City of Mountain City
Hays County Hazard Mitigation Plan Update
2018

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Mountain City Annex
Section 1: Organize and Review

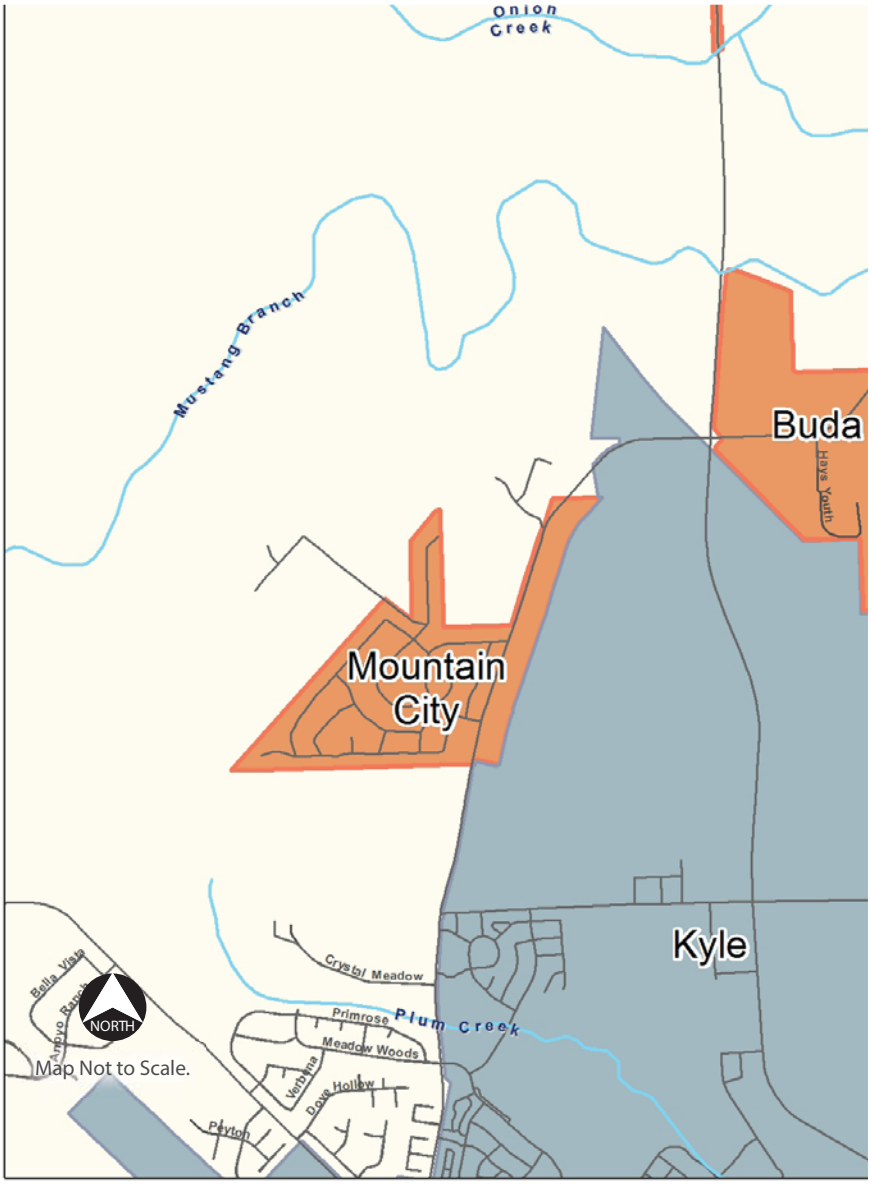
This section contains a brief description of Mountain City and its jurisdictional features. In addition, Section 1 contains the following details regarding Mountain City's:

- participation in the Hays County HMP Update process,
- stakeholder engagement,
- public outreach strategy,
- incorporation efforts, and
- plan maintenance procedures.

*Population :	537
Size of Community:	0.42 sq. miles
*Population over 65 years old	55
*Population under 16 years old	130
Mountain City is serviced by the following responders:	
Fire - Kyle Fire Department	
EMS - San Marcos Hays County EMS	
Law Enforcement - Hays County Sheriff's Office	

HAZUS-MH 3.2 Updated Census 2010 Population Estimates

Figure MC.1, Mountain City



1.1 Community Description

When planning, it is important to take into account the characteristics that make a community unique. Consideration of unique needs when it comes to mitigating or recovering from natural hazards ensures that all members of the community and their needs are addressed.

Located 12 miles north of San Marcos in Central Hays County, Mountain City is less than a square mile in size. The community previously existed as a subdivision called Mountain City Oaks and incorporated as Mountain City in 1984 (Mountain City, Texas, 2017).

Served by Hays Consolidated Independent School District (ISD), the community has no school structures located within the City limits.

The community is 100% residential with 237 structures making up the entire City.

Mountain City is governed by a Mayor, Mayor Pro-Tem, 3 Aldermen, and supported by a City Secretary, City Treasurer, and City Administrator.

Mountain City's main utility providers are shown in Table MC.1.

Major Employers

Mountain City is 100% residential and does not have any employers besides home-based operations run and operated by community members.

Table MC.1, Utility Providers

Type	Provider
Electric	Pedernales Electric Cooperative (PEC)
Water	Mountain City Oaks Water System

Community Planning Involvement

MPC planning activities for the Hays County Hazard Mitigation Plan (HMP) Update are captured in Figure MC.2, which utilizes check-marks to indicate each of the activities that were completed by the Mountain City MPC members.

Figure MC.2, Mountain City Plan Participation

Meetings

- ✓ Kick-Off
- ✓ Risk Assessment
- ✓ Mitigation Strategy

Data Submission

- ✓ Planner's Survey
  Data Collection Spreadsheet/ GIS Data
- ✓ Planning Worksheets
- ✓ Phone Interview

Public Involvement

- ✓ City Council/Commissioner's Court Agenda Items
- ✓ Public Survey Posting/ Collection

1.2 Outreach Strategy

Mountain City was very active in the following outreach activities used to inform the public of their participation in the Hays County HMP Update.

Public Survey Promotion

Mountain City advertised the Hays County HMP Update Public Survey through the community email list, which is a self-subscribed list to which community members may subscribe.

As of March 10, 2017, Mountain City had 25 residents respond to the public survey. Details on how the survey data was directly incorporated into the risk ranking process for hazards is included in Chapter 2, the risk assessment portion of the main plan document.

City Council Meeting Announcement

On February 13, 2017, the Mayor presented information on the Hays County HMP Update to the Mountain City Council. Elected officials, local agency leaders, and members of the public attended the meeting. The Council agenda and item report for this presentation are included in Plan Appendix A of the Hays County HMP Update.

Plan Phase Newsletters

Mountain City MPC utilized newsletters for each phase of the planning process in order to share updates with stakeholders, elected officials, City staff, and the public. Copies of the newsletters can be found in Plan Appendix A of the Hays County HMP Update.

Plan Draft Public Review and Comment Period

The link to the draft Hays County HMP Update was posted on the Mountain City website from July 12, 2017 to July 26, 2017 and a hard copy was placed in the Mountain City Hall for public review. No public comments were received during this review period.

1.3 Incorporation of Sources

In addition to stakeholder and public input, the MPC also reviewed other planning resources that could provide useful information to the plan update process. Table MC.2 lists the documents reviewed and how they were considered for incorporation in the updated plan.

Table MC.2, Review/Incorporation of Sources

Name of Document	Type	How Incorporated
2013 State of Texas Hazard Mitigation Plan	Plan	Utilized hazard definitions and hazard classification names.
Flood Insurance Study	Study	Incorporated best available hydraulic and hydrologic study results for flood hazard profile.
Mountain City Waste Management Program	Program	Reviewed for opportunities for enhancement to incorporate brush pick-up service for wildfire and lightning mitigation. (Mountain City, TX, 2016)
Mountain City Building Permit	Program	Research for applicability of floodplain management elements. (Mountain City, TX, 2017)
Mountain City Directory Information Request Form	Program	Review for opportunities to enhance the current contact system for residents in Mountain City.(Mountain City, TX, 2017)
Mountain City Ordinances	Regulations	Reviewing ordinances for possible incorporation of mitigation practices, such as flood damage prevention ordinance or building codes.
Interlocal Agreement for Emergency Water Service	Agreement	Agreement between Hays Consolidated ISD and Mountain City Oaks Water System in order to interconnect their water systems to serve as alternative sources of water for emergency situations. Seeking ways to enhance to reduce the impacts of drought. (Hays County, 2010)

Section 2: Risk Assessment
Mountain City Jurisdictional Hazards

This section contains Mountain City's hazard profiles for each natural hazard included in the Hays County HMP Update. Profiles include:

- Location - the area where the hazard is known to occur
- Previous Occurrences - a history of reported events for the hazard
- Significant Previous Occurrences (when applicable) - notable hazard events within the community
- Extent - the strength or magnitude of the hazard
- Probability - the likelihood of the hazard event occurring in the future
- Impact - the consequence or effect (or possible effect) of hazard events
- Vulnerability Summary - identification of structures, systems, populations or assets susceptible to loss or damage and how they are/could be impacted

Hazard descriptions and extent scales for hazard magnitudes are found in Chapter 2, the risk assessment portion of the main plan document.

When available, data specific to Mountain City was used for hazard analysis. When no instances were reported specifically for the jurisdiction for regional hazards, County-wide data was applied.

State and national datasets were used to determine occurrence, extent, and the respective probabilities, rather than verbal testimonies, in an effort to retain data consistency. For some hazards, the National Oceanic and Atmospheric Administration (NOAA) Storm Events Database was used as the most comprehensive data available for hazards. The Storm Events Database does not always reflect the most recent totals for fatality, injury, and damage amounts for previous hazard occurrences. The Previous Occurrences paragraph identifies instances in which this may occur. Verbal testimony, when available, was integrated into impact or vulnerability summaries to account for updates in this data.

2.1 Hazard Profiles

Hazards profiled within the risk assessment include:

- Drought - Within Chapter 2, the Risk Assessment portion of main Plan document.
- Extreme Heat - Within Chapter 2, the Risk Assessment portion of main Plan document.
- Severe Winter Storms - Within Chapter 2, the Risk Assessment portion of main Plan document.
- Lightning - Within Chapter 2, the Risk Assessment portion of main Plan document.
- Hailstorms
- Windstorms
- Tornadoes
- Expansive Soils
- Floods
- Hurricanes/Tropical Storms
- Earthquakes
- Wildfires

Hailstorms

Hailstorms: Location

The entire extent of Mountain City is exposed to some degree of hail hazard. Since hail can occur at any location, hail events could be experienced anywhere within the jurisdiction.

Hailstorms: Previous Occurrences

While Mountain City has not had any previous occurrences reported through the NOAA Storm Events Database, if an event were to occur, it would be similar in size and magnitude to events within the surrounding County area. There were 57 hail events reported for Hays County since the year 1967.

Hailstorms: Extent and Probability

The Tornado and Storm Research Organization (TORRO) created a hail extent index to measure hail called the Hailstorm Intensity Scale. According to the reported previous hail occurrences for the planning area, the maximum hail extent experienced was up to 3 in., or 76.20 mm. in diameter. This corresponds to a TORRO Hailstorm Intensity Scale classification of a "Super Hailstorm." Refer to Chapter 2, the risk assessment portion of the main plan document, for TORRO hail extent scale descriptions.

Based on 57 reported events in 49 years, a hail event occurs in Hays County approximately once a year, on average. Since hail events can happen anywhere throughout the HMP update area, Mountain City's future probability is assumed to be similar to the surrounding County area. The City's probability for a hail event is approximately once a year (on average) in the future, with hail up to 3 in., or 76.20 mm. in diameter, corresponding to a TORRO Hailstorm Intensity Scale classification of a "Super Hailstorm."

Hailstorms: Impact

Based on the maximum hail extent experienced (76.20 mm) in the surrounding County area, the TORRO Hailstorm Intensity Scale indicates that impact can be expected to include any of the following:

- Varying degrees of damage to vegetation and crops
- Damage to plastic structures
- Varying degrees of damage to glass
- Paint and wood scored
- Vehicle bodywork damage
- Varying degrees of roof damage
- Varying degrees of risk of injuries
- Varying degrees of aircraft damage
- Brick walls pitted
- Risk of severe or even fatal injuries to persons caught in the open

During undocumented past instances of hail (based on resident testimony without dates or measurement data to include in this analysis), there are typically 3-5 roofs that need to be restored after a typical hail event.

Hailstorms: Vulnerability Summary

The shingle roof type on the residential structure that serves as City Hall could be susceptible to hail damage. There is no critical City equipment or vehicles.

Windstorms

Windstorms: Location

The entire extent of Mountain City is exposed to some degree of wind hazard. Since wind can occur at any location, wind events could be experienced anywhere within the jurisdiction.

Windstorms: Previous Occurrences

While Mountain City has not had any previous occurrences reported through the NOAA Storm Events Database, if an event were to occur, it would be similar in size and magnitude to events within the surrounding County area. There were 38 wind events reported for Hays County and its unincorporated jurisdictions from year 1974.

Windstorms: Extent and Probability

Wind is measured by the Beaufort Wind Scale that relates wind speed to observed conditions on land and sea. According to the reported previous windstorm occurrences for the planning area, the maximum wind extent experienced was 70 knots (corresponding to Beaufort Wind Scale Classification: Hurricane). Refer to Chapter 2, the risk assessment portion of the main plan document, for a description of wind extent scales.

Based on 38 reported events in 42 years, a wind event occurs approximately once every year (on average) in Hays County. Since wind events can happen anywhere throughout the HMP update area, Mountain City's future probability is assumed to be similar to the surrounding County area. In the future, the City's probability of a wind event of up to 70 knots, or 80.55 miles per hour, (Hurricane Classification in the Beaufort Wind Scale) is approximately once every year (on average) in the future.

Windstorms: Impact

Data available from the Texas Department of Transportation's Crash Records Information System shows that between the years of 2010 and 2017, rural Hays County experienced 5 crashes related to severe crosswind weather conditions. There were no injuries reported from these crash events (see Table MC.3). Since wind events occur on a regional scale, it is assumed that weather related crashes in the surrounding County area would be similar to those experienced in these conditions within Mountain City.

Table MC.3, Windstorms, Vehicle Accidents, Hays County

City	Fatality	Incapacitating Injury	Non-Incapacitating	Possible Injury	Crash Year	Street Name	Surface Condition	Weather Condition
Rural Hays County	0	0	0	0	2010	LIME KILN RD	Dry	Severe Crosswinds
Rural Hays County	0	0	0	0	2014	IH0035	Dry	Severe Crosswinds
Rural Hays County	0	0	0	0	2014	IH0035	Dry	Severe Crosswinds
Rural Hays County	0	0	0	0	2014	IH0035	Dry	Severe Crosswinds
Rural Hays County	0	0	0	0	2017	US0290	Wet	Severe Crosswinds

(Texas Department of Transportation, 2017)

Structures can be damaged by flying debris and impact from winds, damaging rooftops and causing other structural damage. Critical infrastructure, such as utility poles and street signals, could also be disrupted, impacting all residents in the affected area. Debris on the roadway can also cause obstruction for emergency responders' ability to provide services.

Windstorms: Vulnerability Summary

Mountain City has previously experienced debris accumulation on roadways during past windstorm events. Such incidents could cause impact on the ability of public safety officials to respond to emergency calls. Undocumented accounts of wind events (without magnitude that could be included in analysis) indicated that in April of 2016, straight line winds caused downed trees and power lines. Pedernales Electric Cooperative performed repairs on the lines, however power was interrupted for residents for several hours.

Additionally, the residential structure serving as City Hall is not retrofitted to mitigate damages caused by extreme winds and does not have generator back-up. A lack of resources for electricity for City Hall or damage to the structure could lead to delays in getting assistance for members of the community.

Tornadoes

Tornadoes: Location

The entire extent of Mountain City is exposed to some degree of tornado hazard. Since tornadoes can occur at any location, tornado events could be experienced anywhere within the jurisdiction.

Tornadoes: Previous Occurrences

Since tornadoes can occur at any location, tornado events could be experienced anywhere within the jurisdiction. While Mountain City has not had any previous occurrences reported through the NOAA Storm Events Database, if an event were to occur, the event would be similar in size and magnitude to events within the surrounding County area. Table MC.4 lists the 16 tornado events reported for Hays County and its unincorporated jurisdictions since year 1953.

Fatality, injury and damage amounts are shown in Table MC.4, per the NOAA Storm Events Database. Community testimony indicates that these amounts do not reflect the most recent totals, however NOAA data is being used as the best source of information available for the record period.

Table MC.4, Tornado Events, Hays County

Location	Date	Type	Extent	Fatalities	Injuries	Property Damage	Crop Damage
Hays County	4/28/1953	Tornado	F3	1	5	250,000.00	0.00
Hays County	4/30/1954	Tornado	F1	0	0	250,000.00	0.00
Hays County	5/2/1958	Tornado	F1	0	0	30.00	0.00
Hays County	11/12/1961	Tornado	F2	0	0	2,500.00	0.00
Hays County	9/20/1967	Tornado	NA	0	0	250.00	0.00
Hays County	9/20/1967	Tornado	NA	0	0	30.00	0.00
Hays County	5/10/1975	Tornado	F1	0	0	25,000.00	0.00
Hays County	3/30/1976	Tornado	F2	0	0	25,000.00	0.00
Hays County	3/30/1976	Tornado	F2	0	1	250,000.00	0.00
Hays County	8/10/1980	Tornado	F2	0	0	25,000,000.00	0.00
Hays County	4/22/1985	Tornado	F2	0	0	250,000.00	0.00
Hays County	8/22/1991	Tornado	F1	0	0	2,500.00	0.00
Countywide	5/13/1994	Tornado	F0	0	0	500.00	500.00
Henly	11/15/2001	Tornado	F0	0	1	50,000.00	0.00
Driftwood	10/8/2002	Tornado	F0	0	0	70,000.00	0.00
M. Gaynor	5/23/2015	Tornado	EF0	0	0	0.00	0.00
Total				1	7	$26,175,810.00	$500.00

(National Oceanic and Atmospheric Administration Storm Event Database, 2016)

Tornadoes: Extent and Probability

Tornadoes are measured by severity on the Fujita and Enhanced Fujita Scales, with a range from 0-6. According to the reported previous tornado occurrences in the jurisdiction, the maximum tornado extent experienced was a category F3 tornado in 1953. Refer to Chapter 2, the risk assessment portion of the main plan document, for a description of the Fujita (F) Scale and Operational Enhanced Fujita (EF) Scale.

Based on 16 reported events in 63 years, a tornado event occurs approximately every 4 years on average in Hays County. Mountain City's future probability is assumed to be similar to the surrounding County area. The City can expect a tornado event approximately once every 4 years (on average) in the future, with up to an F3 magnitude.

Tornadoes: Impact

Based on the surrounding County area having experienced tornadoes between F0 and F3 levels in the past, if similar events were to happen in the future in the City, the type of impacts that the jurisdiction can expect associated with those magnitudes would include (from least to greatest severity):

- Light Damage - Broken branches; shallow rooted trees pushed over; some chimney damage.
- Moderate Damage - Surface damage to roofs; mobile homes pushed off foundation; moving vehicles pushed off the road.
- Significant Damage - Frame houses have roof torn off; mobile homes completely destroyed; train boxcars overturned; large trees snapped or uprooted; smaller debris turned into missiles.
- Severe Damage - Roofs completely torn off well-constructed buildings, along with some walls; majority of trees uprooted; trains overturned; vehicles lifted off the ground.

  (Tornado Facts, 2016)

Critical infrastructure, such as utility poles and street signals, could also be disrupted, impacting all residents in the affected area. Debris on the roadway can also cause obstruction for emergency responders' ability to provide services.

Tornadoes: Vulnerability Summary

Mountain City is 100% residential. There are no shelters or other buildings available within the City to provide temporary shelter for residents after a disaster event. There is no dedicated reverse-911 system or emergency communications source for residents, besides the email lists that they can subscribe to for emails regarding administrative issues and upcoming events. This leaves residents at risk if they are unaware of a tornado threat and therefore do not take shelter.

Mountain City has previously experienced debris accumulation on roadways during past windstorm events. This illustrates vulnerability as high winds and heavy debris accompany tornadoes. Such incidents could cause impact on the ability of public safety officials to respond to emergency calls. Additionally, the residential structure serving as City Hall is not retrofitted to mitigate damages caused by the extreme winds that accompany tornadoes and does not have generator back-up for these kind of events. A lack of resources for electricity for City Hall or damage to the structure could lead to delays in getting assistance for members of the community.

Expansive Soils

Expansive Soils: Location

Figure 2.3 within Chapter 2 (the risk assessment portion of the main plan document) shows the location of expansive soil areas for the City. The entire extent of the jurisdiction is classified as having less than 50 percent of the area underlain by soils with clays of high swelling potential, therefore all of the jurisdiction is equally at risk.

Expansive Soils: Previous Occurrences

There was no documentation of past site-specific events of structural damage due to expansive soils from local, State, or national databases queried.

Expansive soils cannot be documented as a time-specific event, except when they lead to structural and infrastructure damage. There are no specific damage reports or historical records of events in the City, however future events can occur.

Expansive Soils: Extent and Probability

Considering the amount of swelling potential within the jurisdiction, and the lack of reported events, the probability of a future event is low (0 - 1 occurrences in the next 10 years affecting less than 5 structures).

Expansive Soils: Impact

There have been several undocumented residential foundation problems that have occurred within the community (less than $10,000 in damage) that could possibly be attributed to the presence of expansive soils.

Expansive Soils: Vulnerability Summary

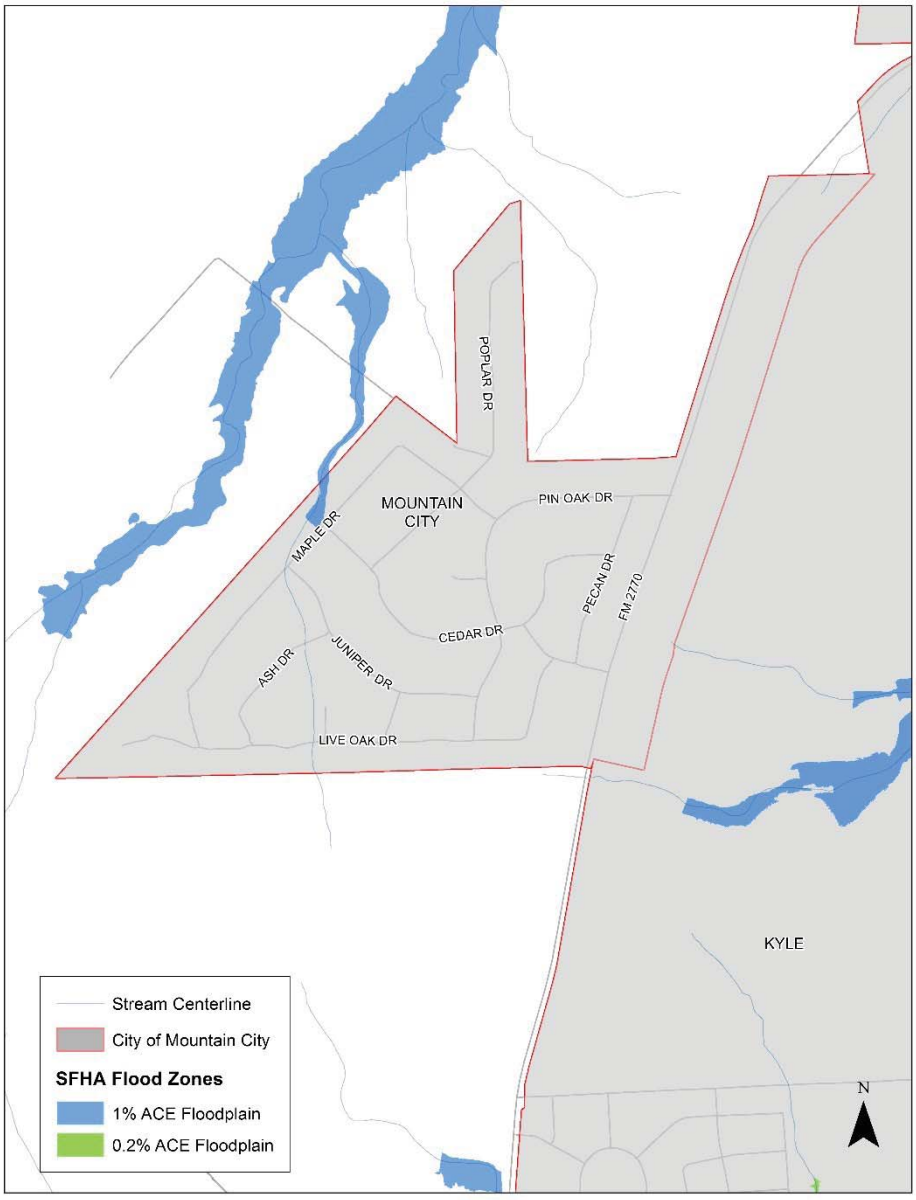
The residences in the community were mostly constructed between 20 and 30 years ago, before the community was incorporated and before National Building Codes were adopted with specific codes for foundation work. As time progresses and the structures continue to age, the number of foundation issues could grow. A general lack of concern for the hazard creates a vulnerability due to the resulting lack of individual-level (homeowner) mitigation action for expansive soils.

Floods

Floods: Location

The 1% Annual Chance Event (ACE) floodplain for Mountain City is shown in Figure MC.3, showing little Special Flood Hazard Area (SFHA) within the City limits. However, an unnamed tributary to Mustang Branch is located within the City, therefore localized flooding could still occur. Homes and roads located adjacent to this unnamed tributary would be the areas most affected if a flooding event were to occur.

Figure MC.3, Special Flood Hazard Areas, Mountain City



(Texas Natural Resources Information System, 2011)

Floods: Previous Occurrences

Hays County was included in 3 Federal disaster declarations between 2013 and 2015, all related to flooding. Although there were no flood events reported specifically for Mountain City in the NOAA Storm Events Database, Table MC.5 lists the 69 documented events reported for Hays County and its unincorporated jurisdictions from year 1997 to 2016. Due to the size and extent of some flood occurrences as well as the regional nature of reports in the NOAA Storm Events Database, the jurisdiction may have been affected by many of the events that were reported for the surrounding areas.

Fatality, injury and damage amounts are shown in Table MC.5, per the NOAA Storm Events Database. Community testimony indicates that these amounts do not reflect the most recent totals, however NOAA data is being used as the best source of information available for the record period.

Table MC.5, Flood Events, Hays County

Location	Date	Type	Fatalities	Injuries	Property Damage	Crop Damage
Countywide	5/23/1997	Flash Flood	0	0	10,000.00	0.00
Countywide	6/6/1997	Flash Flood	0	0	10,000.00	0.00
Countywide	6/7/1997	Flash Flood	0	0	15,000.00	0.00
Countywide	6/8/1997	Flash Flood	2	7	2,500,000.00	50,000.00
Countywide	6/21/1997	Flash Flood	0	0	5,000.00	0.00
Countywide	6/22/1997	Flash Flood	0	0	50,000.00	50,000.00
Countywide	2/21/1998	Flash Flood	0	0	5,000.00	0.00
Countywide	7/3/1998	Flash Flood	0	0	20,000.00	0.00
Countywide	8/22/1998	Flash Flood	0	0	20,000.00	10,000.00
Countywide	8/23/1998	Flash Flood	0	0	10,000.00	0.00
Countywide	10/17/1998	Flash Flood	0	100	500,000.00	50,000.00
HAYS (ZONE)	10/17/1998	Flood	0	25	4,000,000.00	50,000.00
HAYS (ZONE)	10/17/1998	Flood	0	25	4,000,000.00	50,000.00
Countywide	6/21/1999	Flash Flood	0	0	3,000.00	0.00
Countywide	6/9/2000	Flash Flood	0	0	15,000.00	0.00
Countywide	11/2/2000	Flash Flood	0	0	20,000.00	0.00
HAYS (ZONE)	11/4/2000	Flood	0	0	0.00	0.00
North Portion	8/26/2001	Flash Flood	0	0	10,000.00	0.00
Countywide	8/31/2001	Flash Flood	0	0	20,000.00	0.00
Countywide	8/31/2001	Flash Flood	0	0	30,000.00	20,000.00
Countywide	11/15/2001	Flash Flood	0	20	200,000.00	50,000.00
HAYS (ZONE)	11/15/2001	Flood	0	0	0.00	0.00
West Portion	6/30/2002	Flash Flood	0	0	10,000.00	0.00
HAYS (ZONE)	7/1/2002	Flood	0	0	0.00	0.00
South Portion	7/1/2002	Flash Flood	0	0	0.00	0.00
Countywide	7/2/2002	Flash Flood	0	0	0.00	0.00
West Portion	7/3/2002	Flash Flood	0	0	0.00	0.00
West Portion	7/5/2002	Flash Flood	0	0	0.00	0.00

Table MC.5, Flood Events, Hays County, cont.

Location	Date	Type	Fatalities	Injuries	Property Damage	Crop Damage
South Portion	9/19/2002	Flash Flood	0	0	0.00	0.00
South Portion	10/24/2002	Flash Flood	0	0	0.00	0.00
Countywide	11/4/2002	Flash Flood	0	0	0.00	0.00
Countywide	2/20/2003	Flash Flood	0	0	10,000.00	0.00
West Portion	6/13/2003	Flash Flood	0	0	5,000.00	0.00
South Portion	9/11/2003	Flash Flood	0	0	3,000.00	0.00
Northwest Portion	1/16/2004	Flash Flood	0	0	3,000.00	0.00
East Portion	6/5/2004	Flash Flood	0	0	0.00	0.00
Countywide	6/9/2004	Flash Flood	0	0	350,000.00	0.00
Driftwood	6/26/2004	Flash Flood	0	0	0.00	0.00
West Portion	6/27/2004	Flash Flood	0	0	0.00	0.00
West Portion	6/28/2004	Flash Flood	0	0	0.00	0.00
Countywide	6/29/2004	Flash Flood	0	0	0.00	0.00
South Portion	6/30/2004	Flash Flood	0	0	0.00	0.00
HAYS (ZONE)	6/30/2004	Flood	0	0	0.00	0.00
West Portion	7/25/2004	Flash Flood	0	0	0.00	0.00
Countywide	10/2/2004	Flash Flood	0	0	0.00	0.00
Countywide	10/23/2004	Flash Flood	0	0	0.00	0.00
HAYS (ZONE)	10/23/2004	Flood	0	0	0.00	0.00
HAYS (ZONE)	10/24/2004	Flood	0	0	0.00	0.00
Countywide	11/16/2004	Flash Flood	0	0	0.00	0.00
HAYS (ZONE)	11/17/2004	Flood	0	0	0.00	0.00
Countywide	11/21/2004	Flash Flood	0	0	0.00	0.00
Countywide	11/22/2004	Flash Flood	0	0	0.00	0.00
Countywide	11/22/2004	Flash Flood	0	0	0.00	0.00
Southeast Portion	11/23/2004	Flash Flood	0	0	0.00	0.00
South Portion	5/6/2006	Flash Flood	0	0	0.00	0.00
Henly	3/30/2007	Flash Flood	0	0	0.00	0.00
Driftwood	3/30/2007	Flood	0	0	0.00	0.00
Henly	5/2/2007	Flash Flood	0	0	0.00	0.00
Henly	7/2/2007	Flash Flood	0	0	0.00	0.00
Henly	5/17/2010	Flash Flood	0	0	0.00	0.00
Driftwood	9/7/2010	Flash Flood	0	0	0.00	0.00
Driftwood	5/10/2012	Flash Flood	0	0	0.00	0.00
Driftwood	5/11/2012	Flash Flood	0	0	0.00	0.00
Fitzhugh	5/17/2015	Flash Flood	0	0	0.00	0.00
Henly	5/30/2015	Flash Flood	0	0	0.00	0.00
Fitzhugh	6/14/2015	Flash Flood	0	0	0.00	0.00
Driftwood	10/30/2015	Flash Flood	0	0	10,000,000.00	0.00

Table MC.5, Flood Events, Hays County , (cont.)

Location	Date	Type	Fatalities	Injuries	Property Damage	Crop Damage
Fitzhugh	5/19/2016	Flash Flood	0	0	0.00	0.00
Driftwood	8/16/2016	Flash Flood	0	0	0.00	0.00
Totals			2	177	$21,824,000.00	$330,000.00

(National Oceanic and Atmospheric Administration Storm Event Database, 2016)

Floods: Significant Past Events

Hays County experienced 3 disaster declarations discussed under Floods: Previous Occurrences. Refer to the Floods: Significant Past Events section within the Hays County Annex for narratives discussing these events.

Floods: Extent

While Mountain City has few properties in the designated floodplain, community testimony indicates that the City does experience flooding issues during large rain events. Past events have led to flooding of up to 4-6 inches in depth in roadways and low-lying areas, impeding and affecting City traffic and operations for periods of time. While residential flooding is limited, the events have caused minor damage to several residences and structures within the City.

