverts and create additional ditches and drainage ponds throughout the county

Mitigation Action Plan

The mitigation action plan explains the specific programs, policies, and projects that the county and the local jurisdictions aim to implement for the county to reach its HMAP objectives and goals. The mitigation action plan provides the details of each mitigation action including which local department will oversee implementing the actions, how the county or local jurisdiction plan to pay for these actions, and the estimated time for implementing these actions.

Prioritization of Mitigation Actions

For each action included in the mitigation action plan ten factors were considered when prioritizing actions within each jurisdiction; these include political and technical feasibility, social benefit, property protection and the mitigations action's ability to meet other community goals. This is based off FEMA's mitigation action evaluation worksheet (Appendix A). The highest scoring mitigation action was assigned the number 1, and the second highest was assigned 2, and so on for each jurisdiction. The cost benefit of each action was given based on the potential cost of the mitigation in comparison to the potential benefit of the completed project. The prioritized mitigation actions are listed below.

All Participating Jurisdictions

Jurisdiction:	All participating jurisdictions		**Action Number:**	A1
Hazard(s) Addressed:	Flooding, Hurricane, Wildfire, Drought, Lightning, Heat Events, Hail, Tornado, and Expansive Soils			
Project Title:	Educating public on mitigation techniques			
Project Description:	Implement an outreach and education campaign to educate the public on mitigation techniques for all hazards to reduce loss of life and property.			
Responsible Entity:	County Emergency Managers, All participating jurisdictions mayors and city councils			
Losses avoided:	Residents and business owners			
Cost Estimate:	7,000	**Timeframe:**	1 month	
Potential Funding Sources:	Local budget and salary, HMPG, Fire Prevention and Safety Grants	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	All participating jurisdictions		**Action Number:**	A2
Hazard(s) Addressed:	Hail, Tornado, Hurricane			
Project Title:	Retrofitting structures for hail and wind protection			
Project Description:	All participating jurisdictions will retrofit city and county owned structures with roofs that can withstand hail and high wind damage			
Responsible Entity:	County Emergency Coordinator, Participating Jurisdictions Representatives			
Losses avoided:	Buildings, residents, and city/ county employees in county and city buildings when a hail storm hits.			
Cost Estimate:	20,000	**Timeframe:**	48 months	
Potential Funding Sources:	HMGP, PDM, Local budgets	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	All participating jurisdictions		**Action Number:**	A3
Hazard(s) Addressed:	Wildfire			
Project Title:	Technical support for residents to reduce the risk of wildfire			
Project Description:	The county and partnering cities will provide incentives and technical support for property owners to reduce underbrush throughout the county to properly cut back trees, upgrade fences, and replace landscape materials with nonflammable materials			
Responsible Entity:	County's Emergency Management Coordinator			
Losses avoided:	Homes within the wild-urban interface and residents living within these areas			
Cost Estimate:	5,000	**Timeframe:**	3 months	
Potential Funding Sources:	HMPG, Current county and city budget/ staff time	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	All participating jurisdictions		**Action Number:**	P8
Hazard(s) Addressed:	Expansive Soils			
Project Title:	Drip irrigation			
Project Description:	All participating jurisdictions will install drip irrigation around critical facilities' foundations throughout the county. This action mitigates the damage that shrinking and expanding soils cause on foundations and pipes.			
Responsible Entity:	Emergency Coordinator			
Losses avoided:	Cost of repair to critical facilities' foundations, water and sewer lines.			
Cost Estimate:	$250,000	**Timeframe:**	12 months	
Potential Funding Sources:	HMGP, FP&S Grants	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	All participating jurisdictions		**Action Number:**	A4
Hazard(s) Addressed:	Heat Events			
Project Title:	Installing misting stations			
Project Description:	The county and partnering cities will install misting stations throughout city and county owned parks and property to help prevent heat related illness or loss of life			
Responsible Entity:	County Emergency Coordinator			
Losses avoided:	Loss of life; Especially the elderly and children in the county			
Cost Estimate:	3,000	**Timeframe:**	6 to 12 months	
Potential Funding Sources:	HMPG, current city and staff time	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	All participating jurisdictions		**Action Number:**	A5
Hazard(s) Addressed:	Drought			
Project Title:	Drought tolerant plants			
Project Description:	All participating jurisdictions will incorporate drought tolerant landscape design into all new county and city owned properties.			
Responsible Entity:	Emergency Coordinators for the county and partnering jurisdictions.			
Losses avoided:	Structures throughout the jurisdiction impacted by drought			
Cost Estimate:	$1,000	**Timeframe:**	3 months	
Potential Funding Sources:	Current staff time	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	All participating jurisdictions		**Action Number:**	A6
Hazard(s) Addressed:	Lightning			
Project Title:	Rebate program for lightning rods			
Project Description:	All participating jurisdictions will work to develop a program that offers reduced price lightning rods and technical assistance for homeowners throughout the county.			
Responsible Entity:	County Emergency Coordinator			
Losses avoided:	Homes and residents who could be affected by lightning throughout the county.			
Cost Estimate:	$150,000	**Timeframe:**	12 months	
Potential Funding Sources:	HMGP, FP&S Grants	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	All participating jurisdictions	**Action Number:**	A8
Hazard(s) Addressed:	Floods		
Project Title:	Updating Maps		
Project Description:	All participating jurisdictions will work to update floodway maps throughout the county. The updated floodway maps will also be made available to public.		
Responsible Entity:	County Emergency Coordinator		
Losses avoided:	Homes and residents (loss of life) who could be affected by flooding throughout the county		
Cost Estimate:	150,000	**Timeframe:**	12 months
Potential Funding Sources:	HMGP, FP&S Grants	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction Specific Mitigation Actions

Ames

Jurisdiction:	Ames	**Action Number:**	A1
Hazard(s) Addressed:	Floods		
Project Title:	Improve drainage system		
Project Description:	Widening culverts and ditches throughout the jurisdiction		
Responsible Entity:	County Emergency Coordinator and Mayor		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$500,000	**Timeframe:**	24-36 months
Potential Funding Sources:	USACE-Small Flood Control Projects, USDA NRCS-Emergency Watershed Protection Agency, TWDB (Development Fund II)-Texas Water Development Fund, USDA NRCS-Watershed Protection	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Ames	**Action Number:**	A2
Hazard(s) Addressed:	Hurricane and Tropical Storms, Floods, Wildfire		
Project Title:	Evacuation routes		
Project Description:	Implement a system that notifies public of evacuation routes		
Responsible Entity:	County Emergency Coordinator and Mayor		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$5,000	**Timeframe:**	24-36 months
Potential Funding Sources:	Local Commitment, Partnership with Public radio	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Ames		**Action Number:**	A3
Hazard(s) Addressed:	Floods, Hurricanes and Tropical Storms			
Project Title:	Education campaign.			
Project Description:	Conduct hurricane outreach and education campaign.			
Responsible Entity:	County Emergency Coordinator and Mayor			
Losses avoided:	Buildings, residents, and city/county employees in county and city			
Cost Estimate:	$5,000	**Timeframe:**	24-36 months	
Potential Funding Sources:	PDM, HMGP	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Ames		**Action Number:**	A4
Hazard(s) Addressed:	Heat Events			
Project Title:	Generators for Critical Facilities			
Project Description:	Purchase and provide back-up generators to all critical facilities throughout the jurisdiction			
Responsible Entity:	Mayor and County Emergency Coordinator			
Losses avoided:	Vulnerable populations and any city resident without power			
Cost Estimate:	$15,000	**Timeframe:**	12 months	
Potential Funding Sources:	HMPG	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Ames	**Action Number:**	A5
Hazard(s) Addressed:	Wildfire		
Project Title:	Education campaign.		
Project Description:	Conduct wildfire outreach and education campaign.		
Responsible Entity:	County Emergency Coordinator and Mayor		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$5,000	**Timeframe:**	24-36 months
Potential Funding Sources:	HMPG	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Ames	**Action Number:**	A6
Hazard(s) Addressed:	Floods		
Project Title:	CRS workshop		
Project Description:	Participate in CRS workshop hosted by H-GAC.		
Responsible Entity:	County Emergency Coordinator and Mayor		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$300	**Timeframe:**	24-36 months
Potential Funding Sources:	HMPG	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Daisetta

Jurisdiction:	Daisetta	**Action Number:**	B1
Hazard(s) Addressed:	Floods Hurricane/ Tropical Storms		
Project Title:	City Ordinance		
Project Description:	The city shall adopt a land use ordinance which requires any structure within the 100-year floodplain to be elevated 2 feet above base flood elevation.		
Responsible Entity:	City council and mayor		
Losses avoided:	Homes, businesses, and residents within the 100-year floodplain.		
Cost Estimate:	$5,000	**Timeframe:**	6 months
Potential Funding Sources:	HMGP, current city budget and staff time	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			Yes

Jurisdiction:	Daisetta	**Action Number:**	B2
Hazard(s) Addressed:	Floods and Hurricane/ Tropical Storms		
Project Title:	Adopting land-use ordinance		
Project Description:	The city shall adopt a land-use ordinance which prohibits building residential or commercial structures in the 100-year floodplain		
Responsible Entity:	City Manager, City Council, Office of Code Enforcement		
Losses avoided:	Future buildings and infrastructure that may have been built within the 100-year floodplain		
Cost Estimate:	$5,000	**Timeframe:**	4 months
Potential Funding Sources:	Current city budget and salary, HMGP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			Yes

Jurisdiction:	Daisetta		**Action Number:**	B3
Hazard(s) Addressed:	Floods and Hurricane/ Tropical Storms			
Project Title:	Property Protection			
Project Description:	Removal of debris, silt and vegetation obstacles in drainage ways. Project will clear obstacles, mow and reshape ditches, and upgrade culverts to restore adequate drainage to mitigate flooding			
Responsible Entity:	City Engineer			
Losses avoided:	Homes, business, and public facilities			
Cost Estimate:	$250,000	**Timeframe:**	6 months	
Potential Funding Sources:	HMGP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				Yes

Jurisdiction:	Daisetta		**Action Number:**	B4
Hazard(s) Addressed:	Hurricane and Tropical Storms, Tornadoes, Hail, and Heat			
Project Title:	Retrofitting critical facilities			
Project Description:	Retrofit high school, city hall for shelter during emergency.			
Responsible Entity:	Emergency Management Committee			
Losses avoided:	Buildings, residents, and city/county employees in county and city			
Cost Estimate:	$75,000	**Timeframe:**	24 months	
Potential Funding Sources:	HMGP, Red Cross, FEMA-Emergency Operation Center Funding, PDM	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Daisetta		**Action Number:**	B5
Hazard(s) Addressed:	Hurricane and Tropical Storms, Tornadoes, Drought			
Project Title:	Drainage projects			
Project Description:	Drainage projects. Including widening culverts and ditches.			
Responsible Entity:	Mayor			
Losses avoided:	Buildings, residents, and city/county employees in county and city			
Cost Estimate:	$750,000	**Timeframe:**	24 months	
Potential Funding Sources:	HMGP, PDM	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Daisetta		**Action Number:**	B6
Hazard(s) Addressed:	All Hazards			
Project Title:	Educate city council			
Project Description:	Educate city council on benefits of mitigation and encourage council members to become more involved.			
Responsible Entity:	Emergency Management			
Losses avoided:	Buildings, residents, and city/county employees in county and city			
Cost Estimate:	$1,000	**Timeframe:**	Ongoing	
Potential Funding Sources:	Staff time and resources, FEMA and Red Cross materials free of charge, HMGP, Pre-disaster Mitigation	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Daisetta		**Action Number:**	B7
Hazard(s) Addressed:	Hurricane/ Tropical Storms			
Project Title:	Hurricane resistant powerline poles			
Project Description:	All new power line poles installed within the jurisdiction will be wind resistant			
Responsible Entity:	Engineering Department			
Losses avoided:	Homes, business, and public facilities			
Cost Estimate:	$120,000	**Timeframe:**	36 months	
Potential Funding Sources:	HMGP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				Yes

Jurisdiction:	Daisetta		**Action Number:**	B8
Hazard(s) Addressed:	Lightning, Hail, Tornadoes, and Hurricane			
Project Title:	Educate public of home improvement opportunities			
Project Description:	Educate elderly, low-income residents of grant funding opportunities to insulate the foundation of pier and beam homes, and update homes to withstand hurricane force winds and hail.			
Responsible Entity:	County Emergency Managers, partnering jurisdictions mayors and city councils, code enforcement and building departments			
Losses avoided:	Life, health, and safety of vulnerable populations, and property damage			
Cost Estimate:	$2,500	**Timeframe:**	6 months	
Potential Funding Sources:	HMGP, USDA Home Repair Grant	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Daisetta		**Action Number:**	B9
Hazard(s) Addressed:	Wildfire			
Project Title:	Reducing underbrush for wildfire prevention			
Project Description:	The city and county will work to reduce underbrush on identified wild-urban interface areas through techniques such as using skid steers or goats.			
Responsible Entity:	County emergency managers, mayor			
Losses avoided:	current and future buildings and residents in wild-urban interface areas			
Cost Estimate:	$500,000	**Timeframe:**	12-24 months	
Potential Funding Sources:	HMGP, local budget and current salary, fire prevention and safety grants	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Daisetta		**Action Number:**	B10
Hazard(s) Addressed:	Wildfire			
Project Title:	Becoming an active participant in Firewise USA program			
Project Description:	The City will become an active participant in the Firewise USA program and encourage local neighborhoods to join the program as well.			
Responsible Entity:	Mayor and city council			
Losses avoided:	Property and residents throughout the city.			
Cost Estimate:	$4,000	**Timeframe:**	12 months	
Potential Funding Sources:	HMP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Dayton

Jurisdiction:	Dayton	**Action Number:**	C1
Hazard(s) Addressed:	Flooding/ Hurricanes		
Project Title:	Drainage channel improvements		
Project Description:	Implement drainage channel improvements to reduce flooding including increased culvert size at SH321 underpass to Waco St.		
Responsible Entity:	City Manager's Office		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$1,100,000	**Timeframe:**	8 months
Potential Funding Sources:	TWDB & Local Matching Funds, HMGP, PDM	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Dayton	**Action Number:**	C2
Hazard(s) Addressed:	Flooding/ Hurricanes		
Project Title:	Generator for underpass		
Project Description:	Permanent back up power (generator) for SH 321 underpass.		
Responsible Entity:	TXDOT/ Public Works		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$50,000	**Timeframe:**	12 months
Potential Funding Sources:	TXDOT and Local Matching Funds	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Dayton	**Action Number:**	C3
Hazard(s) Addressed:	Flood		
Project Title:	Increase culvert size		
Project Description:	Increase culvert size at all railroad crossings.		
Responsible Entity:	Dept. of Planning and Community Development		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$15,000	**Timeframe:**	12 months
Potential Funding Sources:	Local funding through Capital Improvements, DOT Grants-in-Aid for Railroad Safety Program, USACE Clearing and Snagging Projects, USACE Small Flood Control Projects, CDBG, USDA NRCS Emergency Watershed Protection Agency, TWDB Clean Water State Revolving Fund TWDB (Development Fund II)-Texas Water Development Fund, USDA NRCS	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio

Does this action reduce effects of hazards on existing buildings?	No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?	No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?	No

Jurisdiction:	Dayton	**Action Number:**	C4
Hazard(s) Addressed:	All Hazards		
Project Title:	GIS Maps		
Project Description:	Establish GIS-based hazard information system.		
Responsible Entity:	Planning, Building, Code Enforcement		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$5,000	**Timeframe:**	12 months
Potential Funding Sources:	Federal and/or State Grants, Operating Budget, PDM, HMGP	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio

Does this action reduce effects of hazards on existing buildings?	No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?	No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?	No

Jurisdiction:	Dayton		**Action Number:**	C5
Hazard(s) Addressed:	Flooding/ Hurricanes/ Wildfires			
Project Title:	Truck Bypass			
Project Description:	Develop a truck bypass around Dayton.			
Responsible Entity:	City of Dayton			
Losses avoided:	Buildings, residents, and city/county employees in county and city			
Cost Estimate:	$10,000,000	**Timeframe:**	120 months	
Potential Funding Sources:	TXDOT Pass Through Funding, Toll Road	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Dayton		**Action Number:**	C6
Hazard(s) Addressed:	Floodss			
Project Title:	Provide for erosion control measures			
Project Description:	Provide for erosion control measures at Luke Street Bridge drainage outfall.			
Responsible Entity:	Dept. of Planning and Community Development			
Losses avoided:	Buildings, residents, and city/county employees in county and city			
Cost Estimate:	$10,000	**Timeframe:**	12 months	
Potential Funding Sources:	Local funding through Capital Improvements and operating budget, 406 Public Assistance (following federal disaster declaration), HMGP, PDM Program	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Dayton	**Action Number:**	C7
Hazard(s) Addressed:	Floods		
Project Title:	Enlarge storm drain		
Project Description:	Enlarge storm drain to reduce flooding from Main Street to Church Street.		
Responsible Entity:	Dept. of Planning and Community Development		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$15,000	**Timeframe:**	12 months
Potential Funding Sources:	Local funding through Capital Improvements and operating budget, 406 Public Assistance (following federal disaster declaration), HMGP, PDM Program	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Dayton	**Action Number:**	C8
Hazard(s) Addressed:	Flooding/ Hurricanes		
Project Title:	Drainage Master Plan		
Project Description:	Develop drainage master plan.		
Responsible Entity:	Dept. of Planning and Community Development		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$100,000	**Timeframe:**	12 months
Potential Funding Sources:	Local funding through Capital Improvements, USACE-Planning Assistance to States, Flood Mitigation Assistance Program, TWDB- Research and Planning Fund Grants, HMGP, PDM	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Dayton	**Action Number:**	C9
Hazard(s) Addressed:	Floods		
Project Title:	Increase culvert size		
Project Description:	Increase culvert size to reduce flooding at Highway 90 and Waco Street.		
Responsible Entity:	Dept. of Streets and Drainage		
Losses avoided:	Residents and buildings prone to flooding		
Cost Estimate:	$75,000	**Timeframe:**	24-36 months
Potential Funding Sources:	Local funding through Capital Improvements and operating budget, 406 Public Assistance (following federal disaster declaration), HMGP, PDM Program	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Dayton	**Action Number:**	C10
Hazard(s) Addressed:	Tornadoes and Hurricanes		
Project Title:	Building regulations for wind		
Project Description:	Enforce wind load requirements for new construction within city limits.		
Responsible Entity:	Dept. of Planning and Community Development		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$0	**Timeframe:**	12 months
Potential Funding Sources:	Local Commitment, PDM, HMGP	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Dayton	**Action Number:**	C11
Hazard(s) Addressed:	Flooding/ Hurricanes		
Project Title:	City Ordinance		
Project Description:	Develop and implement city drainage ordinance		
Responsible Entity:	Dept. of Planning and Community Development		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$20,000	**Timeframe:**	12 months
Potential Funding Sources:	Local funding through Capital Improvements, USACE- Planning Assistance to States, Flood Mitigation Assistance Program, TWDB- Research and Planning Fund Grants, HMGP, PDM	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Dayton	**Action Number:**	C12
Hazard(s) Addressed:	Hurricane and Tropical Storms, Floods, Wildfire		
Project Title:	Develop a coordinated system of emergency evacuation routes.		
Project Description:	Work with Liberty County, TxDOT and other neighboring cities to develop a coordinated system of emergency evacuation routes.		
Responsible Entity:	Dept. of Planning and Community Development		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$20,000	**Timeframe:**	12 months
Potential Funding Sources:	Local operating and capital budget, FEMA Hurricane Local Grant Program, FEMA Hazardous Materials Assistance Program, HMGP, PDM, FEMA Emergency Management Performance Grant, USDA Environmental Quality Incentives Program	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Dayton	**Action Number:**	C13
Hazard(s) Addressed:	Floods		
Project Title:	Develop a capital improvement program		
Project Description:	Develop a capital improvement program addressing drainage issues.		
Responsible Entity:	Dept. of Planning and Community Development		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$20,000	**Timeframe:**	12 months
Potential Funding Sources:	Local Commitment, PDM, HMGP	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Dayton Lakes Estates

Jurisdiction:	Dayton Lake Estates	**Action Number:**	D1
Hazard(s) Addressed:	Floods		
Project Title:	Re-route County Road 2331		
Project Description:	Re-route County Road 2331 to area not prone to flooding.		
Responsible Entity:	Liberty County Pct. 2		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$5,000	**Timeframe:**	24-36 months
Potential Funding Sources:	TxDOT, 406-Public Disaster Assistance, PDM, HMGP	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Dayton Lake Estates	**Action Number:**	D2
Hazard(s) Addressed:	Floods		
Project Title:	Construct bulkhead along Trinity River		
Project Description:	Construct bulkhead along Trinity River to reduce flooding impacts to County Road 2231.		
Responsible Entity:	Liberty County Pct. 2		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$75,000	**Timeframe:**	24-36 months
Potential Funding Sources:	TxDOT, 406-Public Disaster Assistance (Following a local disaster), USACE-Clearing and Snagging Projects, USACE-Small Flood Control Projects, USACE-Planning Assistance to the States, PDM, HMGP	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Dayton Lake Estates	**Action Number:**	D3
Hazard(s) Addressed:	Floods		
Project Title:	Improve drainage by cleaning and widening ditches		
Project Description:	Improve drainage by cleaning out/re-grading ditches within City of Dayton Lake Estates.		
Responsible Entity:	City of Dayton Lake Estates		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$50,000	**Timeframe:**	24-36 months
Potential Funding Sources:	TxDOT, 406-Public Disaster Assistance (Following a local disaster), USACE-Clearing and Snagging Projects, USACE-Small Flood Control Projects, USACE-Planning Assistance to the States, PDM, HMGP	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Dayton Lake Estates	**Action Number:**	D4
Hazard(s) Addressed:	Floods		
Project Title:	Construct detention pond		
Project Description:	Construct detention pond.		
Responsible Entity:	Dayton Lakes Estates		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$50,000	**Timeframe:**	24-36 months
Potential Funding Sources:	USACE-Small Flood Control, CDBG, USDA NRCS Emergency Watershed Protection, TWDB Clean Water Fund, TWDB-Texas Water Development Fund, USDA NRCS, MASSGrant Program, 406 Public Assistance, PDM, HMGP	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Dayton Lake Estates	**Action Number:**	D5
Hazard(s) Addressed:	Heat Events		
Project Title:	Generators for Critical Facilities		
Project Description:	Purchase and provide back-up generators to all critical facilities throughout the jurisdiction		
Responsible Entity:	Dayton Lakes Estates		
Losses avoided:	Vulnerable populations and any city resident without power		
Cost Estimate:	$15,000	**Timeframe:**	12 months
Potential Funding Sources:	HMPG	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Dayton Lake Estates	**Action Number:**	D6
Hazard(s) Addressed:	Tornado		
Project Title:	Tornado mitigation through rebate program		
Project Description:	The city will develop a rebate program for building owners who install straps, structural bracings, window shutters, or interlocking roof shingles in new construction or when renovating residences or businesses.		
Responsible Entity:	City Manager, Office of Code Enforcement		
Losses avoided:	Residents, homes, business, and local facilities.		
Cost Estimate:	$5,000	**Timeframe:**	3 months
Potential Funding Sources:	Current city budget and salary, HMGP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Hardin