Floods: Probability

Probability has been calculated on the basis of NOAA reported events, as a standard, consistent calculation method for all hazards profiled with the Hays County HMP. Based on 69 reported events in 19 years, a flood event occurs approximately 3 to 4 times per year on average in Hays County and its unincorporated jurisdictions. Due to the size and extent of some flood occurrences, as well as the regional nature of reports in the NOAA Storm Events Database, Mountain City's future probability is assumed to be similar to the surrounding County area. The City can expect a flood event approximately 3 to 4 times per year on average in the future, up to 4-6 inches in depth.

Floods: Impact

The following describes the inventory counts and building replacement values for the jurisdictional area.

Mountain City Building Counts			
Residential	Commercial	Other	Total
131	11	9	151

Mountain City Building Replacement Value		
Building ($)	Content ($)	Total ($)
63,243,144	35,328,106	98,571,249

A Probabilistic 100-year Return Period HAZUS-MH 3.2 analysis was run for Mountain City. HAZUS results are calculated to census blocks. This analysis utilized the best available LiDAR (COA 2012 and CAPCOG 2008) and depth grids. These blocks were then intersected with the City to run a weighted area analysis to get jurisdictional results. The following paragraphs describe results from the 100-year Return (1% Annual Chance Event) weighted area analysis.

While this analysis did not produce any damages due to its upstream location on the Mustang Branch Tributary 2 - 1, the area could experience damages from an extreme event or localized flooding.

HAZUS-MH Results

General Building Stock Damage

HAZUS estimates that no buildings will be at least moderately damaged in Mountain City. 'At least moderately damaged' is defined by HAZUS as greater than 10% damage to a building. For this scenario, no buildings received any damages.

Building-Related Losses

Exposed Value is the total building and content values for structures within the community. The exposed value for the community is $101,284,964. The total building-related losses were $0 for this scenario.

Essential Facility Damage

HAZUS does not estimate any critical facilities or infrastructure interruption for more than 1 day on the day of the event. The model estimates that 100% of community hospital beds would be available for use by patients already in the hospital and those injured by an event.

Debris Generation

HAZUS estimates that no debris will be generated in this scenario.

Shelter Requirements

The model estimates no households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, no people are estimated to seek temporary shelter in public shelters.

Floods: Vulnerability Summary

According to community testimony, a recent change to the impervious cover on the side of the City that borders the high school led to an increase in flooding to homes that back-up to the property. The intent of the school was to reduce the strain that a row of cedar trees had on the local water supply. The unintended consequence of the removal of the trees negatively impacted the several residents of Mountain City.

National Flood Insurance Program Repetitive Loss

Mountain City is a current participant in the National Flood Insurance Program (NFIP) and has 2 tallied Repetitive Loss payments (as of September of 2016) with an average total (building & contents) payment of $11,602.33. Details regarding Repetitive Loss can be found in Chapter 2: Step 4 National Flood Insurance Program Participation/Losses (within the risk assessment portion of the main plan document).

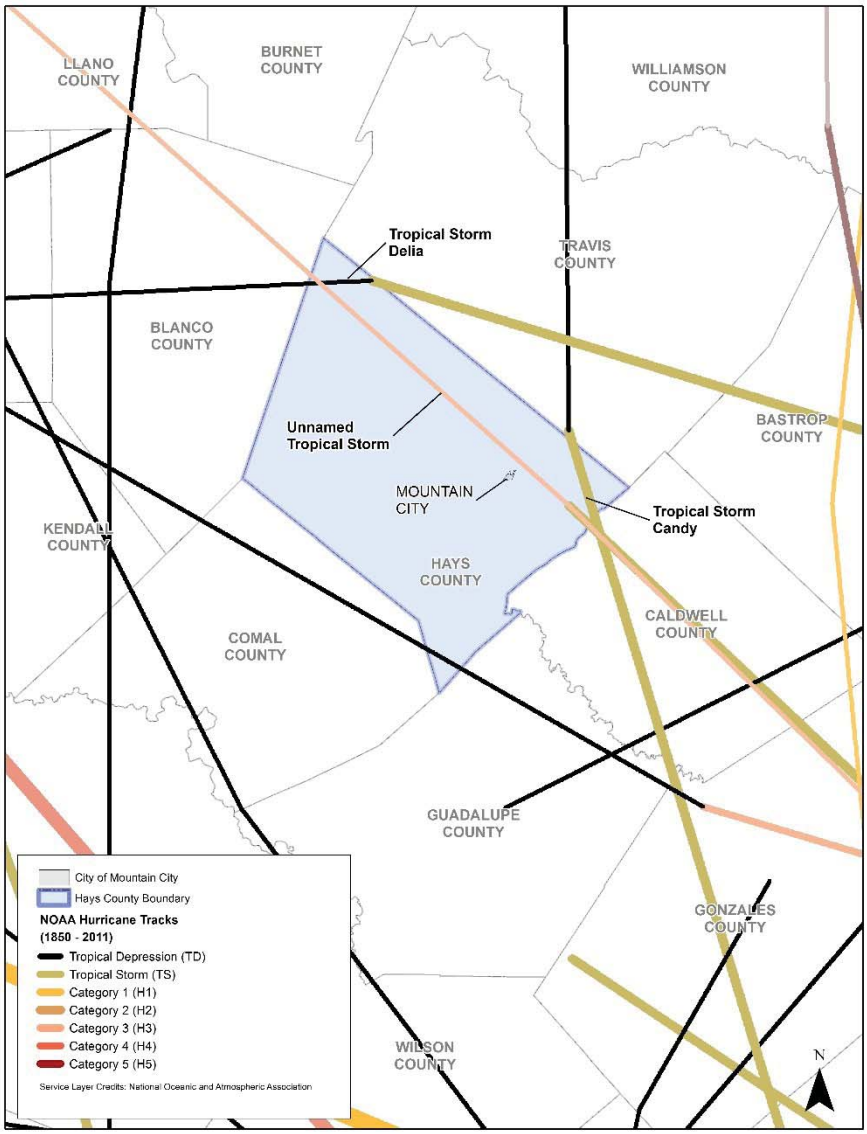
Structure Type	Number of Structures	Number of Claims	Amount of Claims
Residential	1	2	$23,204.66
Non-Residential	0	0	N/A

Hurricanes/Tropical Storms

Hurricanes/Tropical Storms: Location

Due to the regional nature of a hurricane or tropical storm event, the entire extent of Mountain City is equally exposed to a hurricane or tropical storm. Figure MC.4 illustrates the location of the jurisdiction with historical hurricane and tropical storm paths documented by NOAA's Hurricane Tracker from 1850 to 2011.

Figure MC.4, Historical Hurricane/Tropical Storm Paths, Mountain City



(National Oceanic and Atmospheric Administration, 2016)

Hurricanes/Tropical Storms: Previous Occurrences

The following previous events are listed based on NOAA Storm Events Database for Tropical Storm Hermine and NOAA Hurricane Tracker for all other events. By the time most hurricanes reach the County, they are tropical storms, depressions or thunderstorms. Because hurricane and tropical storm events occur on a regional scale, all events listed for Hays County have been included, as they would impact Mountain City.

July 13 to July 22, 1909 – An unnamed storm made landfall near Freeport, as a Category 3 Hurricane. This storm impacted Hays County and participating communities as a tropical depression with wind speeds

up to 30 knots. No significant damages, injuries, or fatalities were reported for the City.

June 22 to June 26, 1968 – Tropical Storm Candy made landfall near Port Aransas. This storm impacted Hays County and participating communities as a tropical storm with wind speeds slowing to 30 knots as a tropical depression just after leaving the County. No significant damages, injuries, or fatalities were reported for the planning area.

September 1 to September 7, 1973 – Tropical Storm Delia made landfall near the border of Brazoria and Matagorda counties. This storm impacted Hays County and participating communities as a tropical storm with wind speeds slowing to 30 knots as a tropical depression just after leaving the County. No significant damages, injuries, or fatalities were reported for the HMP update area.

September 6 to September 8, 2010 – According to the NOAA Storm Events Database, Tropical Storm Hermine made landfall near the Texas/Mexico border on the night of September 6. South Central Texas was hit very hard with widespread rains of 8-12 inches across much of the IH-35 corridor from Austin down to San Antonio.

Hurricanes/Tropical Storms: Extent and Probability

The Saffir-Simpson Scale measures pressure, wind speed, and storm surge in 5 categories. According to the reported previous hurricane occurrences in the jurisdiction, the maximum hurricane extent experienced was categorized as a tropical storm. Refer to Chapter 2, the risk assessment portion of the main plan document, for a description of storm extents.

Based on 4 reported events in 107 years, a hurricane or tropical storm event occurs approximately every 27 years on average in Hays County. Since hurricane and tropical storm events can happen anywhere throughout the HMP update area, Mountain City's future probability is assumed to be similar to the surrounding County areas. In the future, the City can expect an event approximately once every 27 years on average, of up to a magnitude of a tropical storm at a 100-yr Max Wind Speed of 72 mph based on historical extents and HAZUS analysis.

Hurricanes/Tropical Storms: Impact

A Probabilistic 100-year Return Period HAZUS-MH 3.2 analysis was run on Mountain City. The following describes the results of this analysis.

HAZUS-MH Results

General Building Stock Damage

The total property damage losses were $14,040. The majority of damage can be expected to impact residential areas (98%). The remaining damages (2%) are for commercial, industrial, agriculture and religious buildings. While some building damage is experienced, it is estimated that no buildings will be completely destroyed or experience severe damage. Exposed Value is the total building and content values for structures within the community. Loss values are divided separately for building and content loss in dollars.

Exposed Value ($) (Building + Content)	Building Loss ($)	Content Loss ($)	Total Loss ($)
101,284,964	14,035	4	14,040

Essential Facility Damage

HAZUS does not estimate any critical facilities or infrastructure to be interrupted for more than 1 day on the day of the event. The model estimates that 100% of available hospital beds would be available for use by patients already in the hospital and for those injured by the hurricane.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the hurricane at a total of 1 ton. Of the total amount, brick/wood comprises 100% of the total. If the building debris tonnage is converted to an estimated number of truckloads, it will require 1 truckload (with 1 to 25 tons per truck) to remove the building debris generated by the hurricane.

Shelter Requirements

HAZUS estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of people displaced that will require accommodations in temporary public shelters. The model estimates no households to be displaced due to the hurricane. While there is an estimation of over $14,000 in property damages expected, it is aforementioned that "no buildings are estimated to be completely destroyed or experience severe damage." Residents would likely remain in their homes as damages were repaired, therefore it is estimated that no temporary shelter is needed.

Hurricane/Tropical Storms: Vulnerability Summary

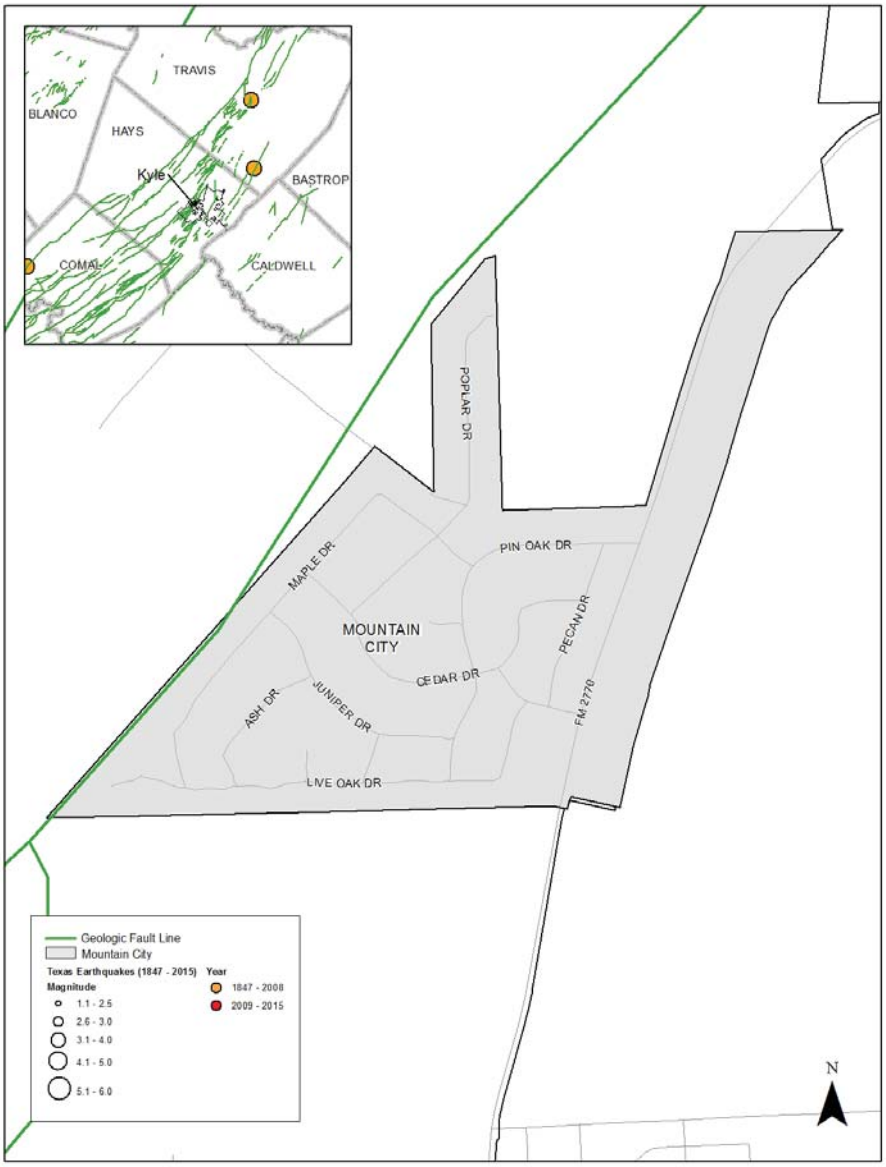
Similar to the impacts of Windstorms, Hailstorms, and Lightning, Mountain City can expect to be impacted with debris and possible interruptions of critical infrastructure. In addition, the community's proximity to Interstate Highway 35 could lead to traffic delays caused by major evacuation efforts if the highway is used as an evacuation route for coastal residents.

Earthquakes

Earthquakes: Location

Locations within proximity to fault lines are typically the areas most at risk for earthquakes. Figure MC.5 shows USGS documented fault lines and the locations of earthquakes from 1847 to 2015 in relation to Mountain City.

Figure MC.5, Texas Earthquakes, 1847 – 2015, Mountain City



(USGS Earthquake Hazard Program, 2015)

Earthquakes: Previous Occurrences

According to USGS 1847-2015 data, there have been no documented earthquake events for Mountain City, as illustrated in Figure MC.5.

Earthquakes: Extent and Probability

Earthquakes are measured by Peak Ground Acceleration (PGA). The HAZUS Max PGA for the planning

area is 1.56% (see Mountain City Impact Section for a description of the HAZUS Analysis). This corresponds to the Modified Mercalli Scale Category IV, with light perceived shaking and no potential structure damage. HAZUS measures PGA on a census tract level. Cities within more than 1 census tract were assigned the highest PGA level to reflect the maximum possible extent. Refer to Chapter 2, the risk assessment portion of the main plan document, for extent scale and PGA descriptions.

As there have been no recorded previous occurrences of earthquakes for Mountain City and the PGA is less than 2% for the area, the probability of an earthquake in the City in the future is low (0 - 1 occurrences in the next 10 years at up to a 500-yr PGA of 1.56%).

Earthquakes: Impact

The FEMA How-To Guidance, Understanding Your Risks (FEMA 386-2, page 1-7), suggests the earthquake hazard should be profiled if the PGA is greater than 3%g, where PGA is measured in the acceleration of gravity (g). The City's PGA is less than 3%g (0.03) and there have been no recorded earthquakes in or near the jurisdiction. Therefore, only a minimum level-1 HAZUS analysis was profiled using the 500-year probability event scenario. The HAZUS analysis produced a PGA of 1.56%. HAZUS scenario would produce $0 in building damages (Residential, Commercial, Agriculture, Religious and Government) from an event. Critical facilities and infrastructure would not experience any loss of service. There would be no critical facilities or infrastructure that would experience moderate to complete damage. No debris would be generated from this event and no people or households would require temporary housing. There would be no moderate, extensive or completely damaged buildings by this event. HAZUS estimates no residents are expected to be displaced from their homes or will require accommodations in temporary public shelters due to the simulated earthquake. Additionally, there would be no causalities or fatalities from this event.

Earthquakes: Vulnerability Summary

While the probability of an earthquake in Mountain City is low, with no significant prior events on file, there are fault lines within the community that could cause impact if there were to be an increase in seismic activity in the area. There is 1 fault line located on the west side of the City running along Maple Drive according to USGS data. Mountain City could expect to be impacted with debris and possible utility interruptions if an event were to occur in an unlikely and unprecedented scenario exceeding the 500-yr probability event scenario run in HAZUS. If an event of this magnitude were to incapacitate roadways, emergency responders would be hindered from responding, leaving the residents at risk.

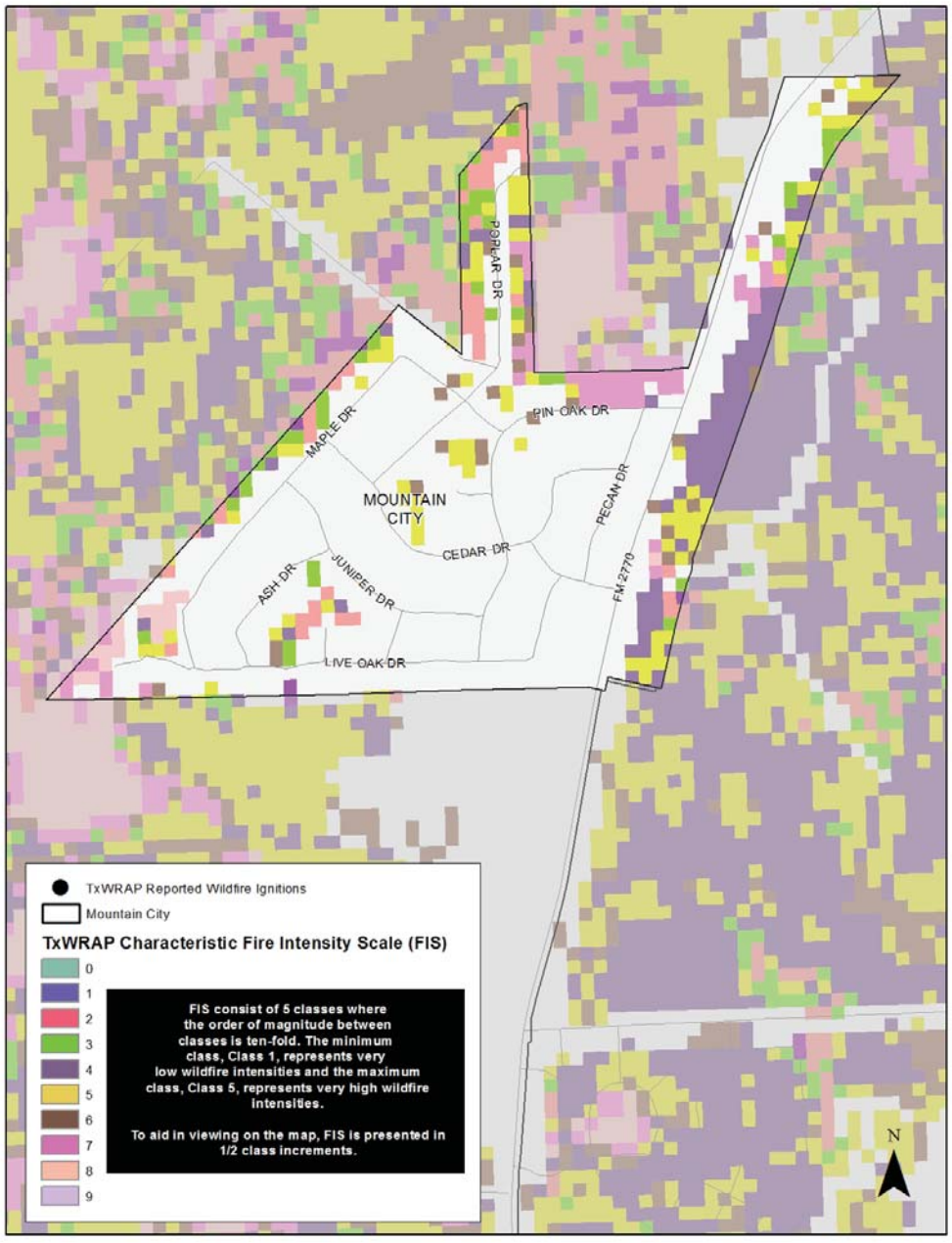
Page 21 Dam/Levee Failure have been redacted from this copy of the plan.

Wildfires

Wildfires: Location

The Texas A&M Forest Service's Texas Wildfire Risk Assessment Portal (TxWRAP) can be used to help communities understand their wildfire risk. Figure MC.6 below shows the location of TxWRAP's documented wildfire occurrences with Fire Intensity Scale (FIS) classifications within Mountain City. TxWRAP identifies FIS areas as those where wildfire fuels and associated potential dangerous fire behavior exist, based on a weighted average of 4 percentile weather categories.

Figure MC.6, Fire Intensity Scale (FIS), Mountain City



(Texas A&M Forest Service, 2016)

Wildfires: Previous Occurrences

There were no reported wildfire ignitions within Mountain City according to TxWRAP and USGS Federal Fire Occurrence data from the years 1980 to 2015.

Wildfires: Extent and Probability

Table MC.6 lists the Fire Intensity Acreage for the City, according to the Texas A&M Forest Service TxWRAP Community Summary Report. Refer to Chapter 2, the risk assessment portion of the main plan document, for a description of the FIS.

Table MC.6, TxWRAP Fire Intensity Acreage, Mountain City, Texas

Class	Acres	Percent
Non-Burnable	189	74.00%
1 (Very Low)	1	0.50%
1.5	12	4.60%
2 (Low)	7	2.80%
2.5	11	4.30%
3 (Moderate)	15	6.00%
3.5	7	2.70%
4 (High)	8	3.20%
4.5	5	1.80%
5 (Very High)	0	0.00%
Total	255	100.0 %

There were no reported ignitions from TxWRAP and USGS Federal Fire Occurrence data in 35 years for Mountain City. However, a wildfire can be ignited from a variety of sources including lightning or by human activity such as campfires, smoking, arson, or equipment use. When considering the lack of reported previous events for the City, a wildfire event in the future is moderate, 1-10 occurrences in the next 10 years with up to a potential fire intensity of 4.5, or “High” classification on the TxWRAP FIS.

Wildfires: Impact

Impact on the community can be measured using TxWRAP housing density levels within the WUI. Areas with a higher housing and population density would be affected to a greater extent than rural areas, especially in areas near burnable fuels. In the event of a wildfire in high density areas of population, residential structures would be damaged or destroyed, critical infrastructure such as water, sewer and electrical services would be interrupted and residents would experience injury or loss of life. Table MC.7 lists the population, percent of total population, WUI acreage and percent of WUI acreage for Mountain City, according to the Texas A&M Forest Service TxWRAP Community Summary Report.

Table MC.7, WUI Acreage, Mountain City

Housing Density		WUI Population	Percent of WUI Population	WUI Acres	Percent of WUI Acres
	LT 1hs/40ac	0	0.0 %	3	1.0 %
	1hs/40ac to 1hs/20ac	0	0.0 %	1	0.4 %
	1hs/20ac to 1hs/10ac	0	0.0 %	7	2.6 %
	1hs/10ac to 1hs/5ac	0	0.0 %	30	11.6 %
	1hs/5ac to 1hs/2ac	5	0.5 %	22	8.5 %
	1hs/2ac to 3hs/1ac	1,101	99.5 %	193	75.8 %
	GT 3hs/1ac	0	0.0 %	0	0.0 %
Total		1,106	100.0 %	255	100.0 %

Wildfires: Vulnerability Summary

Mountain City has residences that back-up to ranches that place them in the WUI and at risk for ignition of structures. There is infrastructure that supports the water supply as well as Pedernales Electric Cooperative power lines located in an area that backs up to ranches as well. The area is kept mowed, however a risk remains if private lots are not kept from becoming overgrown with vegetation.

The community has no official fire hydrants. There are pipe stands that can be used to fill water tanks for the purposes of fighting fires, however a pump could not be used by fire apparatus to fight a structure fire without causing water lines to collapse.

The community is serviced by an Emergency Services District that is dedicated to a portion of the County rather than just Mountain City.

2.2 Risk Ranking Result

On January 12, 2017, members of the Mountain City MPC completed a questionnaire as part of the Hays County Hazard Mitigation Plan Update: Risk Assessment. The questions covered the risk associated with the hazards that affect the community based on the level of concern over each profiled hazard, the hazards' impact on health and safety as well as property damage and business continuity. The answers from this questionnaire were combined with public survey results on perception of risk. The values from both sources were analyzed using the Halff Risk Ranking Tool (details regarding the risk ranking tool are in Chapter 2, the risk assessment portion of the main plan document). The results provided a quantified ranking of risk, with values ranging from 0 to 100. The results for Mountain City are shown below (hazard values are shown from highest to lowest risk):

Ranking Order	Hazard	Risk Ranking Value
1	Wildfire	92.8
2	Tornadoes	70.3
3	Drought	60.5
4	Wind Storms	55.3
5	Lightning	54.8
6	Floods	54.7
7	Hail Storms	45.8
8	Extreme Heat	44.7
9	Earthquakes	40.6
10	Expansive Soils	38.9
11	Severe Winter Storms	38.9 (Exact same value as Expansive Soils)
12	Hurricanes/Tropical Storms	32.8
-	Dam/Levee Failure	Not Profiled
-	Land Subsidence	Not Profiled

Section 3: Mitigation Strategy

This section examines the community's ability to perform mitigation (a review of existing capabilities is shown in Table MC.8) and identifies specific actions to address vulnerabilities for each hazard profiled in the Hays County HMP Update. The mitigation strategy is the application of actions into an approach for performing structural and non-structural mitigation efforts within the jurisdiction. Actions are also prioritized and considered for incorporation into other community programs, regulations, projects or plans.

Completed and canceled actions are also included in a separate section for future reference.

3.1 Existing Capabilities

Table MC.8, Existing Capabilities

Capability Name	Capability Type	Ability to Expand/Improve
Mayor/Emergency Management Coordinator	Elected Official	Political support and funding for mitigation actions/ management of City-level HMP updates. Could attend mitigation information session to learn about community risks and mitigation strategy.
Aldermen		Political support and participation in HMP MPC. Could attend mitigation information session to learn about community risks and mitigation strategy.
City Administrator	City Staff	Support for implementation of mitigation actions. Participation in MPC as stakeholder.
Engineer/Floodplain Administrator	Consultant	Expertise in structural mitigation projects and compliance with flood damage prevention ordinance. Attend advanced floodplain management training.
Sales Tax	Funding	Provides potential funding for Hazard Mitigation items.
Property Tax		Provides potential funding for Hazard Mitigation items.
Permitting and Licensing Fees		Provides potential funding for Hazard Mitigation items.
Chapter 211 of the Local Government Code: Zoning	Authority	State-level code that authorizes the City to regulate zoning (State of Texas, 1987).
Chapter 213 of the Local Government Code: Municipal Comprehensive Plans		State-level code that authorizes the City to adopt a comprehensive plan for the long-range development of the City (State of Texas, 1997).
Chapter 214 of the Local Government Code		State-level code that authorizes the City to have regulatory authority as it relates to building codes (such as structural integrity and plumbing) (State of Texas, 1995).
Ordinance No. 021609		Gives the City authority to establish and maintain a uniform ordinance for development, maintenance and use of the property within its jurisdiction (Mountain City, TX, 2014). Development standards can be reviewed by MPC for consideration of amendments that would increase resiliency and mitigate risk.
Ordinance No. 121514A		Adopts National Model Building and Rehabilitation Codes (National Codes) (Mountain City, TX, 2014). Can continue to be updated as National codes are updated.
Waste Management	Program	Adopts an official vendor for Waste Management for Mountain City (Mountain City, TX, 2016). Brush pick-up provisions in the plan.
Interlocal Agreement for Emergency Water Service	Agreement	Provide opportunity for conservation measures. (Hays County, 2010)

3.2 National Flood Insurance Program Participation

Mountain City currently participates in the National Flood Insurance Program (NFIP). Currently, there are not any Certified Floodplain Managers on staff, due to a lack of resources and staff. The current Floodplain Administrator is the City Mayor. The amount of mapped floodplain in Mountain City is very small. The City has adopted minimum standards in their flood damage prevention ordinance and regulation of the development within the floodplain are done through Hays County Development Services as part of a Memorandum of Understanding between the City and the County. The City will continue to explore options for higher standards and consider application for the Community Rating System. Mountain City has a total of 8 NFIP policies in force, as of June 2016. This totals $2,520,000.00 in total insurance coverage.

3.3 Mitigation Goals

The plan-level Mitigation Goals can be found in Chapter 3, the Mitigation Strategy portion of the Hays County HMP Update. These goals apply to each community and were mutually decided upon as the guiding goals for the development of actions in each jurisdiction.

3.4 Mitigation Actions

Risk Focus is defined as:
***E= Actions reducing risk to existing buildings and infrastructure**
***F= Actions reducing risk to new development and redevelopment**

Number/Title	Hazard	Item Description	Implementation Agency
1 Adopt Higher Standards for Flood Damage Prevention Ordinance (previously action 2 in 2011 plan)	Floods	Create a plan to review the ordinance every 5 years and if possible, adopt 1 foot of freeboard in existing ordinance for new development and substantial repairs and also to include a field that requires City staff to check Flood Insurance Rate Maps before permits for building are approved.	Mountain City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services	6 months	Not started	E/F

Cost and Benefit Considerations
This item would only take the amount of time/labor required to amend an ordinance within the City. The benefit would be for substantially improved or new development.

Number/Title	Hazard	Item Description	Implementation Agency
2 Attend Local Floodplain Management Courses to receive Certification (previously action 3 in 2011 plan, modified)	Floods	Send member of the staff or elected official to training in order to become a Certified Floodplain Manager.	Mountain City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, cost of accommodations for FEMA E-273 Floodplain Course and CFM testing session	6 months	Not started	E/F

Cost and Benefit Considerations
If attending the course at the Emergency Management Institute, the cost of the course would be very low, and only include a minimal meal ticket purchase. The benefit of an informed floodplain administrator would help both new and existing residents through guidance on how to mitigate flood damages to development.

Number/Title	Hazard	Item Description	Implementation Agency
3 Improve Emergency Communication Capabilities- Phone Tree Plan (previously action 4 in 2011 plan, modified)	Extreme Heat, Severe Winter Storms, Lightning, Hailstorms, Windstorms, Tornadoes, Floods, Hurricanes/Tropical Storms, Earthquakes, Wildfires	Continue existing City directory program and add phone tree responsibilities for non-critical hazard call down messaging, such as drought alerts.	Mountain City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff, community volunteer hours/ in-kind services	6 months	Ongoing	N/A

Cost and Benefit Considerations
The implementation of this action would be a low-cost way to go beyond the current email communication that the community has with its members. The benefit would be to all who register to receive calls.

Number/Title	Hazard	Item Description	Implementation Agency
4 StormReady Designation for Mountain City (previously action 6 in 2011 plan)	Windstorm, Hailstorm, Severe Winter Storms, Lightning, Hurricanes/ Tropical Storms, Tornadoes, Floods	Application preparation and submission for StormReady designation from the National Weather Service that attests to the community's level of preparedness for severe weather.	Mountain City Secretary

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services	12 months	Not started	N/A

Cost and Benefit Considerations
This free application would benefit all members of the community as Mountain City.

Number/Title	Hazard	Item Description	Implementation Agency
5 Cooling Plan for vulnerable members of the community during periods of extreme heat that result in power loss (previously item 7 in 2011 plan, modified)	Extreme Heat	Documented plan for how to provide cool accommodations for vulnerable populations during periods of extreme heat when electrical power is interrupted.	Mountain City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, free brochures from FEMA	6 months	Not started	N/A

Cost and Benefit Considerations
With existing staff documenting the interlocal agreements for assisting each other with accommodating their vulnerable populations, this effort would benefit approximately 185 who are either over 65 or under 16 years of age.

Number/Title	Hazard	Item Description	Implementation Agency
6 Promote Flood Insurance in the community (previously action 8 in 2011 plan)	Floods	Placing National Flood Insurance Program information brochures in City Hall.	Mountain City Secretary

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, community volunteer hours/ in-kind services	1 month	Not started	N/A

Cost and Benefit Considerations
The cost and labor required to promote the NFIP is negligible. The benefit is difficult to estimate.

Number/Title	Hazard	Item Description	Implementation Agency
7 Increase public awareness of hazard mitigation (previously action 9 in 2011 plan)	Drought, Extreme Heat, Severe Winter Storms, Lightning, Hailstorms, Windstorms, Tornadoes, Expansive Soils, Floods, Hurricanes/Tropical Storms, Earthquakes, Wildfires	Increasing public awareness of natural hazards and hazardous areas; distributing information regarding hazards and potential mitigation measures. Promotional sources would include City website, social media, and public education programs. Provide link to HaysInformed on local page.	Mountain City Mayor

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services	1 month	Not started	N/A

Cost and Benefit Considerations

There is minimal cost and labor required to make this enhancement to the existing Mountain City website.

Number/Title	Hazard	Item Description	Implementation Agency
8 Monitor Drought Conditions (previously action 11 in 2011 action plan, modified)	Drought	Provide widget on Mountain City homepage that provides the latest US Drought Monitor conditions for the day, in addition to monitoring local water levels.	Mountain City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, costs for water system monitoring	6 months	Ongoing. Water system purchase ongoing.	N/A

Cost and Benefit Considerations

The cost for sharing the drought monitor should be minimal, however there may be more cost associated with monitoring the Mountain City Water System.

Number/Title	Hazard	Item Description	Implementation Agency
9 Develop drought contingency plan to ensure water for firefighting, provision of drinking water and reduction of groundwater depletion (previously action 12 in 2011 plan, modified)	Drought	Water conservation level triggers and actions documented and publicized.	Mountain City Water

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, consultant fees from plan writers	6 months	Not started.	N/A

Cost and Benefit Considerations

Although the cost of professional help for establishing a water conservation plan (drought plan) would be costly at the onset, the benefit to current and future residents is critical.

Number/Title	Hazard	Item Description	Implementation Agency
10 Generator Purchase and Installation for City Hall	Extreme Heat, Severe Winter Storms, Lightning, Hailstorms, Windstorms, Tornadoes, Floods, Hurricanes/Tropical Storms, Earthquakes, Wildfires	Back-up electrical power available to City Hall to ensure continuity of government operations and to also provide temporary sheltering for vulnerable populations in the City.	Mountain City Mayor

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, grant writing assistance, Hazard Mitigation Grant program funding, if applicable and eligible	18 months	Not started	E

Cost and Benefit Considerations

If grant funding is eligible, the cost/benefit of this project would have to be positive. There is only 1 public building in the City in use and it has no back-up source for power.

Number/Title	Hazard	Item Description	Implementation Agency
11 Icy Roads Response Plan (previously action 14 in 2011 plan, modified)	Severe Winter Storms	Documentation of how to keep ingress and egress to the community clear of ice so that first responders can access residents during severe winter storms.	Mountain City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, County Support, possible contractor for ice removal	6 months	Not started	N/A

Cost and Benefit Considerations

This planning effort would only take the time of City employees and could be critical to saving lives if a medical emergency occurred during a Severe Winter Storms event.

Number/Title	Hazard	Item Description	Implementation Agency
12 Coordination of new Limb and Large Item Pick-up day (Dumpster Day) for Wildfire Mitigation (previously action 15 in 2011 plan, modified)	Wildfires, Lightning, Windstorms, Tornadoes	Enhancement of existing large item pick-up or "Dumpster Day" to emphasize the wildfire mitigation benefits of cleaning brush and overgrown lots.	Mountain City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services	2 months	Not started	N/A

Cost and Benefit Considerations

This slight change to marketing an existing event would likely lessen the risk for wildland fire for residents located within the Wildland urban interface.

Number/Title	Hazard	Item Description	Implementation Agency
13 Flood-proofing repetitive loss structure that has been identified by FEMA for the number of flood insurance claims (previously action 16 in 2011 plan, modified)	Floods	Taking flood mitigation measures to reduce the amount of flood damage impacting a private residence in Mountain City that is classified as a Repetitive Loss structure by the National Flood Insurance Program.	Mountain City Council/ Hays County Planning & Development

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff hours/ in-kind services, cost-share for mitigating structure if Hazard Mitigation Grant funding is pursued	24 months	Not started	E

Cost and Benefit Considerations
In order to qualify for grant funding for mitigation, the project would have to be cost-benefit effective. The City needs to analyze the actions available and cost-effective for mitigating the home.

Number/Title	Hazard	Item Description	Implementation Agency
14 Tree Removal Ordinance to enforce when and how trees should be removed (previously action 17 in 2011 plan, modified)	Floods, Wildfires, Windstorms, Lightning, Tornadoes, Severe Winter Storms	Development of an ordinance that would prohibit tree removal that would negatively impact neighboring properties. Also mitigate the effects of falling trees by calling for the removal of dead trees that could harm people or property or become debris during a wind event, or fuel during a fire event or lightning strike.	Mountain City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff hours/ in-kind services, legal consultation fees for review	6 months	Ongoing	N/A

Cost and Benefit Considerations
This regulation would help the community enforce measures that would minimize adverse impact on neighbors, saving them an undetermined amount in damages or injuries.

Number/Title	Hazard	Item Description	Implementation Agency
15 Encroachment audit to ensure that the floodway in the City limits does not have any unauthorized dams or obstructions on a quarterly basis (previously action 18 in 2011 plan, modified)	Floods	Creation of an encroachment audit program to perform quarterly audits to visually inspect and document any violations to the flood prevention ordinance in the form of waste, debris or unauthorized private dams in the floodplain/floodway located near Maple Road.	Mountain City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, volunteer hours to do inspections from the public street	2 months	Not started	E

Cost and Benefit Considerations
The visual inspection of this property from the public road that runs parallel to it is virtually cost-free, besides the time to physically visit the site and the time to document the findings. The benefit to homeowners near the floodplain would be the prevention of adverse impacts in the future that could cause damage.

Number/Title	Hazard	Item Description	Implementation Agency
16 Evacuation Plan Development (previously action 19 in 2011 plan, modified)	Wildfires, Floods	Creation of a formal evacuation plan that would provide residents with procedures for receiving evacuation messaging, evacuating the community, alternate routes and repatriation procedures for returning to the community safely.	Mountain City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, possible acquisition of easement to create additional connectivity to community through creation of additional entrance/exit	24 months	Not started	N/A

Cost and Benefit Considerations
With just the creation of a plan, the cost of this project could be minimal, however with the consideration of the creation of an additional point of entry/exit, the cost could increase substantially.

Number/Title	Hazard	Item Description	Implementation Agency
17 Homeowner maintenance workshops including expansive soil mitigation instruction for engineers and builders	Severe Winter Storms, Windstorms, Expansive Soils, Tornadoes, Drought, Wildfires, Floods	Public education workshops that feature experts from various fields that can provide advice on measures that can mitigate (xeriscaping for drought, foundation care for expansive soils, yard care for mitigating wildfire, safe room construction, retrofitting for flood or high winds), weatherproofing, protecting plumbing from cold, and rainwater harvesting.	Mountain City Mayor

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services for research or coordination of speakers, volunteer hours from speakers, cost of materials for hand outs	12 months	Not started	E

Cost and Benefit Considerations
These overall low-cost workshops would save attendees an unknown amount in damages that could be mitigated.

Number/Title	Hazard	Item Description	Implementation Agency
18 Energy prioritization plan for citizens of the community for submittal to PEC	Extreme Heat, Severe Winter Storms, Windstorms, Tornadoes, Hurricanes/ Tropical Storms, Lightning	Identification and documentation of members of the community who depend on electricity for survival (medical).	Mountain City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, hours from Pedernales Electrical Cooperative	6 months	Not started	N/A

Cost and Benefit Considerations
The benefit of this survey to prioritize special needs in the community will assist and perhaps save lives.

Number/Title	Hazard	Item Description	Implementation Agency
19 Adoption of Soil Compaction Standards for Road Construction	Expansive Soils	Adoption of road techniques that require a higher level of soil compaction to mitigate expansive soils.	Mountain City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing Staff, $100 cost of printing	3 months	Not started	E/F

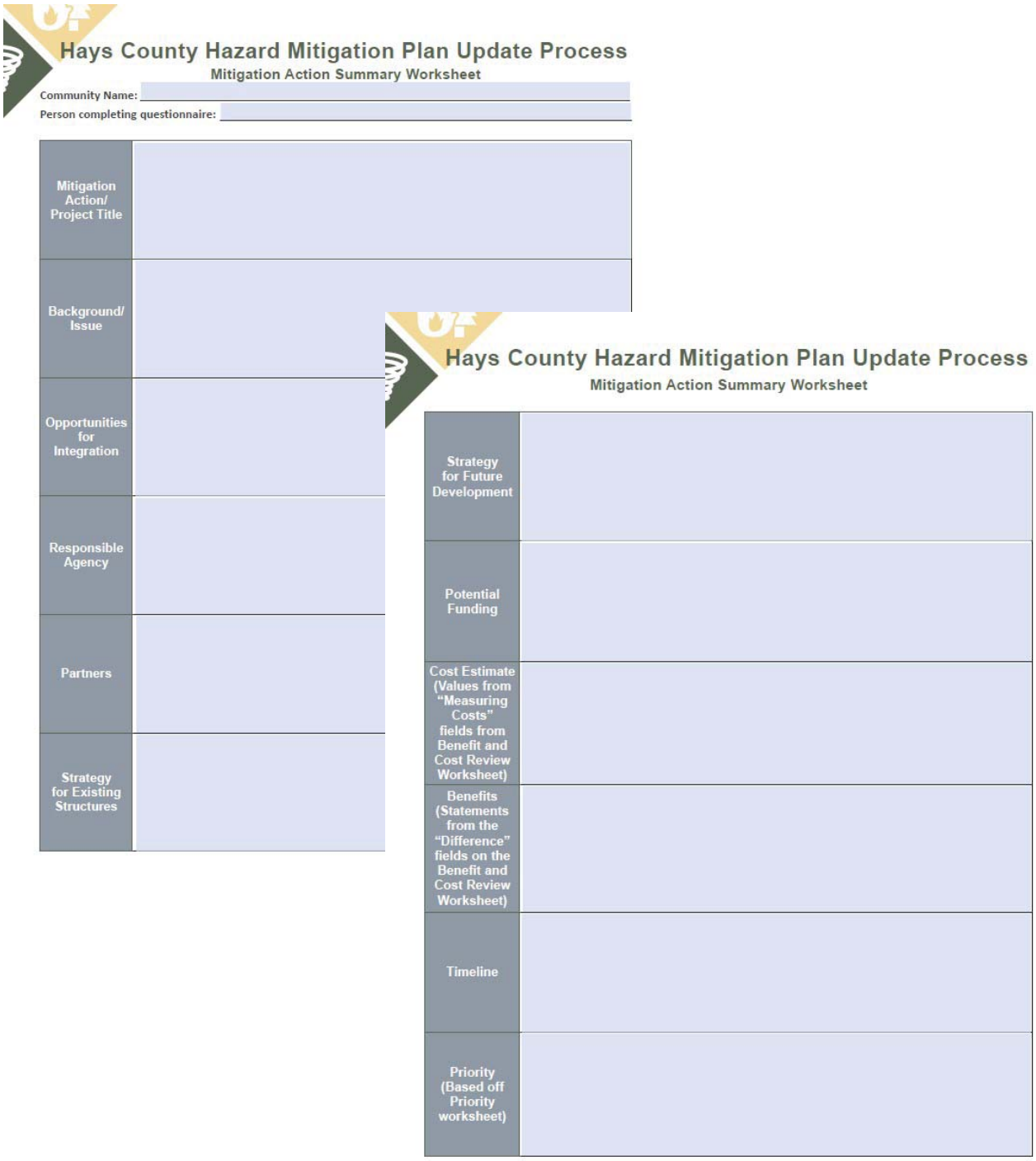
Cost and Benefit Considerations
This low-cost effort would increase the resilience of new roads that support the entire population of the community.

3.5 Capabilities Assessment

Evaluation/Prioritization of Actions

Each action added to the plan was developed using the Mitigation Action Summary Worksheet shown in Figure MC.7.

Figure MC.7, Mitigation Action Summary Worksheet



Hays County Hazard Mitigation Plan Update Process

Mitigation Action Summary Worksheet

Community Name:

Person completing questionnaire:

Mitigation Action/ Project Title	
Background/ Issue	
Opportunities for Integration	
Responsible Agency	
Partners	
Strategy for Existing Structures	

Hays County Hazard Mitigation Plan Update Process

Mitigation Action Summary Worksheet

Strategy for Future Development	
Potential Funding	
Cost Estimate (Values from "Measuring Costs" fields from Benefit and Cost Review Worksheet)	
Benefits (Statements from the "Difference" fields on the Benefit and Cost Review Worksheet)	
Timeline	
Priority (Based off Priority worksheet)	

Table MC.9, Mitigation Action Prioritization (with Hazards in order of highest priority to lowest)

Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community	Risk Ranking Score	Total Score
3 Improve Emergency Communication Capabilities- Phone Tree Plan	1	1	1	1	1	1	1	1	0	1	93	102
7 Increase Public Awareness of Hazard Mitigation	1	1	1	1	1	0	1	1	0	1	93	101
12 Coordination of New Limb and Large Item Pick-up day (Dumpster Day) for Wildfire Mitigation	1	1	1	1	1	0	1	1	0	1	93	101
17 Homeowner maintenance mitigation workshops including expansive soil mitigation instruction	0	1	1	1	1	1	1	1	0	1	93	101
16 Evacuation Plan Development	1	0	0	0	1	0	0	1	0	0	93	96
14 Tree Removal Ordinance- to enforce when and how trees should be removed	1	1	-1	0	1	0	0	-1	0	1	93	95
4 Storm Ready Designation for Mountain City	1	1	1	0	1	1	1	1	0	1	70	78
10 Generator Purchase for City Hall	1	0	1	1	1	0	1	1	0	1	70	77
18 Energy prioritization plan for citizens of the community for submittal to PEC	1	0	1	1	-1	0	1	1	0	1	70	75
15 Encroachment audit to ensure that the floodway in the City limits does not have any unauthorized dams or obstructions on a quarterly basis	0	1	1	1	1	1	1	1	0	1	55	63
13 Flood-proofing repetitive loss structure that has been identified by FEMA for the number of flood insurance claims	0	1	-1	1	0	1	1	-1	1	1	55	59
11. Icy Roads Response Plan (ensuring process does not harm environment)	1	0	1	1	1	0	1	1	0	0	39	45
4. Storm Ready Designation from National Weather Service	0	0	0	0	0	0	0	0	0	0	95	95
3. Floodplain Management Training	0	0	0	0	0	0	0	-1	0	0	95	94.1
5. Energy Restore Priority Effort	1	0	-1	0	0	0	1	-1	0	0	90	90
9. De-icing Contract Research/Plan Development	1	0	0	1	0	0	0	0	0	0	68	70
19. Adoption of Soil Compaction Standards for Road Construction and Residential Recommendation	1	0	1	-1	0	0	0	1	0	1	39	42

Mitigation Actions by Hazard

The mitigation actions are shown with corresponding hazards in Table MC.10 below.

Table MC.10, Mitigation Action Impact, Mountain City

Action Number	Drought	Extreme Heat	Severe Winter Storms	Lightning	Hailstorms	Windstorms	Tornadoes	Expansive Soils	Floods	Land Subsidence	Hurricanes/ Tropical Storms	Earthquakes	Dam/ Levee Failure	Wildfire
1									X					
2									X					
3		X	X	X	X	X	X		X		X	X		X
4			X	X	X	X	X		X		X			
5		X												
6									X					
7	X	X	X	X	X	X	X	X	X		X	X		X
8	X													
9	X													
10		X	X	X		X	X				X			
11			X											
12			X	X		X	X							X
13									X					
14			X	X		X	X		X					X
15									X					
16									X					X
17	X		X			X	X	X	X					X
18		X	X	X		X	X				X			
19								X						

3.6 Integration Efforts

Table MC.11 captures ways that the HMP risk assessment, mitigation goals and actions developed in the HMP can be integrated into other Mountain City documents, programs and regulations.

Table MC.11, Plan Integration Efforts, Mountain City

Name of Document	Type	Item Type	Process for Integration
Mountain City Building Permit	Form	Action	Add field on building permit to require Mountain City staff to check flood insurance rate maps to ensure that development is not occurring within the floodplain. If it is, the plans and details will be forwarded to Hays County for support in ensuring the flood damage prevention ordinance is followed.
"Dumpster Day"	Program	Action	Amend existing waste management contract to increase number of brush pick-up days. Also enhance existing large-item pick-up event to provide wildfire mitigation focus to the event marketing.
HaysInformed.com	Program	Goals	Coordinate with City website administrator to use HaysInformed.com links on the Mountain City website Hazard Information page to provide residents with additional resources and information regarding the hazards that affect Hays County.
Hazard Mitigation Grant Program (HMGP)	Funding	Action	Identify actions that can be funded through new and existing grant awards. Review existing mitigation actions for eligibility for the grant program, to include Benefit Cost consideration. Prepare grant application documents in advance to prepare for future grant periods. Process involves identification of actions from Plan; obtaining Council approval to apply; notification of interest in grant to the public; completion of application for funding; if awarded, obtaining Council approval to accept; if accepted, administration of funds and implementation of project.
Pre-Disaster Mitigation (PDM)			
Flood Mitigation Assistance (FMA)			
TWDB Flood Protection Planning (FPP) Grant			
TWDB Clean Water State Revolving Fund (CWSRF)			Identify actions that can be funded through new and existing loans. Review existing mitigation actions for eligibility for the loan program, to include Benefit Cost consideration. Prepare loan application documents in advance to prepare for future application periods. Process involves obtaining Council approval to apply; notification of interest in loan to the public; completion of application for loan; if awarded, obtaining Council approval to accept; if accepted, administration of funds and implementation of project.
Texas Water Development Fund (DFund)			

Incorporation Achievements Since Previous Plan Update

Data, information, and mitigation goals and actions were not integrated into other planning mechanisms in the last 5 years prior to this update due to a lack of funding and resources.

Section 4: Finalize Plan Update (Review, Evaluation, and Implementation)

4.1 Changes in Development

With little changes in development, the majority of the activity in Mountain City construction is from home renovations and repairs. As the community is nearly completely built-out, there are no new significant changes in development. The level of vulnerability to natural hazards has not increased or decreased as a result of development occurring since the previous plan update.

4.2 Progress in Mitigation Efforts

Past Mitigation Action Progress Reports Summary - Completed and Canceled

2011 Action Number	Hazard	Item Description	Lead Department
10	Drought	Wildfire Hazard Areas	Mountain City
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
$500		TBD; likely initiated in 2011	Canceled due to lack of applicability to activities at the local level. This projects is being undertaken by Hays County as an application to the Firewise program.
Cost Effectiveness			
Not independently cost-effective but essential in minimizing loss of life and injuries during significant storms			

2011 Action Number	Hazard	Item Description	Lead Department
13	Extreme Heat	Evaluate Excessive Heat Risks	Mountain City
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
No addition cost-uses existing staff resources		TBD; probably initiated in 2011	Canceled due to lack of priority, feasibility, and benefit to community.
Cost Effectiveness			
Not independently cost-effective, but needed to develop adequate risk reduction efforts			

4.3 Changes in Priorities

Plan-level priority changes are reflected in the changes to the plan-level goals shown in Chapter 3: Mitigation Strategy within the main plan document.

As new elected officials have brought new platforms for their governance of the community, the latest officials seek to enhance and improve existing regulations. In addition they wish to prioritize the structural integrity of critical facilities and infrastructure, as well as the safety of residents.

Section 5: Approval and Adoption

5.1 Approval and Adoption Procedure

The procedures for approval and adoption are described in Chapter 4.1 of the main plan document.

Table MC.12, Municipal Jurisdiction Adoption Date

Municipality	APA Date	Adoption Date
Mountain City		

Jurisdiction Adoption Documentation Placeholder

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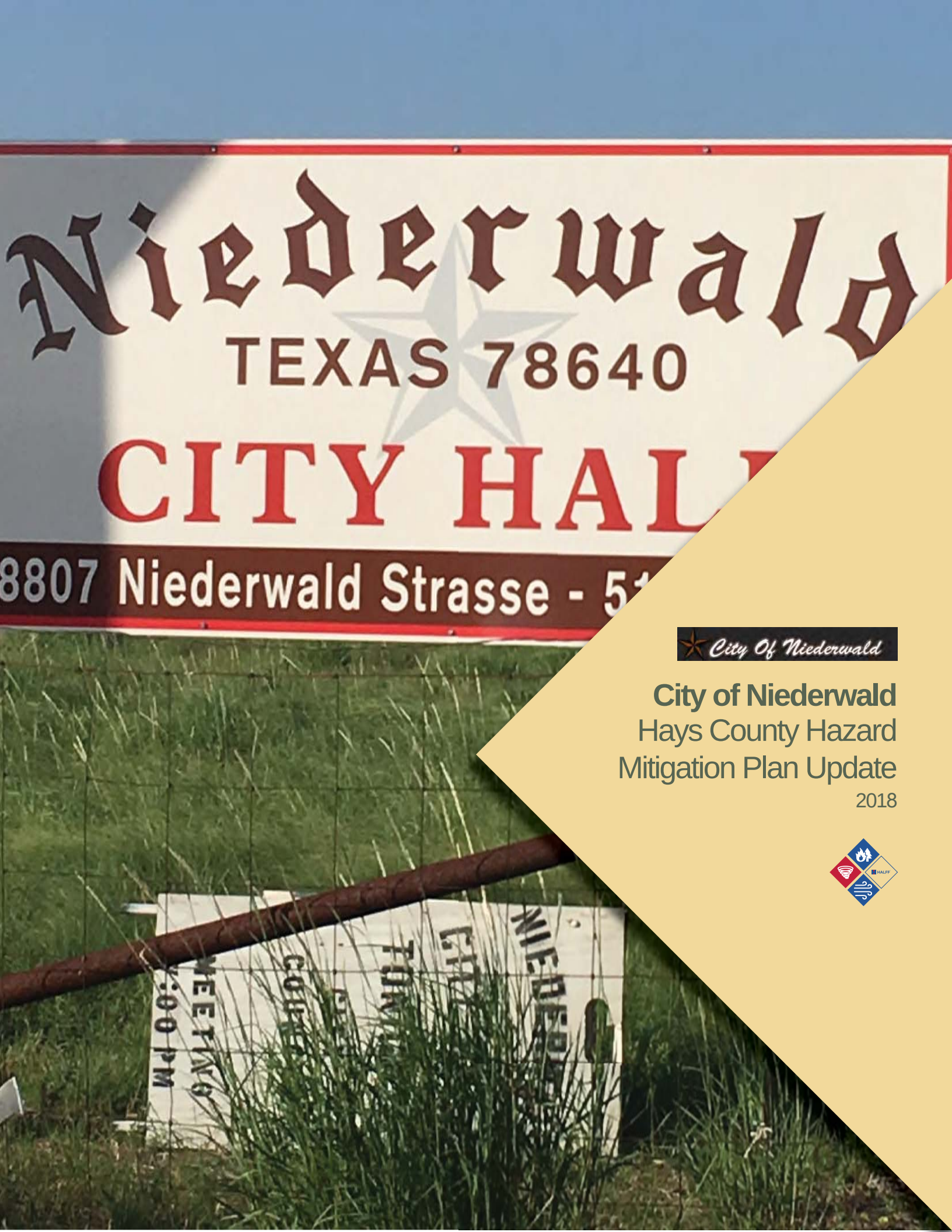

City Of Niederwald

City of Niederwald

Hays County Hazard Mitigation Plan Update

2018

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City of Niederwald Annex
Section 1: Organize and Review

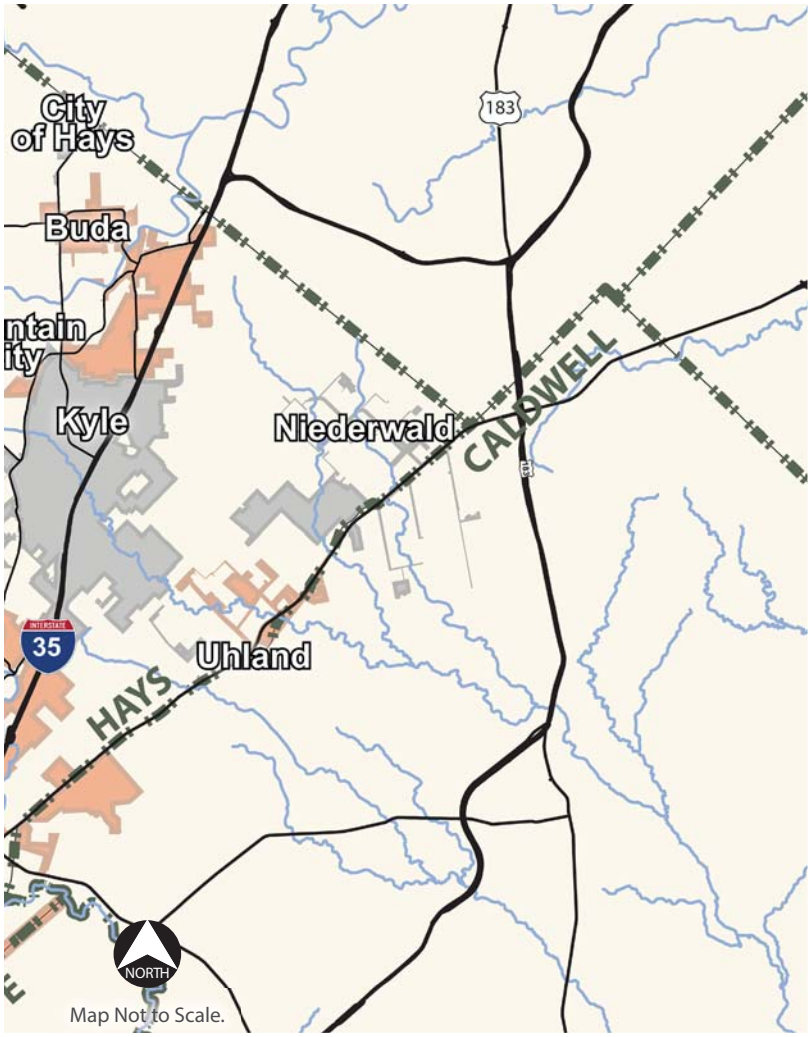
This section contains a brief description of the City of Niederwald and its jurisdictional features. In addition, Section 1 contains the following details regarding Niederwald's:

- participation in the Hays County HMP Update process,
- stakeholder engagement,
- public outreach strategy,
- incorporation efforts and
- plan maintenance procedures.

*Population :	399
Size of Community:	3.55 sq. miles
*Population over 65 years old	36
*Population under 16 years old	110
*Economically Disadvantaged Population ($0-$20k)	32
Niederwald is serviced by the following responders:	
Fire/EMS - Chisholm Trail Fire Rescue / ESD #1, Niederwald Volunteer Fire Department	
Law Enforcement - Hays County Sheriff's Office	

**HAZUS-MH 3.2 Updated Census 2010 Population Estimates*

Figure NW.1, City of Niederwald Planning Area



1.1 Community Description

When planning, it is important to take into account the characteristics that make a community unique. Consideration of unique needs when it comes to mitigating or recovering from natural hazards ensures that all members of the community and their needs are addressed.

Located in Hays and Caldwell Counties, Niederwald is located on Highway 21, known as the Camino Real. Niederwald faces the challenges of having to conduct business in 2 separate County jurisdictions with a small staff and limited operating budget. The community is a General Law Type A municipality and is governed by a Mayor, Mayor Pro-tem and 4 Council Members. These officials are supported by 1 member of the City Staff, the dual-role City Administrator/Secretary.

Served by the Hays Consolidated Independent School District and Lockhart Independent School District (ISD), Niederwald has 3 subdivisions (2 of which are mobile home communities) within the City limits and is in the process of developing 6 more that will be a combination of site-built and mobile homes. The population will likely quadruple in the next 5 years,

with subdivisions making up about 40% of the community. The overall community development goal is to increase retail development by 400% and residential by 400%. There is currently only 1 convenience store and 2 restaurants that support the tax base. Outside of subdivisions, the remainder of the community is made up of approximately 40% manufactured/mobile homes, a small percentage of farmland and 10-15% of undeveloped tracts. The remainder of the community is made up of ranchettes.

Niederwald incorporated in 1987 and currently is among the communities with the most farmland in Hays County.

Niederwald's major employers are listed in Table NW.1 and major utility providers are listed in Table NW.2.

Table NW.1, Major Employers

Business Type	Name of Employer
Retail	Valero (convenience store/gas station)
Restaurant	H & Aleyda's Mexican Restaurant
Restaurant	El Camino Restaurant

Table NW.2, Utility Providers

Type	Provider
Electric	Bluebonnet Electric Cooperative/ Pedernales Electric Cooperative (PEC)
Water	Goforth Special Utilities District

Community Planning Involvement

MPC planning activities for the Hays County Hazard Mitigation Plan (HMP) Update are captured in Figure NW.2, which utilizes check marks to indicate each of the activities that were completed by the Niederwald MPC.

Figure NW.2, City of Niederwald Plan Participation

Meetings

- ✓ Kick-Off
- ✓ Risk Assessment
- ✓ Mitigation Strategy

Data Submission

- ✓ Planner's Survey Data Collection Spreadsheet/ GIS Data
- ✓ Planning Worksheets
- ✓ Phone Interview

Public Involvement

- ✓ City Council/Commissioner's Court Agenda Items
- ✓ Public Survey Posting/ Collection

1.2 Outreach Strategy

The City of Niederwald was very active in the following outreach activities used to request the public participation in the Hays County Hazard Mitigation Plan Update.

Public Survey Promotion

Niederwald advertised the Hays County Hazard Mitigation Plan Update Public Survey on the City of Niederwald homepage of http://niederwaldtx.com.

As of March 10, 2017, Niederwald had 0 residents respond to the public survey, this was despite the fact that the survey was advertised to the public. Details on how the survey data was directly incorporated into the risk ranking process for hazards is included in Chapter 2, the risk assessment portion of the main plan document.

City Council Meeting Announcement

On January 23, 2017, the City Administrator presented information on the Hays County Hazard Mitigation Plan Update to the Niederwald City Council and public attendees. Elected officials, local agency leaders and members of the public attended the meeting. The Council agenda and item report for this presentation is included in Plan Appendix A of the Hays County HMP Update.

Plan Phase Newsletters

Niederwald was provided with newsletters at each phase of the planning process in order to be able to share updates on the planning process with stakeholders, City staff and the public. Copies of the newsletters can be found in Plan Appendix A.

Plan Draft Public Review and Comment Period

The link to the draft Hays County HMP (hosted on the Hays County Office of Emergency Services page) was posted on the City of Niederwald website from July 12, 2017 until July 26, 2017 and a hard copy was placed in the Niederwald City Hall for public review. No public comments were received during this review period.

1.3 Incorporation of Sources

In addition to stakeholder and public input, the MPC also reviewed other planning resources that could provide useful information to the plan update process. Table NW.3 lists the documents reviewed and how they were considered for incorporation in the updated plan.

Table NW.3, Review/Incorporation of Sources

Name of Document	Type	How Incorporated
2013 State of Texas Hazard Mitigation Plan	Plan	Utilized hazard definitions and hazard classification names.
Flood Insurance Study	Study	Incorporated best available hydraulic and hydrologic study results for flood hazard profile.
City of Niederwald Ordinance 120406-B Zoning	Regulations	Reviewed to seek opportunities for mitigation enhancement. Ordinance currently includes FP designation to identify floodplains. (Niederwald, TX, 2006) Reviewed for Floodplain Reference, the ordinance includes: • Floodplain Setback Lines requiring a setback, also requires proposed lots to have at least 1 acre out of the floodplain for an unsewered lot and at least 1/2 acre out of the floodplain for a sewered lot. • It also indicates that the City Engineer may require a hydrologic/ hydraulic study to be performed by the developer's engineer and approved by the City to determine the floodplain. • It requires the 100-year floodplain to be shown on the preliminary plat and plans. (Niederwald, Tx, 2000)
City of Niederwald Ordinance 12605-A Subdivision	Regulations	Reviewed to seek opportunities for mitigation enhancement. Included: • Consideration of the ordinance's "…desires to protect the creeks and waterways in the City of Niederwald and limit flooding of adjacent property." • Ordinance also establishes Critical Water Quality Zones and requires site plans consider respect to the "protection and conservation of watercourses and areas subject to flooding." (Niederwald, TX, 2006)
City of Niederwald Ordinance 71706 Site Development	Regulations	Reviewed for mitigation measures: • Adopts the standards of the City of Austin Drainage Criteria Manual. • Establishes drainage easements. • Regulation of peak runoff rates. • Design requirements to minimize erosion. • Requires runoff computations and establishes standards. • Addresses stormwater conveyance and storm sewer standards. Numerous other flood-related considerations are addressed. None are presented as actionable items for the Plan, yet do set the standard for floodplain consideration in the community development. (Niederwald, TX, 2017)
City of Niederwald Building Permit Application	Form	Reviewed for possible enhancements/improvements to document/ process. • Found necessity for clarification of floodplain review for building and need to address requirement for elevation certificates for development in the Special Flood Hazard Area.

Section 2: Risk Assessment
City of Niederwald Jurisdictional Hazards

This section contains Niederwald's hazard profiles for each natural hazard included in the Hays County HMP Update. Profiles include:

- Location - the area where the hazard is known to occur
- Previous Occurrences - a history of reported events for the hazard
- Significant Previous Occurrences (when applicable) - notable hazard events within the community
- Extent - the strength or magnitude of the hazard
- Probability - the likelihood of the hazard event occurring in the future
- Impact - the consequence or effect (or possible effect) of hazard events
- Vulnerability Summary - identification of structures, systems, populations or assets susceptible to loss or damage and how they could be impacted

Hazard descriptions and extent scales for hazard magnitudes, are found in Chapter 2, the risk assessment portion of the main plan document.