Jurisdiction:	Hardin	**Action Number:**	E1
Hazard(s) Addressed:	Floods and Hurricane		
Project Title:	Implement subdivision ordinance		
Project Description:	Implement subdivision ordinance regulations concerning building in flood-prone areas.		
Responsible Entity:	City Council		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$0	**Timeframe:**	24-36 months
Potential Funding Sources:	Staff time and resources, HMGP, TWDB-Research and Planning Fund Grants, PDM	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Hardin	**Action Number:**	E2
Hazard(s) Addressed:	Floods and Hurricane		
Project Title:	Reduce flooding by increasing size of culverts		
Project Description:	Reduce flooding by increasing size of culverts to 24 inches on County Road 2361, 2362, 2363, and 2364 and CR 2358.		
Responsible Entity:	City Council		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$15,000	**Timeframe:**	24-36 months
Potential Funding Sources:	USACE-Small Flood Control Projects, USACE-Clearing and Snagging Projects, CDBG, USDA NRCS-Emergency Watershed Protection Agency, TWDB-Clean Water State Revolving Fund, TWDB (Development Fund II)-Texas Water Development Fund, USDA NRCS	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Hardin	**Action Number:**	E3
Hazard(s) Addressed:	Floods and Hurricane		
Project Title:	Join the community rating system.		
Project Description:	Join the community rating system.		
Responsible Entity:	City Council		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$2,000	**Timeframe:**	24-36 months
Potential Funding Sources:	City Council	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Hardin	**Action Number:**	E4
Hazard(s) Addressed:	Hurricane and Tropical Storms and Tornadoes		
Project Title:	Wind-resistant construction techniques.		
Project Description:	Inform the public regarding the use of wind-resistant construction techniques.		
Responsible Entity:	City Council and local agencies		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$5,000	**Timeframe:**	24-36 months
Potential Funding Sources:	Local Commitment, See FEMA documents, including Taking Shelter from the Storm (FEMA 320), PDM, HMGP	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Hardin	**Action Number:**	E5
Hazard(s) Addressed:	Hail		
Project Title:	Hail Damage Protection		
Project Description:	The jurisdiction will retrofit city and county owned structures with roofs and window panes that can withstand hail damage		
Responsible Entity:	Emergency Coordinator and Local Building Departments		
Losses avoided:	Buildings, residents, and city/county employees in county and city buildings when a hail storm hits.		
Cost Estimate:	$20,000	**Timeframe:**	24-36 months
Potential Funding Sources:	HMGP, Housing Preservation Grants, Weatherization Assistance Program	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Hardin	**Action Number:**	E6
Hazard(s) Addressed:	Heat Events		
Project Title:	Generators for Critical Facilities		
Project Description:	Purchase and provide back-up generators to all critical facilities throughout the jurisdiction		
Responsible Entity:	Emergency Coordinator		
Losses avoided:	Vulnerable populations and any city resident without power		
Cost Estimate:	$15,000	**Timeframe:**	12 months
Potential Funding Sources:	HMPG	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Hardin		**Action Number:**	E7
Hazard(s) Addressed:	Tornado			
Project Title:	Tornado mitigation through rebate program			
Project Description:	The city will develop a rebate program for building owners who install straps, structural bracings, window shutters, or interlocking roof shingles in new construction or when renovating residences or businesses.			
Responsible Entity:	City Manager, Office of Code Enforcement			
Losses avoided:	Residents, homes, business, and local facilities.			
Cost Estimate:	$5,000	**Timeframe:**	3 months	
Potential Funding Sources:	Current city budget and salary, HMGP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Kenefick

Jurisdiction:	Kenefick	**Action Number:**	F1
Hazard(s) Addressed:	Floods		
Project Title:	Improve grading of ditches		
Project Description:	Improve grading of road ditches adjacent to existing roads.		
Responsible Entity:	City of Kenefick, Liberty County		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$30,000	**Timeframe:**	24-36 months
Potential Funding Sources:	USACE-Small Flood Control Projects, TxDOT, HMGP, USACE-Clearing and Snagging Projects, CDBG, USDA NRCS, PDM	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Kenefick	**Action Number:**	F2
Hazard(s) Addressed:	Floods		
Project Title:	Culvert improvement program		
Project Description:	Develop culvert widening and clean out program.		
Responsible Entity:	City of Kenefick, Liberty County		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$20,000	**Timeframe:**	24-36 months
Potential Funding Sources:	USACE-Small Flood Control Projects, TxDOT, HMGP, USACE-Clearing and Snagging Projects, CDBG, USDA NRCS, PDM	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Kenefick		**Action Number:**	F3
Hazard(s) Addressed:	Heat Events			
Project Title:	Generators for Critical Facilities			
Project Description:	Purchase and provide back-up generators to all critical facilities throughout the jurisdiction			
Responsible Entity:	Emergency Coordinator			
Losses avoided:	Vulnerable populations and any city resident without power			
Cost Estimate:	$15,000	**Timeframe:**	12 months	
Potential Funding Sources:	HMPG	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

North Cleveland

Jurisdiction:	North Cleveland	**Action Number:**	G1
Hazard(s) Addressed:	Floods		
Project Title:	Design and construct new bridge		
Project Description:	Design and construct new bridge over East Fork San Jacinto River on Low Water Bridge Road (County Road 388) to reduce flooding.		
Responsible Entity:	County Emergency Coordinator and Mayor		
Losses avoided:	Buildings, residents, and city/county employees in county and city buildings when a hail storm hits.		
Cost Estimate:	$1,000,000	**Timeframe:**	12-24 months
Potential Funding Sources:	HMGP, PDM, County funds	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	North Cleveland	**Action Number:**	G2
Hazard(s) Addressed:	Property Protection		
Project Title:	Acquisition of property		
Project Description:	Acquisition of property in the floodplain.		
Responsible Entity:	County Emergency Coordinator and Mayor		
Losses avoided:	As funding becomes available		
Cost Estimate:	$750,000	**Timeframe:**	12-24 months
Potential Funding Sources:	HMGP, Flood Mitigation Assistant Program, PDM, HUD-Disaster Recovery Initiative Program, CDBG	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	North Cleveland		**Action Number:**	G3
Hazard(s) Addressed:	Tornadoes, Hurricanes/ Tropical Storms, Hail, flood, and Heat Events			
Project Title:	New emergency shelter			
Project Description:	North Cleveland emergency shelter located at old TxDOT offices on FM 2025.			
Responsible Entity:	County Emergency Coordinator and Mayor			
Losses avoided:	Residents, homes, business, and local facilities.			
Cost Estimate:	$500,000	**Timeframe:**	36-60 months	
Potential Funding Sources:	HMGP, Pre-Disaster Mitigation, County Funds	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	North Cleveland		**Action Number:**	G4
Hazard(s) Addressed:	Floods			
Project Title:	Engineering study			
Project Description:	Engineering study for drainage improvements.			
Responsible Entity:	County Emergency Coordinator and Mayor			
Losses avoided:	Residents, homes, business, and local facilities.			
Cost Estimate:	$30,000	**Timeframe:**	12-24 months	
Potential Funding Sources:	HMGP, PDM	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	North Cleveland		**Action Number:**	G5
Hazard(s) Addressed:	Floods			
Project Title:	Bridge Road			
Project Description:	Elevate Bridge Road.			
Responsible Entity:	County Emergency Coordinator and Mayor			
Losses avoided:	Residents, homes, business, and local facilities.			
Cost Estimate:	$2,000,000	**Timeframe:**	12-24 months	
Potential Funding Sources:	PDM, HMGP, County, State, Federal, TXDOT, 406 Public Assistance (following federally declared disaster)	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	North Cleveland		**Action Number:**	G6
Hazard(s) Addressed:	Tornado			
Project Title:	Tornado mitigation through rebate program			
Project Description:	The city will develop a rebate program for building owners who install straps, structural bracings, window shutters, or interlocking roof shingles in new construction or when renovating residences or businesses.			
Responsible Entity:	City Manager, Office of Code Enforcement			
Losses avoided:	Residents, homes, business, and local facilities.			
Cost Estimate:	$5,000	**Timeframe:**	3 months	
Potential Funding Sources:	HMGP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Plum Grove

Jurisdiction:	Plum Grove	**Action Number:**	H1
Hazard(s) Addressed:	Floods		
Project Title:	Raise road surfaces		
Project Description:	Reduce flooding by raising road surface of Plum Grove Road and installing larger culverts from FM 1010 intersection to Paul Campbell Loop and at Orange Branch crossing.		
Responsible Entity:	Mayor		
Losses avoided:	Residents, homes, business, and local facilities.		
Cost Estimate:	$35,000	**Timeframe:**	12-24 months
Potential Funding Sources:	Local Funding through Capital Improvements, TX DOT, USACE-Small Flood Control Projects, TWDB-Clean Water State Revolving Fund, TWDB, USDA NRCS-Watershed Protection and Flood Prevention	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Plum Grove	**Action Number:**	H2
Hazard(s) Addressed:	Hurricane and Tropical Storms, Floods, Wildfire		
Project Title:	Expand development of emergency notification system		
Project Description:	Expand development of emergency notification system/work to establish public awareness of emergency notification process.		
Responsible Entity:	County Emergency Coordinator and Mayor		
Losses avoided:	Phase 1 Underway with the introduction of first call to the community, Phase 2 pending funding		
Cost Estimate:	$10,000	**Timeframe:**	12 months
Potential Funding Sources:	National Weather Service, FEMA Emergency Management Performance Grant, Dept. of Homeland Security-State Homeland Security Grant Program, Private Industry	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Plum Grove		**Action Number:**	H3
Hazard(s) Addressed:	Floods, Hurricane and Tropical Storms			
Project Title:	Purchase generator for City Hall			
Project Description:	Purchase generator for City Hall to run water well, air conditioning and lights during emergencies.			
Responsible Entity:	Mayor			
Losses avoided:	Residents, homes, business, and local facilities.			
Cost Estimate:	$5,000	**Timeframe:**	12-24 months	
Potential Funding Sources:	HMGP	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Cleveland

Jurisdiction:	Cleveland		**Action Number:**	I1
Hazard(s) Addressed:	Floods, Hurricane/ Tropical Storms			
Project Title:	Adopting land-use ordinance			
Project Description:	The city shall adopt a land-use ordinance which prohibits building residential or commercial structures in the 100-year floodplain			
Responsible Entity:	City manager, City council, Office of Code Enforcement			
Losses avoided:	Future buildings and infrastructure that may have been built within the 100-year floodplain.			
Cost Estimate:	$5,000	**Timeframe:**	4 months	
Potential Funding Sources:	Current city budget and salary, HMGP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				Yes

Jurisdiction:	Cleveland		**Action Number:**	I2
Hazard(s) Addressed:	Hurricane and Tropical Storms, Tornadoes, Floods, lighting, Heat Events, Wildfire			
Project Title:	Retrofit police department EOC			
Project Description:	Retrofit police department EOC with generators for emergency backup power to maintain critical services during power outages caused by natural hazards.			
Responsible Entity:	Police/EOC			
Losses avoided:	Buildings, residents, and city/county employees in county and city			
Cost Estimate:	$100,000	**Timeframe:**	24-36 months	
Potential Funding Sources:	General Fund, EDC, FEMA, Homeland Security, Grants, HMGP, PDM	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Cleveland		**Action Number:**	I3
Hazard(s) Addressed:	Floods, Hurricane/ Tropical Storms			
Project Title:	City Ordinance			
Project Description:	The city shall adopt a land use ordinance which requires any structure within the 100-year floodplain to be elevated 2 feet above base flood elevation			
Responsible Entity:	City council and Mayor			
Losses avoided:	Homes, businesses, and residents within the 100-year flood plain			
Cost Estimate:	$5,000.00	**Timeframe:**	6 months	
Potential Funding Sources:	HMGP, current city budget and staff time	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				Yes

Jurisdiction:	Cleveland		**Action Number:**	I4
Hazard(s) Addressed:	Hurricane/ Tropical Storms and Tornado			
Project Title:	Property Protection, Structural Project			
Project Description:	Replace and relocate Fire Station 1			
Responsible Entity:	Fire Department			
Losses avoided:	Homes, business, and public facilities			
Cost Estimate:	$2,000,000	**Timeframe:**	18 months	
Potential Funding Sources:	General Fund, EDC, FEMA, Homeland Security, Grants, HMGP, PDM	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				Yes

Jurisdiction:	Cleveland		**Action Number:**	I5
Hazard(s) Addressed:	Floods, Hurricanes/ Tropical Storms			
Project Title:	Property Protection			
Project Description:	Removal of debris, silt and vegetation obstacles in drainageways. Project will clear obstacles, mow and reshape ditches, and upgrade culverts to restore adequate drainage to mitigate flooding			
Responsible Entity:	City Engineer			
Losses avoided:	Homes, businesses, and public facilities			
Cost Estimate:	$5,000,000	**Timeframe:**	60 Months	
Potential Funding Sources:	HMGP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				Yes

Jurisdiction:	Cleveland		**Action Number:**	I6
Hazard(s) Addressed:	Floods			
Project Title:	Installing drainage lines			
Project Description:	Install larger drainage lines in downtown Cleveland to reduce flooding.			
Responsible Entity:	City of Cleveland Public Works			
Losses avoided:	Residents, homes, business, and local facilities.			
Cost Estimate:	$1,000,000	**Timeframe:**	24-36 months	
Potential Funding Sources:	CDBG, USACE, Small Flood Control Projects, TWDB Clean Water State Revolving Fund, PDM, HMGP, 406 Public Assistance	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				Yes

Jurisdiction:	Cleveland		**Action Number:**	I7
Hazard(s) Addressed:	Hurricane/ Tropical Storms			
Project Title:	Hurricane resistant power line poles			
Project Description:	All new power line poles installed within the jurisdiction will be wind resistant			
Responsible Entity:	Engineering Department			
Losses avoided:	Homes, business, and public facilities			
Cost Estimate:	$120,000	**Timeframe:**	36 months	
Potential Funding Sources:	HMGP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				Yes

Jurisdiction:	Cleveland		**Action Number:**	I8
Hazard(s) Addressed:	Flooding			
Project Title:	Set back from pipeline right-of-way.			
Project Description:	Adopt 25-foot setback from pipeline right-of-way.			
Responsible Entity:	Building and Inspection Dept.			
Losses avoided:	Buildings, residents, and city/county employees in county and city			
Cost Estimate:	$2,000	**Timeframe:**	4-6 months	
Potential Funding Sources:	General Fund- Local Commitment	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Cleveland		**Action Number:**	I9
Hazard(s) Addressed:	Lightning, Hail, Tornadoes, and Hurricane			
Project Title:	Educate public of home improvement opportunities			
Project Description:	Educate elderly, low-income residents of grant funding opportunities to insulate the foundation of pier and beam homes, and update homes to withstand hurricane force winds and hail			
Responsible Entity:	County Emergency Management, partnering jurisdictions mayors and city councils, code enforcement and buildings departments			
Losses avoided:	Life, health, and safety of vulnerable populations and property damage			
Cost Estimate:	$2,500	**Timeframe:**	6 months	
Potential Funding Sources:	HMGP, USDA Home Repair Grant	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Cleveland		**Action Number:**	I10
Hazard(s) Addressed:	Lightning and Tornado			
Project Title:	Public Information and Awareness			
Project Description:	Contract with First Call Network to notify citizens by phone of possible hazards.			
Responsible Entity:	Emergency Management			
Losses avoided:	Life safety			
Cost Estimate:	$25,000	**Timeframe:**	12 Months	
Potential Funding Sources:	General Fund, National Weather Service, USDA Rural Utilities Service-Weather Radio Grant Program, FEMA Hurricane Local Grant Program, HMGP, PDM, FEMA, Emergency Management Performance Grant, USDA Environmental Quality Incentives Program	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Cleveland	**Action Number:**	I11
Hazard(s) Addressed:	Wildfire		
Project Title:	Reducing underbrush for wildfire prevention		
Project Description:	The city and county will work to reduce underbrush on identified wild-urban interface areas through techniques such as using skid steers or goats		
Responsible Entity:	County emergency managers, mayors		
Losses avoided:	current and future buildings and residents in wild-urban interface areas.		
Cost Estimate:	$500,000	**Timeframe:**	12-24 months
Potential Funding Sources:	HMGP, local budget and current salary, fire prevention and safety grants	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Cleveland	**Action Number:**	I12
Hazard(s) Addressed:	Wildfire		
Project Title:	Becoming an active participant in Firewise USA program		
Project Description:	The City will become an active participant in the Firewise USA program and encourage local neighborhoods to join the program as well		
Responsible Entity:	Mayor and City council		
Losses avoided:	Property and residents throughout the city		
Cost Estimate:	$4,000	**Timeframe:**	12 months
Potential Funding Sources:	HMP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Cleveland	**Action Number:**	I13
Hazard(s) Addressed:	Wildfire		
Project Title:	Outreach and education campaign.		
Project Description:	Conduct wildfire outreach and education campaign.		
Responsible Entity:	Director of Fire and EMS		
Losses avoided:	Buildings, residents, and city/county employees in county and city		
Cost Estimate:	$5,000	**Timeframe:**	24-36 months
Potential Funding Sources:	HMGP, PDM	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Liberty County

Jurisdiction:	Liberty County	**Action Number:**	J1
Hazard(s) Addressed:	Floods		
Project Title:	Hardening Infrastructure		
Project Description:	Harden Bridge, dam and spillway in Winter Valley Subdivision under TCEQ permit NO. 366.		
Responsible Entity:	Liberty County Engineering Department		
Losses avoided:	Residential Flood Damages		
Cost Estimate:	$350,000	**Timeframe:**	36 months
Potential Funding Sources:	NRCS, USACE-Clearing and Snagging Projects, USACE-Emergency Rehabilitation of Flood Control Works for Federally Authorized Coastal Protection Works, USACE-Small Flood Control Projects, HMGP, 406 Public Assistance	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	Liberty County	**Action Number:**	J2
Hazard(s) Addressed:	Floods		
Project Title:	Acquire properties in floodplains		
Project Description:	Acquire property located in the floodplain including properties located in subdivisions along the Trinity River.		
Responsible Entity:	Permit Department, County Engineer		
Losses avoided:	Repetitive flood losses		
Cost Estimate:	$2,000,000	**Timeframe:**	48 months
Potential Funding Sources:	HMGP, Flood Mitigation Assistance Program, CDBG Program, HUD-Disaster Recovery Initiative, USACE	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			Yes

Jurisdiction:	Liberty County	**Action Number:**	J3
Hazard(s) Addressed:	Floods		
Project Title:	Culvert replacement project		
Project Description:	Increase culvert size in identified flood hazard problem areas within Liberty County.		
Responsible Entity:	Drainage Department		
Losses avoided:	Residential & Business & Infrastructure Losses due to flooding		
Cost Estimate:	$2,000,000	**Timeframe:**	24 months
Potential Funding Sources:	USACE-Clearing and Snagging Projects, USACE-Emergency Rehabilitation of Flood Control Works or Federally Authorized Coastal Protection Works, USACE-Small Flood Control	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			Yes

Jurisdiction:	Liberty County	**Action Number:**	J4
Hazard(s) Addressed:	Floods		
Project Title:	Various drainage projects throughout the county		
Project Description:	The county will work with partnering jurisdictions and engineers in order to implement drainage projects throughout the county- including adding ditches, detention ponds and detention basins in identified locations throughout the county in order to improve drainage		
Responsible Entity:	County emergency manager, partnering mayors and engineering staff		
Losses avoided:	current and future buildings and residents in wild-urban interface areas		
Cost Estimate:	500,000	**Timeframe:**	12 to 24 months
Potential Funding Sources:	HMGP, local budget and current salary	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes

Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?	No

Jurisdiction:	Liberty County		**Action Number:**	J5
Hazard(s) Addressed:	Floods			
Project Title:	Drainage plan			
Project Description:	Establish a county wide drainage plan			
Responsible Entity:	Liberty County Engineering Department			
Losses avoided:	Prevent home-business-Infrastructure damage due to flooding			
Cost Estimate:	$125,000	**Timeframe:**	36 months	
Potential Funding Sources:	USACE-Small Flood Control Projects, USDA NRCS-Emergency Watershed Protection Agency, TWDB-Clean Water State Revolving Fund, TWDB (Development Fund II)-	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				Yes

Jurisdiction:	Liberty County		**Action Number:**	J6
Hazard(s) Addressed:	Floods			
Project Title:	Recanalization Feasibility Study			
Project Description:	Dechannelize existing feeder creeks that flow from north to south and improve drainage for storm water runoff.			
Responsible Entity:	Liberty County Engineering Department			
Losses avoided:	Flood damages to Residential - Commercial Structures			
Cost Estimate:	$500,000	**Timeframe:**	36 months	
Potential Funding Sources:	HMGP, Pre-Disaster Mitigation, County budget	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				Yes

Jurisdiction:	Liberty County	**Action Number:**	J7
Hazard(s) Addressed:	Floods		
Project Title:	Update Firm Maps to Include Bench Marks		
Project Description:	Add bench marks to updated Flood Insurance Rate Maps		
Responsible Entity:	Permit Dept., County Surveyor		
Losses avoided:	Residential & Business & Infrastructure Losses due to flooding		
Cost Estimate:	$50,000	**Timeframe:**	24 months
Potential Funding Sources:	FEMA Map Modernization Program, FEMA Flood Hazard Mapping Program, Dept. of The Interior, USGS Mapping Standards Support, FEMA Flood Recovery Mapping, PDM, HMGP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			Yes

Jurisdiction:	Liberty County	**Action Number:**	J8
Hazard(s) Addressed:	Floods		
Project Title:	Update Firm Maps		
Project Description:	Update Flood Insurance Rate Maps (FIRMs)		
Responsible Entity:	Permit Department, County Surveyor		
Losses avoided:	Residential & Business Losses due to flooding		
Cost Estimate:	$100,000	**Timeframe:**	24 months
Potential Funding Sources:	FEMA-Map Modernization Program, FEMA-Flood Hazard Mapping Program, Department of the Interior, United States Geological Survey-Mapping Standards Support, FEMA Flood Recovery Mapping, PDM, HMGP	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			Yes

Jurisdiction:	Liberty County		**Action Number:**	J9
Hazard(s) Addressed:	Floods			
Project Title:	Update Topographic Maps			
Project Description:	Purchase updated topographic maps/complete LiDAR aerial survey for drainage plan.			
Responsible Entity:	Permit Department, County Surveyor			
Losses avoided:	Maps will assist in identifying problem flood areas in need of mitigation			
Cost Estimate:	$100,000	**Timeframe:**	24 months	
Potential Funding Sources:	FEMA-Map Modernization Program, FEMA-Flood Hazard Mapping Program, Department of the Interior, United States Geological Survey-Mapping Standards Support, FEMA-Flood Recovery Mapping, PDM, HMGP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				Yes

Jurisdiction:	Liberty County		**Action Number:**	J10
Hazard(s) Addressed:	Floods			
Project Title:	Flood Control - Drainage Project			
Project Description:	Work with adjoining counties regarding flood and drainage issues.			
Responsible Entity:	Drainage district			
Losses avoided:	Lessen risk of Damage to Homes and Businesses due to flooding			
Cost Estimate:	$500,000	**Timeframe:**	24 months	
Potential Funding Sources:	HMGP, PDM Program, USACE - Small Flood Control Projects, TWDB-Clean Water State Revolving Fund, Texas Water Development Fund, USDA NRCS Watershed Protection and Flood Prevention Program, EPA NPS Grant Program	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				Yes

Jurisdiction:	Liberty County		**Action Number:**	J11
Hazard(s) Addressed:	Hurricane/ Tropical Storms, and Tornado			
Project Title:	Engineering Study			
Project Description:	Conduct structural engineering study on all public buildings			
Responsible Entity:	Liberty County Engineering Dept.			
Losses avoided:	Prevent damage to critical assets due to described hazards			
Cost Estimate:	$50,000	**Timeframe:**	36 months	
Potential Funding Sources:	Hazard Mitigation Grant Program, Pre-Disaster Mitigation, County Budget	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				No
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				No
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	Liberty County		**Action Number:**	J12
Hazard(s) Addressed:	Wildfire			
Project Title:	Reducing underbrush for wildfire prevention			
Project Description:	The county will work to reduce underbrush on identified wild-urban interface areas through techniques such as using skid steers or goats.			
Responsible Entity:	County emergency managers, mayors			
Losses avoided:	current and future buildings and residents in wild-urban interface areas			
Cost Estimate:	500,000	**Timeframe:**	12 to 24 months	
Potential Funding Sources:	HMGP, local budget and current salary, fire prevention and safety grants	**Benefit-Cost Ratio:**	Approximately a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

City of Liberty

Jurisdiction:	City of Liberty	**Action Number:**	K1
Hazard(s) Addressed:	Floods and Hurricane/ Tropical Storms		
Project Title:	Construct Levee		
Project Description:	Construct levee floodwall around waste water treatment plant		
Responsible Entity:	City Engineer		
Losses avoided:	Residents, homes, business, and local facilities.		
Cost Estimate:	$1,600,000	**Timeframe:**	24-36 months
Potential Funding Sources:	US Army Corp of Engineers – Small Flood Control Projects, USDA Natural Resources Conservation Service – Emergency Watershed Protection Agency, Texas Water Development Board – Clean Water State Revolving Fund, USDA Natural Resources Conservation Service – Watershed Protection and Flood Prevention	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	City of Liberty	**Action Number:**	K2
Hazard(s) Addressed:	Floods and Hurricane/ Tropical Storms		
Project Title:	Levee Certification		
Project Description:	Levee certification for new levee around waste water treatment plant		
Responsible Entity:	City Engineer		
Losses avoided:	Residents, homes, business, and local facilities.		
Cost Estimate:	$600,000	**Timeframe:**	12-20 months
Potential Funding Sources:	US Army Corp of Engineers – Small Flood Control Projects, USDA Natural Resources Conservation Service – Emergency Watershed Protection Agency, Texas Water Development Board – Clean Water State Revolving Fund, USDA Natural Resources	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio

	Conservation Service – Watershed Protection and Flood Prevention Program.		
Does this action reduce effects of hazards on existing buildings?			Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?			Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?			No

Jurisdiction:	City of Liberty		**Action Number:**	K3
Hazard(s) Addressed:	Floods			
Project Title:	Main "B" Drainage Channel			
Project Description:	Improvements to Main B drainage channel including upgrading pump station			
Responsible Entity:	City Engineer			
Losses avoided:	Residents, homes, business, and local facilities.			
Cost Estimate:	$10,000,000	**Timeframe:**	24-36 months	
Potential Funding Sources:	City Budget item, PDM, HMGP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

Jurisdiction:	City of Liberty		**Action Number:**	K4
Hazard(s) Addressed:	Floods			
Project Title:	Main "A" Drainage Channel			
Project Description:	Improvements to Main A drainage channel including upgrading pump station			
Responsible Entity:	City Engineer			
Losses avoided:	Residents, homes, business, and local facilities.			
Cost Estimate:	$20,000,000	**Timeframe:**	36-48 months	
Potential Funding Sources:	City Budget item, PDM, HMGP	**Benefit-Cost Ratio:**	More than a 1:4 cost-benefit ratio	
Does this action reduce effects of hazards on existing buildings?				Yes
Does this action reduce effects of hazards for new buildings, infrastructure, or future development?				Yes
Does mitigation action identify, analyze, and prioritize actions related to continued compliance with NFIP?				No

2017

Part 8: Plan Maintenance

Part 8: PLAN MAINTENANCE

To remain an effective tool, the HMAP will undergo continuous review and updates. This practice is known as plan maintenance and requires monitoring, evaluating, updating, and implementing the entirety of the written plan and planning process. To accomplish this, a plan maintenance team is comprised of representatives from each of the County's participating jurisdictions.