When available, data specific to Niederwald was used for hazard analysis. When no instances were reported specifically for the jurisdiction for regional hazards, County-wide data was applied.

State and national datasets were used to determine occurrence, extent, and the respective probabilities, rather than verbal testimonies, in an effort to retain data consistency. For some hazards, the National Oceanic and Atmospheric Administration (NOAA) Storm Events Database was used as the most comprehensive data available for hazards. The Storm Events Database does not always reflect the most recent totals for fatality, injury and damage amounts for previous hazard occurrences. The Previous Occurrences paragraphs identify instances in which this may occur. Verbal testimony, when available, was integrated into impact or vulnerability summaries to account for updates in this data.

2.1 Hazard Profiles

Hazards profiled within the Risk Assessment include:

- Drought - Within Chapter 2, the risk assessment portion of main plan document.
- Extreme Heat - Within Chapter 2, the risk assessment portion of main plan document.
- Severe Winter Storms - Within Chapter 2, the risk assessment portion of main plan document.
- Lightning - Within Chapter 2, the risk assessment portion of main plan document.
- Hailstorms
- Windstorms
- Tornadoes
- Expansive Soils
- Floods
- Hurricanes/Tropical Storms
- Earthquakes
- Dam/Levee Failure
- Wildfires

Hailstorms

Hailstorms: Location

The entire extent of the City of Niederwald is exposed to some degree of hail hazard. Since hail can occur at any location, hail events could be experienced anywhere within the planning area.

Hailstorms: Previous Occurrences

According to the NOAA Storm Events Database, there was 1 documented hail event listed for the City of Niederwald and 57 documented events listed for Hays County and its unincorporated jurisdictions from year 1967. While the NOAA Storm Events Database lists events since the year 1967 for the County, events were not documented per jurisdiction until 1993.

Hailstorms: Extent and Probability

The Tornado and Storm Research Organization (TORRO) created a hail extent index to measure hail called the Hailstorm Intensity Scale. According to the reported previous hail occurrences for the planning area, the maximum hail extent experienced was up to 1.75 inches, or 44.45 millimeters, in diameter This size corresponds to a TORRO Hailstorm Intensity Scale classification of “Destructive.” Refer to Chapter 2, the risk assessment portion of the main plan document, for the TORRO hail extent scale descriptions.

Based on 1 reported events in 23 years, the City of Niederwald can expect a hail event approximately once every 23 years (on average) in the future, with hail up to 1.75 inches, or 44.45 millimeters in diameter, TORRO Hailstorm Intensity Scale classification of “Destructive.”

Hailstorms: Impact

Based on the maximum hail extent experienced (44.45 millimeters), the TORRO Hailstorm Intensity Scale indicates that impact can be expected to include any of the following:

- Varying degrees of damage to vegetation and crops
- Damage to plastic structures
- Varying degrees of damage to glass
- Paint and wood scored
- Vehicle bodywork damage
- Varying degrees of roof damage
- Varying degrees of risk of injuries
- Varying degrees of aircraft damage
- Brick walls pitted

Hailstorms: Vulnerability Summary

Although the City has not experienced significant damage to public property due to hail stones, the City Hall is susceptible to hail. City Hall is currently a modular building with a metal roof. Besides a zero-turn mower, there are no other vehicles or equipment that need protecting. Future purchases of equipment is likely, as development continues. The City will consider storage options for these purchases as they are made.

Windstorms

Windstorms: Location

The entire extent of the City of Niederwald is exposed to some degree of wind hazard. Since wind can occur at any location, wind events could be experienced anywhere within the planning area.

Windstorms: Previous Occurrences

According to the NOAA Storm Events Database, there were 2 documented wind events listed for the City of Niederwald and 38 documented events listed for Hays County and its unincorporated jurisdictions since the year 1974. While the NOAA Storm Events Database lists events since 1974 for the County, events were not documented per jurisdiction until 1994.

Windstorms: Extent and Probability

Wind is measured by the Beaufort Wind Scale that relates wind speed to observed conditions on land and sea. According to the reported previous windstorm occurrences in the planning area, the maximum wind extent experienced was 43 knots (corresponding to Beaufort Wind Scale Classification: Strong Gale). Refer to Chapter 2, the risk assessment portion of the main plan document, for a description of wind extent scales.

Based on 2 reported events in 22 years, the City of Niederwald can expect a wind event of up to 43 knots approximately once every eleven years (on average) in the future (Beaufort Wind Scale Classification: Strong Gale).

Windstorms: Impact

Data available from the Texas Department of Transportation's Crash Records Information System shows that between the years of 2010 and 2017, rural Hays County experienced 5 crashes related to severe crosswind weather conditions. There were no injuries reported from these crash events. Since wind events occur on a regional scale, it is assumed that weather related crashes in the surrounding County area would be similar to those experienced in these conditions within Niederwald (see Table NW.4).

Table NW.4, Windstorms, Vehicle Accidents, Hays County

City	Fatality	Incapacitating Injury	Non-Incapacitating	Possible Injury	Crash Year	Street Name	Surface Condition	Weather Condition
Rural Hays County	0	0	0	0	2010	LIME KILN RD	Dry	Severe Crosswinds
Rural Hays County	0	0	0	0	2014	IH0035	Dry	Severe Crosswinds
Rural Hays County	0	0	0	0	2014	IH0035	Dry	Severe Crosswinds
Rural Hays County	0	0	0	0	2014	IH0035	Dry	Severe Crosswinds
Rural Hays County	0	0	0	0	2017	US0290	Wet	Severe Crosswinds

(Texas Department of Transportation, 2017)

Structures can be damaged by flying debris and impact from winds, damaging rooftops and causing other structural damage. Manufactured homes are especially vulnerable to damage that high winds can cause, to include destruction in the most extreme event conditions.

Critical infrastructure, such as utility poles and street signals, could also be disrupted, impacting all residents in the affected area. Debris on the roadway can also cause obstruction for emergency responders' ability to provide services.

Windstorms: Vulnerability Summary

Niederwald has previously experienced debris accumulation on roadways during past windstorm events. Such incidents can cause impact on the ability of public safety officials to respond to emergency calls.

Modular buildings, manufactured and mobile homes make up approximately 40% of the structures within Niederwald. Niederwald City Hall is a modular structure. These structures are more vulnerable to damage from severe winds than site-built structures. Significant structural damage to City Hall could lead to delays in getting assistance for members of the community.

Tornadoes

Tornadoes: Location

The entire extent of the City of Niederwald is exposed to some degree of tornado hazard. Since tornadoes can occur at any location, tornado events can be experienced anywhere within the planning area.

Tornadoes: Previous Occurrences

While the City of Niederwald has not had any previous occurrences reported through the NOAA Storm Events Database, if an event were to occur, the event would be similar in size and magnitude to events within the surrounding County area. Table NW.5 lists the 16 tornado events reported for Hays County and its unincorporated jurisdictions since the year 1953.

Fatality, injury and damage amounts are shown in Table NW.5, per the NOAA Storm Events Database. Community testimony indicates that these amounts do not reflect the most recent totals, however NOAA data is being used as the best source of information available for the record period.

Table NW.5, Tornado Events, Hays County

Location	Date	Type	Extent	Fatalities	Injuries	Property Damage	Crop Damage
Hays County	4/28/1953	Tornado	F3	1	5	250,000.00	0.00
Hays County	4/30/1954	Tornado	F1	0	0	250,000.00	0.00
Hays County	5/2/1958	Tornado	F1	0	0	30.00	0.00
Hays County	11/12/1961	Tornado	F2	0	0	2,500.00	0.00
Hays County	9/20/1967	Tornado	NA	0	0	250.00	0.00
Hays County	9/20/1967	Tornado	NA	0	0	30.00	0.00
Hays County	5/10/1975	Tornado	F1	0	0	25,000.00	0.00
Hays County	3/30/1976	Tornado	F2	0	0	25,000.00	0.00
Hays County	3/30/1976	Tornado	F2	0	1	250,000.00	0.00
Hays County	8/10/1980	Tornado	F2	0	0	25,000,000.00	0.00
Hays County	4/22/1985	Tornado	F2	0	0	250,000.00	0.00
Hays County	8/22/1991	Tornado	F1	0	0	2,500.00	0.00
Countywide	5/13/1994	Tornado	F0	0	0	500.00	500.00
Henly	11/15/2001	Tornado	F0	0	1	50,000.00	0.00
Driftwood	10/8/2002	Tornado	F0	0	0	70,000.00	0.00
Mt. Gainor	5/23/2015	Tornado	EF0	0	0	0.00	0.00
Total				1	7	$26,175,810.00	$500.00

(National Oceanic and Atmospheric Administration Storm Event Database, 2016)

Tornadoes: Extent and Probability

Tornadoes are measured by severity on the Fujita and Enhanced Fujita Scales, with a range from 0-6. According to the reported previous tornado occurrences in the planning area, the maximum tornado extent experienced was a category F3. Refer to Chapter 2, the risk assessment portion of the main plan document for a description of tornado extent scales, Fujita (F) Scale and Operational Enhanced Fujita (EF) Scale.

Based on 16 reported events in 63 years, a tornado event occurs approximately every 4 years (on average) in Hays County. Since tornado events can happen anywhere throughout the HMP planning area, the City

of Niederwald's future probability is assumed to be similar to the surrounding County area. The City can expect a tornado event approximately once every 4 years (on average) in the future, with up to an F3 magnitude.

Tornadoes: Impact

The City is comprised of approximately 40% factory-built housing to include modular, manufactured and mobile homes. Due to their permanent attachment to a chassis and transportability, these structures are more susceptible from impact from the extreme conditions caused by a tornado event.

There is not specific event data available for the City of Niederwald, from which impacts would be calculated. However, it can be assumed that impacts would be similar to those that the surrounding County area experiences.

Based on Hays County's past experience of tornadoes between F0 and F3 levels, if similar events were to happen in the future in the City, the type of impacts that the planning area could expect associated with those magnitudes would include (from least to greatest severity):

- Light Damage - Broken branches; shallow rooted trees pushed over; some chimney damage.
- Moderate Damage - Surface damage to roofs; mobile homes pushed off foundation; moving vehicles pushed off the road.
- Significant Damage - Frame houses have roof torn off; mobile homes completely destroyed; train boxcars overturned; large trees snapped or uprooted; smaller debris turned into missiles.
- Severe Damage - Roofs completely torn off well-constructed buildings, along with some walls; majority of trees uprooted, trains overturned, vehicles lifted off the ground.
  (Tornado Facts, 2016)

Tornadoes: Vulnerability Summary

Niederwald has previously experienced debris accumulation on roadways during past windstorm events indicating vulnerability as extreme winds and debris accompany tornado events. Such incidents can cause impact on the ability of public safety officials to respond to emergency calls.

Additionally, Niederwald City Hall is a modular structure. These structures are more vulnerable to severe tornado damage than site-built structures. Significant structural damage to City Hall could lead to delays in getting assistance for members of the community.

There are no outdoor warning sirens, nor are there designated structures that can house residents that wish to seek shelter from the onset of a tornado. In addition, there is not a locally-run system or tool that can be utilized to contact residents with emergency notifications or information. Coordination can be made to use County reverse-9-1-1 and other communication resources available.

Expansive Soils

Expansive Soils: Location

Figure 2.3 within Chapter 2 (the risk assessment portion of the main plan document) shows the location of expansive soil areas for the City. The entire extent of the jurisdiction is classified as having over 50% of the area underlain with soils with abundant clays of high swelling potential, therefore all of the jurisdiction is equally at risk.

Expansive Soils: Previous Occurrences

There was no documentation of past site-specific past events of structural damage due to expansive soils from State or national datasets found. However, community testimony indicates that the instances of expansive soils are frequent and that the effects are evident throughout the community.

Expansive Soils: Extent and Probability

Based on the local community testimony on the frequency of expansive soil impacts, the probability of events occurring within the planning area is high (10 - 20 occurrences in the next 10 years affecting up to 20 structures).

Expansive Soils: Impact

The large areas of expansive soils within the Niederwald City Limits puts the structures and infrastructure within the community at risk to the damage caused by the hazard. The impact includes the cracking of foundations, the shifting of homes and the potential structural damage to modular, manufactured and mobile home structures.

Expansive Soils: Vulnerability Summary

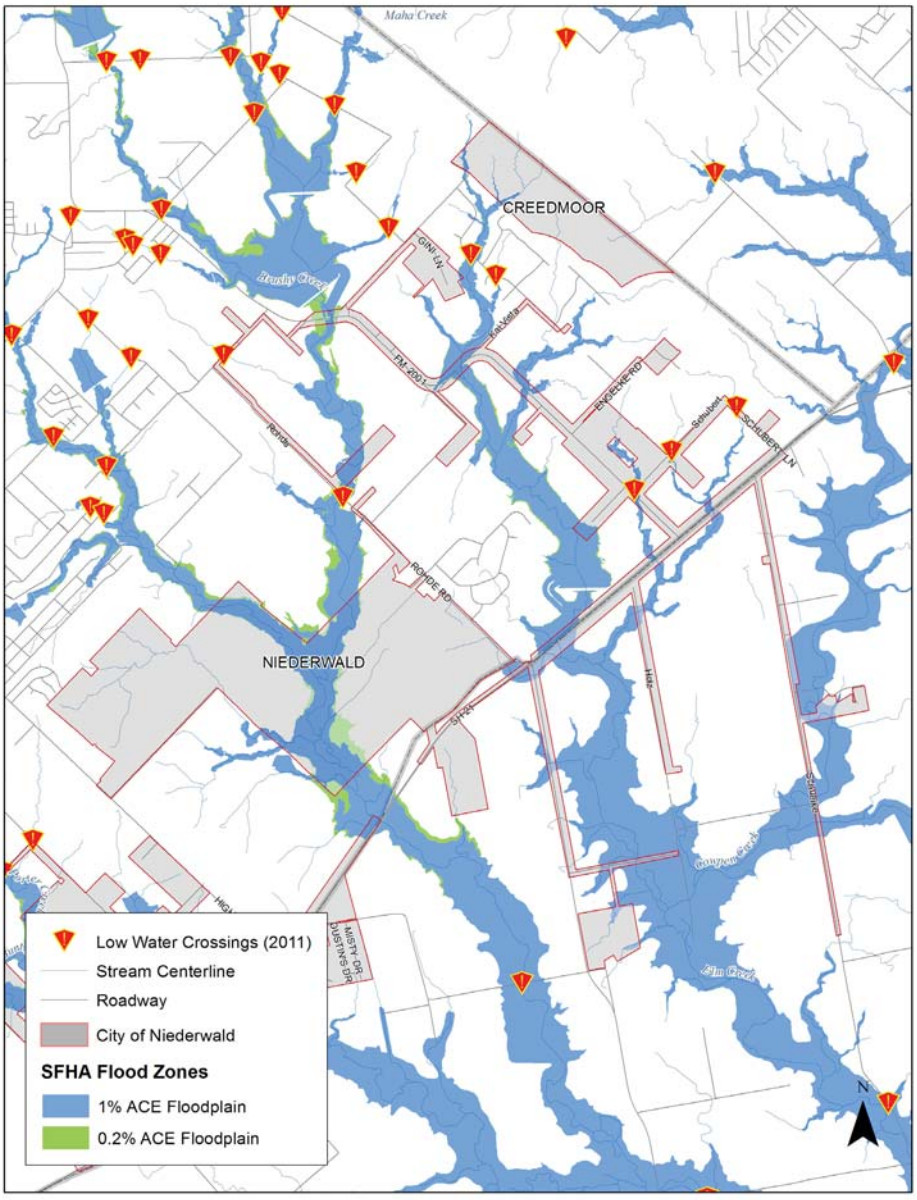
The large amount of development expected in Niederwald, estimated to be a 400% increase within the next 5 years, necessitates the assurance of responsible development within the planning area, so as to reduce the amount of impact to the structures that are built within expansive soils areas. All new homes placed or built in the area are vulnerable to the effects of expansive soils. The City promotes mitigation through requiring foundation designs that are based on geotechnical survey data.

Floods

Floods: Location

The location of low water crossings, as well as the 1% (100-year) and 0.2% (500-year) Annual Chance Event (ACE) floodplains for the City of Niederwald are shown in Figure NW.3. This figure represents the areas most affected by riverine flooding and is based upon newly developed hydrologic and hydraulic analysis. The new analysis is considered the best information available to date. Table NW.6 provides the total acreage in the jurisdiction that is located in the 1% and 0.2% floodplains.

Figure NW.3, Special Flood Hazard Areas and Low Water Crossings, City of Niederwald



(Texas Natural Resources Information System, 2011)

Table NW.6, City of Niederwald Floodplain Acreage

Jurisdiction	100yr (1%) Floodplain Acres (Includes Floodway)	500yr (0.2%) Floodplain Acres (Includes 100yr)
City of Niederwald	393	449

Floods: Previous Occurrences

According to the NOAA Storm Events Database, there was 1 documented flood event listed for the City of Niederwald and 69 documented events listed for Hays County since the year 1997. While NOAA Storm Events Database lists events since 1997 for the County, events were not documented per jurisdiction until 2004. The flood event reported for the City of Niederwald is shown in Table NW.7.

Fatality, injury and damage amounts are shown in Table NW.7, per the NOAA Storm Events Database. Community testimony indicates that these amounts do not reflect the most recent totals, however NOAA data is being used as the best source of information available for the record period.

Table NW.7, Flood Events, City of Niederwald

Location	Date	Type	Fatalities	Injuries	Property Damage	Crop Damage
Niederwald	2/4/2012	Flash Flood	0	0	0.00	0.00

(National Oceanic and Atmospheric Administration Storm Event Database, 2016)

Floods: Extent

Flood extent is described though a combination of ground elevation, river heights, 100-year Water Surface Elevations (WSE's) and HAZUS depth grids. An example of flooding within the jurisdiction is the area along Brushy Creek downstream of its confluence with a tributary, in the southern part of the jurisdiction. This area is exposed to some of the greatest flood extents. This location has an approximate overbank ground elevation of 548 feet with an intersecting 100-year WSE of 552 feet. For a 100-year event, water depth of approximately 4 feet can be expected within this area. A further analysis of Brushy Creek is described below.

With Brushy Creek having an approximate in-channel elevation of 537 feet (per Light Detection and Ranging [LiDAR] data) and an intersecting 100-year WSE of approximately of 552 feet, flood depths would be up to 15 feet.

Floods: Probability

Probability has been calculated on the basis of NOAA reported events, as a standard, consistent calculation method for all hazards profiled with the Hays County HMP. Based on 1 reported event in 12 years, the City of Niederwald can expect a flood event approximately once every 12 years on average in the future with flood water depths up to 15 feet.

Floods: Impact

The following describes the inventory counts and building replacement values for the jurisdictional area.

Niederwald Building Counts			
Residential	Commercial	Other	Total
134	7	2	143

Niederwald Building Replacement Value		
Building ($)	Content ($)	Total ($)
23,931,397	13,751,357	37,682,753

A Probabilistic 100-year Return Period HAZUS-MH 3.2 analysis was run on the City of Niederwald. HAZUS results are calculated to census blocks. This analysis utilized the best available LiDAR (COA 2012 and CAPCOG 2008) and depth grids. These blocks where then intersected with the City to run a weighted area analysis to get jurisdictional results. The following describes results from the 100-year Return (1% Annual Chance Event) weighted area analysis.

HAZUS-MH Results

General Building Stock Damage

HAZUS estimates that about 2 buildings will be at least moderately damaged in Niederwald. "At least moderately damaged" is defined by HAZUS as greater than 10% damage to a building. For this scenario, only residential buildings were at least moderately damaged.

Residential Buildings	Commercial Buildings	Other Buildings	Total Buildings
2	0	0	0

Building Related Losses

Exposed Value is the total building and content values for structures within the community. The exposed value for the community is $37,682,753. The total building related losses were $41,000 for this scenario. This represents 0.10% of the total replacement value of the community. Loss values are divided into building and content loss dollars.

Building Loss ($)	Content Loss ($)	Total Loss ($)
28,000	13,000	41,000

Essential Facility Damage

HAZUS does not estimate any critical facilities or infrastructure interruption to be out of service for more than 1 day. The model estimates that 100% of community hospital beds would be available for use by patients already in the hospital and for those injured by an event.

Debris Generation

HAZUS estimates the amount of debris that will be generated in this scenario. The model estimates that a total of 1 ton of debris will be generated. If the building debris tonnage is converted to an estimated number of truckloads, it will require 1 truckload (with 1 to 25 tons per truck) to remove the building debris generated in this scenario.

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 the number of people displaced that will require accommodations in temporary public shelters. The model estimates 1 person will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 0 people will seek temporary shelter in public shelters.

Floods: Vulnerability Summary

As many of the homes in the community were built or placed before adoption of the Flood Damage Prevention Ordinance, there are many Pre-FIRM (structures built before the adoption of FEMA Flood Insurance Rate Maps) homes that are more vulnerable than those that were built within the standards of the ordinance. According to community verbal testimony, minimal flood damage was experienced to City property in 2015 when the only convenience store in the community experienced flooding. Impacts to this store affect not only community access to fuel and groceries, but also decreases the tax revenue earned for the period of closure.

Additionally, verbal testimony indicated that flooding has impacted the State-owned Highway 21 bridge, which was washed out as a result. There was an alternate route that members of the community and those passing through could utilize, but the routing through a residential area was inconvenient. The detouring of traffic through this area was also harmful to the residential streets due to large trucks.

National Flood Insurance Program Repetitive Loss (RL)

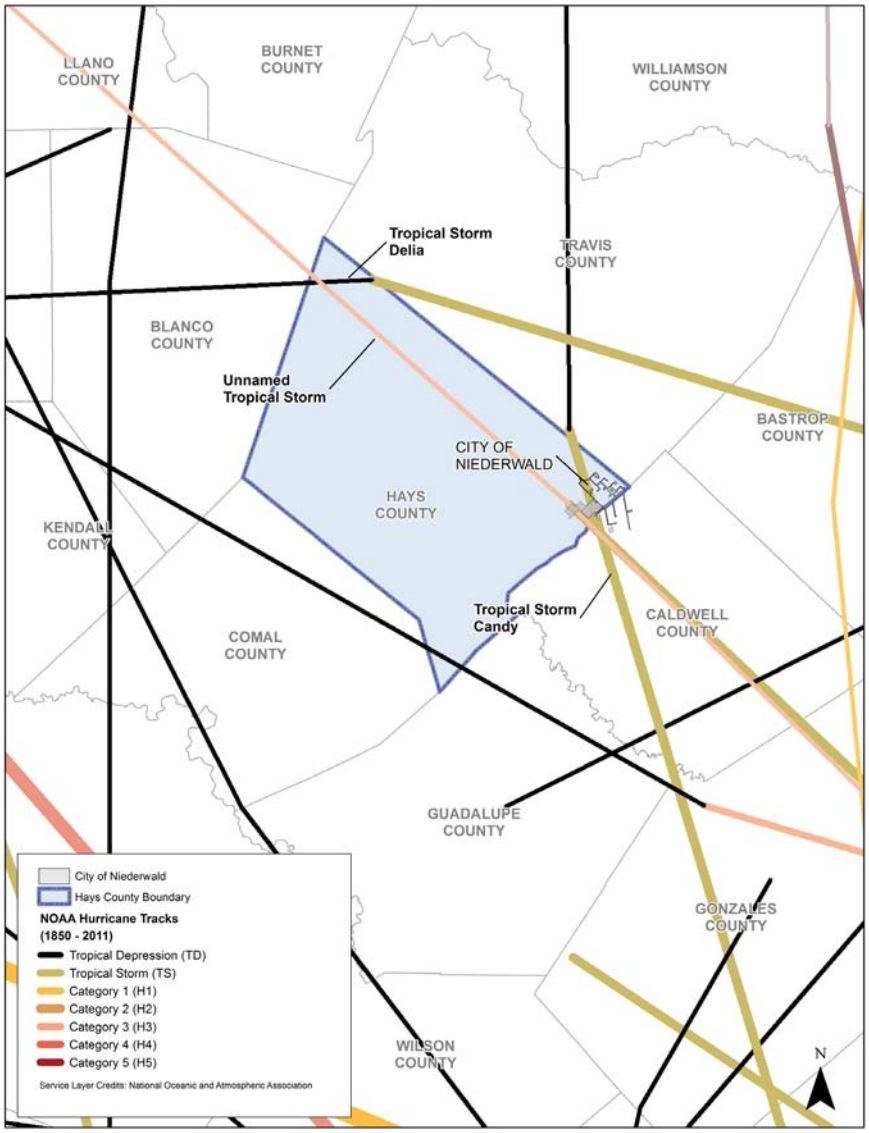
The City of Niederwald is a current participant in the National Flood Insurance Program (NFIP). As of September of 2016, the City does not have any listed RL or SRL properties according to FEMA RL/SRL data.

Hurricanes/Tropical Storms

Hurricanes/Tropical Storms: Location

Due to the regional nature of a hurricane or tropical storm event, the entire extent of the City of Niederwald is equally exposed to a hurricane or tropical storm. Figure NW.4 illustrates the location of the planning area with historical hurricane and tropical storm paths documented by NOAA's Hurricane Tracker from 1850 to 2011.

Figure NW.4, Historical Hurricane/Tropical Storm Paths, City of Niederwald



(National Oceanic and Atmospheric Administration, 2016)

Hurricanes/Tropical Storms: Previous Occurrences

The following events are listed from NOAA Storm Events Database for Tropical Storm Hermine and NOAA Hurricane Tracker for all other events. By the time most hurricanes reach the County, they are tropical storms, depressions or thunderstorms. Because hurricane and tropical storm events occur on a regional scale, all events listed for Hays County have been included, as they would impact the City of Niederwald.

July 13 to July 22, 1909 – An unnamed storm made landfall near Freeport, as a Category 3 Hurricane. This storm impacted Hays County and participating communities as a tropical depression with wind speeds up to 30 knots. No significant damages, injuries, or fatalities were reported for the City.

June 22 to June 26, 1968 – Tropical Storm Candy made landfall near Port Aransas. This storm impacted Hays County and participating communities as a tropical storm with wind speeds slowing to 30 knots as a tropical depression just after leaving the County. No significant damages, injuries, or fatalities were reported for the jurisdiction.

September 1 to September 7, 1973 – Tropical Storm Delia made landfall near the border of Brazoria and Matagorda Counties. This storm impacted Hays County and participating communities as a tropical storm with wind speeds slowing to 30 knots as a tropical depression just after leaving the County. No significant damages, injuries, or fatalities were reported for the planning area.

September 6 to September 8, 2010 – According to the NOAA Storm Events Database, Tropical Storm Hermine made landfall near the Texas/Mexico border on the night of September 6. South Central Texas was hit very hard with widespread rains of 8 to 12 inches across much of the I-35 corridor from Austin down to San Antonio.

Hurricanes/Tropical Storms: Extent and Probability

The Saffir-Simpson Scale measures pressure, wind speed, and storm surge in 5 categories. According to the reported previous hurricane occurrences in the jurisdiction, the maximum hurricane extent experienced was categorized as a tropical storm. Refer to Chapter 2, the risk assessment portion of the main plan document, for a description of storm extents.

Based on 4 reported events in 107 years, a hurricane or tropical storm event occurs approximately every 27 years on average in Hays County. Since hurricane and tropical storm events can happen anywhere throughout the HMP update area, the City of Niederwald's future probability is assumed to be similar to the surrounding County areas. In the future, the City can expect an event approximately once every 27 years on average, of up to a magnitude of a Tropical Storm at a 100-yr Max Wind Speed of 75 mph based on historical extents and HAZUS analysis.

Hurricanes/Tropical Storms: Impact

A Probabilistic 100-year Return Period HAZUS-MH 3.2 analysis was run for the City of Niederwald. The following describes the results of this analysis.

HAZUS-MH Results

General Building Stock Damage

The total property damage losses were $156,245. The majority of damage can be expected to impact residential areas (98%). The remaining damages (2%) are for commercial, industrial, agricultural and religious buildings. While some building damage is experienced, it is estimated that no buildings will be completely destroyed or experience severe damage. Exposed Value is the total building and content values for structures within the community. Loss values are divided separately for building and content loss in dollars.

Exposed Value ($) (Building + Content)	Building Loss ($)	Content Loss ($)	Total Loss ($)
37,682,753	156,245	66	156,311

Essential Facility Damage

HAZUS does not estimate any critical facilities or infrastructure to be interrupted for more than 1 day on the day of the event. Additionally, the model estimates that 100% of hospital beds would be available for use by patients already in the hospital and for those injured by the hurricane.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the hurricane at a total of 13 tons. Of the total amount, brick/wood comprises 100% of the total. If the building debris tonnage is converted to an estimated number of truckloads, it will require 1 truckload (with 1 to 25 tons per truck) to remove the building debris generated by the hurricane.

Shelter Requirements

HAZUS estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of people displaced that will require accommodations in temporary public shelters. The model estimates no households to be displaced due to the hurricane. While there is an estimation of over $156,000 in property damages expected, it is aforementioned that "no buildings would be completely destroyed or experience severe damage." Residents would likely remain in their homes as damages were repaired, therefore no temporary shelter is needed.

Hurricanes/Tropical Storms: Vulnerability Summary

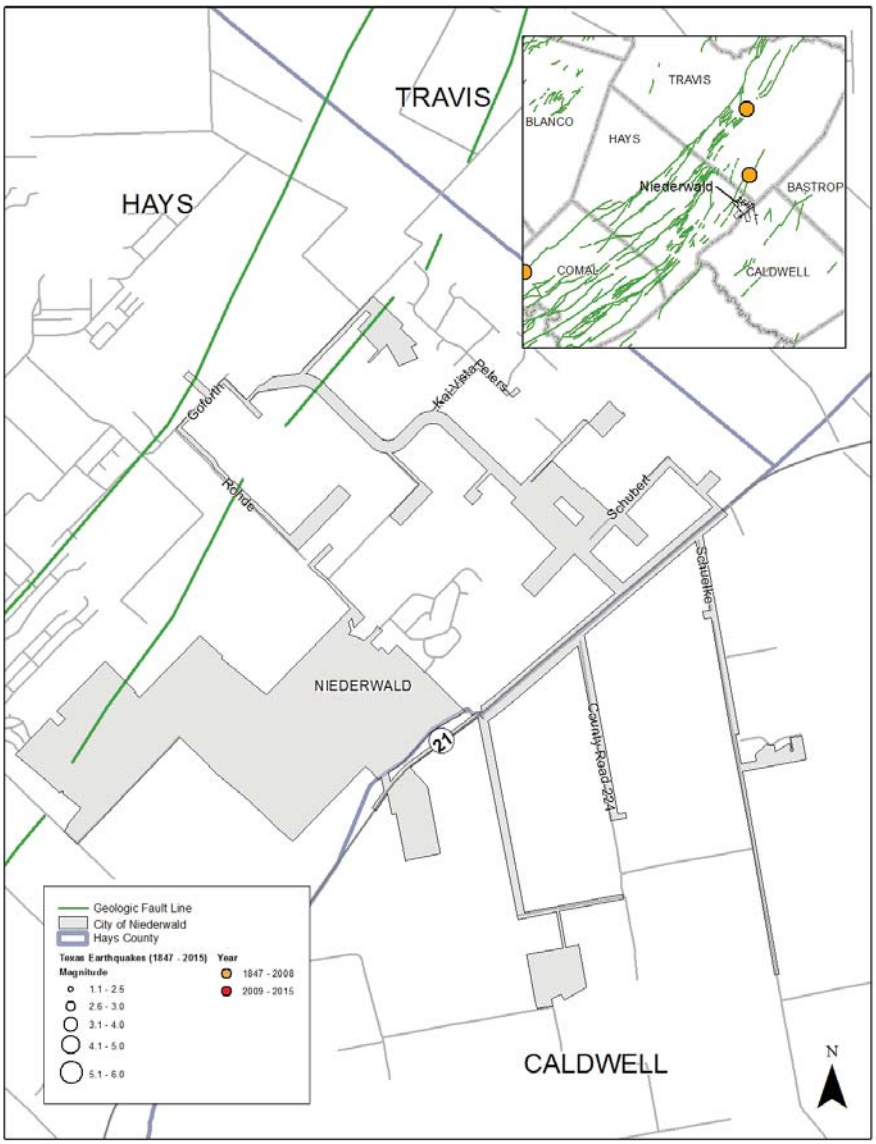
Similar to the impacts of windstorms, hailstorms, and lightning, Niederwald can expect to be impacted with debris and possible interruptions of critical infrastructure if the event is a stronger magnitude than those previously experienced by the City. In addition, the community's proximity to IH 35 and State Highway 21 could lead to traffic delays caused by major coastal evacuation efforts.

Earthquakes

Earthquakes: Location

Locations within proximity to fault lines are typically the areas most at risk for earthquakes. Figure NW.5 shows USGS documented fault lines and the locations of earthquakes from 1847 to 2015 in relation to the City of Niederwald.

Figure NW.5, Texas Earthquakes, 1847 – 2015, City of Niederwald



(USGS Earthquake Hazard Program, 2015)

Earthquakes: Previous Occurrences

According to USGS 1847 to 2015 data, there have been no documented earthquake events for the City of Niederwald, as illustrated in Figure NW.5.

Earthquakes: Extent and Probability

Earthquakes are measured by Peak Ground Acceleration (PGA). The HAZUS Max PGA for the planning area is 1.59% (see Earthquakes: Impact Section for a description of the HAZUS Analysis). This corresponds

to the Modified Mercalli Scale Category IV, with light perceived shaking and no potential structure damage. HAZUS measures PGA on a Census Tract Level. Cities within more than 1 census tract were assigned the highest PGA level to reflect the maximum possible extent. Refer to Chapter 2 for extent scale descriptions (the risk assessment portion of the main plan document).

As there have been no recorded previous occurrences of earthquakes for the City of Niederwald and the PGA is less than 2% for the area, the probability of an earthquake in the City in the future is low (0 - 1 occurrences in the next 10 years, at up to a 500yr PGA of 1.59%).

Earthquakes: Impact

The FEMA How-To Guidance, Understanding Your Risks (FEMA 386-2, page 1-7), suggests the earthquake hazard should be profiled if the PGA is greater than 3%g, where PGA is measured in the acceleration of gravity (g). The City's PGA is less than 3%g (0.03) and there have been no recorded earthquakes in or near the jurisdiction. Therefore, only a minimum level-1 HAZUS analysis was profiled using the 500-year probability event scenario. The HAZUS analysis produced a PGA of 1.59%. HAZUS scenario would produce $0 in building damages (Residential, Commercial, Agriculture, Religious and Government) from an event. Critical facilities and infrastructure would not experience any loss of service. There would be no critical facilities or infrastructure that would experience moderate to complete damage. No debris would be generated from this event and no people or households would require temporary housing. There would be no moderate, extensive or completely damaged buildings by this event. HAZUS estimates no residents are expected to be displaced from their homes or will require accommodations in temporary public shelters due to the simulated earthquake. Additionally, there would be no causalities or fatalities from this event.

Earthquakes: Vulnerability Summary

While the probability of an earthquake in Niederwald is low, with no significant prior events on file, there are fault lines within the community that could cause impact if there were to be an increase in seismic activity in the area. There are 3 fault lines located within the jurisdiction according to USGS data. Niederwald could expect to be impacted with debris and possible utility interruptions if an event were to occur in this unlikely and unprecedented scenario. If an event were to incapacitate a roadway, emergency responders would be hindered from responding, thus leaving the residents who were affected at risk. The following local roadways are crossed by the USGS fault lines displayed on Figure NW.5: FM 2001, Rhode Road, and Gini Lane.

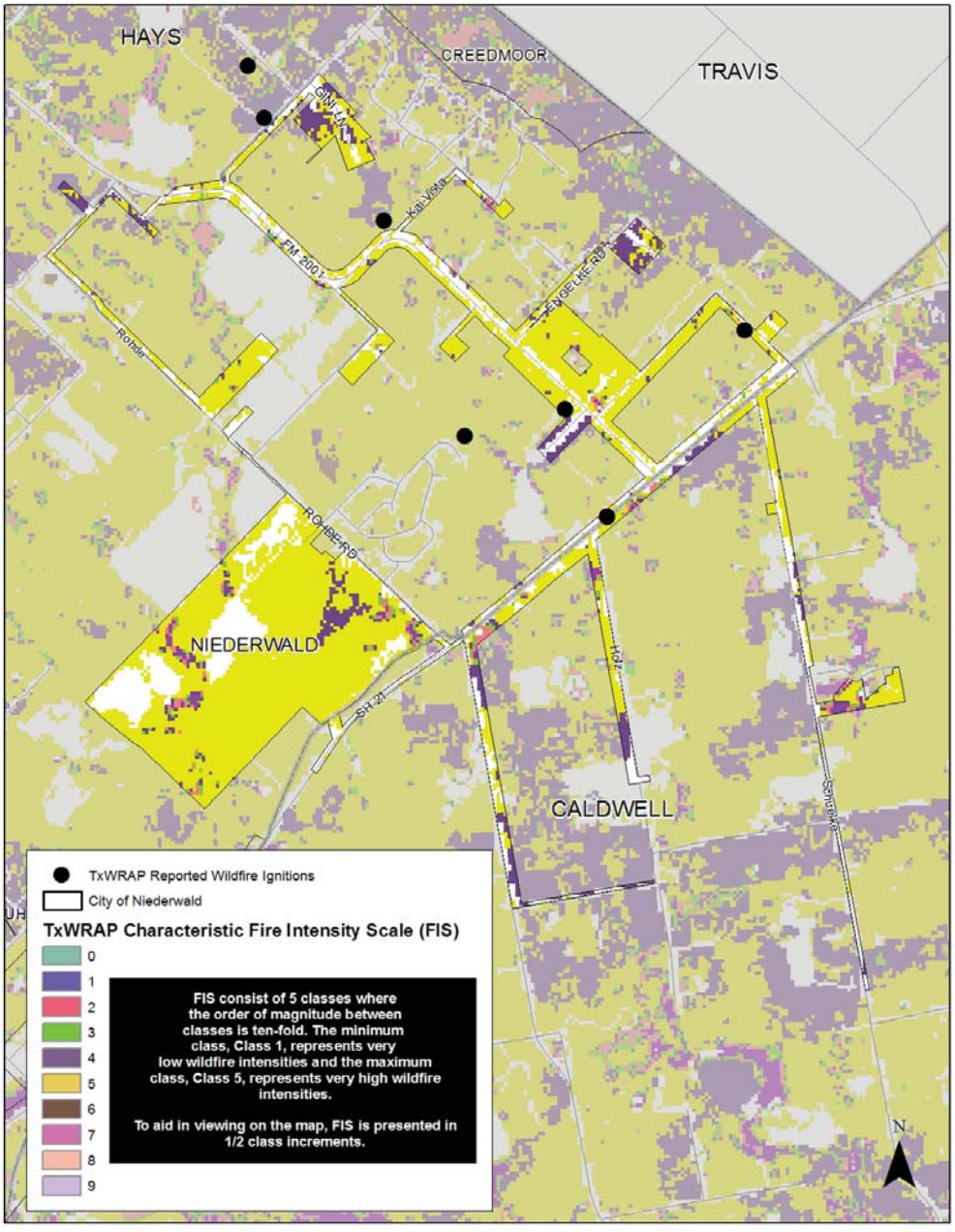
Page 21, 22, and 23 Dam/Levee Failure have been redacted from this copy of the plan.

Wildfires

Wildfires: Location

Wildfires can be ignited from a variety of sources including lightning or human activity such as campfires, smoking, arson, or equipment use. The Texas A&M Forest Service's Texas Wildfire Risk Assessment Portal (TxWRAP) can be used to help communities understand their wildfire risk. Figure NW.7 below shows the location of TxWRAP's documented wildfire occurrences with Fire Intensity Scale (FIS) classifications within the City of Niederwald. TxWRAP identifies FIS areas as those where wildfire fuels and associated potential dangerous fire behavior exist, based on a weighted average of 4 percentile weather categories.

Figure NW.7, Fire Intensity Scale (FIS) and Reported Wildfire Ignitions, City of Niederwald



(Texas A&M Forest Service, 2016)

Wildfires: Previous Occurrences

Table NW.9 shows the reported wildfire ignitions within the City of Niederwald, according to TxWRAP and USGS Federal Fire Occurrence data from the years 1980 to 2015.

Table NW.9, Wildfire Ignitions, City of Niederwald

FPA ID	Date	Fire Size (Acres)
SFO-TX01430601-35766411	8/2/2001	50
SFO-TX02240706-30061	2/12/2006	75
SFO-TX02240706-26597	2/12/2006	110

Wildfires: Extent and Probability

Table NW.10 lists the Fire Intensity Acreage for the City, according to the Texas A&M Forest Service TxWRAP Community Summary Report. Refer to Chapter 2, the risk assessment portion of the main plan document, for a description of the FIS.

Table NW.10, TxWRAP Fire Intensity Acreage, City of Niederwald

Class	Acres	Percent
Non-Burnable	561	27.20%
1 (Very Low)	30	1.40%
1.5	38	1.80%
2 (Low)	6	0.30%
2.5	140	6.80%
3 (Moderate)	1,282	62.10%
3.5	6	0.30%
4 (High)	0	0.00%
4.5	0	0.00%
5 (Very High)	0	0.00%
Total	685	100.0 %

Based on 3 reported events in 35 years, the City of Niederwald's future probability for a wildfire event is approximately once every 11 to 12 years (on average), with up to a potential fire intensity of 3.5, or "Moderate" classification on the TxWRAP FIS.

Wildfires: Impact

Impact on the community can be measured using TxWRAP housing density levels within the WUI. Areas with a higher housing and population density would be affected to a greater extent than rural areas, especially in areas near burnable fuels. In the event of a wildfire in high density areas of population, residential structures would be damaged or destroyed, critical infrastructure such as water, sewer and electrical services would be damaged and interrupted and residents would experience injury or loss of life. Table NW.11 lists the population, percent of total population, WUI acreage and percent of WUI acreage for the City of Niederwald, according to the Texas A&M Forest Service TxWRAP Community Summary Report.

Table NW.11, WUI Acreage, City of Niederwald

Housing Density		WUI Population	Percent of WUI Population	WUI Acres	Percent of WUI Acres
	LT 1hs/40ac	3	0.5 %	202	17.7 %
	1hs/40ac to 1hs/20ac	11	1.7 %	121	10.6 %
	1hs/20ac to 1hs/10ac	81	12.5 %	217	19.1 %
	1hs/10ac to 1hs/5ac	231	35.5 %	330	29.0 %
	1hs/5ac to 1hs/2ac	280	43.1 %	254	22.4 %
	1hs/2ac to 3hs/1ac	44	6.8 %	13	1.2 %
	GT 3hs/1ac	0	0.0 %	0	0.0 %
Total		650	100.0 %	1,136	100.0 %

Wildfires: Vulnerability Summary

According to community testimony, most of the fires that have been experienced recently within the Niederwald City limits have been grass fires that have not impacted life or structures. However, there is a risk resulting from the lack of trash service in the community. While contracts are being pursued, trash is typically burned. The burning within the City limits increases the risk of fires that could spread out of control and impact parts of the community that have large amounts of brush. The intermingling of residences with undeveloped tracts of land increases this risk. There is a limited number of hydrants with a limited volume of water available for fire suppression. Hays/Caldwell ESD #1 transports water to each fire event within Niederwald and supplements their efforts with existing hydrants, and groundwater.

2.2 Risk Ranking Result

On January 12, 2017, members of the City of Niederwald MPC completed a questionnaire as part of the Hays County Hazard Mitigation Plan Update: Risk Assessment. The questions covered the risk associated with the hazards that affect each community based on the level of concern over each profiled hazard, the hazards' impact on health and safety, as well as impact to property and business continuity. The answers from this questionnaire were combined with public survey results on perception of risk. The values from both sources were analyzed using the Halff Risk Ranking Tool (details regarding the risk ranking tool are in Chapter 2, the risk assessment portion of the main plan document). The results provided a quantified ranking of risk, with values ranging from 0 to 100. The results for Niederwald are shown below (hazard values shown from highest risk to lowest):

Ranking Order	Hazard	Risk Ranking Value
1	Floods	81.6 (ranking tied for #1)
2	Wildfire	81.6 (ranking tied for #1)
3	Expansive Soils	81.6 (ranking tied for #1)
4	Drought	77.8
5	Extreme Heat	75.0
6	Tornadoes	58.1
7	Dam/Levee Failure	44.1
8	Sever Winter Storms	37.5
9	Hail Storms	33.8 (ranking tied for #9)
10	Wind Storms	33.8 (ranking tied for #9)
11	Lightning	33.8 (ranking tied for #9)
12	Earthquakes	30.0 (ranking tied for #12)
13	Hurricanes/Tropical Storms	30.0 (ranking tied for #12)
-	Land Subsidence	Not Profiled

Section 3: Mitigation Strategy

This section examines the community's ability to perform mitigation (a review of existing capabilities is shown in Table NW.12) and identifies specific mitigation actions to address vulnerabilities for each hazard profiled in the Hays County HMP Update. The mitigation strategy is the application of actions into an approach for performing structural and non-structural mitigation efforts within the jurisdiction. Actions are also prioritized and considered for incorporation into other community programs, regulations, projects or plans.

Completed and canceled actions are also included in a separate section for future reference.

3.1 Existing Capabilities

Table NW.12, Existing Capabilities

Capability Name	Capability Type	Ability to Expand/Improve
Mayor/Emergency Management Coordinator	Elected Official	Political support and funding for mitigation actions/ Management of City-level HMP updates. Could attend mitigation planning class offered by TDEM.
City Administrator	City Staff	Support for implementation of mitigation actions. Could attend mitigation planning class offered by TDEM.
Engineer/Floodplain Administrator	Consultant	Expertise in structural mitigation projects and compliance with Flood Damage Prevention Ordinance/Responsibility for continued participation in the NFIP. Attend advanced floodplain management training.
Sales Tax	Funding	Provides potential funding for hazard mitigation items.
Property Tax		
Permitting and Licensing Fees		
Chapter 211 of the Local Government Code: Zoning	Authority	State-level code that authorizes the City to regulate zoning.
Chapter 213 of the Local Government Code: Municipal Comprehensive Plans		State-level code that authorizes the City to adopt a comprehensive plan for the long-range development of the City.
Chapter 214 of the Local Government Code		State-level code that authorizes the City to have regulatory authority as it related to building code (such as structural integrity and plumbing).
City of Niederwald Ordinance 120406-B Zoning	Regulations	Regulates zoning in the City limits. (Niederwald, TX, 2006)
City of Niederwald Ordinance 12605-A Subdivision		Regulations for subdivisions in City Limits. (Niederwald, TX, 2000)
City of Niederwald Ordinance 71706 Site Development		Site development standards for residential and non-residential development. (Niederwald, TX, 2006)
City of Niederwald Engineering Design Standards		Adopted standards for design of structures for community. (Niederwald, TX, 2017)
City of Niederwald Budget	Funding	Can be reviewed for funding opportunities for community.

3.2 National Flood Insurance Program Participation

The City of Niederwald participates in the National Flood Insurance Program (NFIP). They do not have a Certified Floodplain Manager on staff, however, they contract out their floodplain management program function to a Professional Engineer that is trained in the administration of the program. The City has adopted the Federal and State standards within their Flood Damage Prevention Ordinance. The City will continue to explore options for higher standards and consider participation in the Community Rating System. The City of Niederwald has a total of 2 NFIP policies in force, as of January 2017, for a total of $313,300 in total insurance coverage.

3.3 Mitigation Goals

The plan-level Mitigation Goals can be found in Chapter 3, The Mitigation Strategy portion of the Hays County HMP Update. These apply to each community and were mutually decided upon as the guiding goals for the development of actions in each planning area.

3.4 Mitigation Actions

***E= Actions reducing risk to existing buildings and infrastructure**
***F= Actions reducing risk to new development and redevelopment**

Number/Title	Hazard	Item Description	Implementation Agency
1 Flood Insurance Information Campaign (previously action 8 in 2011 plan, modified)	Floods	Promote the flood insurance program to lessen the number of structures uninsured from flood loss by providing citizens access to brochures about the NFIP at the local City Hall and links to resources on website.	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services and free NFIP materials from FEMA publication warehouse	3 months	Not started	N/A

Cost and Benefit Considerations
This project would indirectly benefit residents who need information about the hazard at little cost.

Number/Title	Hazard	Item Description	Implementation Agency
2 Residential Development Permit Enhancement for Flood Mitigation (previously action 2 in 2011 plan, modified)	Floods	Improve residential building permit to clarify floodplain information and reference required elevation certificates for development in Special Flood Hazard Area.	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ -in-kind services	3 months	In progress	E/F

Cost and Benefit Considerations
This project would be a low-cost method of ensuring that new development and substantial improvements are done with less risk for flood damage.

Number/Title	Hazard	Item Description	Implementation Agency
3 Floodplain Management Courses to receive certification (previously action 3 in 2011 plan, modified)	Floods	Send member of the staff or elected official to training in order to become a Certified Floodplain Manager.	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
$250/Existing staff/ in-kind services, cost of accommodations for FEMA E-273 Floodplain Course and CFM testing session	3 months	Not started	E/F

Cost and Benefit Considerations
If attending the course at the Emergency Management Institute, the cost of the course would be very low. A benefit of continuing education for the Floodplain Administrator would be that it would help both new and existing residents through guidance on how to mitigate flood damages to development.

Number/Title	Hazard	Item Description	Implementation Agency
4 Emergency Communications-Weather Radio Installation at Public Buildings and Phone Tree Development (previously action 4 in 2011 plan)	Extreme Heat, Severe Winter Storms, Lightning, Hailstorms, Windstorms, Tornadoes, Floods, Hurricanes/ Tropical Storms, Earthquakes, Dam/Levee Failure, Wildfires	Installation of permanent weather radio and weather station at City of Niederwald structures, with back-up power source. Create phone tree with volunteer responsibilities for non-critical hazard call down messaging, such as drought alerts.	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
$500/Existing staff/ in-kind services	6 months	Not started	N/A

Cost and Benefit Considerations

This low cost activity provides the ability for the local community to make rapid contact to provide their citizens messaging when hazard conditions are dangerous. This would benefit all citizens in the community.

Number/Title	Hazard	Item Description	Implementation Agency
5 StormReady Designation for Niederwald (previously action 6 in 2011 plan)	Windstorm, Hailstorm, Severe Winter Storms, Lightning, Hurricanes/ Tropical Storms, Tornadoes, Floods	Application preparation and submission for StormReady designation from the National Weather Service that attests to the community's level of preparedness for severe winter.	Niederwald Emergency Planning

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services	12 months	Delayed	N/A

Cost and Benefit Considerations

This free application would benefit all members of the community in increasing the preparedness of the local government.

Number/Title	Hazard	Item Description	Implementation Agency
6 Increase Public Awareness of Hazard Mitigation (previously action 9 in 2011 plan)	Drought, Extreme Heat, Severe Winter Storms, Lightning, Hailstorms, Windstorms, Tornadoes, Expansive Soils, Floods, Hurricanes/Tropical Storms, Earthquakes, Dam/Levee Failure, Wildfires	Creating a resource page on City website to promote information about the hazards that exist in the community and how to take mitigation actions at the individual level and in coordination with Special Utility District information on water conservation. Provide link to Haysinformed on local page.	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services	6 months	Ongoing	N/A

Cost and Benefit Considerations

This free enhancement to the City's existing website would benefit all with internet access at little to no cost, except the staff resources required to do so.

Number/Title	Hazard	Item Description	Implementation Agency
7 Adopt Firewise hazard information from Hays County for mitigation activities (previously action 10 from 2011 plan, modified)	Wildfire	Formal adoption of Hays County Firewise maps and data for the purposes of planning activities to mitigate against wildfire risk.	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services	6 months	Not started	F

Cost and Benefit Considerations
Building upon an existing and funded County level project, the community can take action to adopt Wildfire maps and data at no cost.

Number/Title	Hazard	Item Description	Implementation Agency
8 Adding Water Conservation to Ordinances/institution of Drought Contingency Plan as part of operations (previously actions 11 and 12 in 2011 plan, modified)	Drought	Adding drought conservation levels to ordinance to increase resiliency to drought conditions and also provide a method for monitoring drought trends on a local, regional and State-level through a drought contingency plan.	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services	6 months	Not started	E/F

Cost and Benefit Considerations
With the sole cost of writing and adopting new ordinance language and publication of the Drought Monitor on the website, all citizens in the City would benefit from actions that would reduce the impact of drought.

Number/Title	Hazard	Item Description	Implementation Agency
9 Energy Prioritization Collaboration with Electric Cooperative (previously 13 in 2011 plan, modified)	Extreme Heat, Severe Winter Storms, Lightning, Windstorms, Tornadoes, Hurricanes/ Tropical Storms	Working with electricity providers to create a citizen registration system for requesting prioritization for power restoration according to special need or circumstance during hazards that could affect access to electricity.	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, Electric Companies	6 months	Not Started	N/A

Cost and Benefit Considerations
This low cost project for prioritizing energy restoration for those with special needs within the community that would be impacted by hazards that are known for affecting impact to electrical power. All those with special needs from electrical resources would benefit.

Number/Title	Hazard	Item Description	Implementation Agency
10 De-icing Contract Research/ Plan Development (previously action 13 in 2011 plan)	Severe Winter Weather	Creation of a plan that provides established procedures and negotiated service providers and rates for ice removal for the 2 City streets.	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services	12 months	Not Started	N/A

Cost and Benefit Considerations
By setting rates for ice removal for extreme cases of icy weather, the whole community could save money on potential price increases.

Number/Title	Hazard	Item Description	Implementation Agency
11 Coordination of new Limb and Large Item Pick-up day for Wildfire Mitigation (previously action 15 in 2011 plan, modified)	Wildfire, Severe Winter Weather, Lightning	Cross marketing of existing brush collection efforts from new trash vendor in order to promote mitigation.	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, trash provider	2 months	In Progress	N/A

Cost and Benefit Considerations
At only the cost of the staff for coordination, the community cross-marketing new resources for collecting/ accepting brush in order to promote cleaning brush and dead trees to decrease fuel for wildfire, potential debris that could fall on power lines during freezing conditions and that could ignite during lightning strike. This would benefit any citizen that resides in a location with vegetation and trees. This will benefit the whole community.

Number/Title	Hazard	Item Description	Implementation Agency
12 Engineering review of City Hall (modular building) to ensure soundness against natural hazards	Flood, Tornadoes, Windstorm, Hurricanes/ Tropical Storms, Hailstorms	Contract a consultation from an engineer to review the new City Hall building to ensure its resiliency (modular building that holds community documents and archives).	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
$10,000/Existing staff/ in-kind services, cost of engineer study	12 months	Not started	E

Cost and Benefit Considerations
The cost of this review will benefit the City government as it will assist with the assurance of the continuity of operations for the community during disaster conditions.

Number/Title	Hazard	Item Description	Implementation Agency
13 Evacuation Plans/ Alternate road consideration (previously action 19 in 2011 plan, modified)	Hurricanes/Tropical Storms, Floods, Dam/Levee Failure, Wildfire	Documentation of an evacuation plan that includes multiple exits.	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind service, possible cost of buy-out for an easement of land to develop an additional emergency exit for the community, pursuit of grant funding for effort.	18 months	Not started	F

Cost and Benefit Considerations
The cost of not establishing a way out of the community would greatly outweigh the cost of mitigating this risk of not being to get citizens out of danger.

Number/Title	Hazard	Item Description	Implementation Agency
14 Creation of Social Media Accounts for the City of Niederwald	Drought, Extreme Heat, Severe Winter Storms, Lightning, Hailstorms, Windstorms, Tornadoes, Expansive Soils, Floods, Hurricanes/ Tropical Storms, Dam/Levee Failure, Wildfires	Opening Social Media accounts from multiple outlets to control emergency messaging and alerts for the community. No other communication methods are in place at the current time, besides County resources.	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, volunteer hours	3 months	In progress	N/A

Cost and Benefit Considerations
This free action would create a way to send messaging out to all members of the community that utilize social media.

Number/Title	Hazard	Item Description	Implementation Agency
15 Expansive Soil Mitigation Measures	Expansive Soils	Adopting City road construction techniques that mitigate against expansive soils. Creating and providing an information sheet regarding expansive soils in the development permit packet given to developers and citizens building in the community. The sheet will provide risk information about the hazard and provide recommendations for soil compaction and engineered foundations, especially for non-site built structures.	City of Niederwald City Administrator

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
General fund/ Existing staff/ in-kind services, $100 cost of printing for info sheets	3 months	Not started	E/F

Cost and Benefit Considerations

The initial cost of roadway mitigation will eliminate future need for repairs, eliminate transportation disruption and reduce driver risk. This free effort would provide awareness and public information that will benefit those looking to perform new development and those who are improving or repairing existing property.

Number/Title	Hazard	Item Description	Implementation Agency
16 Dam Safety Evacuation Tabletop Exercise (previously action 18 in 2011 plan, modified)	Dam/ Levee Failure, Floods	Coordination with the US Army Corps of Engineers to participate in a tabletop exercise that provides the community leaders with insight on the USACE emergency procedures and evacuation plan.	USACE, City of Niederwald Mayor

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Cost covered by USACE, existing staff/ in-kind services	9 months	Not started	N/A

Cost and Benefit Considerations

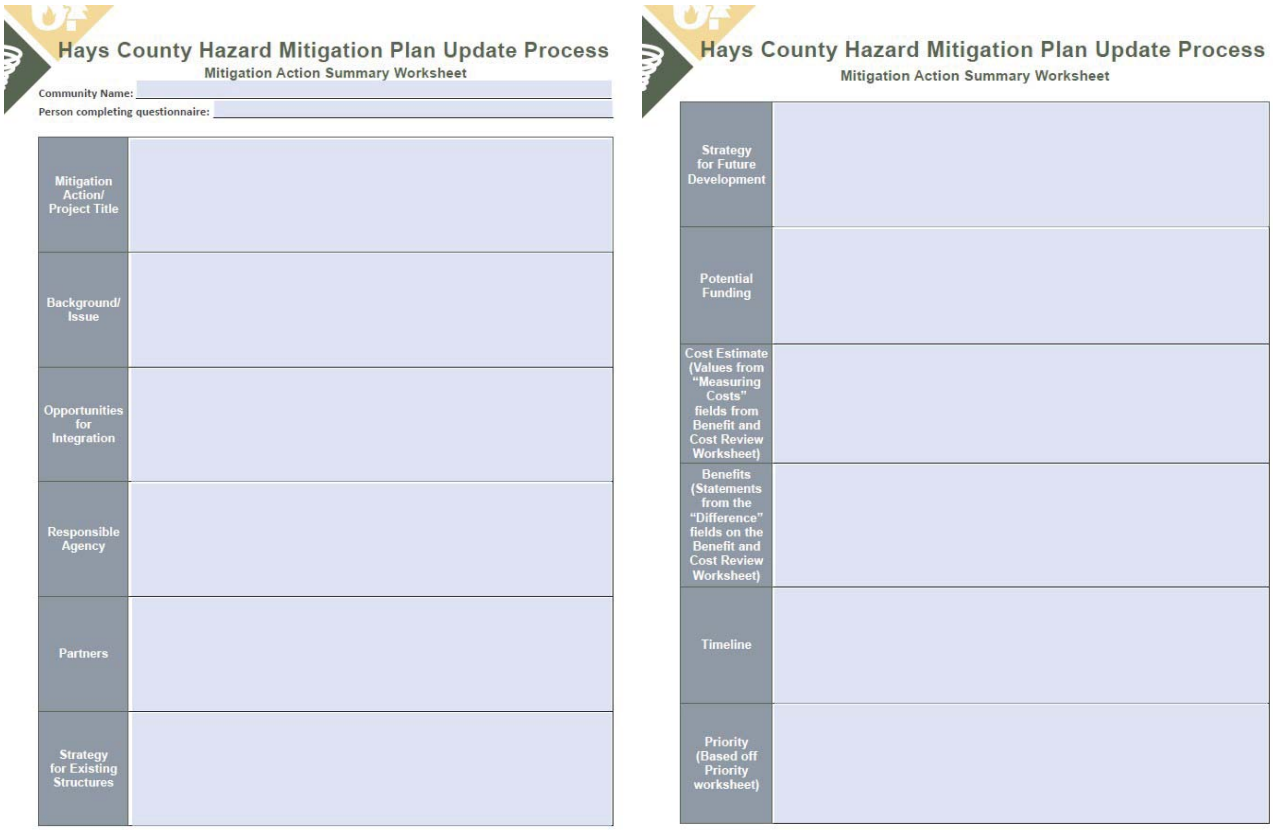
This request for a USACE tabletop will provide insight that will allow the community to inform all affected residents and visitors of the procedures for receiving warnings and seeking safety during emergency situations with the dam.

3.5 Capabilities Assessment

Evaluation/Prioritization of Actions

Each action added to the plan was developed using the Mitigation Action Summary Worksheet shown in Figure NW.8.

Figure NW.8, Mitigation Action Summary Worksheet



Hays County Hazard Mitigation Plan Update Process

Mitigation Action Summary Worksheet

Community Name: _____

Person completing questionnaire: _____

Mitigation Action/ Project Title	
Background/ Issue	
Opportunities for Integration	
Responsible Agency	
Partners	
Strategy for Existing Structures	
Strategy for Future Development	
Potential Funding	
Cost Estimate (Values from "Measuring Costs" fields from Benefit and Cost Review Worksheet)	
Benefits (Statements from the "Difference" fields on the Benefit and Cost Review Worksheet)	
Timeline	
Priority (Based off Priority worksheet)	

Table NW.13, Mitigation Action Prioritization (with Hazards in order of highest priority to lowest)

Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community	Risk Ranking Score	Total Score
7. Adopt Firewise hazard information from Hays County for mitigation activities	1	1	1	1	0	1	1	1	1	1	82	91
6. Increase of Hazard Mitigation	1	1	1	1	0	1	1	1	0	1	82	90
13. Evacuation Plans/Alternate road consideration	1	0	1	1	1	0	1	1	0	1	82	89
5. StormReady Designation for Niederwald	1	0	1	1	0	0	1	1	0	1	82	88
2. Residential Development Permit Enhancement for Flood Mitigation	0	1	1	1	1	0	1	1	0	0	82	88
4. Emergency Communications-Phone Tree Development	1	0	1	1	0	0	1	1	0	1	82	88
11. Coordination of new Limb and Large Item Pick-up day	1	1	1	1	1	1	-1	1	0	0	82	88
8. Adding Water Conservation to Ordinances/institution of Drought Monitor as part of operations	1	0	1	1	0	1	1	1	1	1	78	86
1. Flood Insurance Information Campaign	0	0	1	1	0	0	1	1	0	0	82	86
3. Attend Local Floodplain Management Courses to receive certification	1	1	1	0	0	0	0	1	0	0	82	86
12. Engineering review of City Hall (modular building) to ensure soundness against natural hazards	1	1	1	-1	0	0	0	1	0	0	82	85
14. Creation of Social Media Accounts for the City of Niederwald	1	0	1	-1	-1	0	1	1	1	0	82	85
15. Expansive Soil Mitigation	0	1	1	-1	0	0	1	1	0	0	82	85
9. Energy Prioritization Collaboration with Electric Cooperative	1	0	1	0	-1	0	1	1	0	0	75	78
16. Dam Safety Evacuation Tabletop Exercise	1	1	1	1	1	1	0	1	0	1	44	52
10. De-icing Contract Research/ Plan Development	1	0	1	1	1	0	1	1	0	0	38	44

Mitigation Actions by Hazard

The mitigation actions are shown with corresponding hazards in Table NW.14 below.

Table NW.14, Mitigation Action Impact, City of Niederwald

Action Number	Drought	Extreme Heat	Severe Winter Storms	Lightning	Hailstorms	Windstorms	Tornadoes	Expansive Soils	Floods	Land Subsidence	Hurricanes/ Tropical Storms	Earthquakes	Dam/ Levee Failure	Wildfire
1									X					
2									X					
3									X					
4		X	X	X	X	X	X		X		X	X	X	X
5			X	X	X	X	X		X		X			
6	X	X	X	X	X	X	X	X	X		X	X	X	X
7														X
8	X													
9		X	X	X		X	X				X			
10			X											
11			X	X										X
12					X	X	X		X		X			
13									X		X		X	X
14	X	X	X	X	X	X	X	X	X		X	X	X	X
15								X						
16									X				X	

3.6 Integration Efforts

Table NW.15 captures ways that the risk assessment, mitigation goals and actions can be integrated into other City of Niederwald documents, programs and regulations.

Table NW.15, Plan Integration Efforts, City of Niederwald

Name of Document	Type	Item Type	Process for Integration
Niederwald Budget	Document	Action	Seek funding for Floodplain Administrator training within existing budget line item: 6330-Seminars and Continue Education. (Action 3) Propose line item change to City Council and increase approved during fiscal year budget activities.
HaysInformed.com	Program	Action	Coordinate with City website administrator to link to existing Hays County HaysInformed.com emergency preparedness/awareness page when creating Public Awareness Page for hazards on Niederwald website. (Action 6)
Waste Management			Incorporate Large Item Pick up into negotiations for new trash service vendor that is currently in progress of being selected. (Action 11) Advertise wildfire mitigation measures through trash billing mailers while announcing large-item pick-up events.
Niederwald Social Media			Pre-write Hazard Mitigation posts/tweets for year and provide to social media coordinator volunteer for posting on a regular basis once social media platforms are established formally. (Actions 6 & 14)
Hazard Mitigation Grant Program (HMGP)	Funding	Action	Identify actions that can be funded through new and existing grant awards. Review existing mitigation actions for eligibility for the grant program, to include Benefit Cost consideration. Prepare grant application documents in advance to prepare for future grant application periods. Process involves identification of actions from Plan; obtaining Council approval to apply; notification of interest in grant to the public; completion of application for funding; if awarded, obtaining Council approval to accept; if accepted, administration of funds and implementation of project.
Pre-Disaster Mitigation (PDM)			
Flood Mitigation Assistance (FMA)			
TWDB Flood Protection Planning (FPP) Grant			
TWDB Clean Water State Revolving Fund (CWSRF)			Identify actions that can be funded through new and existing loans. Review existing mitigation actions for eligibility for the loan program, to include Benefit Cost consideration. Prepare loan application documents in advance to prepare for future application periods. Process involves obtaining Council approval to apply; notification of interest in loan to the public; completion of application for loan; if awarded, obtaining Council approval to accept; if accepted, administration of funds and implementation of project.
Texas Water Development Fund (DFund)			

Incorporation Achievements Since Previous Plan Update

Data, information, and mitigation goals and actions were not integrated into other planning mechanisms in the last 5 years prior to this update due to a lack of funding and resources.