Plan Maintenance Team

Jurisdiction	Plan Maintenance Team (PMT) Representative
Liberty County	Emergency Management Coordinator **(PMT Leader)**
Liberty County	Deputy Emergency Management Coordinator
Liberty	Assistant Fire Chief
Cleveland	City Manager
Daisetta	City Manger
North Cleveland	Mayor
Ames	Mayor
Dayton	Mayor
Dayton Lakes	Mayor
Devers	Mayor
Hardin	Mayor
Kenefick	Mayor
Plum Grove	Mayor

Meeting Schedule

The PMT will hold its first meeting within two years after the plan's approval date and will continue to meet every year thereafter. A special meeting will be held 12 months prior to the plan's expiration to develop a timeline and strategy to update the plan in accordance with TDEM and FEMA's requirements.

Procedures

The PMT will meet annually to address necessary revisions, develop amendments, assess the implementation progress, and identify emerging risks and vulnerabilities in the county. Each participating jurisdiction is responsible for reporting and requesting updates to the HMAP, and the team will explore multi-jurisdictional solutions when applicable. Any new mitigation actions, strategies, or required studies, suggestions for improvements or changes to the entire written plan or planning process will be submitted to the County's representative. The representative will evaluate the items for compliance with TDEM and FEMA regulations before leading the process to adopt or approve the new items or suggestions.

Recommended changes, updates, and revisions will be implemented based on available funding to support revisions, and updates and will be assigned to appropriate officials with pre-determined timelines for completion. Updates to the HMAP will then be adopted by the appropriate governing body.

Public Involvement

Continued stakeholder and public involvement will remain a vital component of the HMAP. The PMT will seek public input at all Plan Maintenance meetings and all public hearings related to the HMAP. The PMT Leader will also conduct outreach and invite the public to each Plan Maintenance meetings. The PMT Leader will advertise all meetings in local news outlets, on county and city social media pages and websites, and coordinate with all participating jurisdictions to post the meeting agenda 30 days prior to the meetings in accordance with their bylaws.

In addition, each participating jurisdiction will seek input from the public on the status of existing hazards, emerging vulnerabilities, and evaluate the HMAP including the entirety of the written plan and the planning process with the public. During each meeting, the PMT will provide an open comment forum for an interactive discussion with the public. The development of new suggestions or changes to the planning process and written plan including new goals and strategies will be a joint effort between the PMT and public participants.

Progress Monitoring

It is important to monitor and evaluate the progress each jurisdiction has made toward implementing the HMAP. This ensures the written plan, including the goals, objectives, and the mitigation strategy, is regularly re-evaluated and reviewed for feasibility. Each participating jurisdiction will provide a progress report on completed or ongoing mitigation projects at each Plan Maintenance meeting. Unaddressed mitigation actions will be evaluated for relevancy and/or amended to increase feasibility.

Plan Evaluation

Procedures to monitor and evaluate the HMAP were determined during the December 18th meeting. This ensures that the goals, objectives, and the mitigation strategy are regularly examined for feasibility, and that the HMAP remains a relevant and adaptive tool. An additional meeting will be held 12-months prior to the plan's expiration to develop a timeline and strategy to update the HMAP.

Method and Procedures	Schedule	Responsible Entity
The PMT Leader will advertise all annual meetings in local newspapers, post invitations on the County social media pages, and post fliers at city and county buildings 30 days prior to the meetings.	30 days prior to public PMT meetings	PMT Leader
Emerging risks and vulnerabilities will be identified and discussed. 1) PMT members are responsible for monitoring each hazard in their jurisdiction and providing a written and/or verbal update on any new occurrences and emerging risks. 2) The PMT Leader will seek input from participants and the public at the annual meetings by opening the meeting for public comment.	Annually	PMT representative from each participating jurisdiction
The PMT will monitor the goals and objectives to ensure the HMAP remains relevant and the strategy continues to be effective. 1) PMT members will identify new projects and/or re-prioritize existing strategies based on changes in their jurisdiction. Funding sources and multijurisdictional cooperation for new initiatives will be determined. 2) PMT members will review existing goals and objectives in the existing plan and update/ revise as necessary	Annually	PMT representative from each participating jurisdiction
Each participating jurisdiction will evaluate their progress implementing the HMAP and suggested improvements to the entire current written plan, public participation and planning process 1) Representatives will publicly discuss progress and submit written progress reports to the team leader. 2) Completed and ongoing mitigation actions will be discussed by responsible entity. 3) Unaddressed mitigation actions will be evaluated for relevancy and/or amended to increase feasibility. 4) Feasibility of the mitigation strategy will be evaluated, and any necessary revisions will be proposed. 5) The team leader and each representative will report on all suggestions received throughout the passed year on the	Annually	PMT, the responsible department identified in the mitigation action up for discussion, and the public.

planning process and the entire written plan and discuss how to incorporate these suggestions into current and future planning efforts.		
The PMT will develop a timeline and strategy to update the plan 12 months before it expires. The update strategy will include: 1) Identify entities responsible for drafting and submitting the update to TDEM 2) Send appropriate representatives to G-318 training. 3) Determine funding needs and funding sources for plan update. 4) Review the entirety of the plan; discuss hazards, vulnerabilities and impacts identified in the plan and what to include/ revise in the update	12 months prior to HMAP's expiration	PMT, and PMT Leader

Existing Plans & Regulations

Several existing plans and programs that require integration of the HMAP have been identified by the participating jurisdictions. These known planning mechanisms will be amended to support mitigation efforts, and both plans will be reviewed for contradictions.

DRP: Disaster Recovery Plan
CP: Comprehensive Plan
FMP: Floodplain Management Plan
SMP: Stormwater Management Plan
EOP: Emergency Operations Plan
COOP: Continuity of Operations Plan
TP: Transportation Plan
CIP: Capital Improvements Plan
SARA: SARA Title III Emergency Response Plan
FDPO: Flood Damage Prevention Ordinance
REP: Radiological Emergency Plan
AB: Annual Budget
MA: Mutual Aid Agreement
SO: Subdivision Ordinance
FDPO: Flood Damage Prevention Ordinance
CRS: Community Rating System

Jurisdiction	DRP	CP	FMP	SMP	EOP	COOP	REP	SARA	TP	REG	SO	AB	MA	FDPO	CRS	CIP
Unincorporated Liberty County												X	X	X		
Ames												X	X			
Cleveland		X	X			X	X		X		X	X	X	X		X
Daisetta												X	X	X		
Dayton		X									X	X	X	X		
Dayton Lakes													X			
Devers													X			
Hardin												X	X	X		
Kenefick													X			
Liberty	X		X			X		X	X		X	X	X	X		X
North Cleveland													X			
Plum Grove													X			

Plan Integration

Integrating the HMAP into county and local planning mechanisms is key to its success. Effective integration allows communities to benefit from existing plans and procedures to further reduce their vulnerability and risk. Upon approval of the plan and approval of updates or revisions as proposed by the PMT, each participating jurisdiction will follow the pre-determined actions:

To update and revise existing planning mechanisms to further integrate the HMAP, all participating jurisdictions will follow a basic process(es) described in this section.

1.) Propose a policy, strategy, or regulatory amendment to the proper governing body.
2.) Advertise the amendment a minimum of 60 days before the meeting where it will be discussed. Advertising procedures for the public meeting(s) is outlined in the public involvement measures described in Section 8 of this plan and will also abide by each jurisdiction's local regulations.
3.) Provide the public, elected officials, and governing bodies the opportunity to discuss and comment upon proposed change(s).
4.) If the proposal is accepted, the change is implemented by the appropriate governing authority.

Jurisdiction	Integration Method
Unincorporated Liberty County	The HMAP and plan amendments will be presented to Commissioner's Court by the PMT Leader. Upon approval by Commissioner's Court, approved actions will be acted upon as funding becomes available and integrated into the identified county planning mechanisms.
Cleveland	Cleveland's PMT representative will select appropriate mitigation actions to be implemented using the City's local budget and develop an implementation proposal. The budget request and implementation proposal will be presented before City Council. An agenda will be published 30 days before the meeting.
Daisetta	Daisetta's PMT representative will draft a proposal for incorporating the HMAP's mitigation strategy into their existing planning mechanisms. Upon approval, city staff will act to incorporate the HMAP into their existing planning mechanisms.
North Cleveland	The North Cleveland's PMT representatives will draft a proposal for incorporating the HMAP's mitigation recommendations into their existing planning mechanisms.
Ames	Ames' PMT representative will select mitigation actions to be budgeted into the City of Ames' annual budget to be implemented the following year. The proposal will be presented before City Council. An agenda will be published 30 days in advance.
Dayton	Dayton's City Manager will draft a proposal for incorporating the HMAP's mitigation strategy into their existing planning mechanisms. The proposal will be presented to the City Council and mayor for consideration. Dayton will post an agenda for the public hearing no less than 30 days before the meeting when it will be considered. Upon approval, the city manager will initiate the process to incorporate the HMAP into their existing planning mechanisms.
Dayton Lakes	Dayton Lakes PMT representative will draft a proposal for incorporating the HMAP's mitigation strategy into their existing planning mechanisms.
Devers	Devers PMT representative will draft a proposal for incorporating the HMAP's mitigation strategy into their existing planning mechanisms. Upon approval, city staff will act to incorporate the HMAP into their existing planning mechanisms.
Hardin	Hardin's PMT representative will select mitigation actions to be budgeted into the Hardin annual budget and be implemented the following year. The budget request and implementation proposal will be presented before City Council. An agenda will be published 30 days before the meeting.
Kenefick	Kenefick's PMT representative will select mitigation actions to be implemented using the local budget. An agenda will be published 30 days in advance, the proposal will be presented before council.
Plum Grove	The Plum Grove's PMT representative will draft a proposal for incorporating the HMAP's mitigation recommendations into their existing planning mechanisms. Plum Grove's representative will present proposal for approval. Upon approval, city staff will act to incorporate the HMAP into their existing planning mechanisms.
Liberty	Liberty's PMT representative will select mitigation actions to be budgeted into the City of Liberty's annual budget to be implemented the following year. The proposal will be presented before City Council. An agenda will be published 30 days in advance.

2017

Appendix A: Planning Process

Public Meeting Press Release & Advertisement

HOUSTON-GALVESTON AREA COUNCIL

PO Box 22777 • Houston, Texas 77227-2777• 713-627-3200

NEWS RELEASE

FOR IMMEDIATE RELEASE
September 29, 2017

Contact: Joey Kaspar: (713) 993-4547 or Joey.Kaspar@h-gac.com

Becki Begley: (713) 993-2410 or Becki.Begley@h-gac.com (Media Inquiries Only)

LIBERTY COUNTY HAZARD MITIGATION PLAN KICK-OFF MEETING

The Houston-Galveston Area Council (H-GAC), in partnership with Liberty County, City of Ames, City Cleveland, City of Daisetta, City of Dayton Lakes, City of Devers, City of Hardin, City of Kenefick, City of Liberty, City of North Cleveland, and City of Plum Grove, is hosting the first public meeting to develop Liberty County's Hazard Mitigation Plan. The meeting will be held from 10:00 a.m. to 1 p.m., October 19th, at the Jack Hartel Building, 318 San Jacinto Street, Liberty, TX

A Hazard Mitigation Plan is a strategic plan that proposes actions to reduce or eliminate long-term risk to people and property from future natural disasters. Public input and involvement is important for developing a comprehensive approach to reduce the effects of natural disasters on communities.

All Liberty County residents are invited to participate and contribute their local expertise during the planning process. Mitigation actions developed by participants will be considered for inclusion in the County's Hazard Mitigation Plan to be submitted to the Federal Emergency Management Agency (FEMA).

The meeting agenda is available on H-GAC's website at http://www.h-gac.com/community/community/hazard/documents/10-19-17-Liberty-County-Meeting-Agenda.pdf

More information on hazard mitigation plans is available on FEMA's website at https://www.fema.gov/hazard-mitigation-planning.

For more information about the meeting, contact Joey Kaspar at (713) 993-4547 or at Joey.Kaspar@h-gac.com, or Amy Combs, (713) 993-4544 or at Amy.Combs@h-gac.com.

Houston-Galveston Area Council

The Houston-Galveston Area Council (www.h-gac.com) is a voluntary association of local governments in the 13-county Gulf Coast Planning Region—an area of 12,500 square miles and more than 6 million people. H-GAC works to promote efficient and accountable use of local, state, and federal tax dollars and serves as a problem-solving and information forum for local government needs.

Public Meeting Agenda: October 19, 2017

Liberty County
Hazard Mitigation Plan Kick-Off Meeting

October 19, 2017
10:00 am – 1:00 pm

Jack Hartel Building
318 San Jacinto Street
Liberty, TX

Agenda

9:30-10:00 am Registration

10:00 am Welcome & Overview of Hazard Mitigation Plans & Procedures
H-GAC Staff will provide an overview of meeting objectives, activities, and H-GAC's planning process. The presentation will also include project timelines, partner roles and responsibilities, in-kind match requirements, and exemptions.

10:15 am Review 2017 Risk Assessment
H-GAC staff will present the County's draft risk assessment. Attendees will participate in a breakout session to review the draft risk assessment maps, charts, and provide feedback.

11:10 am Local Risk Assessment & Capability Form
Meeting attendees will fill out a form describing the frequency of a hazard, and rate their mitigation capabilities in their jurisdiction.

11:15 am 15-minute Break

11:30 am Mitigation Actions Presentation & Activity
H-GAC staff will give a presentation on creating mitigation actions and facilitate a practice exercise in writing a mitigation action.

12:30 pm Update 2011 Mitigation Actions & Write New Actions
Review 2011 mitigation actions for viability, and update actions to meet new FEMA standards. With remaining time, draft new mitigations for 2017.

1:00 pm Adjourn

Sign In Sheet From October 19 2017

Liberty County Hazard Mitigation Plan Kickoff Meeting

Your Name	Your Title	Organization, City, or County Represented	Phone Number	Email Address
Steven Grimm	Assistant fire chief	City of Liberty	936-336-3722	sgrimm@cityofliberty.org
Crista Beasley-Adams	Deputy Coordinator	Liberty County OEM	936-334-3219	cbeasley@co.liberty.tx.us
Tom Branch	Coordinator	Liberty County OEM	936-334-3215	tom.branch@co.liberty.tx.us
Kelly McDonald	City Manager	City of Cleveland	281 592-2667	kmcdonald@clevelandtexas.com
Rod Heiney	Dir Public Works	City of Cleveland	281 740 6540	rheiney@clevelandtexas.com
Carolyn McWaters	Mayor Pro Tem	City of Cleveland	281-593-8225	cmcwaters city [illegible]
Sean Anderson	Fire Chief	City of Cleveland	281-761-8580	sanderson@clevelandtexas.com
Darrel Broussard	Chief of Police	City of Cleveland	281 592-2622	dbroussard@clevelandtexas.com
Emerson G Buckhill	EMC	City of Cleveland	281 659 0290	ebuckhill@clevelandtexas.com
Paula Logan	Consultant	City of Cleveland	512-294-7456	Plogan1@att.net
Lorena Reyes	Planner	TDEM	512-909-1439	Lorena.reyesrocha@dps.texas.gov

19 October 2017 10:00 am – 1:00 pm Jack Hartel Building 318 San Jacinto Street Liberty, TX

TEXAS A&M AGRILIFE EXTENSION

LIBERTY County CHARM Workshop
Jack Hartel Community Center
April 13, 2018

TEXAS COMMUNITY WATERSHED PARTNERS

CHARM Meeting Sign-In Sheet

	Name	Organization/Affiliation	Title	E-mail Address
1	Cassandra Gill	City of Dayton	Building Official	cgill@daytontx.org
2	Sheila Doll	FEMA	CPCB	
3	Rick Martin	FEMA	CPCB	
4	Timothy Little	FEMA	675	
5	Ed Monaghan	FEMA	675	
6	Jonathan Colvell	FEMA	R6	
7	Amanda Solitro	Texas A&M		
8	Steven Mikulencak	Texas A&M		
9	Yu-Wen Chang	Texas A&M		
10	MD Yousef Reja	Texas A&M		
11	Celina Coury	Texas A&M		
12	John Jacob	Texas A&M		
13	David Vaughn	Liberty County	FPA	
14	Rhonda Campbell	Liberty Dayton Reg Med Center	COO	rcampbell@libertydaytonrmc.com
15	Shannon O'Keefe	City of Dayton	City Secretary	sokeefe@daytontx.org
16	Bert Pennington	City of Cleveland	Asst CM	bpennington@clevelandtexas.com
17	Sheri'll Lawson	City of Dayton	City Council #2	
18	Keely Sullivan	DSHS	Public Health Nurse	keely.sullivan@dshs.texas.gov

LIBERTY County CHARM Workshop
Jack Hartel Community Center
April 13, 2018

	Name	Organization/Affiliation	Title	E-mail Address
19	Tom Branch	LCOEM	EMC	Tom.Branch@co.liberty.tx.us
20	Amy Combs	H-GAC	Regional Planner	amy.combs@h-gac.com
21	Crista Beasley-Adams	LCOEM	Dep EMC	cbeasley@co.liberty.tx.us
22	Jay H. Knight	Liberty County	Liberty County Judge	cojudge@co.liberty.tx.us
23	Matt Thornton	Liberty Dayton Hospital	CEO	mthornton@libertydaytonrmc.com
24	EG Brantill	City of Cleveland	CBO, EMC, CM	gbrantill@clevelandtexas.com
25	Mike Penry	City of Cleveland	Council member	penrymike@gmail.com
26	James Carson	Liberty County OEM	Liaison Officer	james.carson@co.liberty.tx.us
27	Kalli Egan	USACE	Civil Engr	kalli.clark-egan2@usace.army.mil
28	Daniel Tirran	TRNWR	Intern	dantier94@gmail.com
29	Katie Clevenger	TRNWR	Intern	katieclevenger02@gmail.com
30	Amanda Brooks	TexasA&MAgrilife	CEA	amanda.brooks@ag.tamu.edu
31	Ryan Merrick	Liberty County LTRC	Director	ryanmerrick@gmail.com
32	Dusty McGee	Liberty ISD	Director	dsmcgee@libertyisd.net
33	Mark Ellington	Liberty County SO	Captain	mark.ellington@co.liberty.tx.us
34	Lou L. Sidwell	City of Daisetta	Mayor Pro Tem	texaskingskid@imsday.com
35	Laurie Lomas Gonzales	USFWS	Biologist	Laurie_Lomas-Gonzales@fws.gov
36	Greg Broz	City, Lib	City Mgr	gbroz@cityofLib.org

TEXAS A&M AGRILIFE EXTENSION

LIBERTY County CHARM Workshop
Jack Hartel Community Center
April 13, 2018

TEXAS COMMUNITY WATERSHED PARTNERS

	Name	Organization/Affiliation	Title	E-mail Address
37	Courtland Holman	Dayton Community Dev	Executive Director	cholman@cityofdayton.com
38	Angela Smith	City of Cleveland	City Secretary	asmith@clevelandtexas.com
39	Glennda Hardin	St. Stephen's Episcopal Church GRACE Initiative of S. Liberty Co.	Deacon President	deacon-gh@chemoengineering.com
40	Alexis Cordova	TX A&M AgriLife Ext.	CEA - FCH	ancordova@ag.tamu.edu
41	Johnny Spurlock	Liberty Co EMS	Asst. Director	—
42	Bonnie Campisi	USFWS	Admin	Bonnie_Campisi@fws.gov
43	MICHAEL COLLIER	CITY OF LIBERTY	BLDG OFFICIAL	MCOLLIER@CITYOFLIBERTY.ORG
44	JAMES ARANGO	DSHS	SNS COORD.	James.arango@dshs.texas.gov
45	Kevin Wicks	SSVS	Training Specialist	Kevin.Wicks@dshs.texas.gov
46	Jennifer Manuel	State Rep Ernest Bailes	District Director	Jennifer.Manuel@house.texas.gov

TEXAS A&M AGRILIFE EXTENSION

LIBERTY County CHARM Workshop
Jack Hartel Community Center
April 13, 2018

TEXAS COMMUNITY WATERSHED PARTNERS

Name	Organization/Affiliation	Title	E-mail Address
Cindy Burchfield	City of Daisetta	Alderman Pos. 1	james_b413@hotmail.com