Section 4: Finalize Plan Update (Review, Evaluation, and Implementation)

4.1 Changes in Development

The City of Niederwald is on the cusp of significant changes. The community expects and hopes for a 400% increase in residents in the coming planning period. The increase will be in several planned subdivisions. With the influx of residents, the community is preparing for many permitting applications and are anticipating being stewards for safe growth for their community. The sudden increase of population and development could increase vulnerability.

4.2 Progress in Mitigation Efforts

Past Mitigation Action Progress Reports Summary - Completed and Canceled

2011 Action Number	Hazard	Item Description	Lead Department
1	Flood	Increase the number of Hays County communities that participate in the NFIP	City of Niederwald
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
Cost and Funding: Existing staff resources, no cost		Completed	Completed
Cost Effectiveness			
Not independently cost-effective			

2011 Action Number	Hazard	Item Description	Lead Department
5	All hazard	Development of and maintenance of County-wide and individual community HAZMAP Plans	City of Niederwald
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
Existing staff resources		Original Plan adopted on 4/20/2004. Update in 2011	Completed.
Cost Effectiveness			
Not independently cost-effective			

2011 Action Number	Hazard	Item Description	Lead Department
16	Floods, thunderstorms, high winds, tornadoes, seismic	Upgrades to At-Risk Structures	City of Niederwald
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
Varies depending on measure. Funding from General Fund or FEMA grant program/s		TBD based on study	Canceled. Not fiscally feasible. More regulator measures adopted.
Cost Effectiveness			
Cost-effectiveness will vary with level of risk and project cost			

4.3 Changes in Priorities

Plan-level priority changes are reflected in the changes to the plan-level goals shown in Chapter 3: Mitigation Strategy within the Main Plan document. As the community expects to grow, it is showing an increase in concern for public safety, as is indicated in the ranking of public safety actions in the prioritization of mitigation actions. Higher population counts call for greater levels of responsibility for the community. In addition, a concern for expansive soils also shows that the community hopes to mitigate the effects of this hazard for incoming residents and their structures.

Section 5: Approval and Adoption

5.1 Approval and Adoption Procedure

The procedures for approval and adoption are described in Chapter 4.1 of the main plan document.

Table NW.16, Municipal Jurisdiction Adoption Date

Municipality	APA Date	Adoption Date
City of Niederwald		

Jurisdiction Adoption Documentation Placeholder

References

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City of San Marcos
Hays County Hazard Mitigation Plan Update
2018

Table of Contents

Figures

Tables

City of San Marcos Annex
Section 1: Organize and Review

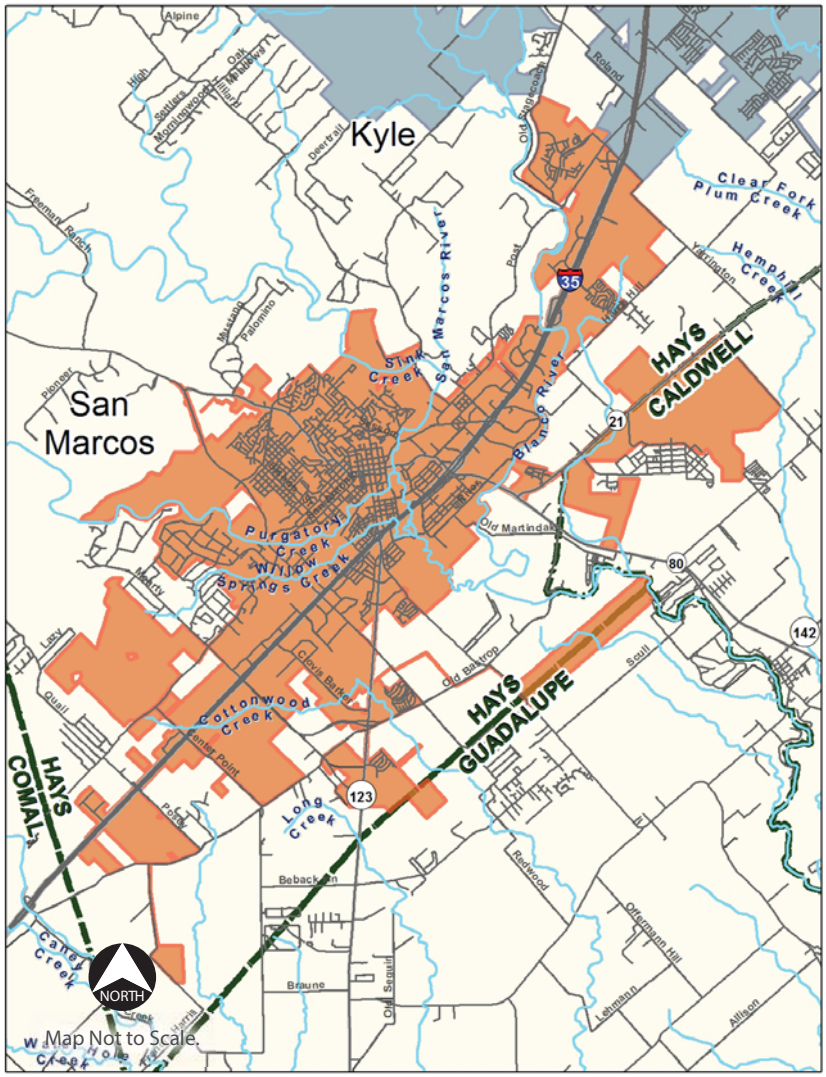
This section contains a brief description of the City of San Marcos and its jurisdictional features. In addition, Section 1 contains the following details regarding San Marcos':

- participation in the Hays County HMP Update process,
- stakeholder engagement,
- public outreach strategy,
- incorporation efforts and
- plan maintenance procedures.

*Population :	44,805
Size of Community:	34.26 sq. mi
*Population over 65 years old	3,013
*Population under 16 years old	6,406
*Economically Disadvantaged Population ($0-$20k)	6,292
San Marcos is serviced by the following responders:	
Fire/EMS - San Marcos Fire Department/San Marcos Hays County EMS	
Law Enforcement - San Marcos Police Department	

**HAZUS-MH 3.2 Updated Census 2010 Population Estimates*

Figure SM.1, City of San Marcos Planning Area



1.1 Community Description

When planning, it is important to take into account the characteristics that make a community unique. Consideration of unique needs when it comes to mitigating or recovering from natural hazards ensures that all members of the community and their needs are addressed.

San Marcos is known as the heart of Central Texas, located exactly midway between the cities of Austin and San Antonio, Texas on Interstate Highway 35 (IH-35). Located along the San Marcos River, San Marcos is the county seat for Hays County. The community has the largest population throughout the County and is home to Texas State University. Incorporated in 1877, the community follows a Council-Manager form of City Government made up of a Mayor and 6 Council Members.

The City is supported by 670 employees and known for its arts and history and is a popular tourist destination fueled by river activities, shopping and other attractions. In 2015, the City was named the fastest growing city in the United States with a population of 50,000 residents or more, and earned the designation for 3 years running. (Time, 2015)

San Marcos is served by San Marcos Consolidated ISD (SMCISD), which has 12 campuses throughout the City. There are 36,000 people enrolled at Texas State University as of 2015. In 2013, San Marcos permitted $235,940,463 in building permit values between the months of January and August. Most populated in the County, and still growing at an impressive rate, San Marcos is also home to 1,700 acres of parkland and open space.

Table SM.1 shows the City's major employers while Table SM.2 lists San Marcos main utility providers.

Table SM.1, Major Employers

Business Type	Name of Employer
Education	Texas State University
Retail	Amazon
Retail	San Marcos Premium Outlets
Retail	Tanger Factory Outlets
Education	San Marcos Consolidated Independent School District
Government	Hays County
Manufacturing	CFAN
Medical	Central Texas Medical Center (CTMC)
Retail	H-E-B Distribution Center
Government	City of San Marcos

(Greater San Marcos Partnership, 2017)

Table SM.2, Utility Providers

Type	Provider
Electric	San Marcos Electric Utility/Bluebonnet Electric/ Pedernales Electric Cooperative (PEC)
Water	San Marcos Water-Wastewater Utility

Community Planning Involvement

MPC planning activities for the Hays County Hazard Mitigation Plan (HMP) Update are captured in Figure SM.2, which utilizes check-marks to indicate each of the activities that were completed by the San Marcos MPC members.

Figure SM.2, City of San Marcos Plan Participation

Meetings

- ✓ Kick-Off
- ✓ Risk Assessment
- ✓ Mitigation Strategy

Data Submission

- ✓ Planner's Survey
  Data Collection Spreadsheet/ GIS Data
- ✓ Planning Worksheets
- ✓ Phone Interview

Public Involvement

- ✓ City Council/Commissioner's Court Agenda Items
- ✓ Public Survey Posting/ Collection

1.2 Outreach Strategy

The City of San Marcos was very active in the following outreach activities used to request public participation in the Hays County Hazard Mitigation Plan Update.

Public Survey Promotion

San Marcos advertised the Hays County Hazard Mitigation Plan Update Public Survey on the City of San Marcos homepage of www.sanmarcostx.gov.

As of March 10, 2017, San Marcos had 160 residents respond to the public survey. Details on how the survey data was directly incorporated into the risk ranking process for hazards is included in Chapter 2, the risk assessment portion of the main plan document.

City Council Meeting Announcement

On February 7, 2017, the City Senior Engineer presented information on the Hays County Hazard Mitigation Plan Update to the San Marcos City Council. Elected officials, local agency leaders and members of the public attended the meeting. The Council agenda and item report for this presentation are included in Plan Appendix A of the Hays County HMP Update.

Plan Phase Newsletters

San Marcos was provided with newsletters at each phase of the planning process in order to be able to share updates on the planning process with stakeholders, City staff and the public. Copies of the newsletters can be found in Plan Appendix A.

Plan Draft Public Review and Comment Period

The link to the draft Hays County HMP (hosted on the Hays County Office of Emergency Services page) was posted on the City of San Marcos website from July 12, 2017 until July 26, 2017 and a hard copy was placed in the San Marcos City Hall for public review. No public comments were received during this review period.

1.3 Incorporation of Sources

In addition to stakeholder and public input, the MPC also reviewed other City planning resources that could provide useful information for the plan update process. Table SM.3 lists the documents reviewed and how they were considered for incorporation in the updated plan.

Table SM.3, Review/Incorporation of Sources

Name of Document	Type	How Incorporated
2013 State of Texas Hazard Mitigation Plan	Plan	Utilized hazard definitions and hazard classification names.
Flood Insurance Study	Study	Incorporated best available hydraulic and hydrologic study results for flood hazard profile.
San Marcos Code of Ordinances	Regulations	Reviewed for opportunities to enhance for mitigation (Municode, 2017) • General Ordinances Chapter 39- Flood Damage Prevention- methods for reducing flood losses. • General Ordinances Chapter 86/Article 8- Drainage Utility Fee. • Land Development Code Chapter 4- Zoning Regulations. • Land Development Code Chapter 7- Public Facilities Standards. • Land Development Code Chapter 3- Comprehensive Planning. • Land Development Code Chapter 1- Development Procedures. • Land Development Code Chapter 5- Environmental Regulations. • General Ordinances Chapter 26- Civil Emergencies. • General Ordinances Chapter 14- Buildings and Building Regulations. • General Ordinances Chapter 38- Fire Prevention and Protection. • General Ordinances Chapter 62- Public Safety. • Land Development Code Chapter 7- Public Facilities Standards. General Ordinances Chapter 30- Emergency Services.

San Marcos Flood Protection Plan 2007	Plan	Reviewed plan for possible incorporation of suggested mitigation actions from the Plan
		Structural Flood Controls
		• Blanco River Watershed
		  • Channel and overbank maintenance/peak flow diversion to Bypass Creek
		• Cottonwood Creek
		• Detention upstream of IH-35
		  • Floodplain ordinances and regulations enhanced
		• Purgatory Creek
		  • Hopkins Street culvert improvement
		  • Castle Creek Drive culvert improvement
		  • Expansion of NRCS Reservoir No. 5 flood storage volume
		• Schulle Canyon culvert improvement
		• Sessom Creek culvert improvement
		• Willow Springs Creek
		  • Downstream regional detention pond
		  • Upstream regional detention pond
		• Flood Early Warning System
		• Streamflow Gage Network
		• Various flood community initiatives
		(Espey Consultants, 2007)

Table SM.3, Review/Incorporation of Sources, (cont.)

Name of Document	Type	How Incorporated
San Marcos Water Master Plan Update 2016	Plan	Reviewed for actions that were applicable for mitigation purposes. The plan ran modeling to simulate future conditions and identify the projects that would be needed to allow the City to continue to provide a safe reliable source of water for its customers. (Alan Plummer Associates, Inc., 2016)
San Marcos Transportation Master Plan		Reviewed actions that were ranked as favorable for Wetland/ Floodplain in the plan for possible incorporation • R-3 Realign Holland and Academy to provide Sessom connection to RM 12 • R-4 Widen Post Road form Aquarena Springs to northern study area limit to 4 lanes (6 lanes needed w/o Loop) • R-5 Extend LBJ northward from Bishop Street to W. Outer Loop as 2 lane section • R-7 Construct 4-lane freeway as E. Outer Loop • R-11 Extend River Ridge Parkway west as 2 lane section (IH 35 to Post Road) • R-13 Extend Beback Inn Road (Old Bastrop Hwy. to CenterPoint) as 2 lane section • R-14 Widen RM 12 from W. Outer Loop to Wimberley to 6 lanes (TxDOT) • R-15 Add U-Turn Lane for Transit Center Access • R-16 Widen River Rd. (SH 80 to new connection from Aquarena Springs) 4 lane section • R-17 Widen Comanche Street to 4 lanes (Sessom to Hopkins); improve 2-lane section (Hopkins to MLK) • R-18 Complete missing sections of University Drive (4 lane section) from Guadalupe to Comanche; long range complete section from Comanche to RM 12 • R-24 Extend Craddock South to Wonder World Drive (2 lane section) • R-25 Widen Thorpe Lane to 5 lanes from Aquarena Springs Dr - Hopkins St • R-26 Widen Hutchison to 3 lanes - CM Allen Pkwy to Moore St • R-27 Widen IH 35 overpass to 6 lanes • R-28 Widen Uhland to 3-4 lane section • R-29 Extend River Ridge Parkway from Post Road to Lime Kiln Road • R-32 Extend Stagecoach Trail (Craddock to W. Outer Loop) • R-33 Construct Purgatory Parkway between Craddock South and Stagecoach Trail western extension • R-34 Widen Charles Austin to 4 lane undivided • R-35 Widen FM 621 to 3 lanes from SH 123 to Old Bastrop Hwy. • R-38 Widen IH 35 to 8 main lanes/3-lane frontage roads throughout ETJ (Wilbur Smith Associates, 2004)

***Table SM.3, Review/Incorporation of Sources**, (cont.)*

Name of Document	Type	How Incorporated
Vision San Marcos: A River Runs Through Us- Comprehensive Plan	Plan	Reviewed community comprehensive plan for goals, objectives and actions to consider for incorporation in HMP. • Economic Development Goal 7/Objective- Engage appropriate partners to create a citywide strategy to better protect the area's natural resources and ecosystem's history. • Environment & Resource Protection Goal 1/Objectives- Adopt watershed specific regulations based on scientific understanding of water quality impacts. Develop a regional detention and water quality strategy. • Environment & Resource Protection Goal 2/Objective- Develop a coordinated tree preservation and planting program. • Environment & Resource Protection Goal 3/Objective- Develop re-claimed water infrastructure plan for activity nodes. Environment & Resource Protection Goal 4/Objectives- Adopt comprehensive floodplain development regulations, Implement an education and outreach program that identifies, and alerts citizens to, risks and responses to all hazards, in coordination with other governmental entities. • Land Use Goal 3/Objectives- Implement rain water retention and storm water Best Management Practices, track and monitor pervious cover at the watershed level. • Parks, Public Services & Facilities Goal 5/Objectives- Study and address homelessness issues through qualitative and/or quantitative analysis. (City of San Marcos, 2013)

Section 2: Risk Assessment
City of San Marcos Jurisdictional Hazards

This section contains San Marcos' hazard profiles for each natural hazard included in the Hays County HMP Update. Profiles include:

- Location - the area where the hazard is known to occur
- Previous Occurrences - a history of reported events for the hazard
- Significant Previous Occurrences (when applicable) - notable hazard events within the community
- Extent - the strength or magnitude of the hazard
- Probability - the likelihood of the hazard event occurring in the future
- Impact - the consequence or effect (or possible effect) of hazard events
- Vulnerability Summary - identification of structures, systems, populations or assets susceptible to loss or damage and how they could be impacted

Hazard descriptions and extent scales for hazard magnitudes, are found in Chapter 2, the risk assessment portion of the main plan document.

When available, data specific to San Marcos was used for hazard analysis. When no instances were reported specifically for the jurisdiction for regional hazards, County-wide data was applied.

State and national datasets were used to determine occurrence, extent, and the respective probabilities, rather than verbal testimonies, in an effort to retain data consistency. For some hazards, the National Oceanic and Atmospheric Administration (NOAA) Storm Events Database was used as the most comprehensive data available for hazards. The Storm Events Database does not always reflect the most recent totals for fatality, injury and damage amounts for previous hazard occurrences. The Previous Occurrences paragraphs identify instances in which this may occur. Verbal testimony, when available, was integrated into impact or vulnerability summaries to account for updates in this data.

2.1 Hazard Profiles

Hazards profiled within the Risk Assessment include:

- Drought - Within Chapter 2, the risk assessment portion of main plan document.
- Extreme Heat - Within Chapter 2, the risk assessment portion of main plan document.
- Severe Winter Storms - Within Chapter 2, the risk assessment portion of main plan document.
- Lightning - Within Chapter 2, the risk assessment portion of main plan document.
- Hailstorms
- Windstorms
- Tornadoes
- Expansive Soils
- Floods
- Hurricanes/Tropical Storms
- Earthquakes
- Dam/Levee Failure
- Wildfires

Hailstorms

Hailstorms: Location

The entire extent of the City of San Marcos is exposed to some degree of hail hazard. Since hail can occur at any location, hail events could be experienced anywhere within the planning area.

Hailstorms: Previous Occurrences

According to the NOAA Storm Events Database, there were 23 documented hail events listed for the City of San Marcos and 57 documented events listed for Hays County and its unincorporated jurisdictions from year 1967. While the NOAA Storm Events Database lists events since 1967 for the County, events were not documented per jurisdiction since the year 1993.

Hailstorms: Extent and Probability

The Tornado and Storm Research Organization (TORRO) created a hail extent index to measure hail called the Hailstorm Intensity Scale. According to the reported previous hail occurrences in the planning area, the maximum hail extent experienced was up to 4.5 in., or 114.30 mm. in diameter. This size corresponds to a TORRO Hailstorm Intensity Scale classification of "Super Hailstorm." Refer to Chapter 2, the risk assessment portion of the main plan document, for TORRO hail extent scale descriptions.

Based on 23 reported events in 23 years, the City of San Marcos can expect a hail event approximately once every year (on average) in the future, with hail up to 4.5 in., or 114.30 mm. in diameter, corresponding to a TORRO Hailstorm Intensity Scale classification of "Super Hailstorm."

Hailstorms: Impact

Hail events in the area have been reported to cause up to $100,000,000 in property damages and $500,000 in crop damages according to NOAA reports for the City. Additional potential impacts can be determined based on the maximum hail extent experienced (114.30 mm), where the TORRO Hailstorm Intensity Scale indicates that impact can be expected to include any of the following:

- Varying degrees of damage to vegetation and crops
- Damage to plastic structures
- Varying degrees of damage to glass
- Paint and wood scored
- Vehicle bodywork damage
- Varying degrees of roof damage
- Varying degrees of risk of injuries
- Varying degrees of aircraft damage
- Brick walls pitted
- Risk of severe or even fatal injuries to persons caught in the open

Data provided by NOAA lists the highest diameter of hail to be 4.5 inches, however community testimony indicates that the hailstorm of 2003 actually produced 6 inch diameter hail. (For the purposes of consistency with analysis data sources, NOAA/NWS datasets were used to determine extent and probability for all communities, while verbal community testimony was integrated into impact and vulnerability). The damage experienced during this storm made 6 inch holes in windshields and caused significant damage to the roof at the City shopping mall.

Hailstorms: Vulnerability Summary

Besides the large hail event of 2003, hailstorms are not a significant concern for the community. There is not a current plan in place for protection of critical vehicles and equipment. There is a variety of roof types for the public facilities in San Marcos, to include composition, built-up, and metal roofs. The City of San Marcos is the Hays County Seat and many critical facilities are located within the City. These have varying levels of vulnerability to hail.

Windstorms

Windstorms: Location

The entire extent of the City of San Marcos is exposed to some degree of wind hazard. Since wind can occur at any location, wind events could be experienced anywhere within the planning area.

Windstorms: Previous Occurrences

According to the NOAA Storm Events Database, there were 17 documented wind events listed for the City of San Marcos and 38 documented events listed for Hays County and its unincorporated jurisdictions from year 1974. While the NOAA Storm Events Database lists events since 1974 for the County, events were not documented per jurisdiction until 1994.

Windstorms: Extent and Probability

Wind is measured by the Beaufort Wind Scale that relates wind speed to observed conditions on land and sea. According to the reported previous windstorm occurrences in the planning area, the maximum wind extent experienced was 70 knots (corresponding to Beaufort Wind Scale Classification: Hurricane). Refer to Chapter 2, the risk assessment portion of the main plan document, for a description of wind extent scales.

Based on 17 reported events in 22 years, the City of San Marcos can expect a wind event of up to 70 knots approximately once every year (on average) in the future (Beaufort Wind Scale Classification: Hurricane).

Windstorms: Impact

City level data available from the Texas Department of Transportation's Crash Records Information System shows that between the years of 2010 and 2017, the City of San Marcos experienced 2 crashes related to severe crosswind weather conditions. There were no reported injuries from these crash events (see Table SM.4).

Table SM.4, Windstorms, Vehicle Accidents, City of San Marcos

City	Fatality	Incapacitating Injury	Non-Incapacitating	Possible Injury	Crash Year	Street Name	Surface Condition	Weather Condition
San Marcos	0	0	0	0	2012	IH0035	Dry	Severe Crosswinds
San Marcos	0	0	0	0	2012	IH0035	Dry	Severe Crosswinds

(Texas Department of Transportation, 2017)

Structures can be damaged by flying debris and impact from winds, damaging rooftops and causing other structural damage. Manufactured homes are especially vulnerable to damage that high winds can cause, to include destruction in the most extreme event conditions.

Critical infrastructure, such as utility poles and street signals, could also be disrupted, impacting all residents in the affected area. Debris on the roadway can also cause obstruction for emergency responders' ability to provide services.

Windstorms: Vulnerability Summary

Significant wind events in San Marcos have caused structural damage in the past. According to verbal community testimony (which is integrated into impact and vulnerability as NOAA and NWS reported datasets are utilized for occurrence and extent analysis), there was a previous windstorm in 2011 that caused damage to the Police Department and airport. In addition, it was stated that there were several roofs blown off of community apartment complexes. Additionally, the vulnerability of critical facilities within the community are a concern for the continuity of services to the public.

An additional concern is the small number of manufactured home communities and mobile home parks. These structures are more vulnerable to severe winds than a site-built home. These types of residences make up less than 10% of the homes in San Marcos.

There are many sites of critical facilities and infrastructure and non-critical public facilities that are located within the City (according to spatial HAZUS data and community submitted critical facility data) that are not retrofitted to mitigate damages from extreme wind events. These facilities include: Hays County Dispatch, San Marcos Activity Center, Southside Community Center, San Marcos Fire Departments, San Marcos Police Department, Texas State University Police Department, Central Texas Medical Center, San Marcos City Hall, Hays County Health Department, and Hays County Government Center. Damages sustained by an extreme wind event to these facilities could hinder the ability to provide crucial services needed by the community.

Tornadoes

Tornadoes: Location

The entire extent of the City of San Marcos is exposed to some degree of tornado hazard. Since tornadoes can occur at any location, tornado events can be experienced anywhere within the planning area.

Tornadoes: Previous Occurrences

According to the NOAA Storm Events Database, there were 3 documented tornado events listed for the City of San Marcos and 16 documented events listed for Hays County since the year 1953. While NOAA Storm Events Database lists events since 1953 for the County, events were not documented per jurisdiction until 1997. The tornado events reported for the City of San Marcos are listed in Table SM.5.

Fatality, injury and damage amounts are shown in Table SM.5, per the NOAA Storm Events Database. Community testimony indicates that these amounts do not reflect the most recent totals, however NOAA data is being used as the best source of information available for the record period.

Table SM.5, Tornado Events, City of San Marcos

Location	Date	Type	Extent	Fatalities	Injuries	Property Damage	Crop Damage
San Marcos	12/30/2002	Tornado	F0	0.00	0.00	0.00	0.00
San Marcos	1/13/2007	Tornado	F1	0.00	0.00	50000.00	0.00
San Marcos Lowman AR	10/30/2015	Tornado	EF1	0.00	0.00	0.00	0.00
Total				$0.00	$0.00	$50,000.00	$0.00

(National Oceanic and Atmospheric Administration Storm Event Database, 2016)

Tornadoes: Extent and Probability

Tornadoes are measured by severity on the Fujita Scale and Enhanced Fujita Scales, with a range from 0-6. According to the reported previous tornado occurrences in the planning area, the maximum tornado extent experienced was a category EF1. Refer to Chapter 2, the risk assessment portion of the main plan document for a description of tornado extent scales, Fujita (F) Scale and Operational Enhanced Fujita (EF) Scale.

Based on 3 reported events in 19 years, the City of San Marcos can expect a tornado event approximately once every 6 years (on average) in the future, with up to an EF1 magnitude.

Tornadoes: Impact

Tornadoes in the City of San Marcos could impact roadways due to the large amount of vegetation and other objects that could become debris in the event of the high winds that accompany a funnel cloud. This debris could also cause physical harm to residents who may be outside during such an event. The wind speeds and debris caused by tornadoes can impact all residents in the community.

Based on San Marcos' past experience of tornadoes between F0 and EF1 levels, if similar events were to happen in the future in the City, the type of impacts that the planning area could expect associated with that magnitude would include:

- Light Damage - Broken branches; shallow rooted trees pushed over; some chimney damage.
- Moderate Damage - Surface damage to roofs; mobile homes pushed off foundation; moving vehicles pushed off the road.
  (Tornado Facts, 2016)

Manufactured homes are especially vulnerable to damage that tornadoes can cause, to include destruction in higher magnitude events. Critical infrastructure, such as utility poles and street signals, could also be disrupted, impacting all residents in the affected area. Debris on the roadway can also cause obstruction for emergency responders' ability to provide services.

Tornadoes: Vulnerability Summary

There are 14 outdoor warning sirens throughout the City of San Marcos. These sirens, however, do not address residents with hearing or access needs. The City is exploring a variety of alternate notification methods to supplement the audible sirens. In addition, the City uses CodeRed to conduct their emergency notifications. Because registration is voluntary, there still remains a risk that people may not receive critical safety alerts and information because officials have no way to contact them without their information being added to the database. There is also a team of trained Storm Spotters that assist with detection of tornado events. This spotter team would benefit from an increase in membership.

An additional concern is the small number of manufactured home communities and mobile home parks. These structures are more vulnerable to tornado winds than a site-built home. These types of residences make up less than 10% of the homes in San Marcos.

Significant wind events in San Marcos have caused structural damage in the past. According to verbal community testimony (which is integrated into impact and vulnerability as NOAA and NWS reported datasets are utilized for occurrence and extent analysis), there was a previous windstorm in 2011 that caused damage to the Police Department and airport. This indicates vulnerability as severe winds accompany tornado events. In addition, it was stated that there were several roofs blown off of community apartment complexes.

There are many sites of critical facilities and infrastructure and non-critical public facilities that are located within the City (according to spatial HAZUS data and community submitted critical facility data) that are not retrofitted to mitigate damages from the extreme winds that accompany tornado events. These facilities include: Hays County Dispatch, San Marcos Activity Center, Southside Community Center, San Marcos Fire Departments, San Marcos Police Department, Texas State University Police Department, Central Texas Medical Center, San Marcos City Hall, Hays County Health Department, and Hays County Government Center. Damages sustained by a tornado event to these facilities could hinder the ability to provide crucial services needed by the community.

Expansive Soils

Expansive Soils: Location

According to the USGS Expansive Soils Regions, Figure 2.3 within Chapter 2 (the risk assessment portion of the main plan document), small sections of the western side of the City have less than 50% of the area underlain with soils with clayey textures that have high shrink-swell properties where as the rest of the planning area has over 50% of the area underlain with soils with abundant clays with high swelling potential, and is the area with the highest magnitude of expansive soil potential within the City.

Expansive Soils: Previous Occurrences

There was no documentation of past site-specific events for structural damage due to expansive soils from local, State, or national datasets found.

Expansive soils cannot be documented as a time-specific event, except when they lead to structural and infrastructure damage. There are no specific damage reports or historical records of events in the City, however future events can occur.

Expansive Soils: Extent and Probability

Considering the amount of swelling potential within the jurisdiction, and the lack of reported events, the probability of a future event is low (0 - 1 occurrences in the next 10 years affecting less than 5 structures).

Expansive Soils: Impact

Foundation issues for slab buildings and road base pads for mobile homes offer the most visible impacts to infrastructure and structures. Undocumented reports of small cracks to foundations and terrain could possibly be attributed to the presence of expansive soils. Deeper and longer cracks, and possible structural shifting could occur with natural conditions that increase soil swelling.

Expansive Soils: Vulnerability Summary

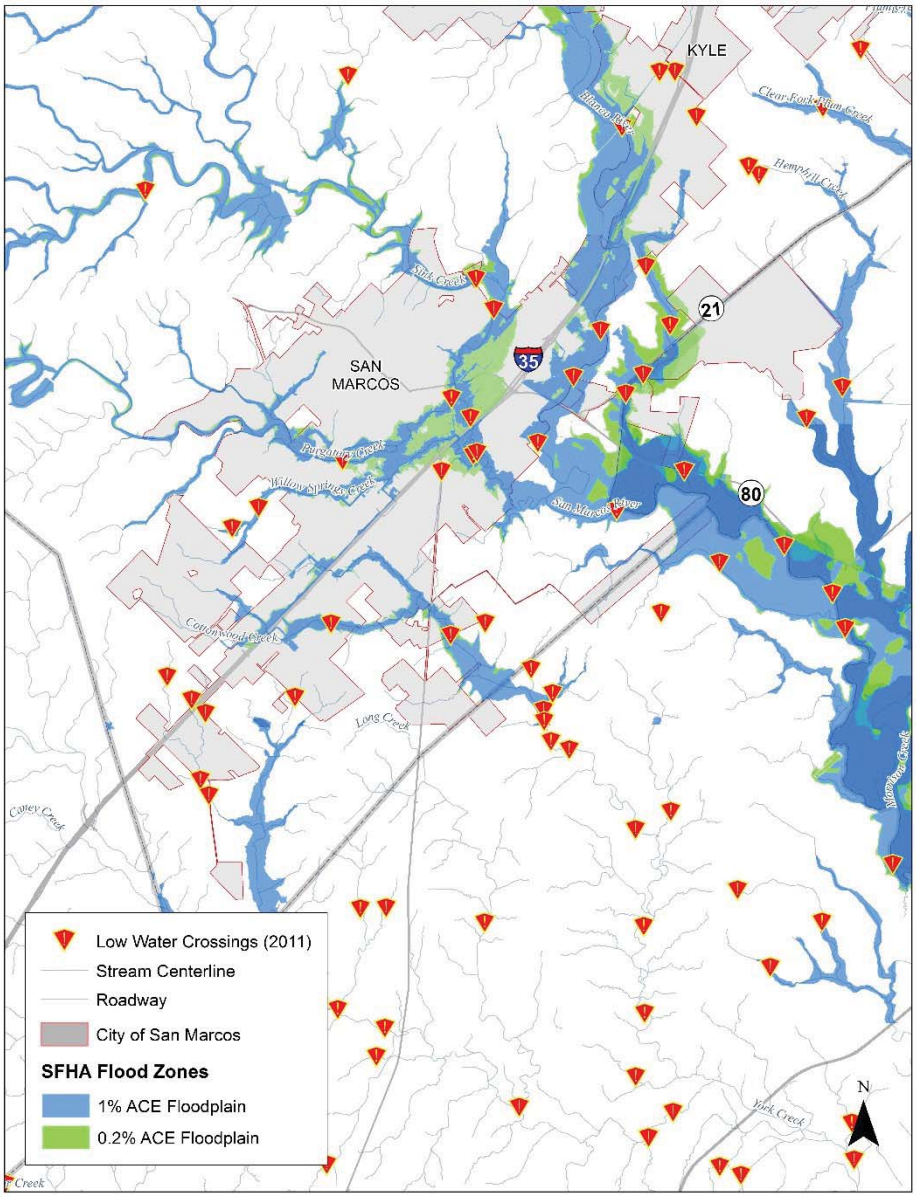
Areas within San Marcos that are experiencing higher amounts of development on previously undeveloped land may find a higher impact as this will offer increased opportunity for structural foundation damage in areas with high clay content. Expansion of jurisdictional boundaries and the development of more land between Austin, San Antonio and San Marcos can lead to exposure to previously unnoticed areas of expansive soil. The lack of current problems from this hazard in the community leads to a lessened concern for the issue. Should parts of the community with higher concentrations of clay in the soil begin to experience subdivision development, there may be a heightened amount of vulnerability for residential structures within San Marcos.

Floods

Floods: Location

The location of low water crossings, as well as the 1% (100-year) and 0.2% (500-year) Annual Chance Event (ACE) floodplains for the City of San Marcos are shown in Figure SM.3. This figure represents the locations within the planning area that are most affected by riverine flooding and is based upon newly developed hydrologic and hydraulic analysis. The new analysis is considered the best information available to date. Table SM.6 provides the total acreage in the jurisdiction that is located in the 1% and 0.2% floodplains.

Figure SM.3, Special Flood Hazard Areas and Low Water Crossings, City of San Marcos



(Texas Natural Resources Information System, 2011)

Table SM.6, City of San Marcos Floodplain Acreage

Jurisdiction	100yr (1%) Floodplain Acres (Includes Floodway)	500yr (0.2%) Floodplain Acres (Includes 100yr)
City of San Marcos	4,250	5,938

Floods: Previous Occurrences

According to the NOAA Storm Events Database, there were 8 documented flood events listed for the City of San Marcos and 69 documented events listed for Hays County from year 1997. While NOAA Storm Events Database lists events since 1997 for the County, events were not documented per jurisdiction until 2004. The flood events reported for the City of San Marcos are shown in Table SM.7.

Fatality, injury and damage amounts are shown in Table SM.7, per the NOAA Storm Events Database. Community testimony indicates that these amounts do not reflect the most recent totals, however NOAA data is being used as the best source of information available for the record period.

Table SM.7, Flood Events, City of San Marcos

Location	Date	Type	Fatalities	Injuries	Property Damage	Crop Damage
San Marcos	11/14/2004	Flash Flood	1	0	0.00	0.00
San Marcos	9/8/2010	Flash Flood	0	0	0.00	0.00
San Marcos	5/13/2014	Flash Flood	0	0	0.00	0.00
San Marcos	5/27/2014	Flash Flood	0	0	0.00	0.00
San Marcos Lowman AR	5/30/2015	Flash Flood	0	0	5,000.00	0.00
San Marcos	6/28/2015	Flash Flood	0	0	0.00	0.00
San Marcos	5/19/2016	Flash Flood	0	0	0.00	0.00
San Marcos	9/26/2016	Flash Flood	0	0	0.00	0.00
Total			0	0	$5,000.00	$0.00

(National Oceanic and Atmospheric Administration Storm Event Database, 2016)

Floods: Significant Past Events

Although not all documented in the NOAA storm events database specifically under the City of San Marcos, the significant flood events described for October 2013, May 2015, and October 2015 in the Significant Past Events within the Hays County Annex were events that greatly impacted the City of San Marcos. Refer to that section for details on those events.

Flood past events in San Marcos, Texas

Floods: Extent

Flood extent is described through a combination of ground elevation, river heights, 100-year Water Surface Elevations (WSE's) and HAZUS depth grids. Areas along the San Marcos River in the center of the community are exposed to some of the greatest flood extents. An example of flooding within the community is along the San Marcos River near Riviera Street and Riverside Drive. This area has an approximate overbank ground elevation of 572 feet with an intersecting 100-year WSE of 574 feet. For a 100-year event, water depth of approximately 2 feet can be expected within this area. A further analysis of the San Marcos River height is described below.

With the San Marcos River having an approximate in-channel elevation of 560 feet (per Light Detection and Ranging [LiDAR] and USGS gauge data), and an intersecting 100-year WSE of approximately of 574 feet, flood depths would be 14 feet.

Floods: Probability

Based on 8 reported events in 12 years, the City of San Marcos can expect a flood event approximately once every 1 to 2 years on average in the future, up to 14 feet in depth.

Floods: Impact

The following describes the inventory counts and building replacement values for the jurisdictional area.

San Marcos Building Counts			
Residential	Commercial	Other	Total
9,462	905	341	10,708

San Marcos Building Replacement Value		
Building ($)	Content ($)	Total ($)
3,912,662,416	2,523,636,898	6,436,299,314

Flood past events in San Marcos, Texas

A Probabilistic 100-year Return Period HAZUS-MH 3.2 analysis was run on the City of San Marcos. HAZUS results are calculated to census blocks. These blocks were then intersected with the City to run a weighted area analysis for jurisdictional results. The following paragraphs describe results from the 100-year Return (1% Annual Chance Event) weighted area analysis.

HAZUS-MH Results

General Building Stock Damage

HAZUS estimates that about 1,102 buildings will be at least moderately damaged in San Marcos. "At least moderately damaged" is defined by HAZUS as greater than 10% damage to a building. The majority of damage can be expected to impact residential areas (98%). The remaining damages (2%) are expected for commercial, industrial, agriculture and religious buildings.

Residential Buildings	Commercial Buildings	Other Buildings	Total Buildings
1,080	19	3	1,102

Building-Related Losses

Exposed Value is the total building and content values for structures within the community. The exposed value for the community is $6,436,299,314. The total building related losses were $381,124,000 for this scenario. This represents 5.90% of the total replacement value of the community. Loss values are divided into building and content loss dollars.

Building Loss ($)	Content Loss ($)	Total Loss ($)
176,961,000	204,163,000	381,124,000

Essential Facility Damage

HAZUS estimates 4 critical facilities and infrastructure to be out of service for 1 day each for this scenario. The scenario estimates that 100% of community hospital beds would be available for use by patients already in the hospital and those injured by an event. The estimated loss values for the area's critical facilities and infrastructure are listed below.

Critical Facilities & Infrastructure (Count)	Building Loss ($)	Content Loss ($)	Total Loss ($)
4	26,385	12,074	38,459

Debris Generation

HAZUS estimates the amount of debris that will be generated in this scenario at a total of 37,309 tons. If the building debris tonnage is converted to an estimated number of truckloads, it will require 1,493 truckloads (with 1 to 25 tons per truck) to remove the building debris generated in this scenario.

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 the number of people displaced that will require accommodations in temporary public shelters. The model estimates 7,503 people will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 6,858 people will seek temporary shelter in public shelters.

Floods: Vulnerability Summary

The City of San Marcos has the most Repetitive Loss payments in all of Hays County. This can obviously be attributed to the fact that the population is higher, but can also be related to proximity to the San Marcos River, the number of Pre-FIRM homes that were built before the Flood Damage Prevention Ordinance was adopted, and also the occurrences of localized flooding that occur outside of the Special Flood Hazard Area where elevation is not required.

According to community testimony, there are also a limited number of locations where mobility issues could create issues during flood events. There is a daycare at risk due to flooding and access to several group homes and other facilities where people are non-ambulatory and unable to seek higher ground on their own.

Areas with low water crossings that become overtopped are also an issue for emergency services access and the ability for residents to enter or exit their residences.

National Flood Insurance Program Repetitive Loss (RL)

The City of San Marcos is a current participant in the National Flood Insurance Program (NFIP) and has 247 tallied RL payments (as of September of 2016) with an average total (building & contents) payment of $37,560.76.

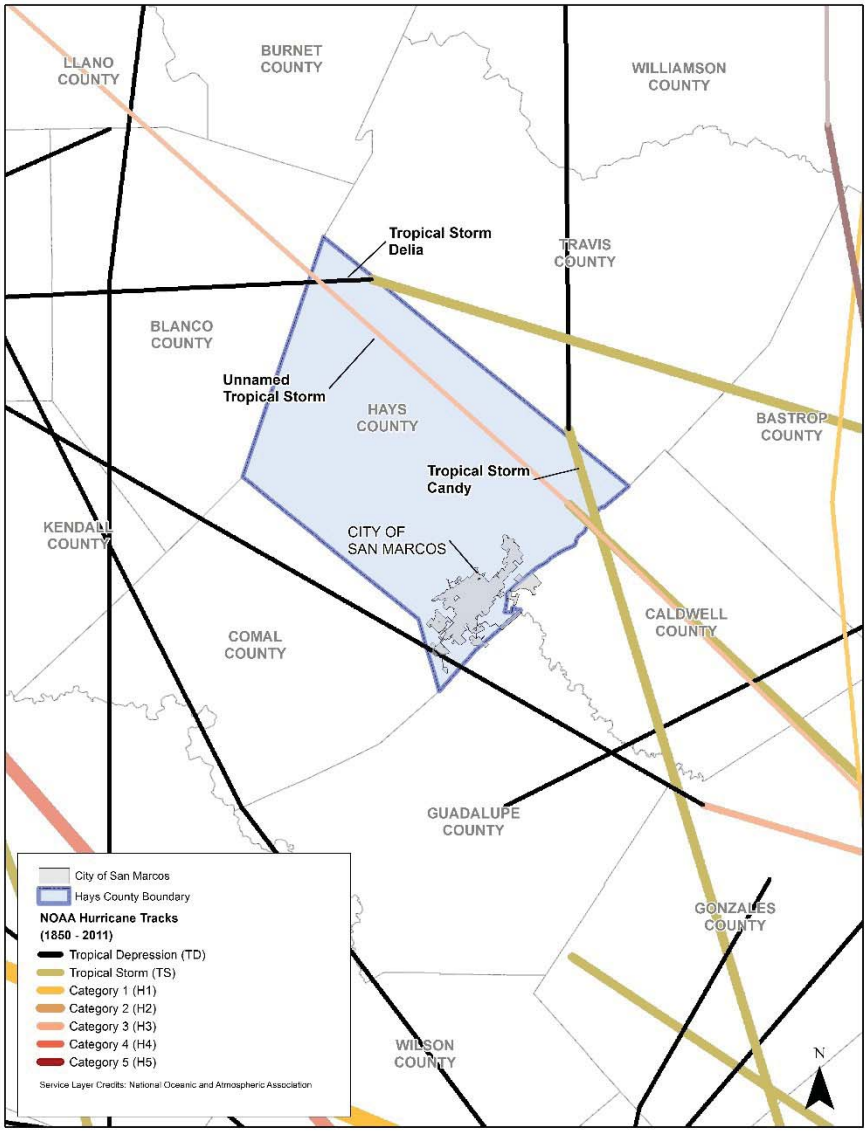
Structure Type	Number of Structures	Amount of Claims
Residential	107	$8,905,976.65
Non-Residential	3	$371,530.54

Hurricanes/Tropical Storms

Hurricanes/Tropical Storms: Location

Due to the regional nature of a hurricane or tropical storm event, the entire extent of the City of San Marcos is equally exposed to a hurricane or tropical storm. Figure SM.4 illustrates the location of the planning area with historical hurricane and tropical storm paths documented by NOAA's Hurricane Tracker from 1850 to 2011.

Figure SM.4, Historical Hurricane/Tropical Storm Paths, City of San Marcos



(National Oceanic and Atmospheric Administration, 2016)

Hurricanes/Tropical Storms: Previous Occurrences

The following events are listed based on NOAA Storm Events Database for Tropical Storm Hermine and NOAA Hurricane Tracker for all other events. By the time most hurricanes reach the County, they are tropical storms, depressions or thunderstorms. Because hurricane and tropical storm events occur on a regional scale, all events listed for Hays County have been included, as they would impact the City of San Marcos.

July 13 to July 22, 1909 – An unnamed storm made landfall near Freeport, as a Category 3 Hurricane. This storm impacted Hays County and participating communities as a tropical depression with wind speeds up to 30 knots. No significant damages, injuries, or fatalities were reported for the City.

June 22 to June 26, 1968 – Tropical Storm Candy made landfall near Port Aransas. This storm impacted Hays County and participating communities as a tropical storm with wind speeds slowing to 30 knots as a tropical depression just after leaving the County. No significant damages, injuries, or fatalities were reported for the planning area.

September 1 to September 7, 1973 – Tropical Storm Delia made landfall near the border of Brazoria and Matagorda Counties. This storm impacted Hays County and participating communities as a tropical storm with wind speeds slowing to 30 knots as a tropical depression just after leaving the County. No significant damages, injuries, or fatalities were reported for the jurisdiction.

September 6 to September 8, 2010 – According to the NOAA Storm Events Database, Tropical Storm Hermine made landfall near the Texas/Mexico border on the night of September 6. South Central Texas was hit very hard with widespread rains of 8 to 12 inches across much of the IH-35 corridor from Austin down to San Antonio.

Hurricanes/Tropical Storms: Extent and Probability

The Saffir-Simpson Scale measures pressure, wind speed, and storm surge in 5 categories. According to the reported previous hurricane occurrences in the jurisdiction, the maximum hurricane extent experienced was categorized as a tropical storm. Refer to Chapter 2, the risk assessment portion of the main plan document, for a description of storm extents.

Based on 4 reported events in 107 years, a hurricane or tropical storm event occurs approximately every 27 years on average in Hays County. Since hurricane and tropical storm events can happen anywhere throughout the HMP update area, the City of San Marcos' future probability is assumed to be similar to the surrounding County areas. In the future, the City can expect an event approximately once every 27 years on average, of up to a magnitude of a tropical storm at a 100-yr Max Wind Speed of 78 mph based on historical extents and HAZUS analysis.

Hurricanes/Tropical Storms: Impact

A Probabilistic 100-year Return Period HAZUS-MH 3.2 analysis was run for the City of San Marcos. The following describes the results of this analysis.

HAZUS-MH Results

General Building Stock Damage

The total property damage losses were $2,251,079. The majority of damage can be expected to impact residential areas (98%). The remaining damages (2%) are for commercial, industrial, agricultural and religious buildings. While some building damage is experienced, it is estimated that no buildings will be completely destroyed or experience severe damage. Exposed Value is the total building and content values for structures within the community. Loss values are divided separately for building and content loss in dollars.

Exposed Value ($) (Building + Content)	Building Loss ($)	Content Loss ($)	Total Loss ($)
6,436,299,314	2,251,079	30,222	2,281,301

Essential Facility Damage

HAZUS does not estimate any critical facilities or infrastructure to be interrupted for more than 1 day on the day of the event. The model estimates that 100% of hospital beds would be available for use by patients already in the hospital and for those injured by the hurricane.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the hurricane. The model estimates that a total of 350 tons of debris will be generated. Of the total amount, brick/wood comprises 100% of the total. If the building debris tonnage is converted to an estimated number of truckloads, it will require 14 truckloads (with 1 to 25 tons per truck) to remove the building debris generated by the hurricane.

Shelter Requirements

HAZUS estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of people displaced that will require accommodations in temporary public shelters. The model estimates no households to be displaced due to the hurricane. While there is an estimation of over $2.2 million in property damages expected, it is aforementioned that "no buildings would be completely destroyed or experience severe damage." Residents would likely remain in their homes as damages were repaired, therefore no temporary shelter is needed.

Hurricanes/Tropical Storms: Vulnerability Summary

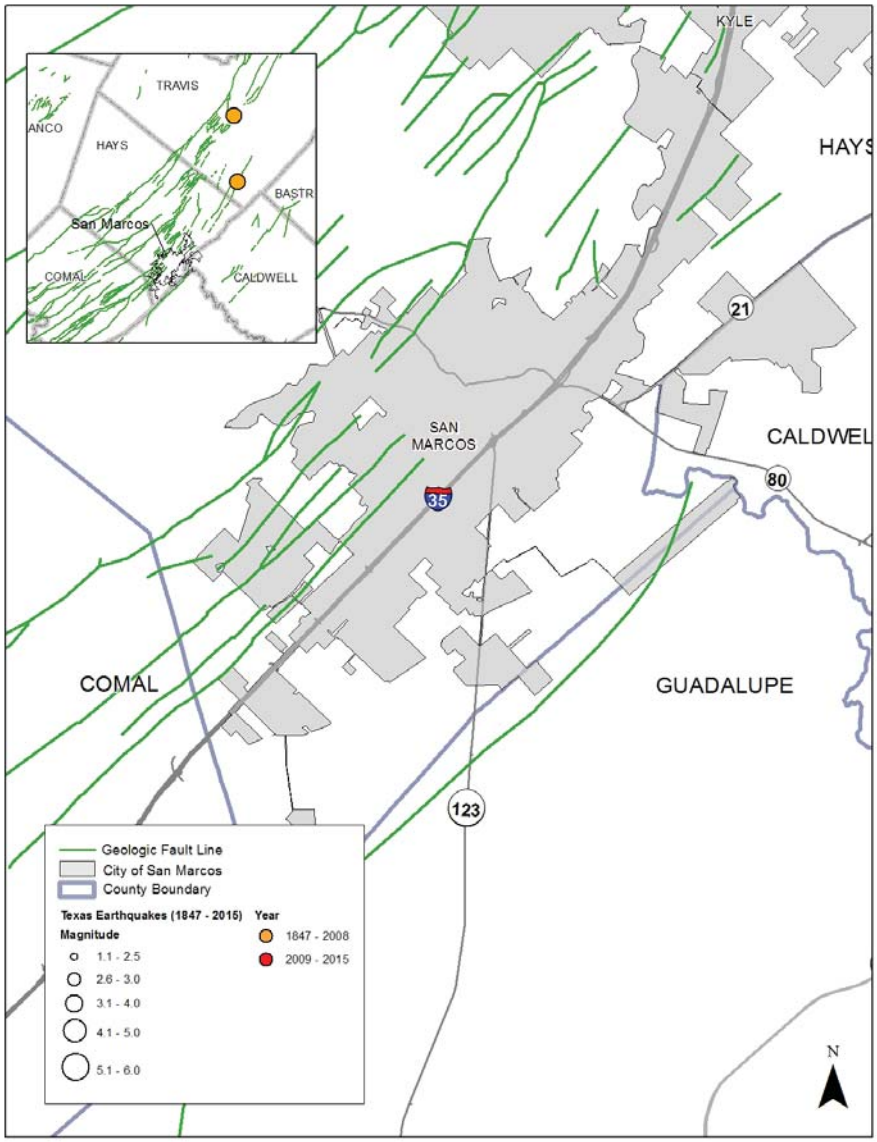
Similar to the impacts of windstorms, hailstorms, and lightning, San Marcos can expect to be impacted with debris and possible interruptions of critical infrastructure if the event is a stronger magnitude than those previously experienced by the City. In addition, the community's proximity to IH-35 could lead to traffic delays caused by major evacuation efforts if the highway is used as an evacuation route for coastal residents.

Earthquakes

Earthquakes: Location

Locations within proximity to fault lines are typically the areas most at risk for earthquakes. Figure SM.5 shows USGS documented fault lines and the locations of earthquakes from 1847 to 2015 in relation to the City of San Marcos.

Figure SM.5, Texas Earthquakes, 1847 – 2015, City of San Marcos



(USGS Earthquake Hazard Program, 2015)

Earthquakes: Previous Occurrences

According to USGS 1847-2015 data, there have been no documented earthquake events for the City of San Marcos, as illustrated in Figure SM.5.

Earthquakes: Extent and Probability

Earthquakes are measured by Peak Ground Acceleration (PGA). The HAZUS Max PGA for the planning area is 1.56% (see Earthquakes: Impact Section for a description of the HAZUS Analysis). This corresponds to the Modified Mercalli Scale Category IV, with light perceived shaking and no potential structure damage.

HAZUS measures PGA on a census tract level. Cities within more than 1 census tract were assigned the highest PGA level to reflect the maximum possible extent. Refer to Chapter 2 for extent scale descriptions (the risk assessment portion of the main plan document).

As there have been no recorded previous occurrences of earthquakes for the City of San Marcos and the PGA is less than 2% for the area, the probability of an earthquake in the City in the future is low (0 - 1 occurrences in the next 10 years, at up to a 500yr PGA of 1.56%).

Earthquakes: Impact

The FEMA How-To Guidance, Understanding Your Risks (FEMA 386-2, page 1-7), suggests the earthquake hazard should be profiled if the PGA is greater than 3%g, where PGA is measured in the acceleration of gravity (g). The City's PGA is less than 3%g (0.03) and there have been no recorded earthquakes in or near the jurisdiction. Therefore, only a minimum level-1 HAZUS analysis was profiled using the 500-year probability event scenario. The HAZUS analysis produced a PGA of 1.56%. HAZUS scenario would produce $0 in building damages (Residential, Commercial, Agriculture, Religious and Government) from an event. Critical facilities and infrastructure would not experience any loss of service. There would be no critical facilities or infrastructure that would experience moderate to complete damage. No debris would be generated from this event and no people or households would require temporary housing. There would be no moderate, extensive or completely damaged buildings by this event. HAZUS estimates no residents are expected to be displaced from their homes or will require accommodations in temporary public shelters due to the simulated earthquake. Additionally, there would be no causalities or fatalities from this event.

Earthquakes: Vulnerability Summary

While the probability of an earthquake in San Marcos is low, with no significant prior events on file, there are fault lines within the community that could cause impact if there were to be an increase in seismic activity in the area. There are 13 fault lines located within the jurisdiction according to USGS data. San Marcos could expect to be impacted with debris and possible interruptions if an event were to occur in this unlikely and unprecedented scenario. If an event were to incapacitate a roadway, emergency responders would be hindered from responding, thus leaving the residents who were affected at risk.

The following thoroughfares are crossed by the USGS fault lines displayed on Figure SM.5:

LBJ, RM 12, Craddock Avenue, Nevada Street, S. Stagecoach Trail, W. Sierra Circle, Camaro Way, and Lancaster Street.

Additionally, the following critical facilities and infrastructure and non-critical public facilities (according to HAZUS and community submitted critical facility data) are located within 1 mile of a fault line within the community:

Hays County Public Safety Answering Point (PSAP), Grande Communications, South Hays Fire Department, San Marcos Police Department (SMPD), Hays County Sheriff, 3 San Marcos Fire Department Locations, Primary EOC – SMPD, SMHCEMS Medics 5, 13, 11, and 12, San Marcos Treatment Center, Goodnight Middle School, Crockett Elementary, Hernandez Elementary, Miller Middle School, Travis Elementary, Blanco Vista Elementary, Mendez Elementary, San Marcos Adventist Junior Academy, San Marcos Center School, Public Safety Building/Jail, Hays County Government Center, and 2 Armed Forces Reserve Centers.

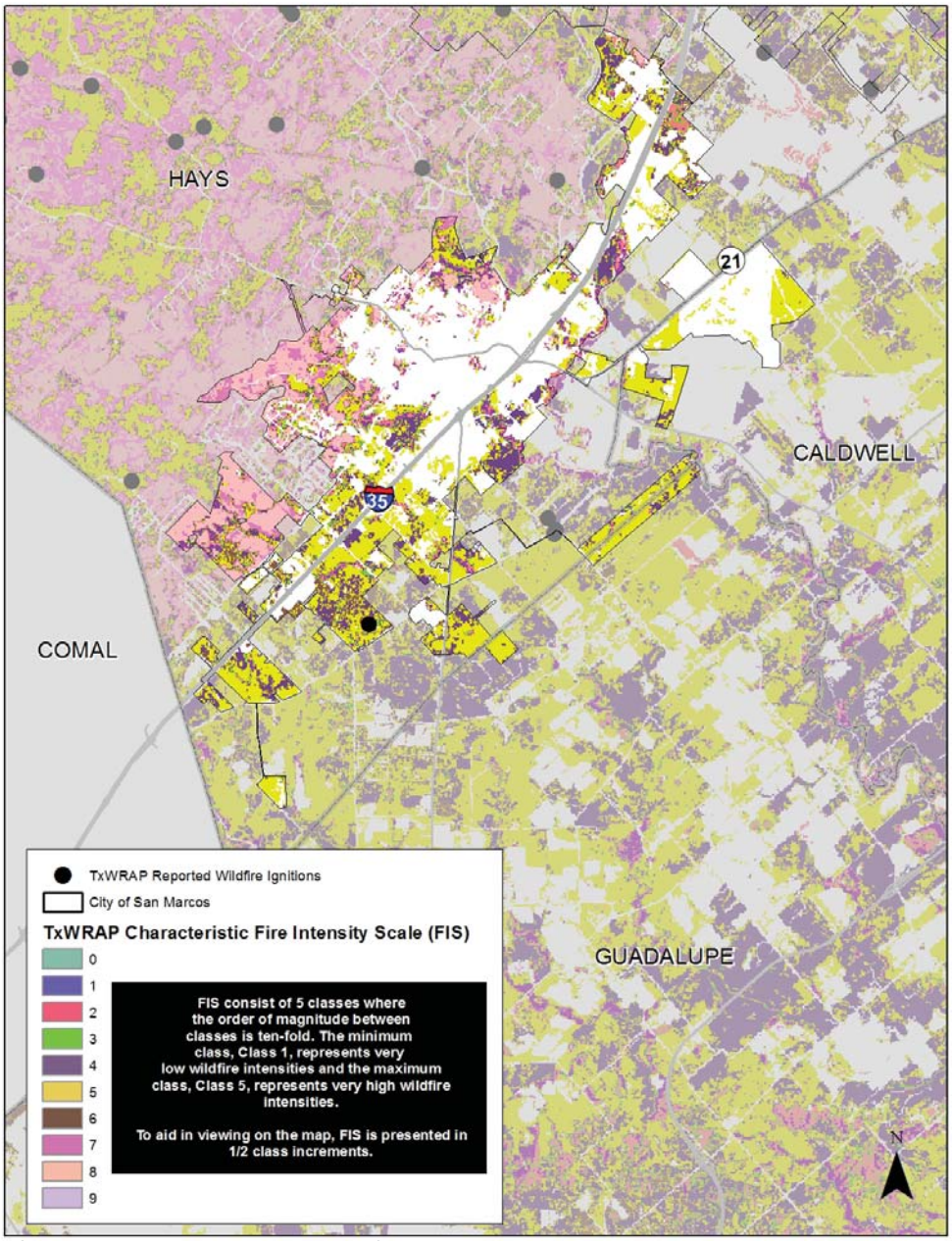
Page 25, 26, and 27 Dam/Levee Failure have been redacted from this copy of the plan.

Wildfires

Wildfires: Location

Wildfires can be ignited from a variety of sources including lightning or human activity such as campfires, smoking, arson, or equipment use. The Texas A&M Forest Service's Texas Wildfire Risk Assessment Portal (TxWRAP) can be used to help communities understand their wildfire risk. Figure SM.7 below shows the location of TxWRAP's documented wildfire occurrences with Fire Intensity Scale (FIS) classifications within the City of San Marcos. TxWRAP identifies FIS areas as those where wildfire fuels and associated potential dangerous fire behavior exist, based on a weighted average of 4 percentile weather categories.

Figure SM.7, Fire Intensity Scale (FIS) and Reported Wildfire Ignitions, City of San Marcos



(Texas A&M Forest Service, 2016)

Wildfires: Previous Occurrences

Table SM.9 shows the reported wildfire ignition within the City of San Marcos, according to TxWRAP and USGS Federal Fire Occurrence data from the years 1980 to 2015.

Table SM.9, Wildfire Ignitions, City of San Marcos

FPA ID	Date	Fire Size (Acres)
SFO-TX0483-72797	1/1/2008	67

Wildfires: Extent and Probability

Table SM.10 lists the Fire Intensity Acreage for the City, according to the Texas A&M Forest Service TxWRAP Community Summary Report. Refer to Chapter 2, the risk assessment portion of the main plan document, for a description of the FIS.

Table SM.10, TxWRAP Fire Intensity Acreage, City of San Marcos

Class	Acres	Percent
Non-Burnable	10,065	49.20%
1 (Very Low)	547	2.70%
1.5	844	4.10%
2 (Low)	216	1.10%
2.5	1,538	7.50%
3 (Moderate)	4,573	22.30%
3.5	525	2.60%
4 (High)	527	2.60%
4.5	1,631	8.00%
5 (Very High)	0	0.00%
Total	20,467	100.00%

Based on 1 reported event in 35 years, the City of San Marcos' future probability of a wildfire event is approximately once every 35 years (on average), with up to a potential fire intensity of 4.5, or "High" classification on the TxWRAP FIS.

Wildfires: Impact

Impact on the community can be measured using TxWRAP housing density levels within the WUI. Areas with a higher housing and population density would be affected to a greater extent than rural areas, especially in areas near burnable fuels. In the event of a wildfire in high density areas of population, residential structures would be damaged or destroyed, critical infrastructure such as water, sewer and electrical services would interrupted and residents would experience injury or loss of life. Table SM.11 lists the population, percent of total population, WUI acreage and percent of WUI acreage for the City of San Marcos, according to the Texas A&M Forest Service TxWRAP Community Summary Report.

Table SM.11, WUI Acreage, City of San Marcos

Housing Density		WUI Population	Percent of WUI Population	WUI Acres	Percent of WUI Acres
	LT 1hs/40ac	30	0.10%	1,620	16.40%
	1hs/40ac to 1hs/20ac	35	0.10%	698	7.10%
	1hs/20ac to 1hs/10ac	84	0.30%	909	9.20%
	1hs/10ac to 1hs/5ac	302	1.00%	984	9.90%
	1hs/5ac to 1hs/2ac	755	2.50%	1,413	14.30%
	1hs/2ac to 3hs/1ac	11,502	38.80%	3,164	32.00%
	GT 3hs/1ac	16,929	57.10%	1,103	11.20%
Total		29,637	100.00%	9,891	100.00%

Wildfires: Vulnerability Summary

Due to the urban nature of San Marcos, community officials are not overly concerned for the WUI within the City Limits, as there are not significant numbers of structures at risk in the areas. There are not currently fire breaks in place, however this could be a potential action for the community to take in the future to lessen risk.

Although there is an ongoing program for picking up brush in the community, there may be a way to market the event in a way so that more citizens are made aware of the effort. This could decrease the amount of vegetative fuel in the community and also serve as an opportunity for an outreach campaign regarding wildfire mitigation.

2.2 Risk Ranking Result

On January 12, 2017, members of the City of San Marcos MPC completed a questionnaire as part of the Hays County Hazard Mitigation Plan Update: Risk Assessment. The questions covered the risk associated with the hazards that affect each community based on the level of concern over each profiled hazard, the hazards' impact on health and safety, as well as impact to property and business continuity. The answers from this questionnaire were combined with public survey results on perception of risk, and the values from both sources were analyzed using the Halff Risk Ranking Tool (details regarding the risk ranking tool are in Chapter 2, the risk assessment portion of the main plan document). The results provided a quantified ranking of risk, with values ranging from 0 to 100. The results for San Marcos are shown below (hazard values shown from highest risk to lowest):

Ranking Order	Hazard	Risk Ranking Value
1	Floods	99.5
2	Drought	94.1
3	Dam/Levee Failure	91.3
4	Severe Winter Storms	72.9
5	Tornadoes	70.9
6	Extreme Heat	70.0
7	Wildfire	51.9
8	Wind Storms	51.0
9	Lightning	50.8
10	Hail Storms	44.7
11	Expansive Soils	43.2
12	Earthquakes	35.9
13	Hurricanes/Tropical Storms	33.8
-	Land Subsidence	Not Profiled

Section 3: Mitigation Strategy

This section examines the community's ability to perform mitigation (a review of existing capabilities is shown in Table SM.12) and identifies specific mitigation actions to address vulnerabilities for each hazard profiled in the Hays County HMP Update. The mitigation strategy is the application of actions into an approach for performing structural and non-structural mitigation efforts within the jurisdiction. Actions are also prioritized and considered for incorporation into other community programs, regulations, projects or plans.

Completed and canceled actions are also included in a separate section for future reference.

3.1 Existing Capabilities

Table SM.12, Existing Capabilities

Capability Name	Capability Type	Ability to Expand/Improve
Mayor	Elected Official	Provides political support for approving and funding mitigation actions. Could attend mitigation information session given by MPC to learn about community risks and mitigation strategy.
Council Members		Supplements political support for implementation of mitigation actions. Could attend mitigation information session given by MPC to learn about community risks and mitigation strategy.
Emergency Management Coordinator	City Staff	Coordinates MPC, implementation of mitigation actions, and monitoring/evaluation/updating HMP. Join other community planning committee, in role as EMC and MPC planner.
Floodplain Administrator (Sr. Engineer)		Ensures enforcement of existing flood damage prevention ordinance, and continued compliance with NFIP requirements. Attend advanced floodplain management training.
Civil Engineer		Provides expertise and guidance for structural mitigation actions. Attend advanced floodplain management training.
Chief Building Official		Collaborates with MPC on ensuring compliance with existing mitigation-related building requirements and consideration of new building practices to increase mitigation. Attend advanced floodplain management training.
Planning and Zoning		Considers HMP-identified risk areas when consulting with community planning stakeholders. Include member of MPC in committee for mitigation consideration.
GIS Coordinator		Can graphically demonstrate changes in development and changes in hazard areas. Track damage data geographically for future risk analysis purposes.
Parks and Recreation Director		Assists in identifying opportunities for integration of mitigation activities into long-term park development plans. Can also assist with coordinating public outreach events.
Police Chief		Assists with flood-related traffic control and evacuation planning. Participate in MPC.
Fire Chief		Assists with wildfire-related mitigation through existing programs and efforts as well as implementation of new measures. Participate in MPC.