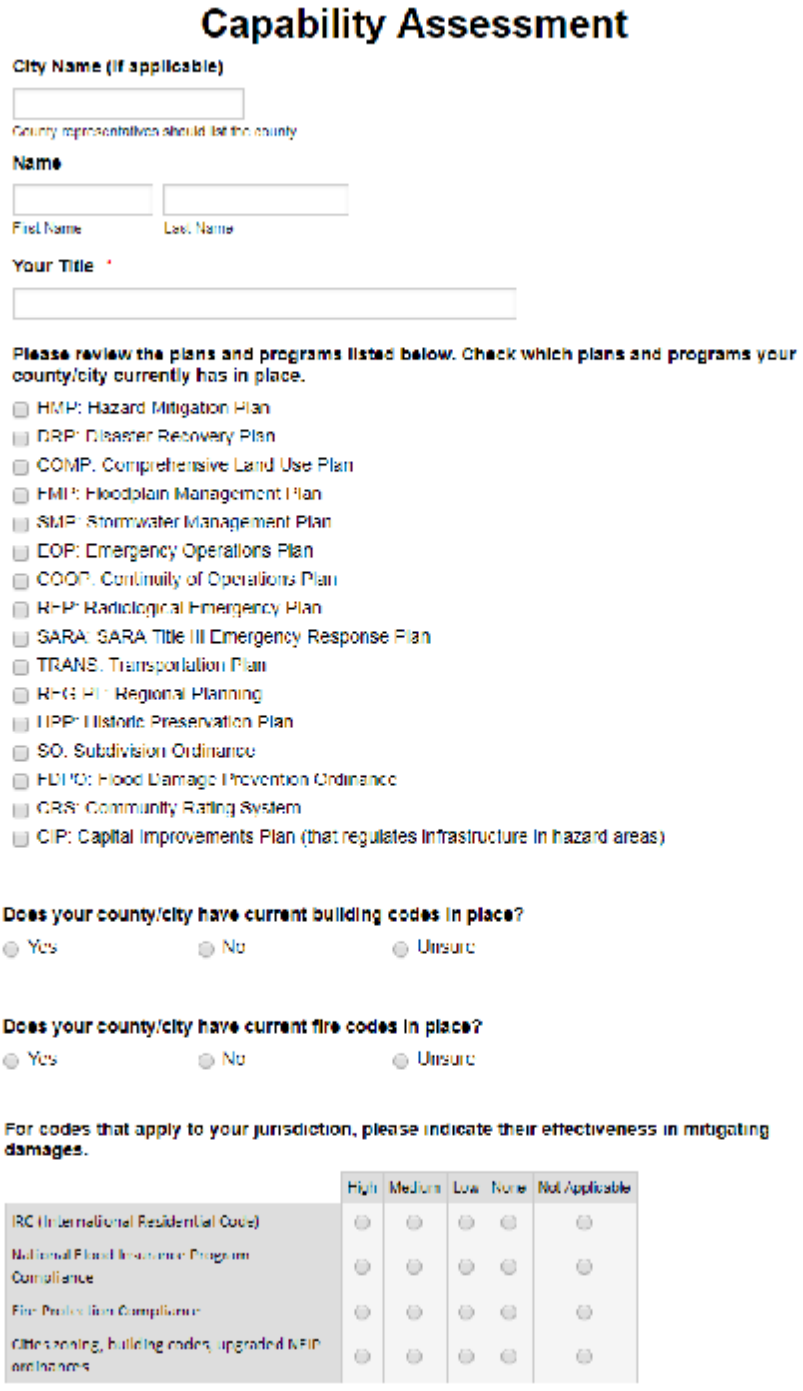
TEXAS A&M AGRILIFE EXTENSION

LIBERTY County CHARM Workshop
Jack Hartel Community Center
April 13, 2018

TEXAS COMMUNITY WATERSHED PARTNERS

Name	Organization/Affiliation	Title	E-mail Address
John Headrick	Dayton PD	Chief	chief@DAYtonTX.ORG

Online Surveys



Capability Assessment

City Name (if applicable)

County representative should list the county

Name

First Name Last Name

Your Title *

Please review the plans and programs listed below. Check which plans and programs your county/city currently has in place.

- HMP: Hazard Mitigation Plan
- DRP: Disaster Recovery Plan
- COMP: Comprehensive Land Use Plan
- FMP: Floodplain Management Plan
- SMP: Stormwater Management Plan
- EOP: Emergency Operations Plan
- COOP: Continuity of Operations Plan
- REP: Radiological Emergency Plan
- SARA: SARA Title III Emergency Response Plan
- TRANS: Transportation Plan
- RPG PP: Regional Planning
- HPP: Historic Preservation Plan
- SO: Subdivision Ordinance
- FDPO: Flood Damage Prevention Ordinance
- CRS: Community Rating System
- CIP: Capital Improvements Plan (that regulates infrastructure in hazard areas)

Does your county/city have current building codes in place?

Yes No Unsure

Does your county/city have current fire codes in place?

Yes No Unsure

For codes that apply to your jurisdiction, please indicate their effectiveness in mitigating damages.

	High	Medium	Low	None	Not Applicable
IRC (International Residential Code)					
National Flood Insurance Program Compliance					
Fire Protection Compliance					
Other zoning, building codes, upgraded NFIP ordinances					

Hazard Mitigation Planning Team

Jurisdiction:	

Primary Point of Contact

Name:	
Title:	
Email:	
Phone:	

Please include the information of your jurisidiction's planning team. The planning team consists of anyone who will help your jurisdiction with the Hazard Mitigation Plan:

Other Team Members:

Name:	
Title:	
Email:	

Name:	
Title:	
Email:	

Name:	
Title:	
Email:	

Name:	
Title:	
Email:	

NFIP & Flood Plain Management Capability

Name

First Name | Last Name

Your Title *

Email

Name of Jurisdiction

County representatives should list the county

Is your jurisdiction a National Flood Insurance Program (NFIP) Participant?

- Yes
- No

NFIP Policy Summary

	Total Number of Policies	Total Coverage	Total Number of Losses	Total Dollars Paid
Summary				

NFIP Staff Assessment

The following questions seek information on your community's participation in and continued compliance with the NFIP. Indicate the source of information.

Is the Community FPA or NFIP Coordinator certified?

- Yes
- No

Source Information	Comments
Community FPA	

Is floodplain management an auxiliary function?

- Yes
- No

Source Information	Comments
Community FPA	

Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)

Local Risk & Capability Survey

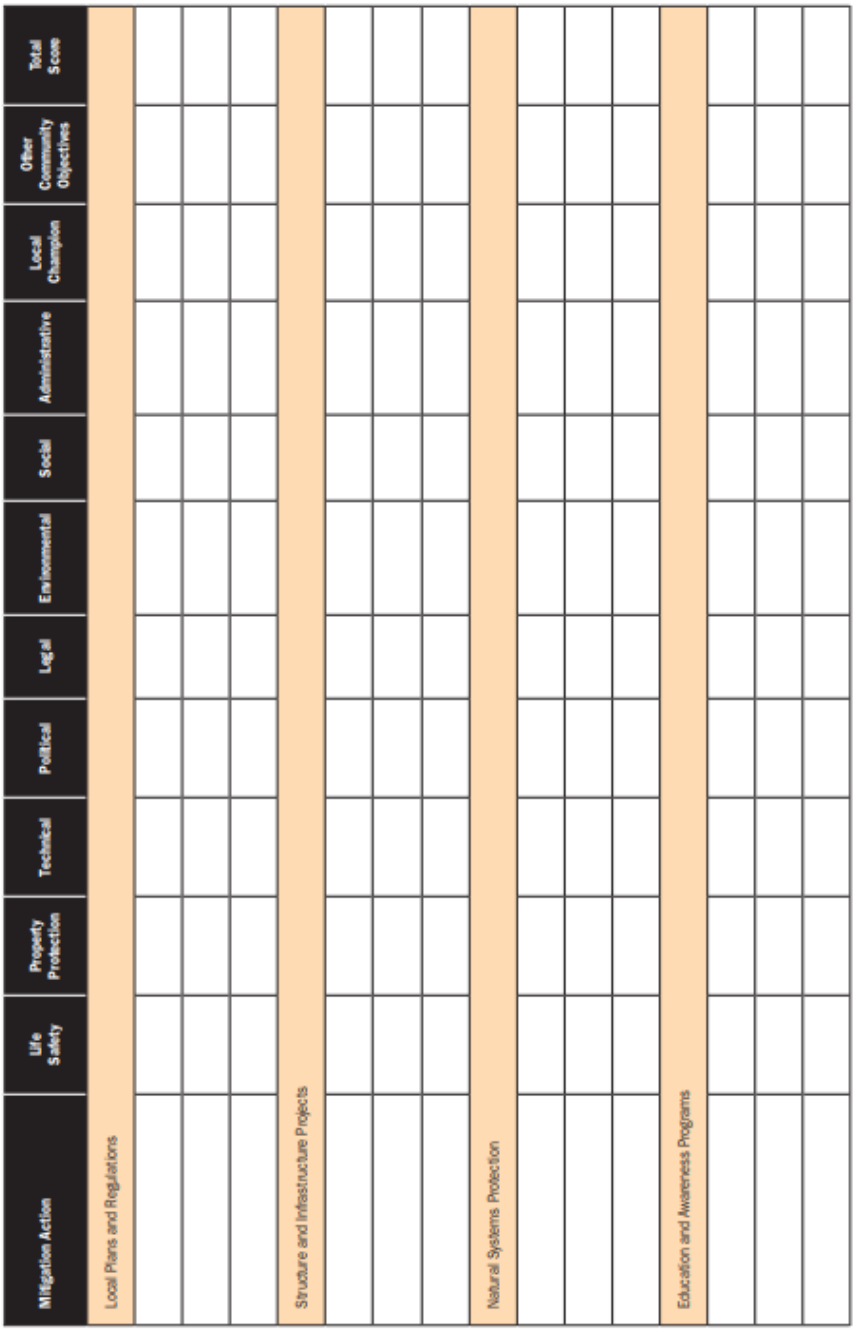
Please rate the cities/ counties ability to reduce the impact of the listed natural hazards.

Hazard	Applicable to your Community?			Current Perceived Risk			Current Ability to Reduce Damages from Hazard			Future Ability to Reduce Damages from Hazard		
Floods	Yes	No	Unknown	Low	Medium	High	Low	Medium	High	Low	Medium	High
Hurricane/Tropical Storms	Yes	No	Unknown	Low	Medium	High	Low	Medium	High	Low	Medium	High
Wildfire	Yes	No	Unknown	Low	Medium	High	Low	Medium	High	Low	Medium	High
Severe Thunderstorms	Yes	No	Unknown	Low	Medium	High	Low	Medium	High	Low	Medium	High
Tornado	Yes	No	Unknown	Low	Medium	High	Low	Medium	High	Low	Medium	High
Drought	Yes	No	Unknown	Low	Medium	High	Low	Medium	High	Low	Medium	High
Coastal Erosion	Yes	No	Unknown	Low	Medium	High	Low	Medium	High	Low	Medium	High
Dam/Levee Failure	Yes	No	Unknown	Low	Medium	High	Low	Medium	High	Low	Medium	High
Expansive Soils	Yes	No	Unknown	Low	Medium	High	Low	Medium	High	Low	Medium	High
Extreme Heat	Yes	No	Unknown	Low	Medium	High	Low	Medium	High	Low	Medium	High
Hail	Yes	No	Unknown	Low	Medium	High	Low	Medium	High	Low	Medium	High
Winter Storms	Yes	No	Unknown	Low	Medium	High	Low	Medium	High	Low	Medium	High

Please rate the cities/ counties ability to reduce the impact of the listed natural hazards.

Hazard	Local Budget			Administrative Staffing			Technical Staffing			Political Determination/Resolve		
Floods	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Hurricane/Tropical Storms	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Wildfire	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Severe Thunderstorms	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Tornado	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Drought	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Coastal Erosion	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Dam/Levee Failure	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Expansive Soils	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Extreme Heat	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Hail	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Winter Storms	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High

Mitigation Prioritization Worksheet



Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
Local Plans and Regulations											
Structure and Infrastructure Projects											
Natural Systems Protection											
Education and Awareness Programs											

2017

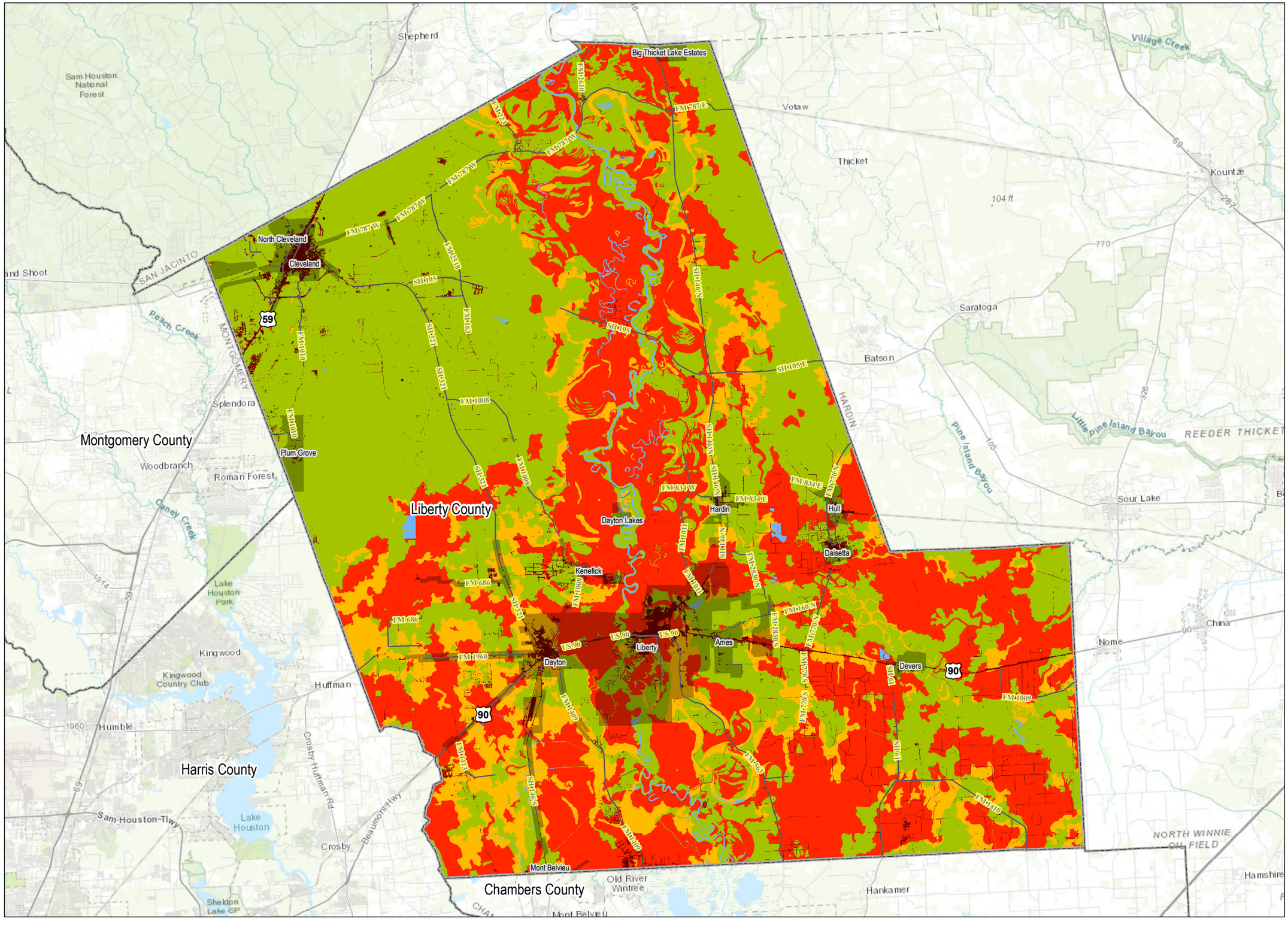
Appendix B: Critical Facilities

TYPE	NAME	CITY
Correctional Facility	Texas Department of Corrections	Cleveland
Electric Substation	Cleveland	Cleveland
EMS	City of Cleveland Emergency Services	Cleveland
Fire Station	North Liberty County VFD	Cleveland
Fire Station	Tarkington VFD	Cleveland
High School	Tarkington High School	Cleveland
Hospital	Cleveland Regional Medical Center	Cleveland
Hospital	Cleveland Emergency Hospital	Cleveland
Police Station	Cleveland Police Department	Cleveland
Fire Department	Cleveland Police Department	Cleveland
School	Eastside Elementary	Cleveland
School	Tarkington Middle School	Cleveland
School	Southside Primary School	Cleveland
School	Northside Elementary	Cleveland
School	Cleveland Middle School	Cleveland
Shelter	St Mary Catholic Church	Cleveland
Shelter	First Baptist Church	Cleveland
Shelter	Calvary Baptist Church	Cleveland
Shelter	Cornerstone Church-Cleveland	Cleveland
Shelter	Hi-Way Tabernacle Assembly of God	Cleveland
Toxic Release Inventory Facility	Georgia Pacific Wood Products	Cleveland
Toxic Release Inventory Facility	Campbell RMC Cleveland	Cleveland
EMS	Liberty County Emergency Medical Services Incorporated	Daisetta
High School	Hull-Daisetta High School	Daisetta
Police Station	Daisetta Police Department	Daisetta
Shelter	Hull Daisetta High School Gym	Daisetta
Toxic Release Inventory Facility	Mobil Oil Daisetta Underground Storage	Daisetta
Fire Station	Daisetta Fire Station	Daisetta
Correctional Facilities	Texas Department of Corrections	Dayton
Electric Substation	Dayton Bulk	Dayton
Electric Substation	Unknown 307747	Dayton
Electric Substation	Unknown 307824	Dayton
EMS	Liberty County Emergency Medical Services	Dayton
EMS	Westlake Community Volunteer Fire Department	Dayton
Fire Station	Highway 321 VFD	Dayton
Fire Station	Dayton VFD	Dayton
High Schools	Premier High School of Dayton	Dayton
High Schools	Dayton High School	Dayton
Liberty County Dayton Annex	Liberty County Constable Precinct 4	Dayton
School	Kimmie M Brown Elementary	Dayton
School	Wilson Junior High School	Dayton
School	Nottingham Middle School	Dayton
School	Richter Elementary	Dayton

School	Colbert Elementary	Dayton
School	Austin Elementary School	Dayton
Shelter	First Baptist Church	Dayton
Shelter	First United Methodist Church	Dayton
Shelter	New Life Church	Dayton
Shelter	Old River Baptist	Dayton
Toxic Release Inventory Facility	Huntsman Petrochemicals LLC	Dayton
Toxic Release Inventory Facility	Champion Technologies	Dayton
Toxic Release Inventory Facility	Alabama Metal Industries	Dayton
Toxic Release Inventory Facility	Insteel Wire Products	Dayton
Toxic Release Inventory Facility	Campbell RMC Dayton	Dayton
Wastewater Treatments Plant	Southwest Waste Water Treatment Facility	Dayton
EMS	Devers Volunteer Fire Department	Devers
Fire Station	Devers Fire Station	Devers
School	Devers Elementary	Devers
EMS	Hardin Volunteer Fire Department	Hardin
High School	Hardin High School	Hardin
School	Hardin Jr. High School	Hardin
School	Hardin Elementary	Hardin
School	Hull-Daisetta Elementary	Unincorporated
Toxic Release Inventory Facility	Hull Underground Storage	Unincorporated
Correctional Facilities	Liberty County Jail	Liberty
EMS	Volunteer Fire Department	Liberty
EMS	Liberty Emergency Management	Liberty
Fire Station	Liberty Fire Department	Liberty
Fire Station	Hull-Daisetta Volunteer Fire Department	Liberty
High School	Liberty High School	Liberty
Hospital	Liberty-Dayton Regional Medical Center	Liberty
Emergency Operation Center	Liberty County Emergency Operations Center	Liberty
Police Station	Liberty County Constable Precinct 1	Liberty
City Hall	Sheriff's Office Identification	Liberty
Police Station	Liberty Police Department	Liberty
School	Liberty Middle School	Liberty
School	Liberty Elementary	Liberty
School	San Jacinto Elementary	Liberty
Shelter	North Main Baptist Church	Liberty
Shelter	Liberty County Shelter/Community Center	Liberty
Shelter	First United Methodist Church	Liberty
Shelter	Liberty Middle School	Liberty
Shelter	Immaculate Catholic Church	Liberty
Shelter	First Baptist Church	Liberty
Shelter	Light House of Moss Hill	Liberty
Toxic Release Inventory Facility	Central Int. Corp	Liberty
Toxic Release Inventory Facility	Dragon Liberty Facility	Liberty

Toxic Release Inventory Facility	Liberty Forge	Liberty
Toxic Release Inventory Facility	Allied Tube & Conduit Corp	Liberty
Shelter	First Baptist Church Plum Grove	Plum Grove
Shelter	First Baptist Church	Unincorporated
EMS	Woodpecker Volunteer Fire Department	Unincorporated
Police Station	Liberty County Sheriff Office	Unincorporated
Dam	Rusk Dam 1	
Dam	George W. Maxwell Levee	
Dam	Lovell Reservoir Levee 1	
Dam	Lake Forest Dam	
Dam	Daniel Lake Dam	
Dam	Lake Bayou Reservoir Dam	
Dam	Knights Forest Lake Dam	
Dam	Stephen Meche Dam	
Dam	Dayton Canal Dam	
Dam	JM Frost Reservoir Levee 2	
Dam	Timber Lake Dam	
Dam	Talley Lake Dam	
Dam	Alders Reservoir Dam	
Dam	Winter Valley Estates Dam	
Dam	W Scott Frost Reservoir Levee 3	
Dam	JM Frost III Reservoir Levee 3	
Dam	Hoop and Holler Lake Dam	
Dam	Bearfoot Lake Dam	
Dam	Silver Bit Lake Dam	
Dam	Pin Oak Reservoir Levee	
Dam	Cypress Lake Dam	
Dam	Six Lakes Estates Number 3 Dam	
Dam	Six Lakes Estates Number 5 Dam	
Dam	Lake Dam One	
Dam	Lovell Reservoir Number 2 Levee	
Electric Substation	Unknown 307557	
Electric Substation	Unknown 307853	
Electric Substation	Unknown 307859	
Electric Substation	Tap 303559	
Electric Substation	Unknown 307555	
Electric Substation	Unknown 307854	
Electric Substation	Unknown 307746	
Electric Substation	Unknown 307823	
Electric Substation	Unknown 307528	
Natural Gas Receipt Delivery	HPL / NGPL Devers Liberty	
Natural Gas Receipt Delivery	MB HUB / NGPL Moss Bluff Liberty	
Natural Gas Receipt Delivery	MB HUB / NGPL Moss Bluff Liberty	

Expansive Soil Map : Liberty County



Legend

Expansive Soils Type

- Water
- Moderate swelling potential
- Low swelling potential
- High swelling potential
- Developed
- County Boundary
- Cities

N

0 1.75 3.5 7 Miles

Sources:
HGAC Natural Resource Conservation Service

2017

Appendix C: Hazus Analysis

Hazus-MH: Flood Global Risk Report

Region Name: Liberty County

Flood Scenario: 100-Year

Print Date: Wednesday, November 08, 2017

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

FEMA

RiskMAP
Increasing Resilience Together

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Texas

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 1,176 square miles and contains 3,597 census blocks. The region contains over 25 thousand households and has a total population of 75,643 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 28,649 buildings in the region with a total building replacement value (excluding contents) of 5,679 million dollars (2010 dollars). Approximately 94.55% of the buildings (and 83.51% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 28,649 buildings in the region which have an aggregate total replacement value of 5,679 million (2014 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	4,742,664	83.5%
Commercial	565,805	10.0%
Industrial	140,988	2.5%
Agricultural	14,556	0.3%
Religion	104,856	1.8%
Government	45,980	0.8%
Education	64,032	1.1%
Total	**5,678,881**	**100.0%**

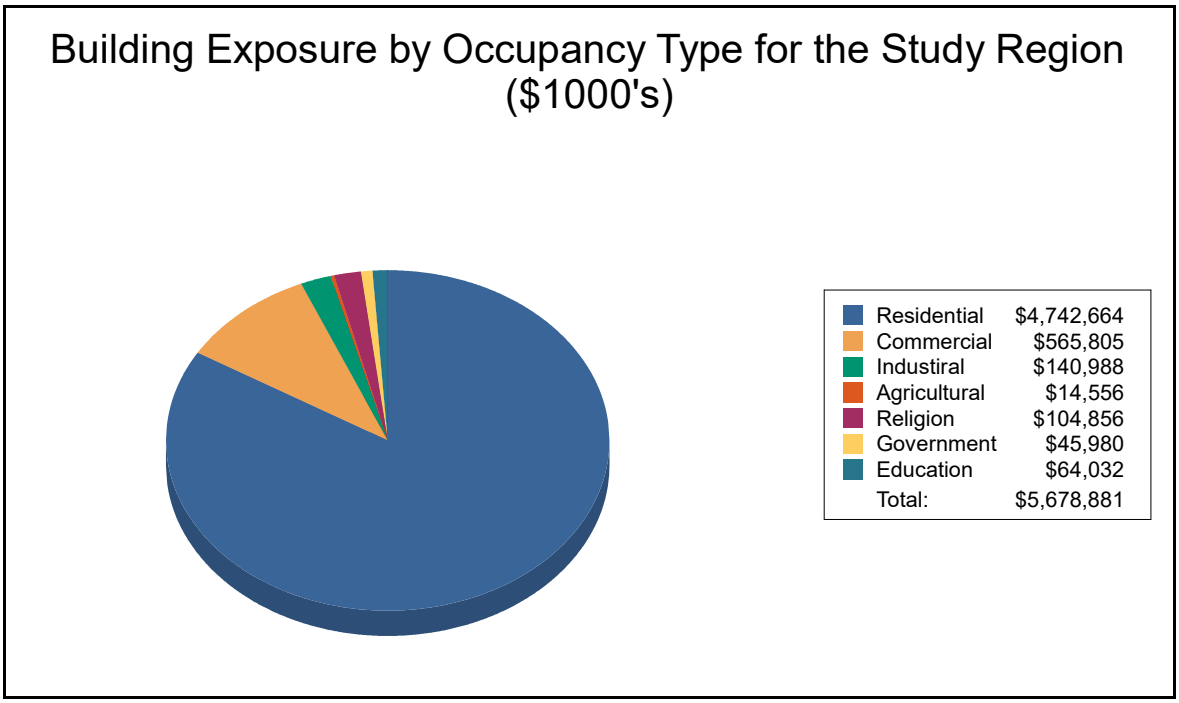
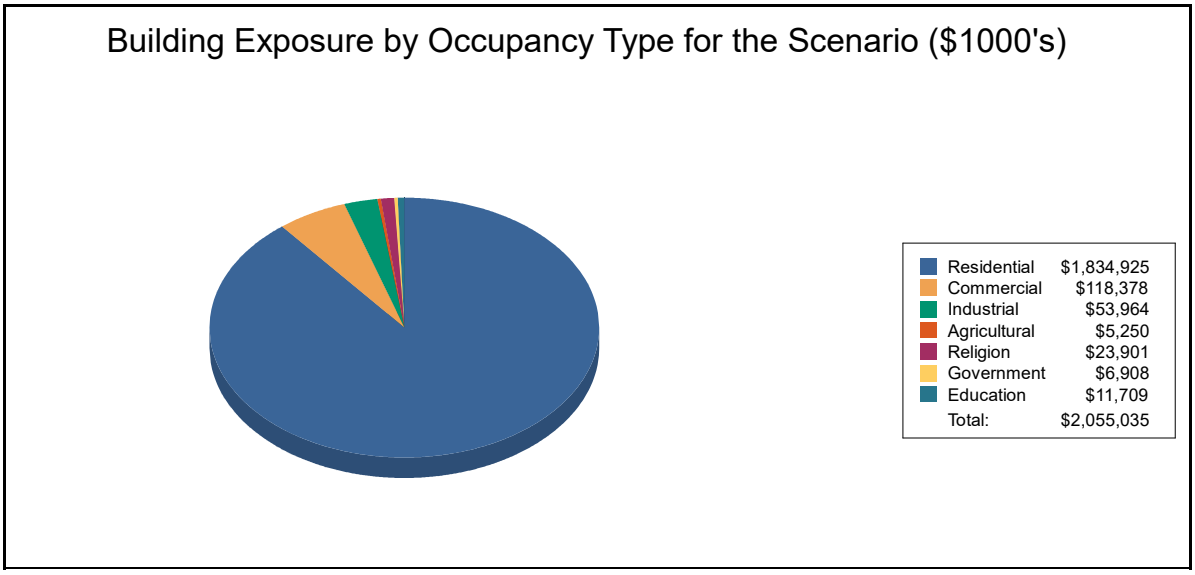


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,834,925	89.3%
Commercial	118,378	5.8%
Industrial	53,964	2.6%
Agricultural	5,250	0.3%
Religion	23,901	1.2%
Government	6,908	0.3%
Education	11,709	0.6%
Total	**2,055,035**	**100.0%**



Essential Facility Inventory

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 144 beds. There are 45 schools, 12 fire stations, 9 police stations and 1 emergency operation center.

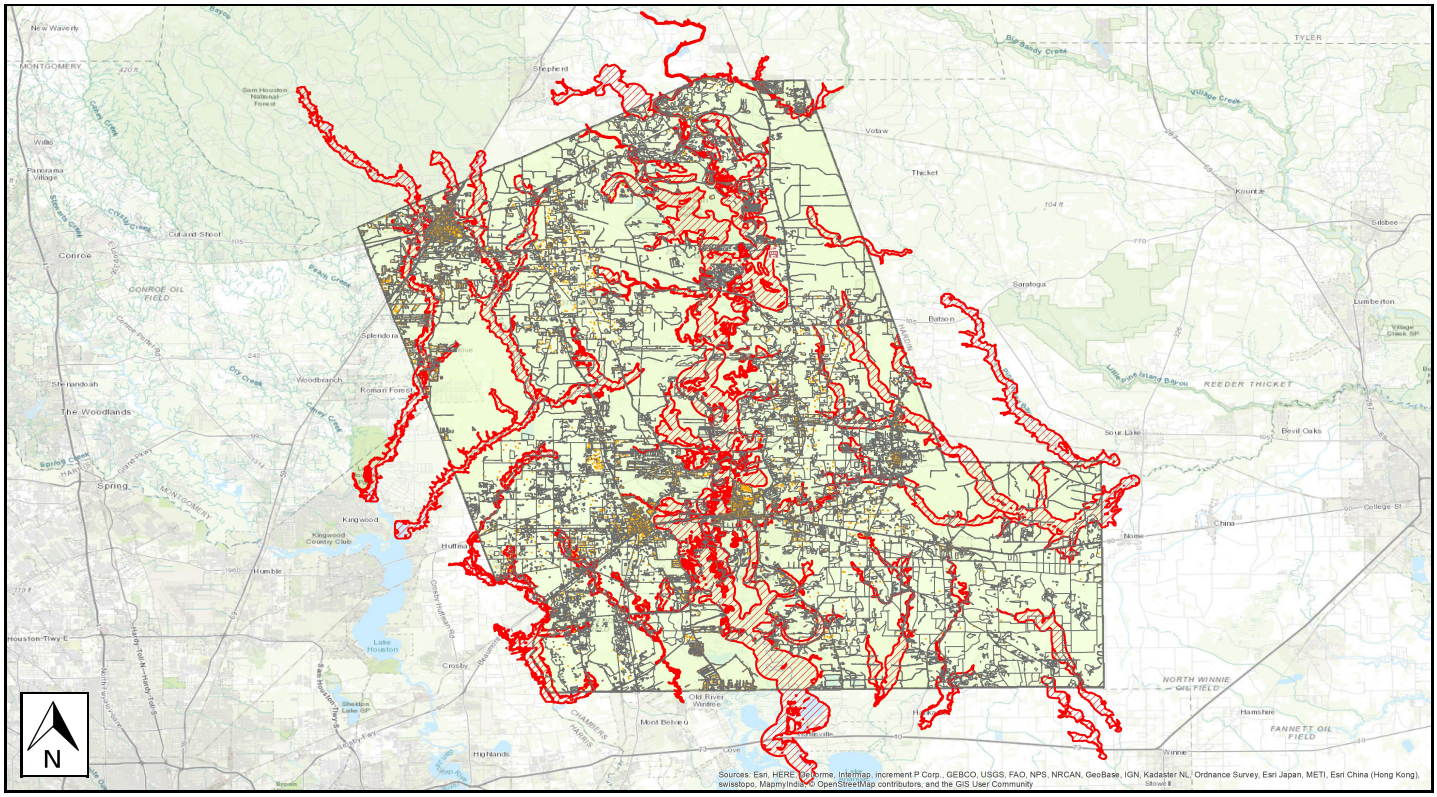
Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Liberty County
Scenario Name:	100-Year
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 280 buildings will be at least moderately damaged. This is over 61% of the total number of buildings in the scenario. There are an estimated 26 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

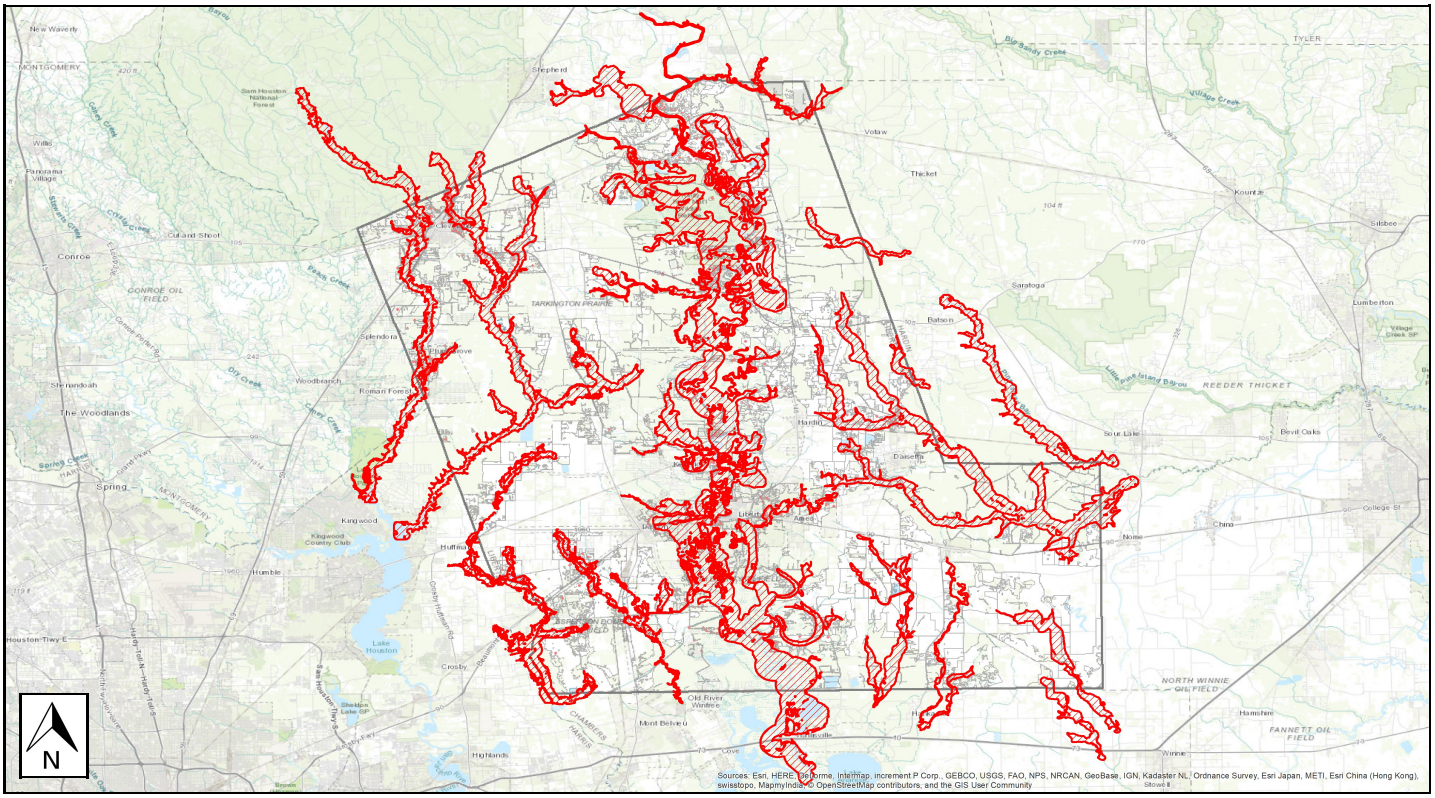


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	126	31.03	165	40.64	52	12.81	27	6.65	10	2.46	26	6.40
Total	**126**		**165**		**52**		**27**		**10**		**26**	

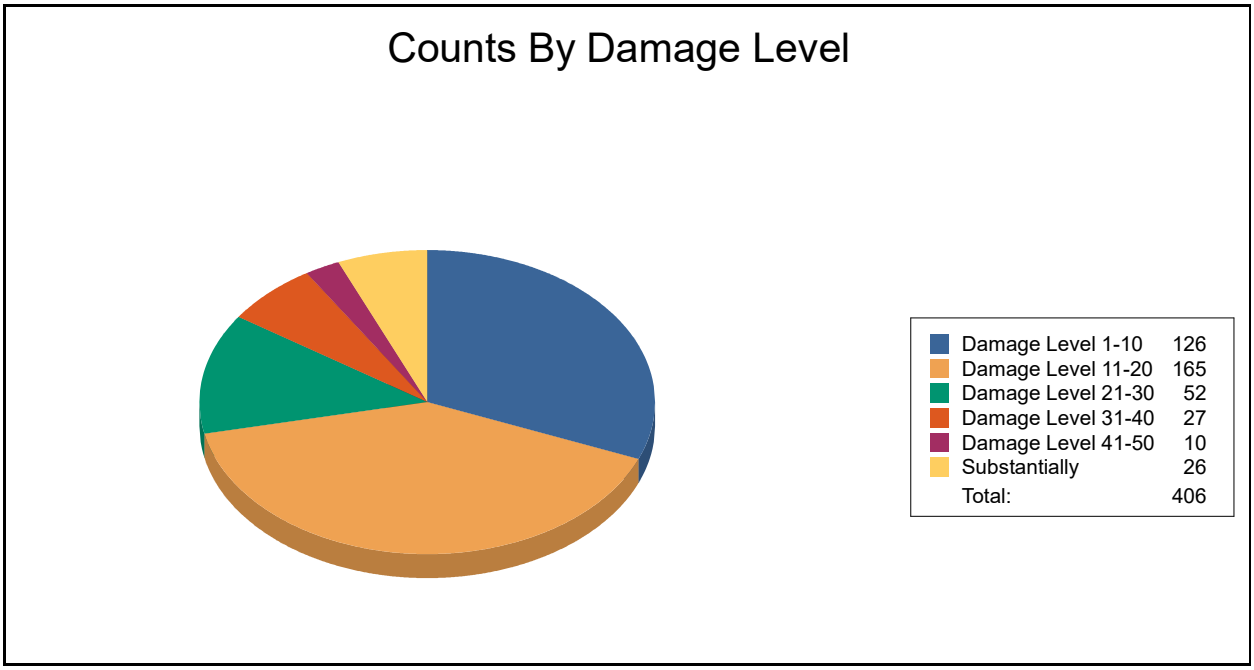


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	15	25	16	27	6	10	0	0	1	2	22	37
Masonry	2	25	6	75	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	109	32	143	42	46	14	27	8	9	3	4	1

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 144 hospital beds available for use. On the day of the scenario flood event, the model estimates that 144 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	12	0	0	0
Hospitals	2	0	0	0
Police Stations	9	0	0	0
Schools	45	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

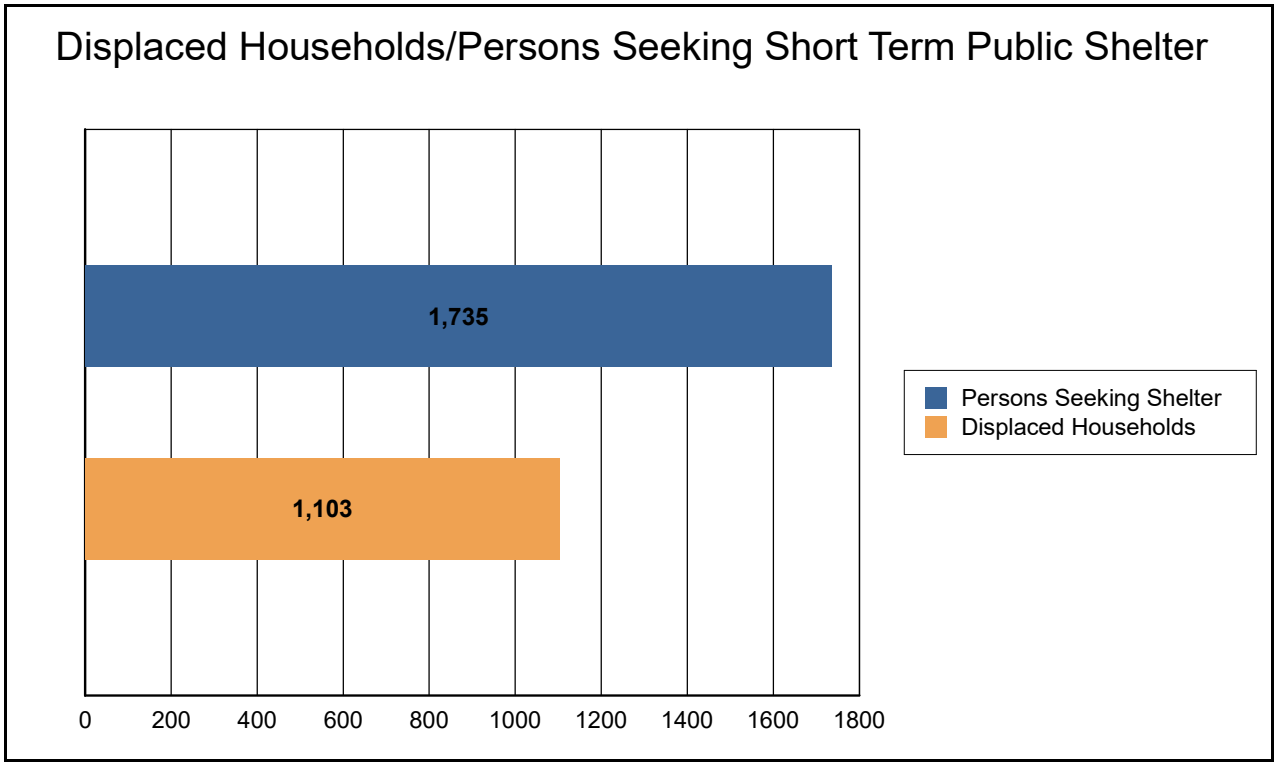
Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 1,103 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,735 people (out of a total population of 75,643) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 71.26 million dollars, which represents 3.47 % of the total replacement value of the scenario buildings.

Building-Related Losses

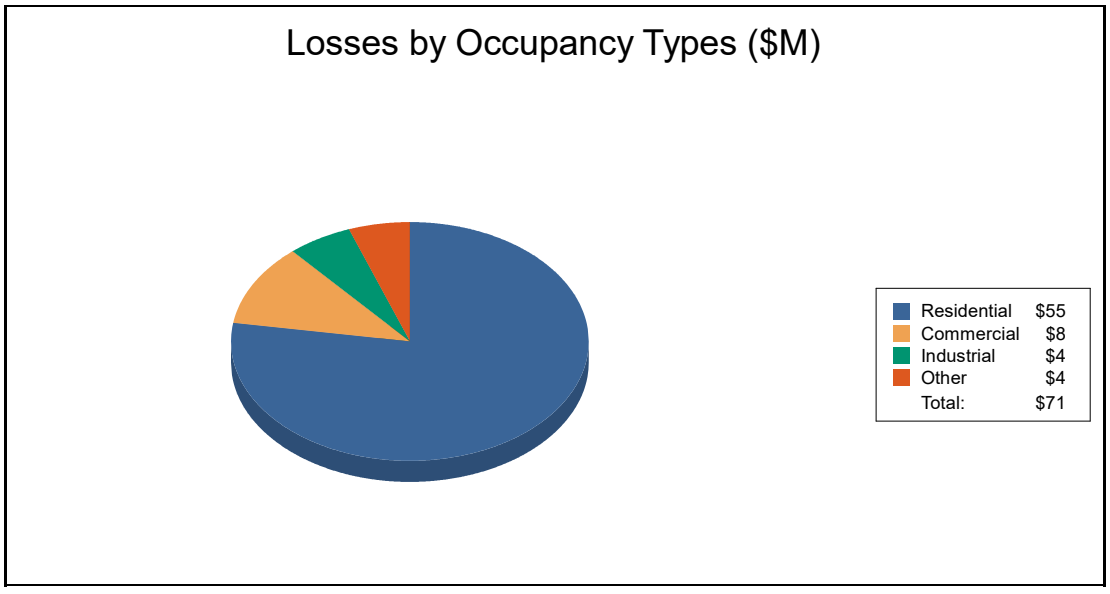
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 70.96 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 77.61% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	35.98	2.08	1.06	0.71	39.83
	Content	19.25	5.51	2.61	3.13	30.49
	Inventory	0.00	0.15	0.48	0.01	0.64
	Subtotal	**55.23**	**7.74**	**4.15**	**3.84**	**70.96**
Business Interruption						
	Income	0.00	0.04	0.00	0.01	0.05
	Relocation	0.07	0.01	0.00	0.01	0.09
	Rental Income	0.00	0.01	0.00	0.00	0.01
	Wage	0.00	0.03	0.00	0.12	0.16
	Subtotal	**0.08**	**0.09**	**0.00**	**0.14**	**0.30**
ALL	**Total**	**55.31**	**7.83**	**4.15**	**3.97**	**71.26**



Appendix A: County Listing for the Region

Texas

- Liberty

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Texas				
Liberty	75,643	4,742,664	936,217	5,678,881
Total	**75,643**	**4,742,664**	**936,217**	**5,678,881**
Total Study Region	**75,643**	**4,742,664**	**936,217**	**5,678,881**

Hazus-MH: Flood Global Risk Report

Region Name: Liberty County

Flood Scenario: 500-Year

Print Date: Wednesday, November 08, 2017

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

FEMA

RiskMAP
Increasing Resilience Together

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Texas

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 1,176 square miles and contains 3,597 census blocks. The region contains over 25 thousand households and has a total population of 75,643 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 28,649 buildings in the region with a total building replacement value (excluding contents) of 5,679 million dollars (2010 dollars). Approximately 94.55% of the buildings (and 83.51% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 28,649 buildings in the region which have an aggregate total replacement value of 5,679 million (2014 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	4,742,664	83.5%
Commercial	565,805	10.0%
Industrial	140,988	2.5%
Agricultural	14,556	0.3%
Religion	104,856	1.8%
Government	45,980	0.8%
Education	64,032	1.1%
Total	**5,678,881**	**100.0%**