***Table SM.12, Existing Capabilities**, (cont.)*

Capability Name	Capability Type	Ability to Expand/Improve
Sales Tax	Funding	Provides potential funding for Hazard Mitigation items
Property Tax		
Franchise Tax		
Permitting and Licensing Fees		
Capital Improvement Plan Funding	Funding	Budget dollars obligated to projects that involve multiple mitigation-related actions.
Chapter 211 of the Local Government Code: Zoning	Authority	State-level code that authorizes the City to regulate zoning.
Chapter 213 of the Local Government Code: Municipal Comprehensive Plans		State-level code that authorizes the City to adopt a comprehensive plan for the long-range development of the City.
Chapter 214 of the Local Government Code		State-level code that authorizes the City to have regulatory authority as it relates to building code (such as structural integrity and plumbing).
General Ordinances Chapter 39- Flood Damage Prevention- methods for reducing flood losses	Regulation	Power to regulate over development in the floodplain. (Municode, 2017) Adopt higher standards in order to qualify for increased Community Rating System rating.
General Ordinances Chapter 86/Article 8- Drainage Utility Fee		Authorizes charging fees that can be utilized for mitigation activities. (Municode, 2017)
Land Development Code Chapter 4- Zoning Regulations		Provides authority over zoning activities, enhance if used with risk assessment information to discourage development in high hazard areas. (Municode, 2017)
Land Development Code Chapter 7- Public Facilities Standards		Ability to increase standards to ensure resiliency of public facilities through mitigation practices. (Municode, 2017)
Land Development Code Chapter 3- Comprehensive Planning		Allows for the community to plan for the future and control growth and development of the community within the vision of the planners. (Municode, 2017).
Land Development Code Chapter 1- Development Procedures		Control over the way land is developed within the City. (Municode, 2017) Enhance through safe growth practices.
Land Development Code Chapter 5- Environmental Regulations		Oversight on the standards that are withheld to protect natural resources. (Municode, 2017) Enhance to protect riverine areas.
General Ordinances Chapter 26- Civil Emergencies		Sets standards for the roles, responsibilities and authority granted to the City during emergencies, to include ordering evacuations and communicating disaster messaging. (Municode, 2017). Enhance natural hazard data.
General Ordinances Chapter 14- Buildings and Building Regulations		Regulation of building standards for construction. (Municode, 2017) Adopt higher standards for mitigation.
General Ordinances Chapter 38- Fire Prevention and Protection		Allows community to disallow dangerous activities and encourage/require fire prevention practices. (Municode, 2017)

3.2 National Flood Insurance Program Participation

The City of San Marcos participates in the National Flood Insurance Program. The community administers their own program and their floodplain administrator is a Senior Engineer. The community has adopted higher standards in their Flood Damage Prevention Ordinance and participates in the Community Rating System. The City will continue to explore options for higher standards and increasing their rating within CRS. The community has 780 NFIP policies in force, as of January 31, 2017, which provides $167,307,000 total insurance coverage in force.

3.3 Mitigation Goals

The plan-level Mitigation Goals can be found in Chapter 3: The Mitigation Strategy portion of the Hays County Hazard Mitigation Plan. These apply to each community and were mutually decided upon as the guiding goals for the development of actions in each planning area.

3.4 Mitigation Actions

***E= Actions reducing risk to existing buildings and infrastructure**
***F= Actions reducing risk to new development and redevelopment**

Number/Title	Hazard	Item Description	Implementation Agency
1 Promote Flood Insurance in the Community (previously action 1 in 2011 plan, modified)	Floods	Placing National Flood Insurance Program information brochures in City Hall.	City of San Marcos Emergency Management, Floodplain Administration

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
Existing staff/ in-kind services, free brochures from FEMA	1 month	In progress	N/A

Cost and Benefit Considerations
The cost and labor required to promote the NFIP is negligible. The benefit is difficult to estimate.

Number/Title	Hazard	Item Description	Implementation Agency
2 Acquisition or Elevation of Repetitive Loss Properties (previously action 3 in 2011 plan, modified)	Floods	As of 09/2016, San Marcos has 110 RL properties that need mitigation to reduce the over $9.1 million in payments that have been made.	City of San Marcos City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
The estimated acquisition cost is $100,000 per structure ($11 million total for 110 structures). The estimated cost to elevate a residential structure a total of 3 feet in a shallow flooding area is $30,000 per structure ($3.3 million total for 110 structures). Funding Sources: FEMA, TDEM, TWDB, GLO, Hays County	48 months	Delayed	E

Cost and Benefit Considerations
Cost effectiveness for these acquisitions or elevations are determined on a per structure or project basis.

Number/Title	Hazard	Item Description	Implementation Agency
3 Increase of Warning Signs and Barricades at Low Water Crossings (previously action 2 in 2011 plan, modified)	Floods	Increase number of barricades for low water crossings, as Phase 2 of the Action Item that was previously completed.	City of San Marcos City Council

Cost Estimate/Funding	Schedule	Status as of 2017	*Risk Focus:
$20,000 - Funding for cost share: in-kind services	18 months	Ongoing	N/A

Cost and Benefit Considerations
This item would only take the amount of time/labor required to amend an ordinance within the City. The benefit would be for substantially improved or new development.

Number/Title	Hazard	Item Description	Implementation Agency
4 Attend Advanced Local Floodplain Management Courses (previously action 6 in 2011 plan, modified)	Floods	Send certified member of staff to advanced courses.	City of San Marcos Floodplain Management

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Existing staff, cost of accommodations for FEMA training off-site	6 months	Delayed	E/F

Cost and Benefit Considerations
If attending the course at the Emergency Management Institute, the cost of the course would be very low, and only include a minimal meal ticket purchase. The benefit of an informed floodplain administrator would help both new and existing residents through guidance on how to mitigate flood damages to development.

Number/Title	Hazard	Item Description	Implementation Agency
5 Improve Flood Warning Systems (previously action 5 in 2011 plan)	Floods	Enhancing stream flow gage network by increasing number of gages throughout community by at least six.	City of San Marcos Emergency Management

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
$120,000- Funding for cost share: in-kind services	Phased over 60 months	Not started	N/A

Cost and Benefit Considerations
This action promotes public safety services through enhancing the communities existing method of detecting flooding.

Number/Title	Hazard	Item Description	Implementation Agency
6 Storm Ready Designation from National Weather Service (previously action 11 in 2011 plan)	Severe Winter Weather, Lightning, Hailstorm, Windstorm, Tornadoes, Floods, Hurricanes/ Tropical Storms	Application for designation that classifies community's level of preparedness for severe weather and storms.	City of San Marcos Emergency Management

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Existing staff/ in-kind services	6 months	Not Started	N/A

Cost and Benefit Considerations
There is a high level of effort to complete the application, however no other cost applies. The level of increased preparedness would benefit the entire population.

Number/Title	Hazard	Item Description	Implementation Agency
7 Increase Public Awareness of Hazard Mitigation (previously action 19 in 2011 plan, modified)	Drought, Extreme Heat, Severe Winter Storms, Lightning, Hailstorms, Windstorms, Tornadoes, Expansive Soils, Floods, Hurricanes/Tropical Storms, Earthquakes, Dam/Levee Failure, Wildfires	Public awareness campaign of providing natural hazard mitigation information and guidance for citizens on the City website, with links to HaysInformed.com also being included.	City of San Marcos Emergency Management

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Existing staff/ in-kind services	1 month	Not started	N/A

Cost and Benefit Considerations

There is minimal cost and labor required to make this enhancement to the existing San Marcos City website.

Number/Title	Hazard	Item Description	Implementation Agency
8 Adopt Wildfire Maps from Hays County Firewise project (previously action 20 in 2011 plan, modified)	Wildfires	Formally adopt the maps created through the Hays County application for Firewise designation in order to begin to control development in accordance with the avoidance of hazard areas, or development with consideration of proper mitigation.	City of San Marcos Fire Marshal's Office, in coordination with Hays County Fire Marshal's office

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Existing staff/ in-kind services	6 months	Not started	E/F

Cost and Benefit Considerations

The benefit of mitigating against wildfire for future development as well as for instituting fire mitigation in existing areas of development greatly saves the community from the costs of potential damages.

Number/Title	Hazard	Item Description	Implementation Agency
9 Coordination of marketing Large Item Pick-up day for Wildfire Mitigation (previously action 33 in 2011 plan, modified)	Wildfire, Lightning, Windstorms, Tornadoes	Enhancement of existing large item pick-up to emphasize the wildfire mitigation benefits of cleaning brush and overgrown lots.	City of San Marcos Public Works

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Existing staff/ in-kind services	2 months	Ongoing	N/A

Cost and Benefit Considerations

This slight change to marketing an existing event would likely lessen the risk for wildland fire for residents located within the Wildland Urban Interface.

Number/Title	Hazard	Item Description	Implementation Agency
10 Drought Monitoring Program	Drought	Provide widget on City homepage that provides the latest US Drought Monitor conditions for the day.	City of San Marcos Emergency Management Coordinator

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Existing staff/ in-kind services	6 months	Not started	N/A

Cost and Benefit Considerations

This low cost monitoring and inclusion of drought water conservation measures will take more time than money to institute and could save the community from a water shortage. All residents that use the water source would benefit.

Number/Title	Hazard	Item Description	Implementation Agency
11 Evacuation Plans/ Alternate road consideration (previously item 27 in 2011 plan)	Hurricanes/ Tropical Storms, Floods, Dam/ Levee Failure, Wildfire	Documentation of an evacuation plan that includes multiple exits for leaving the community.	City of San Marcos Emergency Management

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Existing staff/ in-kind services	18 months	In progress	F

Cost and Benefit Considerations

It is more cost effective to establish additional evacuation routes than other mitigation alternatives.

Number/Title	Hazard	Item Description	Implementation Agency
12 Soil Compaction Recommendation/ Road construction using techniques to Mitigate Expansive Soils	Expansive Soils	Adoption of road techniques that require a higher level of soil compaction to mitigate expansive soils. Recommendation documents for soil compaction to lessen the possible effects of expansive soils for residential foundations.	City of San Marcos City Hall

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Existing staff/ in-kind services, cost of engineer support	6 months	Not Started	F

Cost and Benefit Considerations

This recommendation would add a level of protection to future development of foundations so that they mitigate against expansive soil damage.

Number/Title	Hazard	Item Description	Implementation Agency
13 Sanding Capability Enhancements (previously action 22 in 2011 plan)	Severe Winter Weather	Research of methods and equipment that could be a benefit cost efficient method to increase sanding capability.	City of San Marcos Public Works

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Existing staff/ in-kind services	12 months	Not Started	N/A

Cost and Benefit Considerations

The community already has resources for spreading sand but recognizes that the extent of sanding is limited by the current equipment. The cost alternatives would have to be weighed against the recent years' events and the number of ice days that were experienced during which City roads were impassable.

Number/Title	Hazard	Item Description	Implementation Agency
14 Adoption of Ordinance for Public Land Use Risk Assessment Reviews (previously action 24 in 2011 plan, modified)	Floods, Earthquakes, Wildfires, Expansive Soils, Dam/ Levee Failure	Ordinance update to require any public facility location be reviewed against hazard area layers in order to require location selections consider the safest possible locations, with applicable mitigation standards required during development permitting for increased resilience against relevant hazards.	City of San Marcos Planning in coordination with Emergency Management Coordinator

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Existing staff/ in-kind services	6 months	Not started	F

Cost and Benefit Considerations

This enhancement to existing permitting and review processes is an action that would save the community from potential losses related to hazards that affect critical facilities and infrastructure that all citizens depend upon for services.

Number/Title	Hazard	Item Description	Implementation Agency
15 Adoption of Ordinance for Public Building Structural Engineering Reviews	Tornadoes, Windstorms, Floods, Hurricanes/ Tropical Storms, Wildfires, Earthquakes, Hailstorms, Severe Winter Storms, and Lightning	Ordinance update to require any public facility building plan be structurally reviewed and enforce highest possible building code levels that increase resiliency against natural hazards.	City of San Marcos Planning

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Existing staff/ in-kind services	6 months	Not started	F

This enhancement to existing permitting and review processes is an action that would save the community from potential losses related to hazards that affect critical facilities and infrastructure that all citizens depend upon for services.

Number/Title	Hazard	Item Description	Implementation Agency
16 Dam Safety Tabletop Exercises Program (previously action 26 in 2011 plan, modified)	Dam/Levee Failure	Coordination with dam custodians in order to exercise evacuation and emergency procedures/ Make inundation maps public.	City of San Marcos Emergency Management

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Staff resources/ in-kind services, San Marcos and USACE	12 months	Not started	N/A

Cost and Benefit Considerations

The majority of the labor and cost for this effort would be covered by the owner of the dam. The benefit would be an increased familiarity with the evacuation procedures and expectations that will result in safer conditions for citizens and visitors.

Number/Title	Hazard	Item Description	Implementation Agency
17 Sessom Creek Improvements	Floods	Existing CIP project that would improve drainage off Sessom Creek.	City of San Marcos Engineering

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
$300,000 CIP Budget	18 months	Not started	E

Cost and Benefit Considerations

This project potentially already has funding due to its presence in the Capital Improvements Plan.

Number/Title	Hazard	Item Description	Implementation Agency
18 Adoption of homelessness study results as part of vulnerable population consideration activities in City for future Hazard Mitigation Plan action creation.	Drought, Extreme Heat, Severe Winter Storms, Lightning, Hailstorms, Windstorms, Tornadoes, Floods, Hurricanes/Tropical Storms, Earthquakes, Dam/Levee Failure, Wildfires	Adoption of homelessness study proposed in San Marcos Comprehensive Plan, in order to plan for mitigation measures that serve this vulnerable population.	City of San Marcos Mitigation Planning Committee

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Existing staff/ in-kind services	6 months	Not started	N/A

Cost and Benefit Considerations

This existing effort is planned for and adopted as an action for the community. The adoption of the resulting report will not cost any funds. The benefits will be serving the vulnerable homeless population.

Number/Title	Hazard	Item Description	Implementation Agency
19 Extension of River Ridge Parkway West	Floods	Action R11 of the San Marcos Transportation Plan, this action will increase the ability to divert traffic during flooding events.	City of San Marcos Engineering

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
$2,743,000 Transportation Budget	18 months	Not started	E

Cost and Benefit Considerations
This is a project from an existing community plan that likely already has dedicated funding for completion.

Number/Title	Hazard	Item Description	Implementation Agency
20 Land Conservation for Aquifer Recharge	Drought, Flooding	The preservation of land in flood-prone areas and in the 1% floodplain will help mitigate flooding by reducing the amount of impervious surfaces and allowing more recharge and infiltration of water during rain events.	City of San Marcos Engineering, Floodplain Administrator and Parks Department

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Dependent upon costs per acre as land is acquired Funding sources: Local, State, Federal, Non-government and other sources	18 months	Ongoing	F

Cost and Benefit Considerations
This effort would integrate benefits to not only San Marcos, but to other parts of the County and areas that are served by the aquifer. The benefits would be significant and the natural conservation effort would receive consideration during benefit cost analysis.

Number/Title	Hazard	Item Description	Implementation Agency
21 Regional Detention/ Water Quality Strategy	Floods, Drought	Strategy design to mitigate drought and flooding by use of regional detention.	City of San Marcos Engineering

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
$200,000 Stormwater budget	18 months	Not started	F

Cost and Benefit Considerations
Existing plan item for comprehensive plan, this project is likely to receive City funding.

Number/Title	Hazard	Item Description	Implementation Agency
23 Cooling Plan Development and Implementation	Extreme Heat	Evaluate the risks presented by excessive heat and humidity, especially in terms of high-risk populations such as the elderly or low income. Pursue possibility of local churches serving as cooling stations during extreme heat events.	City of San Marcos Emergency Management

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
No additional cost – uses existing staff resources / In-kind Services	12 months	Not started	N/A

Cost and Benefit Considerations
Cost-effective and beneficial in minimizing injuries during extreme heat events.

Number/Title	Hazard	Item Description	Implementation Agency
24 Purchase and Installation of Generators for Temporary Sheltering Efforts	Extreme Heat, Severe Winter Storms, Lightning, Hailstorms, Windstorms, Tornadoes, Floods, Hurricanes/ Tropical Storms, Earthquakes, Dam/Levee Failure, Wildfires	Purchase and installation of generators for temporary sheltering efforts in all public facilities capable of housing citizens.	City of San Marcos Emergency Management

Cost Estimate/Funding	Schedule	Status as of 2017	Risk Focus:
Existing staff/ in-kind services, grant writing assistance, Hazard Mitigation Grant program funding, if applicable and eligible	18 months	Not started	N/A

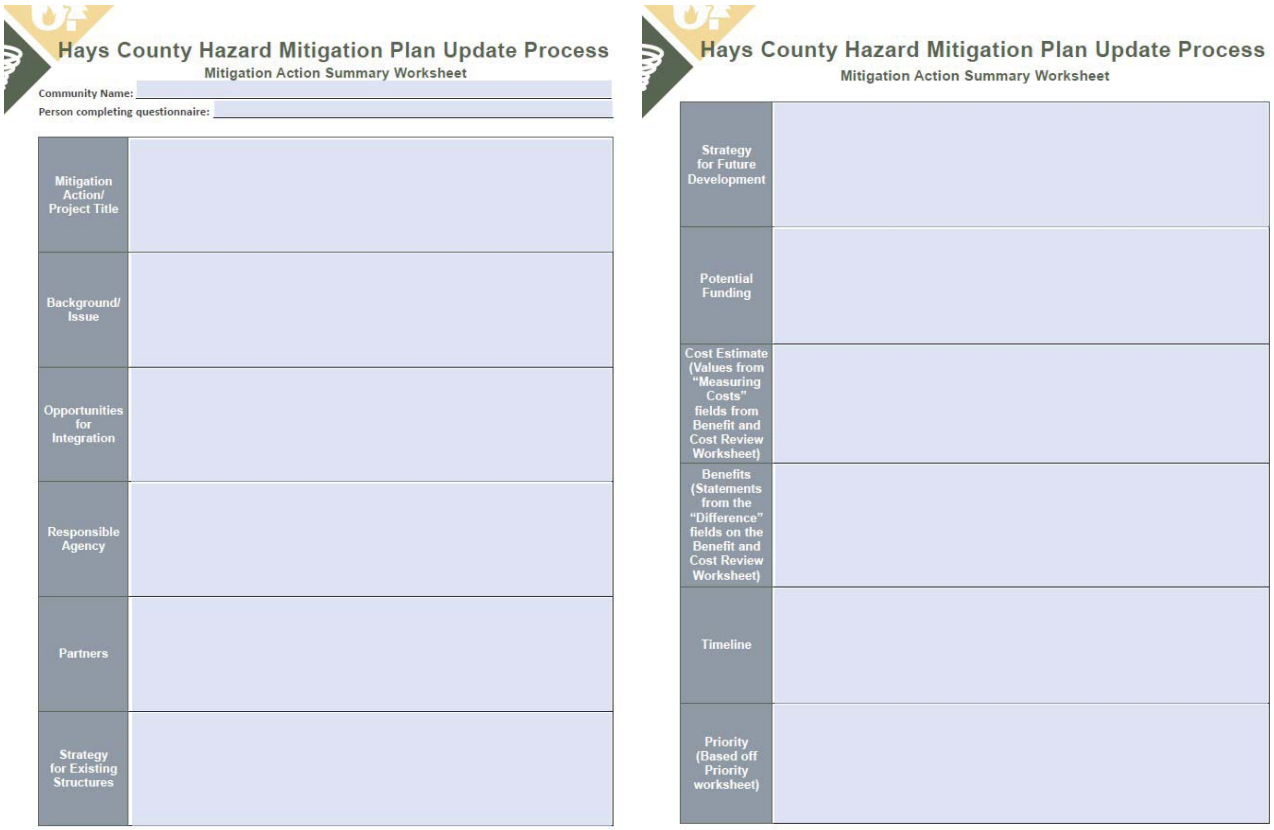
Cost and Benefit Considerations
If grant funding is eligible, the cost/benefit of this project would have to be positive.

3.5 Capabilities Assessment

Evaluation/Prioritization of Actions

Each action added to the plan was developed using the Mitigation Action Summary Worksheet shown in Figure SM.8.

Figure SM.8, Mitigation Action Summary Worksheet



Hays County Hazard Mitigation Plan Update Process

Mitigation Action Summary Worksheet

Community Name: _____

Person completing questionnaire: _____

Mitigation Action/ Project Title	
Background/ Issue	
Opportunities for Integration	
Responsible Agency	
Partners	
Strategy for Existing Structures	

Hays County Hazard Mitigation Plan Update Process

Mitigation Action Summary Worksheet

Strategy for Future Development	
Potential Funding	
Cost Estimate (Values from "Measuring Costs" fields from Benefit and Cost Review Worksheet)	
Benefits (Statements from the "Difference" fields on the Benefit and Cost Review Worksheet)	
Timeline	
Priority (Based off Priority worksheet)	

Table SM.13, Mitigation Action Prioritization (highest hazard priority to lowest)

Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community	Risk Ranking Score	Total Score
28. Evacuation Plans/Alternate road consideration	1	1	1	1	1	1	1	1	1	1	100	110
20. Land Conservation for Mitigation Recharge	1	1	1	1	1	1	1	1	1	1	100	110
7. Increase Public Awareness of Hazard Mitigation	1	1	1	1	0	1	1	1	0	1	100	108
2. Acquisition or elevation of Repetitive Loss Properties	1	1	1	0	1	1	0	1	1	0	100	107
20. Attend Advanced Local Floodplain Management Courses	1	1	1	1	1	1	0	1	0	0	100	107
5. Improve flood warning systems	1	0	1	1	1	0	1	1	0	1	100	107
3. Increase of Warning Signs and Barricades at Low Water Crossings	1	0	1	1	0	0	1	1	1	1	100	107
16. Dam Safety Tabletop Exercises Program	1	1	1	0	1	0	1	1	0	1	100	107
21. Regional Detention/Water Quality Strategy	0	1	1	1	0	1	1	1	0	1	100	107
3. StormReady Designation for San Marcos	1	0	1	1	0	0	1	1	0	1	100	106
15. Adoption of Ordinance for Public Building Structural Engineering Reviews	1	1	1	-1	0	1	1	1	0	1	100	106
19. Extension of River Ridge Parkway West	1	0	1	1	0	0	1	1	0	1	100	106
24. Purchase and Installation of Generators for Temporary Sheltering Efforts	1	0	1	1	0	-1	1	1	0	1	100	105
17. Sessom Creek Improvements	0	0	1	1	0	0	1	1	0	1	100	105
1. Promote Flood Insurance in the community	0	0	1	1	0	0	1	1	0	0	100	104
18. Vulnerability Study Adoption for Mitigation	1	0	1	-1	0	0	1	1	0	1	100	104
14. Adoption of Ordinance for Public Land Use Risk Assessment Reviews	1	1	1	-1	0	0	0	1	0	0	100	103
10. Drought Monitoring Program	1	0	1	1	0	1	1	1	0	1	94	101

Table SM.13, Mitigation Action Prioritization (highest hazard priority to lowest) , (cont.)

Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community	Risk Ranking Score	Total Score
9. Coordination of marketing Large Item Pick-up day for Wildfire Mitigation	1	1	1	1	1	1	1	1	1	0	73	82
30. De-icing Capability Enhancements	1	0	1	1	1	1	1	1	0	0	73	80
23. Cooling Plan Development	1	0	1	1	0	0	1	1	0	1	70	76
8. Adopt wildfire maps from Hays County Firewise project	1	1	1	1	0	1	1	1	1	1	52	61
12. Soil Recommendation	0	1	1	-1	0	0	1	-1	0	0	43	44

Mitigation Actions by Hazard

The mitigation actions are shown with corresponding hazards in Table SM.14 below.

Table SM.14, Mitigation Action Impact, San Marcos

Action Number	Drought	Extreme Heat	Severe Winter Storms	Lightning	Hailstorms	Windstorms	Tornadoes	Expansive Soils	Floods	Land Subsidence	Hurricanes/ Tropical Storms	Earthquakes	Dam/ Levee Failure	Wildfire
1									X					
2									X					
3									X					
4									X					
5									X					
6			X	X	X	X	X		X		X			
7	X	X	X	X	X	X	X	X	X		X	X	X	X
8														X
9				X		X	X							X
10	X													
11									X		X		X	X
12								X						
13			X											
14								X	X			X	X	X
15						X	X		X		X	X		X
16													X	
17									X					
18	X	X	X	X	X	X	X		X		X	X	X	X
19									X					
20	X								X					
21	X								X					
23		X												
24		X	X	X	X	X	X		X		X	X	X	X

3.6 Integration Efforts

Table SM.15 captures ways that the HMP risk assessment, mitigation goals and actions can be integrated into other City of San Marcos documents, programs and regulations.

Table SM.15, Plan Integration Efforts, San Marcos

Name of Document	Type	Item Type	Process for Integration
Haysinformed.com	Program	Action	Link to existing Hays County HaysInformed.com emergency preparedness/awareness page when creating Public Awareness Page for hazards on San Marcos website (Action 6)
City of San Marcos Budget	Document		Seek obligation of funding for floodplain administrator training through available training line item
San Marcos Flood Protection Plan 2007	Plan		Seek participation of Mitigation Planning Committee member for updates of Flood Protection plan in order to ensure that existing flood projects continue on into the next plan if they are not completed by the time the next update period is conducted.
San Marcos Water Master Plan Update 2016	Plan	Goals	Participate in the plan update for the plan and seek more solutions that meet both water quality and conservation goals but also those of flood control.
San Marcos Transportation Master Plan		Actions	Participate in Transportation Master Plan Update and seek further explanation on which projects benefit the floodplain so that those can be added to the Hazard Mitigation Plan.
Vision San Marcos: A River Runs Through Us-Comprehensive Plan		Risk Assessment	Participate in the Comprehensive Plan Update in order to present hazard data for consideration when zoning and future development is considered within the City.
Hazard Mitigation Grant Program (HMGP)	Funding	Action	Identify actions that can be funded through new and existing grant awards. Review existing mitigation actions for eligibility for the grant program, to include Benefit Cost consideration. Prepare grant application documents in advance to prepare for future grant periods. Process involves identification of actions from Plan; obtaining Council approval to apply; notification of interest in grant to the public; completion of application for funding; if awarded, obtaining Council approval to accept; if accepted, administration of funds and implementation of project.
Pre-Disaster Mitigation (PDM)			
Flood Mitigation Assistance (FMA)			
TWDB Flood Protection Planning (FPP) Grant			

Table SM.15, Plan Integration Efforts, San Marcos

Name of Document	Type	Item Type	Process for Integration
TWDB Clean Water State Revolving Fund (CWSRF)	Funding	Action	Identify actions that can be funded through new and existing loan programs. Review existing mitigation actions for eligibility for the loan program, to include Benefit Cost consideration. Prepare loan application documents in advance to prepare for future loan periods. Process involves obtaining Council approval to apply; notification of interest in loan to the public; completion of application for loan; if awarded, obtaining Council approval to accept; if accepted, administration of funds and implementation of project.
Texas Water Development Fund (DFund)			

Incorporation Achievements Since Previous Plan Update

The City of San Marcos incorporated the HMP into other planning mechanisms as a demonstration of progress in local hazard mitigation efforts. This was achieved by identifying MPC planners and or stakeholders to participate in the following local planning efforts:

- San Marcos Water Master Plan Update 2016
- Vision San Marcos: A River Runs Through Us- Comprehensive Plan

Section 4: Finalize Plan Update (Review, Evaluation, and Implementation)

4.1 Changes in Development

The City of San Marcos has been named one of the fastest growing populations in America for 3 years within the past 5 years by Time Magazine (Time, 2015). The booming growth in this college town is not only seen in residents but also in industry. Recently, Amazon built a distribution center in the community, bringing in 3,000 employees. With higher numbers of students and employees on the road into and around San Marcos, the community has had to take measures to expand and improve roads as well. These changes could result in increased vulnerability to natural hazards due to the concentration of a transient workforce within the area.

4.2 Progress in Mitigation Efforts

Past Mitigation Action Progress Reports Summary - Completed and Canceled

2011 Action Number	Hazard	Item Description	Lead Department
4	Flood	Adopt "Higher Standard" Flood Damage Prevention Ordinance	City of San Marcos
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
Cost and Funding: Existing staff resources, no cost		Completed	Completed in 2010.
Cost Effectiveness			
Not independently cost-effective			

2011 Action Number	Hazard	Item Description	Lead Department
7	Flood	Increase Participation in the Community Rating System (CRS) Program	City of San Marcos
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
Cost and Funding: Existing staff resources		2010	Delayed. Not priority during present planning period. The community already participates in CRS.
Cost Effectiveness			
Not independently cost-effective			

2011 Action Number	Hazard	Item Description	Lead Department
9	All Hazards	Improve Emergency Communication Capabilities	City of San Marcos
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
$620,000 Funding: Capital Area Planning Council of Governments (CAPCOG)		Completed	Completed.
Cost Effectiveness			
Not independently cost-effective			

2011 Action Number	Hazard	Item Description	Lead Department
10	All hazards	Development of and maintenance of County-wide and individual community HAZMAP Plans	City of San Marcos
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
Existing staff resources		Completed	Completed.
Cost Effectiveness			
Not independently cost-effective			

2011 Action Number	Hazard	Item Description	Lead Department
12	Extreme Heat	Reduce Impacts of Extreme Heat on Elderly, Disabled, Low-Income and Infants (Fan Distribution Program)	City of San Marcos
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
$2,000 to purchase and distribute 100 box fans and $3,000 estimated cost for a/c repairs; Funding Sources: United Way, Rotary Clubs, Lion Clubs, Red Cross, Churches and charitable organizations, power companies		Completed	Completed.
Cost Effectiveness			
Not independently cost-effective			

2011 Action Number	Hazard	Item Description	Lead Department
14	Tornadoes	Encourage Construction of Tornado “Safe Rooms”	City of San Marcos- Building
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
Funding: Texas DEM, CAPCOG		Completed	Completed.
Cost Effectiveness			
Not independently cost-effective			

2011 Action Number	Hazard	Item Description	Lead Department
15	Tornadoes, thunderstorms and high winds	Building Code Improvements	City of San Marcos- Building
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
Funding: Texas DEM, CAPCOG		Completed	Completed.
Cost Effectiveness			
Not independently cost-effective			

2011 Action Number	Hazard	Item Description	Lead Department
16	Drought	Make San Marcos Drought Resistant	City of San Marcos Water Dept.
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
$20,000 Study Cost; Funding: Texas Water Development Board		Completed	Completed.
Cost Effectiveness			
Not independently cost-effective			

2011 Action Number	Hazard	Item Description	Lead Department
17	Drought	Construct Needed Water System Improvements in Lower Colorado Region K and South Central Texas Region L	City of San Marcos Engineering
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
$472 million (South Central Texas Region- 21 counties) $256 million (14 Lower Colorado Region); Funding sources: TWDB, GBRA, LCRA		Completed	Completed. Converted water supply to San Marcos to 80% surface water and 20% aquifer
Cost Effectiveness			
Not independently cost-effective			

2011 Action Number	Hazard	Item Description	Lead Department
18	Flood	Promote Flood Insurance	City of San Marcos
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
$2,000		Ongoing	Removed. Repeated in Action 1.
Cost Effectiveness			
Not independently cost-effective, but the initial step in identifying appropriate mitigation actions			

2011 Action Number	Hazard	Item Description	Lead Department
21	Extreme Heat	Evaluate Excess Heat Risks Study	City of San Marcos
Cost Estimate/Funding		**Schedule**	**Status as of 2017**
No additional cost-uses existing staff resources		TBD: Probably initiated in 2011	Canceled. Replaced with other extreme heat actions.
Cost Effectiveness			
Not independently cost-effective, but needed to develop adequate risk reduction efforts			

4.3 Changes in Priorities

Plan-level priority changes are reflected in the changes to the plan-level goals shown in Chapter 3: Mitigation Strategy within the Main Plan document. As with many of the communities in Hays County, San Marcos' priorities revolve around water, the abundance and the scarcity, through flooding and drought hazards. As floods destroy structures and endanger lives, droughts threaten the availability of the necessary resources. In an effort to ensure that the supply of water is secure for their citizens, San Marcos has adopted many conservation approaches and actions. Considering and prioritizing land conservation and aquifer focused efforts, the community is making many efforts to mitigate the dangers of both hazards.

Section 5: Approval and Adoption

5.1 Approval and Adoption Procedure

The procedures for approval and adoption are described in Chapter 4.1 of the main plan document.

Table SM.16, Municipal Jurisdiction Adoption Date

Municipality	APA Date	Adoption Date
San Marcos		

Jurisdiction Adoption Documentation Placeholder

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