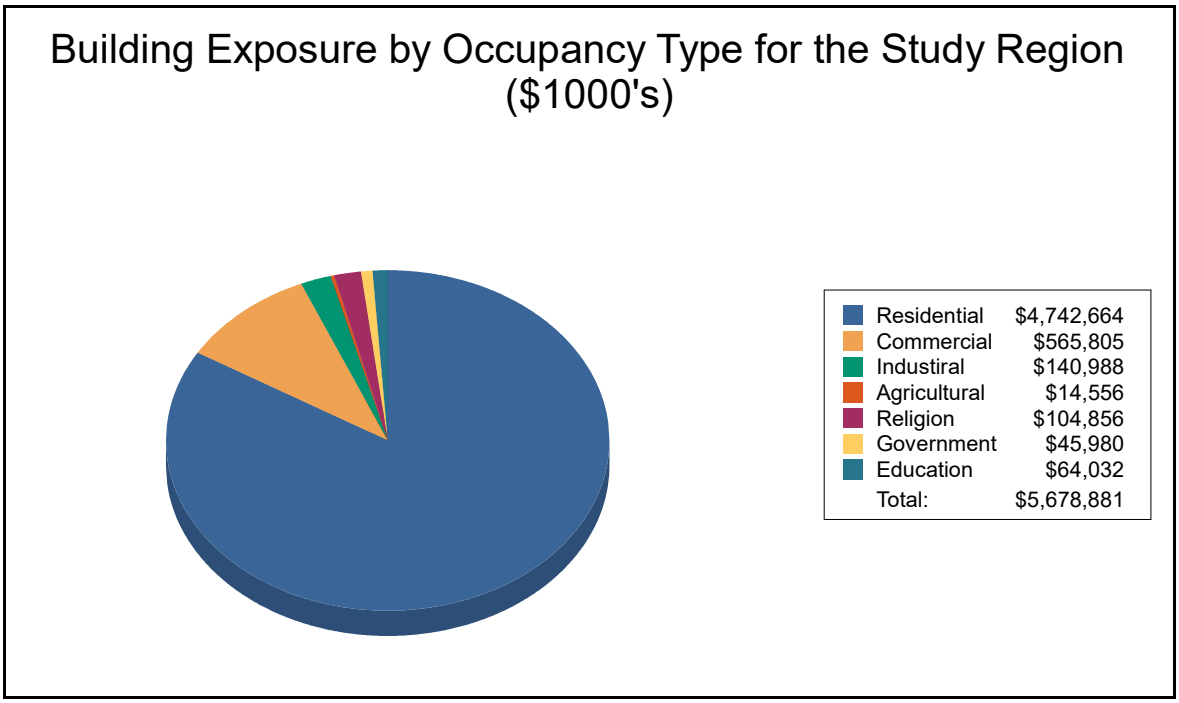
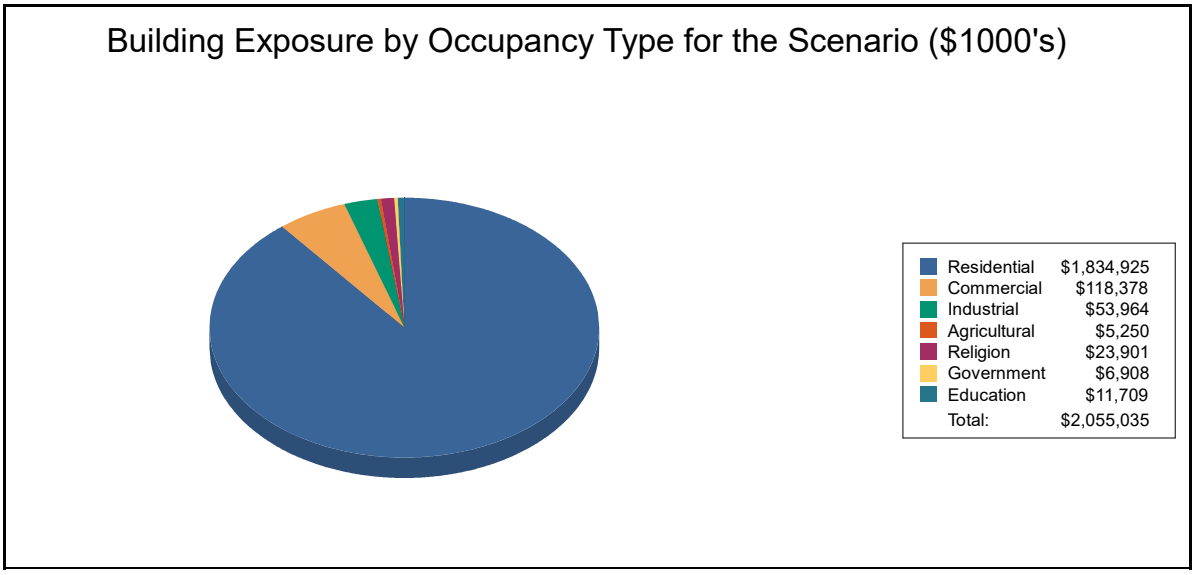


Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	1,834,925	89.3%
Commercial	118,378	5.8%
Industrial	53,964	2.6%
Agricultural	5,250	0.3%
Religion	23,901	1.2%
Government	6,908	0.3%
Education	11,709	0.6%
Total	**2,055,035**	**100.0%**



Essential Facility Inventory

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 144 beds. There are 45 schools, 12 fire stations, 9 police stations and 1 emergency operation center.

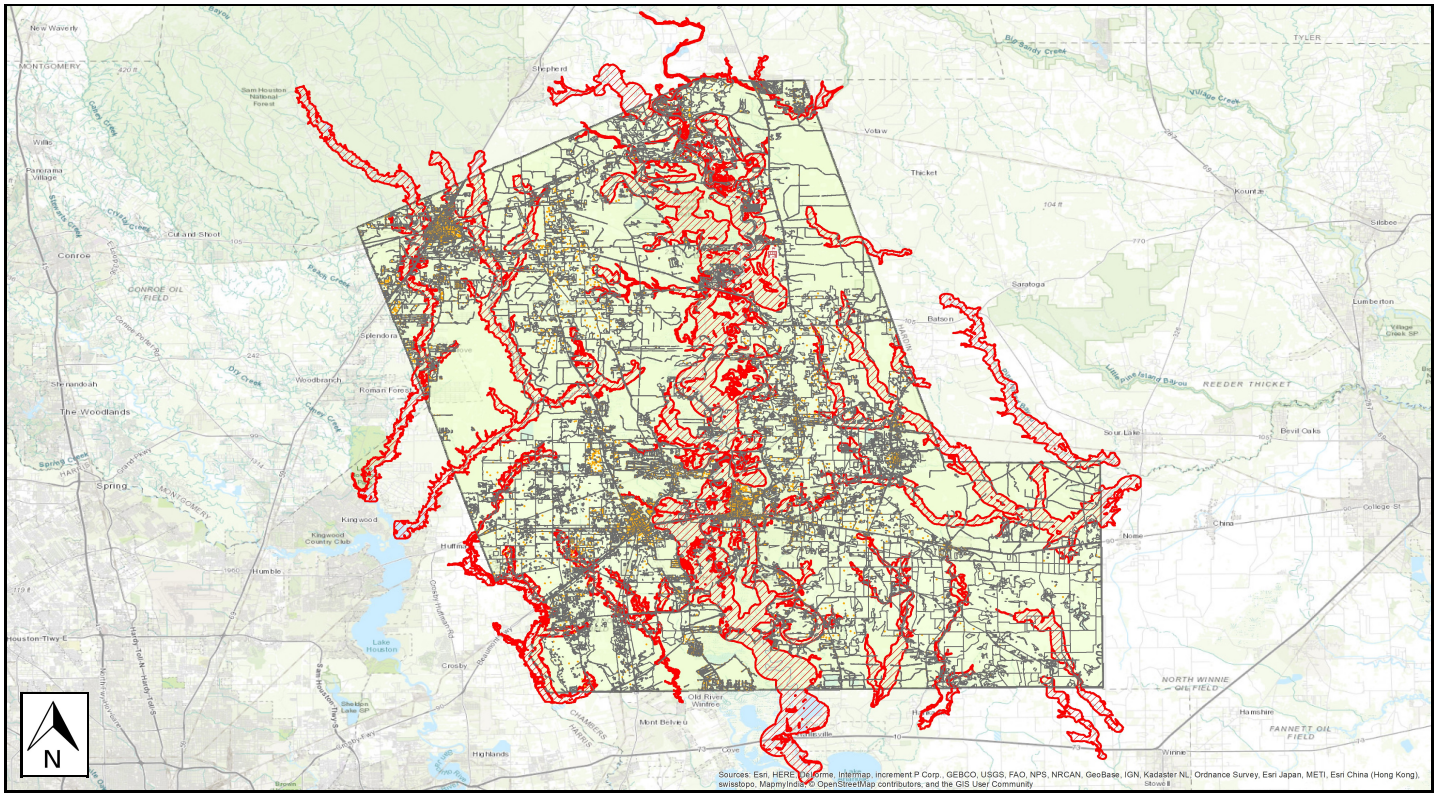
Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Liberty County
Scenario Name:	500-Year
Return Period Analyzed:	500
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



Building Damage

General Building Stock Damage

Hazus estimates that about 517 buildings will be at least moderately damaged. This is over 59% of the total number of buildings in the scenario. There are an estimated 65 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = $300K) Overview Map

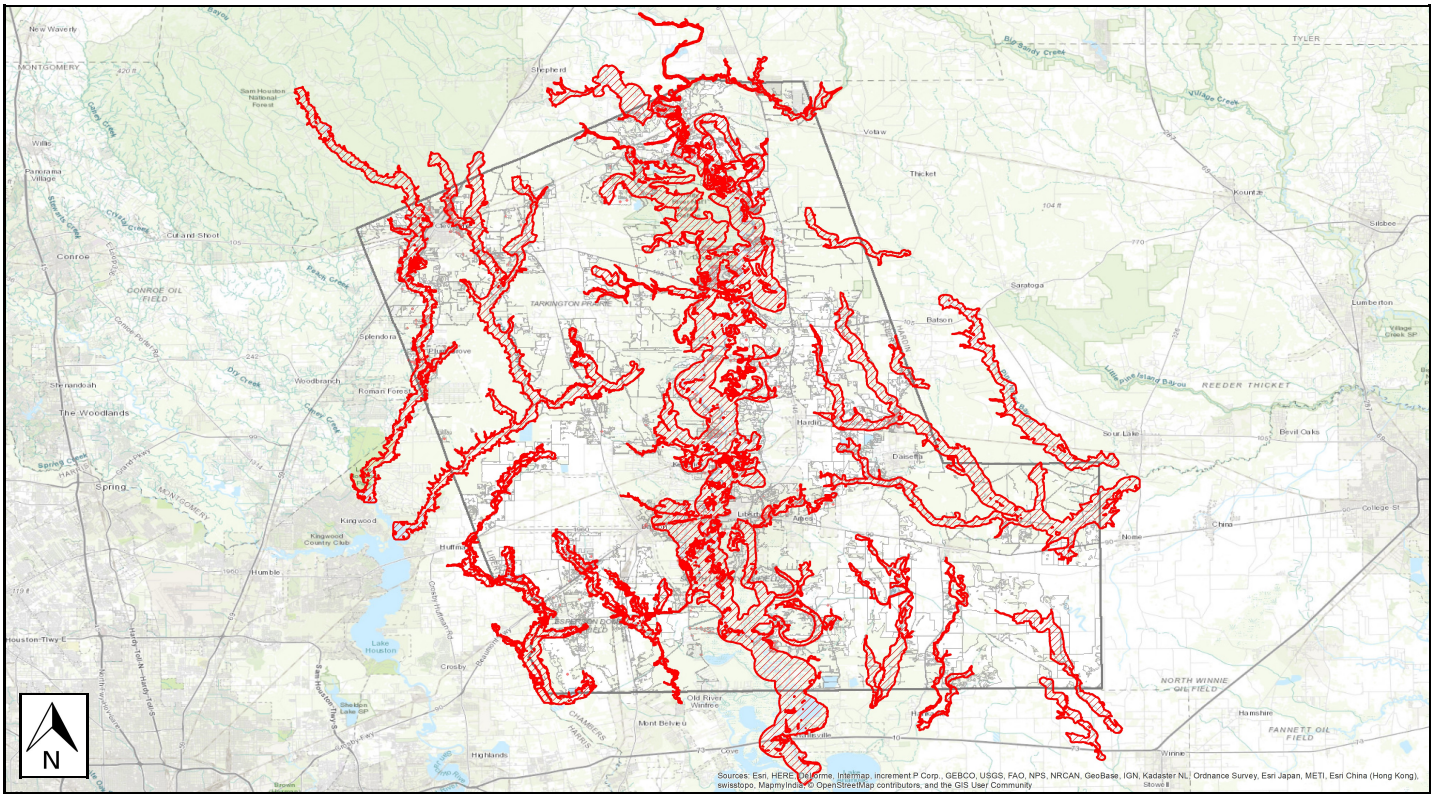


Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	1	20.00	4	80.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	144	21.92	255	38.81	87	13.24	74	11.26	32	4.87	65	9.89
Total	**145**		**259**		**87**		**74**		**32**		**65**	

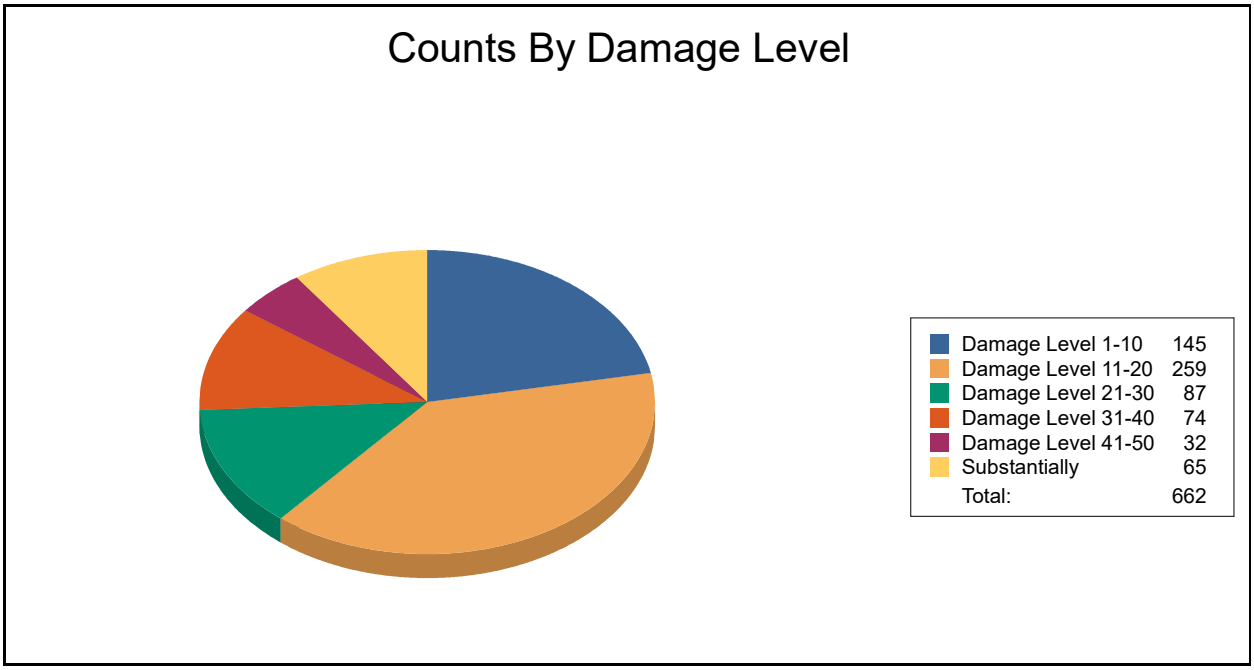


Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	20	19	21	20	13	12	0	0	5	5	48	45
Masonry	3	14	14	64	2	9	3	14	0	0	0	0
Steel	0	0	1	100	0	0	0	0	0	0	0	0
Wood	122	23	222	42	72	14	71	13	27	5	17	3

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 144 hospital beds available for use. On the day of the scenario flood event, the model estimates that 144 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	12	0	0	0
Hospitals	2	0	0	0
Police Stations	9	0	0	0
Schools	45	1	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

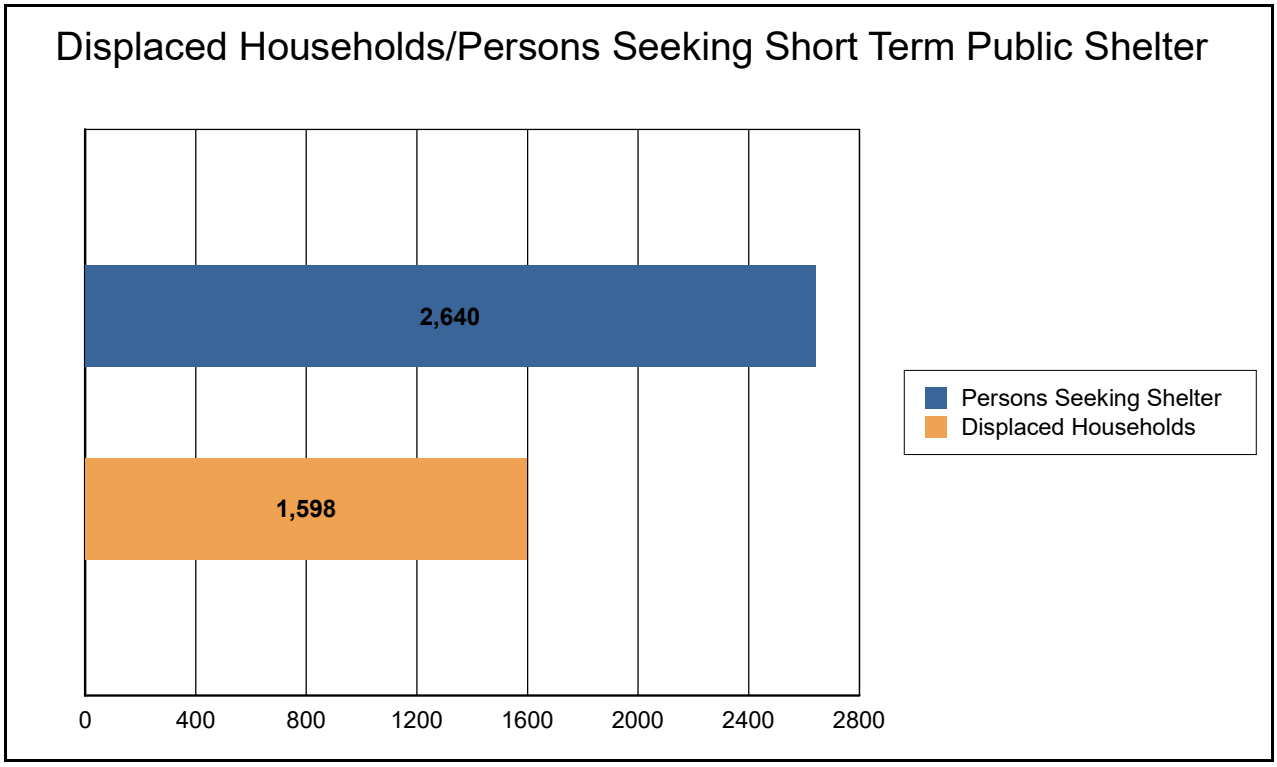
Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 1,598 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 2,640 people (out of a total population of 75,643) will seek temporary shelter in public shelters.



Economic Loss

The total economic loss estimated for the flood is 114.91 million dollars, which represents 5.59 % of the total replacement value of the scenario buildings.

Building-Related Losses

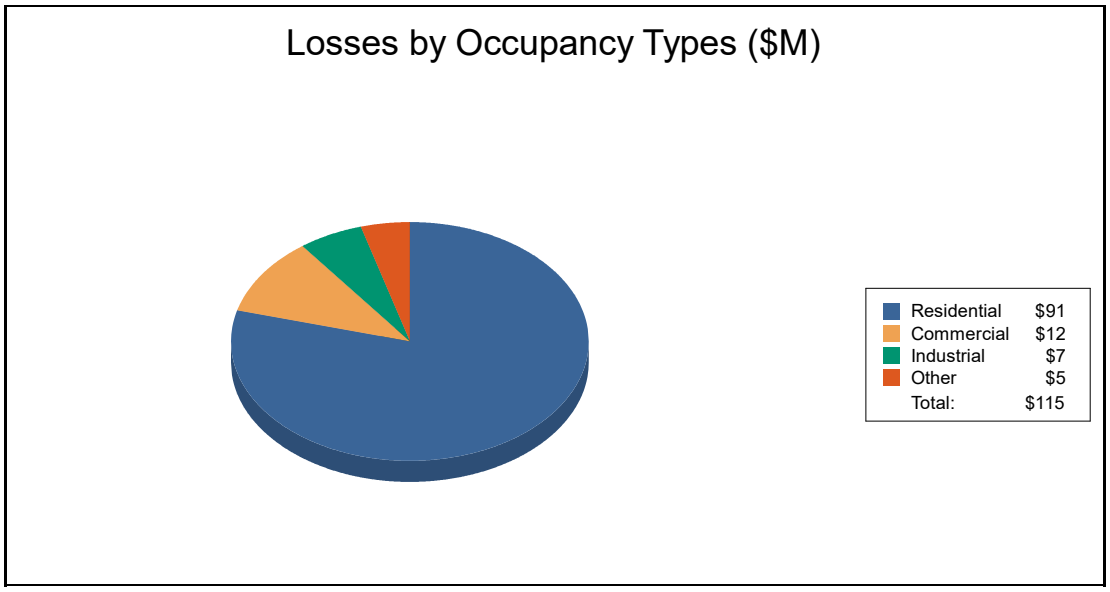
The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 114.47 million dollars. 0% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 79.17% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	58.92	3.25	1.53	0.89	64.59
	Content	31.92	8.48	4.31	4.09	48.81
	Inventory	0.00	0.23	0.83	0.02	1.07
	Subtotal	**90.84**	**11.96**	**6.67**	**5.00**	**114.47**
Business Interruption						
	Income	0.00	0.07	0.00	0.01	0.08
	Relocation	0.12	0.01	0.00	0.01	0.13
	Rental Income	0.01	0.01	0.00	0.00	0.02
	Wage	0.00	0.05	0.00	0.16	0.21
	Subtotal	**0.14**	**0.13**	**0.00**	**0.18**	**0.44**
ALL	**Total**	**90.98**	**12.09**	**6.67**	**5.18**	**114.91**



Appendix A: County Listing for the Region

Texas

- Liberty

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Texas				
Liberty	75,643	4,742,664	936,217	5,678,881
Total	**75,643**	**4,742,664**	**936,217**	**5,678,881**
Total Study Region	**75,643**	**4,742,664**	**936,217**	**5,678,881**

Hazus-MH: Hurricane Global Risk Report

Region Name: Liberty County

Hurricane Scenario: Probabilistic 1000-year Return Period

Print Date: Wednesday, November 08, 2017

Disclaimer:
This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- Texas

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 1,176.34 square miles and contains 14 census tracts. There are over 25 thousand households in the region and has a total population of 75,643 people (2010 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 28 thousand buildings in the region with a total building replacement value (excluding contents) of 5,679 million dollars (2014 dollars). Approximately 95% of the buildings (and 84% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 28,649 buildings in the region which have an aggregate total replacement value of 5,679 million (2014 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

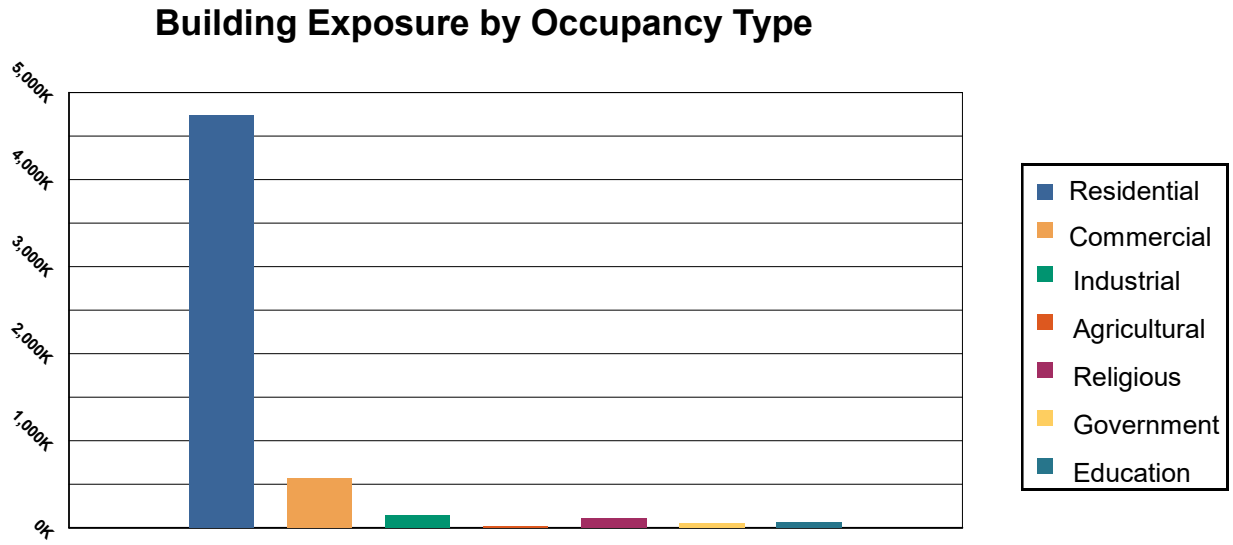


Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure ($1000)	Percent of Tot
Residential	4,742,664	83.51 %
Commercial	565,805	9.96%
Industrial	140,988	2.48%
Agricultural	14,556	0.26%
Religious	104,856	1.85%
Government	45,980	0.81%
Education	64,032	1.13%
Total	**5,678,881**	**100.00%**

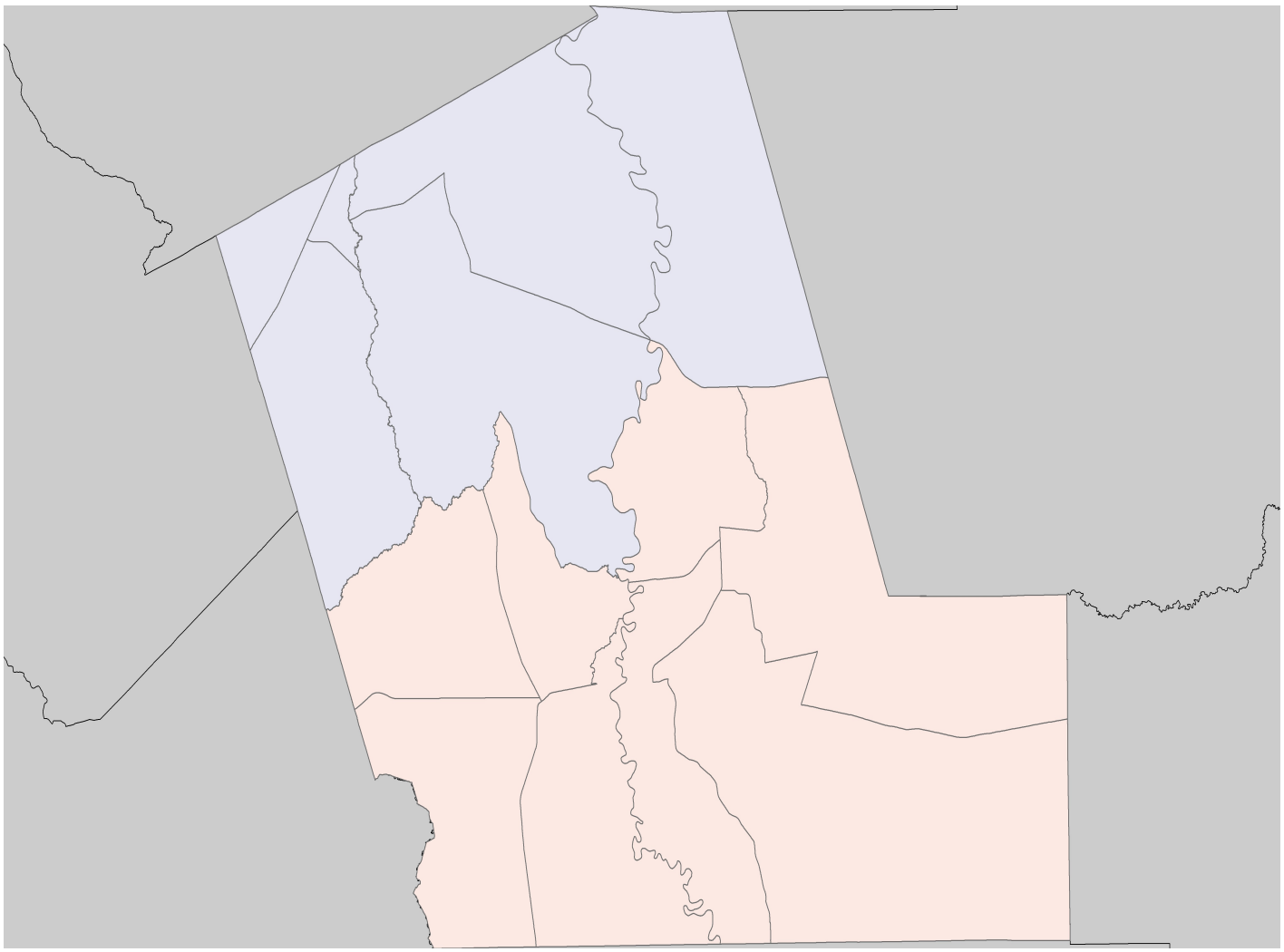
Essential Facility Inventory

For essential facilities, there are 2 hospitals in the region with a total bed capacity of 144 beds. There are 45 schools, 12 fire stations, 9 police stations and 1 emergency operation facilities.

Hurricane Scenario

Hazus used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Thematic Map with peak gust windfield and HU track



Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

Hazus estimates that about 9,585 buildings will be at least moderately damaged. This is over 33% of the total number of buildings in the region. There are an estimated 1,516 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the Hazus Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

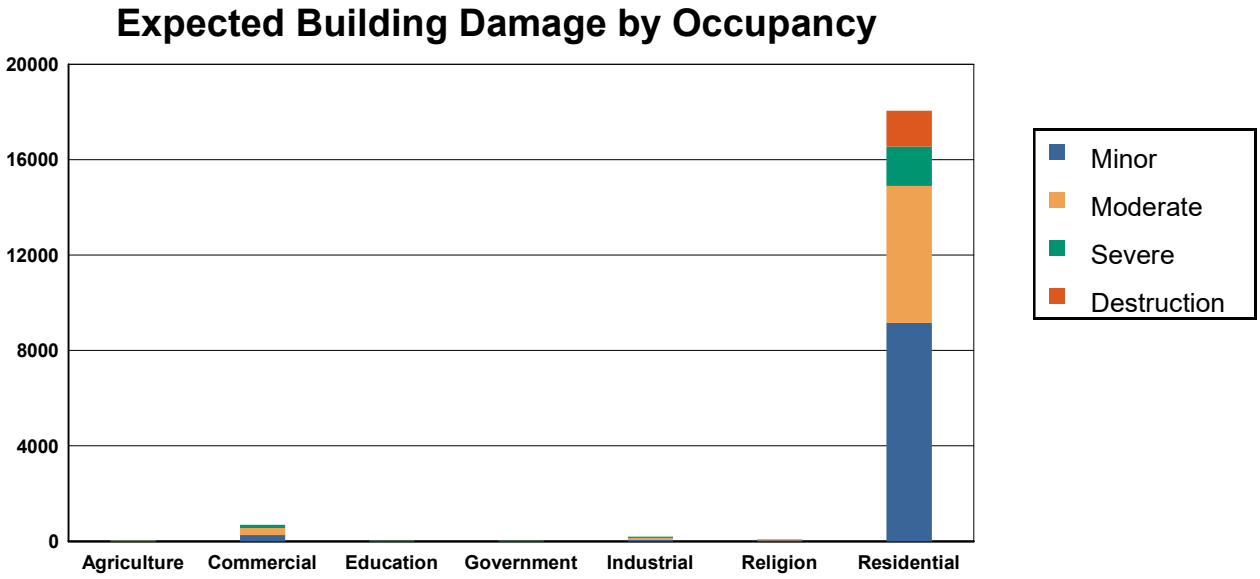


Table 2: Expected Building Damage by Occupancy : 1000 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	16	23.84	13	19.11	17	24.39	17	24.52	6	8.13
Commercial	287	29.19	265	26.95	286	29.09	142	14.39	4	0.37
Education	13	31.08	10	24.71	12	27.68	7	16.53	0	0.00
Government	16	31.07	13	25.83	14	27.21	8	15.89	0	0.00
Industrial	84	29.78	72	25.45	76	27.11	49	17.40	1	0.26
Religion	41	30.82	39	29.47	35	25.91	18	13.78	0	0.02
Residential	9,030	33.34	9,163	33.83	5,732	21.16	1,656	6.11	1,506	5.56
Total	**9,488**		**9,577**		**6,172**		**1,897**		**1,516**	

Table 3: Expected Building Damage by Building Type : 1000 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	37	26.96	28	20.24	46	33.29	27	19.50	0	0.00
Masonry	619	30.62	722	35.73	478	23.65	160	7.90	43	2.11
MH	7,253	86.94	307	3.68	387	4.64	71	0.85	325	3.89
Steel	102	30.17	66	19.60	101	29.95	67	19.84	1	0.44
Wood	4,476	26.73	6,733	40.21	3,675	21.95	1,195	7.13	666	3.98

Essential Facility Damage

Before the hurricane, the region had 144 hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (only 0.00%) are available for use by patients already in the hospital and those injured by the hurricane. After one week, 20.00% of the beds will be in service. By 30 days, 100.00% will be operational.

Thematic Map of Essential Facilities with greater than 50% moderate

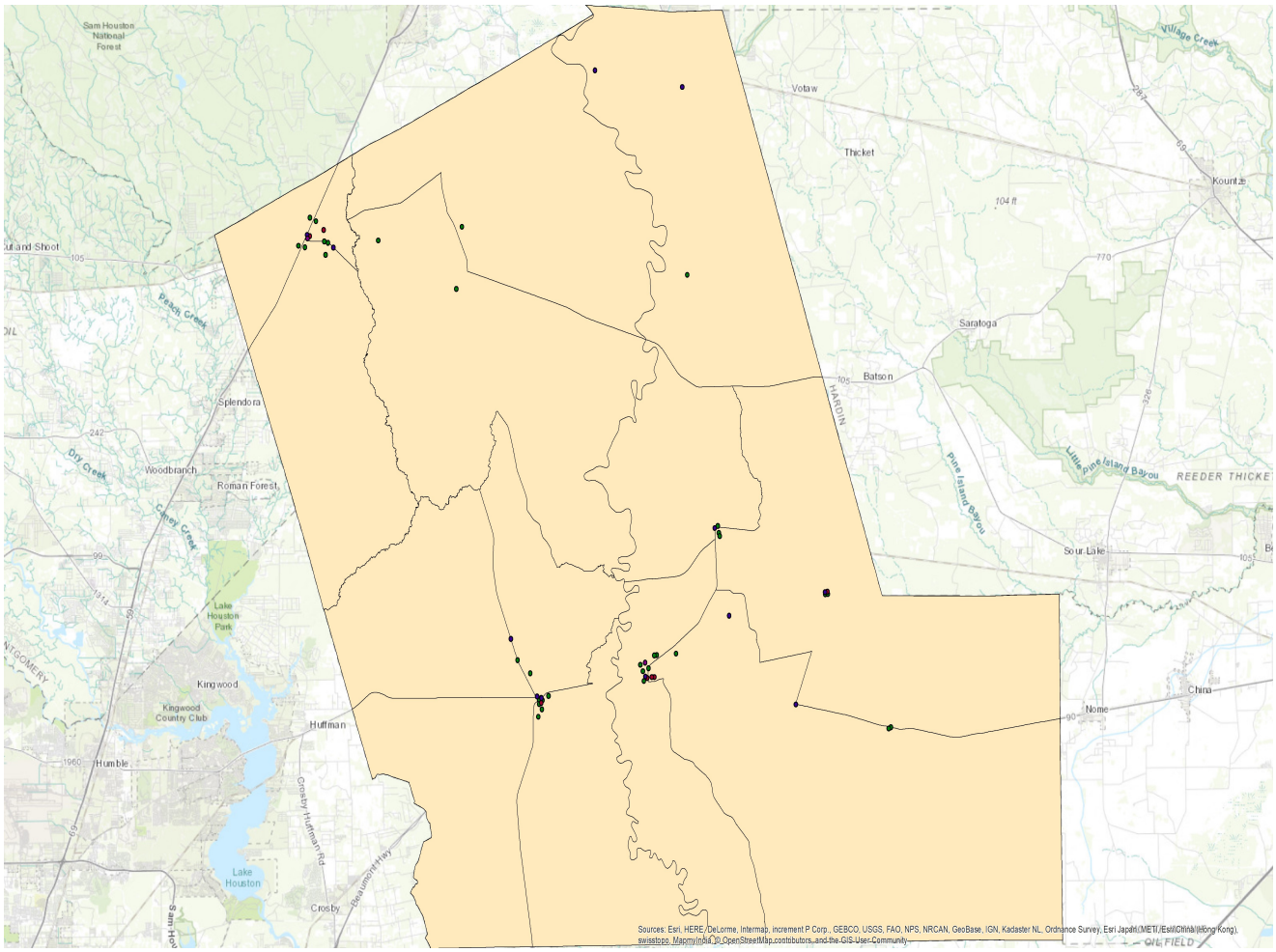
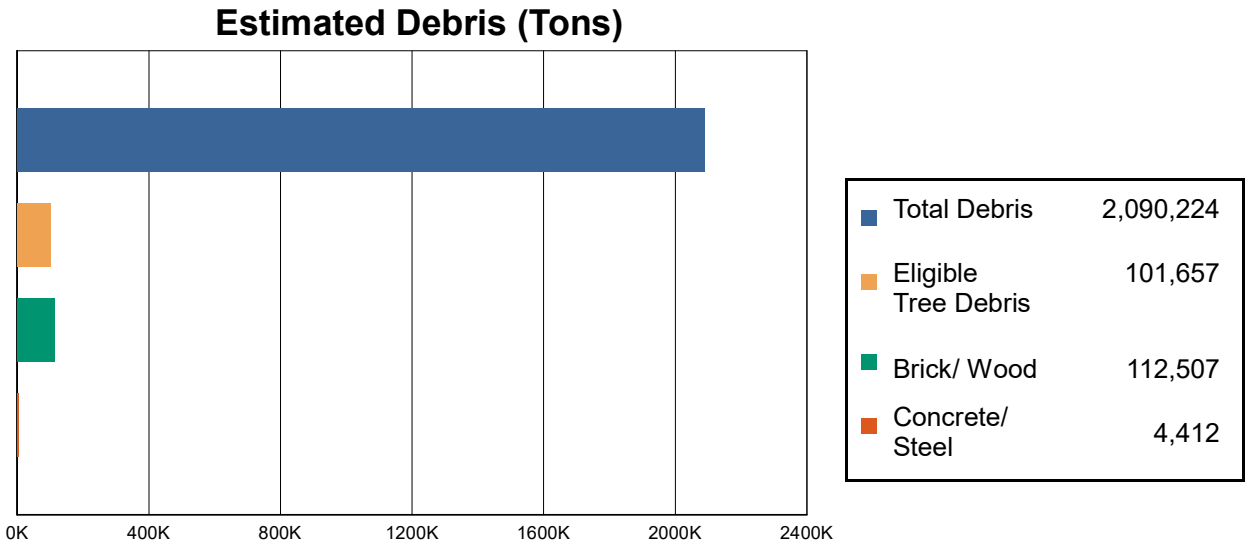


Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
EOCs	1	1	0	1
Fire Stations	12	0	0	12
Hospitals	2	2	0	0
Police Stations	9	3	0	9
Schools	45	42	0	0

Induced Hurricane Damage

Debris Generation

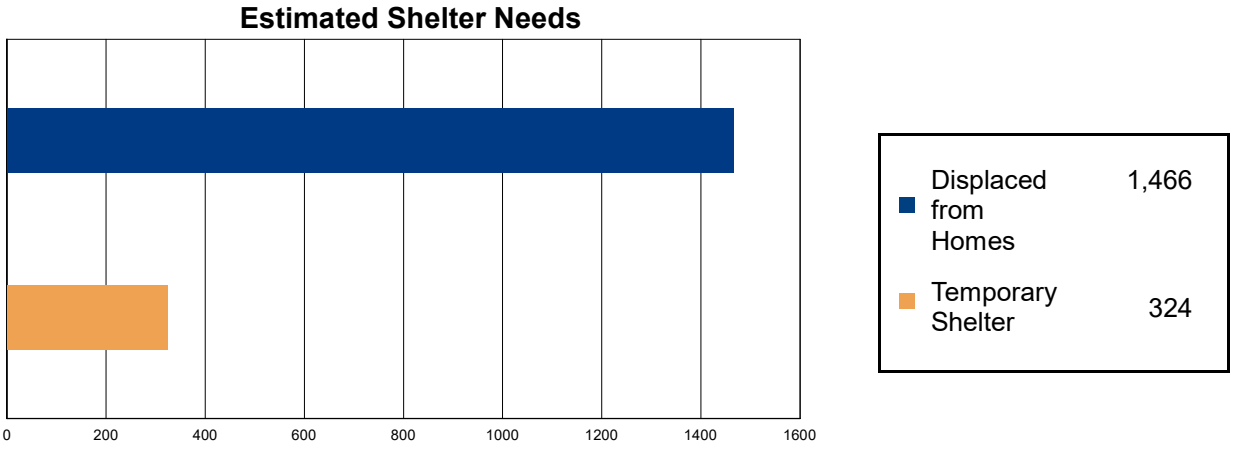


Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 2,090,224 tons of debris will be generated. Of the total amount, 1,869,622 tons (89%) is Other Tree Debris. Of the remaining 220,602 tons, Brick/Wood comprises 51% of the total, Reinforced Concrete/Steel comprises of 2% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 4758 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 101,657 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

Social Impact

Shelter Requirement



Hazus estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 1,466 households to be displaced due to the hurricane. Of these, 324 people (out of a total population of 75,643) will seek temporary shelter in public shelters.

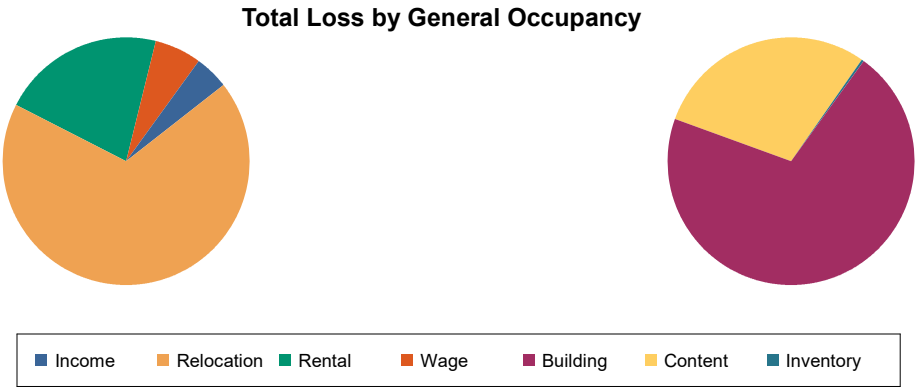
Economic Loss

The total economic loss estimated for the hurricane is 1279.3 million dollars, which represents 22.53 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 1,279 million dollars. 3% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 88% of the total loss. Table 5 below provides a summary of the losses associated with the building damage.



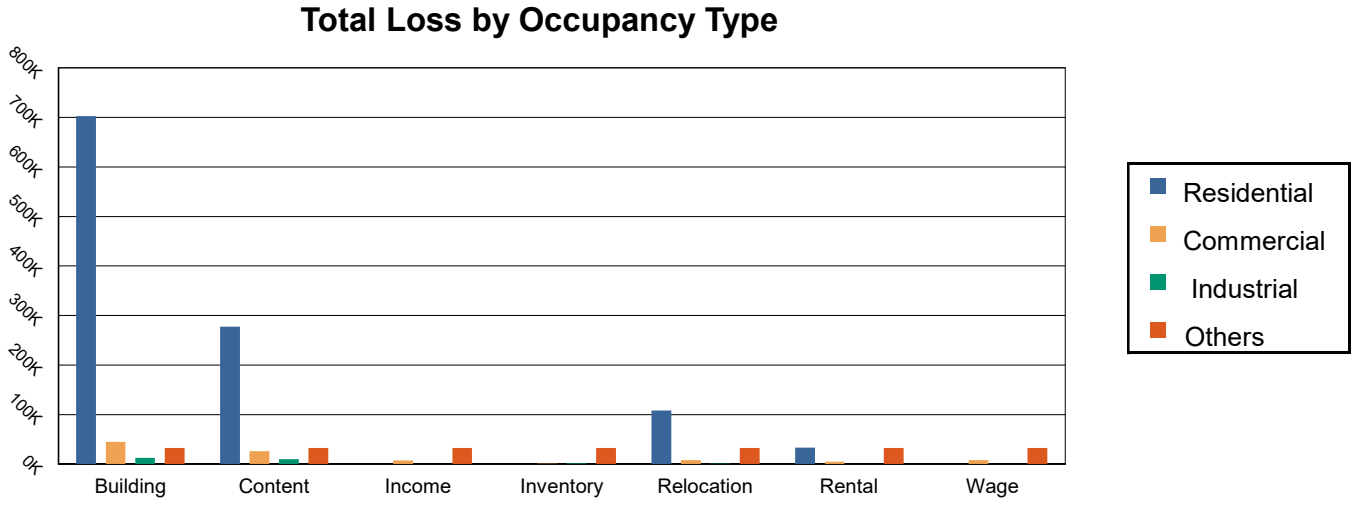


Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Property Damage						
	Building	702,877.28	44,500.22	12,226.30	16,310.87	775,914.68
	Content	277,453.39	26,270.59	10,035.09	8,933.31	322,692.38
	Inventory	0.00	761.01	1,510.18	182.83	2,454.02
	Subtotal	**980,330.67**	**71,531.83**	**23,771.56**	**25,427.01**	**1,101,061.07**
Business Interruption Loss						
	Income	177.81	7,238.38	205.68	354.29	7,976.17
	Relocation	108,149.69	8,191.83	948.38	3,716.30	121,006.21
	Rental	33,261.23	4,508.01	156.58	375.77	38,301.59
	Wage	416.59	7,827.20	305.05	2,410.05	10,958.89
	Subtotal	**142,005.33**	**27,765.43**	**1,615.69**	**6,856.41**	**178,242.86**
Total						
	Total	**1,122,336.00**	**99,297.25**	**25,387.25**	**32,283.42**	**1,279,303.93**

Appendix A: County Listing for the Region

Texas
- Liberty

Appendix B: Regional Population and Building Value Data

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
Texas				
Liberty	75,643	4,742,664	936,217	5,678,881
Total	**75,643**	**4,742,664**	**936,217**	**5,678,881**
Study Region Total	**75,643**	**4,742,664**	**936,217**	**5,678,881**

Quick Assessment Report

November 8, 2017

Study Region : Liberty County

Scenario : Probabilistic

Regional Statistics

Area (Square Miles)	1,176
Number of Census Tracts	14
Number of People in the Region	75,643

General Building Stock

Occupancy	*Building Count*	*Dollar Exposure ($ K)*
Residential	27,087	4,742,664
Commercial	984	565,805
Other	578	370,412
Total	28,649	5,678,881

Scenario Results

Number of Residential Buildings Damaged

Return Period	*Minor*	*Moderate*	*Severe*	*Destruction*	*Total*
10	4	0	0	0	4
20	521	36	1	2	559
50	3,286	459	26	30	3,801
100	5,376	1,382	161	222	7,142
200	7,985	2,811	427	408	11,630
500	7,575	3,884	1,094	995	13,548
1000	9,163	5,732	1,656	1,506	18,057

Number of Buildings Damaged

Return Period	*Minor*	*Moderate*	*Severe*	*Destruction*	*Total*
10	8	0	0	0	8
20	543	39	1	2	584
50	3,450	503	31	31	4,015
100	5,656	1,516	193	224	7,589
200	8,369	3,064	499	411	12,344
500	7,899	4,179	1,259	1,002	14,338
1000	9,577	6,172	1,897	1,516	19,161

Shelter Requirements

Return Period	*Displaced Households (#Households)*	*Short Term Shelter (#People)*
10	0	0
20	0	0
50	4	1
100	98	20
200	166	32
500	983	214
1000	1,466	324

Economic Loss (x 1000)

	Property Damage (Capital Stock) Losses		***Business Interruption***
ReturnPeriod	***Residential***	***Total***	***(Income) Losses***
10	1,199	1,203	0
20	18,641	19,086	884
50	91,056	96,057	9,768
100	203,204	221,133	28,959
200	387,144	426,371	65,300
500	703,775	788,086	121,972
1000	980,331	1,101,061	178,243
Annualized	8,295	9,061	1,175

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

2017

Appendix D: Repetitive Loss Properties

APPENDIX D: REPETITIVE LOSS PROPERTIES

ID Number	Community Name	Insured?	Occupancy	Losses	Total Paid	SRL Indicator
0244526	Ames, City of	Yes	Single Fmly	3	241,150.98	
0262768	Ames, City of	Yes	Single Fmly	2	46,098.79	
0250420	Cleveland, City of	Yes	Othr-Nonres	2	99,074.41	
0249164	Cleveland, City of	Yes	Single Fmly	2	64,472.81	
0249674	Cleveland, City of	Yes	Single Fmly	2	25,177.34	
0070341	Cleveland, City of	No	Single Fmly	2	36,708.00	
0260496	Dayton Lakes, City of	Yes	Single Fmly	2	66,281.92	
0122071	Dayton, City of	No	Othr-Nonres	7	104,029.03	VNU
0259934	Dayton, City of	Yes	Single Fmly	2	151,541.71	
0073549	Dayton, City of	Yes	Single Fmly	6	95,064.76	
0118195	Dayton, City of	No	Single Fmly	2	50,848.27	
0083544	Dayton, City of	No	Single Fmly	2	5,023.30	
0188404	Dayton, City of	No	Single Fmly	2	127,926.73	PU
0262544	Dayton, City of	Yes	Single Fmly	2	202,208.24	P
0244114	Dayton, City of	Yes	Single Fmly	3	79,211.48	
0244886	Dayton, City of	No	Single Fmly	2	17,825.96	
0260317	Hardin, City of	Yes	Single Fmly	2	19,825.45	
0073553	Liberty County	No	Assmd Condo	2	54,912.54	
0089463	Liberty County	No	Assmd Condo	7	130,931.74	PU
0069674	Liberty County	No	Assmd Condo	2	96,470.67	
0012896	Liberty County	No	Other Resid	3	30,104.10	
0005495	Liberty County	No	Other Resid	3	5,711.35	
0070299	Liberty County	No	Othr-Nonres	3	11,330.89	
0004314	Liberty County	No	Othr-Nonres	2	30,481.59	
0004315	Liberty County	No	Othr-Nonres	2	14,898.44	
0004316	Liberty County	No	Othr-Nonres	2	14,505.43	
0108509	Liberty County	No	Othr-Nonres	2	35,219.22	
0073565	Liberty County	No	Single Fmly	2	82,299.90	PU
0090293	Liberty County	No	Single Fmly	6	37,420.93	VU
0072128	Liberty County	No	Single Fmly	3	53,024.48	
0124861	Liberty County	No	Single Fmly	3	144,378.70	
0025815	Liberty County	No	Single Fmly	3	51,848.07	
0108640	Liberty County	No	Single Fmly	2	74,199.53	
0056906	Liberty County	No	Single Fmly	3	17,083.39	
0100576	Liberty County	No	Single Fmly	2	59,649.05	
0099205	Liberty County	No	Single Fmly	2	53,859.54	
0001137	Liberty County	No	Single Fmly	5	26,928.19	
0259763	Liberty County	Yes	Single Fmly	2	72,780.32	
0070149	Liberty County	No	Single Fmly	2	52,900.00	
0068657	Liberty County	No	Single Fmly	6	26,052.16	
0005665	Liberty County	No	Single Fmly	7	145,191.74	VU
0071795	Liberty County	No	Single Fmly	2	34,834.57	
0012893	Liberty County	No	Single Fmly	3	16,574.34	
0071566	Liberty County	No	Single Fmly	4	45,100.56	VU

0071796	Liberty County	No	Single Fmly	2	23,167.83	
0012895	Liberty County	No	Single Fmly	3	53,612.33	
0012892	Liberty County	No	Single Fmly	3	63,780.31	
0073366	Liberty County	SDF	Single Fmly	8	135,409.19	V
0050832	Liberty County	No	Single Fmly	3	35,772.08	
0025854	Liberty County	No	Single Fmly	2	4,926.60	
0094828	Liberty County	No	Single Fmly	3	156,497.86	VU
0004707	Liberty County	No	Single Fmly	3	28,064.52	
0008336	Liberty County	No	Single Fmly	2	88,167.18	
0002889	Liberty County	No	Single Fmly	7	145,310.82	VU
0070312	Liberty County	No	Single Fmly	2	36,771.22	PU
0007277	Liberty County	No	Single Fmly	2	30,695.52	
0005496	Liberty County	No	Single Fmly	4	39,672.11	VU
0110524	Liberty County	No	Single Fmly	3	20,743.51	
0007214	Liberty County	No	Single Fmly	3	70,322.34	
0052445	Liberty County	No	Single Fmly	2	6,374.80	
0071451	Liberty County	No	Single Fmly	2	29,846.42	
0070338	Liberty County	No	Single Fmly	4	70,132.33	VU
0112481	Liberty County	No	Single Fmly	2	12,950.49	
0012888	Liberty County	Yes	Single Fmly	3	68,945.69	
0108511	Liberty County	No	Single Fmly	2	43,783.93	
0074072	Liberty County	No	Single Fmly	2	49,893.84	
0068656	Liberty County	No	Single Fmly	2	9,412.50	
0002561	Liberty County	No	Single Fmly	4	61,403.02	
0070488	Liberty County	No	Single Fmly	2	44,271.29	
0026796	Liberty County	No	Single Fmly	3	14,318.06	
0069804	Liberty County	No	Single Fmly	3	20,176.95	
0071575	Liberty County	No	Single Fmly	2	36,849.99	
0004803	Liberty County	No	Single Fmly	2	38,568.17	
0070490	Liberty County	No	Single Fmly	2	18,233.41	
0089462	Liberty County	No	Single Fmly	5	133,477.46	VU
0007779	Liberty County	No	Single Fmly	2	42,357.00	
0073497	Liberty County	No	Single Fmly	2	13,914.43	
0071454	Liberty County	No	Single Fmly	2	79,646.35	
0097120	Liberty County	No	Single Fmly	2	27,579.70	
0250076	Liberty County	Yes	Single Fmly	3	31,704.19	
0172658	Liberty County	No	Single Fmly	3	53,796.77	
0013239	Liberty County	No	Single Fmly	3	24,504.15	
0000824	Liberty County	SDF	Single Fmly	6	219,393.18	V
0114876	Liberty County	No	Single Fmly	2	12,841.80	
0004765	Liberty County	No	Single Fmly	6	42,591.28	
0003370	Liberty County	No	Single Fmly	3	44,319.99	
0057248	Liberty County	No	Single Fmly	3	19,731.29	
0012885	Liberty County	No	Single Fmly	3	20,782.60	
0005819	Liberty County	No	Single Fmly	2	38,138.12	PU
0007212	Liberty County	No	Single Fmly	2	30,003.56	
0007598	Liberty County	No	Single Fmly	4	78,422.14	VU
0249068	Liberty County	Yes	Single Fmly	3	116,213.22	

0108743	Liberty County	Yes	Single Fmly	2	35,613.92	
0070291	Liberty County	No	Single Fmly	2	55,235.32	PU
0260320	Liberty County	Yes	Single Fmly	2	15,718.49	
0260200	Liberty County	Yes	Single Fmly	2	110,067.98	
0258437	Liberty County	Yes	Single Fmly	2	131,850.37	
0250077	Liberty County	Yes	Single Fmly	3	47,920.98	
0259462	Liberty County	Yes	Single Fmly	2	9,448.07	
0245029	Liberty County	No	Single Fmly	3	157,810.62	
0259742	Liberty County	Yes	Single Fmly	2	66,897.01	P
0260482	Liberty County	Yes	Single Fmly	2	22,295.76	
0244950	Liberty County	Yes	Single Fmly	3	80,405.18	
0259902	Liberty County	Yes	Single Fmly	2	317,662.73	
0246630	Liberty County	No	Single Fmly	2	30,690.56	
0260498	Liberty County	Yes	Single Fmly	2	49,286.79	
0244894	Liberty County	Yes	Single Fmly	3	143,314.39	P
0259962	Liberty County	Yes	Single Fmly	2	25,878.12	
0249391	Liberty County	Yes	Single Fmly	3	46,288.86	
0244407	Liberty County	Yes	Single Fmly	3	295,172.42	
0258325	Liberty County	Yes	Single Fmly	2	6,607.08	
0249392	Liberty County	Yes	Single Fmly	3	8,707.61	
0249863	Liberty County	Yes	Single Fmly	2	82,797.82	
0260497	Liberty County	Yes	Single Fmly	2	66,300.00	
0067877	Liberty County	No	Single Fmly	2	44,397.59	PU
0002378	Liberty County	No	Single Fmly	5	67,557.28	VU
0071445	Liberty County	No	Single Fmly	3	42,393.54	
0070585	Liberty County	No	Single Fmly	2	34,614.39	
0001133	Liberty County	No	Single Fmly	3	43,500.39	PU
0108346	Liberty County	No	Single Fmly	2	17,271.86	
0071450	Liberty County	No	Single Fmly	2	14,578.72	
0050466	Liberty County	No	Single Fmly	2	9,859.79	
0073551	Liberty County	No	Single Fmly	3	272,375.36	
0071559	Liberty County	No	Single Fmly	4	35,828.61	
0104384	Liberty County	No	Single Fmly	3	50,250.63	
0094539	Liberty County	No	Single Fmly	2	5,817.10	
0025454	Liberty County	No	Single Fmly	4	20,461.51	
0100300	Liberty County	No	Single Fmly	2	14,821.53	
0001135	Liberty County	No	Single Fmly	2	17,250.00	
0004769	Liberty County	No	Single Fmly	4	29,740.53	
0081391	Liberty County	No	Single Fmly	2	7,058.24	
0108470	Liberty County	No	Single Fmly	2	76,750.91	PU
0012884	Liberty County	No	Single Fmly	2	13,440.71	
0001872	Liberty County	No	Single Fmly	2	31,144.29	
0000469	Liberty County	No	Single Fmly	8	28,998.98	
0013048	Liberty County	SDF	Single Fmly	7	211,597.13	V
0005810	Liberty County	No	Single Fmly	4	30,364.32	
0005821	Liberty County	No	Single Fmly	7	170,747.36	VU
0108513	Liberty County	No	Single Fmly	2	20,778.83	
0108721	Liberty County	No	Single Fmly	2	15,381.74	

0071447	Liberty County	No	Single Fmly	2	17,557.43	
0249869	Liberty County	Yes	Single Fmly	2	13,610.05	
0045043	Liberty County	No	Single Fmly	8	86,682.51	VU
0088879	Liberty County	Yes	Single Fmly	3	24,744.67	
0260363	Liberty County	Yes	Single Fmly	2	119,731.73	
0247977	Liberty County	Yes	Single Fmly	3	81,126.45	
0002857	Liberty County	No	Single Fmly	5	59,596.94	VU
0121029	Liberty County	Yes	Single Fmly	2	29,599.45	
0258700	Liberty County	Yes	Single Fmly	2	86,838.67	
0098819	Liberty County	No	Single Fmly	4	26,849.89	
0108347	Liberty County	No	Single Fmly	3	21,654.50	
0260485	Liberty County	Yes	Single Fmly	2	36,458.22	
0071446	Liberty County	No	Single Fmly	2	47,262.45	PU
0070340	Liberty County	No	Single Fmly	2	13,313.23	
0012931	Liberty County	No	Single Fmly	3	27,627.43	PU
0005653	Liberty County	No	Single Fmly	3	99,850.75	PU
0046653	Liberty County	No	Single Fmly	11	120,381.00	VU
0122515	Liberty County	No	Single Fmly	2	19,345.42	
0098825	Liberty County	No	Single Fmly	2	10,666.50	PU
0009977	Liberty County	No	Single Fmly	11	155,148.97	PU
0012899	Liberty County	No	Single Fmly	2	11,084.53	
0246235	Liberty County	Yes	Single Fmly	4	72,799.06	
0094541	Liberty County	No	Single Fmly	3	36,844.29	
0071052	Liberty County	No	Single Fmly	2	34,485.35	
0007832	Liberty County	No	Single Fmly	2	28,118.90	PU
0094538	Liberty County	No	Single Fmly	3	16,926.31	
0014089	Liberty County	No	Single Fmly	4	48,831.62	PU
0072354	Liberty County	No	Single Fmly	2	13,660.58	
0071591	Liberty County	No	Single Fmly	2	60,423.24	
0108641	Liberty County	No	Single Fmly	3	72,192.75	
0094542	Liberty County	No	Single Fmly	3	59,798.43	
0069620	Liberty County	No	Single Fmly	11	121,336.47	PU
0249799	Liberty County	No	Single Fmly	2	43,029.47	
0005671	Liberty County	No	Single Fmly	2	16,345.64	
0071558	Liberty County	No	Single Fmly	8	119,709.96	MVU
0012938	Liberty County	No	Single Fmly	2	13,115.65	
0049385	Liberty County	No	Single Fmly	6	107,932.19	
0056830	Liberty County	No	Single Fmly	2	16,837.93	
0117076	Liberty County	No	Single Fmly	2	20,385.27	
0007213	Liberty County	No	Single Fmly	2	34,515.28	
0056876	Liberty County	No	Single Fmly	2	20,593.24	
0070292	Liberty County	No	Single Fmly	2	37,827.50	
0013076	Liberty County	No	Single Fmly	4	34,297.79	
0012994	Liberty County	No	Single Fmly	3	36,509.25	
0014109	Liberty County	No	Single Fmly	2	23,192.22	
0046951	Liberty County	No	Single Fmly	4	51,150.23	MVU
0073499	Liberty County	No	Single Fmly	2	20,918.65	
0072347	Liberty County	No	Single Fmly	2	17,684.00	

0098403	Liberty County	No	Single Fmly	2	31,070.28	
0071800	Liberty County	No	Single Fmly	4	74,187.27	
0014111	Liberty County	No	Single Fmly	3	20,132.09	
0070157	Liberty County	No	Single Fmly	2	16,799.65	
0012886	Liberty County	No	Single Fmly	3	9,670.55	
0071571	Liberty County	No	Single Fmly	2	30,971.50	
0069859	Liberty County	No	Single Fmly	2	29,300.00	
0070774	Liberty County	No	Single Fmly	2	27,275.84	
0071794	Liberty County	No	Single Fmly	2	11,834.23	
0071764	Liberty County	No	Single Fmly	3	142,569.75	
0068423	Liberty County	No	Single Fmly	2	4,567.49	
0070489	Liberty County	No	Single Fmly	2	22,373.41	
0173104	Liberty County	No	Single Fmly	2	42,550.01	
0068422	Liberty County	No	Single Fmly	2	26,134.29	
0098820	Liberty County	No	Single Fmly	2	15,322.53	
0077547	Liberty County	No	Single Fmly	2	19,221.13	
0097171	Liberty County	No	Single Fmly	2	37,605.81	
0007161	Liberty County	No	Single Fmly	3	54,179.51	
0070296	Liberty County	No	Single Fmly	3	33,961.94	
0070179	Liberty County	No	Single Fmly	2	48,443.03	
0071793	Liberty County	No	Single Fmly	2	20,800.00	
0098824	Liberty County	No	Single Fmly	2	7,998.48	
0105290	Liberty County	No	Single Fmly	2	23,826.58	
0108662	Liberty County	No	Single Fmly	2	38,010.53	
0014058	Liberty County	No	Single Fmly	3	84,597.04	
0088130	Liberty County	No	Single Fmly	3	19,596.06	
0108467	Liberty County	No	Single Fmly	2	105,885.24	
0108468	Liberty County	No	Single Fmly	2	75,017.37	
0117980	Liberty County	No	Single Fmly	3	34,707.17	
0013032	Liberty County	No	Single Fmly	2	12,011.33	
0002603	Liberty County	No	Single Fmly	4	16,364.09	
0009897	Liberty County	No	Single Fmly	12	337,129.13	MVU
0008991	Liberty County	No	Single Fmly	8	146,987.86	MVU
0002729	Liberty County	No	Single Fmly	4	36,637.08	MVU
0169389	Liberty County	No	Single Fmly	2	3,282.99	
0068206	Liberty County	No	Single Fmly	2	44,206.49	
0001136	Liberty County	No	Single Fmly	2	17,000.00	
0012943	Liberty County	No	Single Fmly	3	55,208.22	
0007209	Liberty County	No	Single Fmly	2	32,969.88	
0007208	Liberty County	No	Single Fmly	3	96,020.19	
0068654	Liberty County	No	Single Fmly	3	81,802.16	
0012944	Liberty County	No	Single Fmly	2	7,415.70	
0068653	Liberty County	No	Single Fmly	4	50,481.56	
0104383	Liberty County	No	Single Fmly	2	14,756.46	
0012894	Liberty County	No	Single Fmly	3	118,750.21	
0007251	Liberty County	No	Single Fmly	2	10,988.09	
0007210	Liberty County	No	Single Fmly	3	161,747.82	
0013153	Liberty County	No	Single Fmly	2	9,672.26	

0070592	Liberty County	No	Single Fmly	2	12,267.75	
0007194	Liberty County	No	Single Fmly	2	33,938.11	
0014108	Liberty County	No	Single Fmly	2	23,265.40	
0091025	Liberty County	Yes	Single Fmly	3	104,243.56	
0056909	Liberty County	No	Single Fmly	2	10,048.23	
0070495	Liberty County	No	Single Fmly	3	58,232.46	
0053027	Liberty County	No	Single Fmly	3	15,475.11	
0012889	Liberty County	No	Single Fmly	3	33,397.98	
0012927	Liberty County	No	Single Fmly	3	48,764.65	
0057524	Liberty County	No	Single Fmly	2	10,116.76	
0005662	Liberty County	No	Single Fmly	2	27,283.11	
0005663	Liberty County	No	Single Fmly	3	40,401.88	
0040934	Liberty County	No	Single Fmly	4	37,522.38	
0244488	Liberty, City of	Yes	Assmd Condo	3	721,182.32	
0164661	Liberty, City of	Yes	Assmd Condo	4	424,369.08	P
0068867	Liberty, City of	Yes	Othr-Nonres	3	83,568.72	
0108556	Liberty, City of	No	Othr-Nonres	2	7,018.96	
0140219	Liberty, City of	SDF	Othr-Nonres	4	224,733.90	VN
0013011	Liberty, City of	No	Othr-Nonres	7	145,676.57	PNU
0166891	Liberty, City of	Yes	Othr-Nonres	2	54,885.25	
0108522	Liberty, City of	No	Othr-Nonres	8	95,375.28	VNU
0070276	Liberty, City of	Yes	Othr-Nonres	5	50,024.02	
0035434	Liberty, City of	Yes	Othr-Nonres	2	7,079.74	
0164899	Liberty, City of	Yes	Single Fmly	2	144,380.55	
0244409	Liberty, City of	No	Single Fmly	3	49,058.76	
0108947	Liberty, City of	No	Single Fmly	2	81,860.32	
0070428	Liberty, City of	SDF	Single Fmly	4	89,004.09	V
0164883	Liberty, City of	No	Single Fmly	2	78,561.36	
0166155	Liberty, City of	No	Single Fmly	2	13,409.35	
0108773	Liberty, City of	No	Single Fmly	2	80,889.29	
0070427	Liberty, City of	No	Single Fmly	2	93,564.08	
0108515	Liberty, City of	No	Single Fmly	2	65,745.91	
0108554	Liberty, City of	Yes	Single Fmly	2	134,670.64	
0071439	Liberty, City of	No	Single Fmly	2	77,600.92	
0073563	Liberty, City of	No	Single Fmly	3	145,131.95	
0244891	Liberty, City of	Yes	Single Fmly	3	196,852.83	
0013157	Liberty, City of	No	Single Fmly	6	121,214.09	VU
0109250	Liberty, City of	SDF	Single Fmly	3	316,435.65	V
0068868	Liberty, City of	Yes	Single Fmly	5	180,302.14	
0070397	Liberty, City of	No	Single Fmly	3	72,459.07	
0071562	Liberty, City of	Yes	Single Fmly	3	145,270.77	
0108466	Liberty, City of	No	Single Fmly	2	182,695.20	
0071952	Liberty, City of	Yes	Single Fmly	4	92,098.52	
0166154	Liberty, City of	No	Single Fmly	3	166,248.14	
0068869	Liberty, City of	Yes	Single Fmly	4	91,594.50	
0108924	Liberty, City of	SDF	Single Fmly	6	399,854.15	V
0244895	Liberty, City of	No	Single Fmly	2	27,708.82	
0073562	Liberty, City of	No	Single Fmly	3	95,579.66	

0244439	Liberty, City of	Yes	Single Fmly	3	209,970.32
0108516	Liberty, City of	No	Single Fmly	2	15,644.35
0165205	Liberty, City of	No	Single Fmly	2	36,567.23
0108510	Liberty, City of	No	Single Fmly	2	66,718.73
0073564	Liberty, City of	No	Single Fmly	2	27,370.05
0073561	Liberty, City of	No	Single Fmly	3	68,057.90
0070487	Liberty, City of	No	Single Fmly	2	20,036.59
0068877	Liberty, City of	No	Single Fmly	3	24,715.61
0046445	Liberty, City of	No	Single Fmly	2	19,317.45

2017

Appendix F: Plan Adoption

October 9, 2018
THE COMMISSIONERS' COURT OF LIBERTY COUNTY
REGULAR SESSION

RE: Adoption of the 2017 Liberty County Hazard Mitigation Action Plan

WHEREAS, Liberty County is subject to periodic flooding and other natural hazards with the potential to cauee damages to people properties within the area; and

WHEREAS, Liberty County desires to prepare and mitigate for such circumstances; and

WHEREAS, under the Disaster Mitigation Act of 2000, the United States Federal Emergency Management Agency (FEMA) requires that local jurisdictions have in place a FEMA-approved Hazard Mitigation Action Plan as a condition of receipt of certain future Federal mitigation funding after November 1, 2004; and

WHEREAS, the County and its resolute cities, in order to meet this requirement, have initiated development of a county-wide Hazard Mitigation Plan;

NOW, therefore, be it resolved that this Commissioners' Court hereby:
Adopts the Liberty County 2017 Hazard Mitigation Action Plan; and
Vests the Liberty County Office of Emergency Management with the responsibility, authority, and the means to inform all concerned parties of this action; and,

Appoints the County Emergency Management Coordinator to ensure that the Hazard Mitigation Plan be reviewed at least annually and that any needed adjustment to the County's Plan be developed and presented to the Commissioners' Court for consideration; and,

Agrees to consider such other official action as may be reasonably necessary to carry out the objectives of the Hazard Mitigation Plan.

Further, that a copy of same be placed on file with the County Clerk.

APPROVED, this 9th day of October, 2018

Jay H. Knight
County Judge
Liberty County, Texas